White paper

E-mobility ID-codes

The purpose of IDs, ID usage and ID format

Project Acronym	IDACS
Project Full Name	ID and Data Collection for Sustainable Fuels in Europe
Grant Agreement number	MOVE/B4/SUB/2018-498/CEF/PSA/SI2.792684
Activity	1 Coordination of ID registration of e-mobility actors
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1. The purpose and usage of e-mobility IDs

E-mobility ID codes are IDs with a national country code for Mobility Service Providers (MSP) and Charge Station Owners (CSO) or Charge Point Operators (CPO). These unique IDs for organizations that manage charge stations or offer charge services to EV drivers are needed to identify these organizations for international billing and data exchange. Issuing and managing codes for EV driver contracts and charging stations ensures that charging stations can be found throughout Europe and that transactions for access and payment are reliable.

The code consist of two parts: the first part to identify the CSO/CPO and MSP and the second part to identify the individual recharging point and contract within these organizations.
The IDRO issues only the first 5 digits of - IDs for CSO/CPOs and MSPs, and the CSO/CPO and MSP issue the second part to identify respectively the specific charge point (EVSE) or contract (EMA). For the CSO/CPO this total ID of part one and two is called EVSE-ID (Electric Vehicle Supply Equipment) and for the MSP this is called the EMA-ID (Electric Mobility Account).They are conceived by CSO/CPOs and MSPs purely as identifiers. Consequently, they are not meant to contain other information and should not be considered as marketing tools.

2. ID format part 1 (first 5 characters) and 2 (remaining characters)

The IDACS Consortium agreed to use the current format for part one and two as this is adequate for European e-mobility ID issuing and usable for the market. This format was initially published by ISO as part of ISO 15118 and eMI3. eMI3 specified and clarified some characters of the ISO 15118-2:2014 code.

For the use of the ID-format, the IDACS Consortium:

- strongly advises companies NOT to use the optional separators between IT systems. They are meant for visibility only, not for IT communication. It is up to individual companies how to display the IDs and where which separators are put.
- leaves it up to Mobility Service Provider (MSP) to use or not use the ‘Check digit’, as it is mainly for their own benefits and usage and it has no impact on connected organisations, like CPOs.
- requires the ‘Type character’ to be used in all new situations for Contracts with “C” as ‘type character’, and at least an EVSE ID is needed for all charge points with “E” as ‘type character’. If the CPO or CSO is also using the IDs for Pools or Stations is up to the CSO/CPO. If used that way a “P” or “S” must be used. It is meant for use cases addressing POI on maps, such as request for reservation of an EVSE.

The IDACS Consortium acknowledges that possible changes on the format in the future can be processed based on consensus.

Issued by:	ID Registation Organisations (IDRO)				Emobility Provider			
Description	**Country**	**Separator**	**EMP**	**Separator**	**Type**	**Contract ID instance**	**Separator**	**Check digit**
Example	AT	"-"	EVB	"-"	C	12A23GHI	"-"	3
Explanation	2 characters (alphanumeric) [ISO 3166-1 alpha-2]{2}	**optional** [-]{1}	3 characters (alphanumeric) [A-Z;0-9]{3}	**optional** [-]{1}	1 character type identifier (alphanumeric) [A-Z]{1}	8 characters (alphanumeric) [A-Z;a-z;0-9]{8}	**optional** [-]{1}	**optional** calculated check digit [0-9]{1}
	part one				part two			

Issued by:	ID Registation Organisations (IDRO)				Charge point operator / unit	
Description	**Country**	**Separator**	**CPO or LOC**	**Separator**	**Type**	**Charge point ID**
Example	FR	"*"	EDF	"*"	E	2542AX8769
Explanation	2 characters (alphanumeric) [ISO 3166-1 alpha-] {2}	**optional** [*]{1}	3 characters (alphanumeric) [A-Z;0-9]{3}	**optional** [*]{1}	1 character type identifier E for EVSE or P for Pool or S for Station (alphanumeric) [A-Z]{1}	Up to 30 characters (alphanumeric) [A-Z;a-z;0-9]{max 30}
	part one				part two	

= optional, but strong advice not to use it between IT systems but only for visibility
= optional, and used for helpdesk or internal MSP checks. Usage up to MSP
= obliged to use (non optional) at least at EVSE level and Contract level
= obliged to use

Figure 1: Updated agreed ID formats

Annex 1 presents an overview of the syntax of the IDs for MSP and their contracts

Annex 2 shows Syntax IDs for CPOs, Location Owners and the charge points or Electric Vehicle Supply Equipment ID (EVSE ID)

Annex 3 illustrates how an EVSE is defined in the charging infrastructure

Annex 1: Syntax IDs for MSP and their contracts

(Also and more extensively explained by eMI3 deliverable: V1.0 Electric Vehicle ICT Interface Specifications: Part 2 Business Objects)

The Electric Mobility Account (eMA) ID MUST match the following structure – this is used for identifying MSPs and their contracts:

(the notation corresponds to the augmented Backus-Naur Form (ABNF) as defined in RFC 5234):

<eMA ID> = <Country Code> <S> <Provider ID> <S> <ID Type> <Contract ID-Instance> <S> <Check Digit>

Explanation:
<Country Code> = 2 ALPHA; two character country code according to ISO-3166-1 (Alpha-2-Code)

<Provider ID> = 3 (ALPHA / DIGIT); three alphanumeric characters, referring to the MSP

<ID Type> = “C”; one character “C” indicating that this ID represents a reference to a “Contract”

<Contract ID Instance> = 8 (ALPHA / DIGIT); eight alphanumeric characters referring to the internal service contract between MSP and its customer

<Check Digit> = *1 (ALPHA / DIGIT); Optional, for own MSP usage to verify valid contract codes

<S> = *1 (“-”); optional separator, but advised not to use it between IT systems and only for visibility purposes

ALPHA = %x41-5A / %x61-7A; according to RFC 5234 (7-Bit ASCII)

DIGIT = %x30-39; according to RFC 5234 (7-Bit ASCII)

An example for a valid eMA ID therefore is “DE8AACA2B3C4D5L” or with dashes “DE-8AA-CA2B3C4D5-L”.

Note: This identifier definition is a more precise interpretation of ISO/ IEC 15118 eMA ID Id in a sense that ISO/IEC 15118 eMA ID is proposing an instance of 9 Alpha/digits.

Alpha characters SHALL be interpreted case insensitively.

Annex 2: Syntax IDs for CPOs, Location Owners and the charge points or Electric Vehicle Supply Equipment ID (EVSE ID)

(Also and more extensively explained by eMI3 deliverable: V1.0 Electric Vehicle ICT Interface Specifications: Part 2 Business Objects)

The EVSE ID MUST match the following structure (the notation corresponds to the augmented Backus-Naur Form (ABNF) as defined in RFC5234):

<EVSE ID> = <Country Code> <S> <CPO or Loc owner ID> <S> <ID Type> <Charge Point ID>

Explanation:
<Country Code> = 2 ALPHA; two character country code according to ISO-3166-1 (Alpha-2-Code)

<CPO or Location Owner ID> = 3 (ALPHA / DIGIT); three alphanumeric characters, referring to the EVSE Operator or Location Owner

<ID Type> = "E" for EVSE (Charge point), "S" for Charge Station, P for Charge Pool; one character indicating that this ID represents an "EVSE", "Station" or "Pool".

<Charge Point ID> = 1-30 (ALPHA / DIGIT); between 1 and 30 sequence of alphanumeric characters, allowing the EVSE Operator (CPO) to identify one specific EVSE. In case of "Station" it refers to identify the station (which can have one or more charge points. In case of "Pool" it refers to a charge pool.

A charge point MUST have an ID, Pools and Stations are up to the owners/operators.

<S> = *1 ("*"); optional separator, but advised not to use it between IT systems and only for visibility purposes

ALPHA = %x41-5A / %x61-7A; according to RFC 5234 (7-Bit ASCII)
DIGIT = %x30-39; according to RFC 5234 (7-Bit ASCII)

An example for, a valid EVSE ID is "FRA23E45B78C" with "FR" indicating France, "A23" representing a particular EVSE Operator, "E" indicating that it is of type "EVSE" and "45B78C" representing the power outlet ID, that is to say one of its EVSEs.

NOTE: In contrast to the eMA ID, no check digit is specified for the EVSE ID.

Alpha characters SHALL be interpreted case insensitively.

Annex 3: Charging Infrastructure Overview

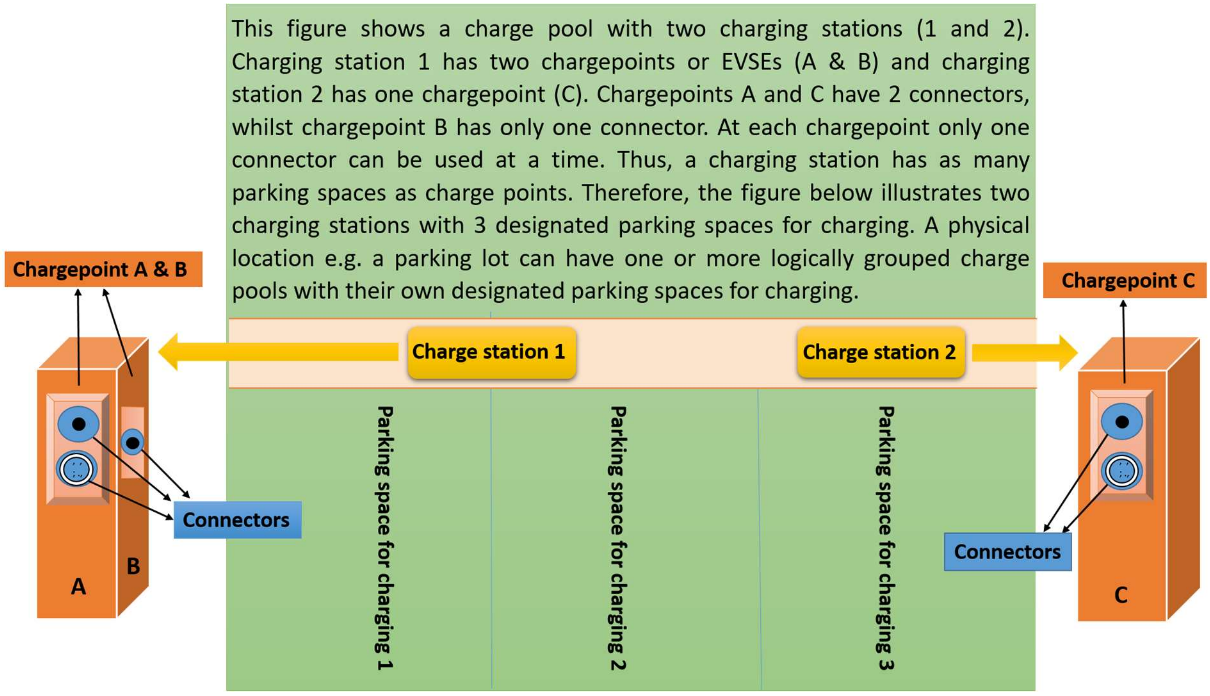

Figure 2 Location, pool, station, point (EVSE), connector

The EVSE-ID could then for example be:

Country code	Operator ID	Type	Charge station	Charge point	EVSE-ID
NL	XYZ	E	CS1	A	NL*XYZ*ECS1*A
NL	XYZ	E	CS1	B	NL*XYZ*ECS1*B
NL	XYZ	E	CS2	C	NL*XYZ*ECS2*C

ID and Data Collection for Sustainable fuels in Europe

Glossary

IDACS Terminology document

Project Acronym	IDACS
Project Full Name	ID and Data Collection for Sustainable Fuels in Europe
Grant Agreement number	MOVE/B4/SUB/2018-498/CEF/PSA/SI2.792684
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Main author	Michel Bayings
Reviewers	Anneke Bosma, Netherlands Enterprise Agency Suzan Reitsma, Netherlands Enterprise Agency Hielke Schurer, Netherlands Enterprise Agency

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1 Introduction

This document describes the different used terminology in the IDACS project for items used for IDs and ID issuing and for National Access Points charge infrastructure. Terms used for Hydrogen and other bio fuels are not part of this document as they use different terms.

1.1 Document setup

The first part of this document the terms are grouped and explained and not just put in alphabetic order, but in logical combinations and where possible with pictures and diagrams for visualization.

The picture below shows the EV Ecosystem, roles and protocols. The important IDACS components are in between the blue block.

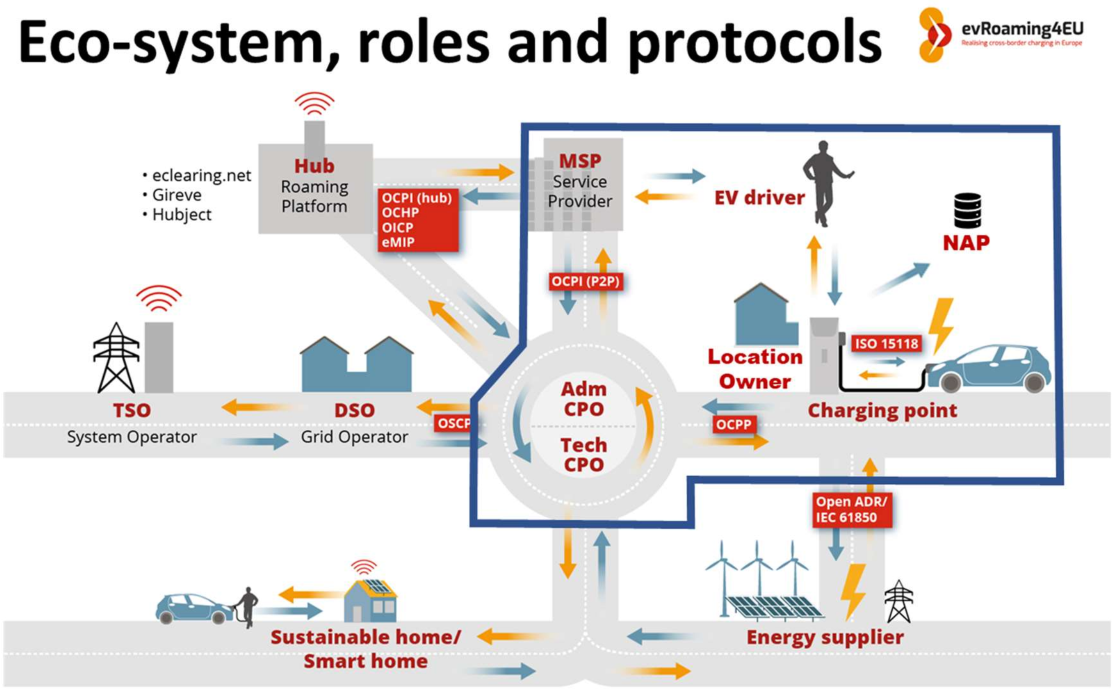
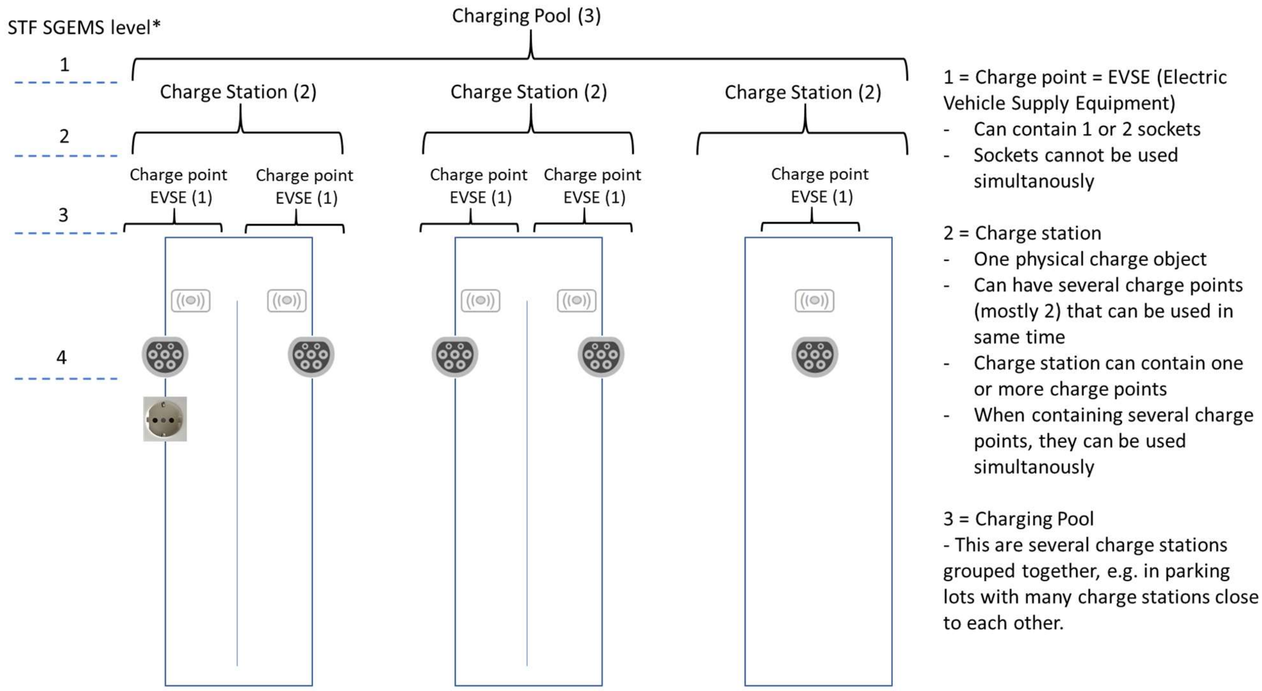


Figure 1: Overview Eco system, roles and protocols

First the main terms for Charging stations/Charging points are explained in chapter 2. Followed in chapter 3 by the terms used for the different roles that are related to charge station networks. The different relevant protocols are described in chapter 4.

2 Charge stations, charge points, etcetera

Enclosed an overview of the most used terms concerning charge stations.



** STF SGEMS level = EU Sub Group Electro Mobility Services, advisory group for EU who defined levels in charge infrastructure overviews*

Figure 2: overview used terms charge stations

The first charge station on the left side contains both 2 **charge points**. The left charge point contains 2 **sockets** (a type 2 socket and Shuko household socket) and the right charge point has 1 socket.

The terms charge point and EVSE are both used but mean the same. **Each charge point should have its own ID**.

In the situation of DC chargers you often see one station which has only one charge point but has two or three sockets: type 2 DC, Chademo and CCS. In that situation only one of them can be used at a time.

Connector
A connector is the physical interface between the charging station and the electric vehicle through which the electric energy is delivered:
- A plug on a cable (one side consists of a 'male' plug and the other side of the 'female version'). The plug of one side of the cable fits into the outlet of the charging point and the plug on the other side of the cable fits into the inlet on the vehicle;
- A plug attached on an inseparable cable of the charging station (common for fast charging stations). This plug fits in the inlet of the vehicle;
- An induction plate (see chapter 7);
- A pantograph (see chapter 7).

Connectors and **Sockets** are used in a mixed way, as for the usage for IDs and NAPs, but also for protocols there is no difference.

A **Charging Pool** also called **Pool** consists of one or multiple charging stations and the accommodating parking lots. The charging pool is operated by one charge point operator (CPO) at one location/address and GPS coordinates. The charging pool is an object relevant for 'cartographic view, guiding tools and all features that represent a charging infrastructure element on a map. A charging pool is defined by: One location/address and GPS coordinates and operated by one charge point operator. Using a charging pool is not a must, you can also group charging stations via other ways.

3 Roles

This chapter is describing the terms/roles in the following part of the IDACS focus area:

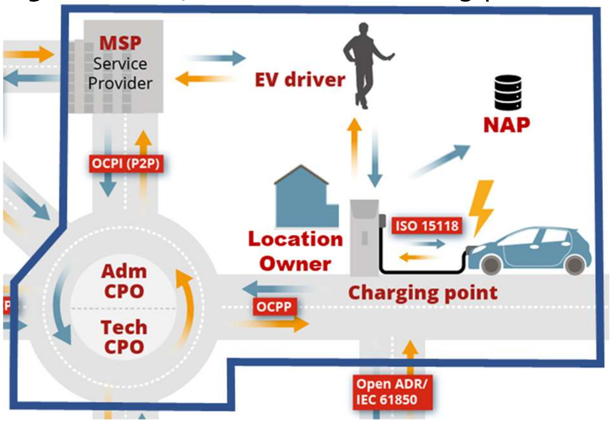


Figure 3:Roles IDACS focus area

The **EV driver** is the person who is taking the energy from the charge station for his/her Electric Vehicle (EV). This person does not need to be the owner of the vehicle. The EV driver can either:

- Have a contract with the Mobility Service Provider (MSP)
  And/or
- Is buying the energy from the charge point directly from the Charge Point Operator, which can be done via the location owner – This is called the Ad Hoc translation where no subscription or registration with any party is needed

The EV driver is charging at a **Charge point or Charge Station**, often these terms are mixed as a charge point can also be directly the charge station (see also chapter 2). These Charge Points have their own full ID also called EVSE ID.

The charge station placed at an area or building that is owned by a **Location owner**. The can be relevant as the location owner can 'outsource' the management of the charge point to a Charge Point Operator. Location owners can have their own ID. E.g. in France cities who own the location have an ID that is used for the EVSE ID, but have the operations outsource to an external Charge Point Operator.

The **Charge Point Operator** (CPO) is managing the charge stations and often seen as one entity or one role. As the technical management of a charge station can be quite complex, the role of CPO can be split in **Technical CPO** (= the manufacturer) and the **Administrative CPO** (the party that is managing the transactions and daily operations). A charge station has only one connection to the operator; because of that the roles are split at the CPO level.
The Administrative CPO need to have an ID and is using them for the Charge Points as EVSE ID.
The CPO must offer Ad Hoc charging services to EV drivers

The **Mobility Service Provider (MSP), also called E-Mobility Provider (EMP) or E-Mobility Service Provider (EMSP) or just Service Provider (SP)** is the organisation who is offering charging services to an EV driver and has a charging contract with that EV driver. Often via subscription, but other ways are also possible.

The MSP must have contracts with CPOs to get access to their charge stations. Also a technical connection is needed. This can be done directly (peer to peer) or via a roaming hub who is managing many connections at the same time.

4 Used protocols

Several protocols are used in the Electric Vehicle value chain. The main ones that could be relevant for IDACS are mentioned and explained in this chapter.

4.1 General protocols

OCPP - Open Charge Point Protocol/ Open Charge Alliance
The Open Charge Point Protocol (OCPP) has been designed and developed to standardize the communications between an EV charge point and a central system, which is used for operating and managing charge points. The communication protocol is open and freely available to ensure the possibility of switching from charging network without necessarily replacing all the charging stations or significant programming, including their interoperability and access for electric grid services. The protocol is intended to exchange information related to transactions and for operating a charge point including maintenance. It can also be used for schedule-based EV charging. For Roaming OCPP provides technical access to the charge point and facilitates forwarding of transactions to the E- mobility Operator/ Mobility Service Provider. More information: www.openchargealliance.org/protocols/ocpp/ocpp-20.

ISO/IEC 15118
This protocol is setup to support plug and charge directly between electric vehicle and charge station, without the need of additional cards/tokens to use. The OEM can act here as MSP and authorisation is done via the car. ISO 15118 also contains strong data security between car and charge station. Current usable version is ISO 15118-2:2014. For the use of this standard, both cars and charge stations need be equipped with specific soft- and hardware. At this moment it is not (yet) used for mass deployment. The standard also defined together with eMI3 the first ID formats, but want now the management of this ID format done by other organisation.
https://www.iso.org/standard/55366.html

Open ADR – Open Automated Demand Response Standard / OpenADR Alliance
The protocol is aimed at automating demand response communication, it supports a system and/or device to change power consumption or production of demand-side resources. This can, for example, be done based on grid needs, either by means of tariff and/ or incentives or emergency signals that are intended to balance demand to sustainable supply. The OpenADR protocol specification profiles A and B are publicly available at no cost from: www.openadr.org.

OSCP - Open Smart Charging Protocol/ Open Charge Alliance
The Open Smart Charging Protocol communicates forecasts of the available capacity of the electricity grid to other systems. The protocol is based on a budgetary system where client systems can indicate their needs to a central system, which guards against overuse of the grid by handing out budgets per cable. If a system requires more it can request more, if it requires less it can hand back part of its budget, to be available for other systems. The OSCP protocol is publicly available at no cost from: www.openchargealliance.org/protocols/oscp/oscp-10.

IEC 61850
The IEC 61850-90-8 document is not a protocol in itself. It is a technical report which describes an object model for electric mobility. It models Electric Vehicles as a specific form of Distributed Energy Resource according to the paradigms defined in IEC 61850. The IEC 61850 specification is publicly available at limited cost from the website of IEC: www.iec.ch/dyn/www/f?p=103:23:0::::FSP_ORG_ID:1255.

4.2 Roaming related protocols

EV Roaming enables EV drivers to charge at each charging station and manages the billing of the charge action towards the driver. Condition is an open charging infrastructure for electric drivers. It means a shared use of charging infrastructure, independent of technology, without fiscal and legal obstacles.

OCPI - Open Charge Point Interface protocol/ NKL Nederland

OCPI is an independent roaming protocol that makes it easy to exchange data. It can be used both by companies (peer-to-peer) and via a roaming hub or platform. The protocol is supported internationally. With OCPI EV drivers get an insight into the availability and costs of charging points. OCPI protocol is publicly available at no cost via NKL Nederland. OCPI development is co-funded by the projects evRoaming4EU and ECISS, which receive EU and NL subsidies. More information: www.nklnederland.nl and www.evroaming4.eu.

OCHP - Open Clearing House Protocol/ e-clearing.net

The Open Clearing House Protocol (OCHP) is a protocol which is meant for exchanging authorization data, charging transaction and charge point information data for roaming via the e-clearing.net platform. The protocol consists of 2 parts:

1. A part that is specifically for communication between market parties and an EV clearing house;
2. A part that is for peer to peer communication between market parties, this is called OCHPdirect.

The OCHP is publicly available at no cost. More information on: https://e-clearing.net.

eMIP – eMobility Interoperation Protocol / GIREVE

The eMobility Interoperation Protocol, called eMIP, is provided by GIREVE as part of his main business objective: "open access to vehicle charging stations". eMIP targets two goals:

1. enabling roaming of charging services by providing a charge authorisation;
2. a data clearing house API and providing access to a comprehensive charging point database.

The eMIP protocol is publicly available at no cost. More information: www.gireve.com/wp- content/uploads/2017/02/Gireve_Tech_eMIP-V0.7.4_ProtocolDescription_1.0.2_en.pdf.

IEC 63119

IEC 63119 is a standard that is currently being developed : Information exchange for Electric Vehicle charging roaming service. It contains of four parts: Part 1: General – aimed publication date August 2019, Part 2: Use Cases, Part 3: Message structure, Part 4: Cybersecurity and information privacy. All last three parts have aimed publication date March 2022. More information: www.iec.ch/dyn/www/f?p=103:23:0::::FSP_ORG_ID:1255.

OICP - Open InterCharge Protocol / Hubject

The Open InterCharge Protocol (OICP) is a roaming protocol which can be used to communicate with the Hubject B2B Service Platform. This platform enables exchanging roaming messages between an EMSP and a CPO. The protocol consists of two parts that together create the protocol: a separate part for the EMSP and a separate part for the CPO. The OICP protocol is publicly available at no cost. More information on: www.hubject.com/en/downloads/oicp (Roaming Hub).

Sources

RVO: Electric vehicle charging - Definitions and explanation
https://www.rvo.nl/sites/default/files/2019/01/Electric%20Vehicle%20Charging%20-%20Definitions%20and%20Explanation%20-%20january%202019_0.pdf

eMI3 Standard V1
http://emi3group.com/documents-links

eMI3 Standard V1, part 2
http://emi3group.com/wp-content/uploads/sites/5/2018/12/eMI3-standard-v1.0-Part-2.pdf

ID and Data Collection for Sustainable fuels in Europe

Report

Deliverable 1.1.1 *Development of a format for the establishment of the first 5-digits of the e-mobility IDs for CPOs and EMPs*

Deliverable 1.1.2 *Report on the usefulness of having an EU wide format for the remaining digits of the e-mobility codes*

Project Acronym	IDACS
Project Full Name	ID and Data Collection for Sustainable Fuels in Europe
Grant Agreement number	MOVE/B4/SUB/2018-498/CEF/PSA/SI2.792684
Activity	1.1 Format of e-mobility codes – proposal for an EU-wide/ coordinated approach
Deliverable Status	Final
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Version / date	V2.0 (final, external) / 30-06-2022
Main author	Michel Bayings
Reviewers	Anneke Bosma, Netherlands Enterprise Agency Suzan Reitsma, Netherlands Enterprise Agency Hielke Schurer, Netherlands Enterprise Agency

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Introduction

This document describes the agreed ID format for Service Providers and Charge Point Operators for contracts and charge stations.

This document covers **Deliverable 1.1.1** (First 5 digits from e-mobility ID) and **Deliverable 1.1.2** (EU-wide format for remaining digits of e-mobility IDs) from the IDACS project.

1.1 Process

The project partners have to decide on the first 5 digits of the ID format and agree on a proposal for the second part of the ID format. The concept of IDs, why they are needed and what the first part and second part is, will be explained in next paragraphs and chapters.

Agreement on the format is based on reaching consensus with all consortium members. The following process was followed:

1. The concept of the IDs has been explained
2. The current format is explained and discussed
3. Discussions with consortium members and in the participating countries resulted in feedback on the current format with pros and cons – they have been described
4. Conclusions have been drawn taking into account all feedback
5. The result is an agreement on format for first and second part of the IDs and the next steps.

The above mentioned process, in which each step is explained, is also part of the deliverables.

1.2 Reason for IDs

Unique IDs for organisations that manage charge stations (Charge Point Operators) or offer charge services to EV drivers (Service Providers) are needed to identify these organisation for international billing and data exchange. For example:

- An EV driver has a charge card from company A. This company has a roaming agreement with several charge point operators to enable their customers to charge at these networks.
    - When this EV driver want to charge at a charge point from operator Z, this operator must check if they have a roaming agreement with service provider A. So they must be able to identify the service provider.
    - Before, during and after charging all kind of data is exchanged between service provider A and charge point from operator Z:
        - Before: location and availability
        - During: information about status of the charge session
        - After: transaction information for billing
- A large part of the data exchange is done via IT systems. These systems need unique IDs from the organisations to setup the connections and data exchange.

The Unique IDs from charge point operators are also used in the National Access Point to connect a charge station to the operator; otherwise several charge stations could have the same identifier which makes it impossible for IT systems to deal with. These unique IDs are also used in all kind of navigation systems to find the right charge points.

IDs are only for identifying companies and their assets. Nothing else. It is pure an identifier.

The next chapter explains the two different IDs in more detail.

Two ID Types

To identify contracts from EV drivers and charge points that can be used by EV drivers, it is needed to recognise the owner of contracts and operator of charge points, as described in chapter 1.2.

For these purposes two type of IDs were created:

1. ID for EV driver contract (EMAID – E-mobility Account Identifier)
    - This comparable with IBAN code from a bank card
    - Currently* consist of:
        - Country ID
        - Service Provider ID
        - Contract ID (one contract can contain several individual tokens/cards)
2. Electric Vehicle Supply Equipment ID (EVSE-ID)
    - To identify a charge station
    - Currently* consists of:
        - Country ID
        - Operator ID
        - Charge point ID or EVSE ID (one station can have several charge points)

(= current used format in several countries and by several organisations in Europe: Format / Syntax based on ISO 15118 & eMI3 standard)*

Figure 1 below shows how the two types are currently used in practice:

Figure 1: Explanation of the two types of IDs that are currently in use

Current Format

1.3 ID Setup

Since several years there is an ID syntax format which is agreed by important organisations in 4 countries, used in approximately 10 countries and approximately used by 1200 organisations (CPO & MSP) in Europe.
These 4 countries and organisations are:

- The Netherlands, with organisation eViolin
- France, with organisations Afirev and Gireve
- Germany, with organisation BDEW
- Austria, with organisation Austrian Mobile Power.

ISO and international organisation eMI3 agreed with this format. eMI3 specified and clarified some characters of the ISO 15118-2:2014 code.
The following overview describes the existing format.

Issued by:	**ID Registation Organisations (IDRO)**				**Emobility Provider (EMP)**			
Description	**Country**	**Separator**	**EMP**	**Separator**	**Type**	**Contract ID instance**	**Separator**	**Check digit**
Example	AT	"-"	EVB	"-"	C	12A23GHI	"-"	3
Explanation	2 characters (alphanumeric) [ISO 3166-1 alpha-2]{2}	**optional** [-]{1}	3 characters (alphanumeric) [A-Z;0-9]{3}	**optional** [-]{1}	1 character type identifier (alphanumeric) [A-Z]{1}	8 characters (alphanumeric) [A-Z;a-z;0-9]{8}	**optional** [-]{1}	**Optional** calculated check digit [0-9]{1}
	part one				part two			

Issued by:	**ID Registation Organisations (IDRO)**				**Charge point operator / unit (CPO)**	
Description	**Country**	**Separator**	**CPO or LOC**	**Separator**	**Type**	**Charge point ID**
Example	FR	"*"	EDF	"*"	E	2542AX8769
Explanation	2 characters (alphanumeric) [ISO 3166-1 alpha-] {2}	**optional** [*]{1}	3 characters (alphanumeric) [A-Z;0-9]{3}	**optional** [*]{1}	1 character type identifier E for EVSE or P for Pool (alphanumeric) [A-Z]{1}	Up to 30 characters (alphanumeric) [A-Z;a-z;0-9]{max 30}
	= optional					
	part one				part two	

Deliverable 1.1.1

Deliverable 1.1.2

Figure 1: Existing ID format, before IDACS project started

This format is also used by the Sustainable Transport Forum (STF), Sub-group on electro mobility services (SGEMS)

1.2 Feedback on current ID format

During the discussions about the ID format with consortium members from the project, several remarks and limitations about the current ID format were made. In random order, the main comments were:

1. The 3 character company abbreviation after the country code, makes it hard to keep them unique and the same in all countries. With 3 characters, codes can look similar and big possibility that the code of a company is already in use for a different country with different country code
2. **Optional separators are confusing** as some use it and some do not. More and more companies do not use them at all.
3. **The check digit** after the ID of the contract is optional, which makes it unclear if used or not. The current standard states: "Optional but highly recommended", which is unclear.
4. When new insights would result in **different versions** of the ID setup, they cannot be identified – which makes **updates hard to do**.

The main positive feedback was:

1. For the setup of and ID Registration organisation, a change in format is **not needed**
2. Already over a thousand **organisations in Europe use the existing format**
3. **The impact on IT systems** from users of existing codes can be large, when you change the code – even if the exiting codes can still be used they must change their systems to accept also a new setup.

1.3 Proposed new ID format

A new format/ID setup is proposed as result of the feedback with the aim:

- To show an alternative, taking into account the issues with current setup
- To support active discussion

As the new proposed format was finally not the outcome of the discussion (there was no consensus about it), it is not further described and presented in this document.

1.4 ID format conclusions

Taking into account all feedback (positive and negative) on the current ID setup and format (part 1 with 5 characters and part 2 with remaining characters), the following conclusions have been drawn:

- The current used format/syntax is used by many CPOs and MSPs
- Many companies are satisfied with current format
- There are market companies that discern several limitations and have certain desires concerning the current ID setup
- Currently no common agreement is expected on short term on an alternative ID format and a majority of consortium members see no need for it
- ID issuing in Europe is crucial and needs to be done in or on behalf of all countries

- For ID issuing organisations, the format is not an obstacle – every format can be issued, although agreement between these organisations about the used and issued format is important.
- The transition to an alternative format requires international alignment with market players and possibly with standardization bodies.

Decision on ID format part 1 (first 5 characters) and 2 (remaining characters)

During IDACS Consortium meeting which was held on the 22nd of May 2019 and follow up meeting on 19th November 2019, the following decisions have been made and agreed upon:

- Agreement to use the current format for part 1 and 2 as this is adequate for European ID issuing and usable for the market.
- It is strongly advised companies NOT to use the optional separators between IT systems. They are meant for visibility only. It is up to individual companies how to display the IDs and where which separators are put.
- Leave it up to Mobility Service Provider (MSP) to use or not use the 'Check digit', as it is mainly for their own benefits and usage and it has no impact on connected organisations, like CPOs.
- The 'Type character' must be used in all new situations for Contracts with "C" as 'type character', and at least an EVSE ID is needed for all charge points with "E" as 'type character'. If the CPO or Location owners is also using the IDs for Pools or Stations is up to the CPO. If used that way a "P" or "S" must be used.
- The IDACS consortium acknowledge that possible changes in the future can be processed based on consensus.

This result in the following agreed ID format:

Issued by:	**ID Registation Organisations (IDRO)**				**Emobility Provider**			
Description	**Country**	**Separator**	**EMP**	**Separator**	**Type**	**Contract ID instance**	**Separator**	**Check digit**
Example	AT	"-"	EVB	"-"	C	12A23GHI	"-"	3
Explanation	2 characters (alphanumeric) [ISO 3166-1 alpha-2]{2}	**optional** [-]{1}	3 characters (alphanumeric) [A-Z;0-9]{3}	**optional** [-]{1}	1 character type identifier (alphanumeric) [A-Z]{1}	8 characters (alphanumeric) [A-Z;a-z;0-9]{8}	**optional** [-]{1}	**optional** calculated check digit [0-9]{1}

part one — part two

Issued by:	**ID Registation Organisations (IDRO)**				**Charge point operator / unit**	
Description	**Country**	**Separator**	**CPO or LOC**	**Separator**	**Type**	**Charge point ID**
Example	FR	"*"	EDF	"*"	E	2542AX8769
Explanation	2 characters (alphanumeric) [ISO 3166-1 alpha-] {2}	**optional** [*]{1}	3 characters (alphanumeric) [A-Z;0-9]{3}	**optional** [*]{1}	1 character type identifier E for EVSE or P for Pool or S for Station (alphanumeric) [A-Z]{1}	Up to 30 characters (alphanumeric) [A-Z;a-z;0-9]{max 30}

= optional, but strong advice not to use it between IT systems but only for visibility
= optional, and used for helpdesk or internal MSP checks. Usage up to MSP
= obliged to use (non optional) at least at EVSE level and Contract level
= obliged to use

part one — part two

Figure 2: Updated agreed ID formats

Annex 1: Syntax IDs for MSPs and their contracts

(Also and more extensively explained by eMI3 deliverable: V1.0 Electric Vehicle ICT Interface Specifications: Part 2 Business Objects)

The Electric Mobility Account (eMA) ID MUST match the following structure – this is used for identifying MSPs and their contracts:

(the notation corresponds to the augmented Backus-Naur Form (ABNF) as defined in RFC 5234):

<eMA ID> = <Country Code> <S> <Provider ID> <S> <ID Type> <Contract ID-Instance> <S> <Check Digit>

Explanation:
<Country Code> = 2 ALPHA; two character country code according to ISO-3166-1 (Alpha-2-Code)

<Provider ID> = 3 (ALPHA / DIGIT); three alphanumeric characters, referring to the MSP

<ID Type> = "C"; one character "C" indicating that this ID represents a reference to a "Contract"

<Contract ID Instance> = 8 (ALPHA / DIGIT); eight alphanumeric characters referring to the internal service contract between MSP and its customer

<Check Digit> = *1 (ALPHA / DIGIT); Optional, for own MSP usage to verify valid contract codes

<S> = *1 ("-"); optional separator, but advised not to use it between IT systems and only for visibility purposes

ALPHA = %x41-5A / %x61-7A; according to RFC 5234 (7-Bit ASCII)

DIGIT = %x30-39; according to RFC 5234 (7-Bit ASCII)

An example for a valid eMA ID therefore is "DE8AACA2B3C4D5L" or with dashes "DE-8AA-CA2B3C4D5-L".

Note: This identifier definition is a more precise interpretation of ISO/ IEC 15118 eMA ID Id in a sense that ISO/IEC 15118 eMA ID is proposing an instance of 9 Alpha/digits.

Alpha characters SHALL be interpreted case insensitively.

Annex 2: Syntax IDs for CPOs, Location Owners and the charge points or Electric Vehicle Supply Equipment ID (EVSE ID)

(Also and more extensively explained by eMI3 deliverable: V1.0 Electric Vehicle ICT Interface Specifications: Part 2 Business Objects)

The EVSE ID MUST match the following structure (the notation corresponds to the augmented Backus-Naur Form (ABNF) as defined in RFC5234):

<EVSE ID> = <Country Code> <S> <CPO or Loc owner ID> <S> <ID Type> <Charge Point ID>

Explanation:
<Country Code> = 2 ALPHA; two character country code according to ISO-3166-1 (Alpha-2-Code)

<CPO or Location Owner ID> = 3 (ALPHA / DIGIT); three alphanumeric characters, referring to the EVSE Operator or Location Owner

<ID Type> = "E" for EVSE (Charge point), "S" for Charge Station, P for Charge Pool; one character indicating that this ID represents an "EVSE", "Station" or "Pool".

<Charge Point ID> = 1-30 (ALPHA / DIGIT); between 1 and 30 sequence of alphanumeric characters, allowing the EVSE Operator (CPO) to identify one specific EVSE. In case of "Station" it refers to identify the station (which can have one or more charge points. In case of "Pool" it refers to a charge pool.

A charge point MUST have an ID, Pools and Stations are up to the owners/operators.

<S> = *1 ("*"); optional separator, but advised not to use it between IT systems and only for visibility purposes

ALPHA = %x41-5A / %x61-7A; according to RFC 5234 (7-Bit ASCII)
DIGIT = %x30-39; according to RFC 5234 (7-Bit ASCII)

An example for, a valid EVSE ID is "FRA23E45B78C" with "FR" indicating France, "A23" representing a particular EVSE Operator, "E" indicating that it is of type "EVSE" and "45B78C" representing the power outlet ID, that is to say one of its EVSEs.

NOTE: In contrast to the eMA ID, no check digit is specified for the EVSE ID.

Alpha characters SHALL be interpreted case insensitively.

Annex 3: Check digit & ID validator tool

Calculation:
http://www.ochp.eu/wp-content/uploads/2014/02/E-Mobility-IDs_EVCOID_Check-Digit-Calculation_Explanation.pdf

Template for calculation and verification check digit:
http://www.ochp.eu/wp-content/uploads/2014/02/E-Mobility-IDs_EVCOID_Check-Digit-Calculation_Template_20140205.xls

Online ID Validator:
http://www.ochp.eu/id-validator/

ID and Data Collection for Sustainable fuels in Europe

Report

Deliverable 1.2.1 *Report on resource requirements and organisational/legal form for the IDRO at Member State level*

Deliverable 1.2.2 *National ID registration organisation (IDRO) set up within each participating Member State*

Project Acronym	IDACS
Project Full Name	ID and Data Collection for Sustainable Fuels in Europe
Grant Agreement number	MOVE/B4/SUB/2018-498/CEF/PSA/SI2.792684
Activity	1.2 Setup of ID registration organisations (IDRO) at national level within each participating Member State
Deliverable Status	Final
Dissemination Level	Public
Version / date	V2.0 (final, external) / 30-06-2022
Main author	Michel Bayings
Reviewers	Anneke Bosma, Netherlands Enterprise Agency Hielke Schurer, Netherlands Enterprise Agency Gilles Bernard, Afirev, France

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Table of contents

List of abbreviations

Abbreviation	**Definition**
CPO	Charge Point Operator
EC	European Commission
EVSE ID	Electric Vehicle Supply Equipment ID
EMAID	E-Mobility Account Identifier
IDRO	ID Registration Organisation
IDRR	ID Registration Repository
MSP	Mobility Service Provider

1 Introduction

To support companies and organisations that need an ID for identifying electric mobility contracts and/or for identifying recharging points, specific organisations are needed that supply and manage these IDs. These so-called ID Registration Organisation (IDRO) are a national responsibility.

This document describes the set-up and organisational mechanisms for IDROs and covers **Deliverable 1.2.1** (Organisation IDRO Member States) and **Deliverable 1.2.2** (National IDRO) from the IDACS project.

The following reports are bases for this document:
- IDACS Terminology v1.0
- PSA IDACS Activity 1.1 Deliverable 1.1.1 and 1.1.2 v2.0

As specified in the PSA IDACS Grant Agreement, in a later phase, the IDROs must be connected to an ID Registration Repository (IDRR) on a European level. This document is focused on the processes and functionalities needed for the set-up of the national IDROs. In addition, this document may also serve in the future as a support guide for Member States that did not participate in the PSA IDACS to set-up their national IDRO.

1.1 Purpose of IDs – IDs only as Identifier

The IDRO issues only IDs for Operators and Service Providers (first 5 Digits), but not for recharging Points (EVSE ID) and contracts (EMAID). The EVSE for recharging points and EMAID for contracts contain the Operator/Provider ID and they are issued by the ID-Owner.They are conceived purely as identifiers. Importantly, they are not meant to contain knowledge (e.g. the operator name) and should not be considered as marketing tools.

Nevertheless, the IDs issued by the IDRO of a Member State are inherently a source of information that might constitute a point of union between governments and the e-mobility market.

1.2 IDRO Framework

The set-up of an IDRO can be split in different components, shown in a summarised manner in the following figure. This document describes each component rigorously in Chapter 2.

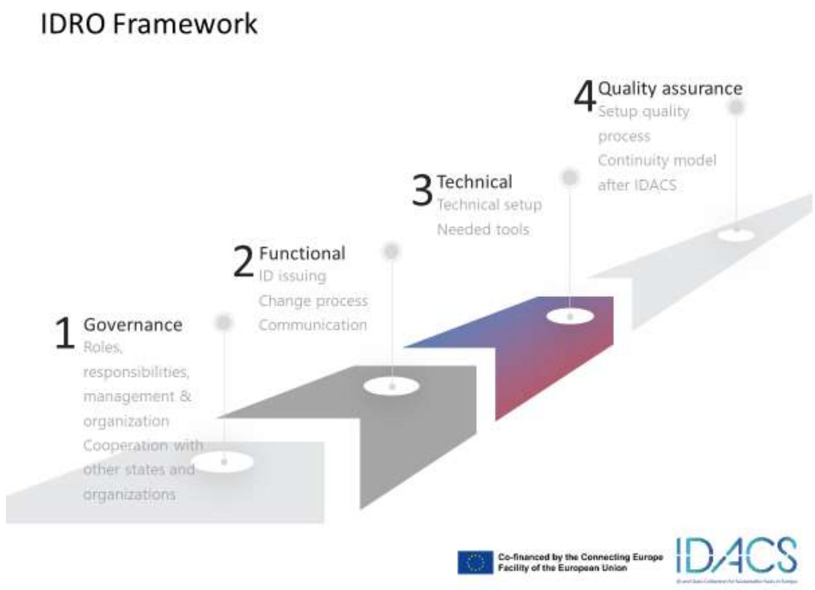

Figure 1: IDRO Framework/components

2 IDRO

The purpose of an ID Registration Organisation is to supply IDs with a national country code for Mobility Service Providers (MSP) and Charge Point Operators (CPO).

According to the standard ISO 15118 '*Road vehicles -- Vehicle to grid communication interface*', each ID starts with a country code. Therefore, the countries are always responsible for issuing these codes. However, there are different implementation schemes, being possible that multiple countries outsource the execution of the IDRO to a common organisation, whilst at the same time keeping the countries responsible and accountable for their (own or outsourced) national IDROs.

2.1 General rules

For submitting and managing IDs there are several general rules that must be taken into account:

1. MSPs and CPOs and/or location owners can request an ID when they have a proven legal entity. A legal entity is defined as a natural or legal person. A location owner is defined as the entity who owns the recharging points to be identified with the ID.
2. A natural or legal person shall request its first ID in the country where they are legally based.
3. A natural or legal person that requests an ID may be legally based in a different country than where the ID is requested.
4. EVSE IDs (IDs for charge points) can be used in other countries, as it is only an identifier. Any laws or regulations that might be applicable can be based on the country location of an EVSE and should not be based on the country code.
5. A natural or legal person can request several IDs.
6. Companies that are both MSP and CPO need 2 IDs: a provider ID for the MSP role and the identification of EV Driver contracts and an operator ID for the CPO role to identify charge points. This can be the same string of characters, as the different purpose of the code is specified via the 'Type character' in the codes. That string of characters must remain unique to the company. An identical ID cannot be given to one MSP and another CPO belonging to different organisations.
7. An ID Registration Organisation may ask a cost covering fee to supply and maintain the codes; this can be a one-time fee and/or time based fee. ID Registration Organizations are free to do this as long as it is clearly mentioned to the applicant of an ID.
8. Provider ID and Operator ID are only valid when published on the website of the ID Registration Organization website. Other IDs may not be used.
9. An ID code cannot be sold or transferred to third parties.

For more background information on the origin of the general rules, please check Annex 1.

2.2 IDRO Governance

This paragraph describes the possible ways to set-up an IDRO and the difference between the Government responsibility and the execution of IDRO activities.
Setting up and maintaining an IDRO is a national responsibility and must be subject to a set of governance principles. This means:

1. There must be a link between IDRO and Government

2. There must be some kind of periodic reporting about the status, functioning and results of the IDRO towards the Government; it is up to the Member States to decide on the exact way of this reporting.
3. How to formalise the set-up this Government responsibility is open:
    a. It can be done via a law or mandate.
    b. It can be done via the set-up of an IDRO foundation or an organisation where the Government is part of.
4. The execution and operation of an IDRO need not necessarily be done by the Government. It can be done by a separate organisation or foundation.
5. The Government must guarantee that there is only one IDRO per country code.

Although there are different ways to manage the link between Government and IDRO, the three that are mainly used are:

a. Set-up of a separate organisation that is responsible for the IDs via a legal mandate. This organisation can for example be a foundation with several stakeholders in the management board.
b. Make a department of the Government completely responsible for the management of the IDRO activities.
c. Via an external organisation that is selected via a tender process and has a mandate from the Government to execute the IDRO activities for a certain period.

2.3 IDRO Functional

From an operational point of view, the following functions must be executed by the IDRO:

1. Offer an application form to request, change or delete an ID, containing at least:
    a. Contact data organization/company: Company name, street, postal code, city, country, address of the company/organisation, Contact person first name, family name, title, function, email-address, phone number, billing address, companies' register number or ZVR-number
    b. A message should be added to announce that the data may be verified. The exact wording is up to the IDRO. Example text: "Please note that your submitted data, VAT number, company address, and company name may be verified. Further, the IDRO may exchange your information with authorities to ensure the correct functioning of the market, intercept fraudulent behavior and illegal activities."
2. Fees for requesting or changing an ID, if any, must be non-discriminatory and transparent.
   Fees are optional, but in the case they apply can consists of:
    a. One-time registration fee
    b. Time based maintenance fee
    c. Change request fee

   In any circumstance, if fees apply, they must be clearly stated on the IDRO website and application form.
3. Set-up a website with an overview of the IDs that are issued by the IDRO
    a. It must be possible for companies to check if a code is available
    b. It can be done via 'simple' overview or via search function
    c. The overview may contain: Company name + ID(s) split for CPO and MSP and Location owners (not for all countries location owners are applicable)
    d. The overview should not contain personal data. Only data like company website and company address should be used.
    e. It must be available to everyone
4. Optional: Providing a possibility to download the overview
    a. The download must at least be in CSV file format
    b. There is no need/must to use DATEX II – this only applies for NAP

   a. The reason is that sharing/downloading the data is not required for requesting an ID and downloaded data is not integrated into other systems.
5. Language of documents/website
   a. All information on websites and documents should at least be available in the national language and in English
   b. Other languages are not a must, although websites can easily be translated via several tools
6. Support – how and where organisations can get information about IDs.
   a. At least, contact information e.g. mail address, should be available on website and forms
   b. Name and phone number of contact person or department is very helpful, but not a must
   c. Follow-up of incoming mails and calls should be managed
   d. Information on how to create and use EVSE ID and EMAID should be available on the website.
   e. Information on where to find other IDRO should be on the website
7. Dealing with all that is necessary to know and understand the purpose and use of the delivered ID, and all detailed rules for requesting one and use it.
   a. IDRO and IDRO contact person should understand and be able to explain purpose and use of IDs.
   b. Possibility to add on website and/or for download, additional information about IDs and formats. Or refer to external sources for this information.
8. The IDRO website should provide an overview of the website links of the IDROs active in other member states.
9. On functional and technical level a link must be set-up to the IDRR (ID Registration Repository) when required. This IDRR will act as the EU portal with links to IDROs, facilitating the access to an overview of all submitted IDs in Europe. The exact functions of the IDRR are still to be defined. Deliverable 1.3. of IDACS will deepen on this aspect.

2.4 IDRO Technical

The set-up of an IDRO and its functions also requires a technical set-up. The following aspects should be taken into account on a technical level:

1. Separate from a website with information and ID overview, also an ID register is needed. This can be a complex database or a simple Excel file depending on the number of IDs issued. The higher the number of IDs issued the harder the management using an excel file will become.
2. The website of an IDRO can be set-up in any tool or language. Basic security levels like TLS and/or HTTPS should be implemented.
3. There must be measurements in place to prevent that non-authorized persons or systems can change IDs on website and/or in the register behind it, e.g. avoid a connection between register and website.
4. A technical link to the IDRR must be created– when the IDRR is setup.

2.5 IDRO Quality Assurance Process

To ensure a sustainable long-term ID Registration system and data exchange in Europe, Quality Assurance processes are identified and described in the next chapter.

3 Quality assurance processes

To ensure a long term sustainable and high quality system of international usable ID issuing and maintenance, quality assurance processes need to be in place. This can be split in processes for **daily operations** (§3.1) and a separate **Innovation and Change process** to deal with new developments and possible changes in rules, requirements or ID syntax/format (§3.2). The processes described below can be used as guidelines to draft the specific processes for a national ID Registration Organisation.

3.1 Quality Assurance Process – daily operations

The following figure shows an overview of the processes for the daily operations in a graph.

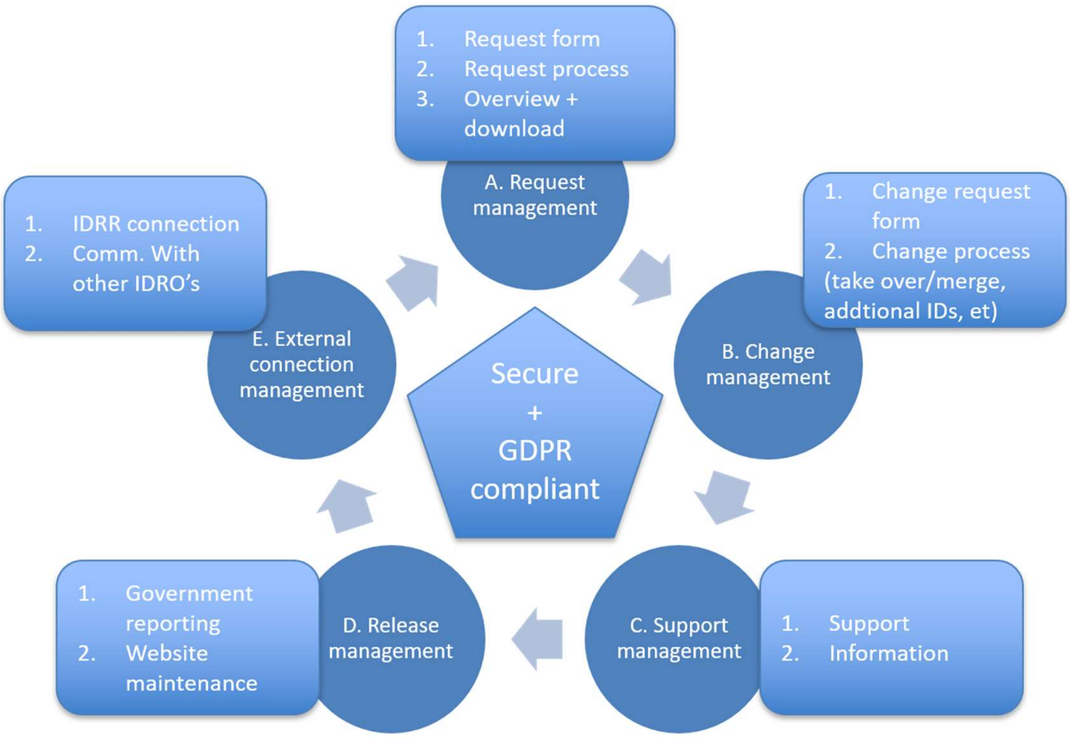

Figure 2: IDRO Quality Assurance Process

The processes are further described in the following paragraphs.

3.1.1 Security and GDPR compliancy

All data that is used must be according to GDPR regulations. This means that requested data is only used for registration and management of IDs and in line with GDPR not used for other purposes. Only the IDs and company contact details will be put on the website of the IDRO and shared with international similar organisations including the European IDRR). No personal data will be shared with others.

The IDRO should ensure that the IDs and information on the website cannot be changed. Although it is purely for informational purposes, it is advised to use at least HTTPS for the website and only distribute PDF files for the registration and change forms.

3.1.2 Registration management

This contains three parts: Registration form, Registration Process and Overview and download possibilities.

3.1.2.1 Registration Form

This is a form which can either be digital (on line) and/or as PDF for download. It should at least contain the following information:

1. Company/Organisation details: Name, address, country etc
2. Website of the company
3. Invoicing details: address, country and, if needed, specific info for e.g. purchase order number
4. Registration info: VAT number, Chamber of Commerce number, etc.
5. Contact details for Business person & Contact details for Technical person
6. Desired ID for specific role (MSP, CPO or Location owner)
7. Info about the cost of the registration
8. Signature of the person requesting it
9. Information must be on the form that the requested data is only used for registration and management of IDs and in line with GDPR not used for other purposes. Only the IDs and company contact details will be put on the website of the IDRO and shared with international similar organisations including the European ID Registration Repository (IDRR).

The website should contain an email address to send the registration form to, unless the registration form is submitted online.
It is also advised to add contact info on the website for additional questions.

3.1.2.2 Registration process

To ensure a good registration, the following procedures should be followed:

1. As companies based in different countries can request an ID, it must be possible to accept signed and scanned registration forms in a digital way
2. Registration forms must be stored digital
3. Following checks should be done:
    a. Are all required fields filled in
    b. In case of an international company, a check must be done if they have already an ID in their main country where they are legally based (see rule 2, chapter 2.1)
    c. Is the required ID acceptable – should not be in contrary to morality (e.g. in combination with country code or the ID itself should not result in swear words)
    d. Does it contain date and signature
4. The ID must be checked on availability in the own national ID register
5. If all OK, confirmation must be sent to the requester
6. If not OK, either additional info must be asked or the requester must be informed that ID request cannot be processed with reason why not.
7. Invoice must be sent to the requesting entity – only after payment the ID is officially approved.

3.1.2.3 Overview and download

To ensure visibility and verification of IDs by other persons and organisations, the IDs must be published:

1. The ID must be placed and published on external visible website with entity name and entity website.
2. The ID with entity name and website must be stored in downloadable overview e.g. a CSV file, which can be downloaded from the website of the IDRO.

3.1.3 Change request management

There are two main reasons for requesting a change related to IDs:

- An entity that already has an ID might want additional IDs, have a need to change some information previously supplied or wants to stop using certain IDs
- Entity is taken over or merging with other organisation which can either result in a change of ownership of IDs or a total stop of using a specific ID.

Above situations must be supported by a change request management process:

1. A form must be available on the website to request a change
2. This form must besides the contact details of the entity also contain the current ID and the requested change, which can either be:
    a. Additional IDs
    b. Removal of IDs
    c. Change of ownership of existing IDs – this should result in a removal at one company and a new request from the new owner, so all right contact details are again available
3. Date and signature
4. The cost of registration must be mentioned
5. Checks should be done on completeness of the form, similar to the ones in the registration process.
6. Forms need to be stored digital
7. If cost of change are involved, invoice must be sent to the entity – only after payment the changes are officially processed.
8. The changes should be processed and made visible on the website and via the downloadable file.

Changing IDs can have considerable impact for the related companies and their customers. It is advised to inform the companies about this.

- IDs are used in roaming agreements between partners – a change of these should also include informing the connecting parties and change of roaming agreements.
- MSP IDs are often used on charge cards/tokens and in apps from EV drivers. When changing or removing IDs this must be taken into account.
- CPO and location owner IDs are often printed on the physical chargers and are used to identify the recharging stations as EVSE IDs. These EVSE IDs are provided by CPOs and location owners through the National Access Points to third parties. When changing these IDs this must be taken into account.

It is the task from the concerning entities to take care of this, but the IDRO should inform about taking the above impacts into account.

3.1.4 Support management

Support management is related to informing entities about the purpose of IDs, the usage and how to obtain them. It is strongly advised to have the following information available on the website:

1. Information about the IDRO, incl. the link to the EU and the national Governmental responsibility
2. The purpose of IDs
3. Explanation how to use IDs
4. Explanation of the format of IDs
5. Information about the cost of registration, time based fees if applicable and cost for changes. Also if it is free of charge, it is advisable to mention.
6. Request and change forms for IDs, including clear overview of the cost of IDs
7. Contact details of your IDRO – at least mail address, but preferable also phone number and contact person or department
8. Link with download possibility to the overview of IDs
9. Link to other IDROs from other countries

10. Information how the IDRO is respecting the GDPR regulations

For usage towards interested external entities, a generic whitepaper should be created which will contain information about: purpose, explanation how to use IDs and the format. This can also be offered as download or direct info on the website.

3.1.5 Release management

The IDROs are a direct responsibility of the national Governments. This requires also reporting to the Governments. As the concrete execution of the IDRO can vary – it can be done by Government department, can be done by external organisation, countries can work together in the execution, etc, the concrete way and frequency of reporting depends on the national situation.

The website and other information must be updated when new IDs are submitted, IDs are changed or when other info is changed.

3.1.6 External connection management

Besides the connection with the national Government, there are two main other connections:

- Other IDROs
- Connection with the IDRR

3.1.6.1 Connection with other IDROs

The agreed type IDs for MSPs & CPOs can be used in different countries. Connection between other IDROs is important because of the following reasons:

- Informing external entities (MSPs, CPOs, etc) about the other IDROs in other countries. Preferable with a link and contact information
    - This requires that if contact info of IDROs are changing the others are informed.
- Exchanging information and experience between IDROs. It is recommended to setup a kind of community of all IDROs and have at least 2 times per year meetings to align and improve processes and share experiences.
- This community can also be lead by the IDRR organisation (see next chapter). However exact role and setup of the IDRR is not yet fully defined.

3.1.6.2 Connection with European ID Registration Repository

As part of the IDACS project a European ID Registration Repository (IDRR) could be set-up. For all kind of parties who want information about IDs or where to obtain them, this IDRR can be used to get information. This IDRR will be a kind of central information portal which will contain at least the following parts:

- General information about IDs
- Information about national IDROs with link to them
- Information about the issued IDs by the IDROs

The ownership, organisational structure of IDRR and what and how the information of the issued IDs are made visible, still needs to be defined. The IDRR will not replace in any case the national IDROs.
The characteristics and set-up of the IDRR will be described in Deliverable 1.3 of the IDACS project.

3.1.6.3 Connection with other stakeholders

Connection with other stakeholders should be part of the activities of the IDRR organisation. These connecting organisations should include, but not be limited to:

- The European Commission (EC)
- Standardization organisations
- eMI3

3.2 Innovation & Change process concerning ID rules, requirements or syntax/format

The EV market is a fast developing and growing market. The market is not yet mature, which results in frequent new insights and visions, based on experience and new developments. This can also have impact on the IDs: the requirements, rules and/or the format. The discussions regarding the ID syntax and format showed that requirements and definitions can change.

It is stated in the definition of the ID syntax that changes of the syntax and format are possible in the future based if there is a need from the market.

In order to facilitate the market regarding IDs and new insights that might result in improvements of the IDs, the IDROs should be open for feedback by the users of IDs and other stakeholders. Collect this information and share it with other IDROs. Changes might also effect the agreed rules and requirements, next to the syntax/format.

The community of IDROs should support these discussions, which can be led by the IDRR organisation – depending on the exact set-up and tasks of the IDRR.

4 Annexes

4.1 Annex 1 - Explanation of the General rules

Below an explanation of the formation and development of the general rules over several meetings and discussions.

1. MSPs and CPOs and/or location owners can request an ID when they have a proven legal entity. A legal entity is defined as a natural or legal person. A location owner is defined as the entity who owns the charge points to be identified with the ID.

> *This general rule was adjusted by Germany and France. It deals with whom can request an ID code.*
>
> *Germany needed the definition of legal entity, because in Germany a natural person can request an ID code. The definition of a legal entity being a natural or legal person originates from the European Energy Directive.*
>
> *France required the inclusion of location owner (more precisely recharging station owner), since in their country it is possible for a location owner to request an ID. This can be useful, when for example a municipality exploits a set of recharging stations, that was put on the market in a public tender, and when due to the end of the contract, another CPO takes over the operation of the charging stations. However, during the Steering Committee this raised the concern that it would now be possible to have more than 1 ID per charging station, if a CPO and a location owner both would apply for an ID code. France, therefore, proposed additional lines, to ensure an unique ID per charge point:*

In order to ensure an unique ID per recharging point and for EV charging contracts the ID Registration Organisation must request the applicant of an ID to specify:
- The set of recharging points which will be identified with the ID
- In case of location owner who request the ID: The identity and contact address of the location owner of these recharging points
- In case of CPO who request the ID: The identity and contact address of the CPO which operates the charge Station
- In case of MSP who request the ID: The identity and contact address of the MSP who supplies EV recharging contracts

> *However, during the call of 28 January 2021, it was decided to skip these lines, as it would not solve the matter and involve a lot of checks, also because the issue is mainly technical. Back ends of (navigation) systems would resolve the issue immediately.*

2. A natural or legal person shall request its first ID in the country where they are legally based.

> *This rule was included to prevent applicants to request an ID code at a Member State in which the costs for an ID code are less than in their own country.*

3. A natural or legal person that requests an ID may be legally based in a different country than where the ID is requested.

> *This rule was included as for some countries (e.g. Germany) it is necessary to have a local ID code, for example because of technical issues, or regulations. In this case,*

an applicant first follows rule 2, and then, if necessary, requests an ID in another country.

4. EVSE IDs (IDs for recharging points) can be used in other countries, as it is only an identifier. Any laws or regulations that might be applicable can be based on the country location of an EVSE and should not be based on the country code.

This rule was included because technically, the ID code is merely an identifier. Therefore, it should not be necessary to apply for another ID code in a different country. Unless, as described in rule 3, the system or regulations require it. However, the local regulations may apply as the country code is not leading for which regulations apply, but the location of the charging station.

5. A natural or legal person can request several IDs.

This rule was included for the Netherlands, as in the Netherlands the current IDRO allowed to have several IDs in use within a company for business management reasons. This does not translate to a charging station having several IDs. When for example, a CPO took over a set of charging stations that previously belonged to another CPO, they requested a different ID code in order to distinguish between the charging stations. Also, in some cases the CPO had several divisions, and used the ID code to distinguish between the charging stations of one division and another. However, as the ID code is merely a identifier, this approach is not recommended.

6. Companies that are both MSP and CPO need 2 IDs: a provider ID for the MSP role and the identification of EV Driver contracts and an operator ID for the CPO role to identify charge points. This can be the same string of characters, as the different purpose of the code is specified via the 'Type character' in the codes. That string of characters must remain unique to the company. An identical ID cannot be given to one EMP and another CPO belonging to different organisations.

This rule shows the functioning of the type character for companies that are both MSP and CPO.

7. An ID Registration Organisation may ask a cost-covering fee to supply and maintain the codes; this can be a one-time fee and/or time based fee. ID Registration Organisations are free to do this as long as it is clearly mentioned to the applicant of an ID.

This rule deals with whether a fee can be requested by an IDRO and the amount of compensation. IDROs usually explain this in their terms of reference.

8. Provider ID and Operator ID are only valid when published on the website of the IDRO website. Other IDs may not be used.

This rule deals with the validity of ID codes. The IDRO publishes an up to date list of which ID codes are currently valid, which can be used by other IDROs and/or the ID Registration Repository for monitoring, or for example to check whether a company has requested its first ID in the country where it is legally based. Also, when there has been a violation by a company, for example when a fee, either an one-time fee or an annual fee has not been paid, the IDRO might not list an ID code anymore as valid.

9. An ID code cannot be sold or transferred to third parties.

This rule was included to prevent fraud, misuse or transfer of ID codes

4.2 Annex 2 – Overview of current ID Registration Organisations

4.2.1 Austria

The list of IDs
https://www.ladestellen.at

ID request
https://admin.ladestellen.at/#/registrieren

4.2.2 France

The list of IDs
https://www.afirev.fr/en/list-of-assigned-identifiers/

ID request
https://www.afirev.fr/en/request-for-identifier/

4.2.3 Germany

List of Provider IDs
https://bdew-codes.de/Codenumbers/EMobilityId/ProviderIdList

List of EVSE operator IDs
https://bdew-codes.de/Codenumbers/EMobilityId/OperatorIdList

ID Request
https://bdew-codes.de/Codenumbers/EMobilityId/Application?tabIndex=0

4.2.4 Benelux

The list of IDs
ID request | Benelux IDRO (benelux-idro.eu)
ID request
ID-register | Benelux IDRO (benelux-idro.eu)

4.2.5 Poland

ID request
https://eipa.udt.gov.pl/operator/register

4.2.6 United Kingdom

The list of IDs
https://www.realschemes.org.uk/ev-roam

ID Request
https://www.realschemes.org.uk/pdf/ev-roam-id-request-form-2020.pdf

4.2.7 Hungary

The list of IDs
https://idro.hu/en/page/members

ID Request
https://idro.hu/register

4.2.8 Croatia

ID Request

Pametna mobilnost - Registar ID kodova (CRO-IDRO)

4.2.9 Czech Republic

ID Request
idro.rsd.cz

4.2.10 Greece

The list of IDs
Hellenic European ID Registration Organisation (yme.gov.gr)

ID Request
Μητρώο Υποδομών και Φορέων Αγοράς Ηλεκτροκίνησης (yme.gov.gr)

4.2.11 Lithuania

Home - LAKD

4.2.12 Portugal

The list of IDs
3f0f61d7-a579-ca1c-4804-a39d4f2df8bc (mobie.pt)

ID request
IDACS - Mobi.e (mobie.pt)

4.2.13 Slovenia

NAP - National Traffic Management Centre

4.2.14 Spain

Ministry for the Ecological Transition and the Demographic challenge - Energy (energia.gob.es)

ID and Data Collection for Sustainable fuels in Europe

Report

Deliverable 1.3.1 *Report on resource requirements and organisational/legal form for the common European ID Registration Repository (IDRR)*

Deliverable 1.3.2 *Common ID Registration Repository set up between participating Member States*

Deliverable 1.3.3 *Management support structure for the common ID Registration Repository set up, that allows its extension to other and potentially all Member States even those that are yet to set up an IDRO*

Project Acronym	IDACS
Project Full Name	ID and Data Collection for Sustainable Fuels in Europe
Grant Agreement number	MOVE/B4/SUB/2018-498/CEF/PSA/SI2.792684
Activity	1.3 Establishment of a “common ID Registration Repository” allowing for exchanging with national ID Registration Organisations (national IDROs)
Deliverable Status	Final
Dissemination Level	Public
Version / date	V2.0 (final, external) / 30-06-2022
Main author	Michel Bayings
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List of abbreviations

Abbreviation	Definition
CPO	Charge Point Operator
EC	European Commission
EVSE ID	Electric Vehicle Supply Equipment ID
EMAID	E-Mobility Account Identifier
IDRO	ID Registration Organisation
IDRR	ID Registration Repository
MSP	Mobility Service Provider

1 Introduction

IDs for CPOs, MSPs and Location Owners – a subcategory of CPOs – are maintained by ID Registration Organisation (IDROs) under the responsibility of national governments. To support these IDROs and to facilitate market companies finding and obtaining IDs, the EU under the IDACS project calls for the set-up of a central ID Registration Repository (IDRR).

This document describes the conception of an IDRR, providing specific information about its set-up. Practically, this covers Deliverables 1.3.1 (Organisation of IDRR), 1.3.2 (Set up of IDRR) and 1.3.3 (Management Support Structure for common IDRR) of the IDACS project.

Goals of the ID Registration Repository (IDRR)

The IDRR has multiple purposes, which can be summarised as follows:

- Act as entrance/portal for electro-mobility companies and organisations which need to obtain an IDs for MSPs, CPOs and Location owners. In addition, the IDRR is a central point of information for all kind of aspects related to the IDs codes and the search of the adequate national IDRO.
- Support and coordinate at European level national IDROs with their activities.
- Offer IDRO functionalities to Member States who might not have yet their own IDRO.
- Ensuring long-term sustainable ID management.

Target group

The purpose and role of both the IDRO and the IDRR is primarily related to B2B purposes. Companies and organisations that are active or want to become active in the EV charging market can get information and IDs. Published information and ways of communication for both the IDRO and the IDRR should be attuned to this B2B target group.

2 Functions of the IDRR

As result of the aforementioned goals several functions are identified. In order to get a comprehensive overview and easy comparison between the IDRO and IDRR functions, the following table provides a concise comparative:

	Function	IDRO (National)	IDRR (EU level)
1	ID Registration (5 characters)	√	
2	ID Maintenance (changes between owners, deletions)	√	
3	National information about how to use IDs	√	
4	EU/international portal for general information about IDs and IDROs		√
5	General information about purpose and usage of IDs and cost, including support for companies and organisations	√	√
6	Manage IDs on behalf of countries who do not have their own IDRO	√*	√
7	National overview of all submitted IDs	√	
8	Overview of all national IDROs, contact details and their websites		√
9	Link to the national ID overviews		√
10	Contact for EU about ID questions and issues		√
11	Manage Community of IDROs		√

* = on request of governments other IDROs can and may manage IDs for other countries during a specific time until the Member State who does not have an IDRO establishes one.

Table 1: Functions of IDRO

Each function of the IDRR is described in the following paragraphs. The functions of the IDRO are described in Deliverables 1.2.1 and 1.2.2 of the IDACS project.

2.1 EU international portal for general information about IDs and IDROs

This is one of the main roles of the IDRR. The IDRR should act as central entry point for organisations that want to be active in the EV charging market. Moreover, the roles of national IDROs should be explained as well as the EU context and cooperation between IDROs.

2.2 General information about purpose and usage of IDs and costs, including support for companies and organisations (helpdesk)

The IDRR should explain the general purpose of IDs, providing an overview of the possible costs that are involved. However, the specific costs of each IDRO will be displayed in their corresponding website at national level, for which the IDRR should display and provide the proper link. Therefore, the IDDR would convey ahigh level view that the national IDRO would take to the required level of details.,

2.3 Manage IDs on behalf of countries who do not have their own IDRO

There are situations where an EU country does not have an own IDRO yet. This can be because of the following reasons:

- Not enough demand for IDs to set up own IDRO
- Country too small to have own IDRO

- The process of setting up an IDRO is planned but not yet finished – this is a temporarily situation where a country cannot yet offer own IDs via own national IDRO.

In these situations, there are two possibilities:

1. An IDRO is asked to manage national IDs on behalf of this country. An IDRO cannot be forced to do submit services for other countries.
2. IDRR is asked to manage IDs on behalf of a country. If there are no IDROs who want to support a country, the IDRR must offer this.

A request for offering IDs via another IDRO or via the IDRR must always be done via a national government. This way the execution of this task will stay under the countries'/government's responsibility.

It is important to remark that this set-up, as well as the enforceability of a national IDRO, is conditioned to the evolution of European legislation, in particular, the revision of the Alternative Fuels Infrastructure Directive (AFID) also known as the forthcoming Alternative Fuel Infrastructure Regulation (AFIR).

2.4 Overview of all national IDROs, contact details and their websites

The IDRR maintains an overview of all IDROs in Europe, their contact details and link to their websites. This overview must also be freely accessible through the web portal of the IDRR.

2.5 Link to the national ID registers

Besides the contact information of national IDROs also a direct link to the national ID registers must be provided via the web portal of the IDRR, in order for all interested parties to be able to directly check/verify whether a certain ID is still available or to whom it belongs.

2.6 Contact for EU about ID questions and issues

The IDRR is the central contact for the EU about general ID-related questions. Specific issues on issuing of IDs or questions at technical level should fall under the remit of the national IDROs. Thus, the IDRR would play a key role as facilitator of solutions between different companies and Member States.

2.7 Manage Community of IDROs

The IDRR should also unite the individual IDROs through community management.

Purpose of this community role is to:

- Share information between IDROs
- Share and discuss experiences related to ID and ID management with IDROs to improve services
- Share and discuss questions and issues from users (CPOs, MSPs, Location owners) with IDROs
- Share and discuss market developments with IDROs e.g., related to syntaxes/format of IDs, security features, different usage or new types of users of IDs.

3 IDRR organisation

During the elaboration of this document, several set-ups of the IDRR were drafted and discussed as can be seen in the overview of Figure 1 below. At the moment of finalising this document, half of the IDROs are operational, therefore, it would not justify the set-up or enabling of an independent IDRR. Next to that, the Alternative Fuel Infrastructure Directive (AFID) is being revised which could lead to the obligation to Member States of setting up an IDRO, which would require additional time until there is a common European layer that would lead to the creation of the IDRR. Moreover, experience with the IDRR is necessary to be able to evaluate its functioning and possibly adjust its set-up. Therefore, it was agreed that flexibility is essential and, thus, the set-up of an IDRR light (Variation 2) was preferred including a long-term vision, which will be described in deliverable 1.4.

Hence, the IDRR light (Variation 2) is the starting point and set-up of the IDACS project. Depending on the developments the coming years, this could grow to a set-up with a fully operational IDRR management organisation.

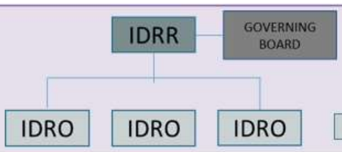
	ORIGINAL PLAN	VARIATION 1	VARIATION 2
CONCEPTUAL ORGANIZATIONAL STRUCTURE			
GOVERNANCE	Governing board	Committee or elected board and secretary	committee
SET UP	Independent	Part of 1 IDRO	Part of all IDROs
RESOURCE REQUIREMENTS	high	lower	hardly
COST SYSTEM REQUIRED?	Yes	Yes	No

Figure 2: IDRR organisation – Overview of proposed set ups

3.1 IDRR light

3.1.1 Tasks

The IDRR will perform two main tasks:

1. Present an overview and basic information about IDs and the IDROs
2. Manage discussions and possible needed changes of activities done by the IDROs, as far as this is limited to situations where EU-wide alignment is needed (e.g. change in format of IDs or way to use it).

In chapter 2.3 is stated the IDRR should be able to manage IDs on behalf of a Member State without an own IDRO. If there are no IDROs who want to fulfil this role for the other Member State, the IDRR must offer this.

At this moment in time (May 2021) the IDROs of Austria and the Benelux are able to manage national IDs temporarily on behalf of another Member State. Therefore, this task is not included in the tasks of the IDRR light.

3.1.2 Management Support Structure

The IDRR will be formed by the operational IDROs who will all be part of the IDRR Steering Committee. The IDRR will have its own IDRR portal.

This portal will be set up by the IDACS project and will contain information about:

- the concept of IDs including the agreed format
- the general rules about how and where IDs can be used
- the IDROs with overview and links to these individual IDROs and their registers

The portal will be hosted by one of IDROs and will be accessible through its own URL. The organisation that will set up this IDRR portal will also be responsible to maintain and update the information. Contact details of all IDROs will be listed to answer any specific questions. Several Member States indicated that their IDROs are able to set up and host the EU IDRR Portal.

The Consortium has ultimately decided the Benelux IDRO will host this portal corresponding to the 'IDRR light' concept.

3.1.3 IDRR Steering Committee

The Steering Committee will consist of one representative of each Member State that has an operational IDRO. Biannual (remote) meetings will be organised to evaluate experiences, discuss the developments and possible issues and, if necessary, changes, concerning the IDRR activities or the ID format and the usage of IDs.

The IDRO representatives in the Steering Committee will agree on a procedure for a rotating board with (alternating) chair and secretary to lead the meetings and activities. This will be decided in the first meeting of the Steering Committee, as well as a working cooperation structure. This working cooperation structure will describe e.g., the decision-making process. The procedures and working cooperation structure will be drafted in a 'Terms of Reference' and agreed upon the next meeting. The first meeting will be chaired by the coordinator of the IDACS project. Moreover, discussions will take place concerning for example participation of non-EU operational IDROs in the IDRR Steering Committee and any other relevant business.

3.1.4 Tasks IDRO versus IDRR

The IDRR will start without active daily management. Consequently, the IDROs will take responsibility to also inform their customers/visitors about usage of IDs in international context and refer to the IDRR web portal and other IDRO websites. In addition, IDROs can still be requested to support other countries and manage the IDs on behalf of these countries. As this is based on bilateral agreement it cannot be enforced. If no agreement can be made countries can check via the IDRR who can support them. An overview of IDROs that are willing to execute IDRO tasks for other Member States on bilateral agreement should be provided.

3.1.5 Financing

The IDRR light will not require any additional financing. The necessary resources e.g., for the web portal will be limited and the Steering Committee meetings can be done remotely and participation will be financed by each IDRO.

3.2 Beyond IDACS

The next steps, future set up and organisation of the IDRR depends on developments at EU level (e.g., experience with the IDRR, the revised AFID, number of operational IDROs). Next to that, a relevant question will be who will manage the ID formats in the future. For the market it is crucial that this format and agreed ways to use it will not limit the activities of CPOs and MSPs or other market parties.

The growth to an active IDRR with separate management organisation would require budget and resources. Furthermore, the experiences of the current set up of the IDRR will be important lessons for a future more mature IDRR. However, it remains to be seen whether such an evolution is necessary.

Deliverable 1.4 will take these issues into consideration.

ID and Data Collection for Sustainable fuels in Europe

Report

Deliverable 1.4.1 ***Report on requirements necessary to extend the approach of a common ID Registration Repository to all Member States***

Deliverable 1.4.2 ***Report with options for an institutional structure and support for the IT operations – beyond the period for this PSA, including funding mechanisms***

Project Acronym	IDACS
Project Full Name	ID and Data Collection for Sustainable Fuels in Europe
Grant Agreement number	MOVE/B4/SUB/2018-498/CEF/PSA/SI2.792684
Activity	1.4 Developing an approach to ensure the continuity of the common ID Registration Repository (IDRR)
Deliverable Status	Final
Dissemination Level	Public
Version / date	V2.0 (final, external) / 30-06-2022
Main author	Michel Bayings
Reviewers	Anneke Bosma, Netherlands Enterprise Agency Pauline Lanz, Netherlands Enterprise Agency Hielke Schurer, Netherlands Enterprise Agency

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List of abbreviations

AFID	Alternative Fuel Infrastructure Directive
AFIR	Alternative Fuel Infrastructure Regulation
CPO	Charge Point Operators
EC	European Commission
EAFO	European Alternative Fuel Observatory
IDRO	Identification Registration Organization
IDRR	Identification Registration Repository
JRC	Joint Research Centre
MSP	Mobility Service Providers
NAP	National Access Point
FTE	Full-time equivalent

1 Introduction

The Programme Support Action ID and Data collection for Sustainable fuels (PSA IDACS) aims to support the set-up of ID Registration Organizations (IDROs) and provide data on alternative fuels through the National Access Points (NAPs) in all participating Member States. The IDROs need to maintain the ID registration for Charge Point Operators (CPOs) and Mobility Service Providers (MSPs) with an unique ID for each organization. These IDs issued by the IDROs are used by CPOs and MSPs to identify charge contracts and charge stations. The use of the unique IDs supports the cross-border use of charge stations by EV drivers, as it enables domestic and foreign ad hoc payments. More information about this can be found in deliverable 1.1 and 1.2.

A total of 15 Member States participate in the PSA IDACS: Austria, Belgium, Croatia, Czech Republic, France, Germany, Greece, Hungary, Poland, Portugal, The Netherlands, Lithuania, Luxembourg, Slovenia and Spain. The UK does not officially participate; they ensue the IDACS project and are aligned with the decisions taken.

According to the goals of the PSA IDACS, the national IDROs are expected to collaborate at EU level via an ID Registration Repository (IDRR). The IDRR is expected to provide relevant and coordinated information at EU level on IDs, access to national ID registers and ID requests, amongst other possible features. It supports national IDROs with their activities and ensures long-term sustainable ID management.

2 Purpose

The purpose of this document is to outline the path for the sustainability and continuity of the ID registration system after the PSA IDACS has finished, both on the national level of the IDROs and the European level of the IDRR. The document will present the results of the following topics and tasks of activity 1.4:

- Information about how existing IDROs and the IDRR are setup by the PSA IDACS project members, which can be used as example for other/new IDROs.
- Options for an institutional structure and support for IDRO and IDRR.
- Requirements of the IDRR to extend the approach to all Member States.

The topics as described in this document result in the combined deliverable 1.4.1 and 1.4.2. Furthermore, this document refers to Deliverables 1.2.1 and 1.2.2 set-up of IDROs and 1.3.1, 1.3.2 and 1.3.3 on the set-up and management structure of the IDRR.

3 Methodology

To formulate a proposal on the requirements how to extent the approach of a common IDRR to all Member States, in first place, it provides an insight in the set-up and management of the IDROs and IDRR. Next to that, the resource requirements of the Consortium members were researched via a questionnaire. The results of this research are presented in chapter 4 and can be used as example for other Member States.

These taken resource requirements into account, options for an institutional structure and support beyond the PSA IDACS have been discussed by the Consortium and presented in chapter 5. Finally, in chapter 6, the Consortium presents a proposal on the requirements to extend the approach of a common IDRR to all Member States.

4 Resource requirements IDRO and IDRR

Almost all IDROs are organized on a national level (except for the Benelux IDRO). Due to this national approach, differences in set-up occur. To gain better insight in the resource requirements of these IDROs different topics were researched:

- Number of submitted IDs
- Collaboration forms
- Legal and governance structure
- Roles and responsibilities
- Funding and financing
- Support to other Member States
- Interaction with market players (CPO and MSP)

An analysis on the research results is presented in §4.1. In §4.2 a reflection is written on the resource requirements as stated in Deliverable 1.3.1.

4.1 Resource requirements IDROs

Before it is explained how the different IDROs are set-up, it is relevant to gain insight in the forecasted number of yearly registered IDs as this will have its impact on the needed effort and resources of the IDRO.

4.1.1 Expected yearly submitted number of IDs

Most IDROs forecast to issue between 10 and 40 ID requests per year in total for both CPOS and MSPs; only one IDRO forecasts 120 IDs per year. The number of IDs that will be requested can be unpredictable, as IDs can be used in different Member States and the market is continuously developing. The number of ID requests will be significantly more during the first years of an IDRO and slow down afterwards, as the majority will already have an ID and only new CPOs and MSPs need to request an ID-code.

A few developments should be taken into account, regarding the expected yearly amount of IDs:

- As IDs from a certain Member State can also be used in other Member States, it is possible that there is no longer a need to request an ID in a specific Member State.
- If each city has its own operator or acts as its own operator (e.g in Germany and France), the number of IDs can be significantly higher.
- More and more new parties will become active in the e-mobility market and due to the economy of sharing, the amount of semi-public poles (e.g. for clients of supermarkets, or restaurants) will also grow considerably.
- The market of CPOs and MSPs is still emerging in many countries. New CPOs and MSPs are being established, which results in more requested IDs on short term.
- Over the last years several CPOs and MSPs have been taken over by other companies which results in a more consolidated market with less market players. On the long term this can have an effect on the amount of requested and maintained IDs.

As an result the workload of an IDRO should be reassessed regularly. It was agreed this should be a recurring agenda item during the IDRR Steering Committee meetings.

4.1.2 Collaboration in IDRO set-up

It is possible that two or more Member States work together to set-up and organise the IDRO. Currently, only the Benelux Member States (Belgium, Netherlands and Luxembourg) are collaborating in this way. All other participating Member States have set-up and currently manage their own IDRO.

Collaboration can be interesting for the following reasons:

- Knowledge of ID and ID management can be organised collectively.
- Resources for managing and issuing the IDs can be shared and thus limited.
- There can be Member States where the expected amount of IDs is so limited, it is not beneficial to set-up an own IDRO.
- It can be an intermediate situation for Member States that do not yet have their own IDRO but already want to support the CPOs and MSPs.

Reasons why Member States manage the IDRO by themselves are:

- As the IDRO is a national governmental responsibility, it is less complex then collaborating with other Member States and create an official legal agreement for the collaboration.
- When the (potential) number of ID registrations in a Member State is so large that a national IDRO gives more value to the market.
- A positive financial business case for a national IDRO due to a large (potential) number of ID registrations.
- It can be more convenient to keep communication in their native language to support the market (besides English).
- When the IT-system of an IDRO is linked to the taxonomy system and/or to the National Access Point, e.g. in Greece and Poland.

4.1.3 Legal and governance structure of the IDRO

Three out of fifteen participating Member States have subcontracted the IDRO activity to an external organization (Germany, France and Greece). Germany has mandated the activity to their association for Energy and Water Industries (BDEW) and Greece subcontracted it to a public company. France has mandated the IDRO activity by a ministerial decree for a renewable term of 5 years to AFIREV. Using a mandate with a renewable term can be a good way to operate the IDRO via an external organization.

The legal base of the IDRO varies between the Member States. There are Member States that made it part of regulations and laws related to their Alternative Fuels Infrastructure policy framework. In addition, there are also Member States that simply make use of a decree by a transport-related Ministry.

4.1.4 Resources, roles, responsibilities and competence/skills

Most IDROs have one or two persons partially available, often this is not more than 1 FTE on a yearly base in total.

Once a system for registration and maintenance of IDs has been set-up, the actual effort of registration is quite limited; probably not more than 2 to 4 hours a week. However, questions will be asked that require answers, billing needs to be managed and contact with the applicants and stakeholders requires time. So even though registration activities will not require a lot of time from a net perspective, these related issues will require availability and time of the persons responsible for the IDRO activities.

Most of the effort is done by operational staff, supported by IT specialists for the automation of processes and maintenance of the website and system(s). However, as mentioned before, the workload should be reassessed regularly. A proposal is to discuss this topic on a regular basis during IDRR Steering Committee meetings.

4.1.5 Funding and financing of an IDRO

Based on the results obtained as part of the project, Member States have invested approximately 25.000 to 35.000 Euro on IT and related infrastructure for setting up their IDRO. In exceptional situations when public procurement is needed these costs are higher and can be up to 100.000 Euro. Occasionally, the set-up of the IDRO is also combined with other EV related activities like the introduction of the National Access Point (NAP) or the implementation of legislation (e.g. from AFID), which makes a specific indication of the costs more complex.

In terms of automation, the level differs per Member State. Most Member States have approximately 60 to 90% of their IDRO processes automated.

Cost covering fees

Currently 9 of the 15 Member States that are part of the IDACS project charge no fee for the registration and maintenance of IDs. A cost covering fee is allowed by the EU, however, national regulations can enforce that no cost shall apply for this kind of activities. In these situations the cost are covered via federal/state budget.

The Member States that do levy a cost covering fee (Benelux, France and Germany), often divide this fee into a registration and yearly fee. One time registration fees are approximately 100 Euro and yearly fees are between 50 and 90 Euro. Another option applied by France is to levy a cost covering fee for three years (200 Euro).

4.1.6 Support to other Member States for the set-up and maintenance

The majority of the IDACS project members are willing to give advice to other Member States who do not yet have an IDRO. During the project Member States developed awareness for the need and understanding of the concept of an IDRO. Moreover, each of the Member States also developed knowledge and experience in setting-up and operating an IDRO. Member States are willing to forward their knowledge to other Member States. As a result of the PSA IDACS a lot of documentation on the ID format and the IDRO set-up is available (check the deliverables of 1.1 and 1.2). Member States interested in setting-up an IDRO are advised to take notice of these documents.

Furthermore, the IDROs of Austria, Hungary, Portugal and the Benelux are willing to offer ID registration activities upon request on behalf of another Member State that does not yet have an IDRO. As this will have impact on the resources and costs of these IDROs, agreements should be made between the Member States. This can either be a temporarily situation or it can result in Member States working together as one IDRO (e.g. like IDRO Benelux).

4.1.7 Contact between IDRO and the CPOs and MSPs

The EV market is emerging rapidly with influences from standardization bodies, national and international (EU) regulations, and of course the market itself. IDROs and the IDRR support this market in the ID registration and maintenance. For these reasons, it is valuable for the IDROs to stay in touch with their customers - the CPOs and MSPs - regarding market developments and more specifically about the use and usability of the IDs. Within the timeframe of the PSA IDACS the Consortium agreed on a specific ID syntax and rules how to use it in good consultation with the market. However, future market developments could require e.g. a change to the syntax or the way it is issued and/or used.

The IDROs that are part of the IDACS project all acknowledge the need to stay in touch with the CPOs and MSPs. They do this in many different ways, e.g.:

- via national and regional representatives (e.g. at foundations or communities of CPOs and MSPs);
- via annual surveys;

- via workshops, online meetings and branch meetings that can either be initiated by the IDRO, the market itself or by other organizations (e.g. national bodies, government departments);
- in situations with a small number of CPOs and MSPs there can be direct one-on-one contact with these organizations.

4.2 Resource requirements IDRR

As stated in the Deliverable 1.3.2. the IDACS Consortium has decided to start with a light version of the ID Registration Repository (IDRR) organization.
The *IDRR Light* will execute two main tasks:

1. Present an overview and basic information about IDs and the IDROs
2. Manage discussions and possible needed changes of activities done by the IDROs, as far as this is limited to situations where EU-wide alignment is needed (e.g. change in format of IDs or way to use it).

4.2.1 IDRR web portal

The IDRR will be formed by the operational IDROs who will all be part of the IDRR Steering Committee. The IDRR will have its own IDRR web portal.

This portal will be set-up by the IDACS project and will contain information about:

- the concept of IDs including the agreed format
- the general rules about how and where IDs can be used
- the IDROs with overview and links to these individual IDROs and their registers

The portal will be hosted by one of IDROs (IDRO Benelux) and will be accessible through its own URL (www.emobilty-idrr.eu). The IDRO Benelux will also be responsible to maintain and update the information.

The IDRR webpage is developed as part of the website of the IDRO Benelux, which entails considerably less costs than building an own website. The IDRR webpage is managed by the team that is also managing the IDRO Benelux. It was estimated that managing the IDRR webpage will cost approximately 4 hours per month.

4.2.2 Management support structure

The management support structure of the IDRRR is formed by the Steering Committee of the IDRR. The Steering Committee will consist of one representative of each operational IDRO. The European Commission (DG MOVE) will also be invited to attend these meetings. Bi-annual (remote) meetings will be organised to evaluate experiences, discuss the developments and possible issues and, if necessary, changes, concerning the IDRR activities or the ID format and the usage of IDs. The meetings will be held virtually and organized by the assigned chairman/chairwoman and secretary. During the first meeting of the IDRR, the first chair will be decided upon. Organizing these events, including wrap up is expected to approximately cost 40 hours-work per meeting. Besides, each IDRO will spend approximately 12 hours of work on preparation, attending and dissemination of the outcomes of the Steering Committee Meeting.

More information about the IDRR Light is described in Deliverable 1.3.3 IDRR set-up.

5 IDRR: options for an institutional structure

During the IDACS project the IDRR Steering Committee will be established in the last quarter of 2021, and supported by its webpage at www.emobility-idrr.eu. As elaborated in previous deliverables 1.3.1, 1.3.2 and 1.3.3. this is a 'light solution'. Based on the resource requirements mapped in the previous chapter, options for future institutional and funding structures of the IDRR and its relation with the IDROs are described in this chapter.

The institutional structure of the IDROs is described extensively in Deliverables 1.2.1 and 1.2.2.

5.1 Functions of the IDRR

On EU level the IDRR which will be set-up, acts as an overarching repository for the IDROs and a central portal for CPOs and MSPs to find information about IDs and links to individual IDROs. As stated in Deliverable 1.3 and the Grant Agreement, the Member States and the European Commission agreed that the IDRR should at least support the following functions:

1. Searching existing ID-codes and finding contact-details related to the ID-code (respecting the provisions of the General Data Protection Regulation). For this purpose, the IDs in use in the different countries will be synchronised when IDs are issued or changed via national IDROs;
2. Requesting the allocation of new ID-codes via national IDROs (for example to avoid duplicates, but also to avoid that the same code is issued at the same time, by different national IDROs);
3. Uploading new ID-codes and the relevant metadata that have been assigned after the validation check.

These functions are taken into account with the set-up of the IDRR by the Consortium and are further described in deliverable 1.3.1, 1.3.2 and 1.3.3.

5.2 Variations of IDRR Governance models

Noticing the functionalities stated in §5.1, an IDRR can be set-up in different ways each with a different governance model. The Consortium appointed three different IDRR-models: the original ambition, variation 1 and variation 2.

The original ambition envisaged an independent IDRR organization with an IT-system/website that covers the functions as stated in §5.1. This would require many resources and cost that are not in proportion to the value added. Therefore, the Consortium discussed alternative IDRR models which could also execute the tasks of the IDRR, only with less resources. Besides the original ambition, two more IDRR-models were added as option for set-up: a model where the IDRR is part of one IDRO (variation 1) and the IDRR as part of all IDROs (variation 2).

<u>Original ambition: Independent IDRR</u>

- In this situation the IDRR is operating as a full independent organization.
- It has its own governing board and daily operational management with own staff.
- The individual IDROs are connected to this organization for support and data exchange.
- This IDRR has its own profit and loss responsibility.

<u>Variation 1: Part of one IDRO</u>

- This IDRR is managed by one IDRO who is willing to take this role and who is appointed by the other IDROs to manage the IDRR.
- It has a Steering Committee or elected Board and separate Secretary. The Secretary can be 'delivered' by the managing IDRO.

- The individual IDROs are connected to this organization for support and data exchange but do not need to be part of the Steering Committee.
- As the IDRR is using its own system, it can be transferred to another IDRO for the daily operations with limited effort.
- The required cost/resources need to be financed by all the IDROs together.

<u>Variation 2: Part of all IDROs</u>

- This IDRR is governed by all IDROs via the IDRR Steering Committee.
- All individual IDROs are represented in and part of the Steering Committee.
- The IDRR is executed by one of the IDROs which is managing the web portal of the IDRR.
- Although this IDRR has its own webpage, it is part of the IDRO organization which is also doing the daily operations. There is no separate secretary and cost for operations are limited.
- This version is also called IDRO Light.

The figure below gives an overview of the different IDRR models, as was described in deliverable 1.3.

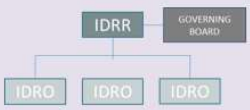
	ORIGINAL AMBITION	VARIATION 1	VARIATION 2
CONCEPTUAL ORGANIZATIONAL STRUCTURE			
GOVERNANCE	Governing board	Committee or elected board and secretary	committee
SET UP	Independent	Part of 1 IDRO	Part of all IDROs
RESOURCE REQUIREMENTS	high	lower	hardly
COST SYSTEM REQUIRED?	Yes	Yes	No

Figure 1: Overview different IDRR models

All three IDRR models support the three main described functions (§3.1). The IDRR Light will do this via references to existing IDROs and links to their ID registers and ID request webpages. While the independent IDRR from the original plan supports these tasks more actively, e.g. by one system which can synchronise ID overviews, offer search functionalities for all IDs and direct application for an ID via one of the connected IDROs. However, the set-up and operational costs of an independent IDRR (original ambition) are at this moment in time not in proportion regarding the added value of the service performed. Therefore, the Consortium decided to start with an IDRR Light (variation 2), with possibility to grow into an independent IDRR. The intermediate variation 1 is not seen as a logic step in between, as it only changes the organisational structure without clear benefits for the execution of the tasks.

5.3 Evolution of the IDRR

In February 2021 the Consortium decided the IDRR should start as an IDRR Light (Variation 2). The IDRR webpage was published in October 2021 and the first Steering Committee was held in May 2022. The Consortium has the desire to first gain experience with this governance model (IDRR Light), and review its functioning on a yearly base before any changes are made to the model.

The annual evaluation could point out reasons to change the IDRR Light-model or changes in EU legislation (AFIR), e.g. if more tasks need to be added, current tasks are expanded, improvement of user-friendliness and/or the efficiency of the daily management. In this context, there could be a preference to grow into (part of) an independent organization as it has more autonomy and stability ((e.g. part of an EU (mandated) institution).

5.4 Cost, fees and funding

The governance model of the IDRR determines the amount of funding and financing necessary. In the case of an IDRR Light, as is proposed, the cost are limited to website set-up, maintenance and organising meetings of the Steering Committee – which is financed by the participating Member States. However, if the IDRR evolves into an independent organization with more tasks, more costs will be involved. These costs could be financed by contributions of the national IDROs and/or by the EC. Therefore, the possibilities of funding mechanisms by the EC should be explored regularly. This could be a recurring agenda item for the IDRR Steering Committee.

The operational costs of an independent IDRR can be funded by annual IDROs fees, calculated on the basis of the budget of the IDRR. Each fee should be proportional to a significant number, e.g: the number of IDs or number of plug-in vehicles in the country/countries covered. This calculation should not have a distorting effect on the way an IDRO manage IDs. Funding the IDRR via a fee from each company requesting an ID is complicated as not all IDROs levy a cost covering fee to their CPOs and MSPs. This could result in an unbalanced way of funding between Member States. Some Member States fear the additional cost for CPOs and MSPs which can be a barrier to enter the market.

The details of the needed amounts and structure for covering the cost for set-up and operations of an independent IDRR requires further analysis, as costs are strongly coherent to choices in the set-up. The following main cost components can be differentiated:

- Set-up of interactive portal/website for CPOs and MSPs to get more information about IDs and with search function to existing IDs.
- Set-up of mechanism for requesting an ID at a specific IDRO via the IDRR portal/website
- Set-up of synchronisation mechanism with ID registers from all individual IDROs
- Maintenance costs of the interactive portal/website
- Resources: director with administrative support
- Communication cost for contact with all stakeholders including the Governing Board

5.5 Continuity of IDRR

The IDRR starts as a Light version in the autumn of 2021. To guarantee the continuity after the IDACS project the following agreements are made:

1. The IDRR will be set-up as a light organization, which can be maintained at minimal costs and with limited resources. In this setup the IDRR will be managed by all IDROs.
2. The IDRR will be managed by a Steering Committee that exist out of a representative of all Member States that have an operational IDRO, where the European Commission will be invited in the role of guest. They will support the IDRR organization, while the IDRR can support the IDROs with knowledge and operational support of the IDRO activities.

The IDRR chair will initiate at least twice a year a (virtual) meeting with the Steering Committee to discuss possible issues, learn from each other and discuss future developments in the EV market that might influence the role and tasks of the IDROs. During these meetings an annual evaluation of the IDRR should be done.

It is likely that when more Member States set-up an IDRO the importance of coordination and support at the EU level increases, both for EV market (incl. but not limited to CPOs and MSPs) and the IDROs.

Combining existing organizations with IDRR role

During Activity 1.3 the IDACS Consortium already investigated the possibility of having the IDRR activities carried out by an existing organization, so that unnecessary overhead cost of a new organization could be avoided. This resulted in the IDRR light set-up at minimal cost.

To create a mature repository with an institutional purpose at EU level it would be reasonable to also add other EV or even alternative fuels tasks stemming from EU legislation. The IDRR would have a unique position as it has direct links with all Member States and IDROs in these Member States. In the future, these tasks could be executed either entirely independent by Member States coordination, or as part of an existing organization, e.g.:

- EAFO (European Alternative Fuel Observatory): portal from the European Commission with multiple data and statistics on the status of alternative fuels infrastructure and vehicles in Europe
    - Pro: existing EU observatory with experience on handling big volumes of data on e-mobility and alternative fuels in general. In addition, ample knowledge of this platform by relevant stakeholders.
    - Con: not equipped yet for active communication with market parties like CPOs and MSPs
- JRC (Joint Research Centre or European Agency): the European Commission's science and knowledge service carries out research in order to provide independent scientific advice and support to EU police.
    - Pro: Could maintain the ID syntax, although JRC is not acknowledged as a standardization body
    - Con: Not equipped yet for interaction with market parties like CPOs and MSPs
- ERTICO: a commercial independent branch organization for companies in the Intelligent Transport Systems market.
    - Pro: familiar with IDs as they formerly operated eMI3 who ‘designed’ the first ID formats
    - Con: commercial organization managed by members mainly from ITS side and no or very limited number of CPOs and MSPs. Also not official EU organization.

These organizations and platforms are mentioned as possible candidates. Nevertheless, there might be other organizations in Europe that could eventually show a better fit, which have been unknown to the Consortium.

As the functionalities of the more mature IDRR are not determined, it is hard for the Consortium to point out one of these organizations as the perfect match. Although EAFO, as EU organization focused on alternative fuels, and ERTICO, as independent organization, might be a reasonable approach to investigate in case of growing towards an independent IDRR. Importantly, this organization should deal with, and be motivated by, several functions of the same kind in relation with the development of an open common market of charging and e-mobility service in Europe.

When the IDRR Light is not sufficient anymore, an independent IDRR can be an option however further research is needed for the exact format. The Steering Committee of the IDRR will assess annually the current situation of its governance and management model, delivering to the European Commission a short paper on current evolution and further actions or support on this area.

5.6 Involvement of IDRO and IDRR towards stakeholders and the market

Both IDRO and IDRR support the e-mobility market. For their existence it is important to be in touch with the market players and stakeholders on a regular basis. In several Member States there is no branch organization or any representing group of the electric mobility market. If such a representing group does not exist, the IDRO has the possibility to organise meetings and gain insights from the market about IDs and related topics. This can also encourage branch organizations to be set-up.

Also for the IDRR the involvement with the market is important as it is the EU entrance for CPOs and MSPs to information about IDs and links to the IDROs. In the situation of an IDRR Light this market connection occurs through the IDRR web portal and via the connected IDROs from the Member States who are represented as stakeholders in the Steering Committee. The IDRR Light will not organise additional market related activities.

If the IDRR grows towards an independent organization, it is likely that the IDRR will get direct relations with market parties and organizations, besides the relation with the participating IDROs.

5.7 Connection with the EU

The IDRR must have links to the EU and its organizations. The IDROs are indirectly linked to the EU through the IDRR. At this moment it is unclear how the EU foresees this connection and what kind of support they are able and willing to give. The new proposal for a Regulation on Alternative Fuels Infrastructure (AFIR) mandates that Member States shall appoint an Identification Registration Organisation (IDRO). The IDRO shall issue and manage unique identification (ID) codes to identify, at least operators of recharging points and mobility service providers, at the latest one year after the date referred to in Article 24. Consequently, an IDRO shall be establish by all Member States.

In this context, the participation as a guest of the European Commission on the IDRR Light Steering Committee represents an opportunity for Member States to transmit their challenges and recommendations on how to continue supporting the development of an open data ecosystem for e-mobility and alternative fuels in general.

In addition, the Consortium proposes to share the written outcomes reached as part of the deliberations of the IDRR Steering Committee, as well as specific recommendations to the European Commission, specifically to DG MOVE and the relevant intelligent transport unit. It is important for the IDRR Steering Committee to interact on a common ground with the EU and to be able to anticipate on new legislation and activities.

6 Extend the approach of the IDRR to all Member States

As can be read in the proposed revision of the Alternative Fuel Infrastructure Regulation (July 2021), the EC requires to set-up national IDROs in all EU Member States. At the end of the PSA IDACS (30 June 2022), all 15 Member States which participated in the PSA IDACS will have established a national IDRO. Member States that did not participate will have to set-up an IDRO within one year from the day the AFIR has entered into force.[1] These Member States can benefit from the work of the IDACS Consortium on the ID format, IDROs and IDRR.

6.1 Support by the IDRR

The IDRR aims to support and coordinate at European level national IDROs with their activities and offer IDRO functionalities to Member States who might not have their own IDRO yet.

Therefore, the current IDRR Light organization will support Member States by giving all kind of information about the reason and purpose of ID and IDROs, how they can be set-up and organised. A website with information will become available via: www.emobility-idrr.eu and includes the contact details from individual IDROs who indicated that they are willing to support other Member States setting up their IDRO.

6.2 Entry of new established IDRO to the IDRR

When new IDROs are established by Member States, these should be able to join the IDRR Steering Committee and be linked to the webpage of the IDRR (www.emobility-idrr.eu). An admission procedure for new IDROs should be defined by the IDRR Steering Committee and this procedure should be made clear on the IDRR webpage.

6.3 Communication

To be found by national governments, CPOs and MSPs the external visibility of IDROs and IDRR is of great importance. This can be via presentations, press releases, a website or social media channels and via internet search engines.

[1] The regulation will enter into force on the twentieth day following on of the publication of the AFIR in the Official Journal of the European Union.

Report

Deliverables 2.1.1 – 2.1.6*:* ***Static and dynamic data collected from electric charging points, hydrogen stations and other fuels filling stations per participating Member State***

Project Acronym	IDACS
Project Full Name	ID and Data Collection for Sustainable Fuels in Europe
Grant Agreement number	MOVE/B4/SUB/2018-498/CEF/PSA/SI2.792684
Activity	2.1 Data collection for electric mobility, hydrogen and other fuels
Deliverable Status	Final
Dissemination Level	Public
Version / date	V.2.0 (final, external) /30-06-2022
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List of abbreviations

AFI	: Alternative Fuels Infrastructure
AFID	: Alternative Fuels Infrastructure Directive
CNG	: Compressed Natural Gas
CPO	: Charge Point Operator
FCH-JU	: Fuel Cells and Hydrogen Joint Undertaking
GNSS	: Global Navigation Satellite System
HRS	: Hydrogen Refuelling Station
IDRO	: ID Registration Organization
ITS	: Intelligent Transport Systems (directive)
LNG	: Liquefied Natural Gas
LPG	: Liquefied Petroleum Gas
MSP	: Mobility Service Provider
NAP	: National Access Point
PSA	: Program Support Action

1. Introduction

For the successful uptake of sustainable modes of transportation it is essential that there is clear, reliable and up-to-date information for consumers about the location and availability of recharging and refuelling points. These data need to be accessible in an open and non-discriminatory manner to all users. The main objective of *activity 2.1* of the IDACS project is to gather missing data (both static and dynamic) related to the alternative fuels infrastructure for electricity, hydrogen and other fuels (LNG, CNG, LPG and biofuels) so these data can be made available to end users through the National Access Points (NAPs) of the Member States. In activity 2.1. the data as prescribed by the European Commission will be collected by each Member State on a continuous basis via a country specific approach.

2. Purpose of this document

This document aims to present the results of the actual data collection on alternative fuels infrastructure done by the participating Member States between 2019 and 2021. From the start of the project the process and frequency of data collection has been developing at different speeds in the participating Member States and has been combined with work on the provision of these data in DATEX II format through the NAPs, which is covered in activity 2.2.

The results presented in this report concern all fuel tracks covered by the IDACS project and therefore this document presents a combination of multiple deliverables, namely the following:

- 2.1.1 Static and dynamic data collected from electric charging points per participating Member State;
- 2.1.2 Static and dynamic data collected from hydrogen stations per participating Member State;
- 2.1.3 Static and dynamic data collected from LNG filling stations per participating Member State;
- 2.1.4 Static and dynamic data collected from CNG filling stations per participating Member State;
- 2.1.5 Static and dynamic data collected from physical LPG filling stations per participating Member State;
- 2.1.6 Static and dynamic data collected from high blended biofuels per participating Member State.

Deliverable 2.1.0 on a common approach and guidelines for data collection is elaborated by the participating Member States in a separate document.

3. Methodology

The methodology used for the collection of data presented in this document follows the overall approach as described in the Grant Agreement. This means the following steps were taken by the Consortium members to prepare and conduct the actual collection of data via a country-specific approach:

1. Each of the Member States examined the current situation of data collection and defined how the information can be collected. In some Member States a national or regional database for (one or more of the) alternative fuelling/charging infrastructures, was already in place. The database could act as NAP, or the NAP could draw its information from this database. However, in many Member States this was impossible or not all required (dynamic/static) data was collected and/or the information might be incorrect, incomplete or outdated;[1]
2. This diversity in national situations meant that each country defined how the national data could best be collected and what type of architecture for the NAP was required, and which organization needed to be set-up and maintained;
3. An overall implementation plan was also drawn up that Member States could use for their country-specific implementation plan. This included, for example, activities, resources, time-plan, challenges / risks and mitigation measures;
4. In addition, it was and is an essential step to create broad acceptance and commitment from all relevant alternative fuels sectors. The Member States involved the relevant stakeholders in the country, to secure broad participation and commitment. This could for example consist of market actors like Charge Point Operators (CPOs), Mobility Service Providers (MSPs), alternative fuels operators, public authorities (national, regional and local) and grid-operators.

[1] Dynamic data can only be collected for charging points which are digitally connected to a central station and cannot be collected from (so called) dumb chargers. Nonetheless, it is market standard that charging equipment provides interfaces for electronic communication and in some of the Member States this is a legal requirement. Therefore, the share of 'dumb' chargers is negligible. The same is true for hydrogen refuelling stations.

4. Deliverable 2.1.1: Data collected from electric charging points

4.1 Objective

This deliverable aims to collect both static and dynamic data on all publicly accessible electric charging points in the participating Member States. The Consortium members are required to collect at least the following data, as laid down in the Grant Agreement:

- ***Static data:***
  - Location:
    - GNSS coordinates;
    - Address (street name, zip code, city,…).
  - List of available charge-solutions (Power, Modes);
  - List of available connectors (plugs, sockets, induction plate...);
  - Opening hours, identification and payment methods;
  - Contact info for owner/operator;
  - Full e-mobility code of the charging point (outlet).
- ***Dynamic data:***
  - Availability (if the station is operational/ non-operational);
  - Occupation status (free, occupied);
  - Price for ad-hoc charging.

4.2 Overview of data collection per Member State

<u>Status of data collection in 2019</u>

At the start of the project in 2019 the existing situation regarding data collection was analysed and described for each of the participating Member States. The results were laid down in Deliverable 2.1.0. Guideline document For Data Collection and National Access Points. This deliverable is being updated on a regular basis and will be finalized by in December 2021. The table below shows the status in 2019 of the data collection in the participating Member States.

Electric Charging Points - 2019

FYI: information stated below is dated from 2019

Country	AT	BE	CZ	ES	FR	GER	GR	HR	HU	LT	LUX	NL	PL	PT	SI
Data collection at national level?	Yes	regional level	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Partly
Public, private or public-private	public-private	private	public and		private	public	public and	public and	private	public	public-private	private	public	public	public and
Data publicly available?	Yes	Yes	Yes		Partly	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Partly
Static Data:															
- GNSS coordinates	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Partly
- Address (street name, zip code, city,…)	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- Available charge-solutions (power, modes)	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- Available connectors (plugs, sockets,…)	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- Opening hours	Yes, when	Yes, when	Yes		Yes	No	Yes	Yes	Yes	No	Yes	Yes, when	No	Yes	Yes
- Identification and Payment methods	Yes	No	Yes		Yes	No	Yes	Yes	No	No	No	Yes	No	Yes	Yes
- Contact info for owner/operator	Yes	Yes	Yes		Yes	No	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes
- Full e-mobility code of the charging point (outle	Yes	No	No		Yes	No	No	No	No	No	Yes	Yes	No	Yes	No
Dynamic Data:															
- Availability (operational / non-operational)	Yes (voluntary	Yes	No		Yes	No	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Partly
- Occupation status (free / occupied)	No	Yes	No		Yes	No	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Partly
- Price for ad-hoc charging	Yes (voluntary	No	No		No	No	No	No	No	No	No	No	No	No	No

Table 1: Status of data collection in 2019 in IDACS MS on publicly accessible electric charging points

In 2019 approximately 80% of the participating Member States already had some form of data collection on electric charging points in place at the national level. However, looking at the baseline situation in 2019 the following points stood out:

- the collected data did not contain all IDACS data categories, especially dynamic data was not always accessible;
- Member States sometimes collected other data types in addition to the IDACS data categories, such as:
  - type of site (parking, street, shop, etc),
  - detailed access description,
  - parking information (eg. number of parking spaces)
  - Roaming yes/no,
  - type of energy source
  - name of energy product
  - parking information
  - photographs of the charging point station
  - comments from users
- the data quality was not always optimal; data could be incorrect, incomplete or not up to date.
- the data collection could be performed by either a public, public/private or private party;
- the data collection was in many cases not (yet) linked to the NAP.

Since 2019 Member States have made an effort to make more data categories publicly available (especially dynamic categories), increasing data quality and linking collected data to the NAP. In 2019 and 2020 there was no official publication of the DATEX II extension that covers (alternative) fuels infrastructures. As a result, it was not yet possible for Member States to make all data available in DATEXII.

Updated status of data collection in 2021

To monitor the progress in data collection for electric mobility by the Member States the status of data collection was analysed again mid-2021. The table below shows the current status of summer 2021 of the data collection in the participating Member States.

A more detailed overview of the status of data collection per Member State in 2021 can be found in Annex 1.

Electric Charging Points - 2021

Country	AT	BE	CZ	ES	FR	GER	GR	HR	HU	LT	LUX	NL	PL	PT	SI
Data collection at national level?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Public, private or public-private	public	private	public and private	public	public and private	public	public and private	public and private	public	public	public-private	private	public	public	public
Data publicly available?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Static Data:															
- GNSS coordinates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- Address (street name, zip code, city,...)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- Available charge-solutions (power, modes)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- Available connectors (plugs, sockets,...)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- Opening hours	Yes, when available	Yes, when available	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Yes	Yes, when available	Yes	Yes	Yes
- Identification and Payment methods	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	N/A	No	Yes	Yes	Yes	Yes
- Contact info for owner/operator	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
- Full e-mobility code of the charging point (outlet	Yes	Yes	No	Yes	Yes	No	N/A	No	Yes	No	Yes	Yes	Yes	Yes	No
Dynamic Data:															
- Availability (operational / non-operational)	Yes (voluntary)	Yes	No	No	Yes	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes
- Occupation status (free / occupied)	No	Yes	No	No	Yes	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Partly
- Price for ad-hoc charging	Yes (voluntary)	Yes	No	No	No	No	Yes	No	No	N/A	No	Yes	Yes	No	Partly

Table 2: Status of data collection in 2021 in IDACS MS on publicly accessible electric charging points

Where in the baseline situation in 2019 approximately 80% of the participating Member States had some form of data collection on electric charging points, this has grown to 100% during the IDACS project in 2021. Member States that did not yet have data collection at a national level have addressed this from the start of the project and have been looking for a suitable way to appoint a responsible organization or platform. While some Member States have taken the initiative themselves and have started to arrange the data collection through a public organization, other Member States have focused on expanding the data categories or the quality of the data. Based on the harmonized categories and the quality requirements, parties were approached and stakeholders were informed about the goals of the project. In addition, the legal requirements and regulations in some Member States have also been adjusted so that data collection could take place that meet the IDACS standards.

4.3 Lessons learnt

Looking at the current status of data collection on electric charging points in the participating Member States and the progress and improvements made by Member States since 2019 the following main conclusions and learnings can be drawn.

<u>Lesson 1: importance of broad acceptance and commitment from stakeholders</u>

For proper data collection it is essential to create broad acceptance and commitment from the relevant alternative fuels sectors. All Member States have involved the relevant stakeholders in their countries to secure broad participation and commitment by approaching industry associations, organizing stakeholder sessions and sharing information from the IDACS project. This consisted of market actors like CPOs and MSPs, public authorities (national, regional and local) and grid-operators. The input and cooperation of these parties is indispensable. Commercial operators who are asked to provide the static and dynamic data on a voluntary basis, do not always agree with all data elements. The sharing of dynamic data is especially sensitive (see also D 2.1.0 chapter 4.5.4 Stakeholder input). Member States have dealt with this in different ways:

- The choice for the architecture of the NAP. For example, by choosing a register in which the market parties remain the owner of the data. These market parties then can determine the conditions for the use of dynamic data (to a certain extent: this can still be limited by, for example, legislation) .
- Legislation and regulation. By making additional legislation, parties can be obliged to make certain (dynamic) data publicly available.
- Create general conditions for data on the NAP. By creating conditions for the use of the data by third parties, the objections of the operators can be met. For example, by prohibiting in the conditions that dynamic data is stored for analytical purposes.
- Fees for the data. Being able to deliver good quality dynamic data costs money. This can be financed in various ways. One option is to charge a reasonable fee for the data. This gives operators the opportunity to invest in the quality of the data.
- Offer different types of data on the NAP. For example, by making a separation between free data and data for a fee. The data for which a fee is charged can then, for example, have a higher update frequency.

Lesson 2: need for regulations / legislation to enforce data collection

A mandatory framework seems necessary to make all static and dynamic data available to the public. At the national level, it has been shown several times that additional legislation was needed to ensure the data collection to take place.

The data collection requirements as laid down in the relevant Directives (AFID, ITS) do not fully align with the data collection requirements as prescribed in the Grant Agreement. The current ITS directive is less strict about dynamic data (dynamic data is optional) compared to the PSA IDACS project (dynamic data is mandatory). A solution for some Member States was to work on additional legislation in order to also make dynamic data collection mandatory. Another option may be an agreement with the sector organization or another regulatory body to ensure that dynamic data is also covered in the data collection process.

Lesson 3: balancing requirements versus the burden on companies

Dynamic data sharing is complex. First, the dynamic data represents a commercial value for some parties and may contain sensitive information. In addition, it is also a technical challenge: for smaller parties it can be technically demanding to constantly make dynamic data available. Systems of alternative infrastructure operators have their limitations and can process a maximum number of requests per hour. The higher the requirements for update frequency, the higher the burden (cost) for alternative fuels infrastructure operators becomes. A balance should be found and this may differ per country (e.g. depending on the maturity of the market).

5. Deliverable 2.1.2: Data collected from hydrogen stations

5.1 Objective

This deliverable aims to collect both static and dynamic data on all publicly accessible hydrogen refuelling stations (HRS) in the participating Member States. The Consortium members are required to collect at least the following data, as laid down in the Grant Agreement:

- ***Static data:***
    - Location (GNSS coordinates/ street name)
    - Opening hours, identification and payment methods
    - Contact info for owner/operator
- ***Dynamic data:***
    - Operational Status (if the station is operational/ non-operational)

5.2 Overview of data collection per Member State

Currently, data collection on HRS is already taking place - mostly on two separate European platforms. Firstly, an application by the company H2 MOBILITY Deutschland GmbH & Co. KG (hereinafter: H2 MOBILITY) called H2.LIVE covers all the required data categories and most of the HRS in Europe. It is available to any end consumer with a smartphone, tablet or via web-browser. Furthermore, H2.Mobility offers an API service for operators (HRS-Connect). Secondly, the “HRS availability system” that has been procured by the Fuel Cells and Hydrogen 2 Joint Undertaking (hereinafter: FCH-JU) has been being rolled out across Europe.

<u>Status of data collection in 2019</u>

At the start of the project in 2019 the data collection via these two data platforms was analysed and described for each of the participating Member States in Deliverable 2.1.0. The table below shows the 2019 status of the data collection on HRS in the participating Member States.

Hydrogen - 2019

Country	AT	BE	CZ	ES	FR	GER	GR	HR	HU	LT	LUX	NL	PL	PT	SI
Static Data:															
- GNSS coordinates	Yes	Yes		Yes		Yes						Yes			
- Address (street name, zip code, city,…)	Yes	Yes		Yes		Yes						Yes			
- Opening hours	Yes	Yes		Yes		Yes						Yes			
- Identification and Payment methods	Yes	Yes		Yes		Yes									
- Contact info for owner/operator	Yes	No		Yes		Yes						Yes			
Dynamic Data:															
- Availability (operational / non-operational)	Yes	Yes		Yes		Yes						Yes			

Table 3: Status of data collection in 2019 in IDACS MS on hydrogen refuelling stations (HRS)

<u>Updated status of data collection in 2021</u>

To monitor the progress in data collection for hydrogen by the Member States the status of data collection was analysed again mid-2021. The table below shows the current status of the data collection in the participating Member States.

A more detailed overview of the status of data collection per Member State in 2021 can be found in Annex 2.

Hydrogen - 2021

Country	AT	BE	CZ	ES	FR	GER	GR	HR	HU	LT	LUX	NL	PL	PT	SI
Data collection at national level?	Yes	Yes	No	Yes	Yes	Yes	No	No	No	No	No	Yes	No	No	Yes
Public, private or public-private	private	public and private		public	public and private	private						public and public/ private			public
Data publicly available?	Yes	Yes		Yes	Yes	Yes						Yes			
Static Data:															
- GNSS coordinates	Yes	Yes		Yes	Yes	Yes						Yes			
- Address (street name, zip code, city,…)	Yes	Yes		Yes	Yes	Yes						Yes			
- Opening hours	Yes	Yes		Yes	Yes	Yes						Yes			
- Identification and Payment methods	Yes	Yes		Yes	Yes	Yes						Yes			
- Contact info for owner/operator	Yes	Yes		Yes	Yes	Yes						Yes			
Dynamic Data:															
- Availability (operational / non-operational)	Yes	Yes		No	Yes	Yes						Yes			

Table 4: Status of data collection in 2021 in IDACS MS on hydrogen refuelling stations (HRS)

Looking at the situation of data collection for hydrogen not much had changed in 2021 compared to the baseline situation in 2019. Two additional Member States started to collect data at the national level. The main reason for the other Member States not to collect data on hydrogen is simple: the absence of data to be collected. Most of these Member States do not have any hydrogen stations in their country or the first hydrogen stations have only recently been opened.

5.3 Lessons learnt

Looking at the current status of data collection on HRS in the participating Member States and the progress and improvements made by Member States since 2019 the following main conclusions and learnings can be drawn.

Lesson 1: data aggregation and source dependence

Apart from the two data platforms mentioned in section 5.3., data can be collected on the level of the individual HRS operator. Depending on the number of HRS operators in a country, this may lead to several data sources that may make data collection more burdensome. The two platforms already aggregate data for most HRS in Europe.

Data collection from a platform will always be more efficient, however, Member States will be dependent on the platform they choose. This is of particular importance with regard to the sustainability of financing the data bases. In a pre-market environment, such as hydrogen refuelling for retail, it has to be considered that the existence of such databases may be contingent upon funding. On the one hand for example, throughout most of 2020 the FCH-JU's availability system did not connect any new stations as the new procurement mission was not underway. Consequently, the dataset was not up to date during that time and there was uncertainty about the future financing and whether a new procurement mission was going to be launched. On the other hand, an HRS operator operating a data platform, such as H2.LIVE, may go out of business in such a pre-market environment, which might put an end to the platform.

Lesson 2: collection of static data versus dynamic data

As there are two types of data categories, it is advisable to establish two different types of data streams. *Static data* will not need to be refreshed as often and in intervals as short as dynamic data. The location, opening hours, identification and payment methods as well as the owner contact info are not expected to change on a regular basis. The static data can be uploaded to the HRS operator's servers, the server of the FCH-JU's HRS availability system or to H2.LIVE and be collected from there to the NAP.

Dynamic data collection for Hydrogen

The hardware needed to collect dynamic data is made up of decentralised modules (Raspberry Pi Compute Modules, such as the RevPi Core 3 by Kunbus) that are integrated in the HRS in both HRS Connect (H2.LIVE) and the FCH 2 JU's E-HRS-AS. These small industrial computers work as control devices that measure a voltage and identify binary dispenser availability signals (either available or unavailable). HRS Connect is integrated deeper into the station and collects a lot more data than mere availability. These signals are then transmitted via a LAN or Wi-Fi connection to a backend server, e.g. the HRS operator's own servers or the FCH-JU's availability platform. If there is no internet connection in place because the HRS is located in a remote area, separate routers can be installed. The availability signals can be overridden manually by a technician at site in order to set the availability state to the desired status. HRS operators should also have the possibility to this remotely via their servers. This is important as internet connections may fail and HRS operators need to be able to signal to FCEV drivers that they can refuel their vehicles if they know that that is possible.

The technically more challenging part of the data collection concerns the *dynamic data* collection, i.e. real-time signals on the operational status of the HRS (see textbox for details). In particular, not all stations were equipped with computers for automatic data transmission, which meant that they needed to be retrofitted. Nonetheless, the market standard includes such equipment for the monitoring of the proper functioning of the infrastructure..

Lesson 3: Data Quality

Throughout the time of the PSA, the status of the datasets in terms of completeness varied. Not all the data was always available on one of the platforms and different quality criteria were set. This often depended on different rationales of the existence of the data platforms. Whereas the FCH-JU's HRS availability system aimed at providing all HRS in Europe with their hardware solution (see box) to help set common minimum standards for data quality, the H2.LIVE platform took a more 'pragmatic' approach. For example, operators of stations without hardware for the automatic transferral of availability/operationality data have the option to set statuses manually using the H2.LIVE operator app. However, their statuses are not displayed in the FCH-JU's system as this does not comply with the quality standards of this system. In contrast, the rationale of letting HRS operators set their statuses manually is that the customer has at least some information on the operationality of the station and that the station operator has no interest in providing inaccurate information that may frustrate his customers. In the end, both approaches come with a trade-off in terms of data quality: in one case the dataset is less complete (one station without live status), in the other the probability that the live status is incorrect may be higher.

Lesson 4: Data formats

The main challenge throughout the IDACS project was that even though data was to be made available on the NAP in DATEX II or any other machine-readable format, static and dynamic data on HRS could not be provided on any NAP in DATEX II as specifications of DATEX II v 3.2 were only published during June 2021. The official publication of the extension (part 10 on energy infrastructures) to the standard 16157 had been repeatedly delayed. Even though it was stated to be published in "late spring / early summer", a publication in autumn 2021 seems more likely. Therefore, a conversion of the data could not be undertaken for fears the specification may change. The data of the two different European platforms is made available in the JavaScript Object Notation (JSON) as a file format but there is no standardized communication protocol for HRS data. As many Member States wished to combine placing the data on the NAP with the conversion into DATEX II as this was the most efficient way to comply with the requirements of the Grant Agreement, efforts came to a halt until the DATEX II v 3.2 specifications were published.

Lesson 5: Open data

In line with the principles of the European data strategy, access to data should be as free as possible, i.e. it should flow freely for the benefit of businesses, researchers and public administrations. Both data platforms allow the end-consumer free access to their data via their websites (and the H2.LIVE app). The FCH-JU's HRS Availability system also offers access to an open API and therefore grants access to third-party actors to make "derivative works starting from it, such as map-based web apps" as stated in the legal notice. In the case of H2.LIVE, no such open API exists, however as in the case of other HRS operators such requirements can be made part of a procurements or funding criteria.

6. Deliverable 2.1.3 – 2.1.6: Data collected from Other fuels filling stations

6.1 Objective

This deliverable aims to collect static data for LNG, CNG, LPG and highly blended biofuels in the participating Member States. At the outset of the implementation phase the Consortium is required to inform the Commission on which fuels will be collected for which Member States.

The Commission and Consortium agreed to define the other alternative fuels as optional. The interest of the participating Member States in electric driving and in hydrogen as a fuel for transportation is common and strategic, whereas the interest in and focus on other (combustible) alternative fuels differs substantially from country to country. Some Member States already have a strong position in LPG for passenger cars; others focus more on Bio-ethanol, other high-blend Biofuels and/or CNG. Most Member States focus on LNG (and its heavy duty specific infrastructure), but specific for heavy duty vehicles.

Further, the Consortium considers static data for other fuels to be more relevant than the dynamic data (other than that a complete station is out-of-order or not yet opened) when compared to hydrogen and electric, due to short fuelling duration and fast throughput of vehicles (except a slow fuelling variant for CNG).

As laid down in the Grant Agreement, static data for other fuels can include:

- Location (GNSS coordinates/street name)
- Opening hours, identification and payment methods
- Contact info for owner/operator

6.2 Overview of data collection per Member State

At the start of the project the participating Member States agreed on collecting data on LNG and CNG and to consider LPG and high blends as additional. The Commission was informed about this in the Quarterly Progress Report Q2 2020.

<u>Status of data collection in 2019</u>
At the start of the IDACS project in 2019 most Member States were already collecting data on other fuel stations nationally, either by public or by private parties. The majority already shared data on address, opening hours and some on fuel availability and price. However, the other data categories used by Member States varied.

In 2020, a questionnaire was sent out to gain insight into which data exactly were already being collected nationally by the Member States. An overview of the data collection at the time is shown in the table below.

Other Fuels - 2020

FYI: information stated below is dated from 2020 (not 2019 like the other fuel tracks as this was inquired at a later stage during the IDACS project.

Member state	AT	BE	CZ	ES	FR	GE	GR	HR	HU	LT	LU	NL	PL	PT	SI
Data collection at national level?	Yes	Yes	No	Yes		Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	No
Public, private or public-private	public-private	public		public		private	private	public				private	public	public	
Data publicly available?	Yes	Yes		Yes		Yes	Yes	Yes				Yes	Yes	Yes	
Static Data:															
- GNSS coordinates	Yes	Yes		Yes		Yes	No	Yes				No	Yes	Yes	
- Address (street name, zip code, city,…)	Yes	Yes		Yes		Yes	Yes	Yes				Yes	Yes	Yes	
- Opening hours	Yes	No		Yes		Yes	Yes	Yes				Yes	Yes	Yes	
- Identification and Payment methods															
- Contact info for owner/operator	Yes	No		Yes		Yes	Yes	No				Yes	Yes	No	
- Fuel availability	Yes	Only CNG/LNG		Yes		Yes	Only CNG, LPG	Only LPG				No	Yes	Yes	

Table 5: Status of data collection in 2020 in IDACS MS on other fuels (LNG, CNG, LPG); note, that the information on payment and identification methods has not been requested in 2020.

<u>Updated status of data collection 2021</u>

The status of data collection for LNG, CNG and LPG was analysed again in June 2021. The table below shows the current status of the data collection in the participating Member States.

A more detailed overview of the status of data collection per Member State in 2021 can be found in Annex 3.

Other Fuels - 2021

Member state	AT	BE	CZ	ES	FR	GE	GR	HR	HU	LT	LU	NL	PL	PT	SI
Data collection at national level?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	No
Public, private or public-private	public	private	public	public	private	private	private	public				private	public	public	
Data publicly available?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes				Yes	Yes	Yes	
Static Data:															
- GNSS coordinates	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes				No	Yes	Yes	
- Address (street name, zip code, city,…)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes				Yes	Yes	Yes	
- Opening hours	Yes	Yes	No	Yes	No	Yes	Yes	Yes				Yes	Yes	Yes	
- Identification and Payment methods	Yes	Yes	No	Yes	Yes	No	No	No				Yes	Yes	Yes	
- Contact info for owner/operator	Yes	No	No	Yes	Yes	Yes	Yes	No				Yes	Yes	Yes	
- Fuel availability	Yes	Only CNG/LNG	Yes	Yes	Yes	Yes	Yes	Only LPG				No	Yes	Yes	

Table 6: Status of data collection in 2021 in IDACS MS on other fuels (LNG, CNG, LPG)

Mid-2021 most Member States collect at least data on GNSS coordinates, address, opening hours and fuel availability and other information, such as fuel prices. Several Member States indicate it could be valuable to make additional data available, such as specific pricing in case of private contracts existence, the various opening hours (daily, during the weekends and holidays), operation status, actual prices.

8 out of 15 Member States collect data at national level, either by a ministry or by public parties. The data is in most cases publicly available via a website. The current situation in France is unknown. The data may not be complete in all Member States. For example, not all Member States collect data on all fuel types (CNG, LNG and LPG) and not all fuel distributors have shared their data nationally.

6.3 Lessons learnt

Looking at the current status of data collection on other fuels in the participating Member States and the progress and improvements made by Member States since 2019 the following main conclusions and lessons learnt can be drawn.

Lesson 1: involve sector organizations for data collection

As mentioned in 4.3, it is important to get commitment from stakeholders and to involve different parties. In addition to those findings, we have seen that the other fuels market can be fragmented with many small players. Therefore it can be helpful to involve sector organizations, in order to collect the data for a large group of fuel distributors. For small fuel distributors, it can be difficult and costly to frequently update the shared data. It would be easier to make one party responsible for the data quality and updating, such as a sector organization. This party can also ensure that a full set of data, from all fuel distributors involved, is made available. They can stimulate and facilitate fuel distributors to share their data. This can work especially well if a party is officially allocated and/or budgeted for this task.

Lesson 2: stimulate and enforce data collection

As noted with the other fuel tracks, a mandatory framework seems necessary to make all (static) data available. Legislation can be supportive in reaching this goal. For these findings we refer to 4.3. Furthermore, it has turned out that for data collection on a national level to be successful, larger incentives are needed. There is a number of reasons why the data are not collected on a national level yet, or the data are not complete in many member states: the data collection for other fuels is not mandatory (yet), fuel distributors already share their data on their own platforms and it has turned out to be difficult and costly to collect a complete set of good quality data. Furthermore, the individual fuel distributors feel that they do not immediately benefit from sharing their data nationally. Therefore, a different or larger incentive is needed to successfully collect these data.

Annexes – Detailed overview data collection

Annex 1 – Electric Charging Points

2021

Member State	AT	BE	CZ	ES	FR	GER	GR	HR
Is there data collection at the national level?	yes	Yes	Yes, only static data	Yes, static data only	Yes	Yes, static data only	Yes,only for static data. Online data are partially available through private organisations	Yes, only static data (Ministry of Industry and Trade) not contains all attributes, see bellow
Which organisation collects the data?	E-Control, Autrian Regulator for Electricity and Gas	Eco-Movement	Ministry of Industry and Trade (public organization) + private organizations witch are key players	Ministry for the Ecological Transition and Demographic Challenge	1) Open data data.gouv.fr 2) GIREVE, private organisation	Federal Grid Agency (Bundesnetzagentur, BNetzA)	Hellenic Ministry of Insfrastructure, Transport and Networks (public organization)	Data are collecting Ministry of Industry and Trade (public organization) and some big private
Is it a public, private op public/private organisation?	public	private organisation	public and private	Public organisation	1) Public 2) Private		Both	public and private
What was the start date of this data collection?	2019	before IDACS		2021	before IDACS		2019	before IDACS
Is the data publicly available?	Yes	Yes	Yes	No	1) Yes 2) No	Yes	Yes	Yes
- If yes, where is the data made available?	with the publicly available charging point register launched by E-Control: www.ladestellen.at	Via Eco-Movement (https://www.eco-movement.com/developers/)	The data collected by the Ministry of industry nad trade (MIT) can be downloaded as a Excel sheet. The Excel sheet is yearly updated.		1) data.gouv.fr 2) N/A	The data collected by the Federal Grid Agency can be downloaded as a Excel sheet. The Excel sheet is monthly updated.	Temporary are not available online, as a dedicated portal is prepared at the moment by the Greek Ministry of Transport. The data are collected and can be made	The data collected by the Ministry of industry nad trade (MIT) can be downloaded as a Excel sheet. The Excel sheet is yearly updated.
Static Data:								
- GNSS coordinates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No / Yes - public / private data
- Address (street name, zip code, city,…)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes / Yes
- Available charge-solutions (power, modes)	Yes (voluntary)	Yes	Yes	Yes	Yes	Yes	Yes	No / Yes
- Available connectors (plugs, sockets, induction plate..)	Yes (voluntary)	Yes	Yes	Yes	Yes	Yes	Yes	No / Yes
- Opening hours	Yes (voluntary)	Yes, if available	Yes	Yes	Yes	No	Yes	No / Yes
- Identification and Payment methods	Yes (voluntary)	Yes	Yes	No	Yes	No	Yes	No / Yes
- Contact info for owner/operator	Yes	Yes	Yes	Yes	Yes	Name of CPO	Yes	No / Yes
- Full e-mobility code of the charging point (outlet)	Yes	Yes	No	Yes	Yes	No	N/A	No / No
Dynamic Data:								
- Availability (operational / non-operational)	Yes (voluntary)	Yes	No	No	1) No 2) Yes, if connected to GIREVE	No	Yes	No / No
- Occupation status (free / occupied)	Not yet (expected 1/2022)	Yes	No	No	1) No 2) Yes, if connected to GIREVE	No	Yes	No / No
- Price for ad-hoc charging	Yes (voluntary)	Yes, if available	No	No	No	No	Yes	No / No
- If other information is available, please specify	Roaming yes/no, electricity disclosure , parking information, detailed access description, type of vehicle station is fitting for (all voluntary)	If a chargingpoint is public, semi-public (company), or private	x	CPO name, brand name, owner name, type of location (street, underground parking…), location facilities.	CPO name, Brand name, owner name, type of site (parking, street, shop, etc), accessibility, number of parking spaces, current type	Public Key of the energy meter, used for encrypted transmission of meter data	Last check-in to the charging point. Photographs of the charging point station, directions, comments from clients	
What is the update frequency for the static data?	First registration of the location must take place 2 weeks after start of operation. The frequency for notifications of further data is still to be defined in an ordinance.	On a daily base		Every time some change occurs, it is necessary to update it within a week.	1) unknown 2) average 10 days (quality check)			
What is the update frequency for the dynamic data?	Will be real-tim	At least every 5 minutes (>90% of availability is in real-time)		'Every time some change occurs.	1) N/A 2) Realtime			

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Electric Charging Points - 20 21

Member State	HU	LT	LUX	NL	PL	PT	SI
Is there data collection at the national level?	Just on voluntary base	Yes (only LRA and municipal owned charging points)	yes	Yes	Yes	Yes	Yes
Which organisation collects the data?	Hungarian Public Roads will be responsible for this activity but regulation is not yet introduced.	LRA	Chargy - operator of the public charging infrastructure	Eco-Movement	Ofiice of Technical Inspection - UDT (public)	MOBI.E,S.A. (public company)	Ministry of Infrastructure in partnership with NAP operator - National Traffic Management
Is it a public, private op public/private organisation?	NAP is operated by a public organisation	public		private	Public		Public entitty
What was the start date of this data collection?		before IDACS		before IDACS	2019		2021
Is the data publicly available?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- If yes, where is the data made available?	via the Hungarian NAP portal https://napportal.kozut.hu/hu/	www.trafficinfo.lt	api is published in the open data portal (https://data.public.lu/fr/organizations/chargy/) and displayed in the national georportal (http://g-	Via Eco-Movement (https://www.eco-movement.com/developers/)	Consumers receive information via EIPA website. The raw data procured by UDT is availible free of charge and can be also to create other websites or apps by	https://www.mobie.pt/en/redemobie/procurar-posto	At NAP - www.nap.si
Static Data:		Yes			Yes		
- GNSS coordinates	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- Address (street name, zip code, city,...)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- Available charge-solutions (power, modes)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- Available connectors (plugs, sockets, induction plate..)	Yes	Yes	Yes	Yes	Yes	Yes	Yes.
- Opening hours	Yes, currently optional	N/A	Yes	Yes, if available	Yes	Yes	Yes.
- Identification and Payment methods	Yes	N/A	No	Yes	Yes	Yes	Yes
- Contact info for owner/operator	Yes	Yes	No	Yes	Yes	Yes	Yes.
- Full e-mobility code of the charging point (outlet)	Yes, currently optional	No	Yes	Yes	Yes	Yes	Yes
Dynamic Data:							
- Availability (operational / non-operational)	Not yet introduced	Yes	Yes	Yes	Yes	Yes	Yes
- Occupation status (free / occupied)	Not yet introduced	Yes	yes	Yes	Yes	Yes	Partly (some CPO's are not yet willing to share data. New AFI Act will adress this issue).
- Price for ad-hoc charging	Not yet introduced	N/A	No	Yes, if available	Yes	No	Partly ((some CPO's are not yet willing to share data. New AFI Act will adress this issue).
- If other information is available, please specify							All data categories in complience with IDACS project. Additional sets of data will be mandatory according to AFIR
What is the update frequency for the static data?	wiil be specified by regulation			Realtime, (< 1 min)	The operator of the public recharging station are obliged to report to the register using the electronic form information on: 1) the company name of the operator of the public charging station / natural gas station, the address of its registered office and its contact details; 2) the type of infrastructure; 3) the coordinates of the public charging station The data must be provided at the latest on the date of commencement of the provision of charging services or natural gas refuelling services and each time the data change	Daily	Real time.
What is the update frequency for the dynamic data?	wiil be specified by regulation			Realtime, (< 1 min)	The operator of the public charging station is obliged to communicate on:	Every minute	Rea time.

Annex 2 – Hydrogen

2021

Member State	AT	BE	CZ	ES	FR	GER	GR	HR
Is there data collection at the national level?	Yes	Yes (EU level)	No - no open public stations (first is under construction)	There is a system to collect H2 data at national level, but there are still no operational public H2 stations.	Yes	Yes	No	No
Which organisation collects the data?	OMV	H2Mobility E-HRS-AS	Ministry of Industry and Trade	Ministry for the Ecological Transition and Demographic Challenge.		H2 MOBILITY Deutschland GmbH & Co. KG (HRS operator)		
Is it a public, private op public/private organisation?	private	Private and public/private		Public organisation.		private		
What was the start date of this data collection?	before IDACS					before IDACS		
Is the data publicly available?	Yes	Yes		Yes	Yes	Yes		
- If yes, where is the data made available?		E-HRS-AS (https://h2-map.eu/api/v1/doc/)		It will be available on a website from the Ministry: https://geoportalgasolineras.		On the German NAP, the app H2 MOBILITY provide and their website		
Static Data:								
- GNSS coordinates	Yes	Yes		Yes	Yes	Yes		
- Address (street name, zip code, city,...)	Yes	Yes		Yes	Yes	Yes		
- Opening hours	Yes	Yes		Yes	Yes	Yes		
- Payment methods	Yes	Yes		Yes	Yes	Yes		
- Contact info for owner/operator	Yes	Yes		Yes	Yes	Yes		
Dynamic Data:								
- Availability	Yes	Yes		No	Yes	Yes		
- If other information is available, please specify						Future stations, last refilling, source of funding		
What is the update frequency for the static data?						on change		
What is the update frequency for the dynamic data?				There is no system forseen to collect dynamic data.		1 to 5 minutes		

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2021 (continued)

Member State	HU	LT	LUX	NL	PL	PT	SI
Is there data collection at the national level?	No, first filling station was opened recently	No	No, no station operational at the moment	Yes	No		Yes, but at the moment there is no hydrogen AFI in
Which organisation collects the data?				H2.Live|H2.MAP			Ministry of Infrastructure in partnership with NAP operator - National Traffic Management Centre
Is it a public, private op public/private organisation?				Private|Public/Private			Public entity.
What was the start date of this data collection?				2019			
Is the data publicly available?				Yes			/
- If yes, where is the data made available?				Public available in map format via H2.LIVE app and H2.MAP. Raw data for			/
Static Data:							
- GNSS coordinates				Yes			/
- Address (street name, zip code, city,…)				Yes			/
- Opening hours				Yes			/
- Payment methods				Yes			/
- Contact info for owner/operator				Yes			/
Dynamic Data:							/
- Availability				Yes			/
- If other information is available, please specify				350/700 Bar			/
What is the update frequency for the static data?				Based upon changes provided by operator.			/
What is the update frequency for the dynamic data?				Most stations every 5 minutes, some stations manually.			/

Annex 3 – Other Fuels

2021

Member State	AT	BE	CZ	ES	FR	GER	GR	HR
Is there data collection at the national level?	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Which organisation collects the data?	E-Control	Gas.be	Ministry of Industry and Trade	Ministry for the Ecological Transition and Demographic Challenge		Zukunft Gas GmbH; gibgas medien GmbH	Fysikon (Natural Gas Distributor for Mobility)	Ministry of Environment and Energy of the Republic of Croatia
Is it a public, private op public/private organisation?	public	Private sector organisation	public	Public organisation		private	Private organisation	Public
What was the start date of this data collection?	before IDACS	2020	before IDACS	before IDACS		before IDACS	2020	before IDACS
Is the data publicly available?	Yes	Yes	Yes	Yes		Yes	Yes	Yes
- If yes, where is the data made available?	Available on website www.spritpreisrechner.at	Available on NAP https://www.transportdata.be/organization/gas-be	Now available on a website from the Ministry	Now available on a website from the Ministry: https://geoportalgasolineras.es/#/Inicio		On their websites/apps	https://www.fisikon.gr/diktyo-pratirion/?lang=en	https://www.min-go.hr/#/
- GNSS coordinates	Yes	Yes	No	Yes		Yes	Yes	Yes
- Address (street name, zip code, city,...)	Yes	Yes	Yes	Yes		Yes	Yes	Yes
- Opening hours	Yes	Yes	No	Yes		Yes	Yes	Yes
- Payment methods	Yes	Yes	No	Yes		No	No	Yes
- Contact info for owner/operator	Yes	No	No	Yes		Yes	Yes	No
- Fuel availability (CNG, LNG, LPG)	Yes	Yes	Yes	Yes		CNG, LNG, sometimes LPG	Yes	Yes
- If other information is available, please specify	Price	Operator / Time Zone	date of commissioning			share of biogas; refuelling options for buses or HDVs; comparative prices for petrol and diesel		Additional Infrastructure Information (Car Wash, ATM, WC, Currency exchange, Restaurant,Coffee shop, Toilet for the disabled, Baby changing area, Shower,Children's playground / playroom, Hotel / Motel, Parking for buses, Place for pets)
What is the update frequency for the static data?	upon change	3 months	upon change	5 minutes		unknown		

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2021 (continued)

Member State	HU	LT	LUX	NL	PL	PT	SI
Is there data collection at the national level?	No active participation in OF IDACS	No	Yes	Yes	Yes	Yes	Not yet, estimated in 2022.
Which organisation collects the data?				Various fuel suppliers	Ofiice of Technical Inspection - UDT (public)	DGEG - Directorate General for Energy and Geology	/
Is it a public, private op public/private organisation?				Private	Public	Public	/
What was the start date of this data collection?				2019	2019	before IDACS	/
Is the data publicly available?			No, november 2021	Yes	Yes	Yes	/
- If yes, where is the data made available?			will be made available here https://data.public.lu/	various websites and an app	Available on website https://eipa.udt.gov.pl/	Available on the websitehttps://precoscombustiveis.dgeg.gov.pt .	/
- GNSS coordinates			Yes	No	Yes	Yes	/
- Address (street name, zip code, city,…)			Yes	Yes	Yes	Yes	/
- Opening hours			Yes	Yes	Yes	Yes	/
- Payment methods			Yes	Yes	Yes	Yes	/
- Contact info for owner/operator			Yes	Yes	Yes	Yes	/
- Fuel availability (CNG, LNG, LPG)			CNG, LNG, LPG	CNG, LNG, LPG	CNG, LNG	CNG, LNG, LPG	/
- If other information is available, please specify					price, max output, CNG connectors, LNG fuel types	services available, type of station, etc	/
What is the update frequency for the static data?			upon change	unknown	1 hour	every time operators change information (e.g. fuel prices) on their filling stations	/

ID and Data Collection for Sustainable fuels in Europe

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Memo

Memo on a common form of NAPs and data provision at EU level *(tasks 1, 2, 3 and 7 as stated in the Grant Agreement)*

Project Acronym	**IDACS**
Project Full Name	ID and Data Collection for Sustainable Fuels in Europe
Grant Agreement number	MOVE/B4/SUB/2018-498/CEF/PSA/SI2.792684
Activity	2.2 Provision of static and dynamic data through the National Access Points of the Member States in requested format DATEX II
Status	Final
Dissemination Level	Public
Version / date	V2.0 (final, external) / 30-06-2022
Main authors	Hielke Schurer, Netherlands Enterprise Agency Jan Wegener, NOW GmbH Jasmijn Vrooland, Netherlands Enterprise Agency
Reviewer	Pauline Lanz, Netherlands Enterprise Agency

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1. Introduction

To reach the main objective of the IDACS project, which is the provision of data for alternative fuels through the National Access Points (NAPs) in DATEX II format, a functioning NAP per Member State needs to be in place. As the obligation to have a NAP containing information about recharging and refuelling points is based on the existing ITS directive from 2010, the EC takes the presence of a NAP in each Member State as a starting point. Consequently, setting up NAPs is not officially part of this project. Nonetheless, in the Grant Agreement collaborative actions have been defined to support Member States in setting-up a NAP in such a way that data collection on the national level and transfer of data on the EU level can take place in the most optimal way.

To support data collection for alternative fuels the Grant Agreement states that the participating Member States will collectively conduct the following tasks:

- **Task 1:** Determine a common form of NAP at the national level
- **Task 2:** Determine the organisation of data provision on the EU level
- **Task 3:** Examine the possibilities to realise multi-country / EC wide databases
- **Task 7:** Formulate an approach for third party access to data

In this Memo these tasks are described in further detail. As third party access to data is an integral part of the overall approach of the IDACS project, this has been integrated in the description of the other tasks.

Objective

This memo does not represent a formal deliverable within the IDACS project. It is nevertheless closely related to other deliverables of the IDACS project. In deliverable 2.1.0 *Guideline document For Data Collection and National Access Points*, options for the set-up of a NAP are given and also the possibilities for a European access point are examined. In addition, Deliverable 2.3.1 *Sustainability and continuity of the data collection beyond the Program Support Action* outlines scenarios for a future data provision at European level.

This memo represents the view of the Consortium on the required form and organisation of NAPs and data provision on the EU level. It should be considered as a basis for follow-up discussions with the European Commission.

2. Methodology

As of 2019, several calls have been held with the Member States about various subjects related to data collection and data provision at the NAP. During these calls, also the topics from this memo were continuously touched upon, such as setting up a NAP and a possible data provision at European level. These topics have been discussed from the beginning of the project and are also described in deliverable 2.1.0 *Guideline document For Data Collection and National Access Points*. To collect more input, various questionnaires were sent out for additional data and views of the member states on these topic. Finally, there was a call to discuss the specific points of this Memo.

3. Determining a common form of NAP at the national level

As stated in the Grant Agreement one of the tasks of the Consortium is to determine a common form of NAP on the national level. "The Consortium will study what the exact form of the NAPs will be. We will search for commonality across the different Member States, but also different solutions per country are thinkable. The most logical approach would be to have one NAP per country through, or in which the data of the infrastructure is collected. This may be a system for all alternative fuels; however, it is also possible that the different fuels will have different systems, approachable via one NAP."

As defined by the EU Directive 2010/40/EU, the National Access Points can take various forms, such as a database, data warehouse, data marketplace, repository, register, web portal or similar depending on the type of data concerned and provide discovery services, making it easier to fuse, crunch or analyse the requested data sets.

The Consortium defines the NAPs as a solution for:

- facilitating access to,
- easy exchange of;
- re-use of,

transport-related data, in order to support the provision of EU-wide interoperable travel and traffic services to end-users. The set-up and organisation of NAPs needs to be focused on optimising benefits for operators, service providers and ultimately consumers in all Member States.

Initial situation

At the start of the project, a baseline measurement was done for all Member States. It appeared that in many Member States there was some form of data collection at the national level taking place. However, these data for the different fuels tracks were not always available via the NAPs. It also turned out that there were different architectures of NAPs, such as a database, data warehouse, data marketplace, repository and register.

In the case of a register, this meant that the NAP does not contain the data itself or the services that are made available for re-use, but only the metadata describing them. One can find links to the underlying services and the sets of data that can be accessed. Subsequently, there were also major differences in these services or data sets: they could be (central) systems where data for all alternative fuels was stored, but these could also be different systems per fuel type.

Discussion

In the beginning of the project the Consortium discussed the desired form of a NAP. At that moment in time, not all Member States had an opinion about the desired form. The Member States were in different implementation phases of setting up or maintaining a NAP. Some did not yet have a NAP or were just transitioning to a new NAP, while others had a NAP operational. Because of these different situations, it turned out to be a challenge to come up with one desired common architecture for the NAP.

A theoretical advantage of having a common form of a NAP is that it can harmonize the way of data collection in and between countries. This will theoretically facilitate data collection and provision at European level. It will also facilitate the eventual formation of an EU NAP. However, the question is whether the architecture of the NAP plays such a major role in this and whether other agreements are not more important in this regard. Such as common agreements about the use of the same protocols, the data categories and the use and access to data

A disadvantage is that countries would no longer have the freedom to make their own choice as to how they would like to organize the data collection at national level. Behind the choice of an architecture there may be fundamental choices about whether or not the government should intervene in this domain. In the current situation, some Member States saw no reason for the government to intervene by setting up a public database: the information provision to drivers is sufficient and they opted for a register. While other Member States had already set-up a database or were clearly in favour of setting-up a database because the information provision was not sufficient. But even in the situation where countries wanted to set up a public database, there could be a preference for a NAP as a register. The NAP would then not contain the data itself, but one can find a link to the underlying public database.

Later in the project, the preference for a common form of the NAP was discussed in more detail. It emerged that a majority of the member states do not have a preference that the NAP itself should become a public database. A large majority indicated that they would not be willing to turn their NAP into a public database. The reason is that this would not be necessary because third parties could make direct (API) connections to the data source (e.g. a public database).

Conclusion
In conclusion, the Consortium decided that no common form of the NAPs could be established. The choice of architecture of the NAP should be left to the countries and not necessarily harmonized across Europe. As the Grant Agreement also indicates, there are different solutions per country that are conceivable. The final approach is to have one NAP per country through, or in which the data of the infrastructure is collected. This will be a place where the data of all alternative fuels will be accessible (to the extent that this applies to the situation of a country, for example whether there are hydrogen filling stations or not). Due to the different architectures that the national NAPs can have, it is possible that the different fuels will have different data systems, approachable via one NAP. It is also possible that there is one database in which all data of all fuels is available.

4. Determining the organisation of data provision on the EU level

As stated in the Grant Agreement, the Consortium will define how the provision of data from the NAP to the EU level will be organized. There are two main options that were be examined:

Option 1: An EU register that has links to all individual NAPs that contain the data
Option 2: A common EU repository where static data is stored and dynamic data is retrieved from the NAPs

Initial situation
At the start of the project there was no European NAP. There was therefore no central point for data provision. There are, however, overviews of all NAPs in the EU, as can be found via: [EU EIP NAPs (andnet.ro)](). This can be seen as the most minimal implementation of an EU NAP: a register with links to all NAPs.

Discussion
The possible options for the European NAP have been explored right from the start of the

IDACS project. In Deliverable 2.1.0 *Guideline document Data Collection NAP*, several possibilities are presented in the chapter *'4.4 Possible setup of NAP'*. The Consortium discussed what form the EU NAP should take and what the possible future role of a EU NAP could be. The options were also discussed with the Member States as well as industry parties during the workshop week of IDACS. There was also a separate call about the common form of a NAP and setting up a NAP at European level.

The following has been discussed with regard to the two options from the Grant Agreement.

Option 1: a register
The second option stated in the Grant Agreement is a European register. As stated in the Grant Agreement, such a register "can contain a main link with a tree view of links to all separate NAPs. This way organisations and third party companies can use this link to collect the data from all refuelling stations in the NAPs. It ensures that both static and dynamic data are most accurate and no double data is stored."

A register has the benefit that the data is always retrieved via the NAP to the source and no copied data is stored. This option does have a disadvantage that this only connects the user to the NAPs: no data is stored in a European NAP and only a link is made to the parties that have the data. This seems less user-friendly for a third party that wants to have the data. There is no single access point for all the data, which makes it harder to get an overall overview. One has to link to the party that offers the data and then connect with that party (and possibly enter into an agreement) to get the data. This can be one party per country, but theoretically it can also be the case that this has to be done for several parties per country.

Conclusion option 1
The consortium is not in favour of such a set-up because it has too little added value.
With the current architecture of some NAPs the option of an EU NAP as a register can be implemented. Moreover, a similar registry is actually already available:**:** EU EIP NAPs (andnet.ro)**.**
In this way, the EU NAP functions as a kind of 'phone book' for third parties.
This could be made even more specific for only data on Electric Charging Points, Hydrogen and Other Fuels, but the consortium is not in favour of such a setup.

Option 2: a common repository
A common EU repository where static data is stored and dynamic data is retrieved from the NAPs. This option requires a direct link to the source of the data: the data will be retrieved real time via a link to the concerning NAP. An advantage of this form could be that data consumers can access European data in one central location. However, this requires national NAPs that can connect directly to this repository.

As described above, the Consortium has not opted for one common set up for the NAP at the national level. Since there will be Member States that will have a register, a common repository seems impossible. If a country has a register, there does not have to be a direct link to the real time data. The NAP would then not contain the data itself, but one can find a link to the underlying public database. However, direct connections could be made with these underlying databases. In this way, a repository can be set up in which static data is stored, and where dynamic data can then be retrieved from these databases (which do not necessarily have to be on the NAP itself).

However, this option has not been elaborated further because the Consortium does not prefer such a setup. With this set-up, the question is whether the potential benefits of a European NAP (see above) will be achieved.

Conclusion option 2
A common repository requires NAPs that can connect directly to this repository. Most of the Most NAPs cannot do this. However, connections could be made with the underlying databases of the NAPs. In order to do this, however, preconditions are needed regarding data quality and access to data. In addition, there should be a legal framework that obliges operators to share the data. Both conditions are not present.
Moreover, setting up such an EU repository will require substantial organizational and financial resources. As a result, option 1 cannot be realized within the frameworks and choices made within IDACS and is not preferred by the member states.

European Database
In line with option 2, the Consortium also considered the idea of setting up an overarching European database with static and dynamic data. The member states are divided on the added value of this set-up, but a majority is in favour of setting up a European database. When asked about the potential added value of an overarching NAP at European level, several reasons are given:
- Possibly easy access to data at European level (especially for smaller businesses)
- Centralization of data: Single entry point
- Uniform quality
- Harmonized data format

As with any other form of data provision on EU level, this is only possible if agreements on the above points are also made and adhered to at European level.

Cost, Funding and fees
In case there will have to be data provision at EU level, this will also have financial consequences. A register, portal or database will have to be set up. A majority of the consortium indicates that this can be financed from the EC or European funds. It is also suggested that it can be financed partly by the EC and partly by countries, whereby the contribution then depending on the number of cars (= the amount of data). Finally, it is also suggested that part of the costs can be financed by the data users because they have to pay a fee for the data.

With regard to the cost of data, a majority of member states of countries are not fully convinced that all (real-time) data should always be available to third parties at no cost. Some member states do agree and indicating that all real-time data should be available for free. And all countries agree on the basic idea that the data should be made publicly available so that services can be built for the end user. However, many countries believe that a reasonable compensation should be possible for certain data. Mainly because data quality checks, data storage and data management involve costs. There are concerns that to share data of commercial interest free of charge may be counterproductive, especially if it involves an initial investment by the private actor. Also "at no cost" entails the risk that the data will be of lower quality and not used.

Overall conclusion
Regardless of what form a NAP on European level should take, there is the discussion about the added value of such an 'EU NAP'. Some industry parties indicated that setting up a database requires significant investments and it must therefore clearly add value compared to the current market situation. It should therefore be clear for future development to which extent an EU NAP as a database is of added value in the current market, because parties can obtain data via roaming platforms, data aggregators and NAPs. Furthermore, it was also discussed that an issue for a NAP on EU level could be the different definitions of public charging points or the different conditions for data quality or accessibility. It requires future discussions about: public accessibility, harmonization of quality definitions and different types of NAP users.

Within the PSA IDACS no explicit clear preference has been expressed for the formation of an EU NAP, and what architecture it should have. In principle, most member states are positive about a form of centralization of data collection in the EU if this offers advantages for the data consumers.
There is agreementthat there must clearly be added value for the users of the data. It should be a single entry point and provide easy access to uniform data of good quality. This is insufficiently reflected in the two set-up options from the Grant Agreement.
Whatever form it takes, there must first be harmonized agreements for data quality, data access, data formats and data use. This PSA IDACS project has made a first step in that direction, but for data provision at EU level it is necessary that this happens at European level.

For further developments for a EU NAP, an important role is also seen for the PSA NAPCORE project where more harmonization of the NAPs is sought. This PSA will look at the challenges concerning the long-term set up of the NAPs and the upcoming requirements, challenges or developments that NAPs will face.

5. Examination of the possibilities to realize multi-country / EC wide databases

As stated in the Grant Agreement the Consortium should examine the possibilities to realize multi-country / EC wide databases to create synergies and to avoid duplication and inefficiencies. According to the Grant Agreement, realizing multi-country / EC wide databases had to be considered - where feasible and desired by the participating Member States.

EC wide database
As explained above many Member States use different architectures for their NAP. Some Member States set up their own database, while other Member States use a register with links that link to (private) parties that can make data available via a database. The lack of an unambiguous form of the NAPs automatically means that setting up an EC wide database was not possible within the scope and resources of the IDACS project.

However, equipped with the necessary funding, an EC- database would be possible and could bring potential advantages for third-party users. To set this up, the operator of an EC-database would have to set up interfaces to the data directly via all national NAPs, in cases where the national NAPs themselves are databases. If NAPs are set up as registers, then the information for the national database will have to be retrieved and an interface set up with it. In this way, an EC-database could ultimately be operated in real time. The advantage for all third-party providers would be that a consolidation would take place and they could then get the consolidated data for the entire EU area in real time with only one partner - the EC-database - and only one interface. However, this solution will require a certain budget and a proper, permanent infrastructure. In addition, there will probably have to be a legislative framework (at European or national level) that ensures that all data at national level is supplied and is supplied in the right quality. Ultimately, one could investigate what the cost-benefit ratio of an EC wide database would be.

Multi Country database
The Member States in the Consortium have looked at possible multi-country databases. The main potential advantages for setting up multi-country databases could be better efficiency, user-friendliness and cost reduction.

Although Member States themselves have not developed multi-country databases, it is possible that different NAPs in their register may refer to the same (private) database. Already now, it can be seen that various Member States can use the same (private) database. For example, a private database such as Eco-Movement makes the data available to a large extent for the Netherlands and Belgium (Flanders region). However, we do not see any public or public/private databases that are used jointly by the participating Member States.

This was ultimately not set-up within the IDACS project: mostly because of the national processes that had already been partially deployed and the (legal) complexity that this entails. Now data collection is a national responsibility. When setting up a joint database from government authorities, clear agreements must be made about responsibilities and accountability. Organizing this adequately and for the long term at national level sometimes proves to be a challenge. None of the Member States has seen the setting up of a multi-country database as a viable option to be able to realize jointly within the lead time of IDACS. The appropriate legislation and regulations for this seem indispensable for Member States to be able to set this up.

As for hydrogen, it is more likely that a shared database is used. That is because there are roughly two initiatives that Member States can make use of:

- H2.LIVE
- Fuel Cell and Hydrogen Joint Undertaking (FCH-JU)

H2.LIVE is an application by the company H2 MOBILITY Deutschland GmbH & Co. KG (hereinafter: H2 MOBILITY) that covers all the required data categories and most of the HRS in Europe. It is available to any end consumer with a smartphone, tablet or via web-browser. The Fuel Cells and Hydrogen 2 Joint Undertaking (hereinafter: FCH-JU) has an ‘HRS availability system’ that has been procured by FCH-JU and has been being rolled out across Europe.

Because HRS operators are often still on the eve of the roll-out of hydrogen filling points, there is a natural moment to join (one of these) platforms. Nonetheless, data can also be shared individually per HRS operator and single links to the NAP can be established. However, individual connections to the NAP would entail less aggregation and could potentially make retrieving the data by users more cumbersome.

Report

Deliverable 2.2.1: *Unlocked data through National Access Points in DATEX II format*

Project Acronym	IDACS
Project Full Name	ID and Data Collection for Sustainable Fuels in Europe
Grant Agreement number	MOVE/B4/SUB/2018-498/CEF/PSA/SI2.792684
Activity	2.2 Provision of static and dynamic data through the National Access Points of the Member States in requested format DATEX II
Deliverable Status	Final
Dissemination Level	Public
Version / date	V1.0 (final) / 30-06-2022
Main authors	Jan Wegener, NOW GmbH Hielke Schurer, Netherlands Enterprise Agency Jasmijn Vrooland, Netherlands Enterprise Agency
Reviewers	Anneke Bosma, Netherlands Enterprise Agency Pauline Lanz, Netherlands Enterprise Agency

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List of abbreviations

AFI	: Alternative Fuels Infrastructure
AFID	: Alternative Fuels Infrastructure Directive
CNG	: Compressed Natural Gas
CPO	: Charge Point Operator
FCH-JU	: Fuel Cells and Hydrogen Joint Undertaking
GNSS	: Global Navigation Satellite System
HRS	: Hydrogen Refuelling Station
IDRO	: ID Registration Organization
ITS	: Intelligent Transport Systems (directive)
LNG	: Liquefied Natural Gas
LPG	: Liquefied Petroleum Gas
MSP	: Mobility Service Provider
NAP	: National Access Point
PSA	: Program Support Action

1. Introduction

The main objective of *activity 2.2* of the IDACS project is to gather missing data and ensure that all data of infrastructure for electricity, hydrogen and other fuels (optional) collected in activity 2.1 is made accessible to end-users via the National Access Points (NAPs) in DATEX II format in the participating Member States.

For this purpose, deliverable 2.2.1. aims to unlock and provide both static and dynamic data on all alternative fuel tracks (both mandatory and optional, if selected) in DATEX II format through the NAPs in the participating Member States. For Member States not having an operational NAP, the static and dynamic data must be made accessible once it becomes operational. Each Member State is required to perform tests to verify the accessibility of static and dynamic data in DATEX II or any machine-readable format fully compatible and interoperable with DATEX II, including integrating relevant data from their Affiliated entities or Implementing Bodies.

2. Purpose of this document

This document aims to present the final results of Deliverable 2.2.1: Unlocked data through National Access Points in DATEX II format. It will present the actual data provision on alternative fuels infrastructure through the NAPs in DATEX II format that took place by the participating Member States during the IDACS project. It concerns quantitative and qualitative information on data collection on all fuel tracks within the scope of the IDACS project, both mandatory (electric and hydrogen) and optional (other fuels). Specific attention will be given to the added value of the DATEXII format as standard format for data collection and provision. To this end, several scenario's and solutions will be presented that were developed during the project to give guidance to Member States on how to implement DATEX II in their NAP.

3. Methodology

The following process has been completed to provide data via NAPs in DATEX II format:

As of 2020, several calls were held with the Member States about various subjects related to DATEXII: the DATEXII format, the developments of DATEXII, the options for implementation, best practices, and the possibilities for unified solutions.

In addition, questionnaires were sent out to retrieve information about the data provision in DATEXII and to monitor developments in DATEXII.

In addition, external research was carried out for advice on the DATEXII implementation. A report was drawn up that outlined the options for implementation and thus served as a 'guideline' for Member States.

During all these activities there has been continuous discussion with the DATEX II working group. For example, it has been agreed the required data categories that should be provided on DATEX II format, but advice has also been sought about the possibilities for one uniform solution for the DATEXII conversion.

4. Unlocked data through NAP in DATEX II format

4.1 Electromobility

The following paragraph provides information per Member State about the static and dynamic data on Electric Charging Points that has been made accessible in DATEX II format via the NAPs. For Member States where the NAP did not become operational during the project it is indicated when the NAP will become operational and when these data will be made accessible via the NAP.

Country	**AT**	**BE**	**CZ**	**ES**	**FR**	**GER**	**GR**	**HR**	**HU**	**LT**	**LUX**	**NL**	**PL**	**PT**	**SI**
Has a NAP been set-up?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Is the NAP operational? If not, when?	Yes	Yes	Q3 2023	Q2 2022	Yes	Yes	Yes	*	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Static data via NAP:															
- GNSS coordinates	Yes	Yes		Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
- Address (street name, zip code, city)	Yes	Yes		Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
- Available charge-solutions (power, modes)	Yes	Yes		Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
- Available connectors (plugs, sockets,...)	Yes	Yes		Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
- Opening hours	Yes	Yes		Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes
- Identification and Payment methods	Yes	Yes		Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes		Yes
- Contact info for owner/operator	Yes	Yes		Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes		Yes
- Full e-mobility code of charging point (outlet)	Yes	Yes		Yes	Yes		Yes		Yes	Yes	Yes	Yes	Yes	Yes	
Dynamic data via NAP:															
- Availability	End 2022	Yes		Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	Yes
- Occupation status		Yes			Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	Partly
- Ad-Hoc price	Yes	Yes		Yes		Yes	Yes			Yes		Yes	Yes		Partly
Are data available in DATEX II format?	Yes	Yes				Yes	Yes		Yes	Yes		Yes	Yes	Yes	

Table 1: Electric Charging Point data available via the NAP per Member State

(green)	= Data available
(orange)	= In progress

* = NAP will be operational after regulation enters into force

4.2 Hydrogen

The following paragraph provides information per Member State about the static and dynamic data on Hydrogen refuelling points that has been made accessible in DATEX II format via the NAPs. For Member States where the NAP did not become operational during the project it is indicated when the NAP will become operational and when these data will be made accessible via the NAP.

Country	AT	BE	CZ	ES	FR	GER	GR	HR	HU	LT	LUX	NL	PL	PT	SI
Has a NAP been set-up?	Yes	Yes		Yes*		Yes						Yes	Yes*		Yes*
Is the NAP operational? If not, when?	end 2022	Yes		Yes*		Yes						Yes	Yes*		Yes*
Static data via NAP:															
- GNSS coordinates	Yes	Yes				Yes						Yes			
- Address (street name, zip code, city,…)	Yes	Yes				Yes						Yes			
- Opening hours	Yes	Yes				Yes						Yes			
- Identification and Payment methods	Yes	Yes				Yes									
- Contact info for owner/operator	Yes	Yes				Yes						Yes			
Dynamic data via NAP															
- Availability (operational / non-operational)	Yes	Yes				Yes						Yes			
Are data available in DATEX II format?	end 2022	Yes				Yes						Yes			

	= Data available
	= In progress
	= Not applicable

Table 2: Hydrogen data available via the NAP per Member State

** NAP is prepared to show static and dynamic information for HRS. However, currently there is not yet a publicly accessible HRS station and therefore no info is shown.*

4.3 Other fuels

The following paragraph provides information per Member State about the static and dynamic data on Other fuels that has been made accessible in DATEX II format via the NAPs. For Member States where the NAP did not become operational during the project it is indicated when the NAP will become operational and when these data will be made accessible via the NAP.

Country	AT	BE	CZ	ES	FR	GER	GR	HR	HU	LT	LUX	NL	PL	PT	SI
Has a NAP been set-up?	Yes	Yes		Yes	Yes				Yes		Yes	Yes	Yes	Yes	
NAP operational? If not, when?	Yes	Yes	Q3 2023	Yes	Yes				Yes		Yes	Yes	Yes	Yes	
Which static data are accessible via NAP?															
- GNSS coordinates	Yes	Yes		Yes	Yes						Yes		Yes	Yes	
- Address (street name, zip code, city,…)	Yes	Yes		Yes	Yes						Yes	Yes	Yes	Yes	
- Opening hours	Yes	Yes		Yes							Yes	Yes	Yes	Yes	
- Identification and payment methods	Yes	Yes		Yes	Yes						Yes	Yes	Yes		
- Contact info for owner/operator	Yes			Yes	Yes						Yes	Yes	Yes		
Are data available in DATEX II format?	end 2022												Yes	Yes	

Table 3: Other Fuel data available via the NAP per Member State

	= Data available
	= In progress
	= Not applicable

5. DATEX II

5.1 Scenarios for DATEX II implementation

At the end of 2020, the preparation of a report was started. The report provides to the Member States with advice on the various ways to make the data available in DATEXII. It also provides different deployment scenarios, depending on the architecture of the NAP and the associated data collection. There are roughly two scenarios: a NAP as Registry Only or as a data portal. In the latter variant, the DATEXII translation can still be done in different places by different parties. These different scenarios are elaborated and the necessary actions have been drawn up for each scenario.

In addition, a mapping has been made of the IDACS data categories and the DATEXII categories: this is necessary to convert the data to DATEXII. This mapping can also be found in Deliverable 2.2.2 *'Description of harmonized data categories'*. The entire report with the implementation scenarios can be found in Annex 1.

Ultimately, this report provided different deployment scenarios and was unable to find a uniform IT solution. This has been investigated, but unfortunately it was not possible to develop a solution that all countries can use. This is also further explained in Deliverable 2.2.4 *'Proposal for an IT solution for provision of static and dynamic data for Member States not having a National Access Point in DATEX II format'.*

5.2 Implementation of DATEX II

As indicated above, there are many ways in which countries can implement DATEX II. This mainly depends on the architecture and set-up of their NAP. Annex 1 provides the options for a NAP that only functions as a data registry, and the options for a NAP that acts as a data portal. Within IDACS we have seen various options being implemented.

- NAP as registry only: In the Netherlands, the NAP is a data register. The responsibility for delivering data in DATEX II lies primarily with the CPO or the data aggregator that offers its data via the NAP. To support the CPOs in this, an OCPI – DATEXII converter has been built and managed by the organization that manages the NAP, the NDW (GitHub link). The CPO can connect to this converter and convert his data from OCPI to DATEX II. It can be used by CPOs which do not wish to deliver their data via the data aggregator/roaming platforms. The converter has been developed open source so that everyone can understand how the converter is built.

- NAP as market place: In Germany, the NAP has the architecture of a market place. The data on recharging points can be retrieved from the NAP in the DATEX II format from the two roaming platforms. Work has also been done on the production of freely available open-source converter tools converting data from the Open Clearing House Protocol (OCHP) and the Open Intercharge Protocol (OICP) to DATEX II v 3.2. These converter tools can be used by CPOs which do not wish to deliver their data via the roaming platforms. With regard to hydrogen, as part of a procurement, a converter was created to convert data to DATEX II. The most complete dataset of hydrogen refuelling stations (H2.live) was thus made available to market parties and NAPs across Europe. The data of hydrogen refuelling stations is available on the German NAP in the DATEX II format.

- NAP as data registry, connected to public database: Several member states have a data registry as their NAP, but they do collect data in a 'public' database. The NAP links to that public database. In that case, the DATEX II translation takes place at the organisation that also manages the database system. An internal converter can then be built that converts the received data to DATEXII format. This is the practice in, for example, Austria, Portugal, Poland and Greece.

In Austria there is a NAP as a data register, which is not hosting data itself. However, a link is made to the database of data for electric charging points in the management of E-Control . The data format of choice is DATEX II. All necessary information about the data E-Control is hosting and about how to access them are available at the NAP including the DATEX II translation-tool.

Also in Poland the NAP is a data register. It offers a direct link to the data sets that are collected at the public EIPA register. This EIPA register is maintained by the Office of Technical Inspection. The available format is DATEX II, and the conversion to DATEX II is done at the EIPA register.

Portugal is yet another example where the architecture of the NAP is a data register. It links to the data that is made publicly available by the public company Mobi.e. They made a DATEX II converter and customized an endpoint for enabling data pushing in the NAP.

5.3 Added value of DATEX II for data collection and provision

As is indicated in Deliverable 2.2.5, the PSA IDACS project was derived from two directives of different disciplines, namely the Alternative Fuel Directive 2014/94/EU (AFID) and the Intelligent Transport System Directive 2010/40/EU (ITS). Whereas the AFID focuses on the stimulation of the uptake of alternative fuels, such as electromobility, the ITS directive focuses on optimal use of road, traffic and travel data for traffic (management) and transport purposes. Consequently, both directives serve different users, although there exist relevant points in common. AFID aims to make alternative fuel data available for consumers through third party service providers, while ITS intends to provide data for ITS services for traffic management and freight transport. However, efforts are being made to integrate systems and regulations from different disciplines, in order to facilitate broader application possibilities. Thus, the collection and exchange of data in DATEX II format through the National Access Point, derives from the ITS directive, whereas the data categories are derived from the alternative fuels framework, and in particular the AFIR proposal .

Consequently, this had implications for the PSA. The Grant Agreement specifies that: the provision of static and dynamic data through the National Access Points of the Member States should be in requested format DATEX II (or any machine-readable format fully compatible and interoperable with DATEX II). In June 2021, the Energy Infrastructures publication, also known as the DATEX II version 3.2, including Point of Interest (POI) electromobility data, was launched. However, in the practice, whilst third party service providers or end users in electromobility may benefit from the data collection on the National Access Point, the provided DATEX II format is not yet in use in the electromobility market, because it serves a different purpose, namely the exchange of data for traffic management and freight transport's use. The protocols that are in use in the electromobility market for sharing POI data are the roaming protocols. Their initial intended purpose has been authentication of the end user (EV driver), authorisation of charging sessions and billing. For these purposes all the static and dynamic data categories are part of the protocols, albeit in different data fields (attribute names) and data types (integer, Boolean etc.). The DATEX II format offers the advantage of a uniform format for this type of data.

The Grant Agreement states that fuel specific standards and protocols may become more relevant in future when innovative services in the energy system such as smart charging and vehicle to grid applications are developed.

So far, Member States and market parties have had little or no demand for data in DATEX II format. This is coherent with the fact that it is still a new release of the format, and its use has yet to fully develop. The IDACS project has taken a good first step towards making data available in DATEX II. Whether data will actually be used in DATEX II by market actors remains uncertain at this stage. A few Member States are willing to use this format and also plan to make it mandatory in upcoming national legislation.

In conclusion, we see that the DATEX II format is not yet in use in the electromobility / alternative fuels market, because it serves a different purpose than the currently available protocols. Currently, it is uncertain to what extend DATEX II adds value in the e-mobility market among all other protocols and formats. It is therefore recommended that this is closely monitored and also assessed in the next PSA NAPCORE.

6 Conclusion

In deliverable *2.1.1.-2.1.6 Static and dynamic data collected from electric charging points, hydrogen stations and other fuels filling stations* an overview is given of the data collection of the participating Member States. This is taken a step further in this deliverable, by making clear which data is actually available through the NAP. In summary, it can be seen that a lot of progress has been made during the project. Where in 2019 not all member states had (some form of) data collection or the data was incomplete, the findings of this deliverable shows that not only the data collection improved, but the data is mostly also accessible at the NAP. This is a big step forward compared to the starting point of the IDACS project. In a few cases, the NAPs even have been prepared for data that is not yet available in the member state (for example, hydrogen, while no hydrogen infrastructure is yet available).

With regard to the availability of the data in DATEX II, there is still room for improvement. A first challenge in the project was that only in December 2021, the Energy Infrastructures publication (also known as the DATEX II version 3.2) including electromobility data, was launched. This significantly reduced implementation time as initially it was expected to be available quickly at the start of the IDACS project. In addition, due to the different forms of the NAPs, it turned out to be a challenge to find one uniform (IT) solution for a DATEX II translation. Therefore, various scenarios were set out within the project (Annex I), after which Member States had to choose their own implementation. This was partly achieved by building converters or translations to DATEX II. By sharing information between Member States and, for example, making open source converters, a lot of information is available to make more data available in DATEX II in the future.

Also, the added value of DATEX II needs to be further examined. DATEX II is currently not relevant within the fuel specific infrastructure. The use of the converted data might prove relevant in the future in a broader context than merely electromobility business/specific fuel infrastructure. For example for new applications/services and interoperability in integrated systems.
Taking this into account, the consortium considers it advisable to evaluate the added value of DATEX II for data collection of alternative fuels after 1 or 2 years. The findings of this evaluation can then be taken in consideration in a future release of DATEX II.

Annex 1 – Report on deployment scenarios for IDACS datasets in DATEX II format

Deployment scenarios for IDACS datasets in DATEX II format

Documentnummer	:	2021.05.10 DATEX II DEPLOYMENT SCENARIO'S FOR IDACS DATASETS.DOCX
Datum	:	10 May 2021
Versie	:	C 0.99 Final draft

CONTENT

1. Introduction

1.1 Aim of this document

Provide the partners in the IDACS project a better understanding of the possible scenario's delivering relevant datasets for Recharging infra and refuelling infrastructure for Hydrogen and alternative fuels in DATEX II format.

1.1.1 Contractor and client

This report is produced by U-Trex b.v. in assignment of RVO Netherlands.

1.2 Document version information

Document control table

Document name	Date	Circulation	Restrictions	Remark
DATEX II Deployment Scenario's For IDACS Datasets c.0.1	*14-4-2021*	*IDACS project*	*Internal use for review only*	*1e draft*
DATEX II Deployment Scenario's For IDACS Datasets c.0.99	*10-05-2021*	*IDACS project*	*Based on draft DATEX II publication*	*Final draft*
	To be announced		*Update based on final DATEX II standard*	*Final document*

2. Formal context

The governed information provision by operators of charging and alternative refuelling infrastructure is partly regulated by European directives and associated Delegated Regulations.

On national level additional legal constructs can be in place governing the data provision on a national level. Usually this is further detailing the obligations and/or extending the mandatory elements of which information to provide.

This chapter provides legal context of the data provision on EU level. This can be supported or further detailed in national legislation or policies.

2.1 Directive on the deployment of alternative fuels infrastructure

DIRECTIVE 2014/94/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 22 October 2014 on the deployment of alternative fuels infrastructure

2.2 ITS Directive

Already in 2010 the EU recognised the need for an better harmonisation and alignment in the development of ITS systems. Therefore the ITS Directive was accepted by the European parliament in order to create a legal basis for delegated regulations, directing the member states towards seamless ITS services. At time this policy was mainly aiming at safety and transport efficiency. In recent years it was recognised that this ITS Directive is also contributing to the new EU policies stemming from The Green Deal.

For IDACS the relevant requirements for the publication of datasets are in priority Action A and B the provision of EU-wide real-time traffic information services and Multi modal travel information services.

2.2.1 Relevant parts of the ITS Directive

DIRECTIVE 2010/40/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 7 July 2010 on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport

Article 3 Priority actions

Within the priority areas the following shall constitute priority actions for the development and use of specifications and standards, as set out in Annex I:

(a) the provision of EU-wide multimodal travel information services;

(b) the provision of EU-wide real-time traffic information services;
(c) data and procedures for the provision, where possible, of road safety related minimum universal traffic information free of charge to users;
(d) the harmonised provision for an interoperable EU-wide eCall;
(e) the provision of information services for safe and secure parking places for trucks and commercial vehicles;
(f) the provision of reservation services for safe and secure parking places for trucks and commercial vehicles.

For each of the priority actions the ITS Directive mandates the Commission to propose delegated regulations (having the status of law in the Member States), further detailing the actions.

2.3 Delegated regulation A: provision of EU-wide MMTIS services

COMMISSION DELEGATED REGULATION (EU) 2017/1926 of 31 May 2017 supplementing Directive 2010/40/EU of the European Parliament and of the Council with regard to the provision of EU-wide multimodal travel information services

2.3.1 The relevant datasets

In this Delegated Regulation A the following data-categories are defined to provide data about. Based on this the NAP's in each country will enable the distribution of this data via their processes.

1.2. *Level of service 2*

(a) Location search (demand-responsive modes):

…

(iv) Publicly accessible refuelling stations for petrol, diesel, CNG/LNG, hydrogen powered vehicles, charging stations for electric vehicles

1.3 Level of service 3

..

(b) Information service (all modes):

….

(iii) Where how to pay for car parking, public charging stations for electric vehicles and refuelling points for CNG/LNG, hydrogen, petrol and diesel powered vehicles (incl. retail channels, fulfilment methods, payment methods)

2.4 Delegated regulation B provision of Real Time Traffic Information

COMMISSION DELEGATED REGULATION (EU) 2015/962 of 18 December 2014 supplementing Directive 2010/40/EU of the European Parliament and of the Council with regard to the provision of EU-wide real-time traffic information services, stipulates the following with regard to the relevant datasets

2.4.1 The relevant datasets

In this Delegated Regulation A the following data-categories are defined to provide data about. Based on this the NAP's in each country will enable the distribution of this data via their processes.

2.4.1.1 Static data

j) location of charging points for electric vehicles and the conditions for their use;
k) location of compressed natural gas, liquefied natural gas, liquefied petroleum gas stations;

2.4.1.2 Dynamic data

2) The types of the dynamic road status data include in particular:
   (o) availability of charging points for electric vehicles;

Those short-term data need not to be included in digital map updates as they shall not be considered as changes of a permanent nature.

2.5 From data-category to dataset

With the level of detail of the aforementioned delegated regulations, the requirements for the data -elements to be delivered are still on a functional level.

The IDAC project identified on a higher granularity the information elements in the relevant datasets. These requirements are the minimum dataset that shall be delivered on the European level.

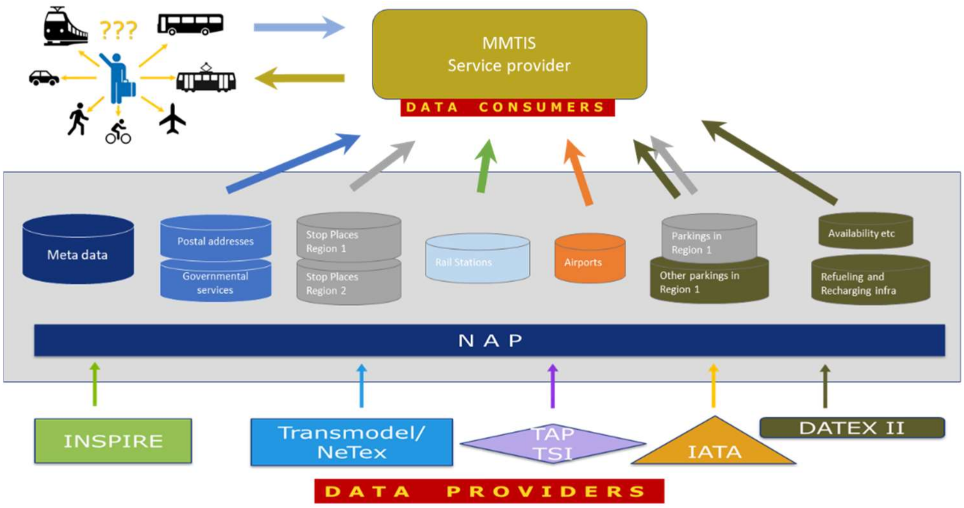
Further details on these datasets can be found in chapter 8, where also the mapping to the DATEX II standard is provided.

The DATEX II standard supports a wider set of relevant information elements. It is up to the data-provider to extent the number of information elements he can provide. How this can be done is addressed in chapter 7 of this guideline.

3. The functional aim of the NAP

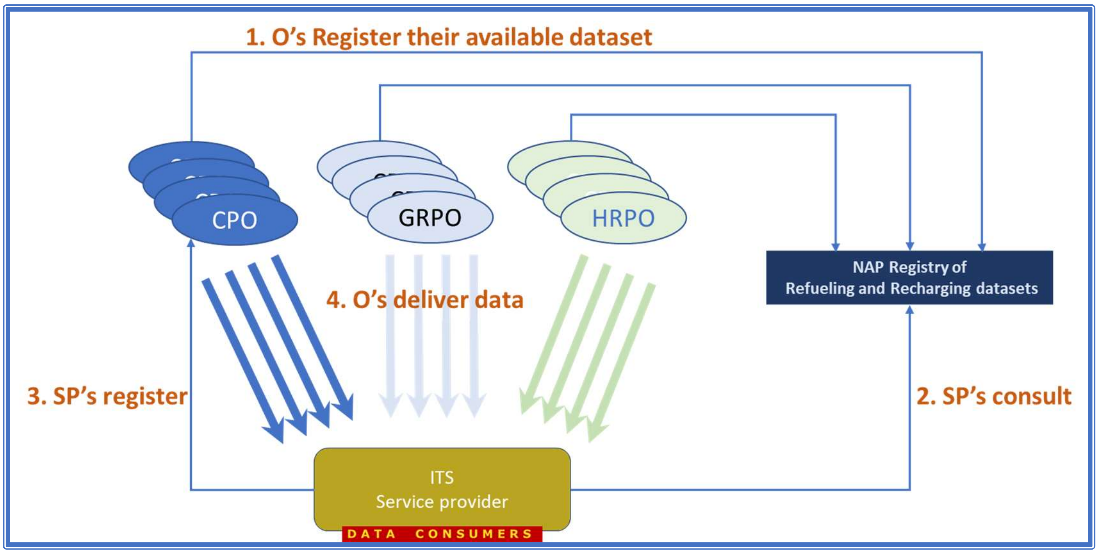
The overall aim of the Directives and its associated Delegated Regulations are to establish a pan European harmonised and aligned infrastructure of data provision in the traffic and travel domain and thus contributing to a safe, green and efficient traffic and travel behaviour throughout Europe.

National Access Points are defined to be the one stop portal for service providers to find all relevant datasets in the data categories regulated and providing ways how to access this data by a registry or by providing the datasets as a data-portal.



3.1 Workflow how to get access to data by ITS Service Providers

The starting point of any NAP is the meta data registry. Here all datasets and their characteristics in terms of datatype, geographical scope, source, owner, conditions of use etc can be found.



The operational process of a NAP looks generally like:

Step 1: The Operators register their dataset and its properties in the NAP Metadata registry. It is recommended to register the data that is defined by the EU-EIP harmonised meta data handbook. This is developed in close collaboration with the pan-European service providers.

Further details can be found on the following webpage:

https://eip.its-platform.eu/highlights/harmonised-metadata-national-access-points?_ga=2.192372771.888633861.1618487368-821110057.1618487368

Step 2: Interested service providers consult the meta-data registry of available datasets and find details about the services of their interest. One piece of information is how and where to register for receiving the data of their interest.

Step 3: SP's register for data delivery to the specific service if needed. In case of anonymous open data provision, registration is not required.

Step 4: the flow of data from data source to ITS Service provider becomes operational.

3.2 The data supply itself

It is up to the national NAP policy whether the data can be consumed from the source directly or a Data Portal function is available where the data is made available in technical terms.

The following 2 chapters describe the scenario's according to which the data supply can take place. Chapter 5 addresses the functions where the DATEX II data supply is directly to the end user

Chapter 6 addresses the different scenario's whit a Data Portal in place.

There is also the possibility that within one country an hybrid situation exists, where some Operators provide the DATEX II datasets directly to Service Providers, and other via the Data Portal. There is no additional functionality required that is not already described in Chapter 5 or 6.

For each type of data:

- EV charging stations,
- Hydrogen refuelling stations infra and
- Alternative fuel stations,

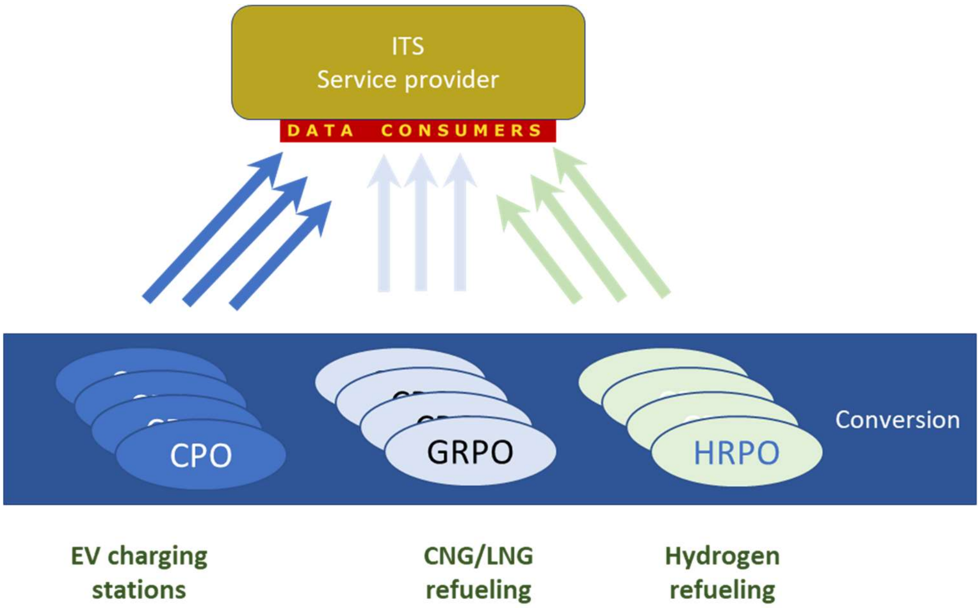
always two datasets are to be provided: one with static data and one with the real time availability.

4. Delivery scenario NAP as registry only

In this scenario the data delivery is direct between each operator and service provider. Each

4.1.1 Functional responsibilities and dataflows

	CPO	Data Portal	Service Provider
Publish OCPI	x		
convert DATEX II	x		
aggregate datasets			x



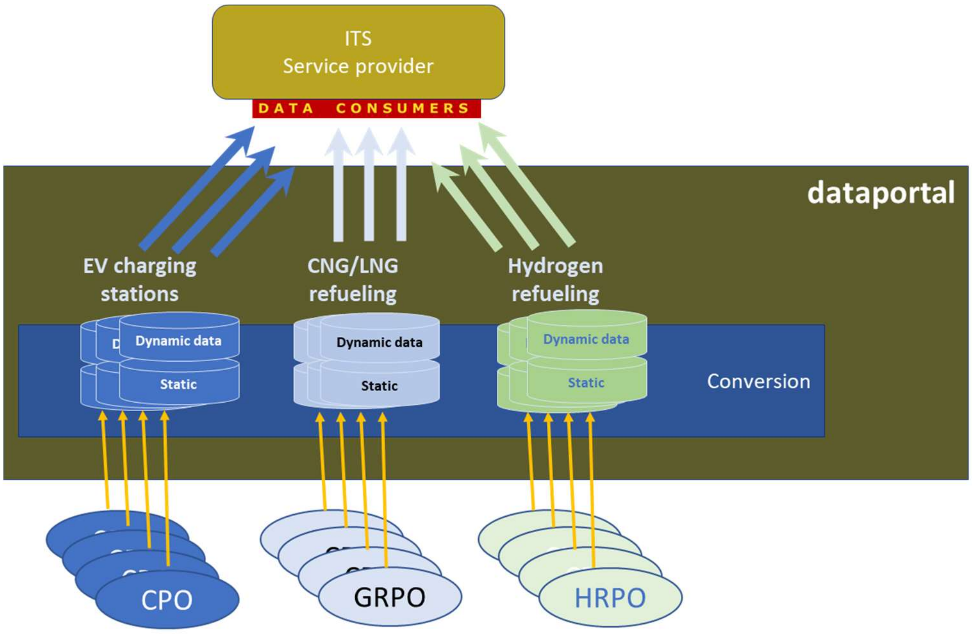
System functions required in the Data portal to support this scenario

5. Delivery scenario's with NAP as data-portal

5.1 Operators providing DATEX II merging done by SP

5.1.1 Functional responsibilities and dataflows

	CPO	Data Portal	Service Provider
Publish OCPI	x		
convert DATEX II		x	
aggregate datasets			x



5.1.2 Required Actions in the Dataportal to support this scenario

Action 0: preparations

1. Take inventory whether available data meets IDACs requirements
2. If applicable: assess whether data fulfills national requirements
3. Create DATEX II profile if national obligations require additional data fields in DATEX II
4. Define mapping of incoming information elements to DATEX II in case of available additional information.

5. Define validation rules for consistency between static and dynamic dataflows.
6. Develop the conversion tooling.

Action 1: set up the data chain

1. Registration of credentials for accessing CPO data-source among which:
    - datatype (location or status)
    - delivery type (push or pull)
    - update interval
2. Define endpoint per CPO
3. Provide endpoint-information per CPO to be registered in meta data catalogue

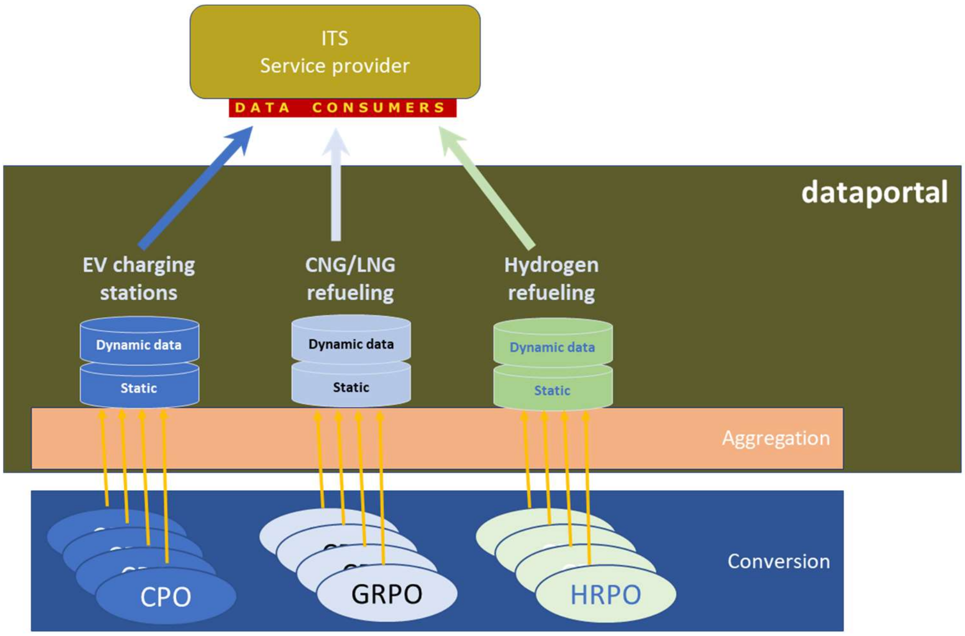
Action 2 Run the data chain

1. receive data according to set parameters
2. validate consistency between actual and dynamic datasets in line with the consistency checks defined in Action 0 step 5
3. convert data according to the mapping defined in Action 0 step 4.
4. Provide access credentials to service providers
5. Monitor timeliness of delivery

5.2 Operators providing DATEX II merging done by data portal

5.2.1 Functional responsibilities

	CPO	Data Portal	Service Provider
Publish OCPI	x		
convert DATEX II	x		
aggregate datasets		x	



5.2.2 Required Actions in the Data portal to support this scenario

Action 0: preparations

1. Take inventory whether available data meets IDACs requirements
2. If applicable: assess whether data fulfills national requirements
3. Create DATEX II profile if national obligations require additional data fields in DATEX II
4. Define mapping of incoming information elements to DATEX II in case of available additional information.
5. Define validation rules for consistency between static and dynamic dataflows.
6. Develop the aggregation tooling.

Action 1: set up the data chain

1. Registration of credentials for accessing CPO data-source among which:
    - datatype (location or status)
    - delivery type (push or pull)

- update interval

2. Define endpoint for aggregated data-sources at NAP
3. Provide endpoint-information of the NAP data portal, including the information of data available per CPO to be registered in meta data catalogue

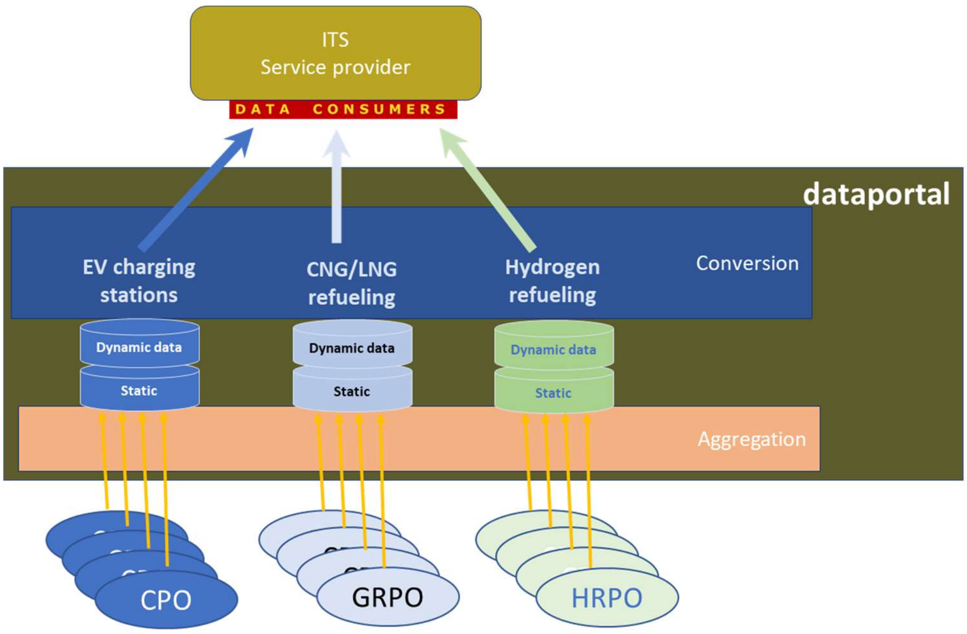
Action 2 Run the data chain

1. receive data according to set parameters
2. validate consistency between actual and dynamic datasets in line with the consistency checks defined in Action 0 step 5
3. aggregate data to one endpoint.
4. Provide access credentials to service providers
5. Monitor timeliness of delivery

5.3 Operators providing OCPI merging and conversion done by data portal

5.3.1 Functional responsibilities

	CPO	Data Portal	Service Provider
Publish OCPI	X		
convert DATEX II		x	
aggregate datasets		x	



5.3.2 Required Actions in the Data portal to support this scenario

Action 0: preparations

1. Take inventory whether available data meets IDACs requirements
2. If applicable: assess whether data fulfills national requirements
3. Create DATEX II profile if national obligations require additional data fields in DATEX II
4. Define mapping of incoming information elements to DATEX II in case of available additional information.
5. Define validation rules for consistency between static and dynamic dataflows.
6. Develop the conversion tooling.
7. Develop aggregation tooling

Action 1: set up the data chain

1. Registration of credentials for accessing CPO data-source among which:
    - datatype (location or status)
    - delivery type (push or pull)
    - update interval
2. Define endpoint for aggregated data-sources at NAP
3. Provide endpoint-information of the NAP data portal, including the information of data available per CPO to be registered in meta data catalogue

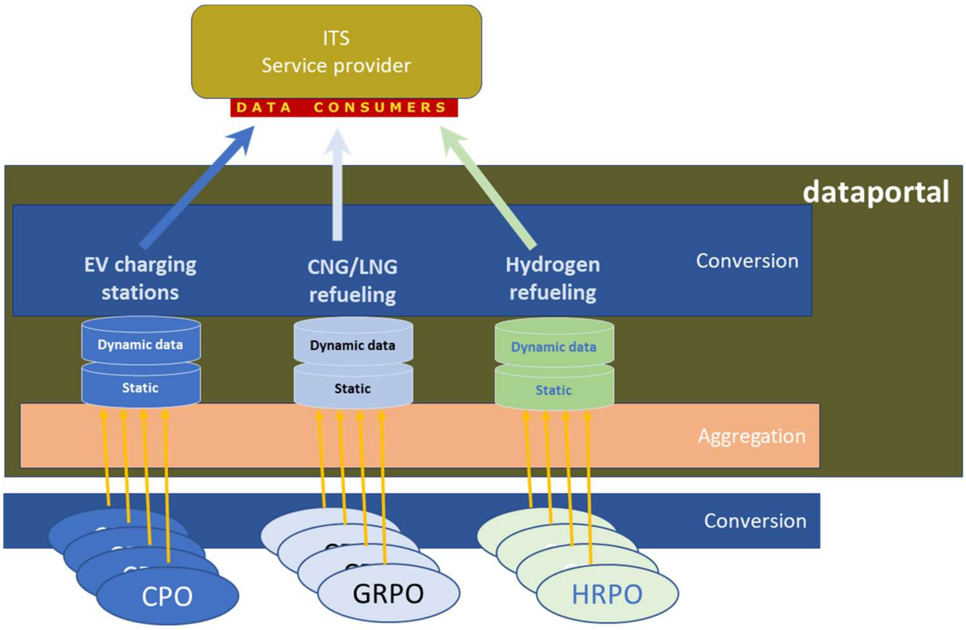
Action 2 Run the data chain

1. receive data according to set parameters
2. validate consistency between actual and dynamic datasets in line with the consistency checks defined in Action 0 step 5
3. convert data according to the mapping defined in Action 0 step 4.
4. aggregate incoming data to one endpoint
5. Provide access credentials to service providers
6. Monitor timeliness of delivery

5.4 Hybrid data provision by operators merging and conversion done by data portal

5.4.1 Functional responsibilities

	CPO	Data Portal	Service Provider
Publish OCPI	x		
convert DATEX II	x	x	
aggregate datasets		x	



5.4.2 Required Actions in the Data portal to support this scenario

Action 0: preparations

1. Take inventory whether available data meets IDACs requirements
2. If applicable: assess whether data fulfills national requirements
3. Create DATEX II profile if national obligations require additional data fields in DATEX II
4. Define mapping of incoming information elements to DATEX II in case of available additional information.
5. Define validation rules for consistency between static and dynamic dataflows.
6. Develop the conversion tooling.

7. Develop the aggregation tooling, capable of receiving both native DATEX II from CPO's and internally converted datasets

Action 1: set up the data chain

1. Registration of credentials for accessing CPO data-source among which:
    - datatype (location or status)
    - delivery type (push or pull)
    - update interval
2. Define endpoint for aggregated data-sources at NAP
3. Provide endpoint-information of the NAP dataportal, including the information of data available per CPO to be registered in meta data catalogue

Action 2 Run the data chain

1. receive data according to set parameters
2. validate consistency between actual and dynamic datasets in line with the consistency checks defined in Action 0 step 5
3. convert OCPI data according to the mapping defined in Action 0 step 4.'
4. Aggregate native DATEX II provided data with converted datasets and publish
5. Provide access credentials to service providers
6. Monitor timeliness of delivery

6. The DATEX II Recommended Service Profiles

In order to support the implementing data sources with adequate data profiles DATEX II creates so called Recommended Reference profiles, containing the minimum relevant information-elements fulfilling the requirements of the delegated Regulations.

Further information on DATEX II Recommended profiles can be found here:

https://docs.datex2.eu/profiles/index.html

As the IDACS community has gone one step deeper and created consensus about European information profile, the resulting Recommended Service Profiles have been created as well. This paragraph contains the references to the DATEX II website where the additional information can be found for these profiles.

Further information on DATEX II Recommended Service Profiles can be found here:

https://docs.datex2.eu/profiles/rsp/index.html

Note: the RSP's for IDACS datasets will become available in the next few weeks, but cannot be found yet.

6.1 Extending an RSP with national mandatory elements

6.1.1 Selecting additional attributes available in DATEX II

The IDACs recommended service profiles contain only those information elements that are identified as mandatory by the IDACs project. However, the DATEX II data model has many more attributes available (comparable to the OCPI standard). If for some reason an Operator wants (or has to) provide additional data-elements, this can be done by extending the RSP. How this is done can be found here:
https://docs.datex2.eu/profiling/index.html Especially the webinar video on https://www.youtube.com/watch?v=RMS917bz8ZM is very informative on how to do this.

6.1.2 Extending the DATEX II energy publication with local additions

In the situation where additional information elements are required that are not (yet) in the DATEX II EnergyInfrastructure publication, it is possible to extend the model. It is recommended to consult a known DATEX II expert, or the DATEX II helpdesk if this is required. For those that are willing to become an expert please check out the support section on this topic on the DATEX II documentation portal;
https://docs.datex2.eu/level3user/level2extensionguide.html

And for more advanced extensions:

https://docs.datex2.eu/level3user/level3extensionguide.html

6.2 The IDACS RSPs

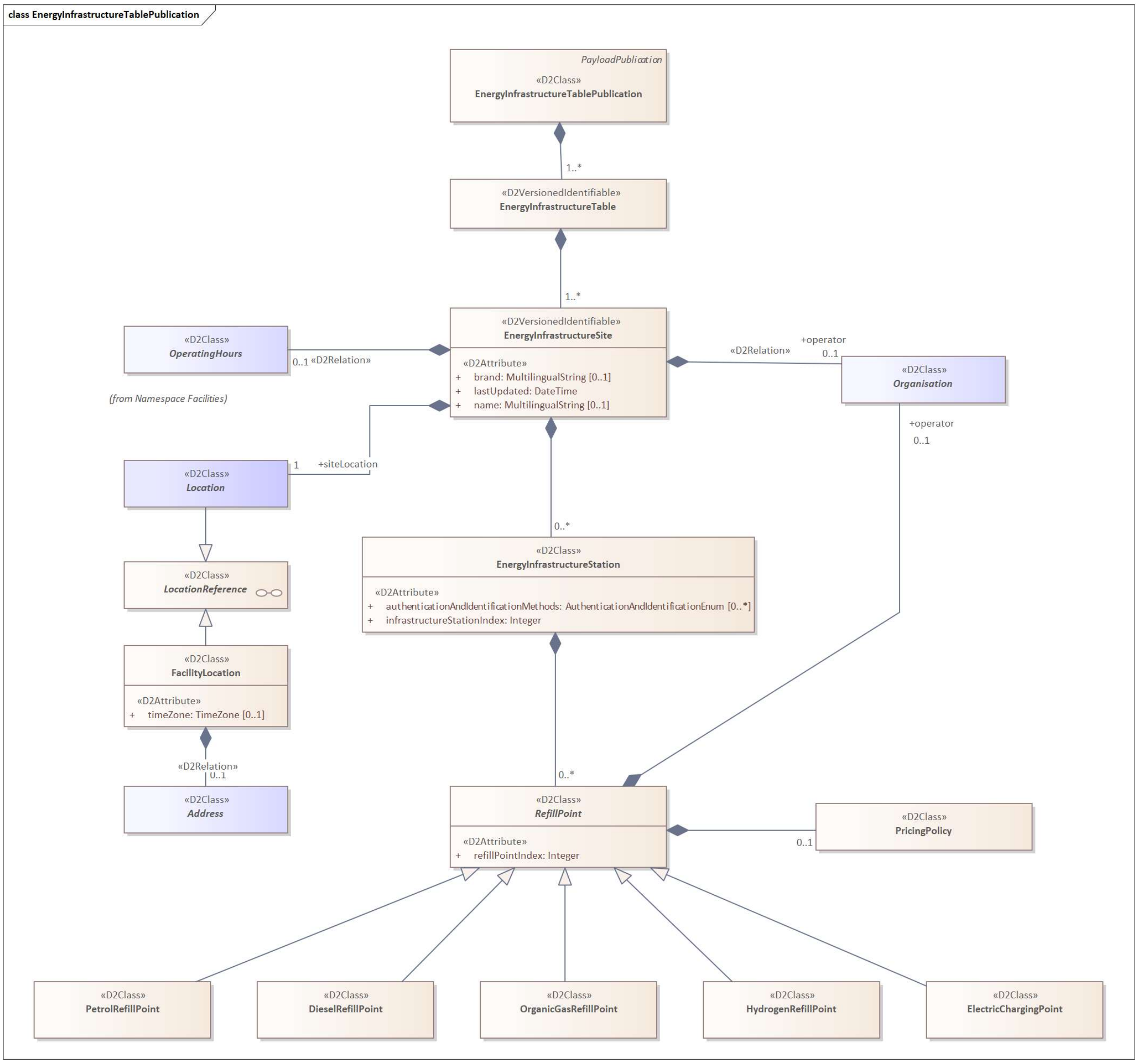
The IDACS Service profiles have the data structure as described in the next paragraphs.

6.3 Generic top structure

Each energy station has a similar data structure with regard to the common elements.

At the level of refill point the differences per type of energy and fuel emerge.

The generic structure is



In the next paragraphs the specifics of the different kinds of refill points are specified.

All energy type provisions have the same structure for

Site: the grand overarching structure of a refuelling/charging site.

A EnergyInfrastructuresite with multiple Energy Infrastructure Stations

Energy infrastructure site with 5 Energy Infrastructure Stations:

2 stations in the front, each having 1 refill point of type ElectricChargingPoint (in the front)

3 stations in the back, each having multiple refill points of different fuelling (in the back)

An Energy Infrastructure Station with several Refill Points of different nature

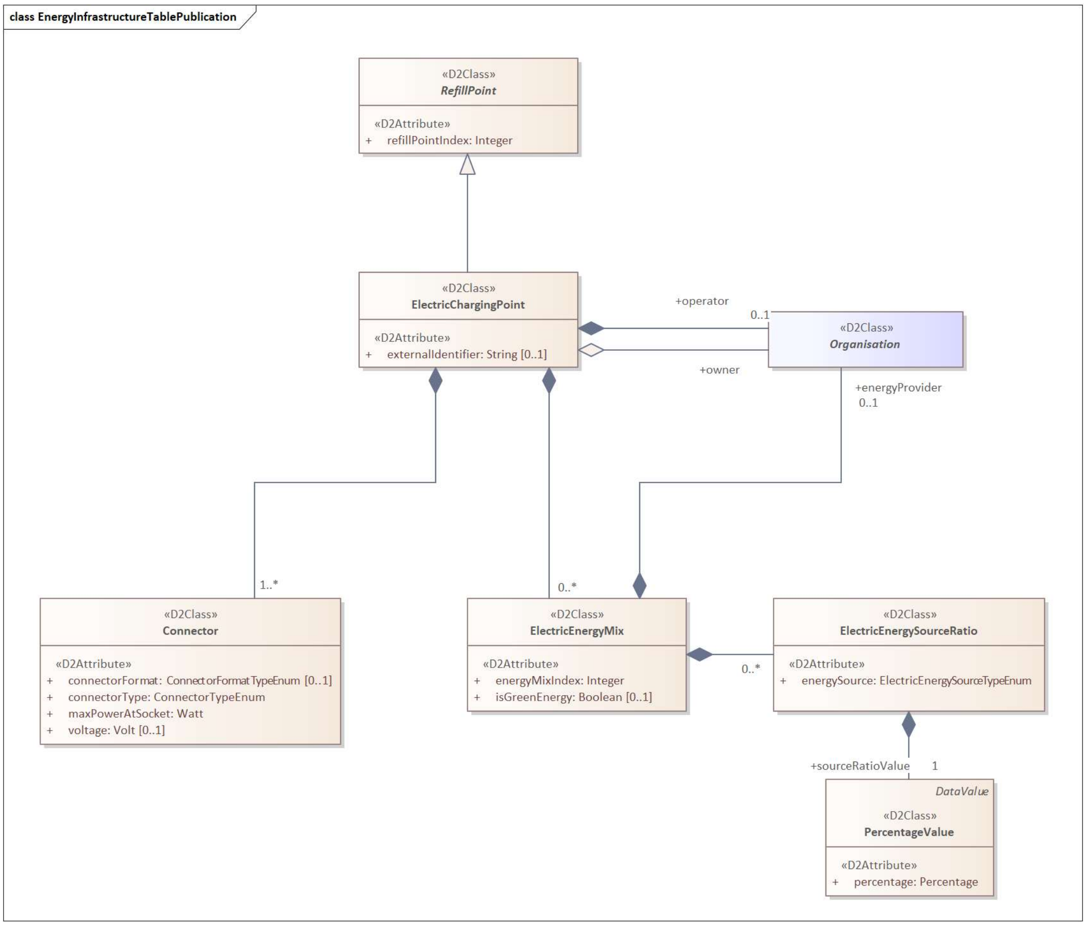
A Hydrogen refill point as a standalone Energy Infrastructure station

An Energy Infrastructure Station with refill points of different nature: Hydrogen, Petrol and Diesel

6.4 EV charging service profiles

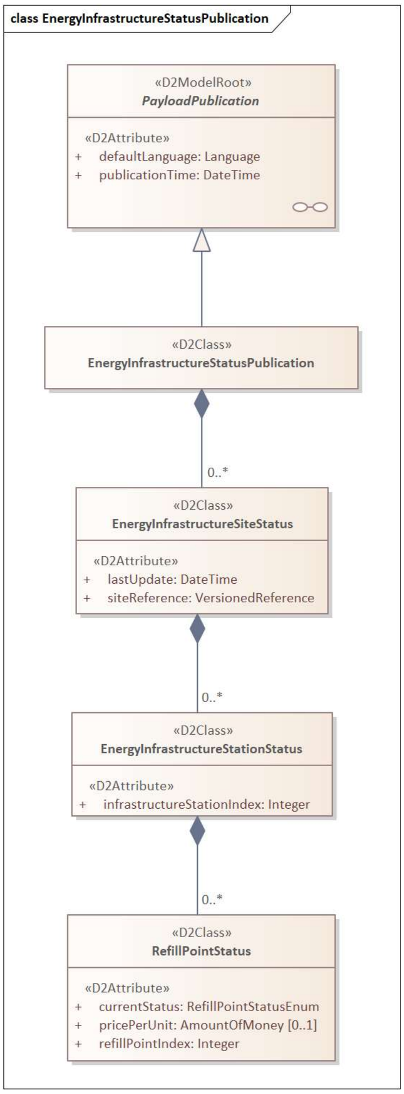
6.4.1 Infrastructure

The data model for the EV ChargingInfrastructure is a specialization of the refill point as shown in the diagram in paragraph 6.3, documenting the generic data structure.



6.4.2 Actual availability status

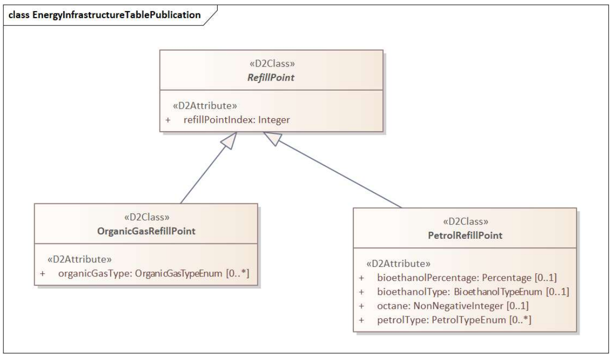
The actual availability status of the EV-Charging infrastructure is published as a DATEX II EnergyInfrastructureStatus publication. This publication carries the following information elements as shown in the UML diagram below.



6.5 Alternative fuels service profiles

6.5.1 Infrastructure

The data model for Alternative fuels refueling Infrastructure is a specialization of the refill point as shown in the diagram in paragraph 6.3, documenting the generic data structure.



Depending on the type of fuel (petrol or organic gas) the specialization of the refillpoint is determined.

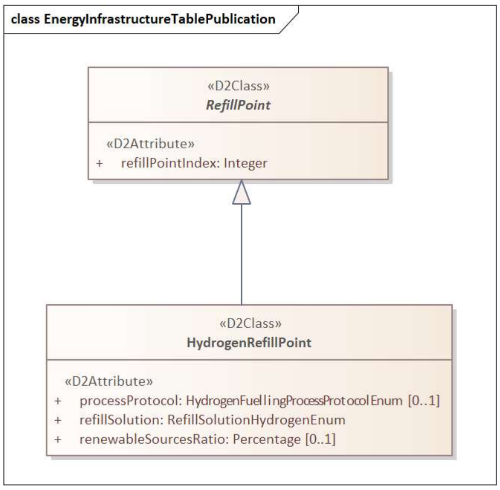
6.5.2 Actual availability status

Not in scope of IDACS

6.6 Hydrogen

6.6.1 Infrastructure

The data model for the Hydrogen Refueling infrastructure is a specialization of the refill point as shown in the diagram in paragraph 6.3, documenting the generic data structure.



6.6.2 Actual availability status

Not in scope of IDACS

7. Functional mapping of IDACS data requirements to DATEX II RSPs

The Generic components of the different alternative fueltypes are all the same. Therefore there is one specific mapping to DATEX II available, where only the energy source specifics are a variation.

The entire mapping is provided in the Annex 1 of this document.

7.1 EV charging stations

7.1.1 EV charging stations infrastructure

The following information elements are defined as the minimum dataset to be provided

1 Location:

- GNSS
- Address (street name, zip code, city,…).

2 List of available charge-solutions (Power, Modes);

3 List of available connectors (plugs, sockets, induction plate...);

4 Opening hours, identification and payment methods;

5 Contact info for owner/operator;

6 Full e-mobility code of the charging point (outlet).

The details of this dataset and how they map to OCPI and DATEX II are provided in Annex 1

7.1.2 EV charging stations actual status

The following information elements are part of the

7 Availability (if the station is operational/ non-operational);

7 Occupation status (free, occupied);

8 Price for ad-hoc charging.

The details of this dataset and how they map to OCPI and DATEX II are included in in Annex 2

7.2 Alternative fuels

7.2.1 Static Data

In the Grant Agreement, for Other fuels only the exchange of static data is mentioned. There is no focus on dynamic data (e.g. operational status or fuel availability), because of technical difficulties with sharing these data and because fuel availability is not a problem for other fuels.

To achieve the project goal, it is important that there is harmonisation between the data elements that are exchanged for electricity, hydrogen and other fuels. Therefore, the list of static data elements for electricity was used as a base for the data elements for other fuels. All participating countries agreed on sharing the data elements in figure XX. Countries are allowed to add extra data categories, but at this moment none of the participants has plans to add dynamic data.

Static Data	**description**
Gas station owner name	Name of the company that owns the gas station
Fuel type	Type of fuel, when applicable percentage of bio component
Fuel Station Latitude	Latitude on the exact location of the station. Should be in WGS84 decimal standard.
Fuel Station Longitude	Longitude on the exact location of the station. Should be in WGS84 decimal standard.
Fuel station address	Street Name where the station l is located. If available, as not all locations have Street Names.
Postal Code + Addition (if used)	Postal Code where the fuel station is located. This should be the main Postal Code + addition (if used) and can include alpha/digit characters.
City/Location	The City/Town/Location where the fuel station is located.
Country	Country where the fuel station is located. This should be the ISO 31661 Alpha-2 Country Codes.
Opening Time	The time periods when a fuel station is open to the public. This could indicate the availability of a public charging station, but also indicate the times or days that a private station becomes a public station. This is a complex type of data as it will include several different components to define the times when the fuel station can be used.
Timezone	Timezone where the fuel station resides. This is used to make sure that the availability is shown correctly and also to make reservation possible in the future.
Payment and identification methods	available identification and payment methods described as a list

7.3 H2 refuelling stations

7.3.1 H2 refuelling stations infrastructure

7.3.1.1 Location (GNSS coordinates/ street name)

Data on the location has to be collected in two different ways: as GNSS coordinates and street name. As streets may cover long distances, occur numerous times in the same city or in different cities, the consortium opts for indicating a house number, postal code, town and country in order to get an unambiguous address. Therefore, the following definitions apply:

'GNSS coordinates' means the geographical location of the driveway to a hydrogen refuelling point accessible to the public determined by a Global Navigation Satellite System (GNSS) consisting of a constellation of satellites and a global network of ground stations;

'Street name' means the address of a hydrogen refuelling point accessible to the public consisting of a street name and, if applicable, a house number, postal code, city, country and additional information

7.3.1.2 Opening hours

'Opening hours' means the period in which a hydrogen refuelling point is accessible to the public

7.3.1.3 Identification and payment methods

'Identification and payment methods' means the way with which users identify themselves and the methods with which they can pay for the gaseous hydrogen dispensed as fuel on board motor vehicles

7.3.1.4 Contact info for owner/operator

'Contact info for owner/operator' means a valid phone number at which the operator of a refuelling point dispensing gaseous hydrogen used as fuel on board motor vehicles can be contacted

7.3.2 H2 refuelling stations actual status

7.3.2.1 Operational Status

'Operational status'[1] means a status signalling whether dispensing gaseous hydrogen used as fuel on board motor vehicles at a refuelling point is possible

The following minimum statuses shall be displayed:

- "Available": dispensing gaseous hydrogen at the refuelling point is possible without restrictions
- "Not available": dispensing gaseous hydrogen at the refuelling point is not possible
- "Outside opening hours": dispensing gaseous hydrogen at the refuelling point is not possible as the refuelling point is currently not accessible to the public
- "No information": there is no information available as to whether dispensing gaseous hydrogen at the refuelling point is possible without restrictions

The operational status of refuelling points dispensing gaseous hydrogen shall be refreshed every 300 seconds as a minimum. A time of 300 seconds is chosen as that is average time it

[1] This category should not be mistaken with "availability" in the sense of real-time information on an occupational status, i.e. whether someone is refuelling their car there.

takes to refuel a FCEV and malfunctions occur mostly as a result of wrong handling of the dispenser and associated hardware during the refuelling process. Operators of refuelling points dispensing gaseous hydrogen may choose different symbols in order to illustrate these statuses.

7.3.2.2 Additional information

'Additional information' means any information not covered in data categories a) to e)

Apart from the data categories that are to be collected mandatorily as part of IDACS, certain other categories could be useful to the end consumer. For example, other data categories could include:

- The amount of hydrogen left in the station (once progress to a mass market is made)
- Current prices for hydrogen in Euros per kg
- Share of green hydrogen (e.g. according to the CertifHy scheme)
- Images of the station
- Origin of funding
- Refuelling manuals (video training)
- Payment and billing information
- General information on hydrogen

The consortium opts not to make the display of such criteria mandatory as part of IDACS, especially as new data categories entail higher costs and maintenance efforts. However, the consortium may find value added in defining these categories at the end of deliverable 2.2.2. even as many of these will be relevant in a future mass market only.

Annex 1 Mapping 2 DATEX II Static data

The mapping of the static IDACS information elements to the corresponding DATEX II elements.

For a full mapping see 2021.05.10 DRAFT IDACS Data Categories EV mapped to DATEX II.xlsx

Which is based on a non-stable version of the DATEX II Energy publications. Minor modifications might occur once the final specifications become available.

Generic Static Data	Mandatory/ Optional	description	DATEX II v3.2 Main Class	element	subelement	attribute
Refueling/Recharging Station Latitude	M	Latitude of the Refueling/Charging Station. This Latitude will be on the exact location of the Refueling/Charging Station itself. Latitude and Longitude should be in WGS84 decimal standard.	EnergyInfraStructureSite	siteLocation	pointByCoodinates	pointCoordinates.latitude
Refueling/Recharging Station Longitude	M	The Longitude of the Refueling/Charging Station. This Longitude will be on the exact location of the Refueling/Charging Station itself. Latitude and Longitude should be in WGS84 decimal standard.		siteLocation	pointByCoodinates	pointCoordinates.longitude
Refueling/Recharging Station name	M	Name or number to identify station for reference purposes		name		
Street name	M, if available	Names.		address	detailedAddressInformation	street
House Number	M, if available	all Refueling/Charging Pool locations will be close to a house number.				houseNumber
Postal Code + Addition (if used)	M, if available	Postal Code + adddition (if used) and can include alpha/digit characters.				postcode
City/Location	M	The City/Town/Location where the Refueling/Charging station is located.				city
Country	M	Country where the Refueling/Charging Pool is located. This should be the ISO 3166-1 Alpha-2 Country Codes.				country
Opening Time	M	The time periods when a Refueling/Charging Pool is open to the public. This could indicate the availability of a public Refueling/Charging station, but also indicate the times or days that a private station becomes a public station. This is a complex type of data as it will include several different components to define the times when the Refueling/Charging Pool can be used.		operatingHours		
Timezone	M	Timezone where the Refueling/Charging Pool resides. This is used to make sure that the availability is shown correctly and also to make reservation possible in the future.		address	facilityLocation	timeZone
Capabilities	M	available identification and payment methods described as a list				
Telephone	M	Telephone number of the Helpdesk, contracted by the Refueling/Charging Point Operator that is reachable during the opening hours of the Refueling/Charging Pool. This can be used by end users to contact the operator in case of problems during Refueling/Charging, reservations etc. Format should follow European Union style guide and contains the following elements: +Country code <space> complete number including the regional code (if there is one) in one separate block with the starting zero. Extension numbers will be added with a dash directly after the complete number. No other dashes, spaces or brackets can be used in the telephone number.		operator	OrganisationSpecification.unit.contactinformation	telephoneNumber
Refueling/Recharging Point Operator Name	M	Name of operator who operates the Refueling/Charging point as displayed in services			OrganisationSepcification	name
Refueling/Recharging Point Suboperator Name	M, if available	Name of suboperator who operates the Refueling/Charging point as displayed in			OrganisationSepcification.subOrganisation	name
Refueling/Recharging Point Operator Code	O	The Id of the Refueling/Charging Point Operator			OrganisationSepcification	nationalOrganisationNumber
Refueling/Recharging Point Owner Name	O	Name of legal owner			OrganisationSepcification	linkToGeneralInformation
Refueling/Recharging Point Operator Website	O	Website URL of the Refueling/Charging Point Operator. This can be used by end users to find either contact details or more details regarding access and payment methods. This should be the web url without http:// or https:// and should consist of a www (or other subdomain). Maindomain. Country or type code.			OrganisationSepcification	linkToGeneralInformation
Last-StaticData-Update-Timestamp	O	DateTime on which the static data has been changed or upgraded. This date can be used for transactional systems to only update those Refueling/Charging Stations that have changed data. This will limit the amount of data transferred through those systems. DateTime needs to be indicated according to ISO 8601 and All timestamps SHALL be in UTC.	EnergyInfraStructureSite	lastUpdate		
EV Charging Infra Specifics						
Charging Point ID	M	unique ID of the Refueling/Charging Point. This has to be delivered to identify (and book/reserve) the exact place or spot in the bigger pool of stations. See deliverable 1.1.1. for correct format		electricChargingPoint	externalIdentifier	
Mode	M	Refueling/Charging mode according to IEC-61851 terminology Cardinality 1..N			connector	chargingMode
Power	M	rated power level the EVSE is capable of delivering under normal operation conditions.			availableChargingPower	
Type of charging interface	M	list of available connectors at EVSE			connector	connectorType
Energy Source	O	To be indicated as a percentage of green electricity. % electricity from renewable energy			EnergyMix	ElectricEnergySourceRatio
Max Power at Socket	O	The maximum amount of power that can be obtained from the Plug during a Refueling/Charging session. This value should be defined in xxx Watt and can be used to calculate the maximum Refueling/Charging time and to determine compatibility of the connector and vehicle.			connector	maxPowerAtSocket
Voltage	O	The maximum voltage that can be obtained from the Plug during a Refueling/Charging session. This value should be defined in xxx Volts and can be used to calculate the maximum Refueling/Charging time and to determine compatibility of the connector and vehicle.			connector	voltage
Current	O	Sum of the maximum current over all phases, reached during this Refueling/ChargingPeriod: defined in A (Ampere).			connector	maximumCurrent
Connector format	O	The format of the connector, whether it is a socket or a plug.			connector	connectorFormat
H2 refueling infra specifics				hydrogenRefillPoint		
process protocol						processProtocol
refill solution						refillSolution
renewable sources ration						renewableSourcesRatio
AlternativeFuels infra specifics				OrganicGasRefillPoint		
organic gas type						organicGasType
				PetrolRefillPoint		
bioethanol percentage						bioethanolPercentage
bioethanol type						bioethanolType
octane						octane
petrol type						petrolType

Annex 2 Dynamic availability

The mapping of the dynamic IDACS information elements to the corresponding DATEX II elements.

For a full mapping see 2021.05.10 DRAFT IDACS Data Categories EV mapped to DATEX II.xlsx

Which is based on a non-stable version of the DATEX II Energy publications. Minor modifications might occur once the final specifications become available.

Level	Dynamic Data	M/O		DATEX II v3.2			
			description	**Main Class**	**element**	**subelement**	**attribute**
3	Availability	M	The RefillPoint is able to start a new charging session.	EnergyInfrastructureSiteSt	EnergyInfrastructureStationSt	RefillpointSTatus	currentStatus
3	Price ad-hoc charging	M	Price for ad-hoc Refueling/Charging				pricePerUnit/pricePerMinute/pricePerHour
3	Last-DynamicData-Update-Timestamp	O	DateTime on which the dynamic data has been changed or upgraded. This date can be used for transactional systems to only update those Refueling/Charging Points that have changed data. This will limit the amount of data transferred through those systems. DateTime needs to be indicated according to ISO 8601 and All timestamps SHALL be in UTC.	EnergyInfrastructureSiteStatus			lastUpdate

Annex 3 Data Dictionaries

The data dictionary of the EV Static recommended Recommend Service Profile is provided in the accompanying excel file: *2021.05.10 EV IDACS profile Data Dictionary.xlsx*

The data dictionary of all information elements for an EV-charging point available in DATEX II is provided in the accompanying excel file: *2021.05.10 EV Charging Infra all element profile DD.xlsx*

NOTE: These annexes are based on the working draft of the EnergyPublications part. Minor changes will occur until the draft is submitted to CEN for balloting. This is expected in June 2021.

ID and Data Collection for Sustainable fuels in Europe

Report

Deliverable 2.2.2: ***Description of harmonised data categories***

Deliverable 2.2.3: ***Definition of quality criteria and method of quality measurement and monitoring of collected data***

Deliverable 2.2.4: ***Proposal for an IT solution for provision of static and dynamic data for Member States not having a National Access Point in DATEX II format***

Project Acronym	IDACS
Project Full Name	ID and Data Collection for Sustainable Fuels in Europe
Grant Agreement number	MOVE/B4/SUB/2018-498/CEF/PSA/SI2.792684
Activity	2.2 Provision of static and dynamic data through the National Access Points of the Member States in requested format DATEX II
Deliverable Status	Final
Dissemination Level	Public
Version / date	V.2.0 (final, external) /30-06-2022
Main authors	Hielke Schurer, Netherlands Enterprise Agency Jan Wegener, NOW GmbH Jasmijn Vrooland, Netherlands Enterprise Agency
Reviewers	Pauline Lanz, Netherlands Enterprise Agency Anneke Bosma, Netherlands Enterprise Agency

Co-financed by the Connecting Europe Facility of the European Union

Table of Contents

List of abbreviations

AFI	: Alternative Fuels Infrastructure
AFID	: Alternative Fuels Infrastructure Directive
CNG	: Compressed Natural Gas
CPO	: Charge Point Operator
FCH-JU	: Fuel Cells and Hydrogen Joint Undertaking
GNSS	: Global Navigation Satellite System
HRS	: Hydrogen Refuelling Station
IDRO	: ID Registration Organization
ITS	: Intelligent Transport Systems (directive)
LNG	: Liquefied Natural Gas
LPG	: Liquefied Petroleum Gas
MSP	: Mobility Service Provider
NAP	: National Access Point
PSA	: Program Support Action
SGEMS	: Sub-Group on Electro-Mobility Services (Sustainable Transport Forum)

1. Introduction

The main objective of *activity 2.2* of the IDACS project is the provision of static and dynamic data related to the alternative fuels infrastructure for electricity, hydrogen and other fuels (LNG, CNG, LPG and biofuels) through the National Access Points (NAP) of the Member States in DATEX II format. To support the provision of data Member States will work collectively on the description of harmonized data categories and criteria for quality measurement and monitoring.

Further, in activity 2.2. the participating Member States will elaborate a proposal for an IT solution for provision of static and dynamic data for Member States not having a NAP in DATEX II format to be integrated through the NAP once they are operational. Finally, a proposal to the Commission will be developed for complementary data protocols to enable e-Mobility service provision and proposal for relevant standards.

2. Purpose of this document

This document aims to present the results of the abovementioned activities supporting the provision of data through the NAPs as conducted by the participating Member States between 2019 and 2021.

This document will present the final results of the following deliverables of activity 2.2:

- 2.2.2. Description of harmonized data categories across participating MS;
- 2.2.3. Quality criteria and method of quality measurement/ monitoring;
- 2.2.4. Practical solution for Member States without NAP with DATEX II format.

The remaining deliverables of activity 2.2. will be presented in separate documents at a later stage:

- 2.2.1. This deliverable will present the results of the actual data provision through the NAPs in DATEX II format. This will be evaluated at the end of the project and the results will be laid down in a separate document.
- 2.2.5. This deliverable on complementary data protocols to enable e-Mobility service provision and proposal for relevant standards is elaborated in a separate document.
- 2.2.6. This deliverable will present lessons learnt from the Nobil database solution in Norway. This will be elaborated at the end of the project and the results will be laid down in a separate document.

3. Methodology

The methodology used to support the data collection through the NAPs in DATEX II format follows the approach as described in the Grant Agreement. This means the following steps were taken by the Consortium members to prepare the provision of data to end users via the NAP:

Data categories

- To support harmonization the Consortium cooperated to determine a set of data categories for all fuel tracks across the participating Member States, based on the data categories as formulated by the Sustainable Transport Forum sub-group on electro-mobility services (SGEMS);
- The data categories were discussed within the Consortium as well as discussed with market parties such as alternative fuels infrastructure operators;
- These data categories are to be considered minimal standards. Member States are therefore free to provide additional data categories where relevant via the NAP.

Data quality and monitoring

- The Consortium cooperated to determine a set of quality requirements and a common method for quality measurement and monitoring aimed at ensuring the collected data is accurate and reliable;
- The requirements concern the freshness of data, the completeness and correctness of data and the consistency of data;
- These quality requirements are to be considered the minimal requirements that apply to the quality of the data that can be obtained from the National Access Points. Member States can therefore make stricter or more detailed requirements for their data.

IT solution for provision of static and dynamic data for Member States not having a NAP

- Even though there is a legal obligation under the Directive on Intelligent Transport Systems (ITS) to make data accessible through the National Access Points of the Member States, not all Member States have a NAP in place or operational. The Consortium cooperated to elaborate a practical solution to support these Member States in providing static and dynamic data through the NAP, once the NAP becomes operational in the future;
- The elaborated solution depends primarily on the chosen architecture of the NAP (database versus data register), as this determines how data can be made accessible in the mandatory DATEX II format;
- The Consortium has also developed an open source DATEX II conversion tool that can be used at the NAPs by CPOs or roaming platforms to convert data to DATEX II format.

4. Deliverable 2.2.2: Description of harmonized data categories across participating MS

4.1 Objective

This deliverable aims to develop a proposal for the harmonization of data categories across the participating Member States, based on the data categories as formulated by the Sustainable Transport Forum sub-group on electro-mobility services (SGEMS).

As many of the data categories of the different fuel types are the same and DATEX II data descriptions do not differ between fuels either, the Consortium and work package coordinators agreed to define harmonized data categories for all fuel tracks.

4.2 Public accessibility

The data categories refer to recharging and refuelling points that are publicly accessible. Due to the different interpretations of what 'public accessibility' entails in participating Member States, a minimum definition was agreed by the Consortium members that corresponds to the definition as mentioned in the Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014 on the deployment of alternative fuels infrastructure (AFID). Article 2 (7) of the AFID states that:

"a recharging or refuelling point accessible to the public' means a recharging or refuelling point to supply an alternative fuel which provides Union-wide non-discriminatory access to users. Non-discriminatory access may include different terms of authentication, use and payment".

The data categories are the minimum data for publicly accessible recharging and refuelling points that need to be accessible for (re-)use. The data categories are harmonised across the participating Member States, in order to get the same base level of information in the NAPs within the timeframe of the IDACS project.

`

4.3 Data categories

In order for the whole Consortium to speak the same language, the Consortium members agreed to define the exact meaning of the categories for which data have to be collected and shared mandatorily.

For IDACS, the following data categories are required as a minimum:

Static data		Electric Charging Points	Hydrogen	Other fuels
1.	Location:	x	x	x
	• GNSS coordinates	x	x	
	• Address (street name, zip code, city,…)	x	x	
2.	Opening hours, identification and payment methods	x	X	X
3.	Contact info for owner/operator	X	x	X
4.	List of available charge-solutions (Power, Modes)	x		
5.	List of available connectors (plugs, sockets, induction plate...)	X		
6.	Full e-mobility code of the charging point (outlet)	X		

Dynamic data		Electric Charging Points	Hydrogen	Other fuels
1.	Availability (if the station is operational/ non-operational);	x	x	
2.	Occupation status (free, occupied)	x		
3.	Price for ad-hoc charging	x		

The Consortium has further developed these categories into precise definitions of data categories. The European Commission requires the data to be accessible through DATEX II or any machine-readable format fully compatible and interoperable with DATEX II. Therefore, the data categories as described in “Part 10: Energy Infrastructure Publication” of prCEN/TS 16157-10:2020, i.e. the DATEX II extension that covers (alternative) fuels infrastructures, should be aligned with the definitions used by the Consortium.[1]

[1] Dynamic data can only be collected for charging points which are digitally connected to a central station and cannot be collected from (so called) dumb chargers. Nonetheless, it is market standard that charging equipment provides interfaces for electronic communication and in some of the Member States this is a legal requirement. Therefore, the share of ‘dumb’ chargers is negligible. The same is true for hydrogen refuelling stations.

The mandatory data categories for IDACS have been further defined in more detail by the Consortium and are in line with corresponding DATEX II specifications, see below:

Static data categories

Location (GNSS coordinates/ street name)

- ‘GNSS coordinates’ means the geographical location of hydrogen refuelling points / charging points accessible to the public **determined by a Global Navigation Satellite System** (GNSS) consisting of a constellation of satellites and a global network of ground stations;
- ‘Street name’ means the address of a hydrogen refuelling point / charging point accessible to the public consisting of a **street name and**, if applicable, a **house number**, **postal code**, **city**, **country**

DATEX II:

"siteLocation" attribute of class “EnergyInfrastructureSite” of the “Classes” package of CEN/TS 16157-10

- Specify the site's location.

"address" of class “EnergyInfrastructureSite” of the “Classes” package of CEN/TS 16157-10

- [no definition given]

Opening hours

- means the **time period** in which a refuelling/recharging point is **accessible to the public**

DATEX II:

"openingTimes" attribute of class “EnergyInfrastructureSite” of the “Classes” package of CEN/TS 16157-10

- [no definition given]

" openingStatus" attribute of class “EnergyInfrastructureSiteStatus” of the “Classes” package of CEN/TS 16157-10

- The opening status of the site (open or not).

" regularOpeningTimesInForce" attribute package of CEN/TS 16157-6

- If true, regular opening times are in force (can be open or closed).

Identification and payment methods

- means the **way with which end consumers identify themselves** and the methods with which they can pay for the gaseous hydrogen dispensed as fuel on board motor vehicles / the electricity at the charging station

DATEX II:

"authenticationAndIdentificationMethods" attribute of the ”EnergyInfrastructureStation” package of CEN/TS 16157-10

- Information on what methods of identification and/or authentication are accepted

“acceptedPayments” of class “Payment” of the “Classes” package of CEN/TS 16157-10

- " openingStatus" attribute of class “EnergyInfrastructureSiteStatus” of the “Classes” package of CEN/TS 16157-10

Contact info for owner/operator

- means a valid **phone number** at which the operator of a refuelling/recharging point dispensing gaseous hydrogen used as fuel on board motor vehicles can be contacted
- EnergyInfraStructureSite operator organisationUnit.contactinformation telephoneNumber

List of available charge-solutions (Power, Modes)

DATEX II: attribute "chargingSolutionMode" of the class “ElectricChargingPoint” according to CEN/TS 16157-10

- Definition what charging solution is used

List of available connectors (plugs, sockets, induction plate...) / Type of charging interface

- list of available connectors at EVSE

DATEX II: attribute "chargingInterface" of the class “Connector” according to CEN/TS 16157-10

- Specifications of the charging interface type

Full e-mobility code of the charging point (outlet)

- unique ID of the Charging Point. This has to be delivered to identify (and book/reserve) the exact place or spot in the bigger pool of stations. (See IDACS deliverable 1.1.1. for correct format)

DATEX II: subelement " externalIdentifier" of the element “electricChargingPoint” according to CEN/TS 16157-10

Dynamic data categories

Availability

- means a status signalling whether dispensing gaseous hydrogen used as fuel on board motor vehicles at a refuelling point is possible / charging at a charging point is possible
  - “Available”: dispensing gaseous hydrogen at the refuelling point / charging is possible without restrictions
  - “Not available”: dispensing gaseous hydrogen at the refuelling point / charging is not possible
  - “Outside opening hours”: dispensing gaseous hydrogen at the refuelling point / charging is not possible as the refuelling/charging point is currently not accessible to the public
  - “No information”: there is no information available as to whether dispensing gaseous hydrogen / charging at the refuelling point is possible without restrictions

DATEX II: attribute "isAvailable" of the class “EnergyInfrastructureStation” according to CEN/TS 16157-10

- Information whether the specific station is available or not. It might be unavailable for example because of a fault, damage or maintenance. It does not inform if the corresponding refill/charging points are currently occupied or not.

Occupation status

- Occupation status is the up-to-date information about the occupancy status of a refueling/charge point, so that users know if the charge point is available to charge or if the charge point is already occupied.

DATEX II: attribute “Status” of the class "RefillPointStatus" according to CEN/TS 16157-10

- available
- blocked

- charging
- faulted
- inoperative
- occupied
- out of order
- out of stock
- planned
- removed
- reserved
- unavailable
- unknown

Price ad-hoc charging

- The ad-hoc price used.

DATEX II: attribute "pricePerUnit/pricePerMinute/pricePerHour" of the class "PricingPolicy" according to CEN/TS 16157-10

The above-mentioned categories are further specified in Annex I and Annex II. For Electric Charging Points these were aligned with the categories that are used in the most commonly used communication protocols in the sector (eMIP, OCHP, OCPI & OICP). As mentioned, this concerns the minimum required data categories that Member States within the Consortium should make available on the NAP. These were discussed within the Consortium as well as discussed with market parties such as alternative fuels infrastructure operators. Moreover, this means that Member States are free to provide additional data categories where relevant via the NAP.

The Energy Infrastructure publication of DATEX II offers a variety of further data fields such as the percentage of green energy, the cable type or the process protocol for hydrogen refuelling stations.

Of the data categories discussed as part of the IDACS Consortium DATEX II covers most of them. For the most part the description of the data fields does not contradict the definitions as part of the data categories agreed upon by the IDACS Consortium. However, there is no specific field for the phone number of the operator of the fuel infrastructure foreseen. The phone number should be made part of the address field though. Furthermore, the DATEX II data categories offer a limited number of statuses for availability: available, unavailable, faulted and occupied. For ad hoc prices the pricing field can be used.

5. Deliverable 2.2.3: Quality criteria and method of quality measurement / monitoring

5.1 Objective

This deliverable aims to define common quality criteria and a common method for quality measurement and monitoring aimed at ensuring the collected data is accurate and reliable.

To ensure a high quality of data the Consortium will:

- Keep the first responsibility of the data at the NAPs who are in direct contact with the source of their data;
- Use as much as possible (de facto) standard protocols to collect the data in the NAPs and in the EU Repository;
- Set up a quality process where issues concerning quality of data can be reported by users via an easy-to-use system (e.g. via a web-interface);
- Set up a working group of Consortium partners to discuss together with other stakeholders how to improve the quality of data;
- Prevent as much as possible storing redundant data, and use links to the NAPs where possible.

5.2 Data quality

There is not one all-encompassing definition of Data Quality, but in short it comes down to the quality of the data values or instances. It refers to the overall utility of a dataset(s) as a function of its ability to be easily processed and analysed for other uses. The usefulness, accuracy, and correctness of data for its application.

One of the most challenging tasks of data provision for alternative fuels is to ensure the reliability of high data quality at the National Access Points (NAPs). The main reasons why some data platforms fail, is linked to a large extent to (a lack of) data quality.

To illustrate this, the main reasons why data platforms fail are summed up below:

- The data provides no added value to the users
- Ensuring data quality is not considered (testing and continuous execution)
- Data is redundant (in comparison to other data sources)
- Processes and stakeholders have not been sufficiently considered
- A regulative framework (on the national or European scale) is missing
- Communication with stakeholders is missing
- Long-term financing and perspectives are missing

The first three reasons are directly linked to data quality. Consequently, it is of utmost importance that a high quality of data is ensured.

Process
The Consortium has looked at drawing up common quality criteria and a common method for quality measurement and monitoring. In the beginning, it proved challenging to draw up precise quality criteria and to come up with exact methods of quality measurement that all Member States would apply. Current quality measurement practices in the different Member States differ, as does the degree of maturity of the national e-mobility market.

Outcome
Despite the different national situations, a set of quality requirements and some guidelines for data measurement and enforcement have been established. Member States will use these and strive to ensure the collected data are accurate and reliable. Member States can use these guidelines for the national quality requirements of the data and also for possible reinforcement mechanisms. This is discussed in more detail in the following chapters.

In addition, a number of other matters have been agreed that are relevant to data quality. To ensure a high quality of data, the Consortium agreed to use as much as possible (de facto) standard protocols to collect the data in the NAPs. This is often already the case. Also, Member States will strive as much as possible to ensure that issues concerning quality of data can be reported. This may look different per Member State because the first responsibility of the data at the NAPs will differ per situation in a country. This responsibility can be with an organisation which is responsible for all the data collection, but can also be delegated (via legislation) to the source of the data: the alternative fuels infrastructure operators. Depending on the situation, a system can be set up with which issues can be reported. This can be done by users, for example with an easy-to-use system via the app/system where the data is displayed. But this can also be done via a point of contact at the organization responsible for the data collection, or at the organization responsible for monitoring that the correct data is shared. Within the Consortium we see these different options. The solution will therefore differ from country to country, depending on the architecture of the NAP and national legislation.

Regardless of which national solution is chosen, it is important that there are clear agreements or obligations with the alternative fuels infrastructure operators to get the requested data and to ensure that this data is correct. The Consortium has drawn up the following guidelines and principles for this.

5.3 Data quality requirements

The quality requirements mentioned below are to be considered the *minimal* requirements that apply to the quality of the data that can be obtained from the National Access Points. This means that parties that supply the data are responsible for the correct quality of the data. In addition to this IDACS guideline, individual Member States can make stricter or more detailed requirements for their data.

With regard to the data fields that are part of IDACS they are on a purely nominal scale. Therefore, at any point in time the correctness of the data can be established on a binary scale, i.e. the data is either correct or incorrect. However, data quality and correctness also have a temporal dimension which allows for certain degrees of correctness, e.g. data can be correct 97% of the time. The quality requirement will be discussed in further detail in the next sections.

The following three minimal requirements for data quality have been defined by the Consortium:

- Requirement 1: Freshness of data
- Requirement 2: Completeness and correctness of data
- Requirement 3: Consistency of data

The requirements are also based on the findings formulated by the Sustainable Transport Forum sub-group on electro-mobility services (SGEMS), as indicated in the Grant Agreement.

Requirement 1: Freshness of data

‘Freshness of data’ means how fast a change in reality is reflected within the data. How often data changes or how often new data is created in a source.

Parties will make sure that any update that is performed in the real world is reflected in the data at the NAP.

If possible, any change in the data attributes could be indicated in the “Last Evolution” attribute with value Upgraded and a correct Timestamp value. These values can be used by operators and integrators to use the data in a transactional way without having to load all data. This reduces data loads of communication systems or processing time in other processes.

As stated in the Grant Agreement the Consortium will also define how frequently the dynamic updating of data needs to happen, balancing the technical constraints of frequent updates with the user needs (e.g. if a charging/refuelling station becomes non-operational users should be informed swiftly). The Consortium has defined the update frequency of data per fuel track as laid down in table 1. This definition was based on the following assumptions:

- Static data is forwarded/retrieved on a periodic basis;
- Dynamic data can change very frequently, especially the availability status of charge points.

These data can either be retrieved by means of a “push-message” as often as the situation changes or can be retrieved via a direct link in the NAP data.

	Electric	Hydrogen	Other Fuels
Static data			
	within 1 day on change	on change	within 1 day on change*
Dynamic data			
availability	within 6 minutes	within 5 minutes	x
occupation status	within 6 minutes	x	x
ad hoc price	within 15 min	x	x

Table 1 – Minimum update frequency of data per fuel track as defined by IDACS Consortium

** In Belgium the static data for other fuels is being updated every 3 months. Poland, Austria, Spain, Belgium and the Czech republic have stated, that the data quality for other fuels in their Member State is sufficient. For France and the Netherlands it is yet unknown.*

These frequencies have been agreed on within the Consortium as minimum update frequencies. These are mainly based on the technical (im)possibilities that currently exist with regard to data exchange via the NAP in some Member States. This also depends on the NAP architecture and the burden it places on the alternative fuels infrastructure operators. From the point of view of the intermediary and end users (the EV driver or an app developer), a higher update frequency is preferable. The situation in practice can change quickly and the end user therefore benefits from getting the right information at the right time to avoid disappointment. The value of the data provision is lower if the end user does not have access to up-to-date information. However, it is about a balance between what is desirable for the end user and what is possible for the operator.

Some Member States indicate that the systems of alternative infrastructure operators have their limitations and can only process a maximum of requests per hour. The higher the requirements for update frequency, the higher the burden (cost) for alternative fuels infrastructure operators becomes. A balance has been found with this minimum update frequency. In this regard, the requirements for data quality and update frequency may also depend on whether or not fees are charged for the data supply. Member States can make a distinction between data that is accessible for free (at a lower update frequency), and data that is accessible for a fee (high update frequency).

As part of contractual agreements for data deliveries with infrastructure operators, usually minimum operating times of the application programming interfaces (API) as well as certain service level agreements are defined. The minimum operating times of the API should be close to 100% not taking into account planned maintenance. In order to evaluate whether these operating times are met a certain number of requests per second (e.g. 6) needs to be defined. In a second step, the percentage of responses per number of milliseconds should be stated (e.g. the API will enable three responses in 500 ms, i.e. 50% of requests). Service levels define the severity of the inaccuracy (e.g. there is a grave mistake making the data unusable) and for each one of these levels establishes times in which the AFI operator needs to respond and correct the problem, i.e. ensure that data quality is fine again.

Requirement 2: Completeness and correctness

'Completeness' defines the amount of mandatory and optional data that is available in the data. Authorities will make sure that all mandatory fields shall have a valid value available and that optional values are added where possible.

'Correctness' defines that the data correctly reflects the situation in reality. Authorities will demand and strive to keep this quality as high as possible. For all data categories: correct/incorrect, except for "GNSS coordinates": a margin of error could technically be considered, question of exact coordinates of the HRS (e.g. point of entry)

Requirement 3: Consistency

'Consistency' is the process of keeping information uniform as it moves across a network and between various applications. It defines if the data categories are delivered as is defined in the IDACS data categories as laid down in paragraph 4.3 of this document, and eventually in DATEX II format.

Authorities will make sure that all data categories are delivered via the NAP and will strive to make sure all the data will be in DATEX II format or any machine-readable format fully compatible and interoperable with DATEX II. Authorities will have a contact available for any user of the data to indicate issues to the data or violations to the specifications.

Application of quality requirements

The abovementioned guidelines are the minimum frameworks for the Consortium to adhere to. Some Member States indicated that stricter rules would be challenging to implement considering the current market situation. Moreover, it is not always desirable because some Member States do not necessarily want to have the perfect data on the NAP, but want to give market parties the opportunity to enrich the data. There are also some concerns about whether (especially smaller) alternative fuels infrastructure operators can meet these requirements. Therefore, it is up to individual Member States to determine exact standards. This guideline ensures that there is a minimum quality standard for the available data. Member States are free to implement these more concretely and/or more ambitiously (e.g. in national legislation). It is also conceivable that, for example, scores will be assigned to the categories (for example, that 97% of the data must be "Complete").

5.4 Data quality measurement

The Consortium recognizes the importance of measuring and monitoring the quality of the data. At the same time, they also recognize the complexity of developing a common, unambiguous method that is applicable to all Member States. The entire data chain must also be considered here: it is a responsibility of the entire chain (from CPO to MSP).

Moreover, the different situations in Member States with different choices for architecture of the NAP makes it more challenging. Member States with a central database can perform (major) checks faster than Member States that have a register. The task of data monitoring and control can also be assigned to different organizations. Some national organizations have their own working methods (e.g. problem-based intervention only, sample-based measurement only) which makes it challenging to have a universal way of measuring quality.

A number of testing methods are identified for quality measurement. Looking at current practices in Member States, there are a number of common best practices.

- <u>Test the veracity of the data that is provided (static data)</u>
  Some Member States will do this check at the first technical inspection of the station. A periodic check is also an option.
- <u>Random sampling (dynamic data)</u>
  In order to be able to check the dynamic data as well, we see in some Member States the method whereby a random sampling is used to check to what extent the data corresponds to reality.
- <u>Consistency checks</u>
  The quality of data can also be checked remotely, e.g. by comparing zip codes and cities or streets in order to identify inconsistencies and flaws in the dataset.
- <u>Problem based testing</u>
  In case of reports about incorrect data, quality can be tested. A precondition for this is that there is a possibility where this can be indicated.
- <u>Asking for customer feedback</u>
  This requires a back channel to receive customer feedback. Some Member States has set up a low-threshold feedback channel for consumers and requires operators to reply to a check-list which is periodically sent to them.

5.5 Data quality enforcement

Testing the data for quality is one thing, but how do Member States ensure the data is and remains correct? For this, it must first be clear who owns the data and who is responsible. In many cases this is not the NAP, but the operators.

The data quality can therefore be enforced via various options:

- Legislative obligation to share data on the NAP, including quality requirements
  Here too there are various possibilities: it can be defined precisely or left more freedom in the legislation. Quality criteria can be stated in the legislation, but this can also be indicated somewhat less specifically and, for example, described as data that must be correct and with which the driver receives the correct information at all times.
- Service level agreements as part of data procurement contracts
  This can be an important link: as soon as there is procurement for charging/refuelling infrastructure, governments must be aware of the data issue. They can include requirements regarding data ownership, data provision, but also requirements for data quality.
- Sanctions
  To be agreed as part of a contract with a data provider, or as part of regulation. We see both cases within the IDACS Member States. The sanctions can vary from official warnings to fines.

6. Deliverable 2.2.4: Practical solution for MS without NAP with DATEX II format

6.1 Objective

This deliverable aims to elaborate a proposal for an IT solution for provision of static and dynamic data for Member States not having a National Access Point in DATEX II format – to be integrated through the National Access Points once they are operational.

6.2 Available solutions

Also for this topic, there is not one unambiguous solution that can be chosen. The IT solution for provision of data in DATEX II format depends on the architecture of the NAP.

- **Database**
  For databases, the solution lies with the organization that manages the database. They can make the translation of the data to the DATEX II format. The DATEX II working group has made a mapping between the IDACS data categories and the DATEX II categories. This allows organizations to see which data categories need to be converted and how. The mapping IDACS categories > DATEX II categories is the tool that organizations can use for this. Various member states have applied such a translation to the DATEX II format within their database: the data is converted in their own system.

  Because different formats and protocols can be used within the countries, there is no single solution for a conversion to DATEX II that can be applied for all countries that have a database.

- **Data register**
  With registers, the solution is more complex. First of all, there are registers that link to one (government) organization with a database. In this case, the above solution can be applied: the organization that runs the database will have to do the conversion to the DATEX II format.

  The second option is more complex. Some registers can link to multiple organizations or companies. Also in this case there is the option that the organizations that make the data available are responsible for the conversion to DATEX II.

  However, there is also another solution. A DATEX II conversion tool that is active on the NAP: the alternative fuel operator can convert its own data to DATEX II. The operator can use this tool when a data client asks for data in DATEX II. The Netherlands is developing such a tool for their NAP. Initially it is only suitable for electric charging points data and it is limited to the conversion of OCPI data to DATEX II (because all national CPOs can submit in OCPI). Since it is developed Open Source, the tool could be (partly) adopted by other Member States. With this solution, the operator remains the owner of the data.

6.3 Conclusion

Within the IDACS project the mapping has been made for the IDACS categories and DATEXII categories. Countries then went to work and came up with various solutions ranging from translation into the database system to a converter tool that operators can use to convert their own data.

With the knowledge that has now been collected within the IDACS project, it can be stated that there is not one IT solution that can be provided. There are roughly 3 options:

1. The conversion of data to DATEX II takes place at the organization that manages a database;
2. The conversion takes place with a conversion tool that operators can use themselves to make their data available in DATEX II;
3. Operators directly provide the data in DATEX II.

Because operators do not yet use DATEX II, the third option is not applicable. At the moment, the efforts of the countries are still ongoing to make the data available in DATEX II format via the other two options. This is also because the "Energy Infrastructures" publication, i.e. DATEX II v 3.2, has only been published in June 2021. To conclude, there is currently no single proposal to make for an IT solution for the provision of DATEXII data.

Also, whatever technical solution is chosen, there is a dilemma with every solution. For operators, there is no clear (national) obligation to use the DATEX II format for static and dynamic data. This requirement is only there from the IDACS project. Until this is the case, it is still unclear to what extent DATEX II will actually be used in practice by operators and/or service providers.

Annex 1 - IDACS Data categories Electric Charging Points

#	IDACS requirements	Static Data	Description
1	Location	GNSS	Latitude and longitude of the Charging Station. Latitude and Longitude should be in WGS84 decimal standard.
		Charging Station name	Name or number to identify station for reference purposes
		Street name	Street Name where the station l is located. If available, as not all locations have Street Names.
		House Number	The House Number where the Charging Station is located. If available, as not all Charging Pool locations will be close to a house number.
		Postal Code + Addition (if used)	Postal Code where the Charging station is located. This should be the main Postal Code + adddition (if used) and can include alpha/digit characters.
		City/Location	The City/Town/Location where the Charging station is located.
		Country	Country where the Charging Pool is located. This should be the ISO 3166-1 Alpha-2 Country Codes.
2	Available charge-solutions	Mode	Charging mode according to IEC-61851 terminology Cardinality 1..N (e.g. Mode1-AC-1p; Mode1-AC-3p; Mode2-AC-1p; Mode2-AC-3p, Mode3-AC-3p; Mode4-DC)
		Power	rated power level the EVSE is capable of delivering under normal operation conditions.
3	Available connectors	Type of charging interface	List of available connectors at EVSE (e.g. Type 2 "Mennekes", Combo Type 2)
4	Opening hours, identification and payment methods;	Opening Time	The time periods when a Charging Pool is open to the public. This could indicate the availability of a public charging station, but also indicate the times or days that a private station becomes a public station.
		Timezone	Timezone where the Charging Pool resides. This is used to make sure that the availability is shown correctly and also to make reservation possible in the future.
		Capabilities	available identification and payment methods described as a list
5	Contact info for owner/operator;	Charge Point Operator Name	Name of operator who operates the charging point as displayed in services
		Charge Point Suboperator Name	Name of suboperator who operates the charging point as displayed in services (if available)
		Telephone	Telephone number of the Helpdesk, contracted by the Charge Point Operator that is reachable during the opening hours of the Charging Pool. This can be used by end users to contact the operator in case of problems during charging, reservations etc.

6	Full e-mobility code of the charging point	Charging Point ID	unique ID of the Charging Point. This has to be delivered to identify (and book/reserve) the exact place or spot in the bigger pool of stations. (See IDACS deliverable 1.1.1. for correct format)
	IDACS requirements	**Dynamic Data**	**Description**
7	Availability	Availability	Up-to-date information about the accessibility of a charge point, so that it is clear whether a charge point is in operation or out of order (for example due to a defect or maintenance).
8	Occupation status	Occupation status	Up-to-date information about the occupancy status of a charge point, so that users know if the charge point is available or if the charge point is already occupied.
9	Price ad-hoc charging	Price ad-hoc charging	The ad-hoc price used. This is the price that a user pays to the operator for use of its charging point, without using a pre-registration, contract or subscription with a power supplier, charging point operator or service provider. If there is not 1 fixed ad-hoc rate, the price data that is necessary to calculate the ad-hoc price for a charging session must be provided (such as a price per kWh, a start rate and administration costs).

Annex 2 - IDACS Data categories and related DATEX II v 3.2 data classes

Generic Static Data	Mandatory/ Optional	description	DATEX II v3.2 Main Class	element	subelement	attribute
Refueling/Recharging Station Latitude	M	Latitude of the Refueling/Charging Station. This Latitude will be on the exact location of the Refueling/Charging Station itself. Latitude and Longitude should be in WGS84 decimal standard.	EnergyInfraStructureSite	locationReference	pointByCoodinates	pointCoordinates.latitude
Refueling/Recharging Station Longitude	M	The Longitude of the Refueling/Charging Station. This Longitude will be on the exact location of the Refueling/Charging Station itself. Latitude and Longitude should be in WGS84 decimal standard.		locationReference	pointByCoodinates	pointCoordinates.longitude
Refueling/Recharging Station name	M	Name or number to identify station for reference purposes		name		name
Street name	M, if available	Street Name where the station is located. If available, as not all locations have Street Names.		locationReference.facilityLocation.address	address.addressline	street
House Number	M, if available	The House Number where the Refueling/Charging Station is located. Optional as not all Refueling/Charging Pool locations will be close to a house number.				houseNumber
Postal Code + Addition (if used)	M, if available	Postal Code where the Refueling/Charging station is located. This should be the main Postal Code + adddition (if used) and can include alpha/digit characters.			address	postcode
City/Location	M	The City/Town/Location where the Refueling/Charging station is located.			address	city
Country	M	Country where the Refueling/Charging Pool is located. This should be the ISO 3166-1 Alpha-2 Country Codes.			countryCode	country
Opening Time	M	The time periods when a Refueling/Charging Pool is open to the public. This could indicate the availability of a public Refueling/Charging station, but also indicate the times or days that a private station becomes a public station. This is a complex type of data as it will include several different components to define the times when the Refueling/Charging Pool can be used.				operatingHours

Timezone	M	Timezone where the Refueling/Charging Pool resides. This is used to make sure that the availability is shown correctly and also to make reservation possible in the future.		locationReference	facilityLocation	timeZone
Capabilities	M	available identification and payment methods described as a list	EnergyInfraStructureStation			authenticationAndIndentificationMethods
Telephone	M	Telephone number of the Helpdesk, contracted by the Refueling/Charging Point Operator that is reachable during the opening hours of the Refueling/Charging Pool. This can be used by end users to contact the operator in case of problems during Refueling/Charging, reservations etc. Format should follow European Union style guide and contains the following elements: +Country code <space> complete number including the regional code (if there is one) in one separate block with the starting zero. Extension numbers will be added with a dash directly after the complete number. No other dashes, spaces or brackets can be used in the telephone number.	EnergyInfraStructureSite	operator	organisationUnit.contactinformation	telephoneNumber
Refueling/Recharging Point Operator Name	M	Name of operator who operates the Refueling/Charging point as displayed in services			OrganisationSpecification	name
Refueling/Recharging Point Suboperator Name	M, if available	Name of suboperator who operates the Refueling/Charging point as displayed in services		operator.suborganisation		name
Refueling/Recharging Point Operator Code	O	The Id of the Refueling/Charging Point Operator		operator	OrganisationSpecification	nationalOrganisationNumber
Refueling/Recharging Point Owner Name	O	Name of legal owner		owner		name
Refueling/Recharging Point Operator Website	O	Website URL of the Refueling/Charging Point Operator. This can be used by end users to find either contact details or more details regarding access and payment methods. This should be the web url without http:// or https:// and should consist of a www (or other subdomain). Maindomain. Country or type code.		operator	OrganisationSpecification	linkToGeneralInformation

Last-StaticData-Update-Timestamp	O	DateTime on which the static data has been changed or upgraded. This date can be used for transactional systems to only update those Refueling/Charging Stations that have changed data. This will limit the amount of data transferred through those systems. DateTime needs to be indicated according to ISO 8601 and All timestamps SHALL be in UTC.	EnergyInfraStructureSite	lastUpdated

Level	Dynamic Data	M/O	description	DATEX II v3.2 Main Class	element	subelement	attribute
3	Occupation Status	M	The Refill/Charging Point is able to start a new (charging) session.	EnergyInfrastructureSiteStatus	EnergyInfrastructureStationStatus	RefillpointStatus	status
3	Availability		Availability (if the station is operational/ non-operational)			isAvailable	
3	Price ad-hoc charging	M	Price for ad-hoc Refueling/Charging			electricEnergyMixOverride.energyPricingPolicy	pricePerUnit/pricePerMinute/pricePerHour
3	Last-DynamicData-Update-Timestamp	O	DateTime on which the dynamic data has been changed or upgraded. This date can be used for transactional systems to only update those Refueling/Charging Points that have changed data. This will limit the amount of data transferred through those systems. DateTime needs to be indicated according to ISO 8601 and All timestamps SHALL be in UTC.	EnergyInfrastructureSiteStatus			lastUpdated

EV Charging Infra Specifics					
Charging Point ID	M	unique ID of the Charging Point. This has to be delivered to identify (and book/reserve) the exact place or spot in the bigger pool of stations. See deliverable 1.1.1. for correct format	electricChargingPoint	externalIdentifier	
Mode	M	Charging mode according to IEC-61851 terminology Cardinality 1..N		connector	chargingMode
Power	M	rated power level the EVSE is capable of delivering under normal operation conditions.		availableChargingPower	
Type of charging interface	M	list of available connectors at EVSE		connector	connectorType
Energy Source	O	To be indicated as a percentage of green electricity. % electricity from renewable energy		EnergyMix	ElectricEnergySourceRatio
Max Power at Socket	O	The maximum amount of power that can be obtained from the Plug during a Charging session. This value should be defined in xxx Watt and can be used to calculate the maximum Charging time and to determine compatibility of the connector and vehicle.		connector	maxPowerAtSocket
Voltage	O	The maximum voltage that can be obtained from the Plug during a Charging session. This value should be defined in xxx Volts and can be used to calculate the maximum Charging time and to determine compatibility of the connector and vehicle.		connector	voltage

Current	O	Sum of the maximum current over all phases, reached during this ChargingPeriod: defined in A (Ampere).		connector	maximumCurrent
Connector format	O	The format of the connector, whether it is a socket or a plug.		connector	connectorFormat
H2 refueling infra specifics					
process protocol	O		hydrogenRefillPoint		processProtocol
refill solution	O				refillSolution
renewable sources ration	O				renewableSourcesRatio
AlternativeFuels infra specifics					
organic gas type	O		OrganicGasRefillPoint		organicGasType
bioethanol percentage	O		PetrolRefillPoint		bioethanolPercentage
bioethanol type	O				bioethanolType
octane	O				octane
petrol type	O				petrolType

Report

Deliverable 2.3.1: ***Sustainability and continuity of the data collection beyond the Programme Support Action***

Project Acronym	IDACS
Project Full Name	ID and Data Collection for Sustainable Fuels in Europe
Grant Agreement number	MOVE/B4/SUB/2018-498/CEF/PSA/SI2.792684
Activity	2.3 Sustainability and continuity of the data collection beyond the Programme Support Action
Deliverable Status	Final
Dissemination Level	Public
Version / date	V.2.0 (final, external) /30-06-2022
Main authors	Hielke Schurer, Netherlands Enterprise Agency
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List of abbreviations

AC	Alternating Current
AFID	Alternative Fuel Infrastructure Directive
AFIR	Alternative Fuel Infrastructure Regulation
CPO	Charge Point Operators
DC	Direct Current
EC	European Commission
EAFO	European Alternative Fuel Observatory
FTE	Full-time equivalent
ITS	Intelligent Transport Systems
MSP	Mobility Service Providers
NAP	National Access Point
OEM	Original Equipment Manufacturer

1. Introduction

The main objective of *Activity 2.3* of the IDACS project is to secure the sustainability and continuity of the data collection beyond the PSA project.

First, the Consortium will provide information on resource requirements for data collection and, in addition, options for institutional and funding structures in which the data collection can be sustained.

2. Purpose of this document

This document will present the final results of the deliverable 2.3.1 of activity 2.3, which constitute a report with proposals on how to keep collected data on alternative fuels infrastructure up to date – beyond the period of this PSA including funding mechanisms. An overview of resource requirements to sustain the data collection when the project has finished will give insight into the required roles, organization and funding possibilities. These resource requirements are then used to formulate options for institutional and funding structures in which the data collection can be sustained, beyond the project. The Consortium will elaborate on the added value of the data collection for different stakeholders and different options for future funding of the data collection will be explored. According to the Grant Agreement, this could range from a fee-based approach to a situation where downloads are free, but live feeds are provided via a subscription mechanism, or otherwise. Moreover, this also includes the exploration of the possibility of having the data collection activities carried out by an existing organisation. And ultimately, this deliverable will reflect on a possible legislative approach for collecting data, including at national level.

3. Methodology

The methodology used to secure the continuity of the data collection beyond IDACS follows the approach that was described in the Grant Agreement. This approach includes the following steps, which were taken by the Consortium members:

<u>1. Provide information on resource requirements Data collection</u>
The Consortium maps the resource requirements to sustain the data collection after the project has finished, based on:

- Required roles, responsibilities and competences/skills
- Organisation: required legal form and governance structure
- Funding: possible financial funding mechanisms

To gain insight into this, the set-up and management of the NAPs and the data collection of all Member States were examined.

2. Develop a blue-print for an institutional structure and support beyond the PSA

Based on these resource requirements the Consortium formulates options for institutional and funding structures in which the data collection can be sustained.

In order to start the discussion and to gather input a questionnaire has been sent to all participating Member States. This questionnaire can be found in the Annex. A follow-up call was arranged to elaborate on the received answers. The memo that was drafted for activity 2.2 was also used as input and context for this document.

4. Resource requirements NAP and data collection

The requirements of the National Access Points are defined in the Directive 2010/40/EU on Intelligent Transport Systems (ITS directive). This directive allows: *various set-ups of the NAPs, such as a database, data warehouse, data marketplace, repository, register, web portal or similar.* Since the directive was issued in 2010, many Member States already have some established kind of NAP to comply with the directive. This has resulted in many different starting points for all participating Member States. Due to the national approach and the flexibility allowed in the NAP set up, according to the Directive, many different in set-up occur in the IDACS project. The data collection of the IDACS project finds its origin in the Alternative Fuel Directive (AFID), which describes what data categories should be accessible in an open and non-discriminatory way to all users. In order to gain a better insight into the resource requirements required in the future, the requirements of the current NAPs and data collection have been examined. In line with the Grant Agreement, the following topics have been researched:

- Legal form and governance structure
- Roles and responsibilities
- Funding and financing

4.1 Legal form and governance structure

Legal form

The countries have the European ITS and AFID legislation as the legal base for data provision at the NAP. In many countries this is subject to national legislation. The principle that data must be provided via the NAP is therefore supported by legislation in actually all member states. However, it often does not support the sharing of all data categories for all fuel tracks as requested in IDACS. As a result, additional legislation has been drawn up or is still being drawn up in approximately half of the countries.

Governance

As mentioned earlier, there are many differences in the set-up of the NAP between the member states. Regarding the architecture of the NAP, more than 50% of the member states have a data register, three have a data warehouse, two have a database and one has a market place. In the case of a register, most cases refer to a public database (71%)

and only a few to a private database (29%).

Furthermore, it appears that 6 countries have chosen to combine their NAP with the IDRO, or are planning to do so. The reasons for doing this are efficiency, simplicity, to have all information in one place or to have the possibility to link information together.

All NAPs are managed by government organizations. In a majority, the actual data collection is not done by the NAPs themselves, but by other organisation(s). In a large majority these are other government parties, and in 5 member states these are private parties or in 1 case a mix of both.

4.2 Resources, roles, responsibilities and competence/skills

Most NAPs have two or three persons partially available. It is difficult to estimate for the member states how many FTEs this is on a yearly base in total. But it is clear that the deployment of personnel with regard to the NAP is very limited.

Most of the effort is done by operational staff, supported by IT specialists for the automation of processes and maintenance of the website and system(s). Once a NAP has been set-up, the actual effort of registration and maintenance is quite limited.

As for the data collection itself, it's a different story. For the countries that have insight into this, it differs from 2 to 7 persons who are involved. Some of the countries leave the data collection to a private party, which makes it difficult to estimate the actual man-hours. Occasionally, the set-up of the NAP is also combined with the set-up of an IDRO, which makes a specific indication of the costs more complex. However, it can be concluded that most of the resources are on the side of the actual data collection.

The quality of the data is not automatically the responsibility of the organization that runs the NAP or is responsible for data collection. Actually, the majority of the countries have made the operators themselves responsible for good quality data. In other countries, the organization that does the data collection is responsible for good quality.

4.3 Funding and financing

Based on the results obtained as part of the project, Member States have invested investment costs ranging from 15,000 to 800,000 euro on the IT system for data collection. These costs vary considerably. In one case, there may already be an existing system that just needs to be continued or modified. While in other cases everything from setting up a NAP to a public database has been developed. It is also possible that the costs for 'data collection' include multiple functions (the costs for combining the NAP and IDRO, the costs for setting up a public database, costs for the organization that will do the data collection, the maintenance for several years, etc.).

There are also countries where the costs are unknown because the data provision is left to private parties: private data aggregators or operators supply the data. In those cases, the costs of data collection are not clear. As a result, the necessary investments from the government for data collection are considerably limited, compared to the countries that have to build a public system for data collection and provision via the NAP.

Cost covering fees
Around two-thirds of the Member States participating in IDACS charge no fee for the access of the data through the NAP. The five Member States that have apply fees have different approaches. Different tariffs depending on offered services (e.g. higher tariff for higher frequency) or depending on the type of data (static or dynamic data), as in the Netherlands, Belgium, France and Germany. But a recurring tariff (time-based fee/subscription) is also possible. There may be differences in how the fee is determined. This is not always laid down by the government because in the countries mentioned above this is (partly) left to the data owners. In some countries this is left to the data owners. While others have fixed prices or an intermediate option. For example, that a limited number of downloads per hour is free, but real-time data is paid.

A cost covering fee is allowed by the EU, however, national regulations can enforce that no cost shall apply for this kind of activities. In these situations the cost are covered via federal/state budget.

5. Data collection beyond the Programme Support Action

In this chapter the Consortium formulates options for institutional and funding structures in which the data collection can be sustained.

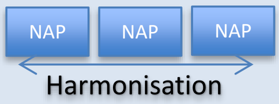
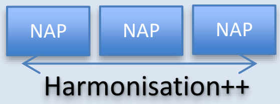
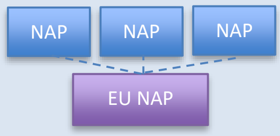
Before this is discussed, it will first be clarified what is meant by 'the data collection'. In activity 2.3, the Grant Agreement talks about "to secure the continuity of the data collection system developed in this project" and about "the central data collection". As has already been shown in other deliverables, no central data collection system has been set up within IDACS on European level. This is due to the considerable differences in national situations and also due to the lack of appropriate (European) legislation. Finally, this is not a formal assignment within the IDACS project.

5.1 Future data collection

The Grant Agreement states that this deliverable must describe how the data collection can be sustained after IDACS: a ‘blue print for future data collection’. However, the data collection as set up in IDACS is designed in a way that can continue after the end of the project. There is therefore little added value if only the continuation of the IDACS way of data collection is considered.

The blue print for future data collection is therefore divided into three scenarios: the first is about continuing the data collection as set up within IDACS. The second scenario focuses on more harmonization of data collection in Europe. And the third option discusses the future data collection by a central European access point. The latter option is elaborated in more detail in the IDACS Memo *'Memo on a common form of NAPs and data provision at EU level'*, including the consortium's views on this data provision at EU level.

In line with the Grant Agreement, the focus will be on legislation, governance, possible funding and added value for stakeholders.

	1.IDACS data collection	**2.More harmonisation data collection**	**3.EU data collection**
CONCEPT			
GOVERNANCE	NAPs	NAPs	EU access point
SET UP	National	National	EU level - independent EU NAP
RESOURCE REQUIREMENTS	-	+/-	+
LEGILATIVE CHANGE?	National or European	National or European	European
FUNDING REQUIRED?	-/+	+	++

1. *IDACS Data collection*

The data collection as set up within IDACS takes place via the NAPs: they provide direct access to data, or lead to the underlying databases of organizations that do the actual data collection. Although many agreements have been made in the project to harmonize things between countries, the implementation is often national. The various member states have set up a way of data collection and data provision at the NAP in their country that complies with IDACS.

Looking at institutional and funding structures, this approach can in principle be continued without any problems in the future. However, there are a few points that could be changed that would improve the future continuation of data collection. Mainly for countries that have not participated in IDACS.

Legal

At the moment of developing the PSA IDACS legislation on alternative fuels was not qualifying the data types that Member States shall made accessible. As a result, Member States had to introduce national legislation. This has been proven to not be a successful approach, since charging operators were exposed to completely different criteria depending on the Member State in which they had to operate.

At the moment of the finalisation of IDACS, the revised AFID (Alternative Fuels Infrastructure Regulation) was published bringing clarity on the data approach for alternative fuels. Concretely, Article 18 of the AFIR proposal specifies a set of static and dynamic data types that operators of recharging and refuelling infrastructure shall made available to Member States NAPs at no cost. In addition, AFIR proposal empowers the Commission to adopt secondary legislation that could further specify the conditions for the sharing of data, including the frequency, quality and other the possible introduction of new data types.

Governance
In terms of governance, not much needs to change. The current parties that are a NAP can remain that way and the parties that do the data collection can also continue to do so. Depending on national needs, this can be changed and - for example via tenders - another organisation can be engaged.

Funding
Funding for the continuation of data collection will mainly come from national funding. There are significant differences here: countries that have set up a database by a public organization will spend more on this than countries that have left the data collection to private parties and allow a fee for the data. As discussed above, there may be differences in how the fee is determined. It would be good for uniformity and harmonization if agreements were made at European level about the possible costs of data for third party users.

Stakeholders
For stakeholders, this does not necessarily seem the most user-friendly option. Data is made available on different platforms and/or NAPs and sometimes on different terms and conditions (free data vs. fee for data). Third party users who want to have the data from all the member states, must first connect to those countries' databases. And/or consult the data from a data aggregator. However, this is a step forward given the starting situation in which countries did not yet have a NAP or no form of data collection.
From the perspective of stakeholders, it is important for data owners that the national obligations and requirements regarding data sharing are as similar as possible. And from the users' point of view, they want access to good quality data as easily as possible at the lowest cost.

Within IDACS harmonization has been sought within a number of matters (data categories, data quality, update frequency, etc.) and for stakeholders this has been a step forward. There is, however, still room for improvement in a number of areas.

2. *Harmonising data collection*

Between the current IDACS practice and a future central data collection at European level, there seems to be room for another scenario. That is the scenario in which further steps are taken between all the European countries to harmonize the aspects of data collection. The data collection in Europe will improve if all countries in Europe have the same conditions concerning: data quality, update frequency, data access, data categories, protocols and formats.

In this way, both the input of data (from data owners) and the output to third party users can be harmonized. The NAPs do not necessarily need to have the same architecture for this scenario. As long as all conditions are the same between all countries, the data collection between countries can improve.

Legal

This will have to be legislated. Agreements must be reached with Member States from the EU on the above points. Member States can incorporate this into national legislation. But this can also be arranged through European legislation and directives, such as the AFIR and ITS. A majority of the IDACS member states want more specific requirements in European regulations regarding data categories and conditions regarding access to data.

Governance and funding

In principle, not much needs to change in this scenario with regard to governance and funding. New requirements can be set to improve data collection and all countries will have to comply with them. This may lead to changes, but at the same time many countries will be able to deploy the same organization and structures. However, higher requirements for data may lead to higher costs. Where this funding should come from is partly dependent on the decision whether a fee may be charged or whether data should always be free of charge. For the countries that have participated in IDACS, however, no major changes will have to take place in terms of funding and governance. For countries that have not arranged sufficient data collection, this will involve the necessary changes. This could be obtained from national or European budgets but this has not been discussed further within IDACS.

Stakeholders

This scenario could be of added value for stakeholders. If all countries in Europe use the same requirements and conditions for data collection, this can be a significant improvement of the current situation for both the data owners and the data users. It simplifies data exchange and makes it easier for parties to aggregate the data in (European) databases.

3. <u>*Central European data collection*</u>

The last scenario for future data collection is to have central data collection at a European level. This can be done in different ways, ranging from a register to a database. In the case of a database, it can be a database with static data or a database with all real-time data. These options and the views of the consortium on this are discussed in the IDACS Memo *'Memo on a common form of NAPs and data provision at EU level'*. Below is a more objective overview of what is required for such a scenario.

Legal

If there is a need for a central location for data collection, this must be sufficiently anchored in European legislation. It should be clear that countries all make the same categories available at the same quality and conditions. This legislation may also require that the data be delivered to a European access point, but this is not necessary. The organization that would manage the European access point will collect the data per country (or will leave this task to a data aggregator) and will make it available on a central EU access point.

Funding

An appropriate budget is needed to set up a central data collection at European level. This organization must manage a database with real-time data that must be of good quality.

Depending on whether a fee may be charged for the data, the need for public funding can increase.
This can be financed from the EC or European funds. Or it is partly financed by by the EC and partly by countries, whereby the contribution of a country then depends on the number of cars or infrastructure (= the amount of data). If the data users have to pay a fee, that can also be a possible source of financing.

Governance
Whatever form of database is chosen, there will have to be an organization that will perform this task. Within the consortium there is a majority who think that this can be performed by one (existing) organization (eg, EAFO or the future Mobility Data Space). However, it is pointed out that this will mainly be a matter of funding. The organization that has to do this will need the right budget for this and the right legislation must be in place. Otherwise there is the risk of incorrect data, as is sometimes the case with existing initiatives.

Stakeholders
Setting up an overarching European database could have many potential benefits for stakeholders. A few examples of added value:
- Possibly easy access to data at European level (especially for smaller businesses)
- Centralization of data: Single entry point
- Uniform quality
- Harmonized data format

6. Conclusion

It seems that not 1 blue print can be given for the future data collection. It appears that gradual steps need to be taken to achieve a good data provision in the EU.

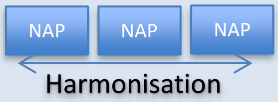
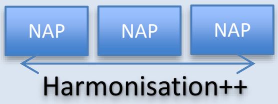
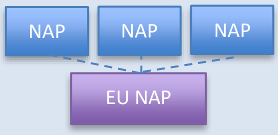
With regard to a future central data collection via an EU wide database, there are many potential advantages. However, these all stand or fall with harmonizing some critical conditions for data collection. If NAPs in Europe have different quality data available under different conditions, it makes less sense to place this in an EU wide database. Setting up an EU wide database should therefore not be the goal in itself, but only a means to get better data provision in Europe.

The IDACS project has taken good steps towards this with its deliverables. But has also shown that sufficient European legislation was lacking and that there are still differences between countries in terms of data quality and data accessibility. The next step is to further harmonize the data collection in Europe concerning at least the following topics:

- data quality,
- update frequency,
- data access,
- data categories,
- protocols and formats.

In conclusion, the consortium realizes that further harmonization of the above points is indispensable for European data collection. It is essential that the correct (European) legislation is available, because otherwise good data collection is not possible. Finally, it is clear that data collection with good quality data costs money. Once again, the right legislation and/or funding is indispensable.

The future blue print will therefore first have to be a situation of NAPs and national data collection that is increasingly uniform and harmonized. It is important that the right supporting legislation is put in place. The IDACS deliverables have brought a step forward for the participating member states. But to get this across Europe, this needs to be further built on by, among others, the Sustainable Transport Forum Group of DG MOVE, the PSA NAPCORE, but also in upcoming European legislation such as the AFIR.

TIMELINE:			
	1.IDACS data collection	**2.More harmonisation data collection**	**3.EU data collection**
CONCEPT			
GOVERNANCE	NAPs	NAPs	EU access point
SET UP	National	National	EU level - independent EU NAP
RESOURCE REQUIREMENTS	-	+/-	+
LEGILATIVE CHANGE?	National or European	National or European	European
FUNDING REQUIRED?	-/+	+	++

Annex 1

Questionnaire – Deliverable 2.3.1

1. Which Member State do you represent?:
2. What kind of architecture does your NAP have:
    - Database ;
    - data warehouse ;
    - data market place ;
    - data register ;
    - other, please indicate: … ;

   - If data register: does your data register have a hyperlink(s) to:
     - to organization(s)/platform(s) with a public database
     - to organization(s)/platform(s) with a private database

3. Do you have a separate NAP for data on alternative fuels infrastructure or is it integrated in the NAP on traffic information (ITS)?
- Included in the NAP on traffic information (ITS Directive 2010/40/EU)
- Separate NAP for data on alternative

4. Have you set-up or are you setting-up a NAP combined with the IDRO?
- Yes,
  Please indicate the reasons why you have chosen for this option
- No

Before filling in the questions below, please consider the difference between 'data collection' and 'data provision at the NAP'.

- Data collection: refers to the actual collection and processing of data gathered in the system until it is made publicly accessible via the NAP, including aggregation, formatting or quality activities. This can be done by a private or public organization, which can be done separately from the NAP.
- Data provision at the NAP: refers to the process of making the data (sources) publicly accessible via the NAP.

It is possible that both the data collection and the data provision via the NAP are carried out by the same organization. But it could also be the case that organization A (and possibly B, C & D) does the data collection, and that the NAP organization is only responsible for the data provision on the NAP.

Governance and roles

5. Does the NAP doing the actual data collection or is this another organization? *Please specify.*

6. Is the NAP outsourced or is it managed by the Government / Authorities?

7. Is the data collection outsourced or is it managed by the Government / Authorities?

8. What organization / what party is responsible for the quality of the data?

Recourses and costs

9. How many persons are involved in <u>data provision at the NAP</u> regarding data related to recharging/refuelling points for alternative fuels? *If information is not present; give an estimation or indicate 'unknown'.*

10. How many persons are involved in the data collection related to recharging/refueling points for alternative fuels? *If information is not present; give an estimation or indicate 'unknown'.*

11. How many hours do they spend on an annual base on data collection activities? *If information is not present; give an estimation or indicate 'unknown'.*

12. Please indicate the investment costs of data collection for the IT system (including developing database, algorithm, setting up APIs, developing other services such as a webportal, etc.) in Euro. *If information is not present; give an estimation or indicate 'unknown'.*

13. Please indicate the yearly maintenance costs of data collection (in Euro) for the IT system. *If information is not present; give an estimation or indicate 'unknown'.*

14. Are the maintenance costs of data collection for alternative fuels in your Member State shared with other IT system concerning the overall NAP data under the Directive 2010/40/EU on Intelligent Transport Systems (in Euro)

If information is not present; give an estimation or indicate 'unknown'.

Funding

15. How is the funding of the NAP for alternative fuels arranged? Please indicate if it differs from the overall NAP data.

16. How is the funding arranged for the organization(s) that carries out the data collection?

17. Is it charged any fee in order to have access to the data via the NAP?

- No
- one time tariff
- recurring tariff; timebased fee / subscription
- different tariffs depending on static or dynamic data
- different tariffs depending on offered services (e.g. higher tariff for higher frequency)
- Other:

18. In case when a fee is charged; is this done by a governmental organisation or by one or more market parties?

- governmental organization
- market party or market parties

Legislation

19. What is the legal base for the alternative fuels data collection and provision at your NAP? Please state if you have relevant national legislation / regulation in place.

20. Please state your reflection on European legislation and the new proposal for a Regulation on Alternative Fuels Infrastructure.

- *According to Art 18.2, operators of publicly accessible recharging and refuelling points or, in accordance with the arrangement between them, the owners of those points, shall ensure the availability of static and dynamic data concerning alternative fuels infrastructure operated by them and allow accessibility of that data through the National Access Points at no cost (see in the article the data types included).* Do you think this provision will facilitate data collection and reduce costs?

- *According to Art.18.4, the Commission shall be empowered to adopt delegated acts in accordance with Article 17 to: (a) add additional data types to the ones specified in paragraph 2; (b) specify elements related to the data format, frequency and quality in which these data shall be made available;).* Do you think this provision will help support IDACS contributions and further expand its outcomes?

Central data collection

21. Do you think it would be useful to facilitate the accessibility of data on alternative fuels by centralizing its discoverability and access to stakeholders (eg. OEMs, navigation tool providers and third party developers) in Europe? Please state your reflection on the added value of a central point for routing data accessibility from the different NAPs on alternative fuels for the different stakeholders in Europe).

22. Do you think your Member State and NAP on alternative fuels would be willing to join an European central data platform aiming to facilitate discoverability and accessibility on alternative fuel infrastructure?

- Yes
- No
- Not sure

23. Do you think the data provision activities on a European level can be carried out by an existing organization (eg, EAFO or the future Mobility Data Space)? *Please indicate why/why not.*

24. Should European legislation be extended to include obligations for central data accessibility and collection (e.g., aggregation, quality, etc.)at an European level?

- Yes
- No

25. How do you think the funding for this centralised central data accessibility set-up should take place?

ID and Data Collection for Sustainable fuels in Europe

Report

Deliverable 2.1.0 *Guideline document For Data Collection and National Access Points (NAPs)*

Project Acronym	IDACS
Project Full Name	ID and Data Collection for Sustainable Fuels in Europe
Grant Agreement number	MOVE/B4/SUB/2018-498/CEF/PSA/SI2.792684
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Deliverable Status	Final
Dissemination Level	Public
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1 Introduction

In the course of the Programme Support Action (PSA) 'Data collection related to recharging/refuelling points for alternative fuels and the unique identification codes related to e-Mobility actors' that was subsequently given the name IDACS, or 'ID and Data Collection for Sustainable fuels in Europe', the 15 member states of the consortium mandatorily have to collect data related to alternative fuels infrastructures, namely electric charging points and hydrogen refuelling stations (HRS) as part of activity 2. Other alternative fuels, such as CNG, LNG, LPG and highly-blended biofuels can be covered optionally. The Grant Agreement that has been signed by all participating countries, describes the goals and requirements of this PSA and forms the basis for all these activities.

The aim of this exercise is to address current issues facing owners of alternatively-fuelled vehicles and related anxieties about the associated infrastructure caused by the currently low coverage of infrastructure units in Europe and persisting problems with downtimes of the extant infrastructure. The 15 member states of the consortium will be able to write their national implementation plans with the help of this document.

It is the ultimate goal of IDACS to support better consumer awareness and buy-in to the use of alternative fuels by making available better information about the location and availability of these infrastructures. With the help of IDACS, member states will also address and transpose Article 7.7 of the Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014 on the deployment of alternative fuels infrastructure which states that, when available, data on the geographic location as well as real-time information on charging/refuelling infrastructure shall be made accessible to all users.

Categories for which data on HRS, electric charging points and other alternative fuels have to be collected comprise the location (GNSS coordinates / street name), contact info for owner/operator, the opening hours, identification and payment methods operational Status (if the station is operational/ non-operational). Additional data categories, such as the available chargers and connectors, the e-mobility code and the occupation status have to be collected for electric charging stations.

As data collection mandatorily has to take place via the National Access Points (NAP) as defined in directive 2010/40/EU on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport, it is the aim of this document to give some guidance as to how this can be achieved.

Figure 1 shows an overview of the IDACS project. The green elements are defined elements in the PSA. The white elements need to be in place to be able to execute the PSA.

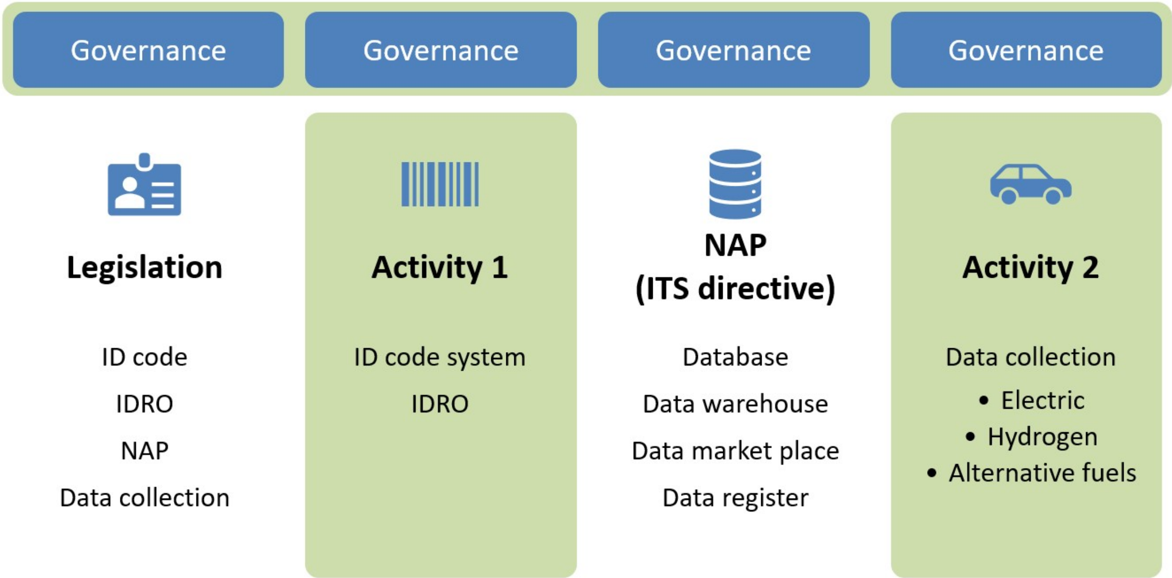

Figure 1: Overview from IDACS

This document was drawn up in 2019, at the start of the IDACS project. This current version was updated in 2022 with the latest insights and state of play.

2 Purpose of this document

As mentioned in the introduction, the aim of this document is to give some guidance as to how the data provision via the NAPs can be achieved.

This Common Approach and Guideline document has the following purpose:

- To support countries who do not yet have a NAP or want to have it improved, by describing country-specific developments, highlighting the possible solutions and describing best practices
- To resolve issues beyond European Directives or the Grant Agreement that need common agreement in order to have a successful project outcome. In the Grant Agreement, the following are already mentioned, but additional items can be added when needed:
    - Quality and reliability of data collected
    - Transparency of data collected
    - Independency of parties collecting data
    - Completeness and correctness of data collected
    - Use of open standards and protocols
    - Sustainability and continuity of data collection after the PSA
    - International access to data
- To support participating countries in developing country-specific implementation plans as required.

This Common Approach and Guideline document has the following scope:

1. It contains the situation per Member State in 2019, and information about the setup of a NAP, based on information gathered from each country.
2. It gives an overview of the requirements that form the context (legislative, project).
3. It points out issues that have not been described in the proposal, but need agreement within the project in order to collaboratively move forward.
4. It gives an overview of issues that are being encountered with a proposal how to resolve.
5. It describes options that are available, and provides best practices when available.
6. It gives points of attention that give guidance to the development of a NAP in a country.

In order to realize the above, all countries are asked to provide their feedback to this document:

- Countries can provide issues, obstacles and opportunities they encounter in implementing the NAP and delivering the project results
- Countries can provide best practices or solutions to each other, making it possible to learn from each other.

This document is therefore a living document: as we move further in the implementation of data collection and NAP, we will encounter new issues that need guidance. It is also a collaborative exercise: most implementation knowledge sits within the countries and not in the Project Management Team. If we learn from each other, each country's outcome will improve. Therefore, the guidance given in this document, in particular on the data categories and the quality criteria, might be subject to changes as the actual data collection is undertaken by the NAPs. By 2021, deliverables 2.2.2. and 2.2.3. will, however, define those elements after experiences have been made.

Having proper legislation in place is a requirement to develop a well-functioning system of data collection and sharing. It is not formally part of the IDACS project, as it is presumed that most Member States have already arrangements for it and therefore it is only partially described in this document. Activity 1, about the e- mobility IDs and the set-up of an ID Registration Organisation (IDRO) is described in deliverables 1.1.1, 1.1.2 and 1.2.1 and therefore not in this document. Figure 2 is an example how the ID-code can be used in the data set.

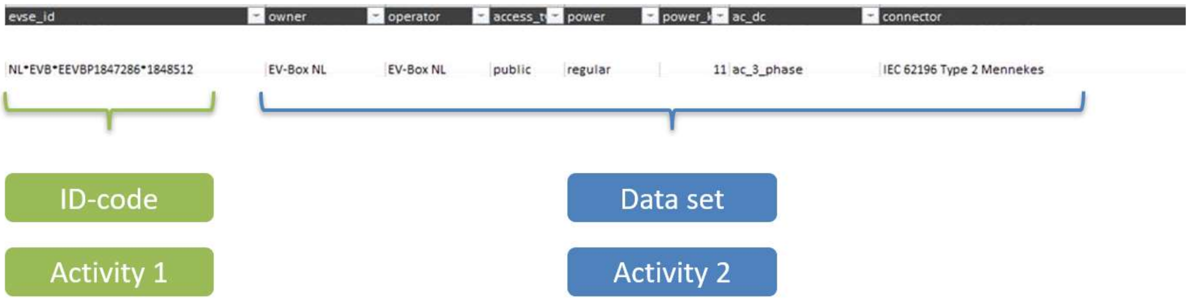

Figure 2: Relation between activity 1 and 2 (Example dataset)

To carry out activity 2 a functioning NAP needs to be in place. As the obligation to have a National Access Point (NAP) containing information about recharging and refuelling point is based on the existing ITS directive from 2010, the EC assumes that member states already have them installed. Consequently, setting up NAPs is not officially part of the IDACS project. Nonetheless, this document will give some guidance on the NAP in connection with data collection on alternative fuels infrastructure as there is a strong interdependency. Furthermore, these guidelines will serve as a manual for the consortium to define common criteria for data collection.

3 Starting situation per MS (2019)

The status per member state has been described in 2018 during the Plan of Approach, and has been enriched with the help of questionnaires, interviews and email contact in 2019. Missing information was further completed in 2021.

3.1 Poland

Electric

Currently the IDRO for Poland is with two organisations. UDT issues codes for CPOs to fulfil its obligation under the Act of Electromobility and Alternative Fuels. The charging / refuelling infrastructure availability database (EIPA) is the IDRO for the charge poles. EIPA is not only functioning as a IDRO but is also containing some data. Not all the dynamic and static data from IDACS is shared yet and development on this is needed. Poland does have a NAP (KPD), charging point and hydrogen station data is not shared on this platform but via EIPA.

Hydrogen

Poland did not set itself targets for hydrogen in its NPF. Nonetheless, two HRS are under construction in Warsaw and Gdansk and will be operated by the company Lotos S.A. They will be operational by 2021 at the latest.

Data is collected by the Register of Alternative Fuels Infrastructure (EIPA), a public register created by the Act on Electromobility and Alternative Fuels and kept by the Office of Technical Inspection (UDT), a public entity. Data collection is mandatory only for charging points and LNG/CNG stations. By law, it is required to send the information about coordinates of natural gas stations and charging stations, current prices of alternative fuels and availability of charging points installed in public charging stations. In addition, electronic services shall be made available in the register allowing for:

1. Registration and updating of data regarding the refuelling point for compressed natural gas (CNG), liquefied natural gas refuelling point (LNG) or charging point installed in a public charging station;
2. Sending up-to-date information on the availability of a charging point installed in a public charging station and current prices of alternative fuels.

The EIPA is also able to collect data for hydrogen stations. It is currently not doing so for two reasons: 1) no HRS is currently working in Poland and 2) it is not mandatory in the Act on Electromobility and Alternative Fuels to store such information for HRS. The UDT is collecting the data for other fuels. The data are publicly available, i.e. consumers receive information via the EIPA website. The raw data procured by UDT (that is later shown on the website) is available free of charge and can also be used to create other websites or apps by private entities.

Other fuels

Poland has an act for electromobility and alternative fuels that obliges all CNG and LNG operators to register in EIPA. At the moment there are 28 CNG stations and 3 LNG stations. Via the EIPA website (https://eipa.udt.gov.pl/) static data of publicly accessible refueling LNG and CNG stations are available for consumers. The raw data procured by the Office of Technical Inspection (UDT) are available free of charge and can be also to create other websites or apps by private entities. Data quality is sufficient, but additional work on data quality is needed to ensure it in full scope

Poland has B100 and bio CNG stations, although no data is collected in the EIPA for these high blended biofuels.

3.2 Austria

Electric

There is no law in place that contains all the parts from the directive. The company Austria Tech, owhned by the Republic, is already the appointed NAP in Austria. On this national access point there will be no public charge point data. Several private organisations are issuing EVSE-Operator-IDs, also a private initiative is running a website for e-mobilists to find charging-stations, but on voluntarily basis only. E-Control is preparing to build a charge point register. General overview on charge points is rather poor and especially price transparency is not good at the moment. A new law is proposed but currently there is no government. E-control is suggesting to put dynamic data in this new law, which is currently not the case.

Hydrogen

Currently there are just five publicly available hydrogen filling stations in Austria. They are all owned by OMV AG (which is one-third owned by the Republic). By that all Austrian hydrogen filling-stations can be found on OMVs website. Due to that there is no priority seen on legislative side to press for a public register for hydrogen filling-stations.

Other fuels

CNG is the only 'other fuel' that is currently available in a registry in Austria. Data collection for CNG stations is happening on a voluntary basis and E-Control is the body in charge to collect the data. There are currently around 100 CNG stations existing in Austria. Both static data as dynamic data on the availability of CNG and prices are publicly accessible via the website www.spritpreisrechner.at . A CNG filling station is always available in opening hours. The filling takes only a few minutes, therefore data on availability is not a big issue. The data quality is good.

3.3 Germany

Electric

By the end of 2019 it will be possible to create publications that refer to data from third parties outside of the German NAP. For example, a JSON feed could then be brokered. The NAP will act as a platform for metadata, i.e. there will be a description of the data source and its publisher as well as a link to the source. In the long term the current NAP will be replaced by a mobility data platform that supports different data formats while keeping all the current functionalities.

a sample of e-mobility data (showing real-time availability of recharging stations in the city of Bonn) can be found here: https://new-poi.chargecloud.de/bonn

There is also a dataset on the location of charging stations: https://opendata.bonn.de/dataset/767a6a78-8c7e-46ac-ac64-33a4ebf70c4c/resource/767a6a78-8c7e-46ac-ac64-33a4ebf70c4c#{view-graph:{graphOptions:{hooks:{processOffset:{},bindEvents:{}}}},graphOptions:{hooks:{processOffset:{},bindEvents:{}}}}

Hydrogen

The German NPF states a target of 400 publicly available HRS by 2025. As of September 2018, 76 700 bar retail stations are open to the public. By the end of 2019, the target of 100 stations is to be reached. The main operator of these stations is the company H2 MOBILITY Deutschland GmbH & Co. KG, whose shareholders consist of a consortium of the main mineral oil companies, car manufactures as well as refuelling equipment manufacturers and gas suppliers.

Data collection with regard to HRS is happening at several levels in Germany. Firstly, the National Organisation Hydrogen and Fuel Cell Technology (NOW) collects static data on the stations. Secondly, H2 MOBILITY collects static and dynamic data and makes them available through an app called H2.LIVE.

The Federal Highway Research Institute (Bundesanstalt für Straßenwesen - BASt) is the designated NAP in Germany. Intelligent transport data are being collected and made available on MobilitätsDatenMarktplatz (MDM), which is described in more detail in section 3.4. Possible setup of NAP

Other fuels

Germany has LNG, CNG and LPG stations. Furthermore there is a small market for high blended biofuels (bio CNG and E85).

Several private sector organisations collect data on gaseous fuels like the CNG and LNG sector's trade association 'Zukunft Erdgas' and the LPG sector's 'Deutscher Verband Flüssiggas'. A company called 'gibgas medien' also collects data on natural gas refuelling stations. Furthermore, private companies maintain registers on E85. However, the data quality often cannot be accounted for. The data is publicly available via the websites and apps of the associations/companies mentioned above.

In case of the data collection on CNG and LNG by 'Zukunft Erdgas', next to static data, also dynamic data is collected. The register contains data on operability, prices, price compared to gasoline, mode of payment, supported vehicles, route planner, share of biogas, information on the refuelling process in the case of LNG. The data quality is sufficient.

3.4 Luxembourg

Electric

Over the last years efforts have already been made in order to collect and disseminate data on publicly accessible charging points. Since 2017 the publicly accessible charge points are collected by CHARGY (http://chargy.lu) and the data is published under an cc0 license on Luxembourg's open data portal . The provided data combines static as well as dynamic information (f.i. occupancy). Numerous reuses of the dataset, for instance a visualization of the available charge points on the national geoportal (www.g-o.lu/chargy), have since been created.

Since the used data format and structure needed optimization so that other stakeholders can reuse the data, the Ministry of Mobility and public Works as well as CHARGY took part in the IDACS project.

Since the beginning of the project, it became clear, that because the data is already on the NAP, the main task would be to contribute the definition of the DATEX II format and to finally implement it. Since this took longer than initially expected, Luxembourg will publish by the end of 2021 the CHARGY data in OCPI format, so that afterwards stakeholders can use this more popular format and for instance use the announced Dutch converter to change the format to DATEX II.

For 2022 a new subsidy scheme for publicly accessible charging stations is put place where the charge point operator have the obligation to publish static and dynamic data under an open format, preferably OCPI, for free on the national access point data.public.lu.*Hydrogen*

Luxembourg indicated no target for publicly available hydrogen refuelling stations in their NPF and does not plan on building up an infrastructure as of now. Consequently, there is no data being collected.

However, a first HRS is planned to open by the end of 2023 and the data regarding the availability of this station will be published on the national access point data.public.lu.

Other fuels

In Luxembourg, both CNG and LPG are available (12 stations in total). The data collection is happening at national level. If LNG will also be sold at a service station, this data will also be included in the data set. The dataset is published on *the national access point data.public.lu.*

3.5 Spain

Electric

There is a NAP in place in Spain, managed by the Directorate General for Traffic (Government body) (http://nap.dgt.es) however this NAP currently just collecting traffic and road information without including any data regarding eV charging or fuel supply.

Hydrogen

Spain aims at 20 publicly accessible hydrogen refuelling points for motor vehicles by 2025. Currently, no publicly accessible HRS is currently operating in the country.

The NAP's functions are fulfilled by a webpage managed by the Directorate General for Traffic of Spain (Ministry for home affairs), which as of now does not collect any dynamic or static data on hydrogen refuelling infrastructure.

Spanish Ministry for the Ecological Transition already collects data for other fuels (petrol & diesel but also CNG, LNG, LPG and biofuels). Data collection is mandatory for all these fuels according to Spanish Act (*Orden ITC/2308/2007*). This data, which comprises static and dynamic data is submitted by the petrol station operator using web forms and an Android app without any cost for the operator. Since 2007 the Ministry has implemented a Geoportal web showing this collected information: https://geoportalgasolineras.es.Within the scope of the PSA IDACS this Geoportal was extended to include Hydrogen and EVs data and linked it to Spain's NAP in DATEX format.

Other fuels

In Spain data exchange is mandatory since 2007 by law and takes place for LNG, CNG, LPG and high blended biofuels (Mostly E85 and B100). The Ministry for the Ecological Transition collects the data and manages a webpage where information is shown and freely available in several formats. (https://geoportalgasolineras.es). This webpage refreshes the information every 5 minutes and will be added to the Spanish NAP in 2020/2021 including a translation to DATEX format. Next to static data the following information is collected: price of each product in real time, discounts plans, brand and available services in the petrol station (store, water, air).

According to the feedback received, the data quality in general is sufficient for the drivers and transport professionals who are the main users of the data. Man issues are verification of the coordinates, missing stations and outdated petrol station data, which is hard to detect and solve. Collaboration of users is useful and is accomplished through several ways (warning webforms, mail box,…)

As a conclusion other fuels data collection is already done in Spain. Pending works are the inclusion of the current webpage in the Spain's NAP (which is ongoing) and the translation of data into DATEX, using the new DATEX II data model for Energy Infrastructure.

3.6 Belgium

After the kick-off of the project in June 2019, bilateral meetings have been set-up with different market parties. Based on these discussions, different scenarios for the implementation of IDACS are being developed. These scenario's will be shared with the stakeholders and worked out in stakeholder sessions.

Electric

The NAP is being set up as a register with links towards the data sets and data services. The first version of the NAP will be available at the end of 2019. Data on charging infrastructure will be implemented in the NAP at the end of 2020. Most likely via a hyperlink towards a dataset.

Belgium is considering a legal obligation for sharing data through the NAP. This legal obligation will probably be arranged on regional level, given the competences of the regions with regard to electromobility. The aspect of ID issuing will most likely be organized on BENELUX-level.

Hydrogen

As of April 2019, there are two publicly available 700 bar hydrogen stations in Flanders as well as one 350 bar station. Belgium's national policy framework (NPF) which was developed following the Alternative Fuels Infrastructure Directive, envisaged 20 HRS in Flanders by 2020, whereas there are no targets for the Brussels Capital Region and Walloon Region.

Currently, no data collection on the NAP is taking place in terms of hydrogen as a fuel. Nonetheless, the operator (DATS24) of the HRS in Halle manually transmits data to the H2.LIVE app via the H2.Operator app.

Other fuels

At the beginning of 2020, there were 137 CNG stations, 12 LNG stations and 30 ongoing projects (of which 25 CNG and 5 LNG) in Belgium. Data collection for CNG and LNG is already happening at the national level by an association of Belgian operators (www.gas.be). A CNG and LNG map can be found at https://www.gas.be/nl/rijden-op-cng/station-zoeker, for LPG there is a list at https://www.lpgwijzer.com/lpg-tanken-belgie/. On these websites, static data is shared. In Belgium there is a small marked for HVO and bio-LNG, but no data is shared on these fuels.

3.7 Hungary

Electric

At the end of September a private meeting was organised by the Hungarian Electromobility Association in the frame of the 'Electromobility Forum 2019' to introduce the project and its aims. The most important CPOs attended on this organisation and they got answers to their questions directly from the project coordinator, Anneke Bosma.

Based on the plans, the next step after the mentioned event was to take some bilateral meetings with the CPOs to gain them to join and study the project in more detail together. At these meetings the participants also discussed static and dynamic data and its structure which is managed by the CPOs.

The selected IDRO company, IFKA has also worked out the concept of their registration platform and created the webpage. Hungarian Public Roads held three Forum with the topic of NAP in the recent months on which they introduced the NAP portal (based on DATEX II data exchange standard), the existing module and the planned features for sharing the information of alternative fuel stations. Furthermore, they collected all the feedback from the NAP portal users (bug fixes, further needs for the upgrade) that they can improve the portal.

Based on the Ministry for Innovation and Technology 27/2019. (VIII.26.) Decree on the National Access Pont and road traffic information services Hungarian Public Roads operates the NAP in Hungary.

Hydrogen

There was no hydrogen filling infrastructure existing in Hungary before 2021. Therefore, the tasks related to hydrogen were not in the focus.

Other fuels

In Hungary, CNG, LNG (1 station) and LPG are available. Furthermore, bio-CNG is available for public transport (buses), but the station is not publicly accessible. Datacollection is happening at a national level, except for LNG and bio CNG. The data is collected by different organisations, both private and public, and made available on websites (e.g. holtankoljak.hu; mobiliti.hu/cng/). Next to static data, also the fuel price is shared on these websites. The data quality is sufficient.

Regulation

Missing elements of the regulatory framework for both IDRO and NAP were recognized by the Hungarian consortium members and the related work was started. Due to the government reorganization in Hungary, the regulation framework tasks are in progress.

3.8 Czech Republic

Electric

There is a functioning NAP in Czech Republic but it's not sharing charging data yet. A technical specification for a functional new module of the National Traffic Information Center (NTIC)/NAP is currently being prepared. This is currently in the analytical phase of the project. Czech Republic would like to use the experiences of other countries to ensure that the technical specification is in line with other countries.

Analysis of Ministry of Industry and Trade (MIT) and Ministry of Transport (MoT) requirements are underway in their agenda. The analysis also takes into account planned changes of legislation, including the competencies of the MoT and the MIT. Data collection is also communicated with representatives of the largest providers of charging services in the Czech Republic. By integrating the new function module into the NTIC, Czech will ensure that the distribution of static and dynamic data for the entire Czech Republic will be in DATEX II format. The aim is to gather information from the whole territory of the Czech Republic not only from the TEN-T communications network. It is likely that the new function module will also contain identification codes for each charging station. In this case, the free registration, issue and maintenance of identification codes will be preferred. The current timetable assumes the submission of the technical specification at the end of 2019. In 2020, we expect the contract to be announced and the functional module to be implemented.

Hydrogen

The Czech Republic aims at five publicly accessible refuelling stations by 2025. Currently, one private station exists at Neratovice. Data collection is not yet happening or publicly available.

The NAP's functions are fulfilled by the Road and Motorway Directorate of the Czech Republic, which as of now does not collect any dynamic or static data on hydrogen refuelling infrastructure. For the future it is planned to have the NAP collect the data via an internet platform.

Other fuels

In The Czech Republic there are 2 LNG stations (planned 13 to 2022), 192 CNG stations, 938 LPG stations , 202E85 stations and B100 stations (number not available). Data is collected by the Ministry of Industry and Trade. A list of all pumping stations is available at the webpage of Ministry of Industry and Trade (https://www.mpo.cz/cz/energetika/statistika/statistika-cerpacich-stanic-pohonnych-hmot). On this website, the address and fuel availability are shared. No information on GSS-coordinates and opening hours are shared on the website of the Ministry. However consumers use several applications of individual stakeholders (operators of respective pumping/refuelling stations) or their association. These maps contain GSS-coordinates and opening hours. For example in case of LPG there is list of LPG stations available at the webpage http://www.lpg.cz/cerpaci_st/cerpacky.php . In case of CNG a relevant map of publicly accesible CNG stations in the Czech Republic can be found the webpage http://cng4you.cz/stanice/informace-na-cesty/mapa-cng-stanic.html . Data quality is not sufficient, since there is no guarantee that all refuelling stations are on the application.

3.9 France

Electric

The directive for alternative fuels infrastructure (Directive 2014/94/EU) is translated into legislation and is waiting for approval by the national government. The IDRO is set up by Afirev and is now 2 years in place. The NAP is prepared for data collection. The national access point it managed by Directorate General for Infrastructure, Transport and Sea (DGITM). There is data about charging points shared by Etalab. The dynamic data is not complete yet. After the legislation is in place, the data must be added. This will speed up things.

Hydrogen

Data on hydrogen refuelling stations is not collected nor available in a gathered format.

Other fuels

France initially did not want to be involved in activity 2.1.3-2.1.6 Other fuels and therefore did not send input.

3.10 Greece

Electric

The Greek Ministry of Transportation & Infrastructure together with National Technical University of Athens have completed the system architecture for ID issuing called «MYFAH». The system is in line with the framework defined in IDACS project as well as the Electro mobility Law 4710/2020 which was published in the Official Gazette no. 142 A of 23/7/2020 and the Common Ministerial Decision No. 355033/2021 which was published in the Official Gazette 5776 / B / 10-12-2021 defining the ‘Management and transmission of data related to the operation of the electric market, the points of recharging of electric vehicles and the access rights to the Register of Infrastructure and Electricity Market Bodies (M.Y.F.A.H.) of the interested parties.’. The activities for the the development and launch of the first official version of the IDRO platform related to the interconnection of electric charging points with the National Access Point (NAP) by taking into account the architecture of EV charging system, which is composed by Charge Points, Charge Point Operators and Distribution System Operators (DSO) have been completed and the MYFAH allows charging points to be issued instantly in association with the status ‘operational’.

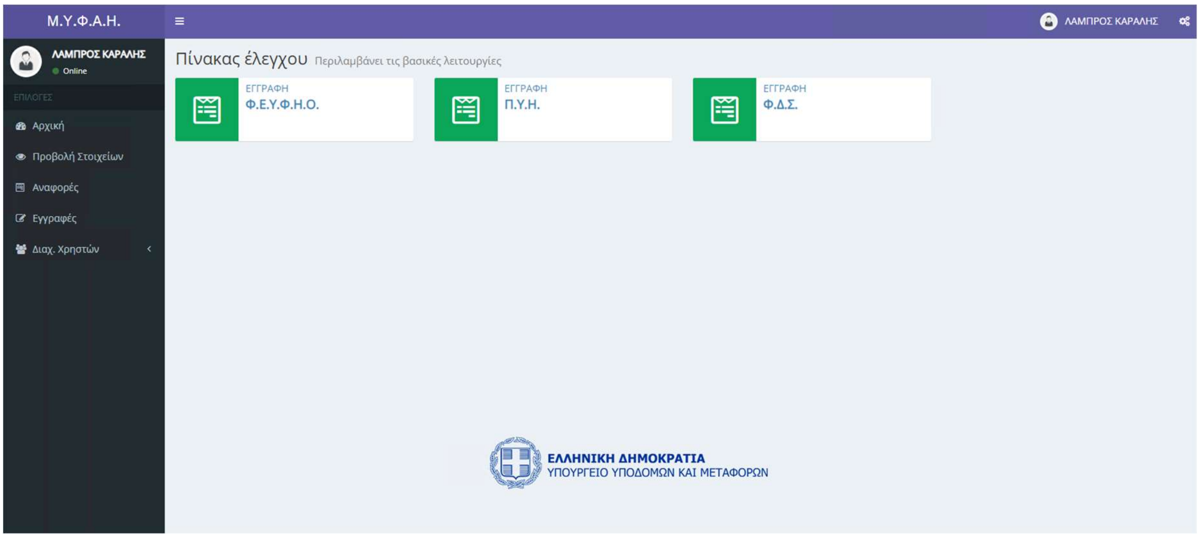

Figure 3: MYFAH for ID issuing

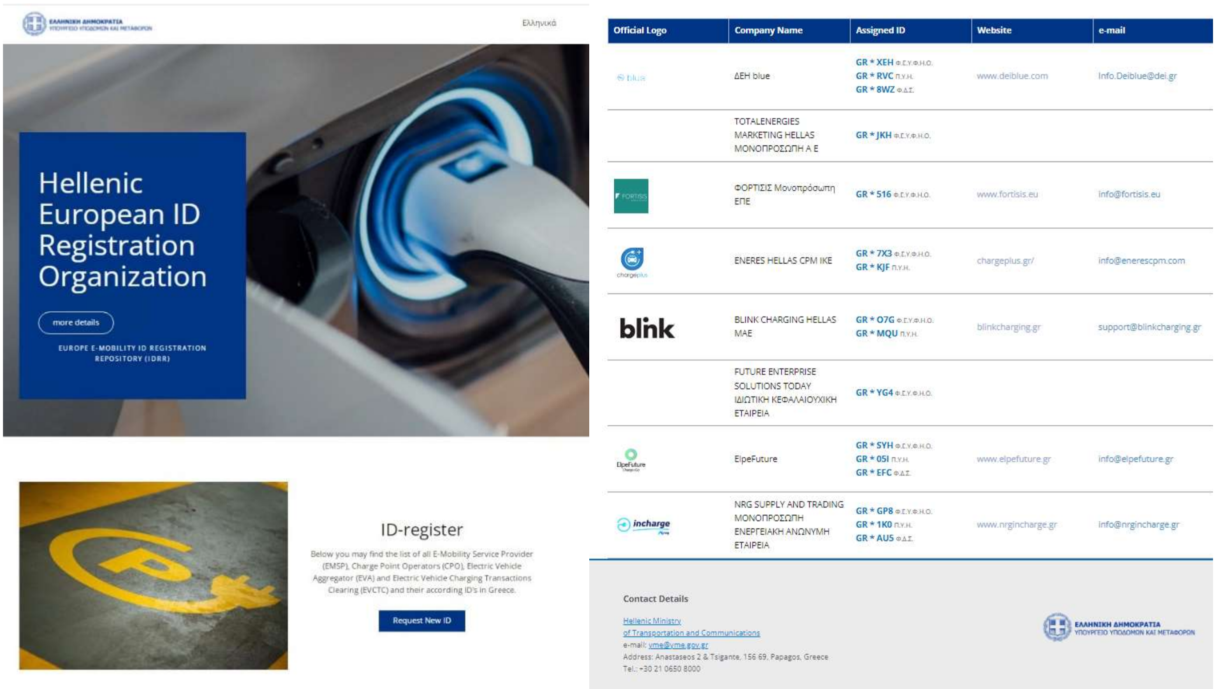

Figure 4: IDRO - https://electrokinisi.yme.gov.gr/public/IDRO/?mlang=en

After the launch of the MYFAI, a wide share of electro-mobility market stakeholders and interesting parties has already responded positively to the new IDACS-based regulations by being registered to the IDRO platform and being assigned IDs, while the process of uploading static and dynamic data is on going. In the figures below, the IDRO operative environment is presented for enabling the registry of end-users.

The related link to the IDRO and the registered CPOs and EMPs is: https://electrokinisi.yme.gov.gr/public/IDRO/

Hydrogen

In Greece, there are only two (2) experimental units for the production of hydrogen; the first in the Center for Renewable Energy Sources & Savings (Pikermi, Attica) and the second in the Centre for Research and Technology (Thessaloniki). In the near future, it is not expected the wide-ranged application of hydrogen in the transport sector due the need for the development of proper infrastructure (77226/1-31 October 2017). Consequently, no data collection related to hydrogen is performed. Moreover, Greece has an operational NAP accommodating static and historical data.

Other fuels

In Greece, LNG (only sea transport) (2 stations), CNG (27 stations and 4 under construction) and LPG (1.197 stations) are available. Currently, biodiesel (blended with conventional fuels) is the only biofuel on the Greek market. However, new efforts have been undertaken in order to boost the production of biofuels on the local fuel market.

Greece promotes the application of alternative fuels for the transportation on a national level. For this reason, data collection is performed to facilitate the consumers. In case of LPG, the data is collected and presented by http://www.fuelprices.gr/ supervised by the Greek Ministry of Transportation & Infrastructure, whereas for CNG the data collection and presentation is performed by the portal https://www.fisikon.gr/ and is supervised by private a organizations. On these websites, consumers are informed about prices and other issues relevant to the operational status of a fueling station. No information is available on the available amount of fuels. The data quality is sufficient.

3.11 Portugal

Electric

There is no functioning NAP in Portugal. It is expected that the NAP will be active in the first half of 2020. Regarding data collection, MOBI.E have almost all the static data required in the Grant Agreement. The mobility sector is obliged to give information to MOBI.E. There will probably be need of new regulation with changes in the data requirements . As in Portugal, for now, only payment via contract with a EMP is available, there is no information about identification and payment methods. Portugal also have most of the dynamic data required for the EVSE, with the exception of the price for ad-hoc charging. This type of payment is expected to be available by the end of 2019, beginning of 2020.

In Portugal, publicly accessible charging infrastructure is all that is open to public. They can be at public spaces or at private spaces and are not obliged to be open 24/7, providing that they have a defined schedule. All the charging points must be registered in MOBI.E national network.

MOBI.E considers that pricing data combined with availability is a sensitive information and shouldn't be publicly and simultaneously available in short period of time like fifteen minutes.

Hydrogen

No national targets for hydrogen refuelling infrastructure were established in the Portuguese NPF. Consequently, there are no hydrogen refuelling points for motor vehicles and no data collection is taking place.

Other fuels

Since 2009, Portugal introduced a web platform of fuel prices, www.precoscombustiveis.dgeg.gov.pt, created by national legislation, Decree-Law n.º243/2008 of 18th December, where filling stations operators located on the mainland of Portugal are obliged to register the retail prices of fuels sold in their filling stations, before applied there.

The same operators are required to report, annually, the volume sales of previous year, made in there filling stations, (also considering the volumes with discounts), by type of fuels, in order to obtain a daily weighted average price, by type of fuel. This volume of sales, is, obviously, confidential. These weighted average prices are useful to be sent, once a week, to European Commission, according to our community obligations.

In addition, the operators are required to send and update information about location, opening hours, state of operation i.e, if filling station is open or closed, between other elements, such as schedules and support services present in the filling stations.

DGEG – Directorate General for Energy and Geology, is the public entity responsible for the management of this publicly available web platform.

In Portugal there is a small market for highly blended biofuels (B10, B15 and B20), but not yet truly developed. That´s why only 5 filling station of Biofuel B15 is available in the webpage

Regarding other alternative fuels, Natural Gas is commercialized in 8 filling stations and LPG in nearly 350 filling stations, in a total of nearly 3000 filling stations registered in this webpage.

At the home page of that website, it is possible to see the top of the five cheapest filling stations operating in the mainland of Portugal. It also offers the possibility to search on the map of Portugal, the filling stations containing information by fuel sold and respective prices, by brand, by address, by geographical location and by opening and closing hours.

This web platform and it´s database, will act as a data source that will be pointed by the Portuguese NAP. It will be necessary to prepare technically this integration, namely the data conversion to DATEX II.

3.12 Croatia

Electric

In Croatia charging services are currently provided by Hrvatski telekom d.d (http://puni.hr/index.php) and HEP d.o.o (https://elen.hep.hr/), which provide access to the most publicly available chargers (they are both CPOs and MSPs). It is expected that with the development of the electric mobility market in Croatia new providers of charging services for electric vehicles will start to appear.

Croatia has created the preconditions and basis for the exchange and collection of data by amending the Law on the establishment of infrastructure for alternative fuels, which entered into force in May 2022 (https://narodne-novine.nn.hr/clanci/sluzbeni/2022_06_63_909.html). Based on the law, an Ordinance is expected to enter into force by the end of June, which will regulate in detail the exchange and collection of real-time static and dynamic data. The Ordinance has passed consultations in working bodies, and is expected to meet in consultation with the interested public by the end of June, after which it will enter into force. Croatia has developed an IT system for the functioning of IDRO and NAP, which can be found at the following link: https://pametnamobilnost.hr/, and which will become fully functional once the Ordinance enters into force and becomes applicable.

Hydrogen

There is no hydrogen infrastructure in the Republic of Croatia, but there are four hydrogen vehicles registered, of which 4 cars (which are hydrogen used in alternative to classical fuels). According to the estimation made for the needs of the National Policy Framework, in the scenario of the faster development of the market for hydrogen-fuelled vehicles, the implementation of projects for construction of a pilot filling station in Zagreb and/or Rijeka is planned to ensure their traffic along the Mediterranean Corridor of the basic TEN-T network which is located in the territory of the Republic of Croatia.

In the long run, hydrogen is projected / included as one of the strategic energy sources in the context of the New Energy Strategy (especially by 2050), which is currently in public debate in Croatia.

Other fuels

There are about 350 LPG filling stations in the Republic of Croatia, 4 CNG filling stations, and last year the first LNG filling station was opened as part of the Blue Corridor project. Biofuels in Croatia are mainly used blended in petrol or diesel fuel in a share of up to 5 % and 7 %, and such fuel does not have to be displayed at the point of sale (filling stations), therefore the information on the number of public filling stations is not available. Biofuel mixtures from 5 % -10 % into petrol, or above 7 % in diesel fuel must be displayed at points of sale; such mixtures are mainly used by transport companies, in either passenger or freight transport, on the basis of contracts with producers/traders of biofuels.

Retailers must provide price information on gasoline, diesel, LPG, biofuels, fuel oil and blue diesel on a daily basis, and average fuel prices are calculated on this basis. Information on the availability of these fuels, location of filling stations, opening hours and fuel prices can be found at the Ministry of Economy's website https://min-go.hr/#/

For the following fuels data are collected on the website of the Croation Minstry of Environment and Energy: LPG, bioethanol, biodiesel, biogas, biomethanol, biodimethylether, Bio-ETBE and Bio-MTBE. Currently there is no market for highly blended bio-fuels, but if they hit the market, the information will be provided. Information on CNG and LNG is not available.

It is possible to search for available fuels at gas stations on the map. Additionally, daily average fuel prices can be seen, and those retailers with the cheapest prices can be identified.

3.13 Lithuania

Electric

IDRO was approved and signed by the Minister of Transport and Communications of the Republic of Lithuania 14 of May, 2020.

IDRO is set-up as Lithuanian Road Administration. The Road Administration has been issuing ID codes since 1 of July.

The registration of EV operators and the issuance of codes take place in an automated way on web side ev.lakd.lt. Operators have to complete a electronic application in order to receive a code. The information system can collect both static and dynamic data from Operators. All data currently can be displayed publicly on Lithuanian Road Administration’s web page

Tools for the transmission of data through the NAP have already been developed. Currently, all EV data can be accessed via the following links https://ev.lakd.lt/open_source and https://maps.eismoinfo.lt/portal/apps/sites/#/npp. NAP support DATEX II.

Hydrogen

There is no hydrogen infrastructure in Lithuania. However, the Lithuanian Ministry of Transport and Communications is developing a strategy on how hydrogen infrastructure could emerge on the Tten-t network. First hydrogen station is planned to be built by 2025.

Other fuels

In Lithuania, there are more than 526* LPG station and highly blended biofuels are available. Lithuania has 8** CNG stations, 4 of them are publicly accessible , but still has no LNG stations. No data collection is happening at the national level. Information on transport fuels is available on the websites of gas station operators and there are a few private initiatives. However, the information is fragmented and does not include all stations. 1st July 2021 The Law on Alternative Fuels entered into force, which obliges operators of all public and semi-public electric vehicle charging points to register and provide data to the Public and Semi-Public Electric Vehicle Charging Access Information System.

* https://www.eafo.eu/countries/lithuania/1742/summary

** https://sgdujos.lt/lt/uzpildymo-stotys

3.14 Slovenia

Electric

In compliance with EU Directive 2010/40 and its Delegated Regulations 2015/962 and 2017/1926, the NAP of Slovenia has already been set up for real time transport and traveling data. NAP is managed by National Traffic Management Centre, division within Ministry of Infrastructure.

After coordinator of the IDACS project was appointed at the beginning of the 2020, Kick Off event was organized for the stakeholders and intensive internal talks were held about the national approach to fullfil the requirements of the project. It was discovered that Slovenia doesn't have any register of charging points (CPs), there is no official record about the number of CPs, technical specifications and locations and there is no national legislation for alternative fuels infrastructure deployment (AFI). There were also no official record of the entities acting as Charging Point Operators (CPOs) or Mobility Service Providers (MSPs). However several web portals and APPs have already existed set up by major CPOs like – www.gremonaelektriko, www.onecharge, www.polni.si. Static and dynamic data of existing CPs available on this portals were not comprehensive and reliable.

On the basis of findings several decisions were made: the existing NAP will be upgraded with additional layer of static and dynamic data of CPs, ID Registration Organisation (IDRO) will be for the time being organized within Ministry of Infrastructure (until the national Alternative Fuels Infrastructure Act will be adopted) and there will be also the obligations for EVSE ID code registration, Ministry of Infrastructure shall begin with the preparations of national legislations for AFI (DG Reform, Structural Reform Support Programme).

Hydrogen

There has been only one hydrogen refuelling station (HRS) set up in Lesce, which was part of a demonstration project but is no longer operational. At the moment, there is no knowledge that some additional HRS might be set up.

Other fuels

There is no reliable data about the refuelling points (RPs) for other alternative fuels in Slovenia. LNG, CNG and LPG RPs are being set up within EU projects, mainly CEF programme and with private initiative. There is no web portal where the locations and other data of RPs are available.

By the end of 2021 as a part of MULTI-E CEF project 15 CNG RPs will be set up along TEN-T corridors by Petrol d.d., and 2 LNG RPs will be set up withing SiLNGt CEF project by Butan Plin d.d. in Sežana and Ljubljana.

3.15 Netherlands

Electric

After the national Kick-Off for the IDACS project, several meetings with experts in the national working groups were held to discuss the national approach for both the ID issuing and the data collection. The discussions with the stakeholders are ongoing and their expertise is being used as input for the discussions on the European level.

Several options of the set-up of the National Access Point and the IDRO are being discussed and explored. There is a NAP in place: NDW. Right now, the set-up of the NAP is foreseen as a register (so not a database), consisting of hyperlinks to a CPO or data aggregator, where a database can be found. The CPOs can therefore set conditions for data provision and usage between them and the user of the data. There will be no database funded by the government. Quality criteria, monitoring and other criteria for data collection will be organized separately.

Concerning Data Collection, a proposal has been prepared for an amendment of the national legislation on Alternative Fuels to oblige the exchange of data as determined in the Grant Agreement through the designated National Access Point. The common goal of both the project and the concept law amendment is to inform the EV driver as good as possible. The Dutch legislation (implementing the EU Alternative Fuels Infrastructure Directive) will leave as much room for market solutions and interpretation as possible. Also, the legal status of the ID Registration Organisation (IDRO) eViolin is under discussion, because its status is also relevant for Belgium and Luxembourg, as they are being serviced by the same organisation.

Hydrogen

As of May 2019, there are 2 publicly available 700 bar hydrogen retail stations in the Netherlands as well as two 350 bar stations. By 2020, the Netherlands envisage a total of 20 HRS, whereas the preliminary target for 2025 is 50 stations. Currently, there are two operators in charge of these stations, however, other industry players plan to deploy hydrogen refuelling infrastructure.

Currently, no data collection on hydrogen refuelling infrastructure is taking place via the NAP. Nonetheless, there is a Whatsapp-Group in place that informs FECEV drivers about the statuses of HRS (down/out of service/ expected time starting service again). Furthermore, the operator of the HRS in Helmond (WaterstofNet) manually transmits data to the H2.LIVE app via the app H2.Operator.

Officially, there is not yet a NAP in place, however the *Nationaal Toegangspunt* is a candidate.

Other fuels

In the Netherlands, there are 28 LNG stations, 160 CNG stations and 1200 LPG stations. Furthermore, there are some stations for biofuels (bio-CNG, bio-LNG, E85, B20, B30, B50 and B100).

Data is shared on the websites of fuel suppliers. For CNG, an overview of all tank locations can be found at the website of Pitpoint (https://www.pitpointcleanfuels.com/nl/). For LPG, an overview of tank locations is given at the website autogas.nl. On these websites, static data are shared. Furthermore the Dutch private biofuels platform runs a map with data on highly blended biofuels (bio-CNG, bio-LNG, E85, B20, B30, B50 and B100). ((https://drivenbynature.org/). The information on this map is however not accurate, for the website is updated only once a year.

3.16 Overview all member states

An overview of the work currently being done is made via email, calls and workshops. It can be seen as a summary of the current situation. The green parts are done, for example setting up a NAP that can function as the NAP for electric charge points, hydrogen stations and other fuel stations. This doesn't mean that data is collected in it, as seen in the next question. The orange parts are being worked on at the moment. The red parts are not yet being worked on or available.

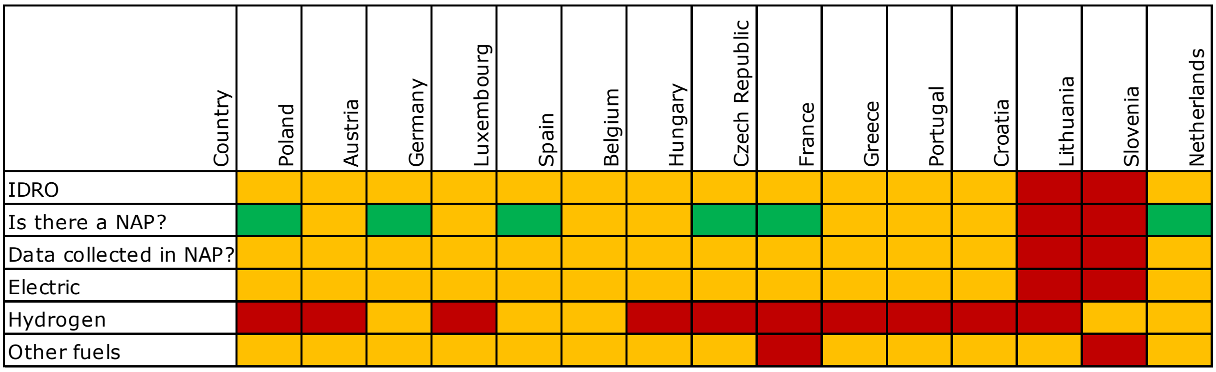

Figure 5: Overview of work being done in 2019

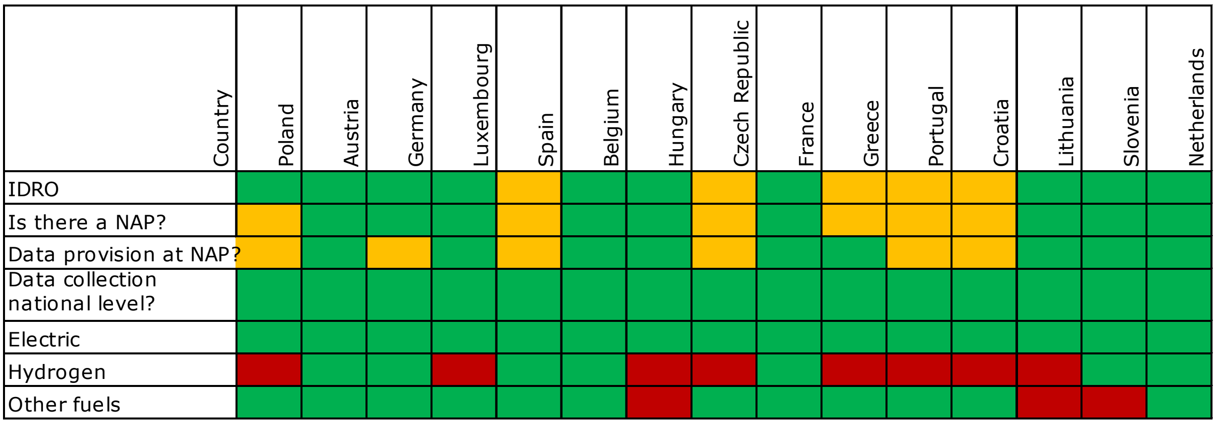

Figure 6: Overview of work being done in 2021

The above tables on progress have been further updated in the Deliverables 2.1.1 – 2.1.6. Here is described which static and dynamic data is collected from electric charging points, hydrogen stations and other fuels filling stations. Deliverable 2.2.1 highlights the provision of data available at the NAPs.

4 National Implementation report (2021)

4.1 Poland

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Set-up NAP
Poland was decided to use the existing NAP for the data provision of alternative fuels. This task is carried out by General Directorate for National Roads and Motorways (GDDKiA) with cooperation with Polish IDRO (UDT). GDDKiA downloads data from IDRO and displays them via NAP.

Set-up IDRO
From the beginning of the project, the IDRO tasks are executed by UDT. UDT is a government authority that also authorizes publicly accessible alternative fuels stations. In line with the Electromobility and Other Alternative Fuel Act, one of the obligations of the operators is to register the public charging station in the IDRO (Article 42 of the Act). This register is public and the data it contains are accessible to any Internet user. This applies only to those stations that are open to the public. All information listed below is provided via the ICT system. Polish IDRO collect, process, display via web and convert data from JSON to DATEXII format.

The data collected in the IDRO are made available to the public in at least two forms - an interactive map and files in JSON format, available at eipa.udt.gov.pl.

Procurement
All tasks related with implementation IDACS project were carried out by UDT.

In November 2021 a study was commissioned to anlyze how the IDRO system and website function in terms of usability for various entities.

Legislation
In the first days of December 2021 an amendment to the Electromobility and Other Alternative Fuels Act was finally adopted. In terms of implementation, ID codes are being assigned and the collection of static and dynamic data for charging points and natural gas refueling points (both CNG and LNG) continues. Now, that the law has been passed, the system also has been required to assign IDs and collecting data for HRS. Fees have been introduced for assigning an ID codes for all alternative fuels, which is now 10 PLN per month (summary 120 PLN per year ~ 28 EUR), payable monthly by every CPO.

DATEXII

A JSON to DATEXII data conversion has been developed for all alternative fuel data collected by IDRO.

4.2 Austria

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Set-up NAP

The European ITS Directive was transposed into the national ITS Act (IVS-G) in Austria in 2013 as the 'Federal Act on the Introduction of Intelligent Transport Systems in Road Traffic and their Interfaces with Other Transport Modes'. AustriaTech was commissioned by the Federal Ministry for Climate Protection, Environment, Energy, Mobility, Innovation and Technology to establish and maintain this body.
The Austrian NAP is set up as a data register. It's public website https://mobilitydata.gv.at/ went online in 2019. In 2020 E-Control registered and connected it's Austrian charge-point directory (www.ladestellen.at) with AustriaTech. All data from publicly available charge-points in Austria that are collected by E-Control are available via an API free of charge. The data can be accessed by E-Controls self-defined format – basically following the OCPP standards – or in DATEX II. Since 2021 all access-urls, information and documentation for third-party users are available at the Austrian NAP.

Set-up IDRO
Historically several associations devoted to e-mobility were issuing IDs within their community. Most of the free of charge one of the semi-commercially. Already 2019 – with Austria already being part of the IDACS project – a huge package of legislation was in the making, dealing mainly with the funding of renewable energy (later being called 'Renewables Development Act'). As a part of this, it was planned to appoint E-Control as IDRO for Austria since it was already running the national charge-point directory and by that already had a consolidated collection of all existing IDs. Due to several changes in government this package was delayed until summer 2021 when it finally passed the floor of Austrian parliament. Since than E-Control implemented a self-service ID assignment application into the administration-website of the charge-point database, making the application for an ID and the registration of a new charging-station one simple process for operators new on the market. The application includes the possibility to download a certificate with official signature to prove ownership of the respective ID. This application went live in January 2022. Since then, about 140 new IDs have been issued.

Procurement
Procurement is used for all of E-Control's software development projects. For this purpose, E-Control has concluded framework agreements with several suppliers, each of which is invited to compete for new projects. In the case of projects regarding charging stations two suppliers were involved for software development. One, that already developed E-Control's fuel price calculator which is online since 2011. For reasons of cost and efficiency, its database and software structure, as well as the basic features of the graphical user interface, were used as the basis for the charging-point directory. This supplier also developed the ID assignment application. Another supplier developed the DATEX II translator that is implemented in the charging-point directory's API. The scope, specifications and development requirements are always worked out in workshops with E-Control's experts, E-Control's IT project managers and the external company.

Legislation
As stated earlier, originally most of the data that operators were reported to the directory had been voluntary. By law they were only required to report the location (address, geo-data). While the rate of reported data for most of the categories also defined within the IDACS project were pretty good (around 90%) some of the crucial information were reported just badly. This was the case especially with ad-hoc-prices. Also CPOs made it clear pretty early that they would not report real-time data about the availability of charge points voluntarily since they considered that to be a asset for business cases or at least customer- loyalty. On the other side the whole e-mobility market is still a

young and very dynamic market and since in Austria most legislation dealing with energy has to pass the floor with a 2/3 majority, which makes it very hard to adopt legislation to new, fast moving development on an emerging market, E-Control came up with the suggestion not to define data categories that have to be reported by CPOs within a law, but rather to have an authorisation for the minister to issue ordinances defining those categories in the above mentioned 'Renewables Development Act'. This ordinance is about to be finalized by the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK) and is expected to come into effect in the third quarter of 2022.

DATEX II

Once Austria was part of IDACS, it was decided on E-Controls side to develop and implement DATEX II directly into its API parallel to the projects progress. During the implementation progress E-Control's IT project manager presented the concept to IDACS' members and although the translator is not a stand-alone application that could be directly used by third parties, its documentation is publicly open and E-Control as well as E-Control's development partner in that case, are happy to share their knowledge to any member state planning to also implement DATEX II directly to their application and help them during the process.

4.3 Germany

Contact person

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Set-up NAP

In Germany, the Mobility Data Marketplace (MDM) takes up the role of the National Access Point. The MDM provides two functions. First, the portal function as an interactive website for providing, searching and subscribing to traffic data. The necessary contractual and commercial requirements are completely up to the participators, the MDM provides an organisational framework with its terms and conditions. Second, the broker function, that primarily provides the reliable data exchange between data supplier and data consumer. Data delivery and reception are securely logged. The MDM is a mere 'delivery platform', i.e. user data is neither amended nor saved. Prevalent internet standards serve as communication protocols. Certificates, signatures and logging of processes ensure high security regarding data exchange. (Technical Details - MDM Portal (mdm-portal.de))

Set-up IDRO

Germany has mandated the activity to their association for Energy and Water Industries (BDEW). The bdew has been commissioned in 2014 to assign e-Mobility ID. In 2018, the Energie Codes and Services GmbH has taken over the issuing and management of e-Mobility ID, including all existing contracts. By December 2021, 978 Operator IDs and 875 Provider IDs has been issued.

Procurement

The consulting mission on data collection for electric recharging stations was awarded to Cosmic Cat GmbH and has been launched in May. In six workshops a concept for a viable way for collecting static and dynamic data of charging stations whilst ensuring market buy-in in the absence of regulatory provisions was worked out.

Based on these results, a procurement process for the development and implementation of an DATEX II protocol converter has been launched. It will start in December 2021.

A procurement procedure for procuring static and dynamic data of hydrogen refuelling stations in Germany on the NAP in the DATEX II format has been started in the second quarter 2021.

Legislation

The Charging Infrastructure Ordinance (Ladesäulenverordnung, LSV) has been updated in September 2021. In the new version, charging station must provide an interface to make dynamic data such as the occupancy status available.

DATEXII
A converter from OICP and OCHP to DATEX II will be developed and published under open-source licence.

4.4 Luxembourg

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Set-up NAP
In Luxembourg it was decided to use the existing NAP also used under the ITS directive. All the required dataset are therefore published on the national open data portal (https://data.public.lu/) and this in general a cc0 license. Even if the open data portal was not initially designed to also figure as a NAP, the site has so far proven to be effective in order to host the different static and dynamic datasets for the project.

Set-up IDRO
At the beginning of the project, the ID issuing activities from Belgium, the Netherlands and also Luxembourg were because of a political agreement back in 2017 executed by eViolin, an association by CPOs and MSPs. The preference of the BENELUX countries was to set up a sustainable governmental organisation for the IDRO. Together with Belgium and the Netherlands, a Benelux common service to manage ID issuing is finalized in the second quarter of 2021 in collaboration between the Benelux Secretariat-General and the involved regions and countries. This Benelux-IDRO launched in July, simultaneously with the hand-over of ID issuing activities from eViolin to the Benelux Secretariat-General. Agreements with the current IDRO were made to formally take over the tasks once the system is ready.
This Benelux IDRO is also appointed to perform the IDRR tasks.

Procurement
Procurement was mainly used for the set-up of the IDRO. For the IDRO, based on the quotations, a company is chosen to design the technical set up and the web portal. To specify the requirements, the results of Deliverable 1.2 and 1.3 were closely examined.

Legislation
So far the current legislation that has been put in place since the transposition of AFID has not been modified. However, AFIR and in particular its data collection provisions will probably modify the current legislation and further changes will also be needed.

DATEXII

The dataset of the public charging infrastructure, which is maintained by CHARGY, will be published by the end of 2021 in OCPI format on the NAP. From there stakeholders can for instance use the announced Dutch converter to change the format to DATEX II.

At the beginning Luxembourg investigated to directly implement an DATEX II conversions of the CHARGY dataset. However, due to time constraints and the pending end of the IDACS project, this was finally no implemented.

For hydrogen, no HRS exists at the moment. However, the operator of the planned station is registered on H2.LIVE and the data from the HRS will be offered in DATEXII format.

4.5 Spain

Contact person

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Set-up NAP

In Spain it was decided to use the existing NAP for the data provision of traffic information (Directorate General for Traffic) (https://nap.dgt.es) and the geoportal of petrol stations (traditional and alternative fuels) hosted by the Ministry for the Ecological Transition (MITERD) https://geoportalgasolineras.es.

Data collection tasks are being executed by MITERD and its architecture is a national register. National legislation is currently under approval procedure and is expected to be approved before summer2022. This new Ministerial regulation will obligate CPOs to make their data accessible for electric charging points via this NAP. This has been communicated and worked extensively with CPOs association. Meanwhile IT developments of the national registry are undergoing. Static data submission procedures are already developed and dynamic data are expected to be ready late 2022 following OCPI data structure.

For Hydrogen and other alternative fuels there is already an obligation in place for petrol stations to send static data and prices to the MITERD registry. Alternative fuels (CNG, LNG and biofuels) data are being collected. There is no HRS information at the moment since no publicly accessible HRS is currently operating in the country.

Set-up IDRO

Ministry for the Ecological Transition will perform the IDRO tasks in Spain. For this purposes CPOs and EMPS will be obligated to ask for a ID code and ID codes will be issued. ID issuing will be a requisite to submit charge points information to the NAP. This obligation is included in the Ministerial regulation to be approved in 2022. IDRO webpage will be included in the Ministry's webpage for data collection.

Procurement

Procurement was mainly used for the IT development of data collection & IDRO webpage.

Legislation

Ministerial Order 'ITC/2308/2007' forces petrol station owners and operators to register petrol stations and send static and dynamic information to the Ministry for the Ecological Transition. This information is published and updated in real time in a webpage (https://geoportalgasolineras.es). This information includes alternative fuels such LPG, CNG, LNG and biofuels. In 2020 this regulation was amended to include hydrogen information.

On the contrary there was no obligation in place to send charging points information to the Ministry nor registration of chargers and companies in any register. In order to set this obligation and as a result from PSA IDACS needs a new regulation framework is being developed. In the first place, some provisions were included in the Energy Transition and Climate Change Act (Ley 7/2020, de Cambio Climático y Transición Energética) in order to set a mandate to the Government to develop an information system for EV chargers and publish this information in the Spain's NAP. MITERD was also appointed by this act to regulate the data collection procedure and content of information. In application of this MITERD is currently processing a Ministerial Regulation that stablish the static and dynamic information to be collected –following PSA IDACS agreements- and the obligation of CPO and EMSP to ask for an ID. This regulation is facing its last steps to be approved in 2022 and was submitted to public consultation in late 2021 (https://energia.gob.es/es-es/Participacion/Paginas/DetalleParticipacionPublica.aspx?k=407)

DATEXII
Most CPOs in Spain use the OCPI protocol. Data will be collected in the NAP following OCPI data structure. This data will be translated to DATEXII format following PSA IDACS best practices.

4.6 Belgium

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Set-up NAP
The Belgian NAP was developed in parallel with the start of the IDACS-project and was launched in February 2020 (www.transportdata.be). The NAP is mostly set-up as a register with links to external datasets, although small/static datasets can be uploaded directly on the NAP. Instructions on registration and adding data are available on the NAP. Data on charging infrastructure is shared through the NAP. From the first of January 2022, a legal obligation for data sharing entered into force in Flanders. For Hydrogen, the platforms E-HRS-AS and H2.LIVE have been registered at the NAP, with links to their POI data via open APIs. For other fuels, a static dataset with LNG/CNG stations is shared through the NAP. The instructions on the NAP are complemented with specific information on data sharing of alternative fuels (e.g. data categories,. Throughout the project, the approach for data sharing through the NAP was closely aligned with the Netherlands, as market players in both countries are more or less the same.

Set-up IDRO
At the beginning of the project, the ID issuing activities for all BENELUX countries were executed by eViolin, a Dutch association of CPOs and MSPs. The preference of the BENELUX countries was to set up a sustainable governmental organisation for the IDRO. A Benelux common service to manage ID issuing was finalized in collaboration between the Benelux Secretariat-General and the involved regions and countries. This Benelux-IDRO was launched in July 2021, simultaneously with the hand-

over of ID issuing activities from eViolin to the Benelux Secretariat-General. This Benelux IDRO is also appointed to perform the IDRR tasks.

Procurement

Procurement was mainly used for external expertise in the project, focusing mainly on developing an implementation plan for Belgium and stakeholder involvement. In addition, Belgium contributed to the procurement for the set-up of the IDRO BENELUX, more specifically for the design and technical set up of the web portal. To specify the requirements, the results of Deliverable 1.2 and 1.3 were closely examined.

Legislation

The need for a legal obligation for data sharing was extensively discussed with the Belgian stakeholders. In addition, Belgium closely followed the Dutch process for a legal obligation, as market players in both countries are more or less the same. Flanders decided in 2021 to develop a similar obligation as the Netherlands, which was included in a more general regulation on charging infrastructure deployment. The other regions in Belgium are closely following the Flanders initiative, to evaluate whether a similar regulation is necessary.

DATEXII

The implementation of DATEX II requirements was closely aligned within the European project and in particular with the Netherlands. Data on charging points and H2 stations will be available in DATEX II on the NAP.

4.7 Hungary

Contact person

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In Hungary, data on electric charging and other fuels are currently provided via NAP based on DATEX II version 2.3. In publication the provision of electromobility information is incomplete.

An upgrade to make more complex electromobility data available in DATEX II v3.3 is ongoing (from other financial resources). The project aims to changeversion has started in August 2021. The first release was handed over at the end of January 2022. Release 3rd tests has been accomplished. Stability improvement and bug fixing are ongoing. The last planned release (Release 4th) will be installed and tested until the 14 of July. *Hydrogen*

Since the first hydrogen filling station (not yet public) was opened this year and a government organization (HUMDA Zrt.) has started to work on executing a national hydrogen infrastructure development program. The tasks regarding the hydrogen infrastructure are planned to be finished by the extended project closing date (June 2022).

Manual data loading is possible if the operator provides data to the NAP operator. After 2022. 06.30. will be available data entry form for hydrogen fuel station operators. These task are out of the scope of the Hungarian project (not financed under the current GA)

Other fuels

In Hungary, CNG, LNG (1 station) and LPG are available. Furthermore, bio-CNG is available for public transport (buses), but the station is not publicly accessible. Datacollection is happening at a national level, except for LNG and bio CNG. The data is collected by different organisations, both private and public, and made available on websites (e.g. holtankoljak.hu; mobiliti.hu/cng/). Next to static data, also the fuel price is shared on these websites. The data quality is sufficient.

Regulation

Regulatory framework, work-flows, customer service will be finalized soon. The procurement of the data transfer from CPOs to the NAP has been already done some CPOs has been selected for the implementation and testing on voluntary basis.

The number registered CPOs including both small and larger market players is approximately 20.

The legal and regulatory framework for CPOs and EMSPs is already in place for registration as well as for data provision, however this was not introduced considering the aims and schemes of the IDACS project. The registration takes place and data is currently provided to a different organization not to the IDRO and the NAP.

In the next period a revision will take place on the regulation to meet the European and IDACS requirements and this way put both the IDRO and the NAP in their expected role and position.

Main data standard is DATEX II. v.2.3, but TN-ITS is also used. In 2021 DATEX II. v.3. will be also available

In accordance with the objectives set before, the website of the IDRO (namely the Hungarian ID Registration Office) has been published and functioning in two languages at the following address: https://idro.hu/. First registrations requests were recently received. There will be some further developments in functions and services after the first registrations took place and we got the feedbacks from the CPOs and EMSPs.

There is a development in progress that would allow CPOs to easily transfer their data to NAP from their back-ends including the DATEX II format conversion. Testing with the first market players who could join voluntarily will took place in 2021.

The Hungarian ID Registration Office was launched in the third quarter of 2020. After the publication of its website, in the last quarter some improvements were made, and some new features were introduced to make the page more informative and transparent and to provide a better understanding about on IDACS project for visitors. We asked a CPO (also being an EMSP) for feedbacks to help with the improvements. Some of the changes have already been realized and some of them are still in progress.

The legal framework for the IDRO has also been investigated and a legal team started to work on the necessary tasks to build a coherent documentation for registrants. The team also works on identification of specific needs for regulation.

A system for data format conversion has also been developed which helps CPOs to easily transfer the necessary data (including static and dynamic data of the electric charge points) to NAP from their back-ends in the DATEX II format. Further IT development was carried out in 2021 for the NAP side to ensure a seamless receipt of data from the NAP.

Consultations and planning in preparation for the change have begun in the NAP so that it can receive the data from the IDRO. After the registration process set and the necessary IT development will be carried out the dissemination and communication can be started to deliver the information to a wide range of users.

In the first quarter of 2021, CPOs and/or EMPs who were interested in the project, were informed about the launch of the IDRO they were also invited to register on a voluntary basis. Due to the pandemic situation, a face to face meeting with all the relevant market players is scheduled for the next quarter. Questions and concerns of the market players will also be collected for both IDRO registration and data exchange. The model of information services to be provided for the B2B partners (e.g. EMSPs) is also part of upcoming tasks. Here we would be highly grateful for any best practices and adjustable regulatory frameworks.

Technical/IT background for data collection from CPO/EMSP side was developed and needs to be connected into NAP’s IT system to start testing.

Setting the national regulatory framework for IDRO and NAP is still in progress that is planned to be completed in 2022. A detailed regulation on the compulsory basis of registration and participation in date exchange would be necessary as well as rules of data quality and frequency will need to be set.

The usage of the collected date needs to be regulated as well including data security and commercial aspects as well.

The NAP operator has been signed a development contract to be able to properly manage IDACS data in the system.

4.8 Czech Republic

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Set-up NAP
According to the Czech governmental strategy on ITS (National action plan on ITS) National Transport Information Centre (NTIC) operating by the Directorate of Roads and Motorways of the Czech Republic has been already appointed as National Access Point (NAP) for the Czech Republic.

In November 2019, a meeting was held between the Ministry of Transport and the Ministry of Industry and Trade. Both ministries agreed on the process of issuing ID codes and data collection on charging and refueling stations, which will be carried out in the future through the National Access Point of the Czech Republic , which is part of the Road and Motorway Directorate.

According to the valid legislation, the operators provide static data to the Ministry of Industry and Trade. The data are presented via the website of the Ministry of Industry and Trade in PDF format.

The aim of the agreement between the Ministry of Transport and the Ministry of Industry and Trade is to build an agenda system addressing the collection of static and dynamic data from the operators of charging and refueling stations. The operator of the new system has been designated the Directorate of Roads and Motorways, which will publish the collected data through the NAP.

In 2019 a feasibility study was prepared, the output of which was the technical specification of a new agenda system for data collection and issuance of identification codes. The results of this study were discussed in a workshop with the main stakeholders (main operators, the Ministry of Transport, the Ministry of Industry and Trade, Škoda Auto,…)

This was followed by the preparation of documentation for a public tender for a new module for data collection and the IDRO agenda.

In 2020, the government adopted a resolution concerning new approval process of public procurement of IT projects. Due to such approval process, our project was significantly delayed. In October 2021, the documentation for respective public tender was approved by the Czech government, and such tender was than announced in November 2021.

We anticipate that the contract with the selected contractor for the data collection module and the IDRO agenda will be signed in February 2022.

The technical specification of the project clearly indicates the public information that is published through the NAP. Other information is marked as non-public and remains in the agenda system for the needs of data validation by the Ministry of Transport and the Ministry of Industry and Trade. The obligation to register and provide data is currently legislatively stipulated for the operators of recharging/refueling points (conventional and alternative fuels). The provision of dynamic data on electric charging stations is addressed by the decree prepared by the Ministry of Transport.

The provision of data through the NAP is subject to general license conditions, which allow access to data to all potential customers in a non-discriminatory manner.

Set-up IDRO
In 2019, the study 'Establishment of the IDRO in the Czech Republic' was prepared. Consultations with the main operators took place. The result was a recommendation that the Ministry of Industry and Trade implements the IDRO agenda. However, due to the problem of funding, it was decided that the Roads and Motorways Directorate would be entrusted with this agenda.

This agenda thus became part of the above-mentioned IT project (public contract) for the elaboration of a module for data collection from energy recharging points and the IDRO agenda.

The IDRO agenda will operate through the NAP from the second quarter of 2022.

Procurement
'The establishment of the IDRO in the Czech Republic' study was funded from the IDACS budget in 2019.

In 2020, the IDACS grant financed a feasibility study, which became the basis for the technical specification of the public contract for the supply of the agenda system - a module for data collection from energy charging points and the IDRO agenda.

The public tender for the contract 'Elaboration of the module for data collection from energy charging points and the IDRO agenda' was launched in 2021. This public contract will be financed from national budget.

Legislation
Act on Fuels provides for a general legal framework on operation of the recharging stations including obligation for CPOs to provide the Ministry of Industry and Trade with the basic static data for all their recharging stations. The scope of those static data is in line with the data requirement as set out in the IDACS project.

As regards to dynamic data and ID issuing Decree of Ministry of Transport is expected to be approved in 2022.

DATEXII
In the Czech Republic, there is a clear requirement, based on a feasibility study in 2019, that automated data exchange between NAP and information providers (CPOs) take place in the Datex II protocol. The information published by the NAP towards registered subscribers will also take place in this protocol.

4.9 France

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Set-up NAP
Several NAPs set up in France pursuant to the ITS directive implementation, depending on the type of data. *Transport.data.gouv* provides the public with data regarding public transportation and alternative fuels infrastructures. Legislation mandates EVSE, HRS, CNG and LNG refuelling stations owners to provide static data through this website, which is under continuous development under Directorate General for Infrastructures, Transport and Sea supervision to offer operators the simplest possible way to fill in their data and add data sets to the website. The NAP currently stores several datasets provided by charge point operators (at least 24 000 charging points) but only 11 000 charging comply with the format required by the regulation. An agreement was reached between the administration, Gireve and the operators to fit static data to the regulatory format and consolidate our database during summer 2022 to properly register approximately 80 0000 recharging points.

Additionally, dynamic data regarding EVSE has to be provided to the NAP when it is available to the owner. The NAP is not capable of providing those dynamic data yet however and EVSE owners are therefore exempted of this obligation. A NAP architecture was recently retained between our implementing body Gireve, which is in charge of data collection and provision to the NAP, and the administration. Dynamic data will start being updated to the NAP by early fourth quarter 2022.

Discussions have started with *France Hydrogène*, the hydrogen business association, which gathers HRS related data, to make static data available on the NAP in the correct format.

As of the end of 2021 CLNG data have been available on the NAP.

Set-up IDRO
An IDRO was established in France before the program started. The *Association Française pour l'Itinérance de la Recharge Electrique des Véhicules* (AFIREV) is in charge of providing IDs to operational units and is involved in data exchange protocols normalisation. It was appointed as implementing body as regards activity 1 for the IDACS program.

Procurement
Legislation

Parallel to the completion of activity 2, it was acknowledged the existing alternative fuels regulation related to data was not binding enough. A provision was included in the 2019 Mobility law and a decree was prepared to allow the administration to fine operators not complying with the mandatory data provision. The enforcement decree will be published in December 2021 and the e-mobility ecosystem will be informed early 2022, which should increase the static data collection rate.

DATEXII
Datex *II* is not utilised by the French e-mobility sector as in other countries, eMIP being the most frequently used in France. Gireve is working to translate the eMIP format in Datex II by the end of the program.

4.10 Greece

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Set-up NAP
In Greece, the Greek Ministry of Infrastructure and Transport in collaboration with National Technical University of Athens (NTUA) has completed the development of a new platform for ID issuing called «M.Y.F.A.H.». related to the interconnection of electric charging points with the National Access Point (NAP) by taking into account the architecture of EV charging system, which is composed by Charge Points, Charge Point Operators and Distribution System Operators (DSO). The overall approach is followed by a user-friendly interface, which will be updated until the final version. The overall action is also focused on the set of safety and security features between electric charger and NAP complemented with interoperability requirements. To facilitate the interconnection of the M.Y.F.A.H. with the governmental databases and services as well as to enhance the safety and security features of the platform, the M.Y.F.A.H. is hosted by the Greek government's main portal (gov.gr).

The management and transmission of data related to the electricity market operators, the recharging points, the access rights of the interested parties, and any other issue related to the application of article 14 of law 4710/2020 (AD 142) will be performed through to the Register of Infrastructure and Electricity Market Operators (M.Y.F.A.H.). The M.Y.F.A.H. will act as the IDRO of Greece in order to harmonise the requirements and guidelines of IDACS with the European directives and regulations. In addition, the fields and groups of fields referred to in the Unique Identification Codes (IDs) are defined to ensure interoperability, taking into account the existing national, legal and operational framework. In accordance with the Directive 2010/40 / EU on intelligent transport systems and Regulation (EU) 2015/962 of the Commission of 18 December 2014, the M.Y.F.A.H. will be linked to the NAP dedicated to exchange data with IDRO according to DATEXII standard. This platform will send the data at the Pan-European Access Point according to the DATEXII data standard. At the same time, the M.Y.F.A.H. will publish static and dynamic data through the website and mobile applications, with the aim of providing comprehensive and valid information to consumers about the location / infrastructure of recharging electric vehicles.

Set-up IDRO
In the course of the project, variable digital services and standardised communication protocols dedicated to EV charging networks were tested and evaluated in order to achieve intelligent exchange of information and optimum interoperability. For this reason, minimum requirements were identified (e.g. secure communication, device synchronization with a centrally maintained time, device logging security events in a locally stored log, etc.).The ontology of the IDRO and technical

specifications are set and already be described as related national regulations as described below. The M.Y.F.A.H. will be able to export the following statistics from the imported data, to facilitate monitoring and to achieve of the goals for the transition to low-emission mobility. Indicative data provided in totals in the country as well as grouped by country and/or by Region and/or by Regional Unit, are the following:

a) Total number of CPOs
b) Total number of electric points, stations and charger groups
c) Total installed capacity of electric vehicle charging points
d) Distribution of charger types
e) Number and average duration of charges per charging point
f) Cost in euros per kWh of charge
g) Duration of non-availability of charging points for technical reasons
h) Number of unacceptable data and duration of communication interruption per charging point

For the smooth and efficient operation of the IDRO, the issuance of statistics will be automated and e-mails for the information of the CPOs will be send by the Ministry of Environment and Energy and the Energy Regulatory Authority. It is also planned to connect the M.Y.F.A.H with the new state-of-the-art and secure digital portal of AADE (myaade.gov.gr), which is the Greek information system for taxpayers and businesses including all the public financial services. This action will enable the verification and enhance the validity of CPOs information when they will register in the IDRO platform. In addition, it is foreseen to deliver a mobile application which will enable the consumers to access all the collected information through a user-friendly and direct way. Lastly, the ID issuing activities are expected to be finalised by the end of January 2022, while the complete NAP and IDRO systems will be delivered in the course of the IDACS project extension.

Procurement
The Ministry of Infrastructure and Transport has assigned the design of the NAP's and IDRO's ontology and its implementation to the National Technical University of Athens because of the necessity for fast actions and solvency as well as the experienced academic background that is required given the IDACS requirements.

Legislation
The realization of the IDACS guidelines in Greece is performed through the preparation of two Ministerial Decisions which were published within December 2021. The system is in line with the framework defined in IDACS project as well as the Electro mobility Law 4710/2020 which was published in the Official Gazette no. 142 A of 23/7/2020 and the Common Ministerial Decision No. 355033/2021 which was published in the Official Gazette 5776 / B / 10-12-2021 defining the 'Management and transmission of data related to the operation of the electric market, the points of recharging of electric vehicles and the access rights to the Register of Infrastructure and Electricity Market Bodies (M.Y.F.A.H.) of the interested parties.'. This law indicates the obligation of the CPOs and EMPs (the electric mobility providers) to register to the national database of IDRO Also, there will be a provision for fees (annual and 8 for the first registration) and currently

Εκδίδεται από	**Μ.Υ.Φ.Α.Η. (Μέρος Α)**				**Φ.Ε.Υ.Φ.Η.Ο. (Μέρος Β)**			
Περιγραφή	**Χώρα**	Κενό	**Αναγνωριστικό Φ.Ε.Υ.Φ.Η.Ο.**	Κενό	**Τύπος**	**Αναγνωριστικό σημείου φόρτισης**	Κενό	Ψηφίο ελέγχου
Παράδειγμα	*GR*	"-"	*EVN*	"-"	*E*	*2542AX8769*	"-"	*3*
Προδιαγραφή	2 χαρακτήρες (αλφαριθμητικοί) [ISO 3166-1 alpha -2] {2}	**Προαιρετικό** [-] {1}	3 χαρακτήρες (αλφαριθμητικοί) [A-Z;0-9] {3}	**Προαιρετικό** [-] {1}	1 χαρακτήρας (αλφαριθμητικός) E για σημείο φόρτισης, S για σταθμούς φόρτισης και P για ομάδα φορτιστών [A-Z] {1}	Έως 30 χαρακτήρες (αλφαριθμητικοί) [A-Z;0-9] {8}	**Προαιρετικό** [-] {1}	**Προαιρετικό**, υπολογιζόμενο σημείο ελέγχου [0-9] {1}
Ενδεικτικό Παράδειγμα: *" GRA23E45B78C" όπου «GR» η χώρα, «A23» το αναγνωριστικό του συγκεκριμένου Φ.Ε.Υ.Φ.Η.Ο., «E» αντιπροσωπεύει τον τύπο του σημείου φόρτισης και «2542AX8769» αντιπροσωπεύει το ID του ρευματολήπτη*								

Figure 7: Snapshot of Ministerial Decision describing ID ontology

DATEXII

A data collection tool will be developed which will collect the information provided by the CPOs and will convert them into DATEXII format. It is under consideration to adapt compilers that are made available through IDACS PSA from the Member States.

4.11 Portugal

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Set-up NAP

In Portugal it was decided to develop the multimodal NAP inside the newly operational road NAP. The multimodal NAP acts like an extension of the road NAP, although it has an independent management and a different architecture, being a register. The Multimodal NAP accommodate the other fuels data and is operational since January 2022. There are two big national datasets that manages other fuels data in Portugal. The electric mobility data, covering all the publicly accessible charging points is managed by MOBI.E. On the other hand, DGEG manages a national database with all the public refuelling stations, including all types of available fuels. This situation facilitates the data provision in the NAP. The hydrogen data, when available, will also be centralized in DGEG database. Other fuels national datasets will be available in the NAP via metadata files, until 30.06.2022.

Set-up IDRO

Mobi.E has been managing a national electric mobility database for several years now, including the charging points id´s. Therefore, this public entity already acted like an IDRO, although using a completely different id syntax. Mobi.E completed the IDRO setup in the first quarter of 2022 and deployed a web page with CPO´s and EMSP´s lists and an online registration form for new CPO´s, available at : https://www.mobie.pt/en/redemobie/idacs..

CPO´s and MSP´s id´s have already been converted to the agreed format.

Procurement
Procurement was mainly used for the set-up of the IDRO and for the development of Datex II converters for Mobi.E and DGEG. Mobi.E and DGEG tendered a converter from its OCPI and xml data.

The development of IDRO was largely based on the requirements defined at Deliverable 1.2 and 1.3. Mobi.E contracted a company to design the technical set up and the web portal. These entities also tendered their endpoint set-up, regarding their linkage to the multimodal NAP.

These entities also tendered their endpoint set-up, regarding their linkage to the multimodal NAP.

Legislation
The legal framework regarding other fuels and electric mobility data remains substantially the same, as it was at the beginning of the project.

In Portugal, according to the law all the charging stations installed on public access spaces must be integrated within the MOBI.E system. This integration means that all the charging stations communicate their statuses and transactions to the MOBI.E system. Decree-Law 90/2014 and more recently the regulation 854/2019 defined the assignments of the electric mobility network management entity (EGME), including the development of information systems to secure charging points operation.

Regarding other fuels, according to Decree Law 243/2008, of 18th December, supporting the website www.precoscombustiveis.dgeg.pt, the operators exploring filling stations in the mainland of Portugal, are obliged to fill online, in each filling station, all the static data specified in IDACS, which are after, validated by Directorate General for Energy and Geology, entity responsible for the website.

After consultation with relevant stakeholders, it was concluded that the existing legal framework was sufficient.

DATEXII
For electric charging points data, a converter tool is developed for the conversion from OCPI to DATEXII. Mobi.E network, covering all the publicly accessible charging points, uses the OCPI protocol. Therefore, Mobi.E acts like a data aggregator that made the data of charging points available through NAP.

DGEG developed a customized Datex II converter, acting also as a data aggregator for the other fuels. Their data is now published in NAP trough a metadata file.

The definition of data categories by the Consortium and their correspondence with DATEX II specifications, in deliverable 2.2.2, were very useful for the tender set-up.

4.12 Croatia

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Organisation: Ministry of the Sea, Transport and Infrastructure

From the beginning, the Republic of Croatia has included in the project all important stakeholders that are important for the development of e-mobility and the use of alternative fuels in the market of the Republic of Croatia. Some companies, such as HT-telekom d.d. and HEP d.o.o. they already had developed internal IT infrastructure monitoring systems for charging stations, however such systems did not provide real-time information or provided only some information. Also, the ID codes of filling stations assigned by these companies did not comply with the agreed IDACS guidelines. Regarding the information of other alternative fuels, the Ministry of Economy had developed an application for informing about the statistics of the LPG filling station. In the long run, hydrogen is projected / included as one of the strategic energy sources in the context of the New Energy Strategy Hydrogen filling infrastructure is currently not available in the Republic of Croatia, while for other fuels there was no user information system. Many meetings were held with the competent state bodies (Ministry of Economy, Ministry of Environmental Protection and Energy, Croatian Employers' Association) and other stakeholders to regulate legislation and determine the current situation (HEP d.o.o., HERA, HEP-ODS d.o.o., INA d.d., Petrol d.d., HT-telekom d.d.).

Set-up IDRO and NAP

As regards infrastructure for alternative fuels, in the Republic of Croatia it is regulated by the Act on the Establishment of Infrastructure for Alternative Fuels, which transposes the provisions of the Directive on the deployment of infrastructure for alternative fuels. The said law stipulates that in the event that data are available indicating the location of publicly available places for supply and refueling with alternative fuels covered by the provisions of this Law, all users shall be provided with access to such data on an open and non-discriminatory basis. Such refueling point data may, if available, include real-time availability information, as well as information on previously performed refills, and real-time refill information. Given that such a provision of the law is too general and rather sparse, the Ministry of the Sea, Transport and Infrastructure has decided to amend the provisions of the law to develop a procedure for issuing ID codes and oblige charging stations owners/ CPOs to provide static and dynamic data in accordance with IDACS guidelines. The Ministry of the Sea, Transport and Infrastructure included the amendments to the said law in 2020 in the national plan of legislative activities. Since the procedure for amending the law in the Republic of Croatia is quite slow, because it has to pass the approval of many different state bodies and institutions the law was adopted in may 2022. Based on the law, ordinance will be adopted, one that will regulate the procedure of issuing ID codes, and the system of data collection and informing users about the infrastructure for alternative fuels in real time. The ordinance has passed the consultations of the working bodies, will soon go to public consultation, after which it is expected to enter into force. After the entry into force of the ordinance, IDRO and NAP IT systems will become operational.

Procurement and legislation

In parallel with the amendments to the Act, the Ministry of the Sea, Transport and Infrastructure in 2021 initiated the process of procuring IT systems for issuing ID codes and IT systems for creating NAP and providing static and dynamic data. The technical documentation for the procurement procedure was prepared in accordance with the IDACS guidelines. The procurement process was delayed due to the crisis caused by COVID-19 and the small market of service providers for the development of such IT systems that did not show interest in responding to invitations to tender. Nevertheless, the Ministry managed to collect the most favorable bids, so in November 2021, contracts were concluded with the most favorable bidders. The IT system for issuing codes is located in the Ministry of the Sea, Transport and Infrastructure and in accordance with the needs of users, it will issue five-digit ID codes in accordance with the rules of administrative procedure. The real-time IT user information system will collect information from charging stations owners/CPOs and distribute it to end users. Both IT systems are expected to be operational after the ordinance enters into force.

4.13 Lithuania

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Set-up NAP
Primary tools for the transmission of data through the NAP have already been developed. Currently, EV data can be accessed via the following links https://ev.lakd.lt/open_source and http://nap.lakd.lt/
.

Set-up IDRO
IDRO was approved and signed by the Minister of Transport and Communications of the Republic of Lithuania 14 of May 2020.

IDRO is set-up as Lithuanian Road Administration. The Road Administration has been issuing ID codes since 1 of July.

Procurement
Lithuanian Road Administration have launched public procurement tenders for the establishment of a ID registration IS. The system is scheduled to start operating in April of 2022. The system includes the tools needed to collect dynamic and static data as well as adapt this data to the DATEXII format.

Legislation
Order of Minister of Transport and Communications of the Republic of Lithuania 14 of May 2020.

DATEXII
NAP support DATEX II.

4.14 Slovenia

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Set-up NAP
It was decided to use and upgrade the existing NAP (www.nap.si) for the data provision of alternative fuels infrastructure (AFI) which has been managed by National Traffic Management Centre, division within Ministry of Infrastructure. NAP is organized as data warehouse. The existing IT architecture, hardware and software were used which enabled smoothly implementation of additional layer of static and dynamic AFI data through the NAP. At the moment only data for CPs for electric vehicle (EV) is available, later on NAP will be upgraded with other AFI data. The exchange of static and dynamic data with the NAP is possible through open Application Programming Interface (API) which has been set up with IDACS funds. Data of CPs for EV is not comprehensive yet, since there are some challenges with persuading the CPOs to start with data exchange since some of them consider dynamic data, as data with value. It is anticipatedthat this issue can be fully resolved only when

national AFI Act will be implemented. Additionally 'General Terms and Conditions' for reuse of AFI data will be prepared and also Guidelines for other users of NAP service.

Set-up IDRO

IDRO was set up as a part of Ministry of Infrastructure, having in mind that this could possibly be a temporarily solution. In the process of preparing the national AFI Act will be decided which entity will act like IDRO in the future. Special computer application (APP) was set up with IDACS funds called PROMETEJ that enables ID code issuing and registration. Besides CPO ID codes and MSP ID codes also the registration of EVSE ID codes is mandatory. That can be implemented with PROMETEJ APP or with Application Programming Interface (API) which was also set up with IDACS funds.

Procurement

Procurement process was carried out for setting-up a computer application for ID codes issuing and registration (APP PROMETEJ), for setting up the Application Programming Interface (API) for data exchange with NAP and for translation to DATEX II format. After this procurement process was finished there were some remains of funds that were used for another procurement process for optimization and upgrading of NAP on new domain: www.nap.si.

Legislation

The draft of national AFI Act was prepared in partnership with the EC, DG REFORM – Structural Reform Support Programme. After analysing the draft AFI Act carefully it was decided that there were still some areas and solutions that should be included in the national AFI Act following AFID revision and AFIR proposal published on the 14th July 2021. Several additional consultations were carried out with representatives of other ministries, implementing bodies and experts. Mean time in April 2022 there were national elections for the Parliament and new government was constituted. The upgraded nation AFI Act proposal is at the moment in the process of harmonizing with the new ministerial cabinet and after that will be put in the approval procedure. It is estimated that AFI Act will be adopted in Q1/Q2 2023. Without having AFI Act in place it is very hard to achieve all the IDACS project goals especially the dynamic data provision through the NAP.

DATEXII

The subcontractor elected for setting up the APP, API and data translation to DATEXII format had previous knowledge of DATEXII since it had cooperated with National Traffic Management Centre before. The subcontractor has been available to all the stakeholders (CPOs, MSPs, …) for technical guidance and any other issues regarding the conversation of AFI data and data exchange with NAP.

4.15 The Netherlands

Contact person

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Set-up NAP

In the Netherlands it was decided to use the existing NAP for the data provision of alternative fuels.

This tasks are being executed by NDW and its architecture is a register: https://nt.ndw.nu/#/home. Legislation obliges CPOs to make their data accessible for electric charging points via this NAP (link and link). This has been communicated extensively with CPOs. For Hydrogen, the platform H2.LIVE has been registered at the NAP (link). They share their POI data via open APIs.
For Other Fuels there is static data of alternative fuels available (link). This contains data for the following fuel types: CNG, LNG and multiple high blended biofuels.
'Best practice': To help operators, a step-by-step guide has been placed on the NAP that explains how an operator can register themselves on the NAP. The data categories that CPOs are obliged to make available can also be found here. Finally, there is a 'General Terms and Conditions'(link). In the Dutch situation, CPOs can set their own set of conditions for data provision and usage between them and the user of the data. The General Terms and Conditions provide a guideline for what conditions a CPO can attach to his data (as long as everyone has access in a non-discriminatory way). This can remove concerns from CPOs such as the misuse of dynamic data.

Set-up IDRO
At the beginning of the project, the ID issuing activities were executed by eViolin, an association by CPOs and MSPs. The preference of the BENELUX countries was to set up a sustainable governmental organisation for the IDRO. Together with Belgium and Luxembourg, a Benelux common service to manage ID issuing is finalized in the second quarter of 2021 in collaboration between the Benelux Secretariat-General and the involved regions and countries. This Benelux-IDRO launched in July, simultaneously with the hand-over of ID issuing activities from eViolin to the Benelux Secretariat-General. Agreements with the current IDRO were made to formally take over the tasks once the system is ready. This Benelux IDRO is also appointed to perform the IDRR tasks.

Procurement
Procurement was mainly used for the set-up of the IDRO and for the development of a DATEXII converter. For the IDRO, based on the quotations, a company is chosen to design the technical set up and the web portal. To specify the requirements, the results of Deliverable 1.2 and 1.3 were closely examined.
An assignment has also been given for the development of an OCPI to DATEXII converter. The organization that manages the NAP, NDW, has developed this tool. An important requirement was that it had to be open source. More information about this can be found in deliverable 2.2.1.

Legislation
Early in the project (2019) it was decided that the AFID legislation in the Netherlands was insufficient to provide all data via the NAP. The Alternative Fuel regulation in the Netherlands has been amended in order to include legal obligations for owners of charging infrastructure to share their data through the NAP. This legislation has entered into force from the 1st of July 2021. A webinar was organized in 2021 to inform all national stakeholders involved within the IDACS project. During this legislative process, much was discussed with CPOs and their input was used to adjust the amendment. The amendment can be retrieved at the Staatscourant 2021, 19832 . The obligation is that a CPO makes his data accessible via the NAP: this means that a CPO registers at the NAP, or the data is available via a data aggregator. The CPOs can therefore set conditions for data provision and usage between them and the user of the data. However, data must be available in a non-discriminatory manner and only a 'fair' fee may be asked. The Quality of data (must be correct) and update frequency (<1 min) for ECP is defined in this legislation.
For hydrogen and other fuels, it has been decided that it was not necessary to adjust the legislation. At the moment these are still small markets with a limited number of operators. Data collection is

first set up on a voluntary basis. If this does not succeed in the course of time, legislation can be amended.

DATEXII
For electric charging points data, a converter tool is developed for the conversion from OCPI to DATEXII. An open source version can be found at: GitHub - NDW-Realtime/ndw-ocpi-receiver. All CPOs in the Netherlands use the OCPI protocol. This tool allows data owners/sources to upload their data and receive it back in DATEXII format and thus retains ownership of the data. More information about this solution can be found in deliverable 2.2.1. In addition, there will also be a solution from the market: a data aggregator that makes the data of many Dutch CPOs available will also offer this data in DATEXII.
For hydrogen, all Dutch operators are registered at H2.LIVE which is able to deliver the data in DATEXII format.

5 Determine National Access Point (NAP)

Moving towards a Single European Transport Area requires a digital layer interlinking all of the elements of transport. Building up this digital architecture involves open and common standards and interfaces and an efficient, but secure data ecosystem[1].

This is why Member States are setting up their NAPs; to facilitate access, easy exchange and reuse of transport-related data, in order to help support the provision of EU-wide interoperable travel and traffic services for end users.

These NAPs are also required for collecting data related to alternative fuels infrastructure. Requirements of the NAP and specific data collection tasks are specified in the following legal acts:

1. Directive 2010/40/EU of the European Parliament and of the Council of 7 July 2010 on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1564046105563&uri=CELEX:32010L0040
2. Commission Delegated Regulation (EU) 2015/962 of 18 December 2014 supplementing Directive 2010/40/EU of the European Parliament and of the Council with regard to the provision of EU-wide real-time traffic information services: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32015R0962
3. Commission Delegated Regulation (EU) 2017/1926 of 31 May 2017 supplementing Directive 2010/40/EU of the European Parliament and of the Council with regard to the provision of EU-wide multimodal travel information services https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32017R1926

While directive 2010/40/EU sets out to provide some common standards and to prevent fragmentation among member states, it also makes the optimal use of road, traffic and travel data its first priority. Accordingly, one of its priority actions encompasses the provision of EU-wide real-time traffic information services.

[1] https://ec.europa.eu/transport/themes/its/road/action_plan/nap_en

The delegated acts which were adopted under the scope of this guideline specify that NAPs have to be established (art. 3, delegated regulation (EU) 2015/962) and that data on refuelling infrastructure, including alternative refuelling infrastructure, have to be made available through the NAPs (art. 4 & 5, delegated regulation (EU) 2017/1926). However, certain provisions apply for the collection of data on charging points for electric vehicles and HRS (annex 1.2. iv) and 1.3., iii), 2.2., b), delegated regulation (EU) 2017/1926):

- By 1 December 2020: the location of publicly accessible refuelling stations for [...] hydrogen powered vehicles and charging stations for electric vehicles for the comprehensive TEN-T network
- By 1 December 2021: retail channels, fulfilment methods, payment methods for publicly accessible refuelling stations for [...] hydrogen powered vehicles and charging stations for electric vehicles for the comprehensive TEN-T network
- By 1 December 2023: the data mentioned above for the for the other parts of the Union transport network.

Furthermore, the Sustainable Transport Forum's Sub-group to foster the creation of an electro-mobility market of services worked out a document on Recommendations for the implementation of article 7.7 of the Directive 2014/94/EU:

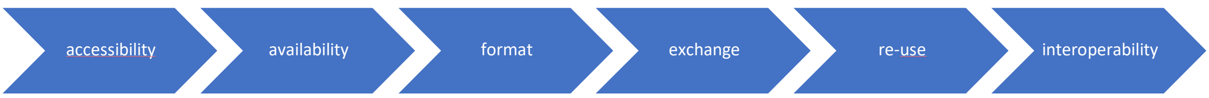
4. STF SGEMS D1.2 Data Categories

The following paragraphs explain in more detail what is required and how this can be realised.

5.1 Definition of NAP

In several delegated acts from the EU the National Access Points are defined[2] in different ways, but with the following common parts:

- National Access Point: a mechanism for accessing, exchanging and reusing transport-related data
- To establish a digital layer interlinking all of the elements of transport. Building up this digital architecture involves open and common interfaces and an efficient, but secure data eco-system
- This is why member states should set up their National Access Points; to facilitate access, easy exchange and reuse of transport related data, in order to help support the provision of EU-wide interoperable travel and traffic services to end users



5.2 EC Requirements

The main requirements from the EC regarding NAPs are mentioned in Directive 2010/40/EU and additional requirements in Delegated Regulation 2017/1926.

[2] https://www.interregeurope.eu/fileadmin/user_upload/tx_tevprojects/library/file_1521040514.pdf

In article 3 of the latter document the EU defines clear statement about the National access points:

1. Each Member State shall set up a national access point. The national access point shall constitute a single point of access for users to access at least the static travel and traffic data and historic traffic data of different transport modes, including data updates, provided by the transport authorities, transport operators, infrastructure managers or transport on demand service providers within the territory of a given Member State.
2. Existing national access points that have been set up to comply with other delegated acts adopted under Directive 2010/40/EU may be used as national access points, if deemed appropriate by the Member States.
3. National access points shall provide discovery services to users, for example services allowing for the search of the requested data using the contents of the corresponding metadata and displaying such contents;
4. Transport authorities, transport operators, infrastructure managers or transport on-demand service providers shall ensure that they provide the metadata in order to allow users to discover and use the datasets made accessible through the national access points.
5. Two or more Member States may set up a common access point.
6. A fee for the usage of NAP data may be asked to users, as long as it is within reasonable margins towards the cost of keeping the NAP available and up to date and the cost may not interfere with open and non-discriminating public usage.

5.2.1.1 Publicly Accessible Charging Infrastructure

The NAP is all about publicly accessible infrastructure. The term emanates from the definition of 'recharging or refuelling point accessible to the public' in Article 2 (7) of the Alternative Fuels Infrastructure Directive of 2014. It specifies that 'Union-wide non-discriminatory access to users' has to be granted, whereby 'Non-discriminatory access may include different terms of authentication, use and payment'. Many member states transposed this provision into laws and regulations in slightly different ways. During the project an attempt was made to set a harmonized definition, but this turned out to be too complex and, moreover, not essential for achieving the project results.

In the IDACS project, countries use the definition as stated in the AFID as the minimum definition for publicly accessible charging infrastructure. Countries can use their own definitions, as long as they are not conflicting with the AFID definition.

5.2.1.2 Update frequency

As stated in the Grant Agreement the Consortium will also define how frequently the dynamic updating of data needs to happen, balancing the technical constraints of frequent updates with the user needs (e.g. if a charging/refuelling station becomes non-operational users should be informed swiftly). The Consortium has defined the update frequency of data per fuel track as laid down in table 1. A more detailed version of this can be found in **Deliverable 2.2.2 – 2.2.4** of the IDACS project.

This definition was based on the following assumptions:

- Static data is forwarded/retrieved on a periodic basis;
- Dynamic data can change very frequently, especially the availability status of charge points.

These data can either be retrieved by means of a 'push-message' as often as the situation changes or can be retrieved via a direct link in the NAP data.

	Electric	Hydrogen	Other Fuels
Static data			
	within 1 day on change	on change	within 1 day on change*
Dynamic data			
availability	within 6 minutes	within 5 minutes	x
occupation status	within 6 minutes	x	x
ad hoc price	within 15 min	x	x

Table 1 – Minimum update frequency of data per fuel track as defined by IDACS Consortium

5.3 Technical requirements

On a technical level there are only a few requirements to take into account:

- The data must at least be made available (so the output) via DATEX II format (or with DATEX II interoperable format)
- There must be a system in place to ensure the quality (correctness) of the data
- The NAP must offer at least one interface that can be used by external developers to develop additional third-party services

The above requirement describes explicitly that data must be accessed through the DATEX II format. Depending on the possible setup of the NAP (a database, or a register etc, see also the below section), this means that the source where the actual data is made available, should be able to export this data in DATEX II format. The data provision in DATEXII is further described in **deliverable 2.2.1.**

As DATEX II is currently not the most used data format, and has no specific semantics for the domain of charging points yet, in the Grant Agreement the member states also agreed to offer data exports via other open formats. It makes senses for this to look into existing protocols in use (and the data format they use), like the OCPI, OCPI, OCHP, eMIP protocols for data exchange of electric charging points and the Open GIS data format. An extensive explanation of this is given in **deliverable 2.2.5**.

5.4 Possible setup of NAP

The setup and format of the NAP is free to choose for each country. The EU gives the following examples:

Architecture	Features	Examples	
		National Access Point	Public or private
Database	A single organised collection of data held	Greece, Lithuania,	Public Public

	on a common media / set of servers		
Data warehouse	A virtual co-located set of databases	Luxembourg: https://data.public.lu/fr/organizations/chargy/ Slovenia: https://nap.si/en	Public (Chargy) Public (National Traffic Management Centre)
Data market places	Intelligent transport data are being collected and made available on a market place that acts as a portal and broker.	Germany: Mobility Data Marketplace https://www.mdm-portal.de/. More details can be found here: https://www.mdm-portal.de/about-mdm/technical-details/?lang=en and at http://service.mdm-portal.de/doc/MDM-UserManual.pdf. Hungary:	Public (Federal Highway Research Institute)
Data register	A national registry pointing towards the different data sources (i.e. data owners' access points, websites, datasets, databases) provided that: 1. the information is digitised 2. the data are in the right format, up to date and ready for re-use 3. the path towards the data sources is self-explanatory	United Kingdom: data.gov.uk Austria: mobilitydata.gov.at Belgium: transportdata.be Czech Republic: Spain: Portugal: Poland: The Netherlands: https://nt.ndw.nu/#/home	Public Public/Private (E-Control) Public Public Public Public Public Public (NDW)

Table 2 – Possible set-ups of National Access Points

The NAPs and the different databases split the responsibility. There are situations, like the NL Data Ware House, where the management of the databases is done by a different organisation under responsibility of a country.

5.4.1 Overview (public/private/procurement/planning)

The different ways of setting up a NAP also require different possibilities to execute. The following possibilities are known:

1. **Public**: NAP setup, management, data input/output and quality criteria are directly controlled by a public authority. This public authority is responsible for the working of the

NAP.

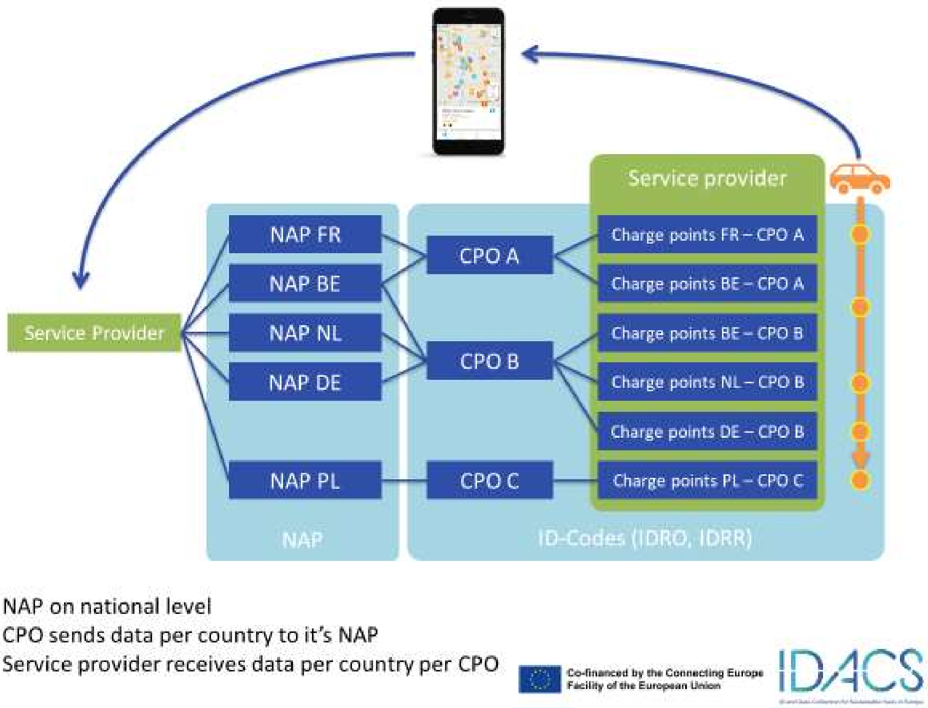
2. **Public/private**: Government appoints a separate organisation (public, semi-public, foundation etc) to set up and maintain the NAP. Oversight lies with the government. This organisation is then free to acquire (e.g. via a tender) the data or organisation that has the data

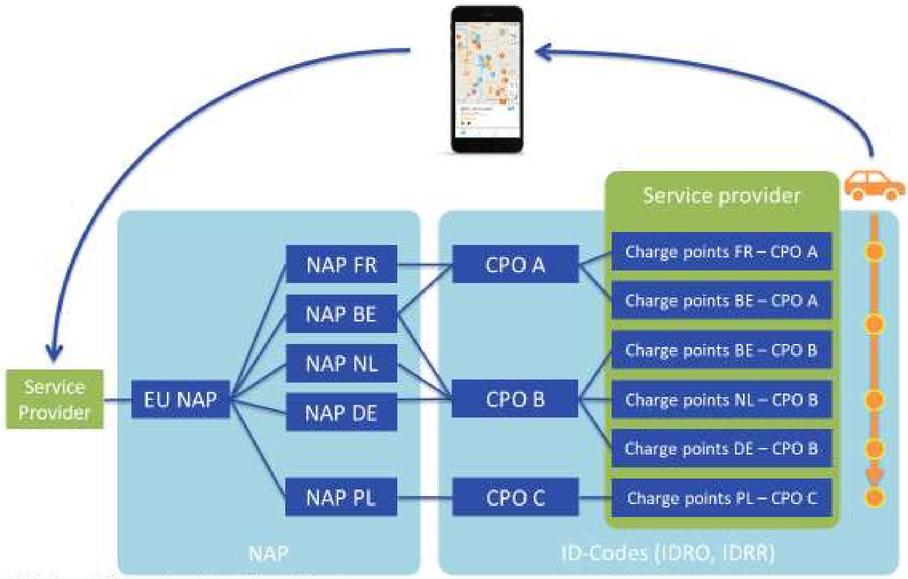
3. **Private**: A private organization (e.g. sector organization) has been given responsibility for management of the NAP through a contractual agreement with the government.

In order to choose between the above options, the market setup for a country needs to be taken into account, and in what way publicly available infrastructure is being regulated. Different choices have been made in each country.

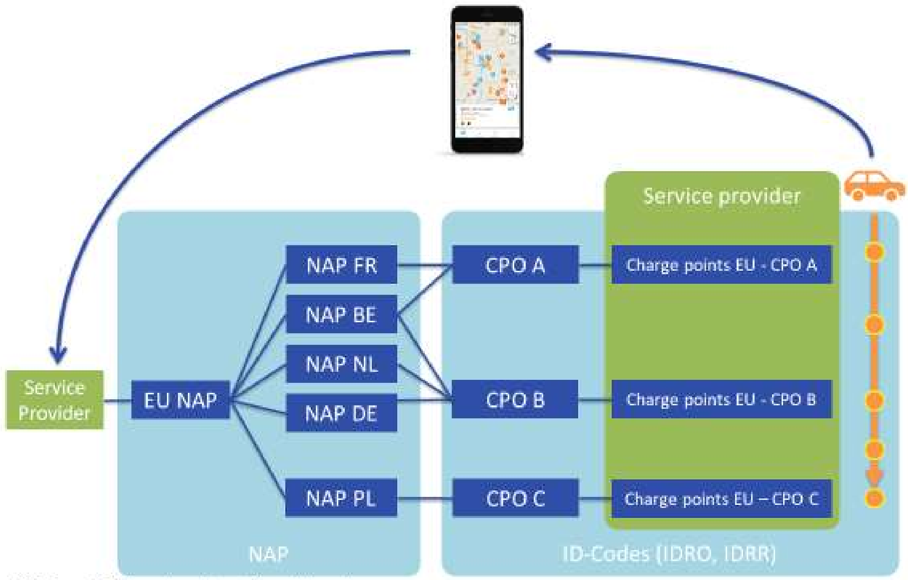
5.4.2 Possible setups NAP and connection to EU NAP

At the start of the project, the various ways of data provisioning on the NAP were considered, as well as the possible link to an EU NAP. Various possibilities and scenarios have been devised, which are outlined below. For example, it has been examined whether CPOs must supply their data per country to a NAP about charging infrastructure of that country alone. Or that they make the data available from all countries where they are active and that data is available on different NAPs (so for example, at the NAP of Belgium, the CPO makes the data available that contains both BE and FR data. And the same data can also be found on the French NAP). The figures below show various options for this:





NAP on EU level and national level
CPO sends it's data to the EU NAP
EU NAP sends data per CPO per country
Service provider receives data per country per CPO



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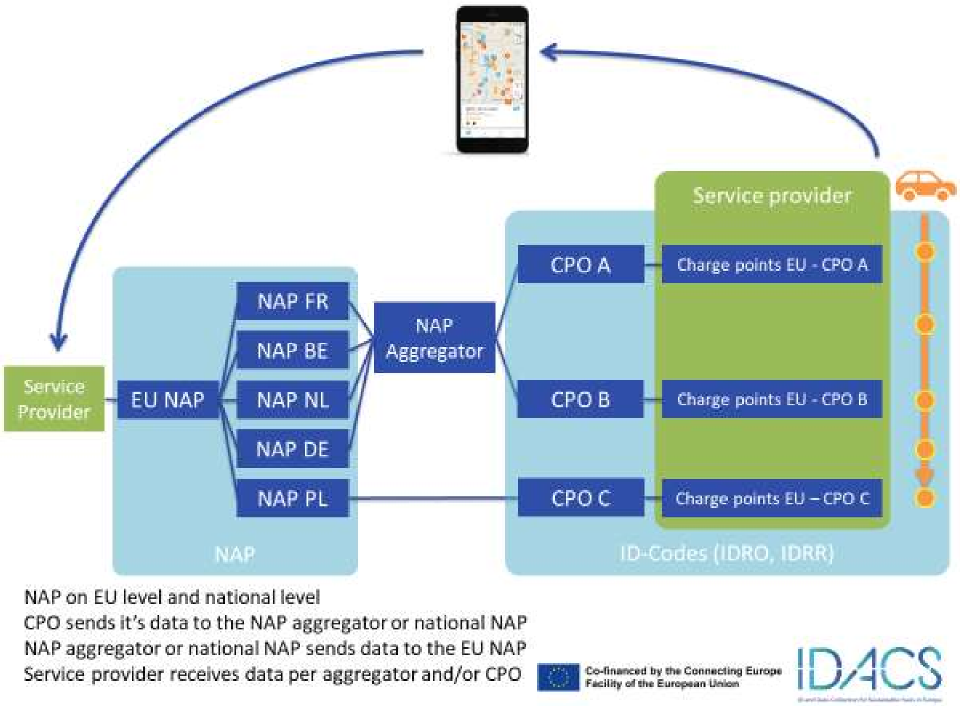


The figure above also includes the role of a Data Aggregator. It has been considered that a data aggregator can play a role by collecting the data from CPOs and making it available via the NAPs. Ultimately, we see that this does happen, but in the background and to a limited extent. There are NAPs that link to underlying databases where data aggregators play a role in collecting the data.

5.4.2.1 Collaboration

Although each country has to fulfil the requirement to set up a NAP, multiple countries can also work together when developing a specific solution for a NAP, or collaborate in management of a NAP. This may save development time and costs.
Looking back, this did not happen during the IDACS project. Much knowledge has been shared, and collaborations have been set up, but not with regard to setting up a NAP. This is a national obligation and it proves complex to do this together with another country, in terms of legislation as well as financially.

5.4.2.2 Procurement

Countries often already have NAPs in place for other information described in the ITS Directive. One option would therefore be to extend this model to include the Alternative Fuels Charging Infrastructure (Electric Charging Points, Hydrogen, Biofuels).

Another option would be to contract or purchase another solution for a NAP: a tendering or similar process would then be the usual approach to contract or purchase a NAP solution. The possible types of NAP have already been described above, as well as the possible governance options. It is a prerequisite to have these well-defined before entering into a tender. Additional points of attention to be taken into account, are:

1. Data delivery to the NAP
2. Data ownership
3. Data quality

4. Data usage by third parties
5. Cost of data collection, -management, -publication

These are detailed below as best practices that may serve as semi-quantitative requirements. It is expected that further work needs to be done in these areas.

5.4.3 Best practices

In addition to choosing a specific governance around a NAP as mentioned above, some additional issues need to be considered carefully

Not all items below do have a best practice available, best practices may be added by countries when available.

1. Data delivery to the NAP
   1.1. Operators of publicly accessible infrastructure for alternative fuels are meant to have a pre-described set of data elements (static, dynamic) available through the NAP. This is currently often taking place on a voluntary basis. This requires good arrangements with the EV sector and may often cause issues with data that has commercial value.
   1.2. It would be preferable to have adequate regulation in place that enforces every operator to provide data to a NAP according to the required specifications. Current national regulation (implementation of AFID, ITS Directive) should be checked regarding whether it provides sufficient basis for enforcing data collection. Some examples of national regulation that provides a basis for data collection are:
   – Poland, data register / public database. Poland has implemented legislation that enforces operators to share data via a public database (operated by a government organization). This database is accessible via the NAP. The legislation can be found in the annex.
   – The Netherlands, data register. The Netherlands have implemented legislation that enforces operators of electric charging infrastructure to have data available via the NAP. '*Regeling van de Staatssecretaris van Infrastructuur en Waterstaat, tot wijziging van de Regeling technische eisen en gebruikersinformatie over de infrastructuur van alternatieve brandstoffen in verband met het verstrekken van informatie over publiek toegankelijke oplaadpunten voor elektrische voertuigen'* It can be retreived at Staatscourant 2021, 19832 | Overheid.nl > Officiële bekendmakingen (officielebekendmakingen.nl)
   1.3. In a market-driven context, where multiple commercial operators operate a business case in providing charging infrastructure, local governments (or subsidiaries) are often the contractors. Contracting Public Alternative Fuel infrastructure can take place in many different ways (e.g. via tenders, permits, auctions etc). It is recommended to adequately describe in this contract the requirements for data collection to a NAP. A central government can provide templates for this.

2. Data ownership
   2.1. Ownership of data often lies with the respective operator who operates the charging station. However, as soon as data has been assembled, enriched and/or repackaged, ownership not always lies with the operator anymore (consider examples such as Navigation service providers). Transparency needs to be given about what happens with the data and who holds ownership.
   2.2. Data is collected via the NAP for the purpose of giving Service Providers the opportunity to create products and services for (EV) drivers. Formally it is stated: 'The national access point shall constitute a single point of access for users to at least the static travel and traffic data

and historic traffic data of different transport modes, including data updates as set out in the Annex, provided by the transport authorities, transport operators, infrastructure managers or transport on demand service providers within the territory of a given Member State.'
This data is therefore not intended to be used for other purposes (such as R&D, roaming transactions, competitive analysis, etc.), as this may influence the market, 'abuse' the purpose of the NAP or abuse the (technical) capabilities of the NAP. Usage of NAP data should be adequately described in a contractual framework with (representations of) NAP-management, NAP-data owners/suppliers and NAP-users.
- In the Netherlands, a set of General Terms and Conditions have been drawn up: these can be used and serve as inspiration to set conditions for the use of data. It can be retrieved at the homepage of the NAP: https://nt.ndw.nu/#/home

3. Data quality
    3.1. The quality of data is often considered to be one of the biggest success factors, but also the biggest obstacles for developing a market of EV-related services. "Wrong information is worse than no information" is an often-used quote in this context. Data quality requirements have to be defined very strictly and monitored on regular basis.
    3.2. Ideally, responsibility for data quality lies with the data source: the operator. In more mature markets, this is the default situation
    3.3. However, in this innovative market the data quality is often suboptimal and market players lack the capability to properly improve their data to the required standards for a successful service product. It is possible to make use of an external quality improvement/enrichment service, but this is a serious investment that needs somehow to be financed. Also, data ownership and other issues may arise.
    In any case, NAP management should make explicit the quality requirements that are in place, based on the requirements as defined in the project and applicable national regulation.

4. Data usage by third parties
    4.1. A fee may be asked from NAP users, as long as this is a reasonable fee and the non-discriminatory aspect is taken into account. In addition to (or as part of) the regulatory obligation, one may consider means to reward Operators for delivering information (e.g. not paying a fee as user), and/or penalize when e.g. information is not complete or not of the required quality level. This largely depends on the regulatory framework that has been implemented
    4.2. It is the intention to have Service Providers (third parties) develop products and services for EV drivers, based on the assembled data. Issues may arise however, when these third parties do not display these data completely, correctly or not timely. In a contractual agreement, the NAP user agrees to display the NAP info in its communication channels with the same quality level as the NAP provides.
    An example: Operators are being asked to update the availability information to the NAP every 2 minutes, but a Navigation Service Provider only updates this info every hour on its website. The EV driver who finds a Charging Point not available will consider this wrong information and may blame the respective Operator for not being able to charge.

5. Cost of data collection, -management, -publication

5.1. There may be cost involved for operators to comply to the data collection requirements. In a country with firm regulation one could argue that this is a 'fact of life' when operating in this country. In another context, an option could be to provide access to the NAP for reduced costs in order to benefit from

5.2. The cost of NAP management and -publication (development, maintenance, monitoring) can be significant, and different solutions exist in how to deal with these costs which heavily depend on the market model in a country and the setup of NAP management:
- The central government funds NAP management
- The cost of NAP management is relayed to NAP users (third parties) that want to make use of the NAP through e.g. a subscription mechanism
- The cost of NAP management are funded by the entity that hosts/manages the NAP, through additional business propositions

5.3. A sustainable model for financing the NAP beyond the project is part of the deliverables: currently developed solutions should also address this scope

5.4. Quality management, or quality improvement is sometimes part of the NAP management process. The strong suggestion would be to treat this as a separate proposition that has its own value.

5.5 Electric Charging Points

The EU set a clear requirement which data is requested mandatorily and which is optional. This is also agreed in the project between the Member States in the Grant Agreement. This chapter describes these requirements.

5.5.1 Data elements

The EU split the data in static and dynamic. The dynamic data is only required when available. However, in several discussions 'when available' means that if an organisation is using dynamic data for own external use, the data is available also for the NAP. In practice, this means that all data used in any way to inform the EV driver (e.g. via own app from the operator) the data is available and must also be shared with the NAP.

The following data elements MUST* be shared with the electric charge point NAP (*=according to the PSA Call and IDACS Grant Agreement):

- Static data:
  - Location
    - GNSS coordinates
    - Address (street name, zip code, city,…)
  - List of available charge-solutions (Power, Modes)
  - List of available connectors (plugs, sockets, induction plate...)
  - Opening hours, identification and payment methods,
  - Contact info for owner/operator
  - Full e-mobility code of the charging point
- Dynamic data:
  - Availability (if the station is operational/ non-operational) and
  - Occupation status (free, occupied)
  - Price for ad-hoc charging

All other data is optional.

5.5.2 Technical conditions, incl. communication protocols

For the NAP Electric charge points there are not few specific conditions or requirements.

Export/download: In general, the DATEX II format must be available for export from the data source that the NAP provides, in addition other formats are possible. This is similar to what has already been described in section 4.3.

Import/upload: To connect from the CPO to the NAP it is recommended to use open protocols and as much as possible protocols that already enable communication between CPO and EMSP. Usually, these are the protocols that also enable roaming. Therefore, the required data set as defined in IDACS is available via these protocols. Additional APIs to connect with the NAP may need to be programmed.

Such protocols in use in Europe are for example OCPI, OCHP, OICP and eMIP. A detailed description and comparison of these protocols can be found in IDACS Deliverable 2.2.5. *Proposal to the Commission for complementary data protocols to enable e-Mobility service provision and proposal for relevant standards.*

Open Charge Point Interface (OCPI)

OCPI was developed by Dutch and Belgian CPOs and MSPs (collaborating under the name eViolin) together with ElaadNL. Until the start of the EVRoaming Foundation in June 2020, the Dutch Knowledge Platform for Charging Infrastructure (Nationaal Kennisplatform Laadinfrastructuur - NKL) held the intellectual property of OCPI and led the development of the protocol. As of July 2021, the board of the EVRoaming Foundation, which currently holds the intellectual property rights, consists of representatives of NKL, EV Box, Chargepoint, LastMileSolutions, Freshmile and Google. The data and functionalities of OCPI in the current version 2.2. can be found here: https://ocpi-protocol.org/app/uploads/2019/06/OCPI-2.2-RC2.pdf

Open Clearing House Protocol (OCHP)

OCHP was developed by Smartlab Innovationsgesellschaft mbH, a limited liability company owned by 232 local power utilities in Germany, to enable roaming via their platform 'ladenetz.de' The data and functionalities of OCHP in the current version 1.4 can be found here: https://github.com/e-clearing-net/OCHP/blob/master/OCHP.md

Open InterCharge Protocol (OICP)

OICP was developed by Hubject GmbH, a limited liability company whose shareholders comprise the vehicle manufacturer BMW Group, the tier 1 supplier Bosch, the vehicle manufacturer Daimler, the energy company EnBW, the energy as a service provider Enel X, E.ON, Siemens and Volkswagen. The data and functionalities of OICP in the current version 2.2. can be found here: https://www.hubject.com/downloads/oicp/

eMobility Inter-Operation Protocol (eMIP)

eMIP is developed by the French roaming provider GIREVE, whose shareholders are the state-owned bank Caisse des Dépôts, electricity producer CNR, venture capital provider Demeter, electric utility company Électricité de France (EDF), electricity distributor Enedis and Renault. The data and functionalities of eMIP in the current version 1.0.2 / 0.7.4 can be found here:

https://www.gireve.com/wp-content/uploads/2017/02/Gireve_Tech_eMIP-V0.7.4_ProtocolDescription_1.0.2_en.pdf

5.5.3 Legislation, regulation, policy

Collecting and distributing data via a NAP is adequately described in the Grant Agreement with respect to input and output criteria (data elements, formats etc).

However, the data collection requirements as laid down in the relevant Directives (AFID, ITS) do not fully align with the data collection requirements as prescribed in the Grant Agreement.

Implementation of the respective EU directives into national legislation may have resulted therefore in incomplete coverage of the scope of IDACS the project. One cause could be the fact that the current ITS directive is less strict about dynamic data (dynamic data is optional) than the PSA IDACS project (dynamic data is mandatory).

One solution is to work on additional legislation in order to also make dynamic data mandatory, another may be an agreement with the sector organization or another regulatory body to ensure that also dynamic data is covered in the data collection process.

The NAP is already a familiar data collection solution for other types of information, as prescribed in the ITS directive. Often, countries already have a NAP that they will want to use for the purpose of data collection for electric charging points. However, the current setup of a NAP may not always be suitable.

Data collection for currently used NAPs have often come from public entities (e.g. road maintenance body). For some countries, the NAP for Alternative Charging Infrastructures is the first that requires data from private organizations. This requires a different legislative framework, and possibly a different setup of the NAP, depending on the country-specific situation. It is important to realize the interdependency between development of the NAP and fulfilling the requirements of data collection as prescribed in the Grant Agreement. Since legislative efforts are often very country-specific, it will be difficult to give detailed guidelines from this perspective.

5.5.4 Stakeholder input

Commercial operators who are asked to provide this info voluntarily, do not always agree with all data elements.

Examples of feedback that has been received thus far from market player (including possible answers/measures in *italic*):

- Static data is usually ok to send through, as this improves visibility for the charging stations
  OK
- Dynamic data is considered an asset that has value: EV drivers even pay money to Navigation Service Providers. Why should Operators share this data for free?
  Public charging infrastructure is often (partly) financed by public funds; part of this deal should be that the data are shared with a NAP, including dynamic data. In addition, some form of profit sharing could be introduced, allowing to reward operators for their contribution to a paid service towards EV drivers.
- Dynamic data (for DC) can lead to insights in company turnover that may be used by competitors to gain a strategic advantage, or used for financial gains such as insider trading.

A minimum update frequency could be defined (e.g. minimum every 30 minutes for DC charging, every 15 minutes for AC charging) to assure that the info offers little competitive advantage

- Assuring a certain quality level has a cost
  Part of acting as an operator in public charging should be to have some minimum quality standards. Even if this makes it difficult for smaller companies or new entrants to enter the market: the EV driver has a right to correct information.
- Assuring a refreshment frequency for dynamic data (e.g. near real-time availability) has a cost
  Current roaming practices already include these type of data transactions: it should therefore not be too difficult. Perhaps this can be introduced via a phased implementation planning.
- Who owns/runs the NAP: how will they use/exploit this data?
  This depends on the market model and financial model of the NAP and is difficult to summarize in a single answer: who builds it, maintains it etc? Transparency on the use of data should be given in any case
- What will third parties (NAP users) do with this data?
  This can be contractually agreed upon with NAP users
- How do we know that NAP users are keeping the data up-to-date?
  This can be contractually agreed upon with NAP users
- Semi-public charging stations (on private ground, but publicly available) may pose a privacy issue, as the dynamic occupancy data may reveal when the owner is not home.
  This is a risk for private home owners that offer their charging station for public use, and expected to be small in size. Overall, it will be privately owned businesses for which this will apply and this will be less of an issue.

The above feedback will no doubt be enriched with other examples, and can in general be dealt with in several ways:

- Laws & Regulation by national government, harmonized across countries
- Contractual arrangements between Operators, NAP-management, NAP-users
- Risk management and monitoring for those issues that are considered of minor impact but may increase over time when numbers increase

5.6 Hydrogen

A prerequisite for data collection at HRS, is to establish the status quo of the current data collection activities in this regard ('Ist') as described in the overall approach. Currently, data collection on hydrogen refuelling stations is already taking place in certain forms. An application by the company H2 MOBILITY Deutschland GmbH & Co. KG (hereinafter: H2 MOBILITY) called H2.LIVE that covers all the required data categories and most of Europe already is available to any end consumer with a smartphone, tablet or via web-browser. Furthermore, an HRS availability system that has received funding by the Fuel Cells and Hydrogen 2 Joint Undertaking (hereinafter: FCH-JU) is being rolled out across Europe. This concept offers a hardware (type A) as well as a software solution (type B). The hardware solution has been demonstrated to work in a trial phase. The system will offer an 'export' function and the data will be accessible by anyone free of charge. After the concept study, the availability system has entered its roll-out phase, which ended in October 2019. It is, however, uncertain for how long funding for the operation of this system will be secured in the future.

These guidelines shall establish common definitions of data categories and set some minimum criteria for the open standards and protocols to be used for data collection and transmission. It shall be possible for the member states to collect and distribute data in different manners as long as the minimum requirements, i.e. the provision of static and dynamic data through the NAPs of the Member States in the DATEX II format, are fulfilled.

In close cooperation with the stakeholders (notably HRS operators, the NAPs and the FCH-JU), the Consortium will determine the necessary steps to ensure the future operation of the system, i.e. to keep it attractive and at a low cost in order for station operators to have an interest in participating. This is all the more important as operating HRS will not return profits in the near future and discouraging the deployment of further stations has to be avoided. The most efficient and sustainable way data is transmitted between the different interested parties and made available to the public shall be elaborated by the consortium. In order to achieve the long-term sustainability of the system, a working business model for the operator of the system might have to be elaborated for the period after the funding runs out. Furthermore, changes to funding criteria, the national legal frameworks or recommendations for European legislation may be drafted as part of these guidelines.

5.6.1 Data (elements/structure/format)

In order for the whole consortium to speak the same language, the members agreed to define the exact meaning the categories for which data has to be collected mandatorily. Where possible, extant legal definitions of the *acquis communautaire* are used.

These definitions refer to hydrogen refuelling stations that are accessible to the public. Article 2 (7) of Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014 on the deployment of alternative fuels infrastructure states that ‘recharging or refuelling point accessible to the public’ means a recharging or refuelling point to supply an alternative fuel which provides Union-wide non-discriminatory access to users. Non-discriminatory access may include different terms of authentication, use and payment.

5.6.1.1 Location (GNSS coordinates/ street name)

Data on the location has to be collected in two different ways: as GNSS coordinates and street name. As streets may cover long distances, occur numerous times in the same city or in different cities, the consortium opts for indicating a house number, postal code, town and country in order to get an unambiguous address. Therefore, the following definitions apply:

‘GNSS coordinates’ means the geographical location of the driveway to a hydrogen refuelling point accessible to the public determined by a Global Navigation Satellite System (GNSS) consisting of a constellation of satellites and a global network of ground stations;

‘Street name’ means the address of a hydrogen refuelling point accessible to the public consisting of a street name and, if applicable, a house number, postal code, city, country and additional information

5.6.1.2 Opening hours

‘Opening hours’ means the period in which a hydrogen refuelling point is accessible to the public

5.6.1.3 Identification and payment methods

‘Identification and payment methods’ means the way with which users identify themselves and the methods with which they can pay for the gaseous hydrogen dispensed as fuel on board motor vehicles

5.6.1.4 Contact info for owner/operator

'Contact info for owner/operator' means a valid phone number at which the operator of a refuelling point dispensing gaseous hydrogen used as fuel on board motor vehicles can be contacted

5.6.1.5 Operational Status

'Operational status'[3] means a status signalling whether dispensing gaseous hydrogen used as fuel on board motor vehicles at a refuelling point is possible

The following minimum statuses shall be displayed:

– 'Available': dispensing gaseous hydrogen at the refuelling point is possible without restrictions
– 'Not available': dispensing gaseous hydrogen at the refuelling point is not possible
– 'Outside opening hours': dispensing gaseous hydrogen at the refuelling point is not possible as the refuelling point is currently not accessible to the public
– 'No information': there is no information available as to whether dispensing gaseous hydrogen at the refuelling point is possible without restrictions

The operational status of refuelling points dispensing gaseous hydrogen shall be refreshed every 300 seconds as a minimum. A time of 300 seconds is chosen as that is average time it takes to refuel a FCEV and malfunctions occur mostly as a result of wrong handling of the dispenser and associated hardware during the refuelling process. Operators of refuelling points dispensing gaseous hydrogen may choose different symbols in order to illustrate these statuses.

5.6.1.6 Additional information

'Additional information' means any information not covered in data categories a) to e)

Apart from the data categories that are to be collected mandatorily as part of IDACS, certain other categories could be useful to the end consumer. For example, other data categories could include:

- The amount of hydrogen left in the station (once progress to a mass market is made)
- Current prices for hydrogen in Euros per kg
- Share of green hydrogen (e.g. according to the CertifHy scheme)
- Images of the station
- Origin of funding
- Refuelling manuals (video training)
- Payment and billing information
- General information on hydrogen

The consortium opts not to make the display of such criteria mandatory as part of IDACS, especially as new data categories entail higher costs and maintenance efforts. However, the consortium may find value added in defining these categories at the end of deliverable 2.2.2. even as many of these will be relevant in a future mass market only.

[3] This category should not be mistaken with "availability" in the sense of real-time information on an occupational status, i.e. whether someone is refuelling their car there.

5.6.2 Technical conditions, incl. communication protocols

The first thing any member state wishing to collect data from the station operators in their country with their NAP needs to decide is whether the data should be collected from the single HRS or whether either one of the two European solutions described in more detail below. Central data collection will always be more efficient, however, one will be dependent on the system and its functioning.

Both use JSON as a format

As there are two types of data categories, it is advisable to establish two different types of data streams. Static data will not need to be refreshed as often and in intervals as short as dynamic data. The location, opening hours, identification and payment methods as well as the owner contact info are not expected to change on a regular basis. The static data can be uploaded to the HRS operator's servers or the server of the FCH-JU's HRS availability system or to H2.LIVE and be collected from there to the NAP.

The technically more challenging part of the data collection concerns the dynamic data collection, i.e. real-time signals on the operational status of the HRS. The hardware needed to collect such signals is made up of decentralised modules (Raspberry Pi Compute Modules, such as the *RevPi Core 3* by *Kunbus*) that are integrated in the HRS in both HRS Connect (H2.LIVE) and the FCH 2 JU's E-HRS-AS. These small industrial computers work as control devices that measure a voltage and identify binary dispenser availability signals (either available or unavailable). HRS Connect is integrated deeper into the station and collects a lot more data than mere availability. These signals are then transmitted via a LAN or Wi-Fi connection to a backend server, e.g. the HRS operator's own servers or the FCH-JU's availability platform. If there is no internet connection in place because the HRS is located in a remote area, separate routers can be installed. The availability signals can be overridden manually by a technician at site in order to set the availability state to the desired status. HRS operators should also have the possibility to this remotely via their servers. This is important as internet connections may fail and HRS operators need to be able to signal to FCEV drivers that they can refuel their vehicles if they know that that is possible.

There are two basic ways of providing the data to the NAPs. Either data is transferred from the single HRS or the HRS operators' backend servers to the NAP, or all data is centrally collected by one server, such as the FCH-JU's availability system or to H2.LIVE.

The advantage of collecting the data at the HRS operators directly is that one can assume that these have a long-term interest in keeping their data up-to-date for their customers. Furthermore, if an HRS operator already operates an own plant monitoring system and makes the data accessible to the public, it is not conceivable why they should finance an additional system, i.e. costs could be kept lower for HRS operators if the data is directly collected from their servers.

The central collection of all data would have the apparent advantage of fewer interfaces as not every single HRS or server system would need a single interface. However, currently it remains unclear whether or how much less effort this entails. It may well be the case that most HRS systems do not substantially differ from one another as they are programmed by the HRS manufacturer (as is the case for ITM Power's and Nel's stations) in a standardized way. In such a case, the major challenge would be to program interfaces so they can communicate with the single NAPs and meet their requirements, an effort that would also occur if data collection were to happen centrally. Furthermore, the disadvantage of such an approach would be that a central server would make the entire system reliant on that infrastructure. This is especially problematic if the funding and future operation of such a server is not secured. In the case of H2.LIVE there is a market actor in place who operates the system regardless of this PSA and its funding and has an interest to keep it up to date for his clients. The HRS availability system of the FCH 2 JU is considered 'procurement' implying that the FCH 2 JU are the owner of the system. According to the FCH 2 JU, this guarantees there will be no 'end of the project' and that it will be financed for a period of a minimum of five years. This is not to say that the FCH 2 JU will be directly financing the system, in particular as the existence and funding of the FCH 2 JU itself are dependent on the continuation of as a joint undertaking according to article 187 of the Treaty on the Functioning of the European Union[4]. The project consortium in charge of the FCH 2 JU's HRS availability system is in the process of finding economic possibilities to make it auto-sustainable for the future. This could also mean that other actors, such as the HRS operators or FCEV drivers will be asked to finance the system. This would lay additional costs on the HRS operators that might discourage the already costly deployment of HRS. More details with regards to the financing possibilities of such a system can be found in the section *3.6.3. Legislation, Regulation, Policy*.

If a member state chooses to use H2.LIVE or the FCH 2 JU's HRS availability system to collect static and dynamic data on HRS by their respective NAP, it has to make sure that the NAP can use the data format JavaScript Object Notation (JSON) and convert it to DATEX II or any other machine-readable format so NAP users can make use of it in their products.

A mix of both the direct data collection at either H2.LIVE, the FCH 2 JU's HRS availability system and individual HRS operators is also possible, where those HRS that are already connected to the FCH-JU's servers have their data transferred to the NAP managed from there and the other HRS, or those whose data is collected by an HRS operator's server like H2.LIVE are transferred from there. Such an approach would mitigate the risk of being reliant on one server infrastructure with a potentially uncertain existence, while still making use of some of the efficiency gains it represents.

H2.LIVE

Before the FCH-JU's E-HRS-AS was conceived, the German HRS operator H2MOBILITY launched its H2.LIVE application in 2017. The app is available at no cost to the public and arguably the most widely used tool for checking HRS availability by FCEV drivers in Europe. The user app, which shows a map with all the stations and their statuses is a by-product of *HRS Connect*, a system conceived to monitor the performance of the individual stations by H2MOBILITY. *HRS Connect* was established to learn about the stations and their operation when most stations were basically prototypes. *HRS Connect* and the data it provided was meant to help improve the station design. Therefore, a lot more data on all major parts of the station is collected than mere availability. The original source of data of *HRS Connect* and by extension H2.LIVE comes from the plant manufacturers. The latter collect detailed data on their stations as essential part of their maintenance services and to further develop their products. All major plant manufacturers, which are few, already have standardized availability APIs or are developing them. The availability APIs of the different plant manufacturers are integrated into the H2.LIVE app. Therefore, the way H2MOBILITY collects data from the stations differs from the type A hardware solution f the FCH-JU's E-HRS-AS (described below). In particular, when using the plant manufacturer API no additional costs for maintenance and support of its provision need to be considered as they should be part of the general service agreement.

[4] An Inception Impact Assessment on the European Partnership for Hydrogen under Horizon Europe has been launched on 30 July 2019: https://ec.europa.eu/info/law/better-regulation/initiatives/ares-2019-4972390_en

The map is also available on a browser at https://h2.live/en/h2 mobility. It can be integrated into other websites via a web-widget. On top of the application for end users, there is an operator app (H2.OPERATOR) with which operators can manually set the statuses of their HRS.

H2.LIVE already provides all the data required as part of IDACS. The operational status is updated every minute. Apart from the status 'available', there are indications if the station is 'outside of opening hours', 'currently out of order', 'maintenance scheduled' and 'no live information'. Furthermore, the following additional data categories are being made available through the app: future stations (i.e. status of planned stations and those under construction), images of the station, origin of funding, refuelling manual (video training), price for hydrogen (currently the fixed German prices are displayed; in the future, coverage will be extended to all European stations), payment and billing information, general information on hydrogen, hydrogen and electric mobility news, frequently asked questions and contact information of the operator.

Apart from HRS in Germany, the app also provides information on HRS in other countries like: Austria, Belgium, the Czech Republic, Denmark, France, Iceland, Italy, the Netherlands, Norway, Sweden, Switzerland and the United Kingdom. Data from these stations is collected in parts on the basis of bilateral contracts and agreements between the station operators from these countries and H2MOBILITY. Some operators from outside Germany, in particular Belgium and the Netherlands, also use the operator app of H2.LIVE to set their statuses manually. Another source of the data from other European stations is the FCH 2 JU's E-HRS-AS.

European HRS availability system (E-HRS-AS)

The FCH 2 JU has established Europe-wide system to report the real-time availability of HRS. In the second half of 2017, project phase 1 started with the development of the hardware and software solution as well as the proof of concept at existing stations. Phase 2 of the project ended in November 2019. The aim of this phase was the roll-out of the system at existing stations in Europe as well as finding a business model to ensure its continued existence. Currently, there are no plans for a third phase and there is uncertainty as regards the future financing of the system.

The proposed system includes a hardware-based solution (type A) and the option for HRS operators or manufacturers to send a signal of their refuelling stations from their servers to update the FCH-JU's web-based platform (type B). The import application programming interface (API) for type B HRS has been published in an open format on https://api.h2-map.eu/doc and allows integration of real-time signals from the operators' or manufacturers' existing monitoring systems. All information (dynamic and static site information) of the HRS availability system is publicly available and visualized on a map to be found at https://h2-map.eu. For third parties who would like to integrate the information in their own applications, an open format export function including all real-time and static information has been realized that can be publicly accessed for free. However, a token needs to be requested at ENDA. In order to protect the data sets from misuse, access restrictions have been put in place. Access can be facilitated via the authentication with an individual token in the moment of connection. The token can be requested at the project partner ENDA.

More information on the API are available here: https://h2-map.eu/api/v1/doc/

Technical specifications (OpenAPI 3 format) are available under this link: https://h2-map.eu/api/v1/doc/e-hrs-as-api-doc.yaml

The system consists of three parts:

a signal input unit (separate solutions for connecting the HRS via software interface or hardware transmitter)

a central software platform to collect and update real-time HRS availability (allowing for site-specific update of static information or planned maintenance activities) and processing information

a standardized, open-source based API to export signal and HRS site information to third party users (integrating the information in own web portals, apps and / or car navigation systems).

Real time signals are generated and collected using two types of signal input for HRS operators and suppliers to connect to the European system:

Type A HRS: Provide a hardware solution (Raspberry PI/Kunbus modules) to be installed on site (in a control cabinet) to collect and transfer data on availability. Signals are transferred via a local internet connection to the central HRS availability platform (WiFi or LAN). If no internet connection is available on site (e.g. stand-alone HRS sites) or if the internet connection is not able to be used by the HRS availability system (e.g. due to safety concerns from the HRS supplier) a separate router can be installed to connect the HRS transmitter unit to the software platform.

Type B HRS: Integrate signals provided by the HRS operator's plant monitoring via a standardized application programming interface (API). The standardized API ensures compatibility with the European HRS availability system and defines the type of signal and frequency of transmission. The large majority of stations shown in the map operate via standardized APIs.

An operators' access area provides an overview of all static information to be included in the API to be exported to the European HRS map and third parties (to be used in apps, navigation systems and or web portals).

At the end of the second project phase, existing HRS were connected to the system Denmark, France, Germany, the UK, Spain and Switzerland. The planned connection of some 150 stations in the space of 10 months was not achieved. In this period however, the FCH 2 JU financed the hardware, but not the personnel costs, which make up the larger part of the bill. Consequently, even though a lot of hardware was made available to station operators, it has not been integrated in many stations. Part of this phase of the implementation phase was to find a suitable business case. Potential business models for continuing to operate and expand the system rely on different potential revenue sources including HRS operators, vehicle OEMs, FCEV users, and various third parties (advertisers, mobile phone app developers, satellite navigation system providers, etc.). There has not been a decision on which business case to support the system and the financing of the system remains uncertain. The FCH 2 JU considers this system their property and plans on continuing its operation for 5 years. However, this depends on future funding and is therefore uncertain as well.

5.6.2.1 Estimated costs for HRS operators

Generally, the costs for the deploying one or the other solution is subject to large uncertainty as the costs are highly dependent on the different solutions. Other key variables that affect the costs are the labour costs in the different member states. Solutions differ in the way the hardware is installed. Certain suppliers of HRS equipment already have the equipment included as a standard and the HRS operator does not need to heed additional costs for the installation after the HRS has been built.

If the hardware needs to be retrofitted in existing stations the cost for that hardware does not exceed €250,00. However, the more substantial part of the costs is made up of the expenditures for the retrofitting the station and the associated labour. The proof-of-concept trial of the FCH-JU's HRS availability system estimates the cost of retrofitting existing stations to be around €1,380 per station. The costs of developing an application program interface (API) to send signals from the HRS sites to the HRS availability platform is estimated to be 300 € / HRS. However, it is granted that the cost will vary significantly depending on the HRS operator and the configuration at their HRS.

The costs for continually operating the FCH-JU's HRS availability system (data storage, software maintenance, cybersecurity and website maintenance) are dependent on the phase of the system's roll-out, i.e. number of HRS that participate in the system. In the initial phase (<200 HRS), the costs are estimated at €1,500 per HRS per year. Once a higher number of stations is connected, the costs per stations per year will decrease to €400.

5.6.2.2 Funding through the PSA

One of the purposes is to give guidance on how to use the budget of the PSA for this work package and its ends. It is currently uncertain how many stations will be equipped with hardware as funded by the FCH-JU even though this number is expected to be in the low two-digit range. Therefore, it may be possible to use the budget of the PSA where there is no funding provided by the FCH-JU. Annex II, PART B, II.19 of the grant agreement specifies that the 'Costs of purchase of equipment and other assets, provided that they are treated as capital expenditure' are eligible. This could cover the expenditures for the hardware.

Other expenditures comprise those that are needed to programme interfaces, so HRS operator's servers can communicate with the NAPs software solutions. Annex II, PART B, II.19 of the grant agreement specifies that the 'Costs entailed by service contracts' are eligible. Therefore, the expenditures for programming API's could be covered by the PSA budget.

On top of that, the basic requirements of eligibility have to be fulfilled:

- Necessary for the PSA implementation (be it goods, works or services)
- Identifiable and verifiable, i.e. recorded in the accounting
- Compliance with the requirements of applicable tax and social legislation
- Reasonable, justified, and comply with the principle of sound financial management

5.6.3 Legislation, regulation, policy

In most member states there is no automatic obligation laid on alternative fuels suppliers to supply the data on their stations. There are countries where fuel suppliers have been obligated to make the prices of the products, they sell available at certain intervals. However, these obligations often stem from antitrust cases and cannot be extended to the suppliers of alternative fuels in many cases.

Member states can of course establish an obligation to have the data delivered to the NAPs. Different ways of imposing such an obligation are conceivable:

Funding criterion

Hydrogen refuelling infrastructure will be in need of public funding for the foreseeable future as the number of FCEVs will remain small until at least 2025. Certain OEMs have proclaimed to launch small series of fuel cell electric passenger cars in the early 2020s but it is highly unlikely that a mass market will be reached until 2025. The roll-out of fuel cell electric heavy-duty vehicles will at best have only just commenced in 2025 and it is uncertain if a system as described here can be made use of at all as different refuelling infrastructure will become necessary.

When funding is granted it can be laid down in the calls that a connection to the NAP, or the FCH 2 JU's HRS availability system respectively, has to be established. The FCH 2 JU has already laid an obligation on all HRS operators that received European funding to connect their HRS to the availability system. Similarly, member states can lay down such obligations as funding criteria for all the subjects of their funding.

Regulation

Member states can propose legislation making the data collection and transmission to the NAP by the operators of HRS mandatory. Legal acts that may be suitable could be those used for transposing the ITS directive or those laying down technical specifications for gaseous hydrogen refuelling infrastructure (transposing article 5 point 2 and point 2 of Annex II to Directive 2014/94/EU).

5.6.4 Stakeholder input

Stakeholders share a general interest but as the infrastructure they operate is currently and in the short term not viable, it is difficult to bear the costs. Furthermore, HRS operators that already have their own system or an app, i.e. the final product, in place may not be willing to pay for yet another system at the European level.

It was in the remit of the project consortium of the FCH 2 JU's HRS availability system to find a sustainable source for funding their system beyond the current funding by the FCH 2 JU's budget. The project consortium identified several possible sources of funding. Some of these are described for the purposes of IDACS in more detail below.

HRS suppliers

As described some suppliers of HRS equipment have their own integrated solutions for monitoring the availability of the stations they sell. It is therefore conceivable that HRS suppliers could maintain such platforms and include in the price of the station.

It may however be difficult to hand down the running cost for such a system to the buyers of HRS equipment.

Public Funding

Public funding would ensure that the data is available to anyone and could therefore support the buy-in of consumers the most. Also, it would be in the public authorities remit to tackle market failure at an early stage where prices are high but revenues low.

However, public funding is not sustainable in the long term and budgetary uncertainty coupled with reliance on the system may lead to its premature demise. On top of that, HRS operators may forego the possibility of funding.

HRS operators

If the data is provided by the HRS operators it may also be accessible to anyone for free or be offered as a service for some cost. As it would be in the HRS operators' interest, it is probable that the data quality would be high.

Making HRS operators fund such a system will further reduce the profitability and attractiveness of deploying HRS, which might decrease the deployment.

Vehicle manufacturers

Vehicle manufacturers might be interested to offer this service to their customers in order to encourage them to buy FCEVs. The costs would not be borne by HRS operators, further discouraging HRS deployment.

This would, however, probably entail that the data is not accessible to everyone, especially beyond their customers. In addition, as they are not the operators of the station there may be issues regarding the data quality.

Third parties

It is conceivable that third parties offer such a service for a fee or by selling advertisement. The costs would not be borne by HRS operators, further discouraging HRS deployment.

Problematic might be that the data may not be accessible to everyone for free and as they are not the operators of the station there may be issues with regards to the data quality. Furthermore, coordination with vehicle manufacturers might be required.

FCEV owners

The costs would not be borne by HRS operators, further discouraging HRS deployment.

It may be difficult to incur the costs and the administrative burden of doing so would be large and growing with more FCEV owners. Further costs may actually reduce the buy-in into fuel cell electric cars. Moreover, the data will probably not be accessible to everyone if such a model were chosen.

5.7 Other fuels

Activity 2.1.3-2.1.6 Data collection for Other fuels is an optional part of PSA IDACS. Therefore, not all member states participate in activity 2.1.3-2.1.6. The term 'other fuels' is used for a combination of better fossil fuels and biofuels. The Grant Agreement mentions CNG, LNG, LPG and highly blended biofuels.

	CNG	LNG	LPG	Highly blended biofuels
Spain	X	X	X	Mostly E85 and B100
Belgium	X	X	X	-
Luxembourg	-	X	X	-
Poland	X	X	X	B100, bio CNG
Portugal	X	X	X	FAME, bioethanol
Croatia	X	X	X	-
Austria	X	-	X	-
Germany	X	X	X	bio CNG, E85
Lithuania	-	-	X	E85
Greece	X	X	X	Biodiesel
Netherlands	X	X	X	HVO, B100, E85, bio LNG/CNG
Czech Republic	X	X	X	Mostly E85 and B100
Slovenia	X	X	X	-
France	X	X	X	-
Hungary	X	X	X	Bio CNG

Figure 6: Fuel availability per country

Figure 6 shows the fuel availability per country. CNG and LNG are available in almost all participating countries. LPG is available in all countries. In the Alternative Fuel Infrastructure Directive (AFID) it is mentioned as a 'better fossil fuel, but the AFID contains no directions for infrastructure. It will probably be deleted from the next version. The availability of highly blended biofuels differs hugely per country. E85 and B100 are the most common biofuels. Participating member states therefore agreed to focus on CNG and LNG, and to leave the decision to include LPG and highly blended biofuels up to each participating country.

5.7.1 Data categories

In the Grant Agreement, for Other fuels only the exchange of static data is mentioned. There is no focus on dynamic data (e.g. operational status or fuel availability), because of technical difficulties with sharing these data and because fuel availability is not a problem for other fuels.

To achieve the project goal, it is important that there is harmonisation between the data categories that are exchanged for electricity, hydrogen and other fuels. Therefore, the list of static data categories for electricity was used as a base for the data categories for other fuels. All participating countries agreed on sharing the data categories in figure 7. Countries are allowed to add extra data categories, but at this moment none of the participants has plans to add dynamic data.

Static Data	**description**
Fuel type	Type of fuel, when applicable percentage of bio component
Fuel Station Latitude	Latitude on the exact location of the station. Should be in WGS84 decimal standard.
Fuel Station Longitude	Longitude on the exact location of the station. Should be in WGS84 decimal standard.

Fuel station address	Street Name where the station I is located. If available, as not all locations have Street Names.
Postal Code + Addition (if used)	Postal Code where the fuel station is located. This should be the main Postal Code + addition (if used) and can include alpha/digit characters.
City/Location	The City/Town/Location where the fuel station is located.
Country	Country where the fuel station is located. This should be the ISO 3166-1 Alpha-2 Country Codes.
Opening Time	The time periods when a fuel station is open to the public. This could indicate the availability of a public charging station, but also indicate the times or days that a private station becomes a public station. This is a complex type of data as it will include several different components to define the times when the fuel station can be used.
Timezone	Time zone where the fuel station resides. This is used to make sure that the availability is shown correctly and also to make reservation possible in the future.
Payment and identification methods	available identification and payment methods described as a list

Table 3: Agreed static data categories for Other Fuels

5.7.2 Technical conditions, incl. communication protocols

The Grant Agreement states that data should be written in DATEX II or any compatible / machine readable data format. It seems not to make sense to add any other very specific data quality requirements here (e.g. percentages of completeness or correctness), for it is difficult to check if the requirements are achieved.

All participating member states have agreed that the data should meet the following quality requirements:

- The data are compatible to DATEX II (consistency)
- The data are complete
- The data are correct

Consistency
Defines if data are delivered in the data set as is defined in the IDACS format and is compatible with DATEXII format. Authorities will make sure that all content is delivered according to the IDACS format. For other fuels further research is needed on which data format is generally used. The preferred solution is to build a converter that translates the data into DATEXII. If the format that is used by operators is compatible with DATEXII, a more straightforward and low cost solution would be to share the data in the original format. The end user of the data can translate the data if desired.

Completeness
The amount of mandatory and optional data that is available in the data at the NAP. Authorities will make sure that all mandatory fields shall have a valid value available and that optional values are added where possible. For instance, it won't be admissible to include a fuel station without 'Opening Time' or 'Latitude' data, in NAP. 'Complete', means that all static data fields must be filled in for every station.

Correctness
Defines whether the data values are the correct value. In order for data to be correct, the data value must be the right value and must be represented in a consistent and unambiguous form.

Further specifications of quality requirements and how to monitor the data quality, still have to be developed. In this process, we will search for harmonization with the data quality format for electric charging points, as far as that is applicable to other fuels.

5.7.3 Legislation, regulation, policy

Legislation on the obligation of data exchange for other fuels is not in place in all participating countries. In some countries, this legislation will be developed in the next years, in other countries legislation only covers data exchange for charging points and/or hydrogen stations.

Where no legislation is in place, PSA IDACS can function as a driving force to establish data exchange for other fuels. In this case, the cooperation of stakeholders is necessary and stakeholders should be involved in an early stage.

5.7.4 Stakeholder input

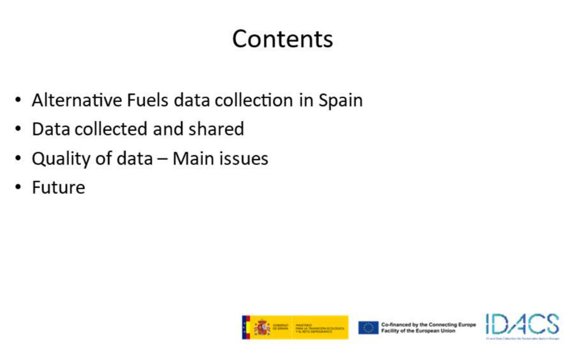
- It is not of great value to add dynamic data elements for CNG, because problems with fuel availability do never occur and station are quite common.
- The exchange of dynamic data elements is technically difficult and should therefore not to be taken into account in this project.

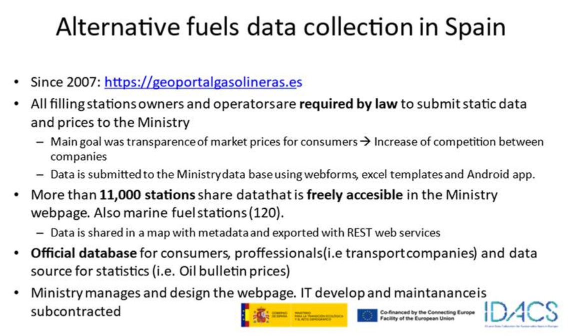
5.7.5 Example of good practice

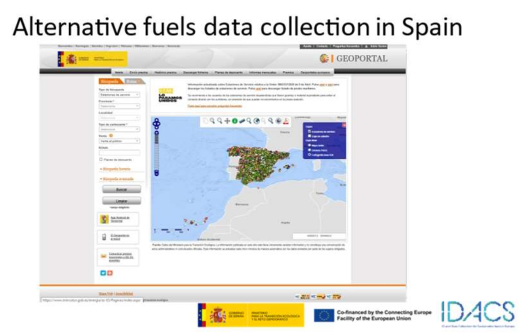
This section contains a summary of the presentation of Spain, given during one of the meetings on other fuels.

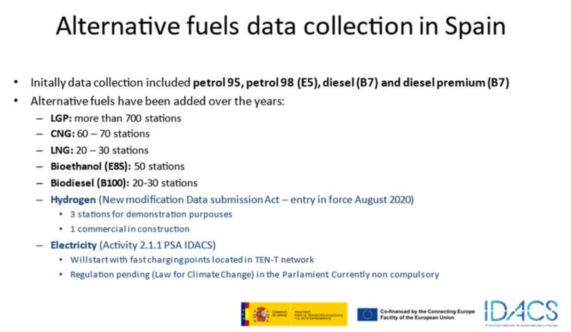
5.7.5.1 Spain

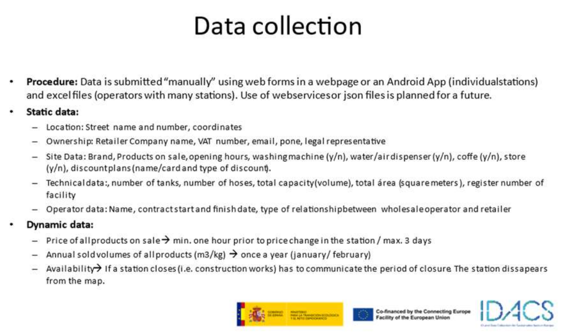
Ever since 2007, Spain collects data of alternative fuels at https://geoportalgasolineras.es. This data is freely accessible and over the years (new) alternative fuels have been added. All filling stations owners and operators are required by law to submit static data and prices to the Ministry. The main goal of this legislation was transparency of market prices for consumers and thus increase the competition between companies. The data is shared in a map with meta data and it is possible to export the data for statistics. The data is submitted manually by the filling station owners and operators by means of web forms and excel files. For the future, it is planned to include this webpage with alternative fuel data into the Spanish National Access Point. For more details check figure 8 below.

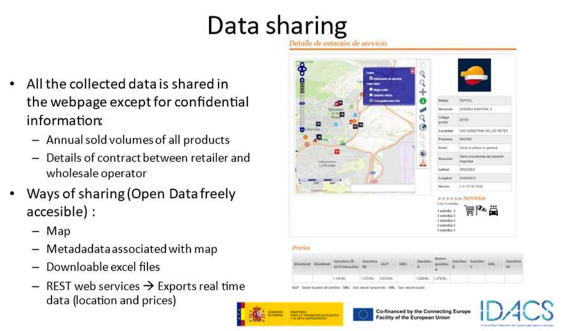


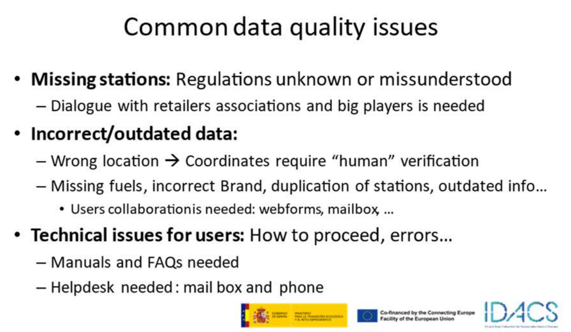












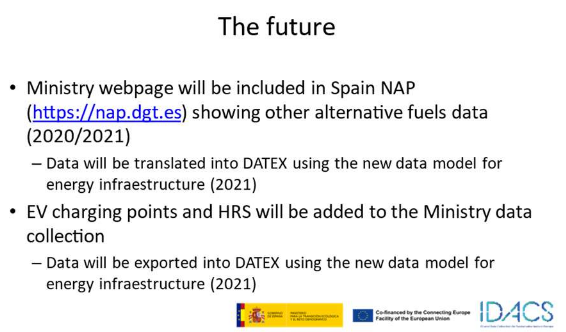


Figure 8: Spain – Best Practice

Annex I: Practical guide HRS Data Collection

CONTACT THE HRS OPERATOR(S) IN YOUR COUNTRY: Ask them whether they are already collecting data for the given categories.

IF YES: Ascertain whether the HRS operators in your country have established an own plant monitoring system, use the system of an HRS manufacturer, or if they are connected to the FCH 2 JU's HRS availability system or the H2.LIVE system.

IF NOT: Find out whether they are in favour of participating in the FCH 2 JU's HRS availability system, H2.LIVE or if they prefer to set up an own plant monitoring system (usually if they operate a larger number of stations).

IF A), THEY ARE INTERESTED IN PARTICIPATING IN THE FCH 2 JU'S HRS AVAILABILITY SYSTEM: Liaise them with nadine.hoelzinger@spilett.com in order to take part in the FCH 2 JU's HRS availability system (until end of October 2019, the hardware will be funded by the FCH 2 JU).

IF B), THEY ARE INTERESTED IN CONNECTING TO H2.LIVE: : Liaise them with n.schroeder@portrix.net in order to take part in the H2 MOBILITY's H2.LIVE

IF C), THEY ARE INTERESTED IN SETTING UP THEIR OWN PLANT MONITORING SYSTEM: Make sure there is an API programmed that makes a connection to the NAP or to the FCH 2 JU's availability system possible. Programming such an API could be financed by the grant received under this PSA.

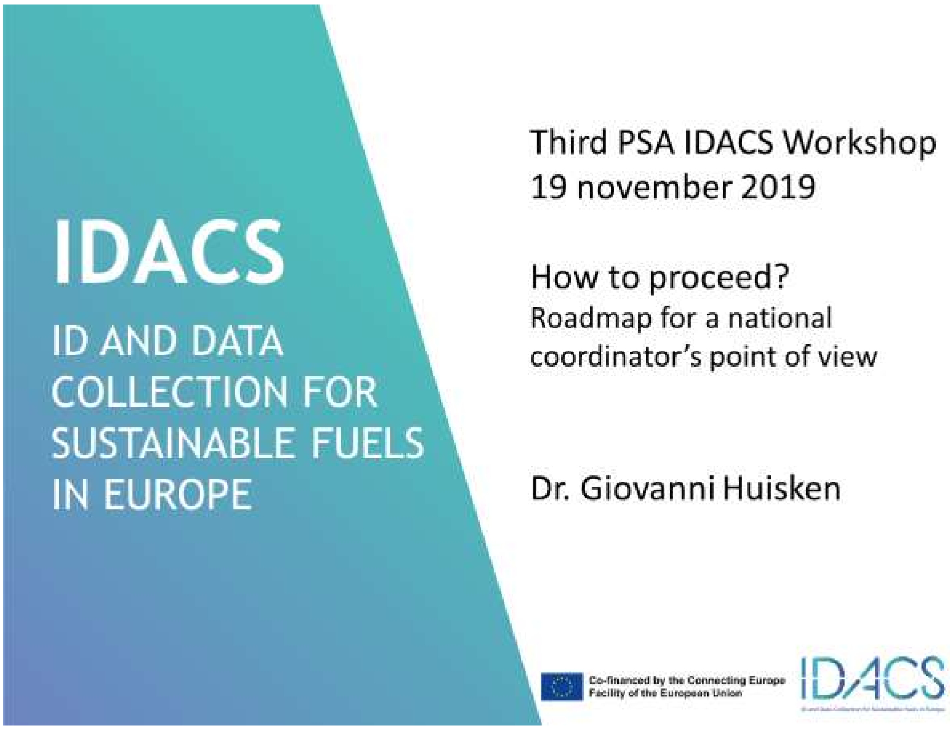
IF D) THEY ARE NOT INTERESTED IN SETTING UP THEIR OWN PLANT MONITORING SYSTEM: Evaluate other suitable alternative options for data collection (e.g. using webforms) that meet the requirement for the PSA (data available in NAP in DATEX format).

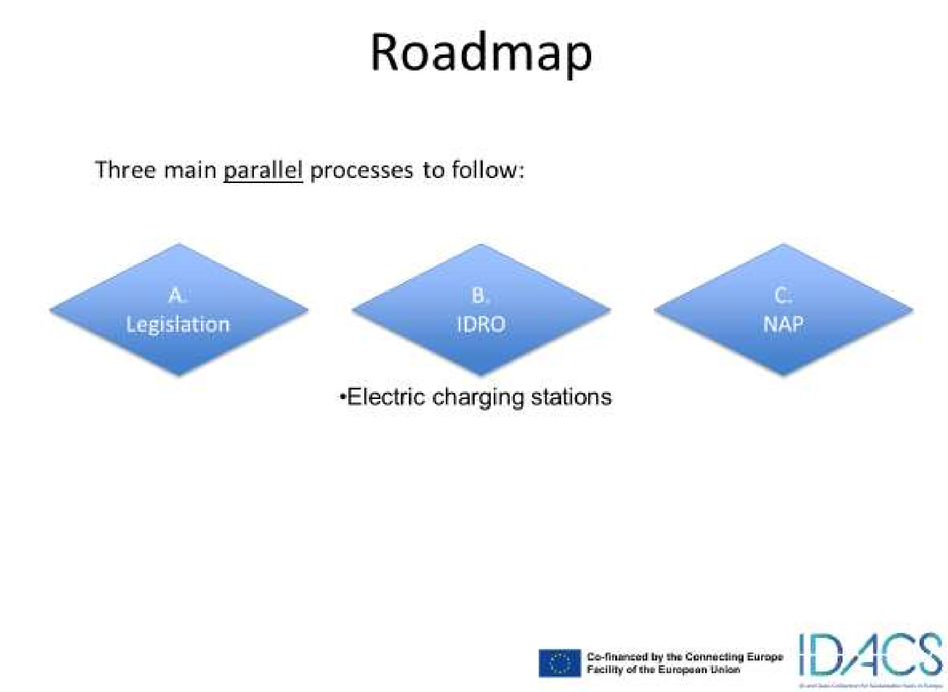
ONCE DATA COLLECTION IS UNDERWAY, CONNECT THE DATA WITH THE NAP: choose whether you want to collect the data directly from the HRS operator's servers, or whether you want to collect the data from H2.LIVE or the FCH 2 JU's HRS availability system

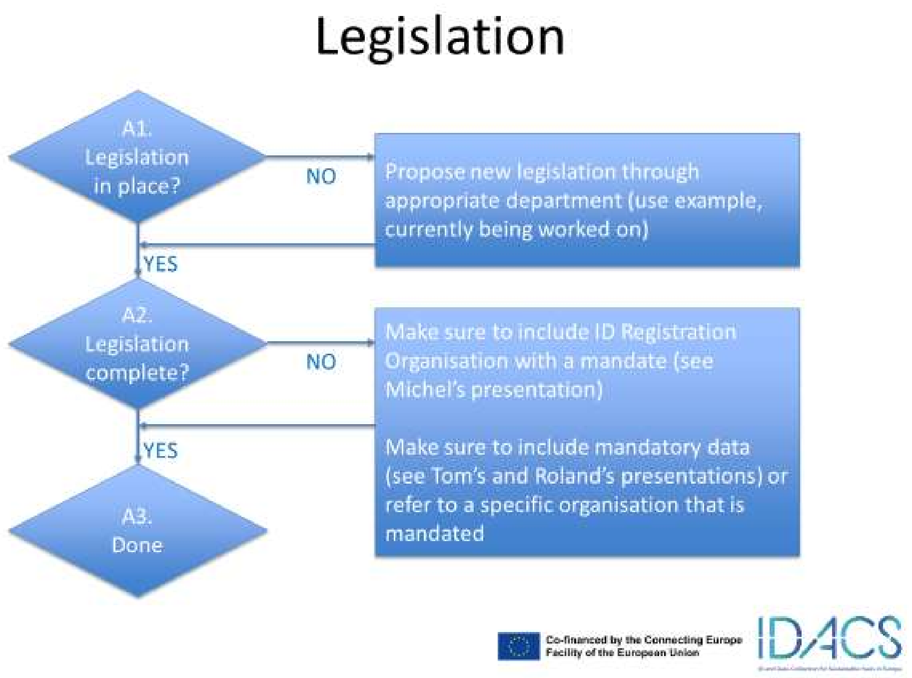
HRS OPERATOR – NAP: check with your NAP and the HRS operator whether the data can be used and what interfaces are needed. Possibly, fund the interface programming with the grant.

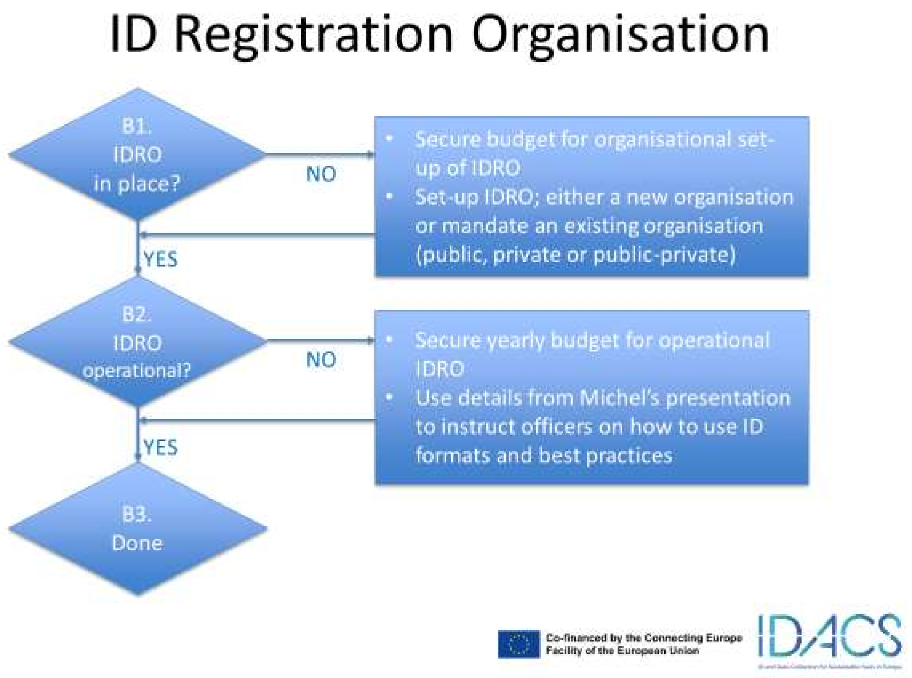
FCH 2 JU'S HRS AVAILABILITY SYTEM – NAP: check with your NAP whether JSON is supported and whether the data can be converted into DATEX II. Possibly, fund the interface programming with the grant.

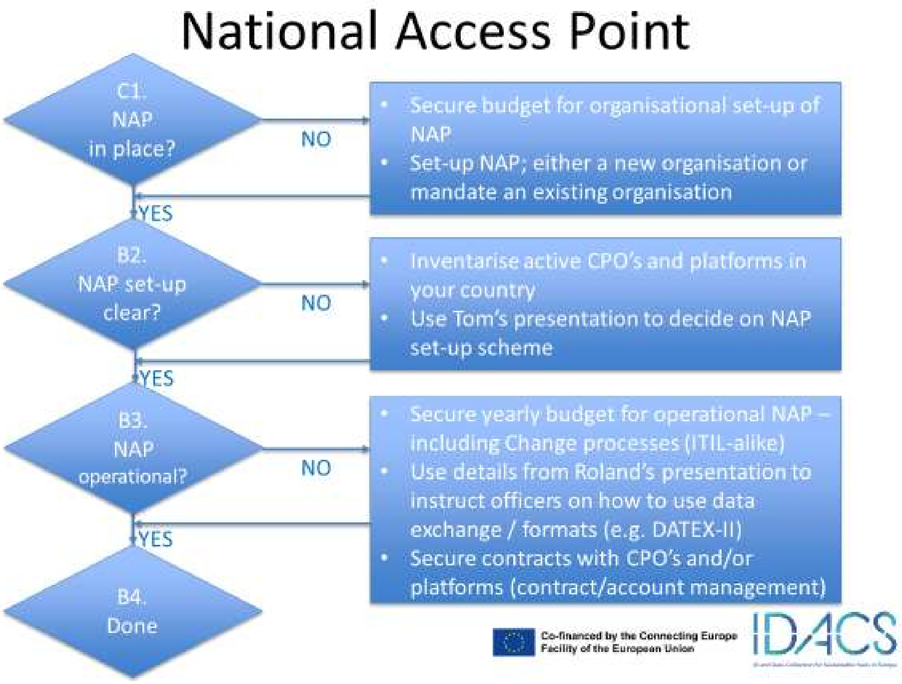
Annex 2: Roadmap for national implementation plan






Legislation
A1.
Legislation
in place?
NO
Propose new legislation through appropriate department (use example, currently being worked on)
YES
A2.
Legislation
complete?
NO
Make sure to include ID Registration Organisation with a mandate (see Michel's presentation)
Make sure to include mandatory data (see Tom's and Roland's presentations) or refer to a specific organisation that is mandated
YES
A3.
Done
Co-financed by the Connecting Europe Facility of the European Union
IDACS


ID Registration Organisation
B1.
IDRO
in place?
NO
• Secure budget for organisational set-up of IDRO
• Set-up IDRO; either a new organisation or mandate an existing organisation (public, private or public-private)
YES
B2.
IDRO
operational?
NO
• Secure yearly budget for operational IDRO
• Use details from Michel's presentation to instruct officers on how to use ID formats and best practices
YES
B3.
Done
Co-financed by the Connecting Europe Facility of the European Union
IDACS


National Access Point
C1.
NAP
in place?
NO
YES
• Secure budget for organisational set-up of NAP
• Set-up NAP; either a new organisation or mandate an existing organisation
B2.
NAP set-up
clear?
NO
YES
• Inventarise active CPO's and platforms in your country
• Use Tom's presentation to decide on NAP set-up scheme
B3.
NAP
operational?
NO
YES
• Secure yearly budget for operational NAP – including Change processes (ITIL-alike)
• Use details from Roland's presentation to instruct officers on how to use data exchange / formats (e.g. DATEX-II)
• Secure contracts with CPO's and/or platforms (contract/account management)
B4.
Done
Co-financed by the Connecting Europe Facility of the European Union
IDACS

Annex 3: Example legislation Poland in English

Act on electromobility and alternative fuels[1) 2)]

of 11 January 2018 (Journal of Laws of 2018, item 317)

Chapter 1. General Regulations

Art. 1. [Scope] The Act sets out:

1) rules for the development and operation of infrastructure for the use of alternative fuels in transport, hereinafter referred to as "alternative fuels infrastructure", including technical requirements to be met by this infrastructure;
2) duties of public entities in the field of alternative fuels infrastructure development;
3) information obligations regarding alternative fuels;
4) operating conditions of clean transport zones;
5) National framework for the development policy of alternative fuels infrastructure and the manner of their implementation.

Art. 2. [Explanation of statutory terms] The terms used in the law mean:

1) zero-emission bus - a bus within the meaning of art. 2 point 41 of the Act of 20 June 1997 - Road Traffic Law (Journal of Laws of 2017, items 1260 and 1926, as of 2018, items 79, 106, 138 and 317) which uses electricity generated from hydrogen in the fuel cells installed in it to drive or only an engine the work cycle of which does not lead to the emission of greenhouse gases or other substances covered by the greenhouse gas emission management system, referred to in the Act of 17 July 2009 on the gas emission management system of greenhouse gases and other substances (OJ of 2017, items 286, 1566 and 1999), and a trolleybus within the meaning of 2 point 83 of the Act of 20 June 1997 - Road Traffic Law;
2) bunkering with liquefied natural gas (LNG) - filling tanks of vessels with liquefied natural gas (LNG) to propel the units;
3) public transport infrastructure - hydrogen charging or refuelling points with the accompanying infrastructure necessary for operation, intended for charging or refuelling, in particular zero-emission buses used in public transport;
4) [3)] vessel - a ship within the meaning of art. 5 par. 1 point 1 of the Act of 21 December 2000 on inland navigation (Journal of Laws of 2017 item 2128 and 2018 item 1137) and a ship in the meaning of art. 2 § 1 of the Act of 18 September 2001 - the Maritime Code (Journal of Laws of 2016, item 66 and of 2018, items 650 and 1137);
5) [4)] charging - electricity consumption by:
a) an electric vehicle, hybrid vehicle, zero-emission bus,
b) a motor vehicle, moped, bicycle or bicycle cart not being an electric vehicle within the meaning of the Act of 20 June 1997 - Road Traffic Law
- for the purpose of driving the vehicle;
6) [5)] public charging station - a charging station available on the basis of equal treatment for each holder of an electric vehicle and a hybrid vehicle;
7) operator of a public charging station - an entity responsible for the construction, management, operational safety, operation, maintenance and repair of a generally accessible charging station;
8) natural gas station operator - an entity providing a natural gas refuelling service in the form of compressed natural gas (CNG) or liquefied natural gas (LNG), including those generated from biomethane;
9) operator of an electricity distribution system - a distribution system operator within the meaning of art. 3 point 25 of the Act of April 10, 1997 - Energy Law (Journal of Laws of 2017, item 220, as amended[6)]), dealing in the distribution of electricity;
10) operator of a gas distribution system - a distribution system operator within the meaning of art. 3 point 25 of the Act of April 10, 1997 - Energy Law, dealing in the distribution of gas fuels;
11) alternative fuels - fuels or electricity used to drive engines of motor vehicles or vessels that are a substitute for fuels generated from crude oil or obtained in the processing of it, in particular electricity, hydrogen, liquid biofuels, synthetic and paraffin fuels, compressed natural gas (CNG), including biomethane generated from liquefied natural gas (LNG), including those generated from biomethane, or liquid gas (LPG);
12) electric vehicle - a motor vehicle within the meaning of art. 2 point 33 of the Act of 20 June 1997 - Road Traffic Law which uses only electricity accumulated by connection to an external power source;

13) hybrid vehicle - a motor vehicle within the meaning of art. 2 point 33 of the Act of 20 June 1997 - Road Traffic Law, with an electric-diesel drive, in which electricity is accumulated by connection to an external power source;
14) natural gas-powered vehicle - a motor vehicle within the meaning of art. 2 point 33 of the Act of 20 June 1997 - Road Traffic Law, using compressed natural gas (CNG) or liquefied natural gas (LNG), including those generated from biomethane;
15) hydrogen-powered vehicle - a motor vehicle within the meaning of art. 2 point 33 of the Act of 20 June 1997 - Road Traffic Law, using electricity generated from hydrogen in the fuel cells installed in it for the drive;
16) liquefied natural gas (LNG) bunker point - a set of devices together with construction facilities or a watercraft used for supplying vessles with liquefied natural gas (LNG), including that generated from biomethane;

17) charging point - a device enabling the charging of a single electric vehicle, a hybrid vehicle and a zero-emission bus, and a place where a battery for the drive of the vehicle is replaced or charged;
18) normal-duty charging point - a charging point with a power less than or equal to 22 kW, excluding devices with a power less than or equal to 3.7 kW installed in places other than generally accessible charging stations, in particular in residential buildings;
19) high-power charging point - a charging point with a power greater than 22 kW;
20) compressed natural gas refuelling point (CNG) - a set of devices for supplying vehicles with compressed natural gas (CNG), including that generated from biomethane, to drive the engines of the vehicles;
21) liquefied natural gas refuelling point (LNG) - a set of devices for supplying vehicles with liquefied natural gas (LNG), including that generated from biomethane, to drive the engines of the vehicles;
22) shore-side point of supply of electric units - a set of devices used to supply electricity to vessels during a stay in a port, when auxiliary engines of the units are turned off;
23) TEN-T core network - the basic trans-European transport network referred to in Regulation (EU) No. 1315/2013 of the European Parliament and of the Council of 11 December 2013 on EU guidelines for the development of the trans-European transport network and repealing Decision No. 661/2010/EU (Official Journal UE L 348 of 20/12/2013, page 1, as amended [7]);
24) liquefied natural gas (LNG) - liquefied natural gas within the meaning of art. 2 par. 1 point 7a of the Act of August 25, 2006 on the Fuel Quality Monitoring and Control System (Journal of Laws of 2016, item 1928 and 1948, as of 2017, item 624 and item 2290);
25) compressed natural gas (CNG) - compressed natural gas within the meaning of art. 2 par. 1 point 7 of the Act of August 25, 2006 on the fuel quality monitoring and control system;
26) natural gas station - a set of devices, including a compressed natural gas (CNG) refuelling point or a liquefied natural gas (LNG) refuelling point, connected to a gas distribution network or terminal intended for importing, unloading and regasifying liquefied natural gas (LNG) together with auxiliary installations and storage tanks used in the regasification process;
27) [8] charging station:
(a) a construction device, including a normal-capacity charging point or a high-capacity charging point, associated with a construction facility, or
b) a detached building with at least one normal-capacity charging point or a high-capacity charging point installed
- equipped with software enabling the provision of charging services, including a parking stand and, if the charging station is connected to the distribution network within the meaning of the Act of April 10, 1997 - Energy Law, an installation from the charging point to the power connection;
28) natural gas refuelling - filling tanks of motor vehicles with compressed natural gas (CNG) or liquefied natural gas (LNG), including those generated from biomethane, used to drive the vehicles.

Chapter 2. Principles of the development and functioning of alternative fuels infrastructure

Art. 3. [Operator's and supplier's obligations] 1. Operator of a public charging station:
1) ensures that:
(a) at least one charging service provider operates at a public charging station,
b) a public charging station fulfils the technical requirements referred to in art. 13 and the regulations issued on the basis of art. 17;
2) ensures that the Office of Technical Inspection, hereinafter referred to as "UDT", conducts tests of the public charging station;
3) ensures safe operation of the public charging station;
4) [9] equips:
a) a public charging station with software enabling:
- connecting and charging an electric vehicle and a hybrid vehicle,
- transferring data to the Register of Alternative Fuels Infrastructure about the availability of a charging point and the price for the charging service,
b) each charging point installed in a public charging station that it manages, with a measuring system allowing the measurement of electricity consumption and the transfer of measurement data from that system to the charging station management system in near real time;
5) [10] concludes an agreement for the provision of electricity distribution services, referred to in art. 5 par. 2 point 2 of the Act of April 10, 1997 - Energy Law, for the purposes of the charging station operation and provision of charging services - if the charging station is connected to the distribution network within the meaning of the Act of 10 April 1997 - Energy Law
6) transfers data on the amount of electricity used separately for the provision of charging services and for the charging station to the electricity distribution system operator, charging service provider and the electricity seller who concluded a contract for the sale of electricity with a charging service provider running business at this station;
7) concludes an agreement for the sale of electricity for the purposes of the charging station operation;
8) accounts for electricity losses resulting from the charging station operation;
9) provides information on the rules of using the station at the public charging station along with instructions on the operation of it;
10) [11] provides charge service providers with access to a public charging station on an equal treatment basis;

11) agrees the number of parking stands available at public stations with the traffic management authority in the cases referred to in art. 12b par. 1 of the Act of 21 March 1985 on public roads (Journal of Laws of 2017, item 2222 and of 2018, items 12, 138, 159 and 317).

2. Provider of the charging service:

1) concludes an electricity sales agreement with the electricity seller, referred to in art. 5 par. 2 point 1 of the Act of April 10, 1997 - Energy Law;

2) provides a charging service including charging and providing the possibility of using charging station infrastructure for charging purposes;

3) provides, on its website, information on the price of the charging service and the terms of its provision.

Art. 4. [Agreement with a public charging station operator] The supplier of the charging service uses the public charging station on the basis of an agreement concluded with a public charging station operator.

Art. 5. [Operator's liability for damages] The operator of a public charging station is liable for damages incurred due to a failure to comply with the technical requirements specified in art. 13 and in the regulations issued on the basis of art. 17, or as a result of a failure to perform the duties referred to in art. 3 par. 1 points 3 and 9, under the terms specified in art. 435 of the Act of 23 April 1964 - Civil Code (Journal of Laws of 2017, items 459, 933 and 1132).

Art. 6. [Performing tasks of a charging service provider] The public charging station operator can perform the tasks of a charging service provider.

Art. 7. [Unconditional provision of the charging service] The charging service provider may not make the provision of the charging service dependent on the prior conclusion by the user of an electric vehicle or hybrid vehicle of an agreement in writing, in paper or electronic form.

Art. 8. [Testing the correctness of energy use] The operator of a public charging station ensures that the electricity supplied to the public charging station is used only for the purpose of:

1) charging;

2) charging or replacing a battery used to drive an electric vehicle, a hybrid vehicle, a zero-emission bus or a motor vehicle within the meaning of art. 2 point 32 of the Act of 20 June 1997 - Road Traffic Law, not being an electric vehicle;

3) ensuring the operation of this station.

Art. 9. [Information on the change of electricity supplier] 1. The charging service provider shall indicate to a public charging station operator the electricity seller with whom he concluded the electricity sales agreement, at the latest on the day the charging services are started, and inform the public charging station operator of any change to the seller.

2. The operator of a public charging station forwards to the operator of the electricity distribution system information on the change by the supplier of charging services to the electricity supplier, within 7 days from the date of receipt of this information.

3. The provision of art. 4j of the Act of April 10, 1997 - Energy Law shall apply accordingly.

Art. 10. [Methods of energy settlements] 1. If a metering and settlement system is installed in an electric vehicle or a hybrid vehicle, which enables communication with the ICT system of a public charging station and information on the conditions under which the user of this vehicle purchases electricity on the basis of an electricity sales agreement concluded by him, referred to in art. 5 par. 2 point 1 of the Act of 10 April 1997 - Energy Law, the charging service provider provides the user of the vehicle with the option of paying for the electricity charged for charging the vehicle under the conditions specified in this sales agreement.

2. If a metering and settlement system is installed in an electric vehicle or a hybrid vehicle, which enables communication with the metering and settlement system used to measure the electric energy of the vehicle collected by the user in a single-family residential building or a dwelling located in a multi-family residential building, to which he has the title legal, the electricity seller takes into account the electricity consumed during charging in the invoice for the user's electricity.

Art. 11. [Public purpose within the meaning of the Real Estate Management Act] Construction and maintenance of public transport infrastructure for road transport and projects necessary to connect the charging points that are part of this infrastructure to the network, in particular for the modernization, expansion or construction of the network, constitute a public purpose within the meaning of the Act of 21 August 1997 on real estate management (Journal of Laws of 2018, items 121 and 50).

Art. 12. [Connection capacity] 1. Public utility buildings and multi-family residential buildings located in the municipalities referred to in art. 60 par. 1, and related internal and external parking spaces, are designed and built, providing connection capacity allowing to equip the stations with charging points with a power of not less than 3.7 kW.

2. [12)] The minister responsible for energy issues shall determine, by way of a regulation, the manner of determining the connection capacity referred to in par. 1, guided by the need to gradually increase the number of charging points and network construction of the points allowing the use of electric vehicles and hybrid vehicles.

Art. 13. [Technical and operational requirements] [13)] Charging stations, charging points being part of the public transport road charging infrastructure and shore-side power supply points for electric units meet the technical and operational requirements specified in particular in Polish Standards, ensuring their safe use, including fire safety, safe operation of power grids and access to charging stations for the disabled.

Art. 14. [Operation in accordance with the purpose and documentation] 1. Operation of a charging station, a charging point being an element of the public transport road charging infrastructure and the shore-side point of supplying electric units is carried out in accordance with their intended use and when their technical condition ensure the safe use of them.

2. Charging stations, charging points constituting an element of public transport road charging infrastructure and shore-side power supply points for electric units have documents specifying their construction, technical and operational properties.

Art. 15. [Opinion on the compliance of technical documentation of a designed station with technical requirements] 1. Before starting the construction of a charging station, it is possible to request the President of the Office of Technical Inspection, hereinafter the "UDT President", for an opinion on the compliance of the technical documentation of the planned station with the technical requirements specified in art. 13 and in the regulations issued on the basis of art. 17.

2. The UDT President issues the opinion referred to in par. 1 within 30 days from the date of submitting the application.

3. The issuance of the opinion referred to in par. 1 is subject to a fee, which is the income of UDT.

Art. 16. [Technical examination of stations and charging points] 1. Charging stations and charging points being part of the public transport road charging infrastructure are subject to technical tests carried out by UDT in terms of their safe operation, repair and modernization.

2. The test referred to in par. 1 shall be carried out:

1) before putting the charging station or the infrastructure for loading public transport by road;

2) each time in the case of a repair or modernization of such a station or infrastructure, including the increase in the number of charging points, or changing the place of installation, a charging point at the station or infrastructure.

3. The test referred to in par. 1 shall be carried out accordingly at the request of a public charging station operator or entity operating the charging station other than the public charging station or public transport infrastructure.

4. The UDT President issues a decision to suspend the operation of a charging point installed at a charging station or a charging station, or a charging point constituting an element of a public transport road charging infrastructure, if determined a failure of the charging point installed at a charging station or a charging station, or a charging point being part of the public transport road charging infrastructure tomeet the technical requirements specified in art. 13 or in the regulations issued on the basis of art. 17.on the basis of the test results referred to in par. 1.

5. Carrying out the tests referred to in par. 1 is subject to a fee, which is the income of UDT.

Art. 17. [Statutory authorization] 1. The minister responsible for energy will determine by regulation:

1) detailed technical requirements, other than in the field of the replacement of batteries used to drive vehicles:

a) regarding the operational safety, repair and modernization of charging stations,

b) regarding the safety of operation, repair and modernization of charging points that are part of the public transport infrastructure of road transport,

c) what must be fulfilled by the public charging stations and charging points being part of the public transport infrastructure in the scope related to outlet sockets or vehicle connections,

2) the types of tests concerning charging stations and charging points that are part of the public transport infrastructure of road transport, and the method and dates of such tests carried out by UDT,

3) documents attached to the request for testing,

4) the amount of the fee referred to in art. 15 par. 3 and art. 16 par. 5

- taking into account the need to ensure uniformity of technical solutions, user safety, access for people with disabilities, the scope of the examination carried out by UDT and the type of the subject of the tests.

2. The minister responsible for energy matters may determine by regulation:

1) detailed technical requirements regarding the safety of operation, repair and modernization of charging points for the replacement of batteries used for electric vehicles or hybrid vehicles,

2) the manner and dates of conducting tests of the charging points referred to in point 1 by UDT,

3) documents attached to the request for testing,

4) the amount of the fee referred to in par. 5

- taking into account the need to ensure uniformity of technical solutions, safety during the exchange and storage of batteries for vehicle propulsion, the scope of the test carried out by UDT and the type of the subject of the test.

Art. 18. [Testing shore-side power supply points of electric units] 1. Shore-side supply points for electric units, in terms of their safe operation, repair and modernization, are subject to technical tests carried out by Transport Technical Supervision, hereinafter referred to as "TDT".

2. The test referred to in par. 1 shall be carried out before putting a shore-side point of supply for electric units into operation and each time in the case of any repair or modernization of such a point.

3. The test referred to in par. 1 shall be carried out at the request of the entity operating the shore-side point of supply for electric units.

4. The Director of Transport Technical Supervision, hereinafter referred to as the "TDT Director", issues a decision to suspend the operation of a shore-side power supply point for electric units in case it determines, based on the results of the tests referred to in par 1, non-fulfilment of the technical requirements specified in art. 13 or in the regulations issued on the basis of art. 19.

5. Carrying out the tests referred to in par. 1 is subject to a fee, which is the income of TDT.

Art. 18a. [TDT Director's opinion on the compliance of technical documentation] [14)] 1. Before starting the operations of a shore-side power point for electric units, you may apply to the TDT Director for an opinion on the compliance of the technical documentation of the shore-side point designed to supply electric units with the technical requirements set out in Art. 13 and in the regulations issued on the basis of art. 19.

2. The TDT President issues the opinion referred to in par. 1 within 30 days from the date of submitting the application.

3. The issuance of the opinion referred to in par. 1 is subject to a fee, which is the income of TDT.

Art. 19. [Statutory authorization] The minister competent for energy, in agreement with the minister competent for maritime economy and the minister competent for inland waterway transport, will determine by regulation:

1) detailed technical requirements to be met by the shore-side power supply points for electric units in the field of operational safety, repair and modernization of the points,
2) types of the tests of the shore-side points of supply for electric units carried out by TDT and the manner and dates of the implementation of them,
3) the amount of the fee referred to in art. 18 par. 5

- guided by the need to ensure the safety of vessels' power supply, the uniformity of technical solutions and the security of the network's operation, access for the disabled and taking into account the scope of the research carried out by TDT and the type of the test subject.

Art. 20. [Program for the construction of a natural gas station] 1. [15)] The operator of the gas distribution system referred to in art. 9d par. 1d of the Act of April 10, 1997 - Energy Law, with the exclusion of enterprises referred to in art. 9d par. 7 points 3 and 4 of this Act, develops a program for the construction of a natural gas station and projects for the modernization, expansion or construction of networks necessary to connect the stations.

2. The program referred to in par. 1 constitutes a separate part of the development plan in the scope of satisfying the current and future demand for gaseous fuels, referred to in art. 16 par. 4 of the Act of April 10, 1997 - Energy Law.

3. In the program referred to in par. 1, the gas distribution system operator shall take into account each municipality located in the area of its operation which meets all the following criteria:

1) the number of inhabitants of the municipality is at least 100,000 and
2) at least 60,000 motor vehicles have been registered in the municipality, and
3) there are at least 400 motor vehicles per 1000 inhabitants of the municipality.

4. The program referred to in par, 1 specifies:

1) the number of planned natural gas stations;
2) technical parameters and locations of natural gas stations planned to be connected to the network;
3) information on the available technical capacity of gas networks to which natural gas stations are to be connected;
4) information on the connection capacity available at the exit point.

Art. 21. [Tasks of the gas distribution system operator] 1. The gas distribution system operator:

1) builds a natural gas station in accordance with the program referred to in art. 20, including compressed natural gas (CNG) refuelling points;
2) performs repairs and modernization of the natural gas station.

2. The costs of the construction, repair and modernization of the natural gas station referred to in par. 1 borne by the gas distribution system operator 1, excluding the costs referred to in art. 23 point 4, are included in its justified costs within the meaning of art. 3 point 21 of the Act of 10 April 1997 - Energy Law.

Art. 22. [Selection of a natural gas station operator by a tender] 1. The gas distribution system operator selects the operator of the natural gas station by way of a tender and concludes an agreement with him to provide refuelling services and operate a natural gas station. The provisions of the Act of 21 October 2016 on the concession agreement for construction works or services (Journal of Laws item 1920) apply accordingly.

2. If it is not possible to identify the operator of a natural gas operator in accordance with par. 1, the function of the natural gas station operator is performed by an energy company engaged in economic activities in the field of trade in gaseous fuels, which the non-cash contribution referred to in Art. $5b^1$ of the Act of 10 April 1997 - Energy Law.

Art. 23. [Responsibilities of a natural gas station operator] The natural gas station operator:

1) is responsible for the technical condition and safe operation of the natural gas station;
2) ensures technical the tests of natural gas stations referred to in art. 27;
3) runs a natural gas station in accordance with the agreement referred to in art. 22 par. 1;
4) covers the costs of repairs and overhauls resulting from the operation of the natural gas station conducted in a way inconsistent with the terms of the agreement referred to in art. 22 par. 1;
5) provides a compressed natural gas (CNG) refuelling service.

Art. 24. [Access to Liquefied Natural Gas Bunkers (LNG)] The managing entity of the port belonging to the TEN-T core network ensures that a liquefied natural gas (LNG) bunker point is available at that port.

Art. 25. [Compliance of natural gas stations with technical requirements] Natural gas stations and bunkering points for liquefied natural gas (LNG) are built, operated, repaired and modernized in a manner consistent with the technical requirements specified in the regulations issued on the basis of art. 29 and the conditions of refuelling vehicles and bunkering vessels, ensuring:

1) user safety;
2) proper functioning of the gas network;
3) fire safety;
4) access for people with disabilities;
5) proper technical condition of the infrastructure used.

Art. 26. [Opinion on the compliance of technical documentation of a designed station with technical requirements] 1. Before starting the construction of a natural gas station, the gas distribution system operator may submit a request to the UDT for an opinion on the compliance of the technical documentation of the planned station with the technical requirements set out in Art. 25 and in the regulations issued on the basis of art. 29 par. 1.

2. The UDT President issues the opinion referred to in par. 1 within 30 days from the date of receipt of the application.

3. The issuance of the opinion referred to in par. 1 is subject to a fee, which is the income of UDT.

Art. 27. [Being subject to technical inspections carried out by UDT] 1. Gas stations, in terms of their safe operation, repair and modernization, are subject to technical inspections carried out by UDT.

2. The test referred to in par. 1 shall be carried out before putting the natural gas station into service and each time in case of any repair or modernization of such a station.

3. The test referred to in par. 1 shall be carried out at the request of the operator of the natural gas station.

4. The UDT President issues a decision to suspend the operation of the natural gas station if a failure of the natural gas station is found on the basis of the results of the tests referred to in paragraph 1 to meet the requirements specified in art. 25 or in the regulations issued on the basis of art. 29 par. 1.

5. Carrying out the tests referred to in par. 1 is subject to a fee, which is the income of UDT.

Art. 28. [Being subject to technical inspections carried out by TDT] 1. Liquefied natural gas bunkering point (LNG), in terms of its safe operation, repair and modernization, is subject to technical tests carried out by TDT.

2. The test referred to in par. 1 shall be carried out before putting the liquefied natural gas point (LNG) into service and each time in case of any repair or modernization of such a point.

3. The test referred to in par. 1 shall be carried out at the request of the entity operating the liquefied natural gas (LNG) bunkering point.

4. The TDT Director issues a decision to suspend the operation of the liquefied natural (LNG) bunkering point if a failure of the point is found on the basis of the results of the tests referred to in paragraph 1 to meet the technical requirements specified in art. 25 or in the regulations issued on the basis of art. 29 par. 1.

5. Carrying out the tests referred to in par. 1 is subject to a fee, which is the income of TDT.

Art. 28a. [Application to the TDT Director for an opinion on the compliance of technical documentation] [16)]
1. Before commencing the construction of a liquefied natural gas (LNG) bunker, you may apply to the TDT Director for an opinion on the compliance of the technical documentation of the designed natural gas bunker with the technical requirements set out in Art. 25 and in the regulations issued on the basis of art. 29 par. 2.

2. The TDT President issues the opinion referred to in par. 1 within 30 days from the date of submitting the application.

3. The issuance of the opinion referred to in par. 1 is subject to a fee, which is the income of TDT.

Art. 29. [Statutory authorization] 1. The minister responsible for energy will determine by regulation:

1) detailed technical requirements for safe operation, repair and modernization of the natural gas station,
2) types of technical tests of natural gas stations carried out by UDT as well as the method and dates of their implementation,
3) the amounts of the fees referred to in art. 26 par. 3 and art. 27 par. 5

- guided by the need to ensure the safety of operation and use of the stations, the uniformity of technical solutions, and taking into account the scope of the tests carried out by UDT and the type of subject of this study.

2. The minister competent for energy, in agreement with the minister competent for maritime economy and the minister competent for inland waterway transport, will determine by regulation:

1) detailed technical requirements for safe operation, repair and modernization of liquefied natural gas (LNG) bunkering points,
2) types of technical tests of liquefied natural gas (LNG) bunkering points carried out by TDT as well as the method and dates of their implementation,
3) the amount of the fee referred to in art. 28 par. 5

- guided by the need to ensure the safety of operation and use of the points, the uniformity of technical solutions, and taking into account the scope of the tests carried out by TDT and the type of subject of this study.

Art. 30. [Basis for determining the amounts of fees] The basis for determining the amounts of fees referred to in art. 15 par. 3, art. 16 par. 5, art. 18 par. 5, art. 26 par. 3, art. 27 par. 5 and art. 28 par. 5 is the average monthly remuneration in the national economy in the previous year announced by the President of the Central Statistical Office in the Official Gazette of the Republic of Poland "Monitor Polski", in accordance with art. 5 par. 7 of the Act of 4 March 1994 on the Company Social Benefits Fund (Journal of Laws of 2017, item 2191 and 2371), in force on the day of submission of the application for technical tests or preparation of an opinion.

Art. 31. [Proceedings regarding the decision to suspend exploitation] 1. Proceedings regarding the issue of a decision to suspend exploitation, referred to in art. 16 par. 4, art. 18 par. 4, art. 27 par. 4 and art. 28 par. 4 are subject to the provisions of the Act of 14 June 1960 - the Code of Administrative Procedure (Journal of Laws of 2017 item 1257 and of 2018 item 149).

2. In the case of appeals against the decisions referred to in art. 16 par. 4, art. 18 par. 4, art. 27 par. 4 and art. 28 par. 4, the higher-level body within the meaning of the Act of 14 June 1960 - The Code of Administrative Procedure is the minister competent for energy.

Chapter 3. Duties of public entities in the field of alternative fuels infrastructure development

Art. 32. [Plan of location of public charging stations and natural gas station] 1. The General Director of National Roads and Motorways prepares a plan for the location of public charging stations and natural gas stations along the TEN-T base network roads remaining in its management for a period of not less than 5 years.

2. The plan referred to in par. 1 specifies the number and location of public charging stations and natural gas stations, including CNG filling points and LNG refuelling points necessary to cover the demand for alternative fuels in vehicles travelling on the TEN-T core network roads.

3. The General Director of National Roads and Motorways consults the draft plan referred to in par. 1 with the relevant operators of electricity and gas distribution systems and with entities managing service locations, referred to in the regulations issued on the basis of art. 7 par. 2 point 2 of the Act of July 7, 1994 - Construction Law (Journal of Laws of 2017, item 1332 and 1529 and of 2018, items 12 and 317).

4. Operators of electricity and gas distribution systems as well as entities managing service locations of travellers, referred to in the regulations issued on the basis of art. 7 par. 2 point 2 of the Act of July 7, 1994 - Construction Law, submit their opinions on the draft plan referred to in par. 1, within 2 months from the date of receipt of the draft. The opinions contain an assessment of technical and economic conditions for the connection of charging points and natural gas stations in locations indicated in the plan referred to in par. 1.

5. The General Director of National Roads and Motorways publishes the plan referred to in par. 1, along with the results of consultations and opinions of the operators of electricity and gas distribution systems on the website of the office servicing it.

6. The General Director of National Roads and Highways may include the location of hydrogen refuelling points in the plan referred to in par. 1, i.e. sets of devices for hydrogen supplying hydrogen-powered vehicles in order to drive engines of the vehicles, if the location of such points is justified by the needs of developing alternative fuels market. The provisions of par. 2-5 shall apply accordingly.

Art. 33. [Plan for the location of liquefied natural gas (LNG) bunkering points] 1. The managing entity of the port belonging to the TEN-T core network prepares a plan for the location of liquefied natural gas (LNG) bunkering points or the possibility of bunkering using bunkers and supply points for shore-side electric units, including the assessment referred to in art. 43 par. 2 point 8.

2. The plan referred to in par. 1, specifies the number and location of liquefied natural gas (LNG) bunkering points as well as power supply points for shore-side electric units.

3. The managing entity of the port belonging to the TEN-T core network shall consult the draft plan referred to in par. 1 with the relevant operators of electricity and gas distribution systems.

4. The operators of electricity and gas distribution systems submit their opinions on the draft plan referred to in par. 1, within 2 months from the date of receipt of the draft. The opinion contains an assessment of technical and economic conditions for the connection of liquefied natural gas (LNG) bunkering points and power supply points for shore-side electric units.

5. The managing entity of the port belonging to the TEN-T core network shall publish the plan referred to in par. 1, along with the results of consultations and opinions of the operators of electricity and gas distribution systems, on its website.

Art. 34. [Share of electric vehicles in the fleet of primary vehicles and central state administration bodies] 1.

[17)] The supreme and central organs of state administration ensure that the share of electric vehicles in the fleet of the vehicles used in the office or budget management institution or other entity providing services in the field of passenger transport is at least 50% of the number of vehicles used.

2. The provision of par. 1 does not apply to:

1) the minister competent for foreign affairs in the field of vehicles used in foreign branches of the Republic of Poland within the meaning of the Act of 27 July 2001 on foreign service (Journal of Laws of 2017, items 161 and 476 and of 2018, item 138);

2) the General Director of the Prison Service, Chief Police Commander, Chief Inspector of Road Transport, Head of the Internal Security Agency, Head of the Foreign Intelligence Agency, Head of the Military Counterintelligence Service, Head of the Military Intelligence Service, Head of the Central Anticorruption Bureau, Chief Commander

of the Border Guard and Chief Commandant of the State Fire Service;
3) the Head of the National Tax Administration regarding vehicles used for special purposes within the meaning of art. 2 point 37 of the Act of 20 June 1997 - Road Traffic Law;
4) General Director of National Roads and Motorways in the field of vehicles other than those exclusively used for passenger transport;
5) State Protection Services.

Art. 35. [Share of electric vehicles in the fleet of local self-government units] 1. [18] A local government unit, with the exception of municipalities and poviats whose population does not exceed 50,000, ensures that the share of electric vehicles in the fleet of the vehicles they use in the office servicing is at least 30% of the number of vehicles used.

2. Local government unit, with the exception of municipalities and poviats whose population does not exceed 50,000:
1) performs a public task, with the exception of public public transport, using at least 30% of electric vehicles or natural gas-fuelled vehicles, or
2) commissions a public task, with the exception of public collective transport, to an entity whose at least 30% of the fleet of vehicles used in carrying out this task are electric vehicles or vehicles powered by natural gas.

Art. 36. [Provision of public transport services using zero-emission buses] 1. A local government unit, with the exception of municipalities and poviats whose population does not exceed 50,000, provides a service or commissions a public transport service within the meaning of the Act of 16 December 2010 on public collective transport (Journal of Laws of 2017, item 2136 and 2371 and 2018 item 317) to an entity whose share of zero-emission buses in the fleet of the vehicles used in the area of this local government unit is at least 30%.

2. A local government unit, excluding municipalities and poviats whose population does not exceed 50,000, provides a service or commissions a public transport service within the meaning of the Act of 16 December 2010 on public collective transport to an entity whose use of vessels using only engines whose cycle of work does not lead to the emission of greenhouse gases or other substances covered by the greenhouse gas emission management system, referred to in the Act of 17 July 2009 on greenhouse gas emissions management system and other substances, in the fleet used in this local government unit is at least 30%.

Art. 37. [Analysis of the costs and benefits of using zero-emission buses] 1. The local government unit referred to in art. 36, draws up, every 36 months, an analysis of the costs and benefits of using, in the provision of urban transport services, zero-emission buses and other means of transport in which only engines whose work cycle does not emit greenhouse gases or other substances covered by the cycle are used for propulsion, as covered by the greenhouse gas emission management system, referred to in the Act of 17 July 2009 on the greenhouse gas emissions management system and other substances.

2. The analysis referred to in par. 1, includes in particular:
1) a financial and economic analysis;
2) estimation of environmental effects related to the emission of harmful substances to the natural environment and human health;
3) a socio-economic analysis including the valuation of costs associated with the emission of harmful substances.

3. The local government unit referred to in art. 36 provides for the opportunity for public participation in the development of the analysis referred to in par. 1, on the principles set out in section III in chapters 1 and 3 of the Act of 3 October 2008 on access to information about the environment and its protection, public participation in environmental protection and environmental impact assessments (Journal of Laws of 2017 items 1405, 1566 and 1999).

4. The analysis referred to in par. 1, immediately after its development, is forwarded to the minister competent for energy matters, the minister competent for economy and the minister competent for environmental matters.

5. If the results of the analysis referred to in par. 2 point 3, indicate the lack of benefits from the use of zero-emission buses, the local government unit referred to in art. 36, may fail to meet the obligation to achieve the level of zero-emission bus share.

Art. 38. [Information on the number and percentage share of electric vehicles or vehicles powered by natural gas] The entities referred to in art. 34-36, until 31 January each year, provide the minister responsible for energy with information on the number and percentage of electric vehicles or natural gas vehicles in the used fleet, as of 31 December of the year preceding the transfer of this information.

Art. 39. [Clean transport zone] 1. [19] In order to prevent negative impact on human health and the environment in connection with the emission of pollutants from transport in a municipality with more than 100,000 inhabitants, for the inner city area or its part, constituting a cluster of intensive development in the inner city area, defined in the local spatial development plan, and in the case of lack of a study of the conditions and directions of spatial development of the municipality, a clean transport zone can be established in the area including roads managed by the municipality, to which it is restricted to enter with vehicles other than:
1) electric;
2) powered by hydrogen;
3) powered by natural gas.

2. The owner of a vehicle powered by natural gas may benefit from the exclusion referred to in par. 1 point 3, if it ensures the marking of this vehicle on its windscreen in accordance with the regulations issued on the basis of art. 76 par. 1 point 1 letter a the Act of 20 June 1997 - Road Traffic Law. The label is issued to owners of vehicles by

the municipality head, mayor or city president competent for the place of residence or seat of the vehicle owner.

3. The following are released from the restriction referred to in par. 1:

1) [20] vehicles used by:

a) the Police, Road Transport Inspection, Internal Security Agency, Intelligence Agency, Military Counterintelligence Service, Military Intelligence Service, Central Anticorruption Bureau, Border Guard, State Protection Service, Prison Service, National Fiscal Administration, fire protection units, Maritime Search and Rescue Service and emergency services,

b) used in the fleet servicing the Chancellery of the Prime Minister,

c) road authorities and those executing tasks for road managers,

d) the Armed Forces of the Republic of Poland, as well as the armed forces of foreign states, if an international agreement to which the Republic of Poland is a party provides so,

e) with a maximum permissible mass up to 3.5 t, whose owners or users are residents of the clean transport zone;

2) specialist sanitary transport used by medical rescue teams and sanitary transport teams;

3) zero-emission buses;

4) school buses.

4. A municipality council, in the resolution establishing a clean transport zone, may establish exemptions from the entry restriction to this zone other than those specified in par. 3.

4a. [21] The municipality council, in the resolution establishing a clean transport zone, may allow movement within this zone, within a period not longer than 3 years from the date of adoption of the resolution, of vehicles other than those specified in par. 1 and 3-4, subject to the payment of a fee.

4b. [22] The fee for entering the clean transport zone is the income of the municipality, it can be used only for the purposes of:

1) marking the clean transport zone;

2) purchase of zero-emission buses;

3) covering the costs of performing the analysis referred to in art. 37 par. 1.

4c. [23] Fee for entering the clean transport area:

1) can not be higher than 2.50 PLN per hour and can be charged only for moving around the zone for vehicles other than those specified in par. 1 and 3-4 from 900 am to 500 pm;

2) can take the form of a subscription or a flat fee.

4d. [24] The fee for entry into the clean transport area is collected by the municipality head, mayor or city president.

5. The boundaries of the area of clean transport zone are marked with road signs.

Art. 40. [Resolution on the establishment of a clean transport zone] 1. The clean transport zone is established, by way of resolution, by the municipality council.

2. The resolution referred to in par. 1 specifies:

1) boundaries of the area of clean transport zone;

2) the manner of organizing the restriction of entry to the clean transport zone;

3) additional ways to publicize the content of the resolution on the establishment of a clean transport zone.

3. The resolution referred to in par. 1 is an act of local law.

Chapter 4. Information obligations in the field of alternative fuels

Art. 41. [Inserting information on the type of fuel used into the drive of the vehicle] 1. Information on the type of alternative fuel used to power a motor vehicle is placed:

1) in the instruction manual of the vehicle - by the vehicle manufacturer;

2) on fuel filler plugs or vehicle sockets or in the vicinity of the plugs or sockets - by the vehicle manufacturer;

3) in the area of a commercial outlet selling motor vehicles - by the owner of this facility.

2. A public charging station operator and a natural gas station operator labels a public charging station or natural gas station in a manner clearly indicating the possibility of charging or refuelling the vehicle with natural gas.

3. If motor vehicles can be charged or refuelled with alternative fuels at a liquid fuel station within the meaning of regulations issued on the basis of art. 7 par. 2 point 2 of the Act of 7 July 1994 - Construction Law, the owner of this station places a comparison of unit prices of fuels offered at this station.

4. The information referred to in paragraph 1-3 are placed in visible and accessible places.

5. Control of the fulfilment of the information obligations referred to in par. 1-4 is carried out by the Trade Inspection.

6. The minister responsible for energy will determine by regulation, the method of:

1) marking places of refuelling or charging a motor vehicle,

2) formulating and making the available information about the possibility of charging or refuelling a motor vehicle with alternative fuel,

3) comparing the prices of alternative fuels with the prices of motor gasoline and diesel oil

- taking into account the need for providing car vehicle users with complete information on alternative fuels and ensuring the transparency of the data on the compared fuel prices.

Art. 42. [Register of Alternative Fuels Infrastructure] 1. The Register of Alternative Fuels Infrastructure, hereinafter referred to as the "register", is a public register kept to provide users of electric vehicles and natural gas vehicles with information facilitating the use of the vehicles.

2. The register is maintained by the UDT President using an ICT system.

3. The register contains information about:

1) coordinates of the natural gas station in accordance with the state spatial reference system in a flat rectangular coordinate system;
2) coordinates of public charging stations, in accordance with the state spatial reference system in a flat rectangular coordinate system;
3) current prices of alternative fuels in places indicated in points 1 and 2;
4) availability of charging points installed in public charging stations.

4. In the teleinformation system referred to in par. 2, the following shall be made available:

1) electronic services allowing for:
a) registering and updating data concerning the refuelling point for compressed natural gas (CNG), liquefied natural gas refuelling point (LNG) or charging point installed at a public charging station, using the electronic form,
b) sending up-to-date information on the availability of a charging point installed at a public charging station and current prices of alternative fuels, using the provided network service;
2) an interactive map containing the information referred to in par. 3.

5. An operator of a public charging station and an operator of a natural gas station are obliged to make a notification to the register, using the electronic form referred to in par. 4 point 1 letter a, of data on:

1) the name of the public charging station operator or the natural gas station operator, the address of his headquarters and his contact details,
2) specification of the type of infrastructure supported by the operator,
3) coordinates of the natural gas station or the public charging station referred to in par. 3 points 1 and 2

- at the latest on the day of the commencement of the provision of charging services or natural gas refuelling services and each time such data is changed.

6. The public charging station operator is obliged to provide, by means of the network service referred to in par. 4 point 1 letter b, information about:

1) availability of a charging point installed at a public charging station - immediately after a change in the availability status of this point, within the time limit resulting from the mode of operation of the network service;
2) current prices of charging services - within an hour of changing the prices.

7. A natural gas station operator provides information on the current natural gas prices using the network service referred to in par. 4 point 1 letter b, within an hour of changing the price.

8. The data presented on the map referred to in par. 4 point 2 is updated in the scope of information referred to in:

1) par. 3 point 3 - within an hour of changing the price;
2) par. 3 point 4 - immediately after the change of the availability status, within the time resulting from the mode of operation of the network service referred to in par. 4 point 1 letter b.

9. Detailed specification of the network service referred to in par. 4 point 1 letter b, defined in the language of WSDL network services description, is available in the Public Information Bulletin on UDT website.

10. The ICT system referred to in par. 2, makes it possible to share the information collected in it, referred to in par. 3, with any entity interested in the processing of it in order to make it available on the map.

11. The minister responsible for energy issues shall specify, by way of a regulation, the model of the notification referred to in par. 5, guided by the necessity of unifying the form and manner of providing information contained in the application.

Chapter 5. National policy framework for the development of alternative fuels infrastructure

Art. 43. [Goals and activities defined in the National Framework] 1. The minister responsible for energy issues develops the National Policy Framework for the Development of Alternative Fuels Infrastructure, hereinafter referred to as the "National Framework".

2. The national framework includes in particular:

1) assessment of the existing state and future development of the alternative fuels market in the transport sector;
2) the national target for the number of charging points installed at public charging stations in the municipalities referred to in art. 60 par. 1, broken down into normal-capacity charging points and high-capacity charging points;
3) the national target for the number of refuelling points for compressed natural gas (CNG), refuelling points for liquefied natural gas (LNG) and bunkering points for liquefied natural gas (LNG);
4) actions necessary to ensure achievement of the national objectives referred to in points 2 and 3;
5) actions aimed at supporting the development of alternative fuels infrastructure in public mass transport services;
6) list of the municipalities and transport networks in which, taking into account market needs, refuelling points for compressed natural gas (CNG) are to be deployed;
7) assessment of the need for installing bunker points for liquefied natural gas (LNG) in seaports outside the TEN-T core network;
8) assessment of the need for installing shore-side power points for electric units in seaports;
9) assessment of the need to install devices for supplying electricity to planes during a stopover at airports.

3. The minister competent for energy may specify objectives and activities related to the development of alternative fuels infrastructure in inland ports in the National framework.

4. The Council of Ministers adopts the National Framework, by way of a resolution, at the request of the minister competent for energy matters.

5. The National Framework shall be published in the Official Gazette of the Republic of Poland "Monitor Polski".

6. The minister competent for energy matters, immediately after the adoption of the framework by the Council of Ministers of State, passes it on to the European Commission.

7. The National Framework shall be updated taking into account the assessment of the functioning and the results of the monitoring, evaluation and report referred to in Article 44 par. 1. Update of the National Framework shall be subject to the provisions of paragraph 2-6 accordingly.

Art. 44. [Responsibilities of the minister competent for energy] 1. Minister competent for energy:

1) monitors the level of the achievement of the objectives set in the National Framework, in particular on the basis of data contained in the register and results of statistical surveys conducted in accordance with the program of statistical surveys of official statistics within the meaning of the Act of 29 June 1995 on official statistics (Journal of Laws of 2016, item 1068 and of 2017 item 60);
2) performs, on an annual basis, an assessment of the level of achievement of the objectives set in the National Framework and publishes it on the website of the office servicing it;
3) on the basis of the assessment referred to in point 2, draws up, every 3 years, a report on the implementation of the National Framework, that he submits to the Council of Ministers for approval by 15 October of the third year covered by the report;
4) shall submit to the European Commission the report referred to in point 3 approved by the Council of Ministers by November 18 of the third year covered by the report.

2. The report referred to in par. 1 point 3, includes in particular:

1) discussion of the level of the achievement of the objectives referred to in art. 43 par. 2 points 2 and 3, and information on actions taken to implement them;
2) information on the applied direct support instruments, in particular about tax instruments and non-financial incentives for purchasing vehicles fuelled with alternative fuels or building infrastructure for the fuels;
3) information on the policy used in the field of public procurement for supporting the use of alternative fuels in transport;
4) an assessment of the need to install refuelling points for aviation fuels from renewable sources at airports belonging to the TEN-T core network;
5) information on procedures and regulations related to facilitating trade in alternative fuels in transport;
6) information on the annual amount of public funds allocated to:
  a) development of alternative fuels infrastructure,
  b) support for production plants in the field of technologies related to alternative fuels,
  c) support for scientific research, technological development and pilot projects related to alternative fuels
  - broken down by individual alternative fuels and types of transport;
7) information on the predicted number of vehicles fuelled with alternative fuels registered in the country in 2020, 2025 and 2030.

Chapter 6. Financial penalties

Art. 45. [Conditions and amount of the penalty payment] 1. The following economic operators are liable to pay a penalty if they:

1) do not comply with the obligation to provide suppliers with the access charging service referred to in art. 3 par. 1 point 10;
2) [25] make the provision of a charging service at a public charging station conditional upon the prior conclusion by the holder of an electric vehicle or hybrid vehicle of an agreement in written or electronic form;
3) do not provide electricity at a public charging station in the manner specified in art. 8;
4) do not provide for the tests referred to in art. 16 par. 1 or art. 27 par. 1, or operate public charging stations, charging points constituting an element of the public transport road charging infrastructure or natural gas stations contrary to the decision to stop exploitation referred to in art. 16 par. 4 and art. 27 par. 4;
5) do not comply with the technical requirements set out in the regulations issued on the basis of art. 17 or art. 29 par. 1;
6) do not comply with the technical requirements set out in the regulations issued on the basis of art. 19 and art. 29 par. 2;
7) do not develop the program referred to in art. 20 par. 1;
8) [26] do not build a natural gas station pursuant to art. 21 par. 1 point 1;
9) do not fulfil the obligation referred to in art. 24;
10) do not comply with the information obligations referred to in art. 41 par. 1-4;
11) do not perform the obligation referred to in art. 42 par. 5;
12) [27] do not build a public charging station in accordance with art. 64 par. 1.

2. The amount of the penalty in the cases specified in paragraph 1 in:

1) point 1 is from PLN 5,000 to PLN 150,000;
2) point 2 is from PLN 1000 to PLN 50,000;

3) point 3 is from PLN 5000 to PLN 50,000;
4) points 4-6 is from PLN 1000 to PLN 100,000;
5) [28] in points 7 and 12 is from PLN 5,000 to PLN 500,000;
6) point 8 is from PLN 10,000 to PLN 2,000,000;
7) point 9 is PLN 50,000 to PLN 1,000,000;
8) point 10 is from PLN 500 to PLN 2000;
9) point 11 is from PLN 500 to PLN 10,000.

3. The amount of the financial penalty referred to in par. 1 may not exceed 15% of the revenue of the punished entrepreneur, achieved in the previous tax year.

Art. 46. [Entities entitled to impose a penalty] 1. The penalty payment referred to in art. 45 par. 1:

1) [29] points 1-3, 7, 8 and 12 - is imposed by the President of the Energy Regulatory Office, hereinafter referred to as "the President of the Energy Regulatory Office;
2) points 4, 5 and 11 - is imposed by the President of UDT;
3) point 6 - is imposed by the TDT Director;
4) point 9 - is imposed by the territorially competent director of the maritime office;
5) point 10 - is imposed by the regional inspector of the Trade Inspection.

2. [30] The President of the Energy Regulatory Office imposes the penalties referred to in art. 45 par. 1 points 1-3, 7, 8 and 12, by way of a decision against which an appeal may be brought to the Regional Court in Warsaw - a court for competition and consumer protection. Pecuniary penalty is paid within 14 days from the date on which the decision to impose the penalty became final.

3. The Regional Inspector of the Trade Inspection orders the penalty referred to in art. 45 par. 1 point 10, by way of a decision against which an appeal may be brought to the President of the Office for Competition and Consumer Protection.

4. The Director of the maritime office imposes the penalty referred to in art. 45 par. 1 point 9 by way of a decision against which an appeal may be brought to the minister competent for maritime economy.

5. The UDT President imposes the penalty referred to in art. 45 par. 1 points 4, 5 and 11, by way of a decision against which an appeal may be brought to the minister competent for energy matters.

6. The TDT Director of the maritime office imposes the penalty referred to in art. 45 par. 1 point 6 by way of a decision against which an appeal may be brought to the minister competent for transport.

Art. 47. [Income from financial receivables due to penalties] Cash receivables due to penalties referred to in art. 46:

1) par. 2-4 - constitute the income of the state budget;
2) par. 5 - constitute the revenue of UDT;
3) par. 6 - constitute the income of TDT.

Chapter 7. Amendments to the existing regulations

Art. 48. In the Act of May 20, 1971 - Code of Petty Offences (Journal of Laws of 2015, item 1094, as amended[31]), following art. 96b, art. 96c shall be added, reading as follows:

"Art. 96c. Whoever does not comply with the restrictions on access to the clean transport zone is liable to a fine of up to PLN 500. ".

Art. 49. The Act of 21 March 1985 on public roads (Journal of Laws of 2017 item 2222 and 2018 items 12, 138 and 159) shall be amended as follows:

1) following art. 12a, art. 12b shall be added:

"Art. 12b.

1. The competent authority for traffic management, designating places for parking vehicles, sets parking spaces at public charging stations for electric vehicles, referred to in art. 2 point 12 of the Act of January 11, 2018 on Electromobility and Alternative Fuels (Journal of Laws item 317):

1) on public roads,
2) in residential areas referred to in art. 2 point 16 of the Act of 20 June 1997 - Road Traffic Law,
3) in the traffic zones referred to in art. 2 point 16a of the Act of 20 June 1997 - Road Traffic Law - marking them with appropriate road signs allowing to distinguish them from parking spaces for other motor vehicles.

2. The parking spaces referred to in par. 1 shall be determined at least in the number corresponding to the number of charging points at a given location.

3. Electric vehicles may use the parking spaces referred to in par. 1 only for the time of charging.

4. The authority referred to in par. 1 may set parking spaces designated for parking electric vehicles and powered by natural gas also in places where there are no public charging stations to promote vehicles powered with alternative fuels.

2) in art. 13 par. 3 point 1 letter d the semicolon is replaced by a comma and the following point is added: e reading as follows:

"**e)** electric vehicles referred to in art. 2 point 12 of the Act of January 11, 2018 on Electromobility and Alternative Fuels;";

3) in art. 13b par. 6 after point 1, the following point 1a is added:

"**1a)** sets, in the paid parking zone, places designated for parking electric vehicles for loading time at charging points installed at the public charging stations referred to in art. 2 point 6 of the Act of January 11, 2018 on Electromobility and Alternative Fuels;";

4) in art. 39 par. 1a is replaced by the following:

1a. The provision of par. 1 point 1 shall not apply to the placement, maintenance, reconstruction and repair of telecommunications infrastructure within the meaning of the Act of 16 July 2004 - Telecommunications Law (Journal of Laws of 2017, items 1907 and 2201 and of 2018, items 106 and 138) and devices for supplying or removing liquids, steam, gas, electricity, including charging points forming part of the public transport infrastructure, as well as devices related to their operation, as well as other activities related to the operation of this infrastructure and the devices, if technical conditions and safety requirements allow.

5) the title of Chapter 6 is replaced by the following:

“Amendments to the existing regulations, episodic, transitional and final provisions”

6) following art. 50, 50a shall be added:

"Art. 50a. In the period until December 31, 2028, fees for travel on national roads, referred to in art. 13 par. 1 point 3, zero-emission buses of the public transport operator performing transport of a public utility character within the meaning of art. 4 par. 1 point 12 of the Act of 16 December 2010 on public collective transport (Journal of Laws of 2017, items 2136 and 2371 and of 2018 item 317). ".

Art. 50. In the Act of March 21, 1991 on Marine Areas of the Republic of Poland and Maritime Administration (Journal of Laws of 2017, item 2205) in art. 42 par. 2 point 33, the full stop is replaced with a semicolon and the following point 34 is added:

"34) control of entities managing seaports in the scope ensuring their accessibility in the port of the liquefied natural gas (LNG) bunkering point specified in the provisions of the Act of January 11, 2018 on Electromobility and Alternative Fuels (Journal of Laws item 317). ".

Art. 51. In the Act of 26 July 1991 on personal income tax (Journal of Laws of 2018 item 200, of 2017 item 2494 and of 2018 items 106 and 138) in art. 23 in par. 1 point 4 shall read as follows:

"**4)** deductions for the consumption of a passenger car, made in accordance with the principles set out in Article 22a-22o, in the part determined from the value of the car exceeding the equivalent:

a) EUR 30,000 - in the case of a car being an electric vehicle within the meaning of art. 2 point 12 of the Act of January 11, 2018 on Electromobility and Alternative Fuels (Journal of Laws item 317),

b) EUR 20,000 - for other passenger cars". - converted into PLN at the average Euro exchange rate announced by the National Bank of Poland on the day of handing over the car for use;

Art. 52. In the Act of 15 February 1992 on Corporate Income Tax (Journal of Laws of 2017, items 2343, 2175, 2201 and 2369) art. 16 par. 1 point 4 shall read as follows:

“**4)** deductions for the consumption of a passenger car, made in accordance with the principles set out in Article 16a-16m, in the part determined from the value of the car exceeding the equivalent:

a) EUR 30,000 - in the case of a car being an electric vehicle within the meaning of art. 2 point 12 of the Act of January 11, 2018 on Electromobility and Alternative Fuels (Journal of Laws item 317),

b) EUR 20,000 - for other passenger cars". - converted into PLN at the average Euro exchange rate announced by the National Bank of Poland on the day of handing over the car for use;

Art. 53. The Act of 7 July 1994 - Construction Law (Journal of Laws of 2017, items 1332 and 1529 and of 2018, item 12) is amended as follows:

1) in art. 29 par. 1 following point 8, the following point 8a is inserted:

"**8a)** charging stations within the meaning of art. 2 point 27 of the Act of January 11, 2018 on Electromobility and Alternative Fuels (Journal of Laws item 317) and charging points within the meaning of art. 2 point 17 of this Act, excluding the infrastructure for charging public transport by road within the meaning of art. 2 point 3 of this Act;";

2) in art. 29a par. 1 is replaced by the following:

1. Construction of the connections referred to in art. 29 par. 1 point 20, and charging stations, within the meaning of art. 2 point 27 of the Act of January 11, 2018 on Electromobility and Alternative Fuels requires a situation plan to be prepared on a copy of the current base map or a unit map adopted for the state geodetic and cartographic resource.

3) in art. 30 in par. 1 point 1a is replaced by the following:
"**1a)** the construction referred to in art. 29 par. 1 point 20, and the construction of a charging station within the meaning of art. 2 point 27 of the Act of January 11, 2018 on Electromobility and Alternative Fuels, subject to art. 29a;";
" in art. 43 par. 1 and 1a are replaced by the following:

1. Construction objects requiring a building permit, the facilities referred to in art. 29 par. 1 point 1a, 2b and 19a-20b, and charging stations within the meaning of art. 2 point 27 of the Act of January 11, 2018 on Electromobility and Alternative Fuels, are subject to geodetic determination in the field, and after the construction - geodetic as-built inventory, including their location on the ground.

1a. The geodetic obligation to designate referred to in par. 1, shall not apply to:

1) the connection referred to in art. 29 par. 1 point 20, if the connection of it to the network is on the same plot as the connection or on a plot adjacent to it;
2) the charging station within the meaning of art. 2 point 27 of the Act of January 11, 2018 on Electromobility and Alternative Fuels.

Art. 54. The Act of 10 April 1997 - Energy Law (Journal of Laws of 2017, item 220, as amended[32)]) shall be amended as follows:

1) in art. 3:
a) in point 5, the common part shall be replaced by the following:
"**-** excluding the sale of the fuels or energy and compression of gas at the natural gas station and supply of electricity to a public charging station for charging stations installed therein, as defined in the Act of January 11, 2018 on Electromobility and Alternative Fuels (Official Journal item 317);"
b) point 6a shall be replaced by the following:
"**6a)** sales - direct sales of fuels or energy by the entity that produces them or resale of the fuels or energy by the entity dealing in the trade of them; this sale does not include the electricity and gas derivative and refuelling vehicles with compressed natural gas (CNG) and liquefied natural gas (LNG) at natural gas stations and charging with electricity at charging points;"
c) following point 10j, the following points 10k-10n shall be added:
"**10k)** energy storage - a system for storing energy, connected to the network, having the capability to supply electricity to the grid;
10l) natural gas station - a natural gas station within the meaning of art. 2 point 26 of the Act of January 11, 2018 on Electromobility and Alternative Fuels;
10m) public charging station - a generally accessible charging station within the meaning of art. 2 point 6 of the Act of January 11, 2018 on Electromobility and Alternative Fuels;
10n) public transport infrastructure - infrastructure for charging road public transport within the meaning of art. 2 point 3 of the Act of January 11, 2018 on Electromobility and Alternative Fuels; "
d) following point 11h, point 11i shall be added:
"**11i)** demand management installation - an end user installation whose devices enable changing the power consumption profile at the request of the distribution system operator, transmission system operator or a connected system operator, which may include, in particular, energy storage, generation installation not cooperating directly with the network or a charging point within the meaning of Article 2 point 17 of the Act of January 11, 2018 on Electromobility and Alternative Fuels; "
e) point 13a shall be replaced by the following:
"**13a)** final recipient - the recipient purchasing fuel or energy for own use does not include electricity purchased for its use for the purposes of generation, transmission or distribution of electricity and gaseous fuels purchased for the purpose of their consumption for the transmission, distribution, storage of gaseous fuels, liquefied natural gas or regasification of liquefied natural gas;"
f) in point 58, the full stop is replaced by a semicolon and the following point 59 is added:
"**59)** energy storage - provision of energy storage services in an energy warehouse. ";

2) in art. 4 par. 1 is replaced by the following:

1. An energy company involved in the transmission or distribution of fuels or energy, storage of energy or gaseous fuels, including liquefied natural gas, liquefied natural gas or regasification of liquefied natural gas is obliged to maintain the capability of equipment, installations and networks to supply the fuels or energy in a manner continuous and reliable, while maintaining the applicable quality requirements.

3) following Art. $4e^1$, $4e^2$ shall be added as follows:

"Art. $4e^2$. An energy company dealing in energy storage is obliged to provide, on an equal treatment basis, the provision of energy storage services. The provision of energy storage services takes place pursuant to an agreement for the provision of the services. ";

4) in art. 5 following par. 1, par. 1a shall be added:

1a. Supply of electricity to a charging point at a public charging station takes place pursuant to:

1) agreements for the provision of energy distribution services, concluded by a public charging station operator within the meaning of art. 2 point 7 of the Act of January 11, 2018 on Electromobility and Alternative Fuels;
2) an agreement for the sale of the energy to be concluded with the charging service provider.
5) in art. 7:
a) following par. 1, par. 1a shall be added:

1a. The provision of par. 1 in the scope of connection to the network, in the first place also applies to the infrastructure of public transport by road.

b) in par. 8 point 3 letter b, the full stop is replaced by a semicolon and the following point and 4 and 5 is added:
"**4)** for connecting public transport road infrastructure and a public charging station:
a) to the grid with a rated voltage of more than 1 kV and not higher than 110 kV, the fee is determined on the basis of one sixteen of the actual expenses incurred for the connection,
b) to the grid with rated voltage not higher than 1 kV, the fee is determined pursuant to the rates of charges in the tariff, calculated on the basis of one sixteenth of annual average investment expenditure for the construction of network sections used for connecting the entities, specified in the development plan, referred to in art. 16; the rates can be calculated in relation to the size of the connection capacity, the unit of the length of the network section used to connect or the type of this section;
5) no fees are charged for connection to the grid of a demand management installation that meets the requirements specified in the instructions referred to in art. 9g, the transmission system operator and the distribution system operator to whose grid the installation is connected. ";
6) in art. 9c par. 3 point 9 is replaced by the following:
"**9)** providing network users and operators of other power systems with which the system is connected, with information on the conditions for the provision of electricity distribution services, including benefits related to the provision of demand management and network management, necessary to gain access to the distribution network and using the network;";
7) in art. 9g par. 4 following point 2, the following point 2a is added:
"**2a)** technical requirements for demand management installations, including those for energy storage;";
8) following art. 15f, 15g shall be added as follows:

"Art. 15g. The minister responsible for energy is the competent national authority responsible for facilitating and coordinating the permitting and decision process for energy infrastructure projects of common European Union interest, in accordance with art. 8 par. 1 of the Regulation of the European Parliament and of the Council (EU) No. 347/2013 of 17 April 2013 on guidelines for trans-European energy infrastructure and repealing Decision No. 1364/2006/EC, and amending Regulation (EC) No. 713/2009, (EC) No. 714/2009 and (EC) No. 715/2009 (Official Journal UE L 115 of 25/04/2013, page 39, as amended[33)]) operating in the mode of cooperation referred to in Art. 8 par. 3 letter c of this regulation. ";

9) in art. 16 par. 1 point 4, the full stop is replaced with a semicolon and the following point 5 shall be added:
"**5)** policy for the development of infrastructure and alternative fuels market in transport. ";
10) in art. 45:
a) in par. 1 following item 2, the following point 2a shall be added:
"**2a)** to cover the costs of legitimate business activities of energy companies in the construction and connection of public charging stations used to charge public transport vehicles and related energy storage installations, together with a reasonable return on capital employed in the activities, not less than the rate of return at the level of 6%;"
b) following par. 1f, the following paragraph is added: 1g, as follows:

1g. Costs related to the construction of a natural gas station, referred to in art. 21 of the Act of January 11, 2018 on Electromobility and Alternative Fuels, in the number referred to in art. 60 par. 2 of this Act, the public charging station referred to in art. 64 par. 1 of this Act, or the charging point used to charge public transport vehicles shall be taken into account in the costs of the operations of the energy company dealing in the distribution of gaseous fuels or electricity.

c) following par. 6, the following paragraphs shall be added, 6a and 6b:

6a. Electricity tariffs take into account the collection characteristics of the infrastructure for charging road public transport and the need for developing collective public transport using electric vehicles.

6b. Tariffs for electricity and gaseous fuels include revenues from activities not related to the activities referred to in art. 44 par. 1 point 1, related to revenues of public charging stations, or compressed natural gas (CNG) refuelling points, referred to respectively in art. 64 par. 1 or art. 60 par. 2 of the Act of January 11, 2018 on Electromobility and Alternative Fuels.

11) in art. 46 par. 3 is replaced by the following:

3. The minister competent for energy, after consulting the President of ERO, will determine, by regulation, detailed rules for the development and calculation of tariffs for electricity and detailed rules for settlements in electricity trading, taking into account: the energy policy of the state, ensuring coverage of reasonable costs of energy companies , including development costs, protection of customers' interests against unjustified level of prices and fees, improvement of the efficiency of electricity supply and use, equal treatment of recipients, elimination of cross-subsidies, transparency of prices and rates, and the need for developing electric public transport by road.

Art. 55. The Act of 20 June 1997 - Road Traffic Law (Journal of Laws of 2017 items 1260 and 1926 and of 2018 items 79, 106 and 138) shall be amended as follows:

1) following art. 65j, the following Section 6 shall be added:

,,

Section 6

The use of roads for research works on autonomous vehicles

Art. 65k. Whenever this section mentions an autonomous vehicle, it should be understood as a vehicle, equipped with systems that control the movement of the vehicle and allow its movement without the interference of the driver who can take control of the vehicle at any time.

Art. 65l.

1. Conducting research related to the testing of autonomous vehicles in road traffic on public roads, in particular for the use of autonomous vehicles in collective transport and the implementation of other public tasks, is possible provided that the safety requirements are met and a permit is obtained for carrying out the works.

2. The permit referred to in par. 1, is issued, by way of decision, by a traffic management body on the road on which research works are to be carried out, upon a written request of the organizer of the research works.

3. The application referred to in par. 2, includes in particular:

1) first name, surname or business name (name) and address of residence or seat of the organizer of the research works;
2) information on the place and date of the commencement and completion of the research works;
3) planned course of the route along which the autonomous vehicle will move;
4) list of persons responsible for securing the route of an autonomous vehicle;
5) signature of the research organization organizer or its representative.

4. The application referred to in par. 2 shall have the following attachments:

1) a document confirming the conclusion of a compulsory insurance agreement for civil liability of the organizer of research works for damages arising in connection with the conduct of research related to the operation of autonomous vehicles, which comes into force in the event of obtaining a permit for conducting research works;
2) proof of payment of premium for the insurance;
3) a copy of the decision on professional registration of vehicles issued on the basis of art. 80t par. 2.

5. The authority referred to in par. 2, consults with the inhabitants of the municipality, in the area of which the research will be carried out, the request for conducting research works, placing this application on its website and setting a deadline for submitting comments. The deadline can not be shorter than 7 days. In the course of consultations, the owner of the real estate located along the planned route, on which the autonomous vehicle will move, may object.

6. The authority referred to in par. 2 shall issue the permit referred to in par. 1, after:

1) obtaining consent of the proper road administrator on which the research works are planned, and
2) seeking an opinion appropriate for the place of conducting research work of the provincial police chief concerning the impact of the research on traffic flow along the planned route along which the autonomous

vehicle will move.

Art. 65m.

1. The authority issuing the permit referred to in art. 65l par. 1, refuses to issue it if:

1) organizer of research works:
a) did not provide the information specified in art. 65l par. 3 in the application referred to in art. 65l par. 2,
b) did not attach the documents indicated in art. 65l par. 4 in the application referred to in art. 65l par. 2,
c) did not obtain the consent and opinions referred to in art. 65l par. 6;
2) despite meeting the requirements specified in art. 65l par. 3 and 4 there is a danger that carrying out research will be a threat to human life or health or property of great value;
3) the owner of the property located along the planned route along which the autonomous vehicle will move has objected.

2. The authority issuing the permit can:

1) withdraw the permit if:
a) the organizer of research work provided false information in the application referred to in art. 65l par. 2,
b) research works are carried out contrary to the information provided in the application referred to in art. 65l par. 2
c) continued research is a threat to human life or health or property of great value;
2) suspend the permit if further conduct of research can threaten human life or health or property of great value - until the threat ceases.

Art. 65n.

1. The organizer of research works is obliged to:

1) enable the Police to perform activities necessary to ensure road traffic safety and protect human life and health and property while conducting the research;
2) ensure that during conducting the research in an autonomous vehicle, in a place intended for the driver, there is a person who has a driving license, who can take control of the vehicle at any time, in particular in the event of a threat to traffic safety road;
3) communicate information about the planned research works and the course of the route on which the autonomous vehicle will move to the public;
4) provide the Director of the Transport Technical Supervision with a report on the research carried out related to the testing of autonomous vehicles and their equipment, in accordance with the formula set out in the regulations issued on the basis of par. 2, within 3 months from the day of completing the tests.

2. The minister responsible for transport will determine, by way of a regulation, a model report submitted by organizers of research related to testing autonomous vehicles and the equipment in them, guided by the need to provide access to uniform information on the reliability of the vehicles, how to navigate on roads, how to control the vehicles vehicles and road safety. “;

2) in art. 71 following par. 2, par. 2a shall be added:

2a. Electric vehicles and hydrogen-powered vehicles have license plates indicating the type of fuel used to drive them.

3) in art. 129b par. 2 point 2 letter c the full stop is replaced by a comma and the following point is added: d reading as follows:

"**d)** limitation of traffic in the clean transport zone, as defined in the resolution of the municipality council, issued on the basis of art. 40 par. 1 of the Act of January 11, 2018 on Electromobility and Alternative Fuels (Journal of Laws item 317). “;
4) the title of Section VI shall be replaced by the following:
“Amendments to the existing regulations, episodic, transitional and final provisions”
5) following art. 148, 148a and 148b shall be added:

"Art. 148a.

1. Until 1 January 2026, it is allowed to move using the electric vehicles referred to in art. 2 point 12 of the Act of January 11, 2018 on Electromobility and Alternative Fuels along lanes for buses designated by the road

administrator.

2. The road manager can make the movement of electric vehicles on the designated lanes for buses dependent on the number of people moving using the vehicles.

Art. 148b.

1. From 1 July 2018 to 31 December 2019, electric vehicles and hydrogen vehicles are marked with a sticker indicating the type of fuel used for their propulsion placed on the windshield of the vehicle according to the formula specified in the regulations issued on the basis of art. 76 par. 1 point 1.

2. The sticker referred to in paragraph 1, shall be issued by the commune head, mayor or city president competent for the place of residence or the seat of the vehicle owner.

Article 56

Art. 56. The Act of 21 December 2000 on technical supervision (Journal of Laws of 2017, item 1040, 1555 and 2201) is amended as follows:

1) in art. 37 in point 19, the full stop is replaced by a semicolon and the following point 20 is added:

"20) issuing opinions referred to in art. 15 para. 1 and art. 26 par. 1 of the Act of January 11, 2018 on Electromobility and Alternative Fuels (Journal of Laws item 317), and carrying out tests referred to in art. 16 and art. 27 of this Act. “;

2) in art. 44 in para. 1 in point 8 the dot is replaced with a semicolon and the following point 9 is added:

"9) carrying out tests referred to in art. 18 para. 1 and art. 28 para. 1 of the Act of January 11, 2018 on electromobility and alternative fuels. ".

Art. 57. In the Act of 13 November 2003 on the incomes of local government units (Journal of Laws of 2017, item 1453, 2203 and 2260) in art. 42:

1) in paragraph 2 after point 5c, the following point 5d is added:

"5d) related to the construction of public transport infrastructure for road transport and charging stations for electric vehicles, referred to in the Act of 11 January 2018 on electromobility and alternative fuels (Journal of Laws No. 317), used to perform own tasks local government units; ";

2) the following paragraph is added: 14 is added:

14. The minister competent for economy in consultation with the minister competent for energy will determine, by way of a regulation, the detailed conditions and procedure for granting subsidies from the state budget for the tasks referred to in paragraph 2 point 5d, taking into account the need for effective use and settlement by local government units of budgetary funds received in the form of subsidies and the security by these units of the share of their own funds in planned investments.

Art. 58. The Act of 6 December 2008 on excise duty (Journal of Laws of 2017, item 43, 60, 937 and 2216 and 2018 item 137) is amended as follows:

1) following art. 109, 109a shall be added:

"Art. 109a.

1. A passenger car constituting an electric vehicle within the meaning of Article 2 point 12 of the Act of January 11, 2018 on electromobility and alternative fuels (Journal of Laws item 317) and a hydrogen-powered vehicle within the meaning of art. 2 point 15 of this Act.

2. In the case referred to in paragraph. 1, the competent head of the tax office issues upon the request of the entity concerned a certificate confirming exemption from excise tax, provided that the entity presents documentation confirming that the vehicle to which the exemption applies is an electric vehicle or a hydrogen-powered vehicle.

2. in Chapter VII, the title of Chapter 2 is replaced by the following: ,, Episodic and transitional provisions "
3) following art. 163, 163a shall be added:

"Art. 163a.

1. In the period until January 1, 2021, exemption from excise duty is a personal car constituting a hybrid vehicle within the meaning of art. 2 point 13 of the Act of January 11, 2018 on electromobility and alternative fuels.

2. In the case referred to in paragraph. 1, the competent head of the tax office issues, at the request of the entity concerned, a certificate confirming exemption from excise tax, provided that the entity presents documentation confirming that the vehicle concerned by the exemption is a hybrid vehicle.

Art. 59. The Act of December 16, 2010 on public collective transport (Journal of Laws of 2017, item 2136 and 2371) is amended as follows:

1) in art. 4 in paragraph 1:

a) the following point 9a is inserted after point 9:

"**9a)** zero-emission bus - zero-emission bus within the meaning of art. 2 point 1 of the Act of January 11, 2018 on electromobility and alternative fuels (Journal of Laws item 317); "

b) point 19 is replaced by the following:

,,**19)** other rail transport - transport of persons by means of transport moving on rails or railway tracks, including by tram or metro, or transport of persons by means of transport moving on one rail or on air or magnetic cushions, other than rail transport and rope transport -terenowy; "

c) point 22 is replaced by the following:

,, 22) rope-off-road transport - transporting people by means of transport moving on rails or one rail using a driving rope; ";

2) in art. 12:

a) in para. 1 in point 7, the full stop is replaced by a semicolon and the following point 8 is added:

"**8)** communication lines on which the use of electric vehicles or natural gas vehicles is envisaged, and the planned date of commencement of their use. ",

b) following par. 1, par. 1a shall be added:

1a. If the transport plan provides for the use of zero-emission buses or buses powered by natural gas, it also specifies:

1) the geographical location of the natural gas station;
2) the geographical location of the public transport road charging infrastructure within the meaning of art. 2 point 3 of the Act of January 11, 2018 on electromobility and alternative fuels, hereinafter referred to as "charging infrastructure";
3) place of connection to:
a) power distribution network - planned charging infrastructure or
b) gas distribution network - a planned gas station, or
c) the energy warehouse referred to in art. 3 point 10k of the Act of April 10, 1997 - Energy Law (Journal of Laws of 2017, item 220, as amended[34)]).
c) following par. 2, the following paragraphs shall be added, 2a - 2c:

2a. When preparing a transport plan for a commune, the results of the analysis referred to in art. 37 paragraph 1 of the Act of January 11, 2018 on electromobility and alternative fuels, prepared by this municipality.

2b. If the results of the analysis referred to in art. 37 paragraph 1 of the Act of January 11, 2018 on electromobility and alternative fuels prepared by the commune indicate the legitimacy of using zero-emission buses in public transport, a transport plan project for the use of these buses is subject to consultations with the electricity distribution system operator and system operator gas distribution, within the meaning of the provisions of the Act of April 10, 1997 - Energy Law.

2c. During the consultations referred to in para. 2b:

1) the operator of the electricity distribution system presents an assessment of the technical and economic conditions for connecting the charging infrastructure to the network in the places indicated in the transport plan project as its location and the possibility of supplying electricity to the network from the energy storage forming part of this infrastructure;
2) the gas distribution system operator shall provide an assessment of the technical and economic conditions for connection to the natural gas station network in the places indicated in the draft transport plan as the location of installations for supplying public transport vehicles.

Chapter 8. Episodic provisions

Art. 60. [Number of charging and refuelling points] 1. The minimum number of charging points installed by December 31, 2020 in public charging stations located in municipalities is:

1) 1000 - in municipalities with a population larger than 1,000,000, in which at least 600,000 motor vehicles have been registered and per 1000 inhabitants, there are at least 700 motor vehicles;
2) 210 - in municipalities with a population larger than 300,000, in which at least 200,000 motor vehicles have been registered and for every 1000 inhabitants there are at least 500 motor vehicles;
3) 100 - in municipalities with a population larger than 150,000, in which at least 95,000 motor vehicles have been registered and for every 1000 inhabitants there are at least 400 motor vehicles;
4) 60 - in municipalities with a population larger than 100,000, in which at least 60,000 motor vehicles have been registered and for every 1000 inhabitants there are at least 400 motor vehicles.

2. The minimum number of refuelling points for compressed natural gas (CNG) located in municipalities until December 31, 2020 shall be at least:

1) 6 - in municipalities with a population of more than 1,000,000, in which at least 60,000 motor vehicles have been registered and per 1,000 locomotives there are at least 700 motor vehicles;
2) 2 - in municipalities with a population higher than 100,000, in which at least 60,000 motor vehicles have been registered and for every 1000 inhabitants there are at least 400 motor vehicles.

3. In the number of charging points installed in generally accessible charging stations referred to in paragraph 1, and in the number of refuelling points for compressed natural gas (CNG), referred to in paragraph 2, the charging points and compressed natural gas refuelling points (CNG) located along the TEN-T core network shall be taken into account accordingly.

Art. 61. [Report on charging points within a municipality] 1. The municipality head, mayor or city president, on the basis of information gathered in the Register of Alternative Fuels Infrastructure and information obtained from the competent architectural and construction administration authority, draws up, by January 15, 2020, a report on charging points in the area of the municipality installed in generally accessible stations charging.

2. The report contains information about:

1) the number and location of generally accessible charging stations, taking into account the capacity of charging points installed in these stations;
2) the number and location of publicly available charging stations planned to be built by December 31, 2020, taking into account the capacity of charging points planned to be installed at these stations;
3) the number of loading points missing to reach the minimum number of charging points indicated in art. 60 ust. 1, as at December 31, 2020, taking into account the charging points referred to in point 2.

Art. 62. [Plan for the construction of generally accessible charging stations] 1. Where from the report referred to in art. 61, it follows that the minimum number of loading points indicated in art. 60 ust. 1, commune head, mayor or city president for the commune:

1) which has a population of at least 100,000 and
2) in which at least 60,000 motor vehicles have been registered, and
3) in which at least 400 motor vehicles per 1000 inhabitants

- draw up a plan for the construction of generally accessible charging stations, hereinafter referred to as "the plan".

2. The plan sets out:

1) the number and location of planned public charging stations with the number of charging points planned to be installed in them, taking into account the power of each of these points;
2) the proposed schedule for the construction of generally accessible charging stations.

3. A commune head, mayor or city president prepares a draft plan by 15 March 2020 and consults it with the residents of the commune, posting it on the website of the office that supports it, and setting a deadline for comments. The deadline can not be shorter than 21 days.

4. The draft plan of the commune head, mayor or city president communicates to power transmission systems operators, in the area of operations, the deployment of generally accessible charging stations is planned for reconciliation. The deadline for agreeing the draft plan may not be shorter than 30 days.

5. The operators shall agree on the draft plan, taking into account the existing and anticipated connection capacity in the development plan to meet the current and future energy demand referred to in Art. 16 sec. 4 of the Act of April 10, 1997 - Energy Law.

6. The operator of the electricity distribution system informs about the agreement of the draft plan of the commune head, mayor or president of the city and provides him with the elaborated connection program referred to in para. 11.

7. The commune head, mayor or city president submits the draft plan to the commune council, immediately after it has been agreed by the last operator of the power distribution system.

8. The commune council adopts the plan, by way of a resolution, within 14 days from the date of its receipt.

9. The plan is not a local law act.

10. The commune head, mayor or city president passes the adopted plan to the operators of electricity distribution systems, informs about its approval of the President of the Energy Regulatory Office and publishes the plan on the website of the office servicing him.

11. Based on the draft plan provided to the electricity distribution system operator, this operator develops a program for connecting the generally available charging stations provided for in the draft plan to the electricity distribution system. The commune head, mayor or city president sets a deadline for the development of this program, not shorter than 30 days from the date of submitting the draft plan to the operator.

12. The connection program referred to in paragraph 11, specifies the technical and economic conditions for connection of generally available charging stations indicated in the draft plan together with the expected connection dates.

Art. 63. [Task commissioned in the field of government administration] The task of preparing a plan is a task commissioned in the field of government administration.

Art. 64. [Construction costs of generally available charging stations] 1. The operator of the power distribution system, competent for the location of the public charging station specified in the plan, builds such a station.

2. The construction costs of generally accessible charging stations, referred to in paragraph 1, incurred by the electricity distribution system operator 1 are included in justified costs within the meaning of art. 3 point 21 of the Act of 10 April 1997 - Energy Law.

Art. 65. [Designation to perform the functions of the operator and the charging service provider] 1. [35)] Commune head, mayor or city president submits an application to the President of the Energy Regulatory Office for the appointment of an energy company that will act as the operator of a generally accessible charging station, which will be built as planned, performing tasks in the field of management, operational safety, operation, maintenance and repairs of such station and supplier charging services at such a station.

2. [36)] The President of ERO determines, by way of a decision, to perform the function of an operator of a generally available charging station and a charging service provider, a power company conducting business in the field of electricity trading, which sells electricity to the largest number of end consumers connected to the electricity distribution grid in the commune, in which it is to act as the operator of a public charging station.

3. An electricity distribution system operator that has built a publicly available charging station within one year from the date of taking over the function of the operator of this station by an energy company designated in accordance with paragraph 2, conducts proceedings to select the operator of a generally accessible charging station operating in the scope indicated in paragraph 1. The provisions of the Act of 21 October 2016 on the concession contract for construction works or services shall apply accordingly.

Art. 66. [Transmission easement] [37)] State Treasury, commune and municipal legal person establish free transmission easement for the benefit of the electricity distribution system operator for the network supplying electricity to the generally available charging station built by this operator in accordance with Art. 64 para. 1.

Art. 67. [Public purpose within the meaning of the Act on Real Estate Management] Construction of generally available charging stations indicated in the plan and implementation of projects necessary to connect them to the network, in particular modernization, expansion or construction of the network, constitute a public purpose within the meaning of the Act of August 21, 1997 about real estate management.

Art. 68. [Share of electric vehicles in the fleet of used vehicles] [38)] 1. The supreme or central organ of state administration, referred to in art. 34, ensures that the share of electric vehicles in the fleet of used vehicles is at least:

1) 10% - from January 1, 2020;
2) 20% - from January 1, 2023.

2. The local government unit referred to in art. 35 para. 1, ensures that the share of electric vehicles in the fleet of used vehicles, from 1 January 2020, is at least 10%.

3. [39)] The local government unit referred to in art. 35 para. 2, from January 1, 2020, performs or assigns a public task to an entity whose share of electric vehicles or natural gas vehicles in the fleet of vehicles used in carrying out this task is at least 10%.

4. The local government unit referred to in art. 36 par. 1, ensures the participation of zero-emission buses in the operated fleet of vehicles at least:

1) 5% - from January 1, 2021;
2) 10% - from January 1, 2023;
3) 20% - from January 1, 2025.

Chapter 9. Adaptation, transitional and final provisions

Art. 69. [Establishment of the Register of Alternative Fuels Infrastructure] The Register of Alternative Fuels Infrastructure is being developed.

Art. 70. [Notice of the National Development Policy Framework] 1. The national framework for alternative fuels infrastructure development policy adopted by the Council of Ministers on 29 March 2017 constitutes the National Policy Framework for the development of alternative fuels infrastructure, referred to in art. 43.

2. The national policy framework for the development of alternative fuels infrastructure referred to in paragraph 1, shall be published in the Official Gazette of the Republic of Poland "Monitor Polski", within 60 days from the date of entry into force of the Act.

Art. 71. [Report for the European Commission] The minister competent for energy for the first time will submit to the European Commission the report referred to in art. 44 par. 1 point 3, by November 18, 2019.

Art. 72. [The date of preparing the cost-benefit analysis] The local government unit for the first time draws up the analysis referred to in art. 37 paragraph 1, by 31 December 2018.

Art. 73. [Time limit for providing information on the number and percentage of vehicles in the fleet] Information referred to in art. 38, entities obliged to provide it, for the first time they provide the minister competent for energy within 3 months from the date of entry into force of the Act. The information includes data as at 31 December of the year preceding the year of forwarding this information.

Art. 74. [Adaptation regulations] [40)] 1. Entities operating on the day of entry into force of the Act charging stations, charging points included in the road transport infrastructure for public transport of vehicles, power stations for shore-side electric power units, natural gas stations and liquefied natural gas (LNG) bunkering sites, for further operation they are obliged within 12 months from the date of entry into force of the secondary legislation issued on the basis of Art. 17, art. 19 and art. 29, adjust them to the requirements set out in this Act and these implementing provisions, and submit, as appropriate to UDT or TDT, a request for conducting a test permitting their further operation.

2. To entities that have started the operation or construction of charging stations, charging points included in the infrastructure for charging road transport of vehicles, power stations for shore-side electric power stations, natural gas stations and liquefied natural gas (LNG) bunkers after the date of entry into force of this Directive act, and before the entry into force of the secondary legislation, issued on the basis of Art. 17, art. 19 and art. 29, in order to commence or continue their operation, they shall be obliged within 12 months from the date of entry into force of the secondary legislation issued on the basis of Art. 17, art. 19 and art. 29, comply with the requirements set out in this Act and these implementing provisions, and submit, as appropriate to UDT or TDT, a request for a study allowing the commencement or their further operation. The provision of art. 16 shall not apply.

Art. 75. [Exclusion of use] The provision of art. 12 para. 1 does not apply to construction plans for which, prior to 1 January 2019, an application for a building permit or a separate decision on the approval of a construction design has been submitted.

Art. 76. [Termination of contracts] Agreements concluded by the supreme and central state administration body with an entity providing economic services in the field of transport and concluded by territorial self-government units for the performance of a public task, excluding public transport, expire on 31 December 2019, if not ensure the use of electric vehicles at the level specified in art. 68 para. 1 or 3.

Art. 77. [Copy of the decision on temporary registration of the vehicle] Until the entry into force of Art. 65l par. 4 point 3 of the Act changed in art. 55 to the application for permission to carry out research works, a copy of the decision on the temporary registration of the vehicle issued on the basis of art. 74 par. 2 point 3 of the Act changed in art. 55.

Art. 78. [Deadline for the development of the natural gas station program] 1. If the date of preparation by the gas distribution system operator of an update of the development plan in terms of satisfying the current and future demand for gaseous fuels referred to in art. 16 sec. 4 of the Act of April 10, 1997 - Energy Law, falls after 6 months from the date of entry into force of this Act, this operator develops the program referred to in art. 20 para. 1, within 6 months from the date of entry into force of this Act for the period of validity of the current development plan as at the date of entry into force of this Act, and agree with the operator of the gas transmission system, and then with the President of the Energy Regulatory Office.

2. In the program referred to in art. 20 para. 1, the operator of the gas distribution system determines the number of planned filling points for compressed natural gas (CNG), not less than specified in art. 60 ust. 2.

3. The General Director of National Roads and Motorways prepares for the first time a plan for the location of generally accessible charging stations and natural gas stations along the remaining TEN-T core network roads, referred to in art. 32 para. 1, and forwards it to consult with the operators of electricity and gas distribution systems and with the entities managing service locations, within 6 months from the date of entry into force of this Act.

4. The managing entity of the port belonging to the TEN-T core network prepares for the first time a plan for the location of liquefied natural gas (LNG) bunkering points or the possibility of bunkering using bunkers and points for supplying electricity from land based on art. 33 para. 1, and forwards it to consult with the relevant operators of electricity and gas distribution systems, within 6 months from the date of entry into force of this Act.

Art. 79. [The deadline for submitting information to the register] The entities obliged to submit information to the register for the first time provide the information referred to in art. 42 par. 3, until January 15, 2019, excluding the entities referred to in art. 74, operating publicly accessible charging stations or natural gas stations, which provide this information for the first time within one month from the day of conducting the test allowing further operation of these stations.

Art. 80. [Update of the public transport sustainable development plan] Plan for the sustainable development of public mass transport, referred to in Art. 9 of the Act changed in art. 59, the entity obliged to develop it shall update in order to take into account the requirements referred to in art. 12 para. 1 point 8 and par. 1a and 2a-2c of the Act changed in art. 59, in the wording given by this Act, within one year from the date of entry into force of this

Act.

Art. 81. [Time for marking parking spaces for electric vehicles] The competent authority for traffic management fulfils the obligation referred to in art. 12b and art. 13b par. 6 point 1a of the Act changed in art. 49, in the wording given by this Act, from the first day of the month following the expiration of 3 months from the date of entry into force of the provisions defining the conditions for the marking of parking spaces for electric vehicles.

Art. 82. [Implementing provisions] Existing implementing rules issued on the basis of art. 46 ust. 3 of the Act changed in art. 54 remain in force until the date of entry into force of the secondary legislation issued on the basis of art. 46 ust. 3 of the Act changed in art. 54, in the wording given by this Act, but not longer than 36 months.

Article 83

Art. 83. [Limit of state budget expenditure] 1. The maximum limit of state budget expenditure allocated for the performance of tasks of the supreme and central state administration bodies resulting from this Act is:

1) 2018 - PLN 4,010,000;
2) 2019 - PLN 4,402,000;
3) 2020 - PLN 13,716,000;
4) 2021 - PLN 2,060,000;
5) 2022 - PLN 2,320,000;
6) 2023 - PLN 7,193,000;
7) 2024 - PLN 2,060,000;
8) 2025 - PLN 19,689,000;
9) 2026 - PLN 2,060,000;
10) 2027 - PLN 2,060,000.

2. In the case of exceeding or threatening to exceed the adopted for a given financial year limit of expenditure specified in paragraph 1, a corrective mechanism is applied, consisting in limiting the fulfillment of the obligation to ensure the share of electric vehicles in the fleet of vehicles used, as defined in art. 34 and art. 35 para. 1.

3. The competent authority to monitor the use of the expenditure limit referred to in paragraph 1, the minister responsible for energy matters.

4. The supreme and central organs of state administration are responsible for the implementation of the correction mechanism referred to in para. 2.

Art. 84. [Exceptions to the application of provisions] Provisions:

1) art. 66 of the Act,
2) art. 50a of the Act changed in art. 49

- in the wording given by this Act, applies from the date of the announcement of a positive decision of the European Commission on the compatibility of state aid provided for in these regulations with the common market or confirmation by the European Commission that these provisions do not constitute public aid.

Art. 85. [Exceptions to the application of the provisions] 1. Provisions of art. 23 par. 1 point 4 of the Act changed in art. 51, in the wording given by this Act, and art. 16 sec. 1 point 4 of the Act changed in art. 52, in the wording given by this Act, the following applies:

1) from the date of announcement of a positive decision of the European Commission on the compatibility of public aid provided for in these regulations with the common market or confirmation by the European Commission that these provisions do not constitute public aid;
2) in respect of electric vehicles within the meaning of this Act, put into use after the date determined in accordance with point 1.

2. Provisions of art. 109a and art. 163a of the Act changed in art. 58, in the wording given by this Act, the following applies

1) from the date of announcement of a positive decision of the European Commission on the compatibility of public aid provided for in these regulations with the common market or confirmation by the European Commission that these provisions do not constitute public aid;
2) for electric vehicles, hybrid vehicles and hydrogen powered vehicles, within the meaning of this Act, in relation to which excise tax liability arose after the date specified in point 1.

Art. 85a. [Application of the provision] [41] Provision of art. 3 par. 1 point 10 shall apply from 1 January 2023.

Art. 86. [Coming into force] The Act comes into force after 14 days from the day of announcement, with the exception of:

1) [42] art. 3 par. 1 point 8 which shall come into force on 1 September 2018;
2) art. 24 which shall come into force on January 1, 2026;
3) art. 34 and art. 35 which shall come into force on January 1, 2025;
4) art. 36 which shall come into force on January 1, 2028;
5) art. 39 par. 2 which shall come into force six months after the date of entry into force of the Act;
6) art. 41 par. 1 which shall come into force after 3 months from the date of entry into force of the Act;
7) art. 42 and art. 69 which shall come into force on January 1, 2019;
8) art. 49 point 6 which shall come into force on November 3, 2018;
9) art. 55:
 a) point 1 in the scope of the added art. 65l par. 4 point 3 which shall come into force on 1 July 2019,

b) point 2 which shall come into force on January 1, 2020.

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1) This Act, within the scope of its regulation, implements Directive 2014/94/EU of the European Parliament and of the Council of October 22, 2014 on the development of alternative fuels infrastructure (Official Journal UE L 307, 28/10/2014, page 1).

2) The following acts are amended by this Act: Act of May 20, 1971 - Code of Infractions, Act of 21 March 1985 on Public Roads, Act of 21 March 1991 on Sea Areas of the Republic of Poland and Maritime Administration, Act of July 26, 1991 on personal income tax, act of February 15, 1992 on corporate income tax, act of July 7, 1994 - Construction law, act of April 10, 1997 - Energy law, the Act of 20 June 1997 - Road Traffic Law, the Act of 21 December 2000 on technical supervision, the Act of 13 November 2003 on the incomes of local self-government entities, the Act of 6 December 2008 about excise tax and the Act of December 16, 2010 on public collective transport.

3) Art. 2 par. 4 in the wording of the Act of 06/06/2018 (Journal of Laws of 2018, item 1356), which came into force on July 28, 2018.

4) Art. 2 par. 5 in the wording of the Act of 06/06/2018 (Journal of Laws of 2018, item 1356), which came into force on July 28, 2018.

5) Art. 2 par. 6 in the wording of the Act of 06/06/2018 (Journal of Laws of 2018, item 1356), which came into force on July 28, 2018.

6) Amendments to the consolidated text of the said Act were announced in the Journal of Laws of 2017 items 791, 1089, 1387 and 1566 and of 2018, items 9, 138 and 317.

7) Amendments to the said Regulation were announced in the Official Journal UE L 136, 09/05/2014, p. 10, Official Journal UE L 126 of 14.05.2016, page 3 and Official Journal UE L 128, 19/05/2017, page 1).

8) Art. 2 par. 27 in the wording of the Act of 06/06/2018 (Journal of Laws of 2018, item 1356), which came into force on July 28, 2018.

9) Art. 3 par. 4, amended by the Act of 06/06/2018 (Journal of Laws of 2018, item 1356), which came into force on October 10, 2018.

10) Art. 3 par. 1,Point 5 in the wording of the Act of 06/06/2018 (Journal of Laws of 2018, item 1356), which came into force on July 28, 2018.

11) Pursuant to art. 85a of the Act, the provision shall apply from January 1, 2023.

12) Art. 12 par. 2 in the wording of the Act of 06/06/2018 (Journal of Laws of 2018, item 1356), which came into force on July 28, 2018.

13) Art. 13 in the wording of the Act of 06/06/2018 (Journal of Laws of 2018, item 1356), which came into force on July 28, 2018.

14) Art. 18a added pursuant to the Act of 06/06/2018 (Journal of Laws of 2018, item 1356), which came into force on July 28, 2018.

15) Art. 20 par. 1 in the wording of the Act of 09/11/2018 (Journal of Laws of 2018, item 2348), which came into force on January 1, 2019.

16) Art. 28a added pursuant to the Act of 06/06/2018 (Journal of Laws of 2018, item 1356), which came into force on July 28, 2018.

17) Art. 34 par. 1 in the wording of the Act of 06/06/2018 (Journal of Laws of 2018, item 1356), which came into force on July 28, 2018.

18) Art. 35 par. 1 in the wording of the Act of 06/06/2018 (Journal of Laws of 2018, item 1356), which came into force on July 28, 2018.

19) Art. 39 par. 1 in the wording of the Act of 06/06/2018 (Journal of Laws of 2018, item 1356), which came into force on July 28, 2018.

20) Art. 39 par. 3 point 1, amended by the Act of 06/06/2018 (Journal of Laws of 2018, item 1356), which came into force on October 10, 2018.

21) Art. 39 par. 4a added pursuant to the Act of 06/06/2018 (Journal of Laws of 2018, item 1356), which came into force on July 28, 2018.

22) Art. 39 par. 4b added pursuant to the Act of 06/06/2018 (Journal of Laws of 2018, item 1356), which came into force on July 28, 2018.

23) Art. 39 par. 4c added pursuant to the Act of 06/06/2018 (Journal of Laws of 2018, item 1356), which came into force on July 28, 2018.

24) Art. 39 par. 4d added pursuant to the Act of 06/06/2018 (Journal of Laws of 2018, item 1356), which came into force on July 28, 2018.

25) Art. 45 par. 1,Point 2 in the wording of the Act of 06/06/2018 (Journal of Laws of 2018, item 1356), which came into force on July 28, 2018.

26) Art. 45 par. 1,Point 8 in the wording of the Act of 06/06/2018 (Journal of Laws of 2018, item 1356), which came into force on July 28, 2018.

27) Art. 45 par. 1 point 12, added by the Act of 06/06/2018 (Journal of Laws of 2018, item 1356), which came into force on October 10, 2018.

28) Art. 45 par. 2,Point 5 in the wording of the Act of 06/06/2018 (Journal of Laws of 2018, item 1356), which came into force on July 28, 2018.

[29] Article 46 par. 1 point 1 in the wording of the Act of 6.06.2018 (Journal of Laws of 2018 item 1356) which comes into force on July 28, 2018; amended by the Act of 9/11/2018 (Journal of Laws of 2018 item 2348), which comes into force on January 1, 2019.

[30] Art. 46 par. 2 amended by the Act of 06/06/2018 (Journal of Laws of 2018, item 1356), which came into force on October 10, 2018.

[31] Amendments to the consolidated text of the said Act were announced in the Journal of Laws of 2015 items 1485, 1634 and 1707, of 2017, items 966, 1941 and 2361 and of 2018, item 79.

[32] Amendments to the consolidated text of the said Act were announced in the Journal of Laws of 2017 items 791, 1089, 1387 and 1566 and of 2018, items 9 and 138.

[33] Amendments to the said Regulation were announced in the Official Journal UE L 349 of 21.12.2013, page 28 and Official Journal UE L 19, 27/01/2016, page 1).

[34] Amendments to the consolidated text of the said Act were announced in the Journal of Laws of 2017 items 791, 1089, 1387 and 1566 and of 2018, items 9, 138 and 317.

[35] Art. 65 par. 1 in the wording of the Act of 06/06/2018 (Journal of Laws of 2018, item 1356), which came into force on July 28, 2018.

[36] Art. 65 par. 2 in the wording of the Act of 06/06/2018 (Journal of Laws of 2018, item 1356), which came into force on July 28, 2018.

37) According to art. 84 of this Act, the provisions of art. 66 shall apply from the date of the announcement of a positive decision of the European Commission on the compatibility of State aid provided for in these provisions with the common market or the statement of the European Commission that these provisions do not constitute public aid.

38) Article 68 in the wording of the Act of 6/06/2018 (Journal of Laws of 2018 item 1356), which shall enter into force on 28/07/2018.

[39] Art. 68 par. 3 in the wording of the Act of 09/11/2018 (Journal of Laws of 2018, item 2348), which came into force on January 1, 2019.

40) Article 74, the designation of paragraphs 1 and par. 2 added by the act of 6.06.2018 (Journal of Laws of 2018 item 1356), which comes into force on July 28, 2018.

[41] Art. 85a added pursuant to the Act of 06/06/2018 (Journal of Laws of 2018, item 1356), which came into force on July 28, 2018.

[42] Art. 86 par. 1 in the wording of the Act of 06/06/2018 (Journal of Laws of 2018, item 1356), which came into force on July 28, 2018.

ID and Data Collection for Sustainable fuels in Europe

Report

Deliverable 2.2.5: *Proposal to the Commission for complementary data protocols to enable e-Mobility service provision and proposal for relevant standards*

Project Acronym	IDACS
Project Full Name	ID and Data Collection for Sustainable Fuels in Europe
Grant Agreement number	MOVE/B4/SUB/2018-498/CEF/PSA/SI2.792684
Activity	2.2 Provision of static and dynamic data through the National Access Points of the Member States in requested format DATEX II
Deliverable Status	Final
Dissemination Level	Public
Version / date	V2.0 (final) / 30-06-2022
Main authors	Jan Wegener, NOW GmbH Anneke Bosma, Netherlands Enterprise Agency
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List of abbreviations

AFI	: Alternative Fuels Infrastructure
AFID	: Alternative Fuels Infrastructure Directive
CNG	: Compressed Natural Gas
CPO	: Charge Point Operator
eMIP	: e-Mobility Protocol Inter-Operation
EVSE	: Electric Vehicle Supply Equipment
FCH-JU	: Fuel Cells and Hydrogen Joint Undertaking
GNSS	: Global Navigation Satellite System
HRS	: Hydrogen Refuelling Station
IDRO	: ID Registration Organization
IEC	: International Electrotechnical Commission
ITS	: Intelligent Transport Systems (directive)
LNG	: Liquefied Natural Gas
LPG	: Liquefied Petroleum Gas
MSP	: Mobility Service Provider
NAP	: National Access Point
OCHP	: Open Clearing House Protocol
OCPI	: Open Charge Point Interface
OICP	: Open Inter Charge Protocol
OSI	: Open Source Initiative
POI	: Point Of Interest
PSA	: Programme Support Action
P2P	: Peer-to-peer
SDO	: Standards Developing Organizations
SGEMS	: Sub-Group on Electro-Mobility Services (Sustainable Transport Forum)
WWCP	: World Wide Charging Protocol Suite

1. Introduction

The Programme Support Action (PSA) was derived from two directives of different disciplines, namely the Alternative Fuel Directive 2014/94/EU (AFID) and the Intelligent Transport System Directive 2010/40/EU (ITS). Whereas the AFID focuses on the stimulation of the uptake of alternative fuels, such as electromobility, the ITS directive focuses on optimal use of road, traffic and travel data for traffic (management) and transport purposes. Consequently, both directives serve different users, although there exist relevant points in common. AFID aims to make alternative fuel data available for consumers through third party service providers, while ITS intends to provide data for ITS services for traffic management and freight transport. However, efforts are being made to integrate systems and regulations from different disciplines, in order to facilitate broader application possibilities, from which this PSA is an example. Thus, the collection and exchange of data in DATEX II format through the National Access Point, derives from the ITS directive, whereas the data categories are derived from the alternative fuels framework, and in particular the AFIR proposal[1].

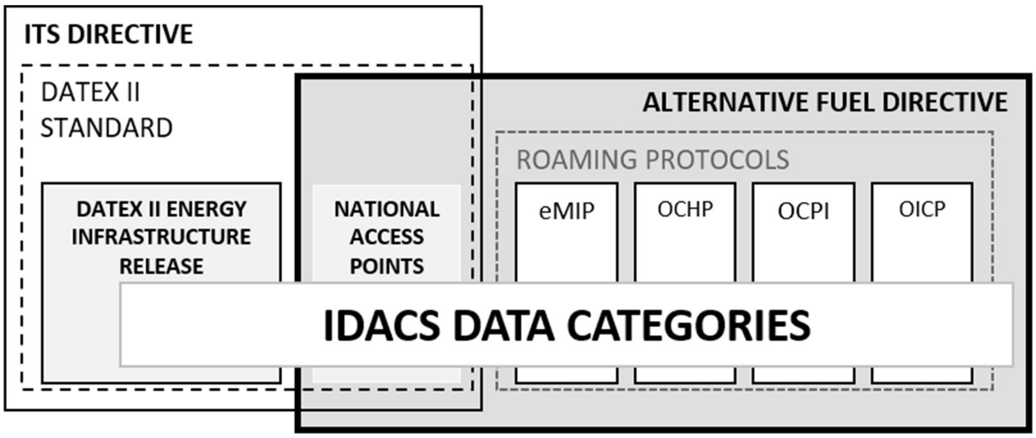

Figure 1: IDACS data categories exchangeable within standards & protocols from both ITS & AF directive

Consequently, this has implications for the PSA. The Grant Agreement specifies that: *the provision of static and dynamic data through the National Access Points of the Member States* should be *in requested format DATEX II (or any machine-readable format fully compatible and interoperable with DATEX II)* In June 2021, the *Energy Infrastructures* publication, also known as the DATEX II version 3.2, including Point of Interest (POI) electromobility data, was launched. However, in the practice, whilst third party service providers or end users in electromobility may benefit from the data collection on the National Access Point, the provided DATEX II format is not yet in use in the electromobility market, because it serves a different purpose, namely the exchange of data for traffic management and freight transport's use. The protocols that are in use in the electromobility market for sharing POI data are the roaming protocols. Their initial intended purpose has been authentication of the end user (EV driver), authorisation of charging sessions and billing. For these purposes all the static and dynamic data categories are part of the protocols, albeit in different data fields (attribute names) and data types (integer, Boolean etc.). The DATEX II format offers the advantage of a uniform format for this type of data.

The Grant Agreement states that fuel specific standards and protocols may become more relevant in future when innovative services in the energy system such as smart charging and vehicle to grid applications are developed. Therefore, the Grant Agreement also requires to study what fuel

[1] https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:52021PC0559

specific data formats and communication protocols in the electromobility market are relevant on top of DATEX II. Thus, this document explores commonly used communication protocols with a focus on those that are used for e-roaming[2] (hereinafter: roaming protocols)[3].

2. Purpose of this document

This document aims to present complementary data protocols on top of DATEX II to the Commission to enable e-Mobility service provision. The purpose of this document is therefore not to give a recommendation for any of the roaming protocols but it will analyse these in terms of their origin, distribution, and openness. The document will find that none of the protocols can be considered *open source* and that all of them have different kinds of cost attached to them. The analysis presented in this document provides insight into available protocols, facilitating third party service developers to access and/or re-use the data, made available through the different NAPs. This overview will further promote the provision of static and dynamic data related to the alternative fuels infrastructure for electricity, which is the main aim of activity 2.2 of the IDACS project.

3. Methodology

The analysis of roaming protocols comprises a summary of the basic functions of the protocols and will briefly touch upon the backgrounds of the protocols, i.e. the initially intended use cases for them. The latest versions will be described even though older versions may still be in use in some cases.

The Grant Agreement states that *robust and secure open standards and protocols* should be promoted. Consequently, a discussion of how *openness* is defined according to different perspectives and an analysis of the different data protocols will be part of section 4 of this document.

Lastly, the document will show to what extent and how the roaming protocols contain fields for the different data categories that are in the scope of IDACS. This will give insight into what IDACS required POI data roaming protocols are able to convey. Moreover, the results will be interpreted in the context of different applications and whether the use of conversion tools allows to convert the data into DATEX II.

4. Roaming protocols

Roaming protocols in use in Europe and relevant for IDACS, are for example the eMobility Inter-Operation Protocol (eMIP), the Open Clearing House Protocol (OCHP), the Open Charge Point Interface (OCPI) and the Open Inter Charge Protocol (OICP). Further, roaming protocols such as

[2] According to Article 2 (21) of the proposal for a regulation on the deployment of alternative fuels infrastructure, and repealing Directive 2014/94/EU of the European Parliament and of the Council “e-roaming means the exchange of data and payments between the operator of a recharging or refuelling point and a mobility service provider from which an end user purchases a recharging service”.

[3] Protocols used for the communication between charging points and the backend of the operators, such as OCPP, will not be described in detail as the Member States in the Consortium decided in their approaches to enable data conversion from different roaming protocols to DATEX II v 3.2 only. OCCP as a protocol seemed ill-suited for the data aggregation via NAP databases because at least hundreds of connections would need to be established between NAP and every CPO to collect charging point data. Fewer connections are required between NAP and roaming platforms.

the World Wide Charging Protocol Suite (WWCP) or interfaces such as OIOI are not described here due to their limited relevance in the context of IDACS. The relevance is limited as only a few or certain market actors make use of them, whereas the others connect thousands of charging points of a multitude of CPOs and MSPs.

The essential functions of the aforementioned protocols are authorization and billing which enable charging sessions and payment. Table 1 summarizes the comparison of the functionalities and communication topologies (platform-based[4] or peer-to-peer) supported by each protocol.

	eMIP 0.7.4	OCHP 1.4 & OCHPdirect 2.0	OCPI 2.2	OICP 2.3
Authorization	•	•	•	•
Billing	•	•	•	•
EVSE static data	•	•	•	•
EVSE dynamic data	•	•	•	•
Tariff Information	•	•	•	•
Remote Start & Stop	•	•	•	•
Reservation	•	•	•	•
EVSE Monitoring[5]	•		•	
Smart Charging			•	
Hub	•	•	•	•
Peer-to-Peer		•	•	

Table 1 Basic functionalities of the roaming protocols

4.1 Origins of the different roaming protocols

The different protocols all have different origins that also partly explains their setup and design. Brief descriptions of their origin and the use cases they are intended to serve are illustrated in the following section. Each protocol is described along the same characteristics, namely: origin, owner, scope, compatibility with other protocols, the type of connections that are supported, its services, users and costs. Annex 1 provides links to more specific information, such as conditions for use and functionalities in the latest releases of these protocols.

4.1.1 eMobility Inter-Operation Protocol (eMIP)

Origin and ownership
eMIP is developed by the French roaming provider GIREVE, whose shareholders are the state-owned bank Caisse des Dépôts, electricity producer CNR, venture capital provider Demeter, electric utility company Électricité de France (EDF), electricity distributor Enedis and Renault.

[4] Following terms are used interchangeably: (roaming) hub, roaming platform, clearing house
[5] Function for immediate detection of malfunctions of the EVSE.

Scope
As of November 2021, GIREVE's roaming platform connects approximately 160 000 charging points in 32 countries.

Supported connections
eMIP works *via a clearing house* and does not support peer-to-peer connections.

Compatibility
According to GIREVE, eMIP is compatible with OCPI since 2018.

Services, users and costs
eMIP's primary use is for the connection to the GIREVE roaming platform. Different services are offered for different market players (MSPs, CPOs and navigation service providers). The prices of these different services are the following:

- Price for one off technical connection to GIREVE range from 5000€ (single role CPO or eMSP) to 7000€ (both roles).
- Yearly subscription CPO : 0 to 4000€
- Yearly subscription eMSP : 3000€ to 8000€ + fee per session or active drivers based on volume

More information
In Annex 1 more information about the conditions for use and functionalities of eMIP in the current version 1.0.1.4 can be found.

4.1.2 Open Clearing House Protocol (OCHP)

Origin and ownership
OCHP was developed by Smartlab Innovationsgesellschaft mbH, a limited liability company owned by 232 local power utilities in Germany, to enable roaming via their platform 'ladenetz.de'

Scope
As of August 2021 ladenetz.de connects more than 100,000 charging points in Europe. As a joint venture together with ElaadNL, a joint research initiative of the Dutch grid operators Smartlab operates another roaming platform called *e-clearing.net*, which also uses OCHP and connects more than 120,000 charge points. E-clearing.net received support from the Dutch and German ministries of economic affairs.

Supported connections
As the name suggests, OCHP is based *on a clearing house* which facilitates the data exchange between all participants. Meanwhile, there is an extension of OCHP protocol which is called OCHPdirect. It was developed to support peer-to-peer communication.

Compatibility
E-clearing.net is compatible with OCPI.

Services, users and costs
OCHP's primary use is to connect to the *ladenetz.de* platform. Different services are offered for different market players (MSPs, CPOs and navigation service providers). The prices of these different services are not disclosed. Prices for a connection to *e-clearing.net* range from €2,500 to €30,000 annually for MSPs (depending on the number connected cards) and €600 to €10,000 for CPOs (depending on the number of connected charge points).

More information
In Annex 1 more information about the data and functionalities of OCHP in the current version 1.4 can be found.

4.1.3 Open Charging Point Interface (OCPI)

Origin and ownership
OCPI was developed by Dutch and Belgian CPOs and MSPs (collaborating under the name eViolin) together with ElaadNL. Until the start of the EVRoaming Foundation in June 2020, the Dutch Knowledge Platform for Charging Infrastructure (Nationaal Kennisplatform Laadinfrastructuur - NKL) held the intellectual property of OCPI and led the development of the protocol. As of July 2021, the board of the EVRoaming Foundation, which currently holds the intellectual property rights, consists of representatives of NKL, EV Box, Chargepoint, LastMileSolutions, Freshmile and Google.

Scope
As of July 2021, OCPI covered 50.000 charging points and 27 CPOs.

Supported connections
OCPI was initially designed for peer-to-peer communication, meanwhile communication through a hub is also supported. Although, it is not based on a clearing house, it is used in internally used clearing houses, e.g. between CPO and MSP, which basically functions like a clearing house.

Compatibility
Two roaming providers are compatible with OCPI: *e-clearing.net* and *GIREVE* which are implemented using OCHP and eMIP, respectively. As a result, organisations can use it in a hybrid way for both peer-to-peer connections and in combination with roaming hubs.

Services, users and costs
Membership of the EVRoaming Foundation can be acquired for an annual fee. Released versions can be used freely, if there are any developer needs one can become a contributor when signing up for a membership of EV4Roaming.

More information
In Annex 1 the data and functionalities of OCPI in the current version 2.2 can be found.

4.1.4 Open InterCharge Protocol (OICP)

Origin and ownership
OICP was developed by Hubject GmbH, a limited liability company whose shareholders comprise

the vehicle manufacturer BMW Group, the tier 1 supplier Bosch, the vehicle manufacturer Daimler, the energy company EnBW, the energy as a service provider Enel X, E.ON, Siemens and Volkswagen.

Scope
OICP is used to enable roaming via the platform *Intercharge*, which currently connects more than 300,000 charging points in 52 countries.

Supported connections
OICP works via a clearing house and does not support peer-to-peer setup. The protocol is split into two parts, one for CPOs and one for EMSPs.

Services, users and costs
The intended use for OICP is to connect to the roaming platform *Intercharge*. Prices range from a one-time connection fee of €5,000 plus 99 per month (€ 1,188 annually) to €5 per charge point per month for CPOs and from €0 to €829/customized fees monthly (€14,256) plus a one-time connection fee of €5,000 annually for MSPs (depending on the number of connected cards).

More information
The data and functionalities of OICP in the current version 2.3 can be found in the Annex 1.

4.2 Characteristics of roaming protocols

The following characteristics of roaming protocols offer insight into the preferred option of utilization of different protocols depending on the starting situation.

4.2.1 Peer-to-peer vs. Platform-based approaches to roaming

As already mentioned in the description of the roaming protocols' origins, two different approaches to roaming for electric vehicles exist: they are either peer-to-peer (P2P) or platform-based (or hub- or clearing house-based). OCPI and OCHPdirect were initially designed as P2P protocols, however, nowadays they can also be used to connect to roaming platforms, if these implement the protocol. eMIP, OCHP and OICP were designed as protocols enabling the communication with roaming platforms.

P2P approach: $y = ((n^2 - n)/2)$ ***Platform approach:*** $y = n$

The formula above shows the difference in connecting through the platform-based approach as opposed to the P2P method. As soon as there are more than four actors involved, there will be more connections with a P2P approach than with a platform-based approach. In markets with many different CPOs, a pure P2P approach would make the connection between all players nearly impossible. For example, in Germany as of November 2021, 950 EVSE Operator IDs have been issued. If one assumes a single CPO per EVSE Operator ID[6], 450,775 connections would need to be made to connect all CPOs on a P2P basis (not considering mobility service providers).

The main advantage of using a platform-based approach is the comparably higher efficiency of having all partners connect to the hub only instead of having every actor connect to everyone else in the market. The disadvantage of the use of platform is that actors' business models can be limited by the functionalities supported by the hub (and its associated protocol). Actors connecting to roaming platforms need to accept terms and conditions which differ from platform to platform. Furthermore, the roaming platforms require their users to pay fees. The amounts to be paid are usually stated on the roaming platforms' websites and often depend on the size of the company involved, the market role (CPO or MSP), the level of support needed to connect to the platform and services used (see section 4.1.).

The main advantage of the peer-to-peer approach is that the actors have potentially higher degrees of freedom while developing their business model. However, as shown above, this type of communication topology potentially requires a lot of resources to establish and maintain a number of connections. The costs are implicit and not known beforehand as they pertain mostly to the activities of the legal departments making single contracts and the IT departments. As the formula indicates, the amount of resources needed increases almost exponentially with the number of connections that need to be made.

Concluding, depending on the starting situation, the market, its set-up and its needs, it may be preferred to choose one roaming approach over another.

4.2.2 Openness of protocols

With the exception of eMIP, all the roaming protocols are designated to be *open* according to their names. In its *Open Source Software Strategy 2020 – 2023* [7], the European Commission states that its aims to encourage and leverage open source principles and software. Furthermore, the Commission specifies that *Open source software (or free software) combines copyright and a license to grant users the freedom to run the software, to study and modify it, and share the code and modifications with others. It facilitates collaboration, innovation, and agility.* This section presents the different definitions of *open* and *open source* that are frequently used, such as the one described above and the *Open Source Initiative (OSI)*[8]. A more detailed assessment of single licenses can be found in Annex 2.

Table 3 illustrates to what extent the different protocols can be considered open according to the above-named definitions and under which licenses they are distributed. It becomes apparent that the *openness* of the protocols pertains to the full documentation of the protocols and to the fact that they can be downloaded free of charge. This should be distinguished from the definition of *open source*[9], which refers to the permission to modify works, such as a protocol.

[6] According to the rules for ID issuing set as part of IDACS Activity 1 this should be the case.

[7] https://ec.europa.eu/info/sites/default/files/en_ec_open_source_strategy_2020-2023.pdf

[8] The definition of 'open source' by the OSI was chosen as it can be regarded as the main steward of the definition of the term even if it has not secured a trademark for it. Other organisations, such as the Free Software Foundation also provide definitions for licenses but focus more on 'free software' with a particular focus on ethics of software development that seemed to be beyond the scope of this paper. https://opensource.org/docs/osd

[9] This implies, among other things, that licensees are allowed to produce derivative works (i.e. modified versions) and distribute them. This carries the risk of distributing different incompatible versions, however, this could facilitate protocol development.

Protocol	Download for free	License	Open source (EU)	Open Source (OSI)
eMIP	Yes	Individual	No	No
OCHP	Yes	MIT License	Yes	Yes
OCPI	Yes	Creative Commons Attribution-NoDerivatives 4.0 International	No	No
OICP	Yes	Creative Commons ShareAlike 4.0 International	Yes	No

Table 3 Openness of protocols according to two commonly used definitions

There are other dimensions that can be discussed when considering the *openness* of these protocols. Even though, for example OCHP is the only protocol distributed under an open source licence as defined by the OSI, which enables that the software can be used, copied, modified, merged, published, distributed, sublicensed, and/or copies of it can be sold, its openness is limited by its use to connect to a roaming platform (ladenetz or e-clearing.net), for which fees have to be paid. The same is true for OICP as well as eMIP, which is distributed under an individual license[10]. These protocols are open in that they and the associated documentation are freely distributed. Furthermore, OCHP and OICP can be modified and modifications can be published, e.g. on software development platforms such as Github. In some cases the original software developer has to be named as part of a new version. The business models of the roaming platforms rely on the fees that are paid for their use. It is part of the roaming platforms' business models to further develop the protocols according to the services they provide and to offer support to the users of the software, which want to connect to the platforms. The software used to connect to the platform is mandated by the platform operators and partly they offer support for the software implementation and onboarding (see 4.1.).

OCPI is free to use and not conditioned on the use of a roaming hub as its initial intended use was to establish P2P connections. As noted above, several roaming platforms have announced plans to implement OCPI. Nevertheless, market actors connecting to a roaming platform with OCPI would still have to pay the fees (and accept terms and conditions) set by the roaming platform. If it is used to connect in a peer-to-peer approach the costs are implicit as described in section 4.2. From an open source perspective, OCPI is distributed under the most restrictive license compared to the other *roaming protocols* as it prohibits the publication of modified versions of the software. The reason for this approach is to forego the risk that different and incompatible versions get into circulation. On the other hand, in order to further develop OCPI, it allows to contribute to the software, when enrolling in one of the membership levels as a *contributor*. There are different costs attached to different membership levels.

[10] "The eMIP protocol is the exclusive property of GIREVE in accordance with the provisions of the Code of the intellectual property. GIREVE concedes to the User a non-exclusive, non-transferable license of use of the eMIP protocol, including its documentation, worldwide in the course of its usual professional activities and notably in order to develop software products based on the eMIP protocol. Any non-authorized use is strictly prohibited, notably any modification, communication, distribution and commercialization of the eMIP protocol as such by the User in any form whatsoever. The present license is conceded free of any charge and without any time limit. However, the present license could be terminated automatically ipso jure and without any formality or prior notice in the event of infringement of the terms of present license by the User, notably in case of an act that infringes the intellectual property rights of GIREVE."

As the use and in parts the development of all of the roaming protocols imply the payment of fees, none of them can be considered truly open, as defined in both the EU as the OSI open source descriptions. In addition to the above points, there are also other criteria for assessing open standards. In the evRoaming4EU project, a comparative analysis of standardized protocols for EV roaming was created. The conditions for international standardization processes of the World Trade Organization's Committee on Technical Barriers to Trade (WTO TBT) were used for this.[11] Next to that, there are standards developed by the standards developing organizations (SDO) such as the International Standardisation Organisation (ISO) or the International Electrotechnical Commission (IEC), which are not distributed freely, however they may solve issues with the applicability of definitions on both P2P- and platform based. For example, the standard IEC 63119 defines a protocol for information exchange for electric vehicle charging roaming services that is currently under development. This protocol might become more relevant in future, next to the roaming protocols described here. Its publication is forecast for 31 October 2023. It is currently unclear what the actual scope of the standards is and whether it will be available in time. Another example would be the standardisation of DATEX II v 2.3 (under the document name prCEN/TS 16157-10:2020) at the CEN, which is ongoing as of November 2021.

Assessing the various protocols with regard to *openness* according to *open source* definitions that might not be suitable for all the different roaming approaches, as it emphasizes the futility of recommending one of the roaming protocols in the market over another. It is evident that the *openness* as suggested in the names of some of the protocols is not necessarily referring to *open source*, but more likely to its free use, its use outside of a platform, or complying with only one of the *open source* definitions. Therefore, the characteristic *openness* of a protocol does not seem valid to recommend one protocol over another one.

4.2.3 Data fields of protocols

The above-mentioned protocols have generally similar data fields for specifying and identifying charging points (see Annex 1). All of them include data fields to define each charging point such as address, geo-coordinates, power type, connector type, opening time, user authorization/identification methods, payment methods, contact, availability and tariff.

However, there are many differences. The main differences are as follows.

1) <u>Data structure, i.e., how the data fields are organized and the information is composed</u>:
   In general, several data fields make up a certain information. For example, address information is a combination of data fields such as country, state, city, street, house number, zip code, etc. In addition to this, some protocols include a data field 'floor' that indicates the floor on which charging points are located whereas other protocols do not.
2) <u>Range of predefined values/options defined by each protocol:</u>
   Some data fields have predefined values to be put into the data fields. For example, the data field 'connector type' has predefined values such as CHAdeMO, IEC 62196 Type 1/2/3, etc. Some protocols have a larger range of predefined values than others. For instance, some protocols have a predefined value 'AVCON Connector', while the others do not.
3) <u>Naming of the data fields and values:</u>
   The naming of data fields is different depending on protocols. For example, data fields for postal codes are named differently, e.g., 'postCode', 'zipCode', etc. Furthermore, predefined values are also differently named, e.g., some protocol names a connector 'Type F Schuko' while another protocol names the same connector 'DOMESTIC_F'.

11 Report can be retrieved at: D6.1-Comparative-analysis-of-standardized-protocols-for-EV-roaming.pdf (evroaming.org)

4) Data type:
   The data type of a data field may differ depending on protocols. For example, OCPI follows 'RFC 3339' format while eMIP and the OCHP follow 'ISO 8601' format to record date and time.
5) Ad hoc charging price:
   eMIP, OCHP and OICP do not have data fields for the prices for ad hoc charging (cf. Annex 3) as these protocols were intended for B2B purposes only with no connection to the end consumer. An option could be to display the prices in other data fields as free text.

   The data written according to each protocol need to be translated into DATEX II v 3.2 format to be *unlocked on the NAPs,* as stated in the Grant Agreement. This implies that the data needs to be carefully compared and matched to ensure correct translation into the single data format, i.e. DATEX II v 3.2. The data classes that are part of DATEX II v 3.2 (Energy Infrastructure) can be found as part of Annex 4.

Currently, the most feasible way to convert charging point data to comply with DATEX II requirements, is by using one of the above-mentioned roaming protocols. As part of IDACS, data conversion will be ensured from OCHP, OCPI and OICP to DATEX v 3.2, therefore compliance with the Grant Agreement with respect to DATEX II requirements is adequately taken care of. As described in the introduction, DATEX II is currently not relevant within the fuel specific infrastructure. The use of the converted data might prove relevant in future in a broader context than merely electromobility business/specific fuel infrastructure for example for new applications/services and interoperability in integrated systems/fields. In that case, it might be that more measures are required to improve conversion, such as the development and adoption of a future single roaming protocol, like IEC63119, which might contribute to DATEX II conversion for protocols that do not have a compatible format yet. Furthermore, if necessary, in a future release of DATEX II possibly other protocols 'data formats could be taken into consideration.

5. Conclusion

As required by the Grant Agreement, research has been performed to describe relevant fuel specific data formats and communication protocols in the electromobility market, on top of DATEX II. Summarizing, it can be concluded that all of the roaming protocols are currently in use for sharing POI data in the European market, albeit to different extents. Where roaming platforms offer the advantage of supplying aggregated data, the P2P approach offers more freedom for business models. Depending on the starting situation, the market, its set-up and its needs, it may be preferred to choose one roaming approach over another.

The *openness* of the protocols has been considered by comparing it to widely recognized *open source* definitions by the EU and the OSI. *Openness* is interpreted differently by all protocols. Nonetheless, the lack of an all-compassing definition or standard is probably not the most urgent issue for the data collection as part of IDACS. In practice, the coexistence of the various protocols is a market reality as they all serve in a particular setting or for a specific use. However, the IDACS consortium acknowledges that a common international standard or protocol focusing on interoperability would be favourable and more resilient.

While all of the roaming protocols can be used to deliver the data that is needed as part of IDACS, differences persist in the exact data properties. Conversion into DATEX II v 3.2 will become necessary on a protocol-by-protocol basis. The Consortium aims to achieve this by the end of the project phase even though DATEX II v 3.2 was only published in June 2021.

Thus, as part of IDACS, no recommendation for one of the existing roaming protocols can be made. An obligation to use only one roaming protocol (in the most current version), would represent a massive market intervention as the protocols are spread to different extents across the different markets across Europe (see section 4.1). The reasons for that are different market structures and accordingly different origins of the single roaming protocols. . On the other side, the existence of multiple e-roaming protocols creates additional costs and set-up issues for charging point operators. Therefore, it is expected that in the medium to long term, e-roaming protocols could converge under a common de jure standard such as IEC 63119.

Protocols developed by individual organizations have the potential to monopolize the market, once they have sufficient market share and power. Thus, such protocols should not be made mandatory. In order to avoid monopolizing the market, possibly in the future, an alternative protocol could be developed by a Standardization Organization (SDO) that unifies different solutions would be the optimal solution. However, this is a time-consuming and costly process since such a protocol is developed through an international standardization process, and it is necessary to reach an agreement considering the circumstances of each country. Moreover, in practice, it currently functions, though interoperability could be improved.

Annex 1 – Specific details per protocol

eMIP

Protocol description: https://www.GIREVE.com/wp-content/uploads/2020/12/GIREVE_Tech_eMIP-V0.7.4_ProtocolDescription_1.0.14-en.pdf

Features implementation guide: https://www.gireve.com/wp-content/uploads/2019/10/Gireve_Tech_eMIP-V0.7.4_ImplementationGuide_1.0.7_en.pdf

OCHP/OCHP direct

The data and functionalities of OCHP in the current version 1.4 can be found here: https://github.com/e-clearing-net/OCHP/blob/master/OCHP.md

The data and functionalities of OCHPdirect in the current version 0.2 can be found here: https://github.com/e-clearing-net/OCHP/blob/master/OCHP-direct.md

OCPI

The data and functionalities of OCPI in the current version 2.2 can be found here: https://ocpi-protocol.org/app/uploads/2019/06/OCPI-2.2-RC2.pdf

OICP

The data and functionalities of OICP in the current version 2.3 can be found here GitHub - hubject/oicp: Open intercharge Protocol

Annex 2 – Overview of common software licenses

Name	Commercial use	Modification	Distribution	Private use	Liability[12]	Warranty[13]	Trademark use[14]	Patent use[15]
Apache 2.0	✓	✓	✓	✓	×	×	×	✓
Creative Commons Attribution-NoDerivatives 4.0 International	✓	×	✓	✓	×	×	×	×
Creative Commons Attribution-ShareAlike 4.0 International	✓	✓	✓	✓	×	×	×	×
MIT License	✓	✓	✓	✓	×	×	Not specified	Not specified
The 3-Clause BSD License	✓	✓	✓	✓	×	×	×	Not specified
The 2-Clause BSD License	✓	✓	✓	✓	×	×	Not specified	Not specified
GNU General Public License version 2	✓	✓	✓	✓	×	×	Not specified	Not specified
GNU General Public License version 3	✓	✓	✓	✓	×	×	Not specified	✓

[12] When an accident occurs while using the open source software, is the licensor responsible for it?
[13] Does the open source software license provide warranty?
[14] Can the names, trademarks and trade names of authors and contributors be used for promotional purposes?
[15] Can open source be used for free even without the permission of the patent holder?

GNU Lesser General Public License version 2.1	✓	✓	✓	✓	✗	✗	Not specified	Not specified
GNU Lesser General Public License version 3	✓	✓	✓	✓	✗	✗	Not specified	✓
Mozilla Public License 2.0	✓	✓	✓	✓	✗	✗	Not specified	✓
Common Development and Distribution License 1.0	✓	✓	✓	✓	✗	✗	✗	✓
Eclipse Public License version 2.0	✓	✓	✓	✓	✗	✗	Not specified	✓

Annex 3 – Data fields in respective protocols

	Category	Subcategory	Data field	Value	OCPI	eMIP	OICP	OCHP
Static data	Location	Address	Country	-	•	•	•	•
			State/province	-	•	•	•	
			City	-	•	•	•	•
			Street	-	•	•	•	•
			House no.	-	•	•	•	•
			Post code	-	•	•	•	•
		Geo-coordinate	Charging pool/entrance	-	•	•	•	•
			Related location	-	•			•
			EVSE	-	•	•	•	•
		Additional Info	Time zone	-	•		•	
			Floor	-	•	•	•	•
			Power type	AC 1 phase	•	•	•	•
	Charging option / charging	-	Power type	AC 3 phase	•	•	•	•
			Plug type	DC	•	•	•	•

	power / plug			CHADEMO	●	●	●	●
			Plug type Opening time	DOMESTIC_A	●	●		●
				DOMESTIC_B	●	●		●
				DOMESTIC_C	●	●		●
				DOMESTIC_D	●	●		●
				DOMESTIC_E	●	●	●	●
				DOMESTIC_F	●	●	●	●
				DOMESTIC_E+F		●		
				DOMESTIC_G	●	●	●	●
				DOMESTIC_H	●	●		●
				DOMESTIC_I	●	●		●
				DOMESTIC_J	●	●	●	●
				DOMESTIC_K	●	●		●
				DOMESTIC_L	●	●		●
				IEC_60309_2_single_16	●	●	●	●
				IEC_60309_2_three_16	●	●	●	●
				IEC_60309_2_three_32	●	●	●	●
				IEC_60309_2_three_64	●	●	●	●

				IEC_62196_T1	●	●	●	●
				IEC_62196_T1_COMBO	●	●	●	●
				IEC_62196_T2	●	●	●	●
				IEC_62196_T2_COMBO	●	●	●	●
				IEC_62196_T3A	●	●	●	●
				IEC_62196_T3C	●	●	●	●
				PANTOGRAPH_BOTTOM_UP	●			
				PANTOGRAPH_TOP_DOWN	●			
				TESLA_R	●	●	●	●
				TESLA_S	●	●	●	●
				AVCON Connector		●	●	
				Small Paddle Inductive			●	
				Large Paddle Inductive			●	
				NEMA 5-20			●	
				UNSPECIFIED		●		
				-	●	●	●	●
	Opening time	-	Identification method	Ad-hoc (e.g. credit card, debit card, cash, etc.)	●	●		

	Identification	-	Identification method Payment method	App	●	●	●	●
				RFID	●	●	●	●
				QR code	○	●	●	
				15118	○	●	●	●
				Ad-hoc (e.g. credit card, debit card, cash, etc.)	●	●	●	●
	Payment	-	Payment method Telephone	Subscription (e.g. RFID, App)	●	●	●	●
				Free of charge		●	●	
				Indication of existence of PED terminal	●			
				-		●	●	●
	Contact	-	Website	-	●			
			Status	AVAILABLE	●	●	●	●
Dynamic data	Availability / occupancy	-	Status Status Schedule	BLOCKED	●	●	●	●
				USABLE		●		
				CHARGING	●	●	●	●
				INOPERATIVE	●	●	●	●
				OUTOFORDER	●	●	●	●
				PLANNED	●	●		●

				REMOVED	●	●	●	●
				RESERVED	●	●	●	●
				UNKNOWN	●	●	●	●
				OPERATIVE		●		●
				EVSENOTFOUND			●	
				-	●			●
			Tariff	-	●	●	●	●
	Price/tariff	-	Ad-hoc price	-	Δ			

Symbols in the table

● Protocol defines the data field/value

○ Not sure, if protocol defines the data field/value. Here, OCPI defines 'OTHER' method of identification. However, there is no detailed description which identification methods could be included in 'OTHER' method.

Δ Protocol provides only an example of the message.

Annex 4 – IDACS Data categories and related DATEX II v 3.2 data classes

	Class name	Atttribute name
Static Data		
Location (GNSS And Address (street name, zip code, city,…))	EnergyInfrastructureStation	location
List of available charge-solutions	ElectricChargingPoint	chargingPower chargingSolutionMode maximumCurrent usageType vehicletoGridCommunicationType voltage
List of available connectors (plugs, sockets, induction plate...)	Connector	cableAttached cableType chargingInterface maxPoweratSocket
Opening hours	EnergyInfrastructureSite	openingTimes
Payment methods	EnergyInfrastructureStation	payment authenticationAndIdentificationMethods
Contact info of the owner/operator	ElectricChargingPoint / EnergyInfrastructureSite	operator
Full e-mobility code of the charging point (outlet)	ElectricChargingPoint	externaldentifier

Dynamic Data		
Availability (if the station is operational/ non-operational)	EnergyInfrastructureStationStatus	isAvailable
Occupation status (free, occupied)	RefillPointStatus	currentStatus
Price for ad-hoc charging	PricingPolicy RefillPointStatus	pricePerHour pricePerMinute pricePerUnit

ID and Data Collection for Sustainable fuels in Europe

Report

Deliverable 2.2.6: *Lessons learned from the NOBIL database solution*

Project Acronym	IDACS
Project Full Name	ID and Data Collection for Sustainable Fuels in Europe
Grant Agreement number	MOVE/B4/SUB/2018-498/CEF/PSA/SI2.792684
Activity	2.2 Provision of static and dynamic data through the National Access Points of the Member States in requested format DATEX II
Deliverable Status	Final
Dissemination Level	Public
Version / date	V.1.0 (final, external) /30-06-2022
Main authors	Hielke Schurer, Netherlands Enterprise Agency
Reviewers	Pauline Lanz, Netherlands Enterprise Agency Anneke Bosma, Netherlands Enterprise Agency

Co-financed by the Connecting Europe Facility of the European Union

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List of abbreviations

AC	: Alternating current
CNG	: Compressed Natural Gas
CPO	: Charge Point Operator
DC	: Direct current
EV	: Electric vehicle
GNSS	: Global Navigation Satellite System
IDRO	: ID Registration Organization
LNG	: Liquefied Natural Gas
NAP	: National Access Point
OEM	: Original equipment manufacturer
OCPI	: Open Charge Point Interface
PSA	: Programme Support Action

1. Introduction and purpose of this document

This document aims to present the final results of Deliverable 2.2.6: Report on the lessons learned from the NOBIL database solution.

According to the Grant Agreement, the Consortium should explore and report on the lessons learnt from the existing national databases, like the Nordic NOBIL (Enova) database solution, which is the official database and map on charging infrastructure for Norway, Sweden and Finland. The team of NOBIL and Enova agreed to advise the Consortium and share the lessons learnt with the IDACS project.

The document briefly introduces the Norwegian situation and NOBIL then continues with an elaboration on the current situation regarding the NOBIL database. This is then reflected on and the lessons learned for IDACS will be explained.

2. Methodology

In order to collect relevant information for this deliverable, desk research was performed and interviews with NOBIL and the Norwegian Electric Vehicle Association were conducted.

At the start of the project (2019) there has been contact with NOBIL to discuss the current state of affairs and to make an inventory of which lessons could already be used for the IDACS project, e.g. for procurement procedures. The most important points have been taken from this first meeting. At the same time, it turned out that a discussion further in the project would also be of added value because there would still be developments regarding NOBIL. Therefore, an additional interview was held (2021) to retrieve the latest information.

3. Introduction to NOBIL

When the number of EVs increased and the national charging infrastructure was being built in 2009-2010, questions arose on how to maximize the benefit from it. The answer was found in collecting all data in a central database, and distribute it with the goal to increase knowledge about the location and availability of charging infrastructure for electric vehicles. The idea was that easy accessible information would facilitate the EV user and stimulate the uptake of electric vehicles. And thus, NOBIL was born.

3.1 NOBIL

The goal of NOBIL is to have an open, publicly owned database that allows everyone to build services using standardized data free of charge. The governmental entity Enova and the Norwegian Electric Vehicle Association (Norsk Elbilforening) have worked together to develop this database.

Governance

NOBIL is developed and maintained by the Norwegian Electric Vehicle Association. Data is collected from EV-users, charging stations owners and operators and other contributors.

Collection and verification of data is prioritized to secure accurate and reliable information for EV-users in need of electricity.

As reported on the website of NOBIL, it was a strategic decision to ensure public ownership of the database to make the content available for everyone. Therefore NOBIL is financed and owned by Enova[1].

3.2 The Norwegian Electric Vehicle Association

The main goal of The Norwegian Electric Vehicle Association is to promote electric vehicles that run fully or partially on renewable energy. They believe electric vehicles are the best alternative for personal transport when it comes to the local environment, climate, energy efficiency and economy.

This EV association is a non-profit organization and represents electric car owners in Norway. They cooperate with the Norwegian government, the electric car industry, and other organizations.

The members elect a Board of Directors and the daily business is operated by the staff based in Oslo. The organization is a member of The European Association for Electromobility (AVERE) and the World Electric Vehicle Association (WEVA)[2].

3.3 Enova

Enova SF is owned by the Ministry of Climate and Environment. They contribute to reduce greenhouse gas emissions, development of energy and climate technology and a strengthened security of supply. Enova is the owner of the NOBIL database.

4. NOBIL database solution

This chapter describes the Norwegian situation of data collection and data provision at the NAP.

4.1 National Access Point

The data of NOBIL is accessible at the Norwegian National Access Point (NAP): NAP (transportportal.no). This NAP does not contain the data itself or the services that are made available for re-use, but only the metadata describing them. One can find links to the underlying services and the sets of data that can be accessed. In this case, there is a link to the NOBIL database for third party users.

[1] Website NOBIL, retrieved in 2021: https://info.nobil.no/eng

[2] Website NEVA, retrieved in 2021: https://elbil.no/english/

4.2 NOBIL Database

NOBIL is built with non-proprietary software tools, includes detailed information about charging stations and receives and distributes real-time data. Key data, including practical and technical information, accessibility for users, type of connectors and charging capacity, map coordinates, and pictures, are available for the general public. The database is continuously updated as new charging stations are built. NOBIL covers the Norwegian charging infrastructure very well and includes around 2,500 charging stations with over 12,000 charging points.

NOBIL's role is to gather information and communicate it effectively to third parties. NOBIL is not instrumental for operations (booking and payment), only for the collection and reporting of data. NOBIL does not interfere into the business of the operators and owners of the charging stations.

There is a distinction between the database and the services built on top of it. The EV-users and Enova take responsibility for the collection of charging station data, verification and making it available to everyone. It is up to the market to develop services using charging station data from NOBIL. Services the EV-users utilize in everyday life, whether the information is on web, in mobile apps or inside the navigation of the electric cars.

Data from NOBIL is freely available through an API (Application Programming Interface). Users can register as an API-user and accept the terms of use (Creative Commons). In return they will have the API-key for access sent. One can read more about the API here and download the documentation.

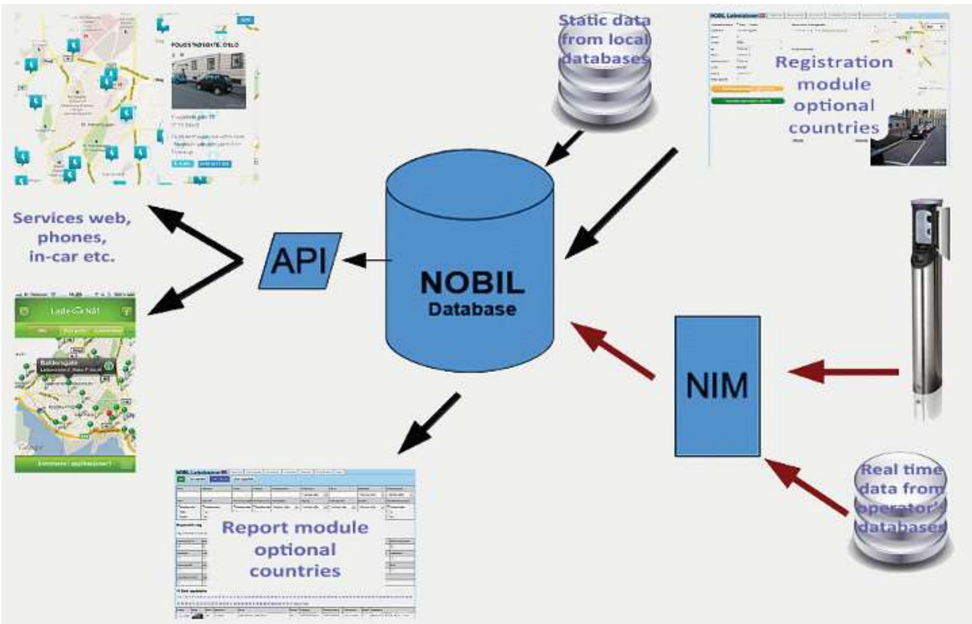


Figure 1: Schematic overview NOBIL database (source: English (nobil.no))

As can be seen in the figure above, both static and dynamic data is supplied to the NOBIL database. NIM= the real-time information part of NOBIL and is connected to CPOs. The static database is manually updated.

4.3 Data and protocols

Data quality

In terms of freshness of the data, the dynamic data is basically updated in real time. For this dynamic part of the database (the NIM part) there are direct connections with CPOs to the NOBIL database. So dynamic data is refreshed every time there is a change on the operator side.

The update frequency for static data is around 2 or 3 times a week. This consists of updating based on the changes that came in that week from EV drivers or operators. The changes from the EV drivers are not always directly double checked with the data base of the CPO. This is done regularly, namely when a new list with static data is received from the CPO. Then everything is double checked.

With regard to the quality of the data, NOBIL is therefore on the one hand dependent on the quality of the data from the CPO. And on the other hand, this is continuously (manually) improved with the comments, suggestions and tips from EV drivers.

Furthermore, with regard to the completeness of the data, it is not yet possible to always have all data available. This can be a challenge especially for dynamic data and especially for AC chargers. The quality of data about DC chargers is higher in that regard.

As will be discussed further below, there are no legal obligations for operators concerning data quality or supplying data to NOBIL.

Data categories

Below, the availability of the IDACS data categories is compared with the data categories available through NOBIL.

Available IDACS data categories at NOBIL database	
IDACS data categories	***NOBIL***
Static data:	
Location: ○ GNSS coordinates; ○ Address (street name, zip code, city,…).	 ✓ ✓
List of available charge-solutions (Power, Modes);	✓
List of available connectors (plugs, sockets, induction plate...);	✓
Opening hours, identification and payment methods;	✓
Contact info for owner/operator;	**x**
Full e-mobility code of the charging point (outlet).	✓
Dynamic data:	
Availability (if the station is operational/ non-operational);	✓
Occupation status (free, occupied);	✓*
Price for ad-hoc charging.	**x**

✓ = available
✓* = not always available
x = not available

Table 1: IDACS data categories compared to NOBIL data categories

NOBIL is also designed for hydrogen data. There are currently two stations that are included. So far there are no databases for other fuels like CNG and LNG.

Protocols
A commonly used protocol in Norway is the NOBIL protocol. This is actually one of the first protocols in the EV market. Because this is a widely used protocol, it will continue to be used. However, NOBIL makes an effort to make data also available in other (internationally used) protocols. For example, NOBIL it is the ambition to enable both receiving and sending data in OCPI. In the beginning of 2019, the Swedish Energy Agency reached out to NOBILs owner, Enova, with a request to develop NOBIL and increase both its data quality and quantity in the Nordic countries. As a result, a new functionality for automatic data registration was developed. The new data registration functionality is an implementation of a new OCPI v2.1.1 interface, which will allow CPOs to automatically publish data to NOBIL. Since multiple CPOs can utilize the same back-office system, integrating one system can connect NOBIL to multiple CPOs at the same time, given that there is an agreement between the individual CPOs and Enova. Enova has made successful contact with several CPOs in the Nordics, some which are prepared to make use of the new data registration in NOBIL at launch, and others may connect further down the road. Moreover, there has also been collaboration with Hubject to make the data available via the Open InterCharge Protocol (OICP).

DATEXII
Furthermore, there is no use of DATEXII for e-mobility data in NOBIL. This also makes sense given that this has only been possible since mid-2021. Because NOBIL is not yet familiar with DATEXII it is uncertain to say whether it may be used in the future.

4.4 Users

NOBIL is the primary database used in Norway and is used by different companies (for example OEMs, navigation tool providers and third party developers). An overview of users can be consulted here: https://info.nobil.no/tjenester. In general, the data is mostly used by service providers. Some of them are using different sources in addition to the NOBIL database.

Connection with other countries
In the Grant Agreement it is stated that the NOBIL database solution is the official database and map on charging infrastructure for Norway, Sweden and Finland. In reality this is somewhat different. NOBIL has 5 databases in 5 different languages. Norway, Sweden, Denmark, Finland and Iceland. It has been prepared for other countries to join but currently it is only actively used for Sweden. Other countries do not use it at the moment.

4.5 Funding

The NOBIL project is owned and funded by the government, namely Enova SF. It is developed and maintained by the Norwegian Electric Vehicle Association. Precise costs cannot be given but the budget is fairly limited.

4.6 Legislation

As mentioned before, there is no legislative base in Norway for data collection of electric charging points. Providing data is on a voluntary basis, although operators have an interest in

having their charging infrastructure found and therefore in sharing their data. There is however an exception if the charging infrastructure has been set up with public funding. In that case, parties are obliged to share the data. However, not many charge points are funded by the government.
Because there are no legal obligations for operators concerning data quality or supplying data to NOBIL, it is possible that the CPOs do not always have all data available for all charging infrastructure.

4.7 IDRO

Norway has not yet an IDRO. The ID codes used by CPOs have the following structure: NOR_12345_01. There is interest in the outcomes of IDACS regarding the ID codes , IDRO and IDRR. In the future, this could be set up by Enova.

5. Conclusions and lessons learned

A number of interesting lessons can be learned from the setup in Norway with the NOBIL database. Lessons that also emerged from other countries during the IDACS project.

Before discussing the lessons, we will briefly summarize the Norwegian situation: Norway has a NAP as a register which links to the NOBIL database. Anyone can access this public NOBIL database via a request for access to the API. This database contains real-time data from CPOs with a direct connection to the database. Static data is manually added based on updates of CPOs and tips from EV drivers.

5.1 Lessons learned

Looking at the NOBIL situation, we can see strengths as well as some challenges. The following lessons can be drawn from this for data provision at the NAP:

Legislation
A legislative obligation to share data is needed to obtain both static and dynamic data from all operators. Sharing dynamic data in particular can be sensitive and/or more expensive for operators. If this is kept on voluntary basis, not all (dynamic) data will be sufficiently accessible to third party users.
Setting legal requirements for the quality of the data (it must be complete, correct and up to date) can also contribute to a better data provision.

Data quality and costs
IT processes should be automated as much as possible and direct connections with CPOs (APIs) are desirable. Manual work takes a significant amount of time and costs. With the (future) increase in charging infrastructure, the amount of data will strongly increase. And also costs will only increase if data has to be entered manually.
It is therefore important to have as many direct connections as possible with the CPOs via, for example, APIs. For the right quality of the data, but also for limiting costs. Both dynamic and static data will have to be updated via direct connections.
It has also been found that it requires investments to get a good quality database. Both in the

Norwegian situation and in the IDACS countries it appears that setting up and maintaining data takes work (deduplication of data, correcting errors). Setting up a (public) database, with good quality data, requires financial resources.

Protocols
Harmonize formats and protocols. This makes data collection a lot more effective and efficient. If different formats are used, the data must first be converted or improved. As indicated at NOBIL, the data collection is considerably better when the same protocol is used or when these are harmonized.

Architecture of NAP
The architecture of a NAP does not necessarily matter for the public availability of good quality data. As the Norwegian situation demonstrates, it does not matter which architecture the NAP has. A NAP itself does not have to be a database in order to still have easy access to a database that is publicly available for third party users.

Connection with other countries
As the NOBIL database shows, it is possible to create shared databases between countries. It can therefore be useful when setting up a database to 'prepare' it for the connection for data for other countries. Clear agreements about funding are, however, necessary to make.

Other
Keep room for new developments. Charging infrastructure is developing fast, with different capabilities and standards. There must be room for this to be able to adjust this in the protocols and data categories.

5.2 Conclusion by consortium

The above-mentioned lessons are the lessons that the consortium draws after studying the NOBIL situation and comparing this to the situation of the IDACS Member States. The Norwegian situation does not have to be necessarily a best practice for other Member States and NOBIL has also indicated that it is working on developments to improve the database.

The Consortium emphasizes that suitable legislation is needed to enable proper public data provision. Without the right legislation it is challenging, if not impossible, to get all the dynamic data.

The consortium also believes that Member States should apply internationally used protocols (as described in Deliverable 2.2.5) as much as possible. In addition, the consortium endorses the view that easy access to public data does not require NAPs to become a database. A register can also provide easy access to an underlying database. In any case, it is of paramount important that the underlying database itself is of good quality, with as many direct connections as possible to CPOs (via APIs).

In conclusion, the NOBIL situation brings new insights that confirmed the findings from IDACS, supporting the above mentioned views from the consortium.

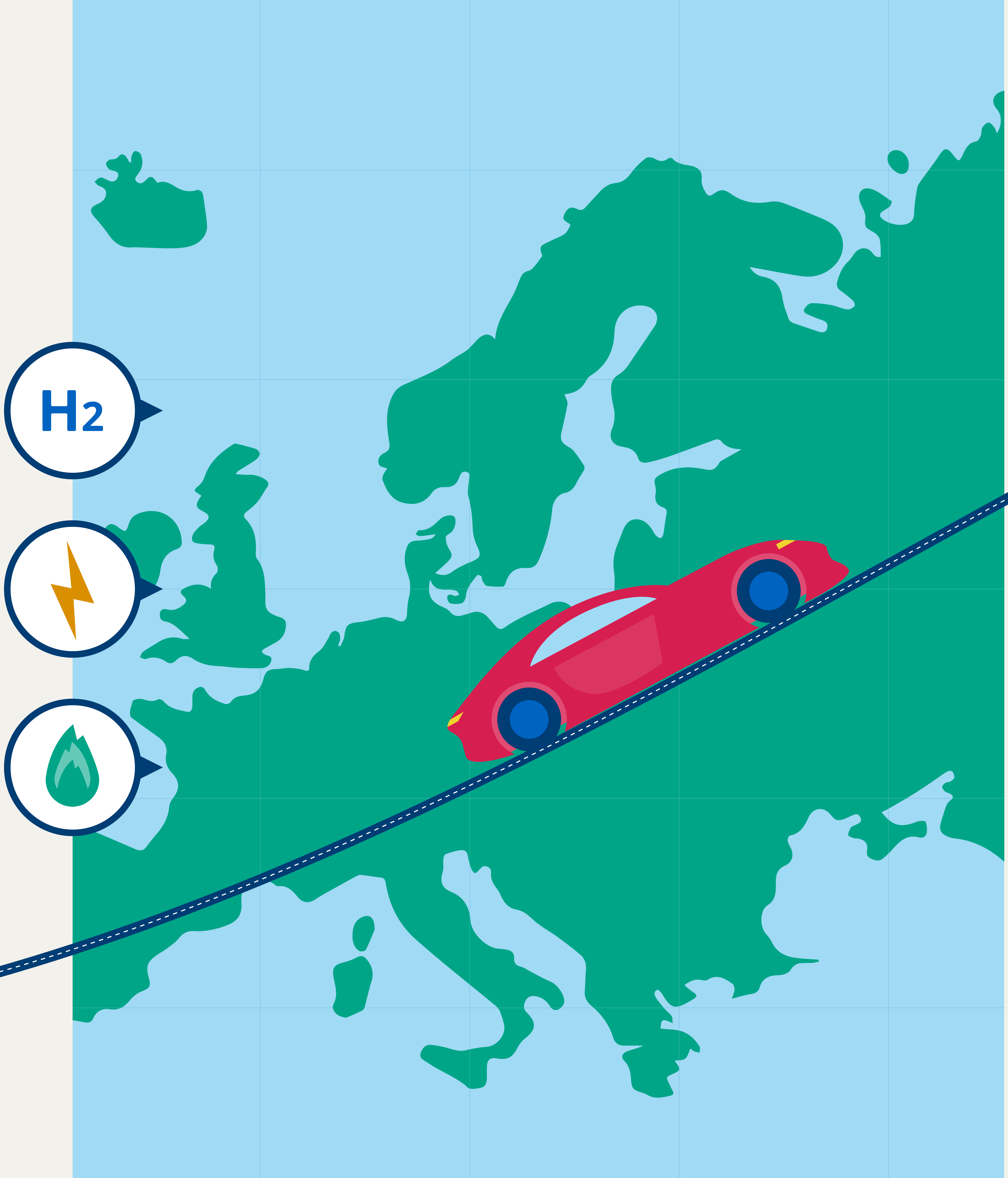
Annex 1

References:

English (nobil.no)

Norwegian EV policy and market | Norsk elbilforening

About Enova – Learn about our work | Enova



IDACS

IDACS ID and Data Collection for Sustainable fuels in Europe

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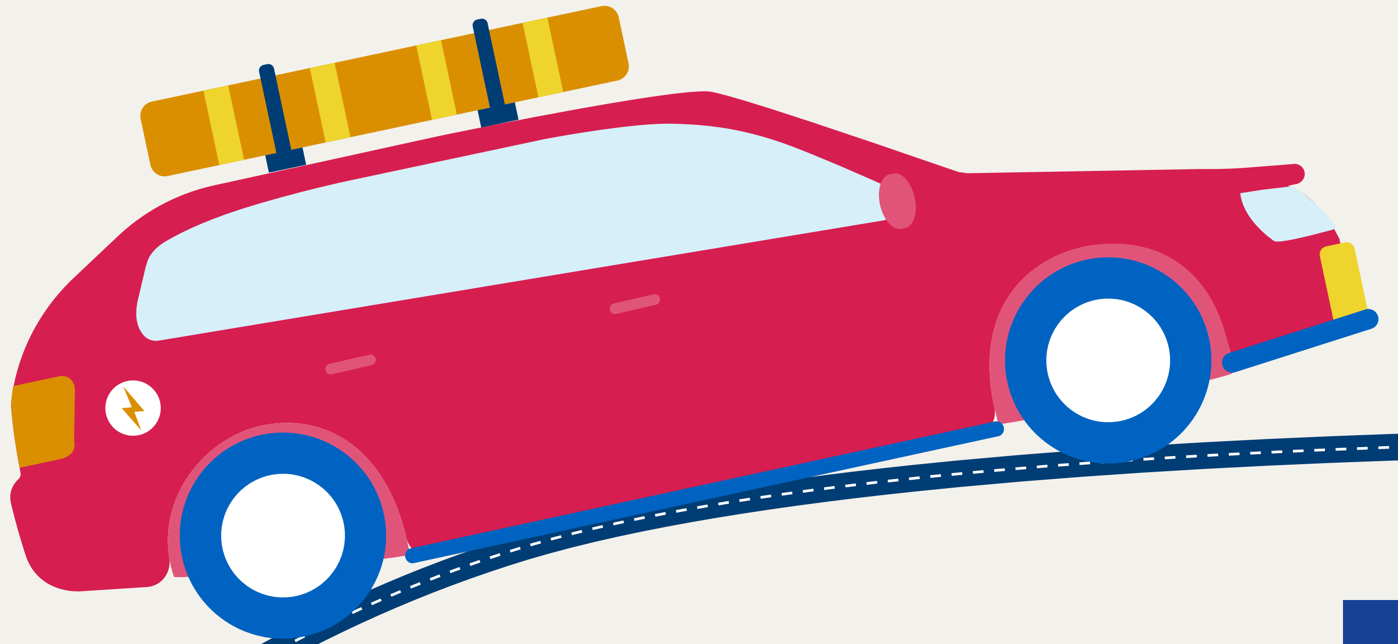


ID and Data Collection for Sustainable fuels in Europe

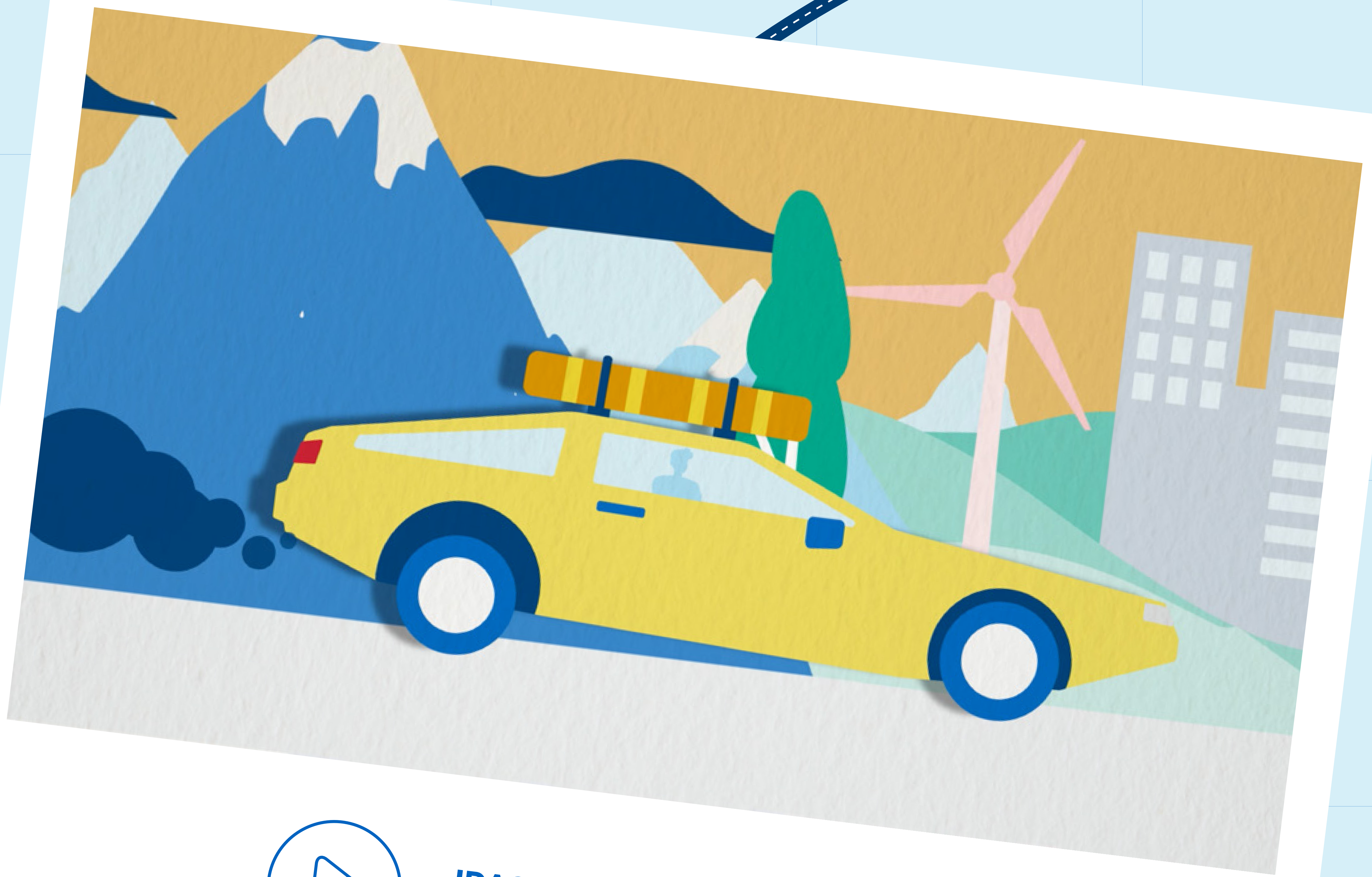
Co-financed by the Connecting Europe Facility of the European Union

About ID and Data Collection for Sustainable fuels in Europe

The Programme Support Action (PSA) ID and Data collection for Sustainable Fuels in Europe (IDACS) is a project funded by the Connecting Europe Facility and carried out under the supervision of the Directorate General Move from the European Commission. In 2019, fifteen member states joined forces to support the use of alternative fuels, such as electricity, hydrogen and biofuels, by consumers, through better information provision. The aim was to collect data, e.g. about location and availability, from alternative fuel recharging and refuelling points, and make this data available through the national access points (NAPs). In order to make data collection for electric charging points possible, one part of the project dealt with determining a format for unique e-mobility codes, setting up ID Registration Organizations (IDROs) in each participating Member States and establish an overarching management structure; the ID Registration Repository (IDRR). Results of the project will be included in the Alternative Fuel Regulation (AFIR). After 3,5 years the project is coming to an end, and our experiences and our findings are presented in this document.

"The works carried out under this Programme Support Action are setting a reference point for the related policy discussions."

Axel Volkery (during End Event)
Deputy Head of Unit Sustainable and Intelligent Transport Unit, DG MOVE



IDACS in a nutshell
Click on the play button to navigate to the video url

Glossary

AFI refers to Alternative Fuel Infrastructure

Alternative Fuels Infrastructure Regulation (AFIR), expected revision of the Alternative Fuel Infrastructure directive (AFID).

The **Charge Point Operator (CPO)** is managing the charge stations and often seen as one entity or one role. As the technical management of a charge station can be quite complex, the role of CPO can be split in Technical CPO (the manufacturer) and the Administrative CPO (the party that is managing the transactions and daily operations). A charge station has only one connection to the operator; because of that the roles are split at the CPO level.

API refers to Application Programming Interface

DATEX II is the electronic language that is used in Europe for exchanging traffic information and traffic data. DATEX II is a way of distributing traffic information and traffic-management information that does not depend on language or presentation format. DATEX II origins from the Intelligent Transport Systems (ITS) directive (2010/40/EU). The Energy Infrastructure release of DATEX II, version 3.0, including the data categories for Alternative Fuels, was adopted by the end of 2021, which caused delays for the development of DATEXII conversion tools.

ECP refers to Electric Charging Points. Collecting data of electric charging points was a mandatory part of the project.

H2 refers to Hydrogen. Collecting data of hydrogen refilling points was mandatory in the project when there were hydrogen stations available.

EV refers to Electric Vehicles

ID Registration Organization (IDRO) isues the first five characters of the e-mobility codes for charge point operators and mobility service providers.

The **ID Registration Repository (IDRR)** is an organizational structure coordinating the functioning of the IDROs. Representatives of all Member States having an IDRO have a seat in the IDRR Steering Committee. The IDRR is managed by a rotating board consisting out of representatives of three Member States of which one chairs the board.

MSP refers to Mobility Service Provider

National Access Point (NAP) is a mechanism for accessing, exchanging and reusing transport related data under delegated acts of the ITS directive (2010/40/EU).

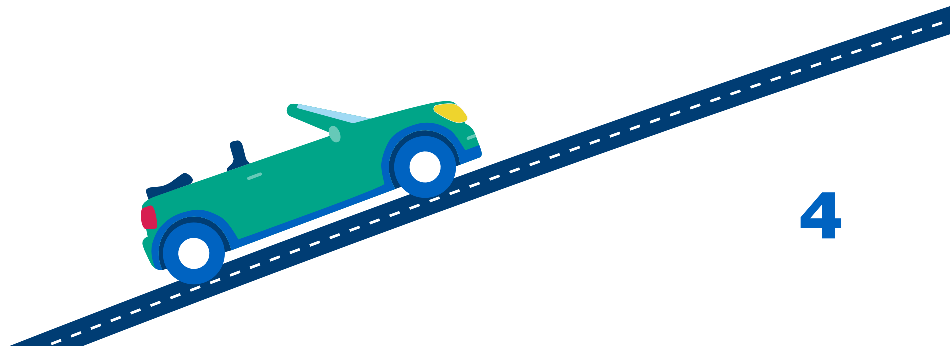
Open Clearing House Protocol (OCHP) enables connections between mobility service providers and charge point operators.

Open Charge Point Interface (OCPI) is a protocol that supports connections between mobility service providers and charge point operators.

Other Fuels referring to CNG, LNG, LPG and highly blended biofuels such as bio diesel and bio ethanol. Collecting the data of the other fuels refilling points was optional in the project.

P2P refers to peer-to-peer connection and is the opposite of platform connection.

PSA refers to Programme Support Action

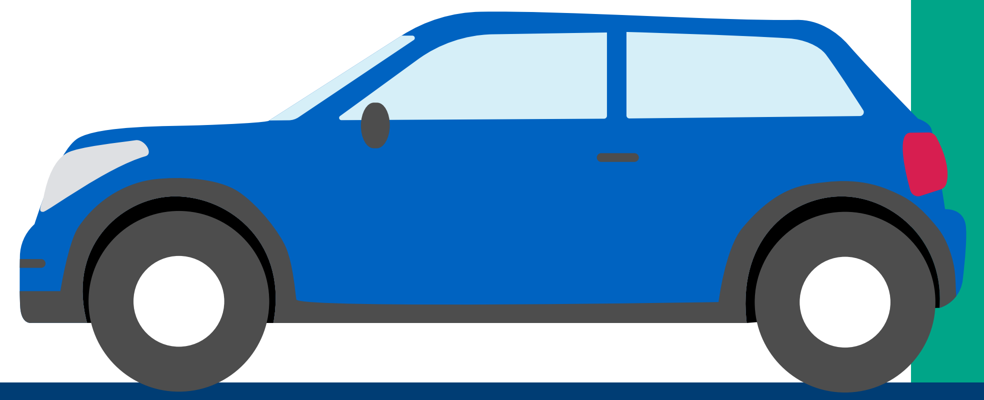


Expectations

What did partners expect from their participation in the project?

Portugal:
'We expected to deepen our knowledge of other European electric mobility markets to understand our limitations and how we should overcome them to pursue the ultimate goal of stimulating the use of alternative fuels. IDACS allowed us to exchange experiences with several member states with different realities regarding electric mobility. Also, IDACS promoted internal dialogue between the various national stakeholders.'

Croatia:
'Our expectations were high given that the Republic of Croatia did not have a system for collecting data on infrastructure for alternative fuels, nor a legislative framework based on which such collection would be carried out.'



Retrospect

What did partners gain from their participation in the project?

Spain:
'IDACS provided us the guidance to initiate a harmonised charge points data recompilation in our country and introduce the Charge Point Operator (CPO) and e-Mobility Service Provider (EMSP) market differentiation which did not exist in our legislation.'

Czech Republic:
'We appreciated meetings at an international level, exchange of experience, sharing know-how between organisations of participating countries, and creating new personal contacts.'

Greece:
'IDACS has proved vital for accelerating the transition towards alternative fuels powered vehicles and electromobility in particular.After all, engaging consumers in electromobility can eventually lead to decarbonization of the transport sector.'

France:
'Participating in the IDACS project allowed the French Ministry for Ecological Transition to tighten its links with the e-mobility ecosystem. Due to increasing light-duty vehicle electrification, business practices, standards, and services evolved quickly. This required constant administration scrutiny to adapt regulation. The IDACS program not only helped enhance the quality of service for the end-user by ensuring data collection and ID registration. It also gave all participants practical knowledge about the effort needed to ensure data dissemination, which will prove useful as charging networks and related services develop.'

Successes

What did partners consider to be their greatest accomplishment in the project?

France:

'IDACS allowed us to drastically increase the static data collection in France. It influenced the new data scheme published by the French administration on May 4th 2021.'

Croatia:

'We consider being able to compile technical procurement documents and develop IT data collection systems based on jointly drafted guidelines from the member states a great success.'

Hungary:

'The fact that the IDACS project could manage such a large number of participating countries, with various development stages (in their ID issuing and data collecting activities). Even COVID could not stop its progress.'

Portugal:

'The major practical successes have been the definition and harmonisation of ID codes and the development of the DATEX II standard, with the integration of the static and dynamic data collected from electric charging points, hydrogen stations and other fuel filling stations. This is a result of getting member states talking in an organised, focused and informed way.'

Spain:

'For us, one of the biggest successes is harmonising ID codes and data fields.'

Luxembourgh:

'Our biggest achievement was setting up, together with the Netherlands and Belgium, the Benelux IDRO.

Czech Republic:

'One of our biggest successes is the realisation of the studies "Design of a functional mechanism for issuing identification codes (IDRO)" and "Technical specification of the module - energy charging points, static and dynamic data collection." Another great achievement is the project plan for the procurement of "Module for static and dynamic data collection and IDRO agenda" approved by the Government and the Chief Architect of eGovernment and the subsequent call for a public tender.'

Slovenia:

'During IDACS, there were two turning points for us. First of all, when we were able to identify existing states and stakeholders of the Alternative Fuel Infrastructure sector before starting with IDACS activities. Secondly, we discovered we had a National Transport Management Centre (NTMC) in place. The NTMC already managed the National Access Point (NAP) with real-time transport data, was equipped with adequate IT hardware and could be upgraded with an additional layer of AFI data. That enabled us to decide about technical and other solutions for IDRO and NAP data exchange.'

From static data to valuable information

Poland was one of the frontrunners during IDACS. Even before the start of the European project, the country established legislation that obliges market parties to share their data. This allowed Poland to quickly implement the data and turn it into valuable information for the market and consumers. Their digital platform Ewidencja Infrastruktury Paliw Alternatywnych, also know as EIPA, which holds records of alternative fuels infrastructure, is a great example of how countries can implement data on alternative fuels. Marek Popiolek (Head of unit Ministry), Joanna Dobek (Ministry Contact), Pawel Smolinski (Director of Innovation and Development at Urząd Dozoru Technicznego), Jaroslaw Napiorkowski (member of IT Department at UDT), Tomasz Jantczak (software developer at UDT) and Darek Cendlewski (member of IT department at UDT) shared their experiences during the implementation and explained the ins and outs of EIPA.

Early adopters

In 2018, Poland established its Electric Mobility Act. Poland based the Act on the European standards available at that time. This meant that ID issuing for their own IT means, and the ID structure existed before entering IDACS. With only some slight adjustments regarding the type of data collected, Poland could start its implementation process right away. Additionally, it created momentum for the market, as the Polish market and demand for sustainable fuels was still growing. Their new Act and the assorted legislation allowed the country to take along a lot of new entities and operators entering the market.

EIPA

The Polish Office of Technical Inspection (UDT) built the digital environment (EIPA), making static and dynamic data on alternative fuels and infrastructure available. On the one hand, the website is meant for Charge Point Operators (CPOs) and Mobile Service Providers (MSPs) to share their data. On the other hand, third party users can use the available data for intelligent solutions for the end users. Lastly, consumers and end users, people who drive/own a vehicle on alternative fuels, can use the website.

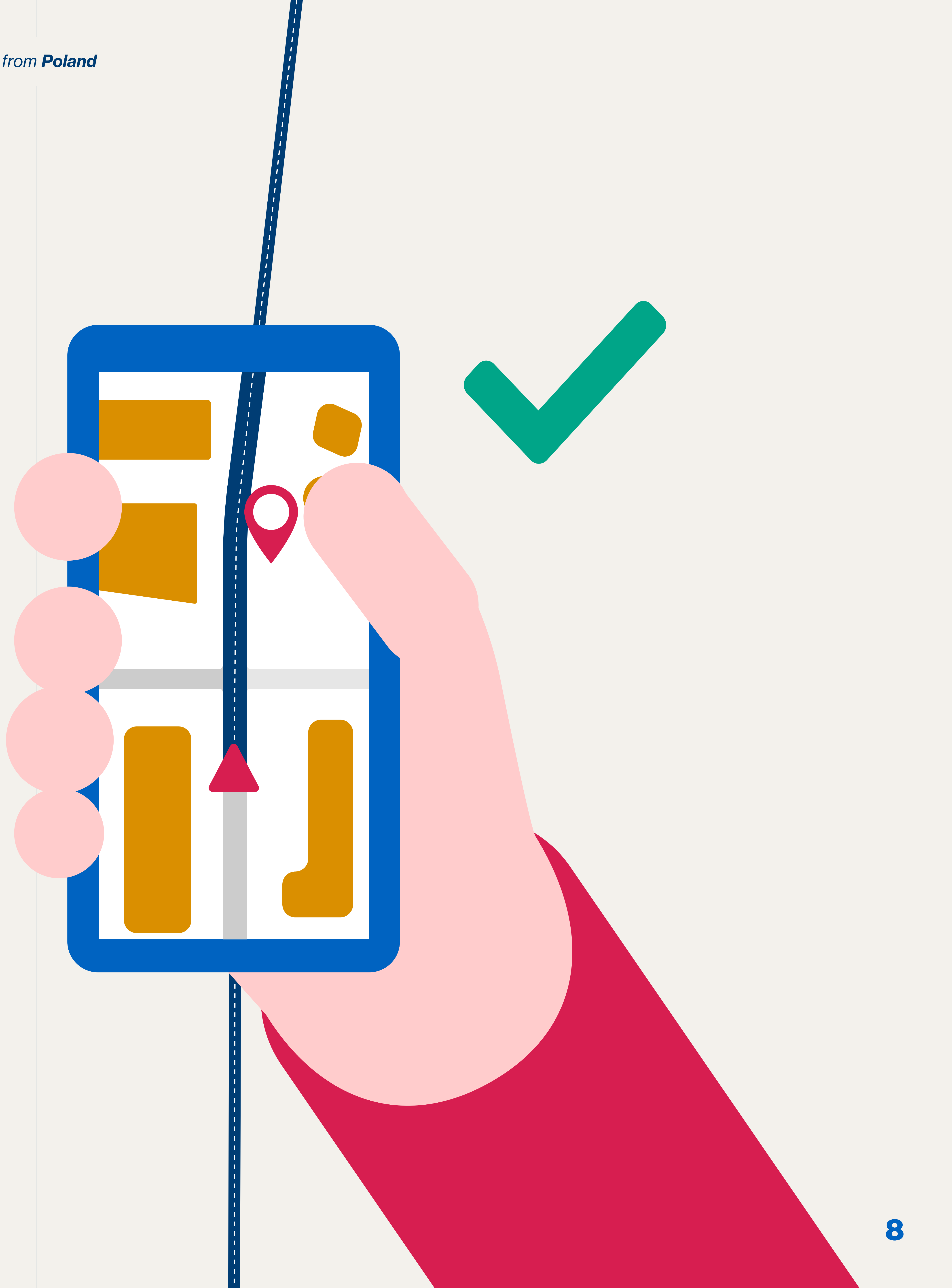
The website releases a list of all ID-code combinations issued in Poland. CPOs can supply and register data through the website, which is directly linked to the countries National Access Point (NAP). The website also includes a map of Poland displaying all charging and refuelling stations in the country. Tomasz: “The website includes (dynamic) data, such as the location of a station, opening hours, pricing, and availability. It shows you the nearest charging and refuelling station based on your location. If you click on the icon of the nearest station, it directs you to a route description in Google Maps.”

TIP: **Poland involved market parties right from the start when developing their IDRO and NAP. This smoothened the collaboration during the implementation phase.**

Future plans

The Polish IDRO and NAP platforms consist of data on charging stations, Compressed Natural Gas (CNG) and Liquified Natural Gas (LNG). Shortly, Poland will include data on hydrogen since the country aims to establish 32 hydrogen stations in the near future.

Marek: **“As far as we are concerned, IDACS will continue to exist, and this project will be accessible to everyone. Setting up a good infrastructure is crucial for future users of alternative fuels.”**



VIDEO INTERVIEW

Gilles Caspar answers the following questions:

- Why did Luxembourg join the IDACS program?
- What was your biggest achievement?
- What was your biggest challenge?

Ilias Pasios & Chrysa Politi answer the questions:

- Why did you decide to join the IDACS projects?
- What were the biggest lessons you learned and biggest achievements?
- What are the next steps you will take in order to start implementation?

Cooperation

How did partners involve stakeholders in the project?

The Netherlands:
'We kept in close contact with our maket parties when making the IDACS product. The input from market parties proved useful and lead to better end products.'

Slovenia:
'We managed to organise a live kick-off event in February 2020, right before COVID hit. Between March 2020 and May 2021, we managed to organise multiple online meetings and workshops with stakeholders, for instance, regarding data exchange with NAP. The final national project event took place June 9th 2022.'

Spain:
'Our Ministry constantly communicated with the main Spanish association of EV companies, called AEDIVE. Especially at the beginning of the project, we needed feedback from the industry to define data fields and communication protocols for charge point data recompilation. We organised several meetings with experts from Spanish companies. For example, when working on activity 2.1 (charge point data collection), the Ministry shared the data format and categories templates with company experts and collected feedback on the IDACS project proposal. This helped the Ministry to build a national position.'

Cooperation

How did partners experience the cooperation in the project?

Portugal:
'We benefited greatly from exchanging experience and knowledge with other member states. This exchange stimulated the need to open up the national system using European norms and standards. Mobi.Es adoption of the OCPI protocol, is a practical example.'

Czech Republic:
'During the project, we mainly cooperated with the IDACS project coordinator and individual member states during meetings or e-mail.'

Great collaboration can have a great impact

Belgium has been collaborating with the Netherlands and Luxembourg to establish a good infrastructure for alternative fuels to stimulate the transition towards zero-emission mobility. Entering IDACS unveiled a new technical side. "At the start of IDACS, I did not know what ID-codes or data categories were", Simon says. Simon Ruyters is policy advisor of the Clean Power for Transport Programme in Flanders Region. He coordinated IDACS on behalf of Belgium, representing Flanders and the two other Belgian regions: Wallonia and Brussels Capital Region. Simon shares his experiences on the successful collaboration processes on a national and international level and elaborates on his countries progress during IDACS.

Valuable collaboration with our neighbours

The idea of IDACS stems from the Benelux declaration, which stimulates boundless electric driving. "The existing cooperation between Luxembourg, the Netherlands and Belgium regarding driving on alternative fuels allowed the Benelux to take a leading role in IDACS. I noticed that it makes it easier to speak the same language and know where to find each other. The Benelux is a formal and legal partnership that is also beneficial. This enabled us to roll out a common ID Registration Organisation for the Benelux."

"I believe that it is possible to realise such collaboration on a European level as well in the long term."

Awareness on different levels

"At the IDACS kick-off, it became clear that ID and data collection for sustainable fuels was relatively unknown territory. Not only for us but for many participating countries. Some countries already had some experience with sustainable fuels. But the majority did not know about an ID code or what data categories to use when disclosing data," Simon says. IDACS turned out to be as much an awareness campaign as an implementation process. "During the project, we quickly decided to involve external expertise to help guide us through the technical matters of the project. We joined forces with a company that supported us with their substantive knowledge and expertise in the process."

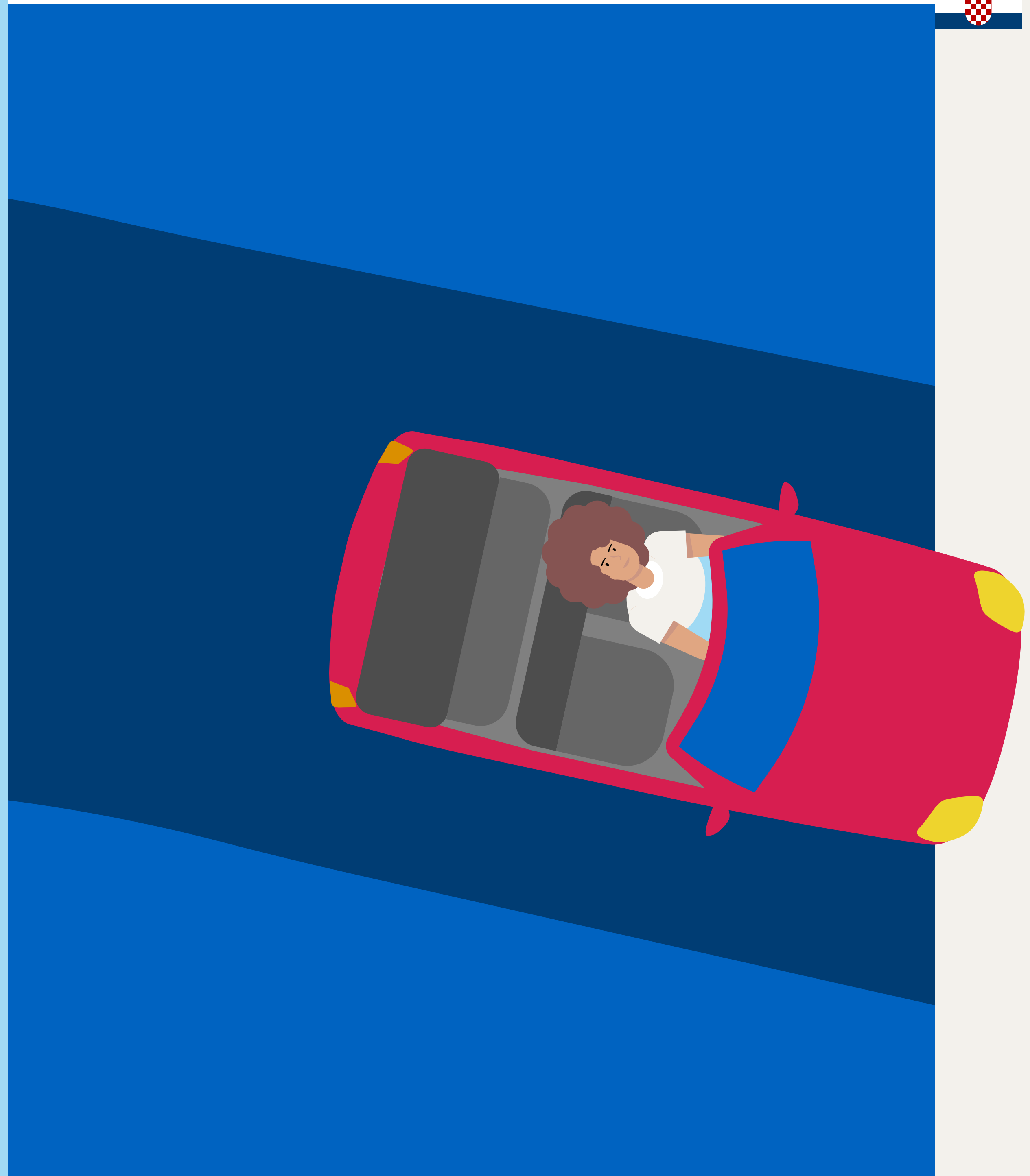
Simon: "In our approach, we focused on involving stakeholders. These stakeholders were quite hesitant about sharing their data and making it accessible to the public. They considered it to be 'their data' and were concerned about who would get access to the data. To raise awareness of the importance of collecting and sharing data, we organised bilateral discussions with stakeholders and market parties. We were hoping to shine a light on the benefits of sharing the data for themselves, the government, and the end-users. Originally, we strived for free and complete data access. Eventually, we found a more pragmatic solution during the intensive process with the stakeholders. This means that market parties will be obliged to share their data. However, they do not have to provide this data for free. Because the Netherlands aimed for a similar implementation approach, we coordinated our plans with the Dutch plans. A great solution because we share a lot of the same stakeholders. And it allowed us to reuse parts of their legislation while writing ours."

A project with impact

"In December 2021, the Flemish government approved legislation for the obligatory data sharing. The effects of this law have yet to become apparent. As far as I am concerned, the awareness we have created is an essential result of IDACS. I advise countries that did not participate in IDACS not to underestimate the importance of creating awareness. Ensure that you involve charging point operators, market parties and stakeholders so that everybody stays informed."

IDRO

In order to make data collection for electric charging points possible, each Member State had to establish an ID Registration Organization. This organization deals with issuing ID or Emobility codes for CPOs and MSPs. The unique ID for a charge point allows for linking specific characteristics to a certain charge point, such as location or availability, and thus make it digitally traceable. In combination with the unique ID code of a service contract it enhances payments (abroad) and transparency.



Luxembourg:

'The handling of IDs was so far delegated by the three BENELUX countries to a private company, so it is also good that we came up with an own solution to do it on our own.'

France:

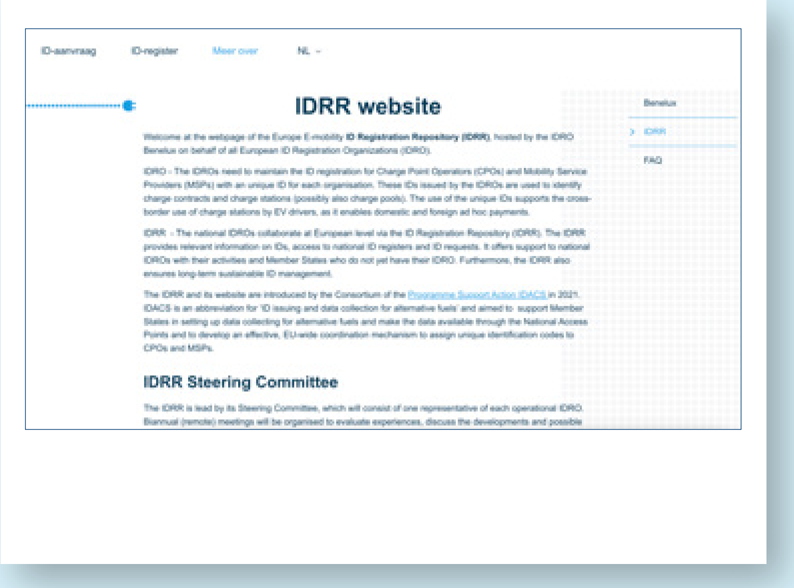
'The major success is the development of the operating rules for IDROs and the set-up of the IDRR, which show you that 11 countries already had a referenced IDRO. The challenge is to generalise the existence of an IDRO for each country. And to start up the IDRR as a permanent coordinating body for all IDROs.'

Croatia:

'At the beginning, we did not know how IDRO would work and whether it would be part of a public body or a private company. The project team, in cooperation with stakeholders and other public bodies, concluded that it would be best if IDRO was within the Ministry of the Sea, Transport and Infrastructure of the Republic of Croatia. Since this Ministry developed the project and had staff, who gained experience and knowledge during project implementation.'

IDRR website

Click on the picture below to navigate to the official IDRR website hosted by the IDRO Benelux.



"The IDRR steering committee should facilitate problem-solving when needed. For instance, by forming subgroups of workgroups dedicated to specific challenges or problems."

Suggestions for the IDRR Steering Committee by the participating member states

ID Registration Repository

The national IDROs are coordinated by an overarching organizational structure, the so-called ID Registration Repository. The IDRR, amongst other tasks, supports the national IDROs, assists new members with establishing an IDRO and provides information about IDs and the general rules. Furthermore, the IDRR ensures long-term sustainable ÍD management. Member states having an IDRO appoint a representative to take part in the IDRR Steering Committee.

The IDRR Steering Committee meets on a regular base and is managed by a rotating board consisting of representatives of three Member States of which one is chairing the board. During the first Steering Committee meeting, which was held on the 12th of May 2022 at the Benelux House in Brussels, the website of the IDRR was formally launched and the first managing board was appointed. Representatives from Germany, Portugal and the Netherlands form the first board, with Germany acting as chair.

"The IDRR steering committee should provide advice and information on subjects such as the syntax of IDs and IDROs of countries."

Suggestions for the IDRR Steering Committee by the participating member states

Making data available in the absence of dedicated legislation

Germany's process of sorting ID and data collecting for alternative fuels stood out as the country was one of the few countries that managed to collect data without legislation. This challenged the German team to look at existing legislation and alternative methods to make the correct data available. Jan Wegener, Team Leader Europe at the National Organisation Hydrogen and Fuel Cell Technology, explained the chosen approach and shared his experiences during IDACS.

Creating new legislation for obligatory data sharing was not an option for the German government. Jan Wegener and his colleagues searched for creative alternatives in existing legislation. By adding a few elements, such as technical necessities to collect the data, or obligations for data sharing in tenders Germany managed to meet the IDACS requirements. Jan: "Besides, we benefited from the fact that Charge Point Operators (CPOs) in Germany are usually connected to a roaming platform." Connecting all CPOs to the National Access Point (NAP) individually would have been very complex due to the large number of CPOs (>950) in Germany. Instead, the better approach was to connect the two existing roaming platforms to the NAP as the data was then made available in an aggregated form.

Open online platform

The German NAP predates IDACS and takes the form of a data marketplace. Independently of IDACS it underwent a major update. The German government purchased the available data from the roaming platforms. The data conversion to DATEX II as well as making the data available in that format on the NAP was in the scope of the data acquisition. Therefore, CPOs were enabled to use their existing connection to the roaming platforms in order to share their data in a hassle-free manner. We estimated that the overwhelming majority of CPOs is connected to the roaming platforms. Data conversion tools for the protocols OCHP and OICP were also made available by the roaming platforms as open-source software so CPOs were enabled to establish individual connections in case they did not want to go through the roaming platforms. However, such a choice would undermine the inherent advantages of the data aggregation by the platforms.

Jan: **"DATEX II caused the most headaches. The standard was ultimately just adopted in the same month IDACS was supposed to end. Therefore, procurements had to be delayed and were not awarded until the very end."**

Success factor

Germany disposes of one of the largest hydrogen refuelling networks in the world and the largest in Europe. Therefore, Jan fulfilled the role of work package coordinator for hydrogen. In 2019, the country started with around 50 hydrogen stations. Three years later, this number increased to 92 stations. Unlike for most of the other alternative fuels, the data on hydrogen refuelling stations was available for free from different sources. As part of a procurement, a converter to was created to convert data to DATEX II. The most complete dataset of hydrogen refuelling stations (H2.live) was thus made available to market parties and NAPs across Europe.

European awareness

Jan: "When we started the project, we had some concerns about whether the sector would cooperate or not in the absence of legal provisions. Luckily, many market parties recognized the advantages of a European approach and even of the data format. The exchanges between countries were eye-opening. And a great merit of IDACS was that we kept assessing each others problems, the motivations of certain market parties and the different aspects to be considered for an open data environment."

National Access Point

What were the challenges the project partners encountered while preparing their National Access Point and collecting the required data?

▶ For more challenges concerning data collection and NAP, please check the videos of Greece, Lithuania, Luxembourg and The Netherlands.

Hungary:

‘The Hungarian Public Roads launched the National Access Point (NAP) portal in 2019. The data content defined in the IDACS project could only be properly handled by then applied DATEX II v.2.3 . Therefore, the Public Roads considered a transition to DATEX II v.3. to be justified. Another challenge was the lack of willingness of the market parties to provide data. For this reason, the Public Roads established cooperation with the largest domestic electromobility service provider, which included the sharing of charging infrastructure data.’

Spain:

‘The definition of data categories was a challenge. Deciding on dynamic data, such as the price, unveiled different points of view in the Spanish sector. A harmonised approach was the solution to implementing the IDACS project definition. Another important challenge is the translation to DATEX II, which is an ongoing issue.’

Procurement

What advice do project partners have to share concerning possible necessary procurement procedures?

▶ For more advice on procurement please read the interviews with Austria, Belgium and Germany.

Portugal:

‘We believe that it is advisable to stimulate conversation among stake-holders and, if possible, with IT companies, even before going ahead with the hiring process. For Mobi.E (implementing body), the procurement rules are different. For them, it was easier, as they already had a company contracted to supply technological developments.’

Slovenia:

‘The public procurement process takes a lot of time, so you must start with it quickly. We had trouble finding a suitable party with knowledge of DATEX II in our process. Fortunately for us, we found one company that applied. Also, in our procurement call, we included an additional fund from the national budget to maintain and upgrade our Prometej app, which has been part of our IDRO and our NAP for three years.’

VIDEO INTERVIEW

Hielke Schurer answers the following questions:

- Why did you decide to join the IDACS project?
- What were your biggest achievements?
- What were the biggest challenges?
- What were the biggest lessons you learned?

Aiste Gasiuniene answers the following questions:

- What were your expectations prior to the project?
- What were your biggest achievements?
- What were the biggest challenges?
- What is the next step you will take during the implementation phase?

Legislation

How did project partners deal with preparing any possible necessary legislation?

Czech Republic:

'An important part of the initial phase of the IDACS project was the analysis of existing legislation. It was necessary to clarify the initial conditions in the Czech Republic and identify the missing legislative measures. It turned out that the existing legislation did not cover dynamic data and the issuance of identification codes. After consultation between the Ministry of Transport and the Ministry of Industry and Trade, we agreed that the Ministry of Transport would prepare a decree for this area. Our Fuel Act covers static data. This act also transposes European legislation and therefore did not have to be amended.'

Croatia:

'In Croatia, there was already a Law on the Establishment of Infrastructure for Alternative Fuels, which transposed the provisions of Directive 2014/94/EU but did not contain articles related to data sharing through the NAP. For that, we have drafted a rule-book that will regulate these processes and whose entry into force is expected soon.'

Portugal:

'In legal terms, there was already a generic framework regarding the data to be reported by stakeholders, their quality and the update frequency. For electric mobility, these obligations were defined in Decree-Law 39/2010 and for other fuels, it was Decree-Law 243/2008 that established them.'

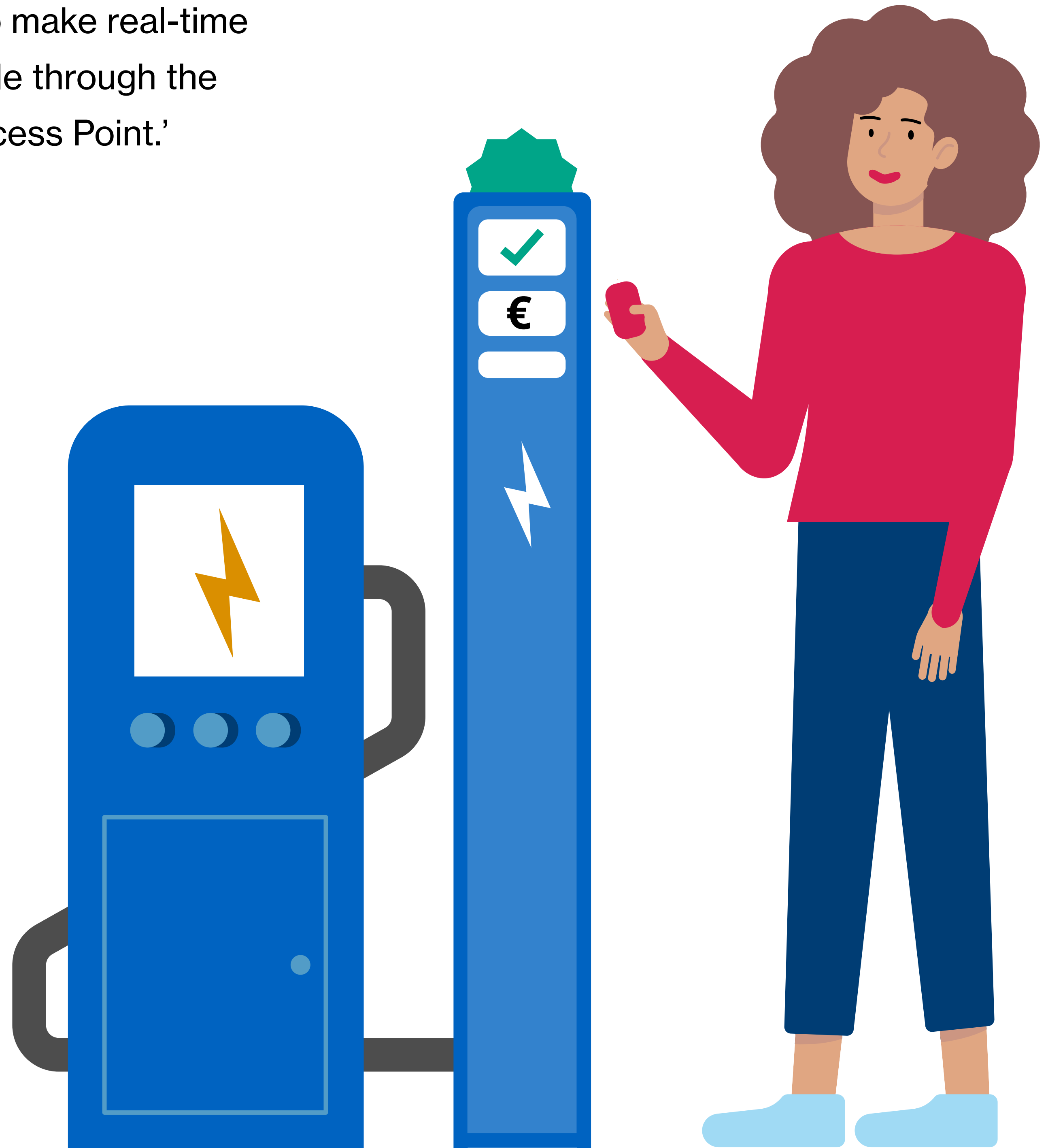
Legislation

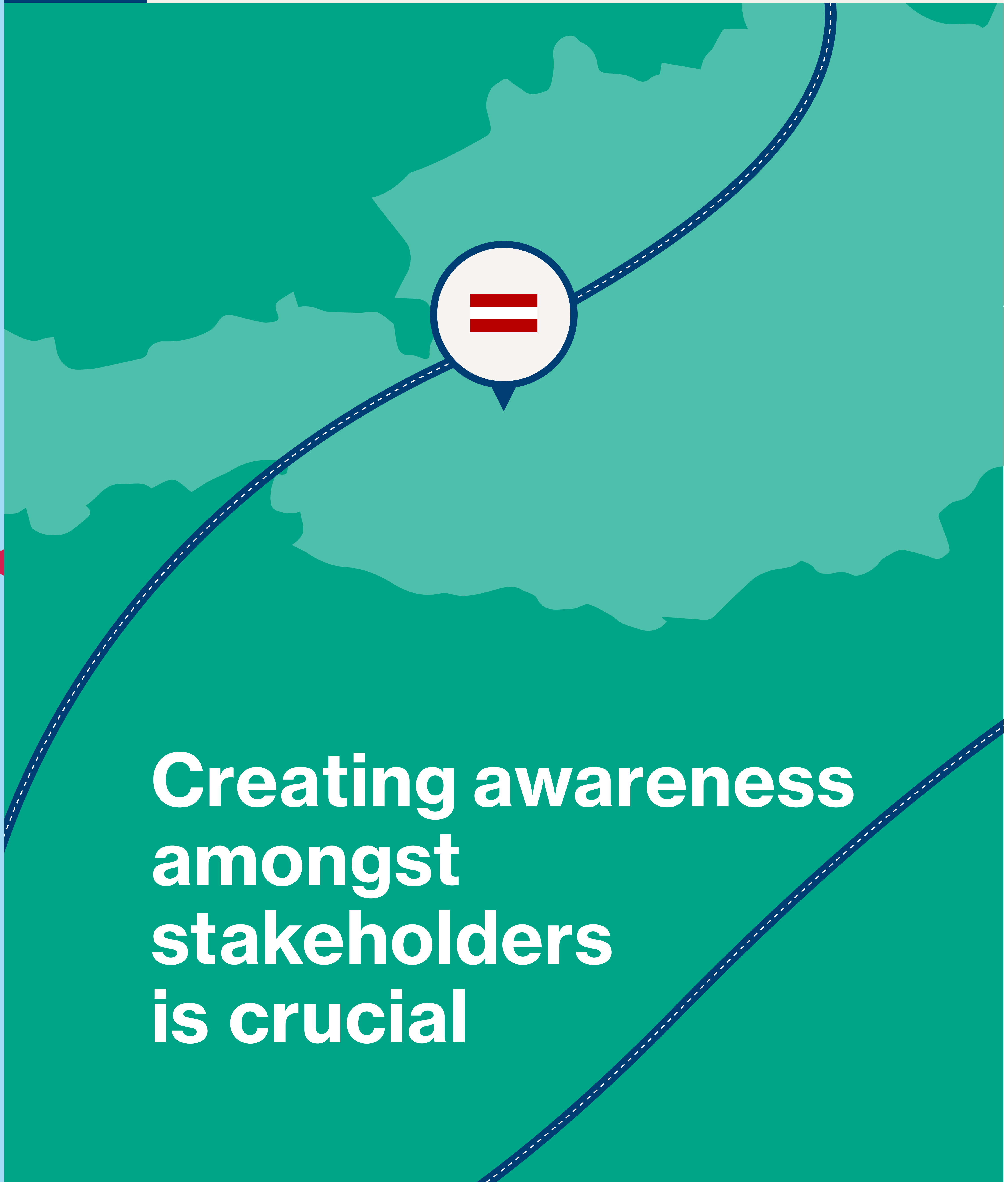
How did project partners deal with preparing any possible necessary legislation?

The Netherlands:

'Making data on charging stations available, turned out to be challenging without national legislation. It was therefore decided to implement national legislation that makes it mandatory for charge point operators to make real-time data available through the National Access Point.'

▶ Please check the interviews with Austria, Belgium, Germany and Poland for more insights on legislation.





Creating awareness amongst stakeholders is crucial

Over the past 3 years, Austria managed to set up a national database providing insight into the Austrian infrastructure for alternative fuels. The database offers static and – soon to come - dynamic data and is freely accessible. Daniel Hantigk, Content & Social Media Manager at E-Control, took us along in the Austrian journey during IDACS and described the most significant challenges and critical success factors.

“Before entering IDACS, the Austrian market for alternative fuels was in an early stage of development. As it was not part of their business model right from the start, the big market players could not provide correct data easily. There was one website on where to find a charging station, established almost 10 years ago as part of a marketing challenge by an electricity supplier,” Daniel says. In order to properly set up ID and data collection for alternative fuels, Austria introduced legislation obliging market parties and operators to share their data. This stimulated these parties to clean their systems. All the data is collected in a national database, which is freely accessible. With the introduction of the new law, Daniel and his colleagues noticed a considerable improvement in the amount of data collected.

The challenges of data collecting

Maintaining quality remains one of the biggest challenges for Austria. As the Austrian market changes, they need to make sure that information is accurate and updated. For example, how do you know if a charging point is still operating? Austria aims to provide up-to-date information through dynamic data with a second law. Daniel: “This dynamic data shows us if a charging station is working. If a charging station is active, we expect a certain flow of data coming in. If not, we can automatically send out an email to the owner of a charging point to verify if it is still operating.”

According to Daniel, legislation is crucial in getting the data collection for alternative fuels sorted. Daniel: “It makes sense for market parties and Charge Point Operators (CPOs) to exchange information to some extent. Such as information about the location of their charging station or about the fact that they use green energy. From a marketing perspective, this is valuable information that might stimulate the consumer to use the operators charging station. However, pricing information is, for example, not shared naturally.”

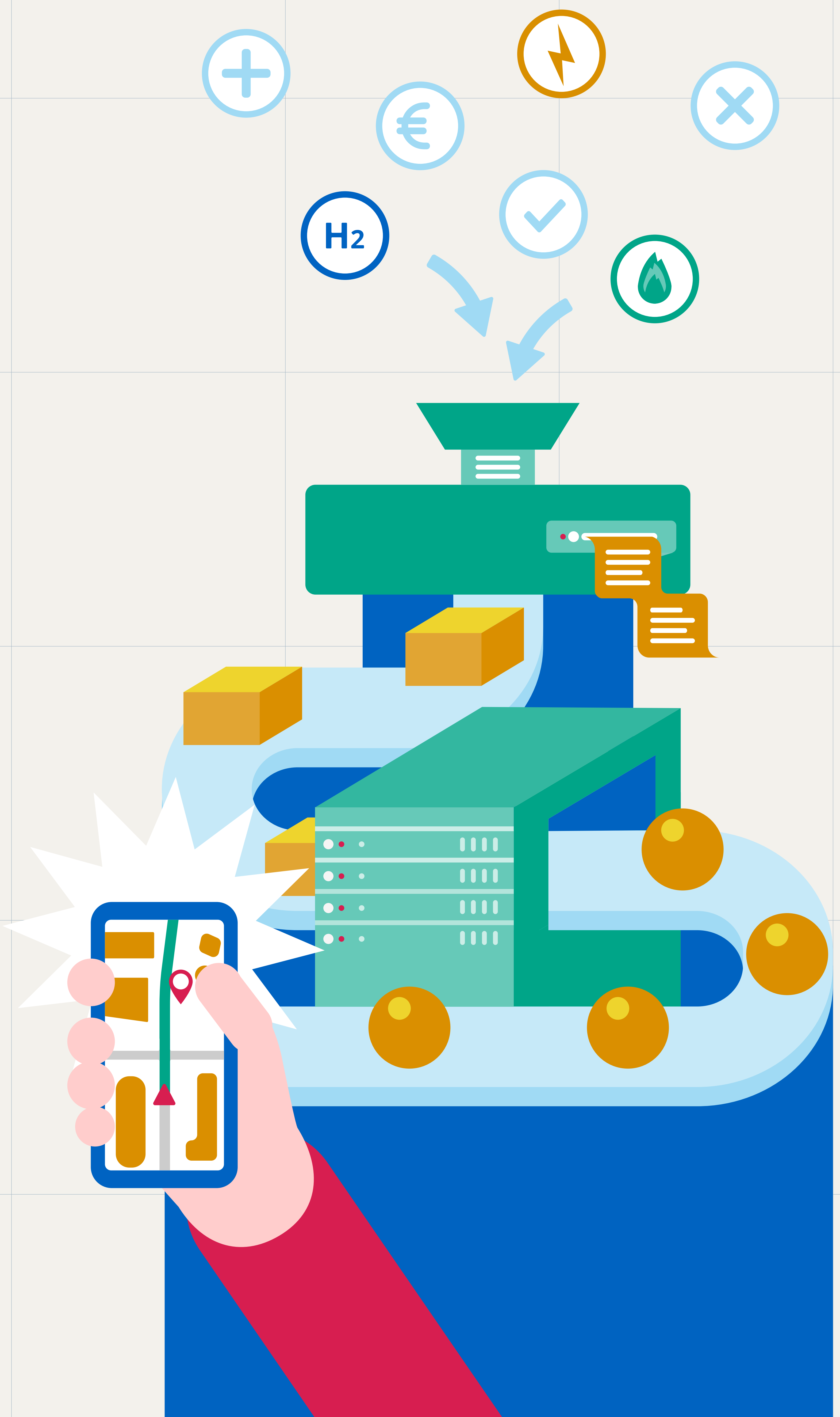
Implementing DATEX II

During IDACS, Austria was one of the first countries to implement DATEX II. One of the critical factors in achieving this was connecting with the right external parties. Daniel: "We connected with an external agency. This agency was already involved with our development partner and our IT department and had experience with the technical matter. They built a translator for our system, enabling us to translate data from our databases to the DATEX II format."

Sharing experiences and best practices

Daniel and his team did not know what to expect of IDACS beforehand. Looking back on these past 3 years, Daniel believes it would have been more complex to implement DATEX II without IDACS. "It was a great advantage to share our own experiences and hear about the different approaches of other participating member states. This gave us insight into what type of data we should collect. And it helped us strengthen our message towards stakeholders, as we could share examples of best practices and insights gained during IDACS."

Daniel: **"We were not the early adopter in e-mobility. When talking with other businesses, we were always a little bit behind and had the feeling we did not know enough. IDACS helped us to keep up and fed us with a lot of knowlegde and experience."**



Future

What will be done to ensure the continuation of the works done in this project?

Czech Republic:
'Due to the long approval process of the project plan and the delay of the public tender for the contract, the Czech Republic will not meet the project objectives until 2023. We are convinced that adopting the AFIR proposal, which addresses the issue, will give a new dynamic to the whole process. It would certainly be desirable for this proposal to fully reflect the IDACS projects conclusions.'

Portugal:
'All the relevant data collected by Mobi.E and DGEG will be updated, validated and available in DATEX II in their endpoints. From the NAP side, there will be a metadata file with a link to that endpoint, enabling automatic data pulling. Secondly, Mobi.E and DGEG will develop APIs, which will allow IT developers to connect and use data automatically. IDACS outputs shall be considered in the activity of Portuguese stakeholders.'

Future

What are the project partners' views on making alternative fuel data available?

Greece:
'Greece will upgrade the national IDRO and the NAP in order to add new functions to the existing registry such as recording accounting data and contracts between stakeholders, so that there is a complete record of electromobility market in Greece.'

Spain:
'Disclosing this kind of data is very important in the case of Spain, a country with long travel distances where recharging anxiety is a relevant barrier for consumers to acquiring an electric vehicle. These citizens need reliable information about the location and characteristics of charging points and the IDACS project has put the basis for building this official database.'

Czech Republic:
'We consider the provision of basic information on charging and filling stations as a state service. Our aim is to make this data available free of charge in basic form within the NAP, both to domestic and foreign customers.'

Portugal:
'Our main concern, as a public entity, is to provide sustainably open, free, accurate, updated, useful and compliant with national and European legislation, data.'

Slovenia:
'It looks like a mindset change is necessary – data sharing is a new reality, and one should stop buying time and not comply.'

Croatia:
'The IDACS project should be a preparation for introducing data availability through navigation. Information on the availability of alternative fuel infrastructure should also be available through road navigation applications (e.g., Tom-tom and the like).'

Reflection during the end event by Vivianne Heijnen, Minister for the Environment (The Netherlands)

"I believe the result of IDACS places a bigger prospect. We have enabled data access for many countries, which makes travelling with an alternative car, or even trucks in the near future, easier."

Kees Hansma
Deputy Director Sustainable Mobility, Ministry of Infrastructure and Water Management, the Netherlands

End events

The informal end of the project was celebrated in the Benelux House in Brussels on the 12th of May 2022, together with the kick-off of the IDRR Steering Committee. Partners shared their successes, critical choices and reflected on the past three years of IDACS. The milestones were made tangible and collected in the Experience Museum of IDACS achievements.

The formal end event was held online, on the 19th of May 2022, which allowed for a greater number of participants. Next to the European Commission and the project partners, stakeholders and other Member States were invited to participate in the event to hear about the project results, share experiences and discuss the future of sustainable mobility, and consumer information.

"I am proud that the Benelux secretary joined IDACS in 2020. When the Benelux decided to establish a common service, where service providers can request an ID-code in one click."

Frank Weekers
Deputy Secretary-General Benelux Union

Museum of IDACS

Critical choices

What turned out to be crucial turning points or decisions within the project?

Poland:
'The most challenging part for us was translating data to DATEX II. We did not know how to translate the data and who should do it. We ended up doing it ourselves.'

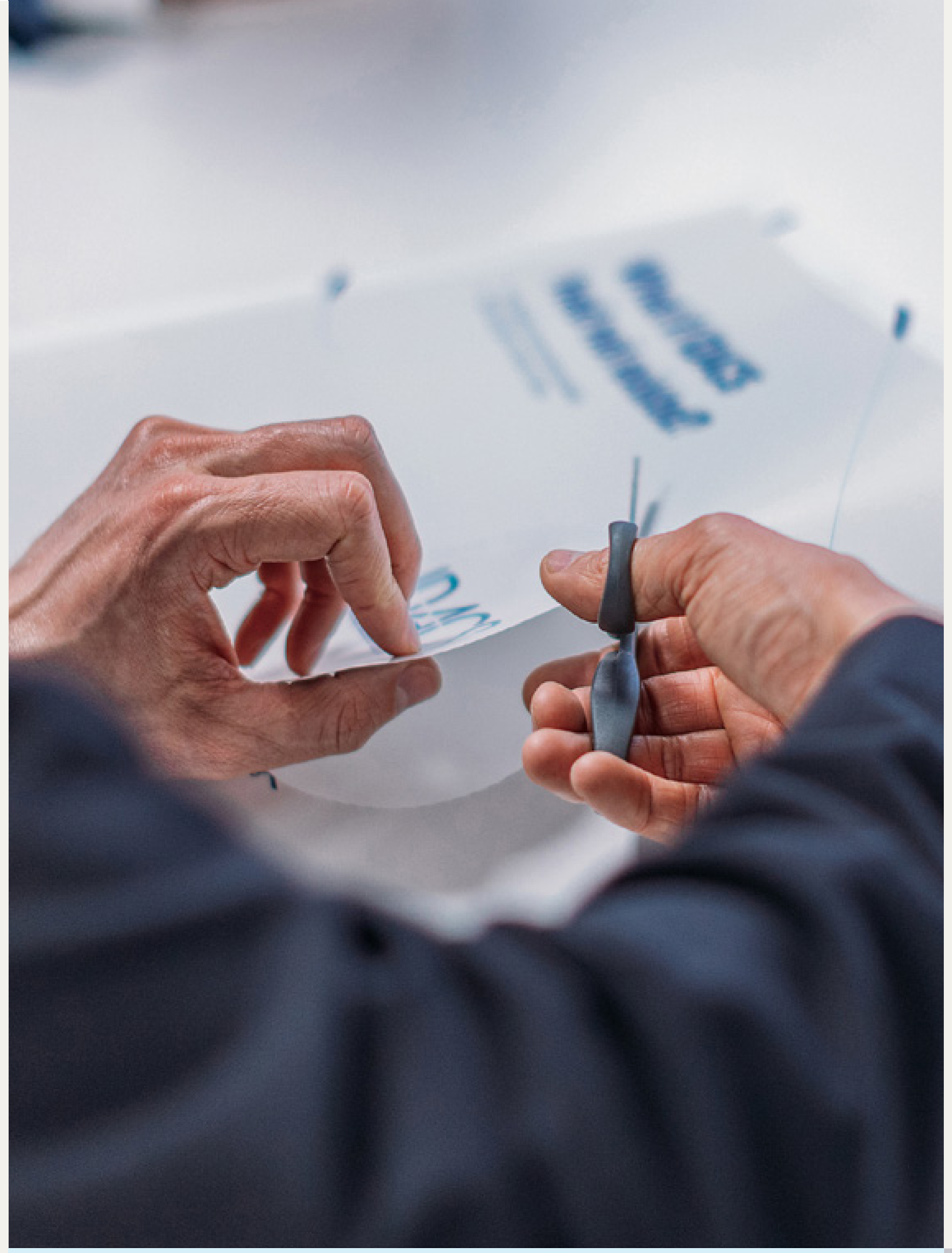
Luxembourg:
'Embracing the SG Benelux proposal to set up the IDRO.'

Slovenia:
'Deciding that the Ministry will act as IDRO and finding out there was already a National Access Point.'

Belgium:
'We were able to 'Copy-Paste' Dutch legislation.'

France:
'We decided to build upon existing structures and created a legal base for AFIREV as an IDRO.'

Germany:
'A critical choice for us was the procurement of data and converter tools.'



"It is essential that consumers have equal and fair access to alternative fuel data in particular on the location and the prices, to help overcome barriers, especially with regards to the lack of infrastructure in certain places."

Alexander Verduyn
Policy Officer Sustainable and Intelligent Transport Unit, DG MOVE European Commission

"You have the kind task to help your fellow member states, to make sure all 27 member states are in the same phase. To ensure smooth transfer of data and endorse alternative mobility."

Saki Gerassis
Policy and Data Officer European Commission

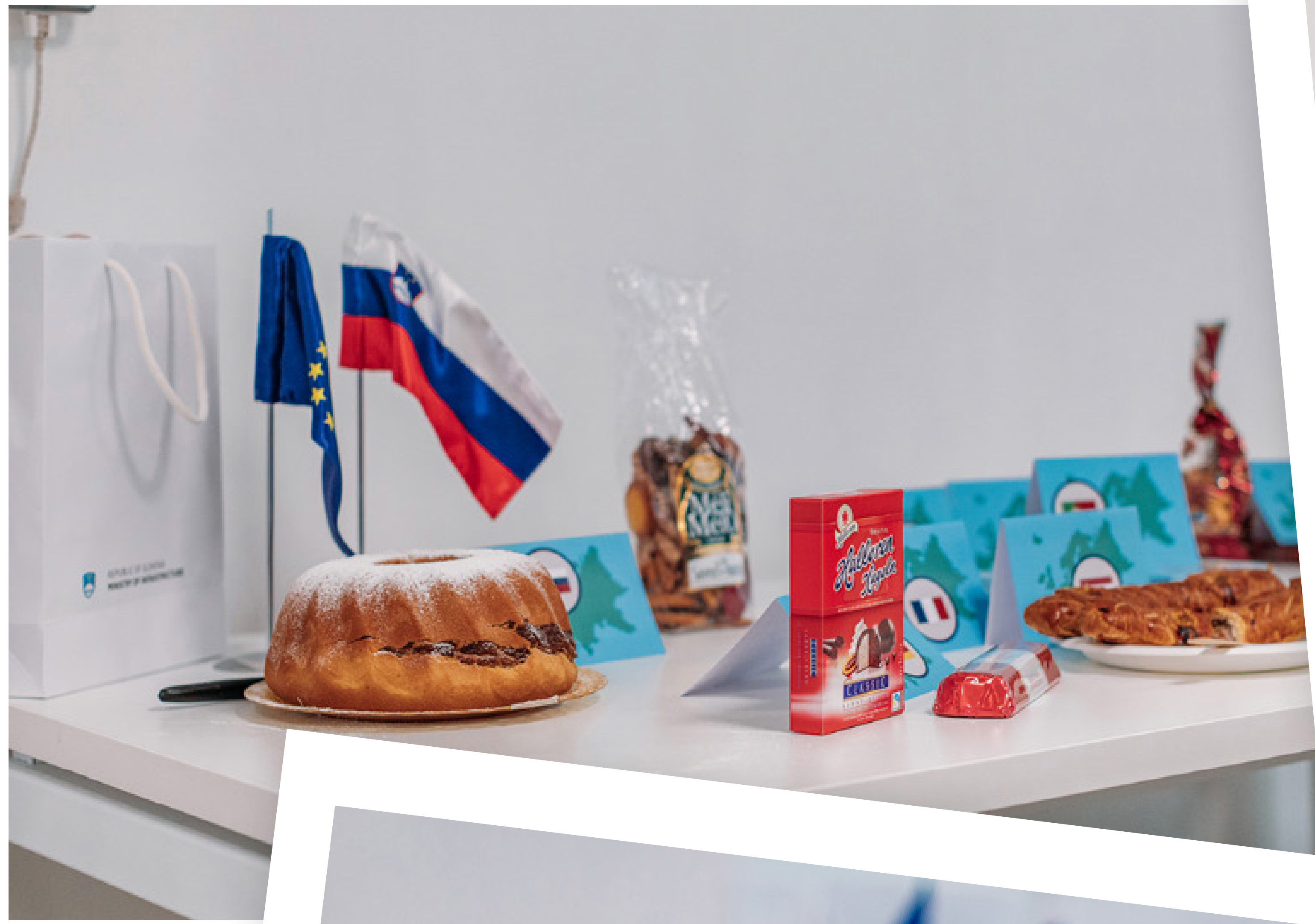


Photo impression

Activity 1 ID management

1.1.1-1.1.2
Format of emobility codes
Describes the agreed ID format for Service Providers and Charge Point Operators for contracts and charge stations.

Click to view deliverable

1.3.1-1.3.3
Organization, set up and Management Support Structure for a common IDRR
Describes the conception of an IDRR, providing specific information about its set-up.

Click to view deliverable

1.2
IDRO setup
Describes the setup and organisational mechanisms for ID registration organisations.

Click to view deliverable

Activity 2 Data collection

2.1.0
Guideline document For Data Collection and National Access Points
Gives guidance as to how the data provision via the NAPs can be achieved. To support countries who do not yet have a NAP or want to have it improved.

Click to view deliverable

2.1.1-2.1.6
Static and dynamic data collected per participating Member State
Presents the results of the actual data collection on electric charging points, hydrogen stations and other fuels filling stations between 2019 - 2021.

Click to view deliverable

2.2.1
Unlocked data through the NAPs in DATEX II format
Presents the actual data provision on alternative fuels infrastructure through the NAPs in DATEX II format.

Click to view deliverable

2.2.2-2.2.4
Report on data 2.2.2 - 2.2.4
Report contains:

- harmonized data categories across participating MS
- Quality criteria and method of quality measurement/ monitoring
- IT solution for provision of static and dynamic data in DATEXII for countries with no NAP

Click to view deliverable

2.2.5
Proposal to EC for complementary data protocols
Presents and analyzes complementary data protocols on top of DATEX II to enable e-Mobility service provision.

Click to view deliverable

2.2.6
Report on the lessons learnt from Nobil database solution
Reports on the lessons learnt from Nordic NOBIL database solution.

Click to view deliverable

Memo
Memo on IDACS tasks
Memo on the following topics: a common form of NAP, data provision on the EU level, multi-country / EC wide databases and third party access to data.

Click to view deliverable

2.3.1
Sustainability and continuity of the data collection
beyond the Programme Support Action Report with proposals on how to keep collected data on alternative fuels infrastructure up to date – beyond the period of the IDACS PSA.

Click to view deliverable

ID Registration Organization

AUSTRIA BELGIUM CROATIA CZECH REPUBLIC FRANCE GERMANY GREECE HUNGARY LITHUANIA LUXEMBOURG THE NETHERLANDS POLAND PORTUGAL SLOVENIA SPAIN

DATEXII conversion tool (if applicable)

AUSTRIA BELGIUM CROATIA CZECH REPUBLIC FRANCE GERMANY GREECE HUNGARY LITHUANIA LUXEMBOURG THE NETHERLANDS POLAND PORTUGAL SLOVENIA SPAIN

National Access Point

AUSTRIA BELGIUM CROATIA CZECH REPUBLIC FRANCE GERMANY GREECE HUNGARY LITHUANIA LUXEMBOURG THE NETHERLANDS POLAND PORTUGAL SLOVENIA SPAIN

IDRO legislation (if applicable)

AUSTRIA BELGIUM CROATIA CZECH REPUBLIC FRANCE GERMANY GREECE HUNGARY LITHUANIA LUXEMBOURG THE NETHERLANDS POLAND PORTUGAL SLOVENIA SPAIN

Deliverables per participant

In progress
Click to navigate

NAP legislation (if applicable)

AUSTRIA BELGIUM CROATIA CZECH REPUBLIC FRANCE GERMANY GREECE HUNGARY LITHUANIA LUXEMBOURG THE NETHERLANDS POLAND PORTUGAL SLOVENIA SPAIN

Electric Charging Points data

AUSTRIA BELGIUM CROATIA CZECH REPUBLIC FRANCE GERMANY GREECE HUNGARY LITHUANIA LUXEMBOURG THE NETHERLANDS POLAND PORTUGAL - STATIC PORTUGAL - DYNAMIC SLOVENIA SPAIN

Hydrogen data (if applicable)

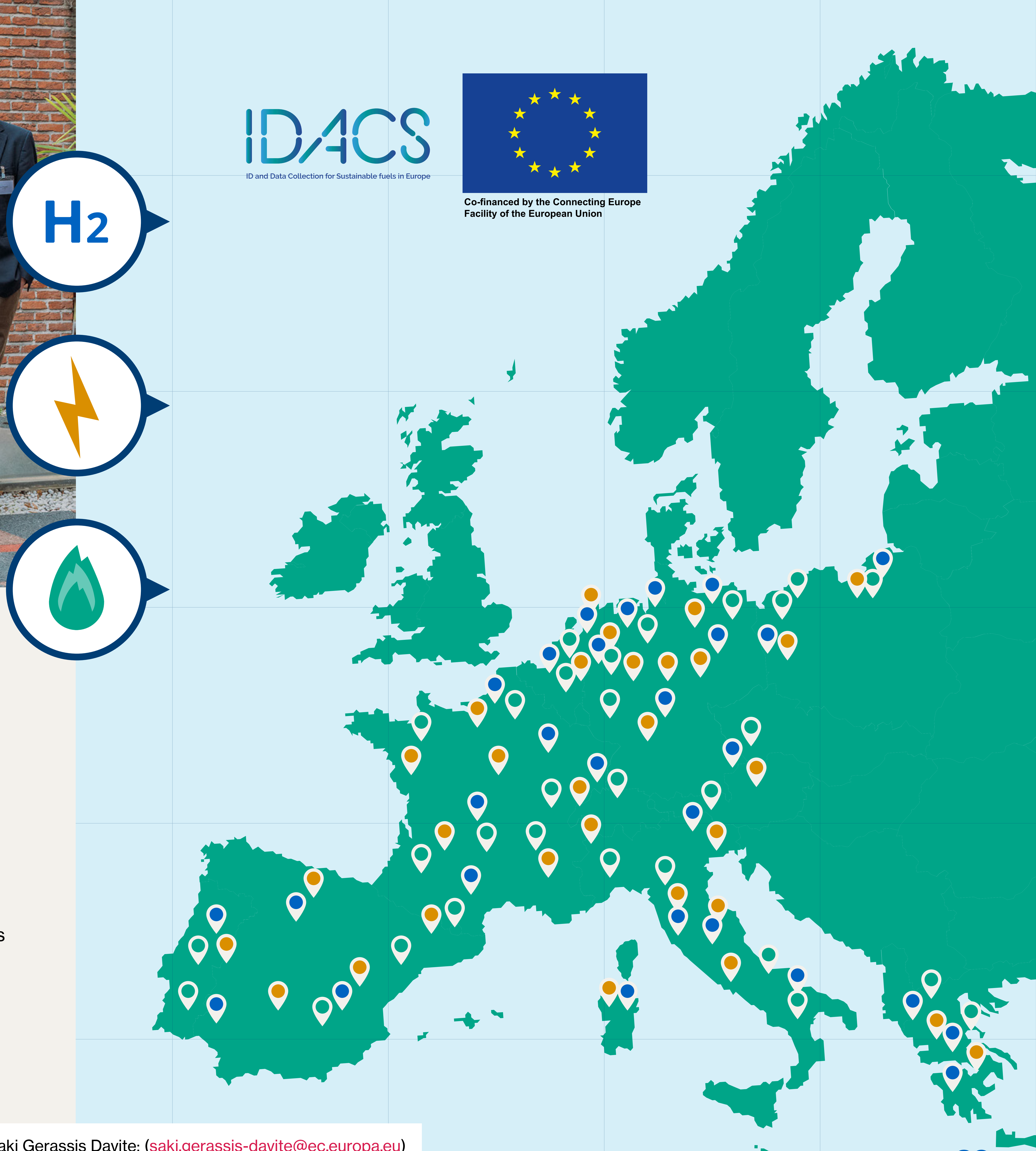
AUSTRIA BELGIUM CROATIA CZECH REPUBLIC FRANCE GERMANY GREECE HUNGARY LITHUANIA LUXEMBOURG THE NETHERLANDS POLAND PORTUGAL SLOVENIA SPAIN

Other fuels data (if applicable)

AUSTRIA BELGIUM CROATIA CZECH REPUBLIC FRANCE GERMANY GREECE HUNGARY LITHUANIA LUXEMBOURG THE NETHERLANDS POLAND PORTUGAL SLOVENIA SPAIN

IDACS
ID and Data Collection for Sustainable fuels in Europe

Co-financed by the Connecting Europe Facility of the European Union



Epilogue

With the IDACS project we took the first essential steps in making good quality alternative fuel data available. Awareness was created on what is necessary to fulfill consumer's needs regarding information, but when it comes to facilitate and improve the consumer's journey on alternative fuels still a lot needs to be done. It is a joint effort that requires European coordination. The results of the project are used in the revision of the Alternative Fuel Regulation. Thus, in the near future all European member states will have to set up an IDRO and join the IDRR.

The discussion about data categories, data quality and formats will be continued in the Sustainable Transport Forum. The new PSA NAPCORE will deal with the coordination and harmonization of the National Access Points and the IDACS data categories are expected to be part of one of the demonstrators within this PSA. For me as the project coordinator this means that all open ends are covered.

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