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
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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

	= Data available
	= 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

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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.

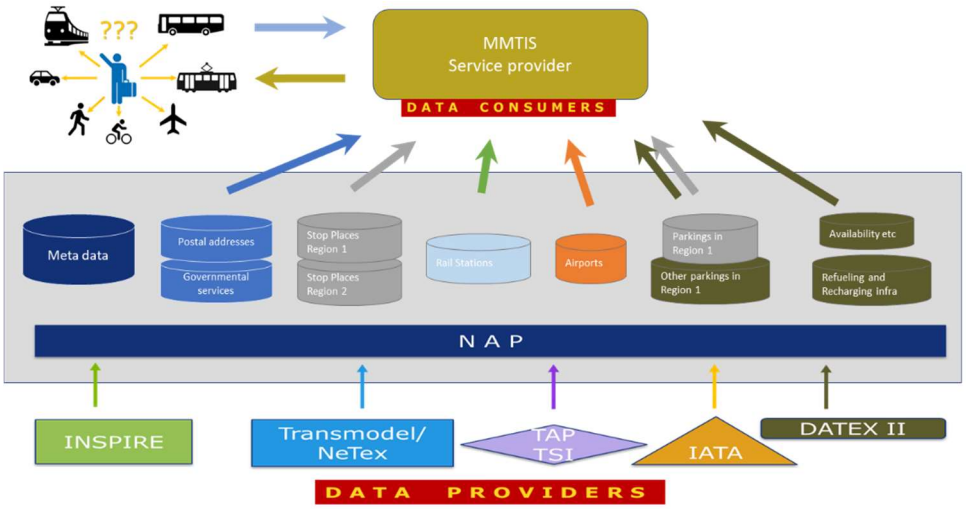
Further details on these datasets can be found in chapter 8, where also the mapping to the DATEX II standard is provided.

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

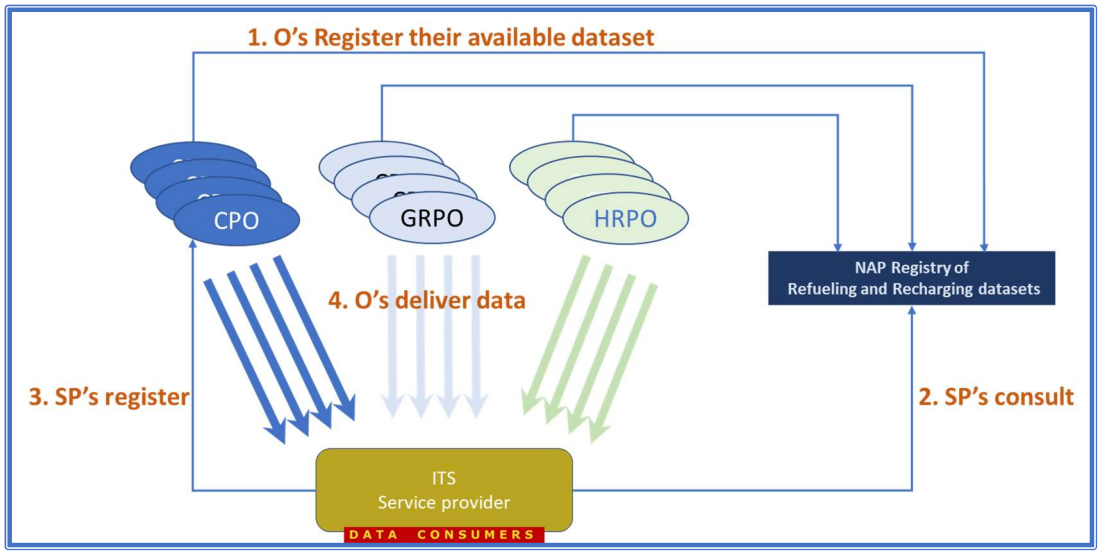
The overall aim of the Directives and its associated Delegated Regulations are to establish a pan European harmonised and aligned infrastructure of data provision in the traffic and travel domain and thus contributing to a safe, green and efficient traffic and travel behaviour throughout Europe.

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,

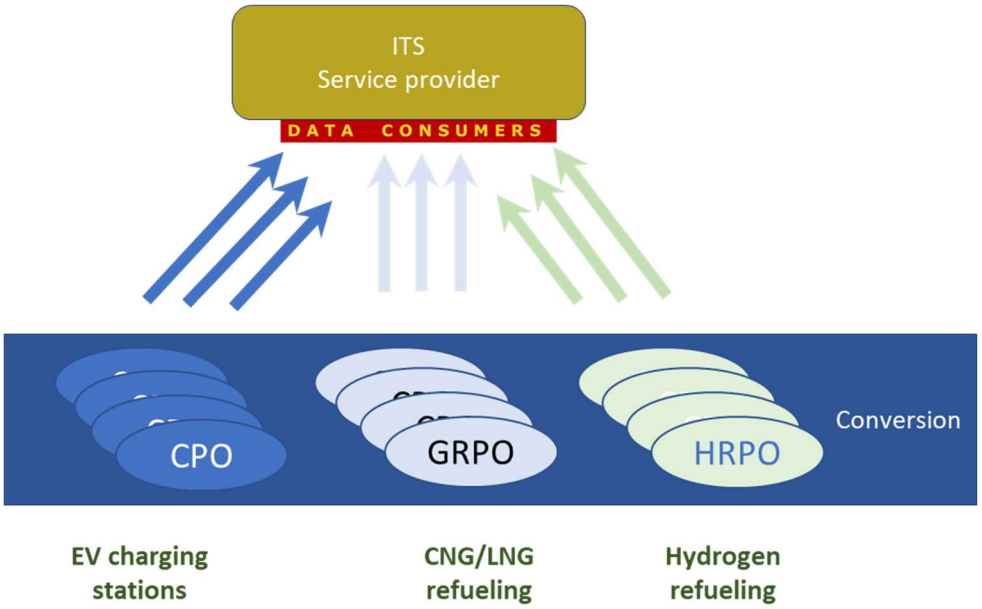
always two datasets are to be provided: one with static data and one with the real time availability.

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



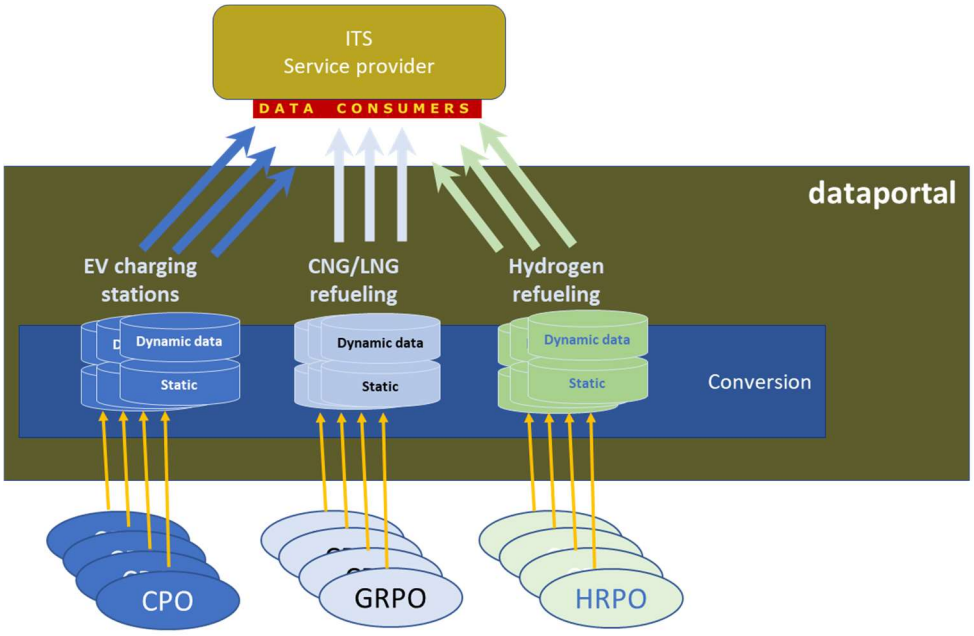
System functions required in the Data portal to support this scenario

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

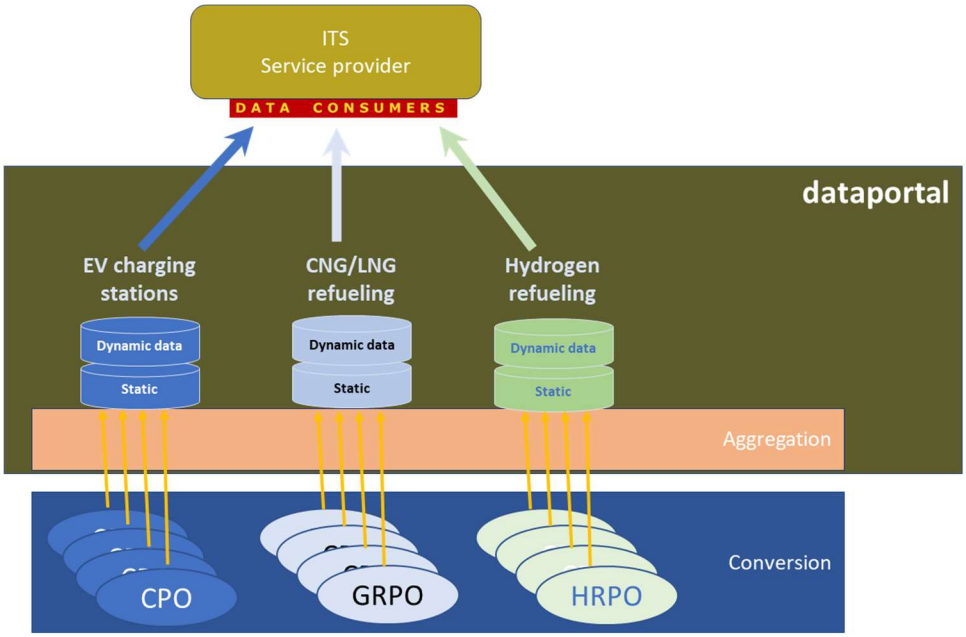
Action 2 Run the data chain

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

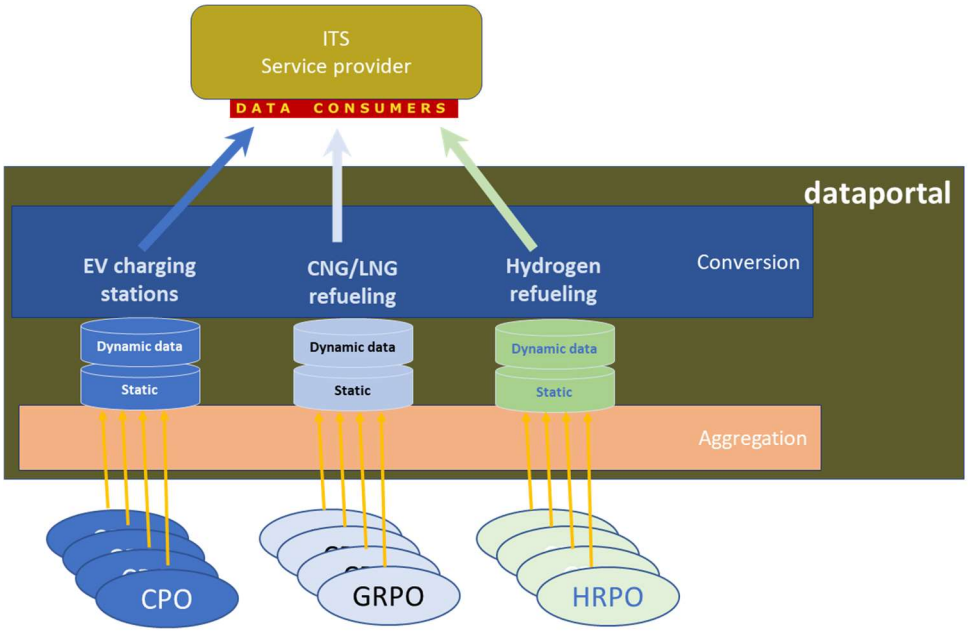
Action 2 Run the data chain

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

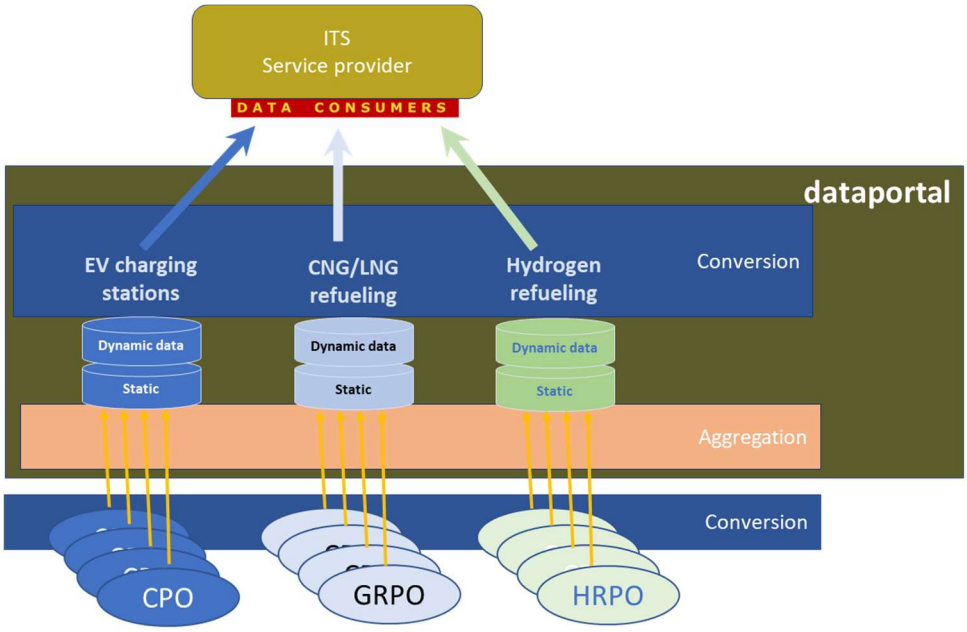
Action 2 Run the data chain

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

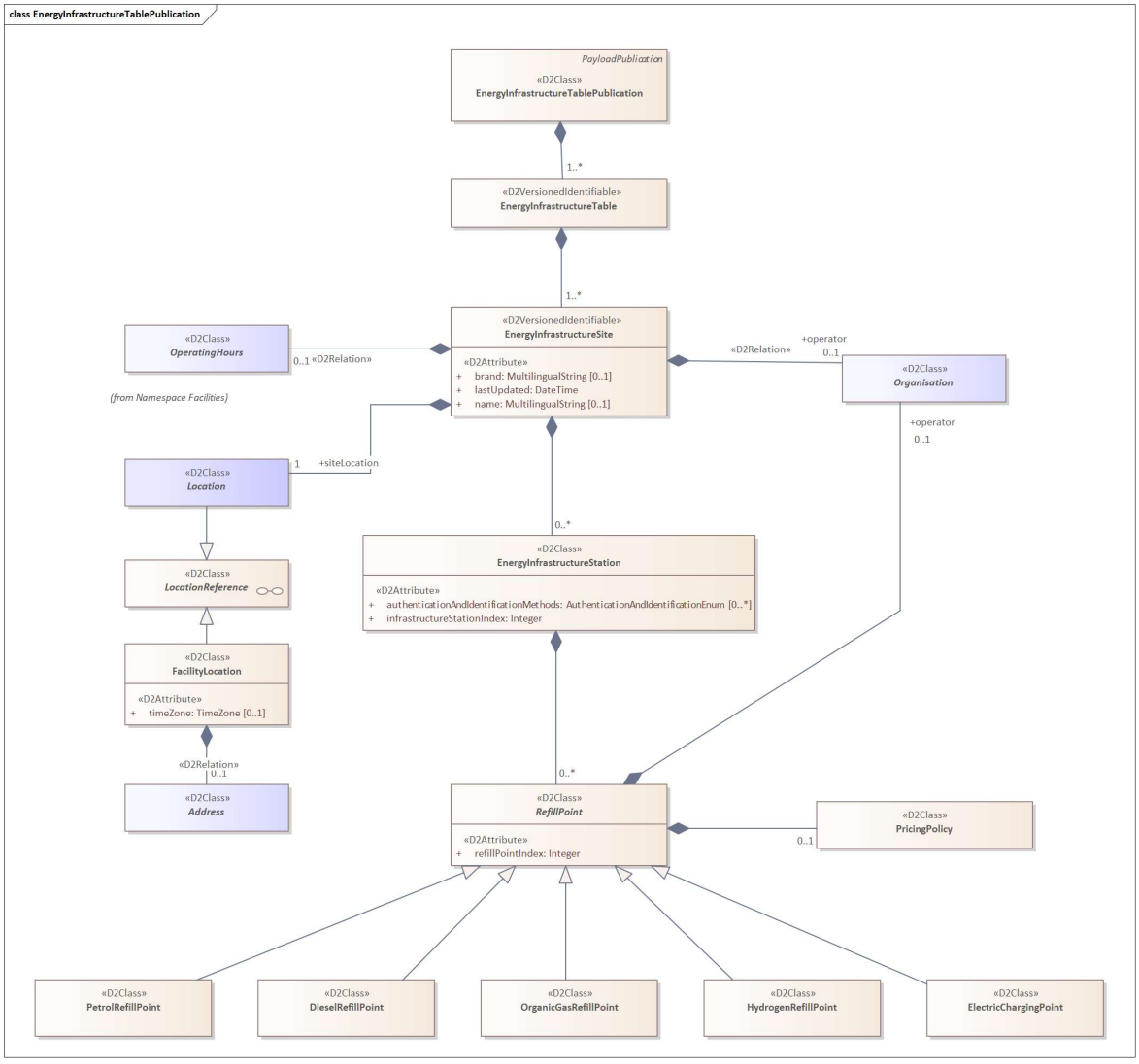
The IDACS Service profiles have the data structure as described in the next paragraphs.

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

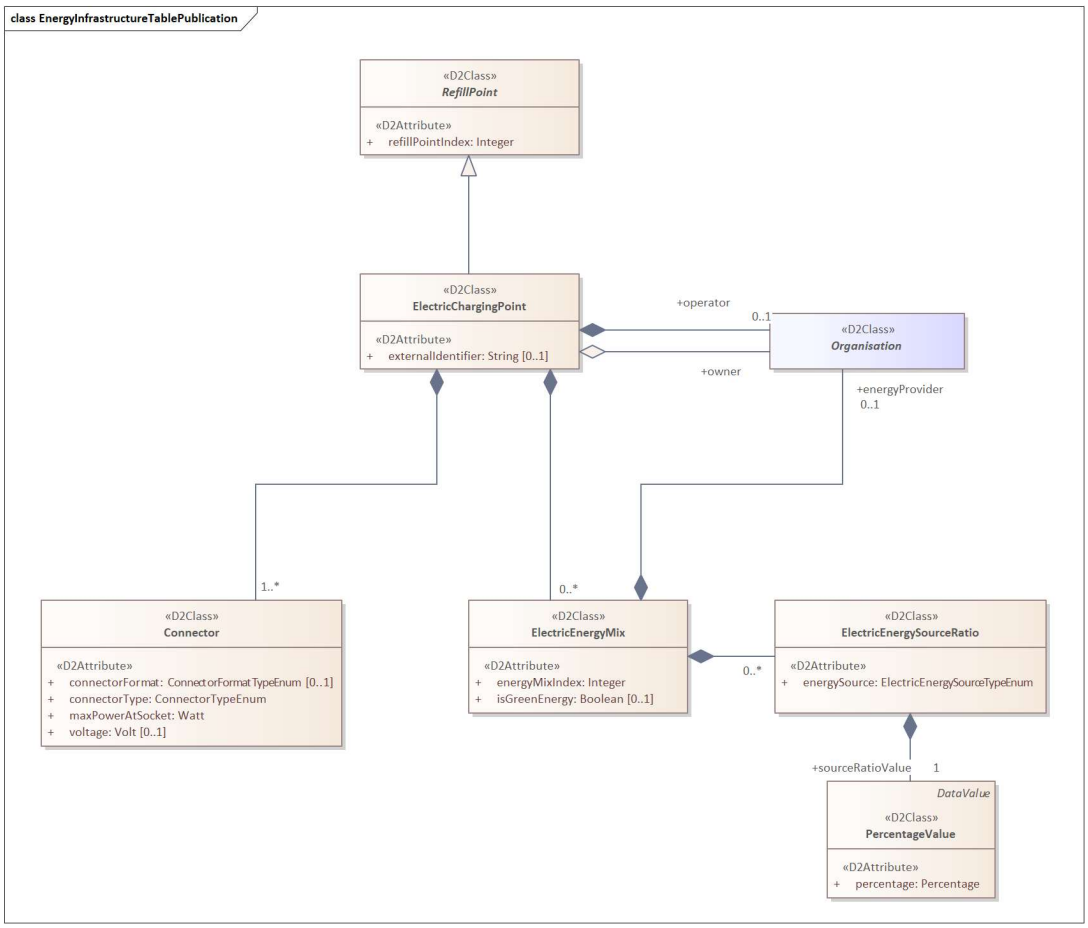
A Hydrogen refill point as a standalone Energy Infrastructure station

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

6.4 EV charging service profiles

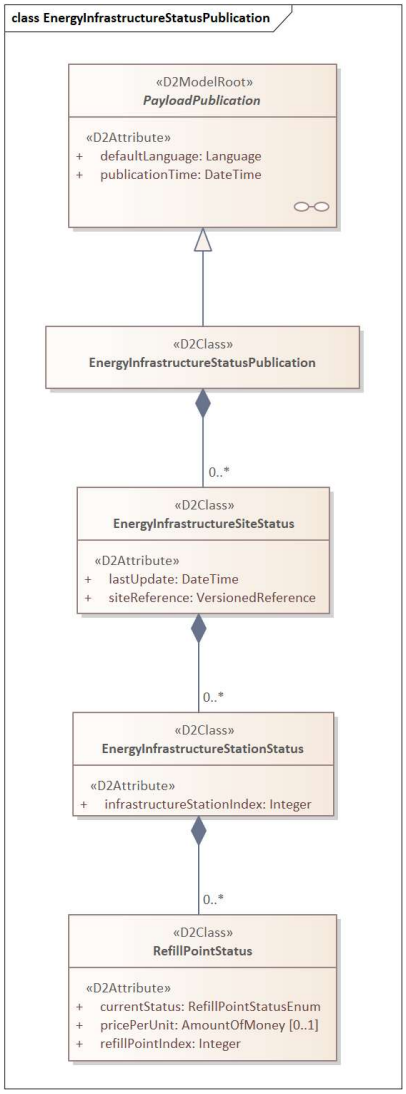
6.4.1 Infrastructure

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

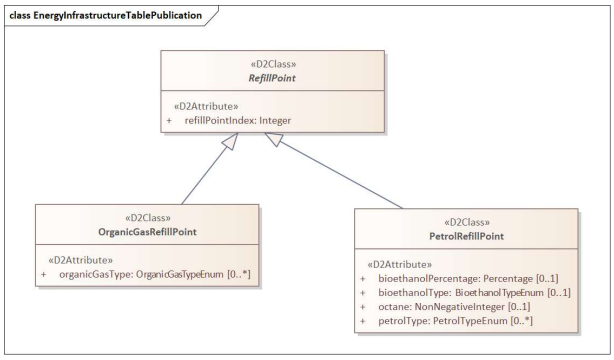
The actual availability status of the EV-Charging infrastructure is published as a DATEX II EnergyInfrastructureStatus publication. This publication carries the following information elements as shown in the UML diagram below.



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.

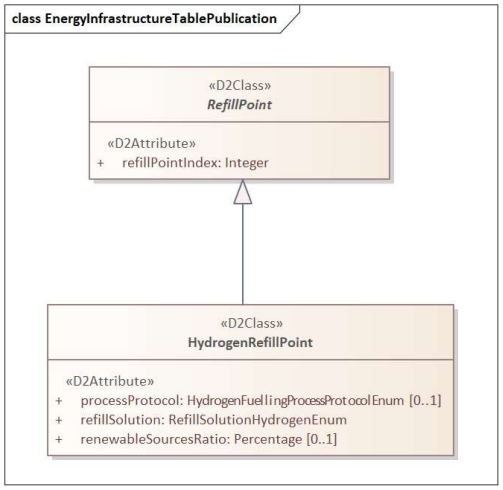
6.5.2 Actual availability status

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.