# Sub-Group to foster the creation of an Electro-Mobility Market of Services

## Deliverable 1.2

Version V023

**SGEMS D1.2 Team**

**25/11/2016**



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|---|---|
| STF: | Sustainable Transport Forum |
| SGEMS: | Sub-Group to foster the creation of an Electro-mobility Market of Services |
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**Versions**

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| **002** | 22-APR-2016 | J.M.Rives | Update after meeting #3 |
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| | | | |
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| **013** | 05/07/2016 | J.M.Rives | First release, for feedbacks |
| **014** | 06/07/2016 | T.Serafimova | Comments from Nobil on Nobil section |
| **015** | 13/07/2016 | J.M.Rives | Feedbacks from SGEMS meeting in Brussels (July 6th)<br>Feedbacks from Allego |
| **The V015 version has been released on July 28th to all the SGEMS team members, for feedbacks** | | | |
| **020** | 19/09/2016 | J.M.Rives | Feedbacks received about the V015 released on July 28th |
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| **022** | 31/10/2016 | J.M.Rives | First liaison with ITS Directive (2010/40/EU) – Stephanie Leonard<br>Remarks and improvements from Alain Van Gaever |
| **023** | 3/11/2016 | J.M.Rives | Liaison with ITS Directive (2010/40/EU) –<br>• EU-wide Multimodal Travel Information Services (MMTIS)<br>• EU-wide Real-Time Traffic Information services (RTTI)<br>Creation of the appendix VII |
| **024** | 25/11/2016 | J.M.Rives | Review from Stephanie Leonard |

# Table of Contents

# 1 Definitions

Electric Vehicle ('EV'): "*means a motor vehicle equipped with a powertrain containing at least one non-peripheral electric machine as energy converter with an electric rechargeable energy storage system, which can be recharged externally;". For the purpose of this document we limit the scope to road-transport battery passenger cars.*

Charging Point or Recharging Point ('EVSE'): *"means an interface that is capable of charging one electric vehicle at a time or exchanging a battery of one electric vehicle at a time;"* (Directive 2014/94/EU, art. 2.3)

Normal power reCharging Point: "*means a reCharging Point that allows for a transfer of electricity to an electric vehicle with a power less than or equal to 22 kW, excluding devices with a power less than or equal to 3,7 kW, which are installed in private households or the primary purpose of which is not recharging electric vehicles, and which are not accessible to the public;* (Directive 2014/94/EU, art. 2.4)

High power reCharging Point: *"means a reCharging Point that allows for a transfer of electricity to an electric vehicle with a power of more than 22 kW;"* (Directive 2014/94/EU, art. 2.5)

ReCharging Point accessible to the public: *"reCharging Point accessible to the public' means a reCharging Point which provides Union-wide non-discriminatory access to users. Non-discriminatory access may include different terms of authentication, use and payment;"* (Directive 2014/94/EU, art. 2.7)

Charge Point Operator (CPO): A "Charge Point Operator" is an actor responsible for the operation of a Charging Infrastructure to provide requested charging services. In charge of the maintenance of the Infrastructure, it maintains the availability of charging spots and detect anomalies.

Charging Pool, Charging Station, Connectors: see chapter 5.1 *Electric vehicle charging infrastructure elements: Models* page 8.

# 2 Aim of this document

## 2.1 SGEMS 1.2 deliverable

The STF-SGEMS-1.2 deliverable is defined as:

"*Recommendations for the implementation of article 7.7 of the Directive 2014/94/EU, by defining the exact data that should be published, and clarifying the process among Member States to release the right information to the public.*"

## 2.2 Directive 2014/94/EC

### 2.2.1 Subject matter

"*This Directive establishes a common framework of measures for the deployment of alternative fuels infrastructure in the Union in order to minimise dependence on oil and to mitigate the environmental impact of transport. This Directive sets out minimum requirements for the building-up of alternative fuels infrastructure, including reCharging Points for electric vehicles and refuelling points for natural gas (LNG and CNG) and hydrogen, to be implemented by means of Member States' national policy frameworks, as well as common technical specifications for such recharging and refuelling points, and user information requirements.*"

### 2.2.2 Article 7.7

"*Member States shall ensure that, when available, the data indicating the geographic location of the refuelling and reCharging Points accessible to the public of alternative fuels covered by this Directive are accessible on an open and non-discriminatory basis to all users. For reCharging Points, such data, when available, may include information on real-time accessibility as well as historical and real-time charging information.*"

## 2.3 Scope and Proposal document from SGEMS 1.2

### 2.3.1 Scope/Disclaimer

Please note that the following document and recommendation from the SGEMS D1.2. only apply to reCharging Points accessible to the public.

# 3 Overview

This document proposes some clarification about Electric Vehicle Charging Infrastructure description and the related data. It would, while minimizing constraints and costs for recharging infrastructure investors/operators,

1 Propose a minimum set of static data required
2 Propose a minimum set of dynamic data required
3 Propose a common structure and format for collecting this data
4 Propose an open EU architecture for collecting and giving access to the data
5 Propose mechanisms to ensure quality/reliability of the data

# 4 Key recommendations

This chapter is a summary of the recommendations described in this document.

- **Charging infrastructure description data shall be published on one designated online location** per country, or per group of countries. The availability of such databases is a key success factor for interoperability. Some already existing platforms could be (re)used for this purpose. The National Access Points of the ITS Directive shall be used when available and accessible.

  *See chapter 6 "Access modes".*

- **The eMI3 data model is fully relevant for these databases**, simple to implement and very robust regarding future possible enhancements and changes.
  *See chapter 5 "Data model".*

- **A set of attributes is defined** and cover the main characteristics of the charging infrastructure. As a summary:
  - Location, Geodesic coordinates, Address, Opening hours, Accessibility, Charge Point Operator
  - Authentication and Identification methods list, Payment methods list
  - List of available charge-solutions (Power, Modes)
  - List of available connectors (plugs, sockets, induction plate …)

  *See chapter 5.2 "Data attributes".*

- **Some "Real-time" attributes could be added** (dynamic attributes). They are very relevant but may be costly.
  - Real-time availability (in order, out of order …) and occupation status (free, occupied, …)

  *We are currently checking the requirements of the ITS Directive (2010/40/EU) in order to define in which situation (if any) providing these "Real-time" attributes could be mandatory.*

- The creation of such a database **requires a clear and defined way of identifying Charging Pools and Charging Points**. This point is addressed by the SGEMS 3.1 sub-group. This document and its recommendations are fully compliant with the SGEMS 3.1 sub-group results.
  *See chapter 5.3 "Object identification and Identifiers management"*

- **A single interface for these databases has to be defined**, to ensure a large use of them and to reduce the implementation costs. This interface definition is not part of this document.

- **The data will be uploaded (stored) by the Charge Point Operators (CPO)**.

- Authorities will make sure that such a location is available, with **reasonable and non-discriminatory conditions** to anyone who wants to download the data.

Nota: Electromobility data are also covered by the **ITS Directive (2010/40/EU).** A deeper analysis would be necessary to define the exact scope of this impact.

# 5 Data model

## 5.1 Electric vehicle charging infrastructure elements: Models

Each time an EV will have to be recharged, the EV driver will have to connect it to a Charging Point. This is the reason why the **Charging Point** is a very important and core object in modelling recharging infrastructure. The Charging Points are also referred to as Electric Vehicle Supply Equipment (EVSE).

In order to be able to connect the vehicle to an EVSE, however, the EV driver will have, previously, to locate it. Because Charging Points are often grouped into Charging Pools, the driver will have to locate Charging Pools. This is the reason why the **Charging Pool** is a very important object in the data model of e-mobility.

Based on these principles, the data model for charging infrastructure elements, could be defined as a 4 levels hierarchy:

- Charging Pools
    - Charging Stations
        - Charging Points = EVSE
            - Connectors (Plugs and sockets)

### 5.1.1 Level 1: Charging Pool

A Charging Pool is a grouping of charging stations that share same location/address. It is the responsibility of the Charge Point Operator to group them in the most convenient/ viewable way for the driver.

The Charging Pool is an object relevant for “cartographic view”, guiding tools and all features where representing a charging infrastructure element on a map.

**A Charging Pool is defined by 1 Charge Point Operator & 1 location.**

### 5.1.2 Level 2: Charging Station

A Charging Station is a physical grouping of one or more EVSEs, sharing a common user identification interface. A Charging Station is a physical object that the user can see, and where all the physical “human-machine” interfaces are located (badge reader, buttons, displays, LEDs …).

**A Charging Station is defined by 1 user interface.**

### 5.1.3 Level 3: Charging Point – (EVSE)

Charging Point is the part of a station that will handle the charging process of one EV at a time. A Charging Point may have one or several connectors but only one can be used at the same time.

**A Charging Point (EVSE) is defined by its ability of charging 1 vehicle at a time.**

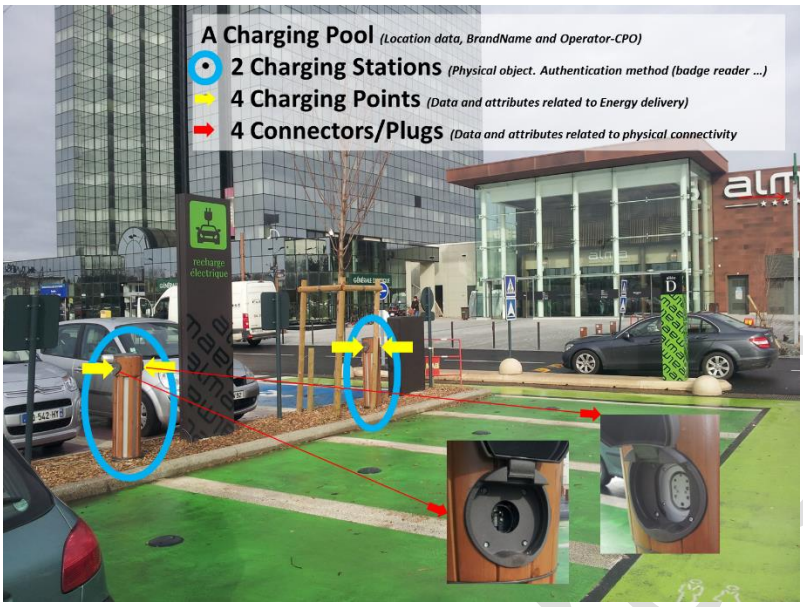
### 5.1.4 Level 4: Connector

The connector is the physical interface connecting to the car used for the transfer of power.

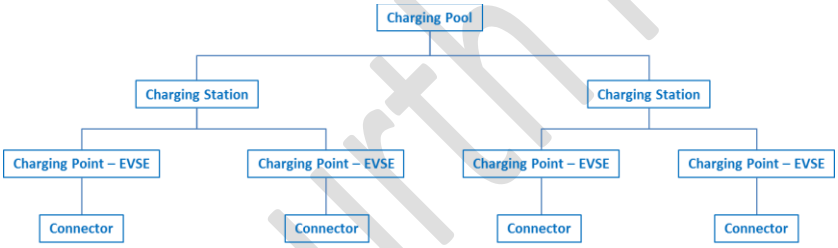
It can be a socket on the Charging Station, a type of plug attached via a cable to the station and/or an induction plate used for wireless charging.

### 5.1.5 Illustration

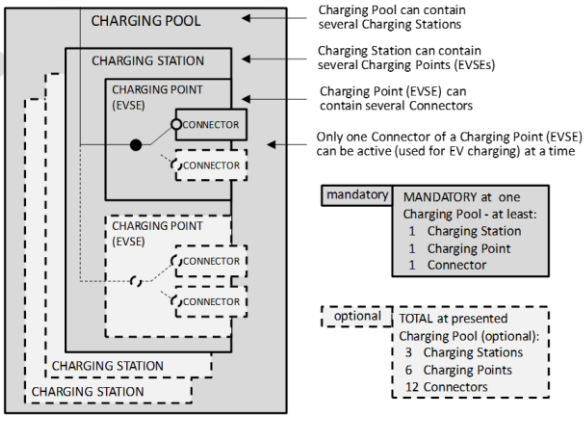
A real Charging Pool that contains 2 Charging Stations with 2 Charging Points each and 1 Connector per Point is presented in the photo below:




This charging pool will be represented by the following set of data:




Minimum and optional components (Charging Stations, Charging Points and Connectors) of a Charging Pool are illustrated in the following figure:




### 5.1.6 Counting

To follow up the charging infrastructure deployment, we promote the use of two mains indicators:

- The number of Charging Points which is a good illustration of the ability/capacity for EV charging.
  - **One** Charging Points is the ability of charging **one** vehicle.
- The number of Charging Pools which is a good illustration of the geographic coverage deployment.

## 5.2 Data attributes

Article 7.7 of Directive 2014/94/EC stipulates that "*Member States shall ensure that, when available, the data indicating the geographic location of the refuelling and reCharging Points accessible to the public are accessible on an open and non-discriminatory basis to all users. For reCharging Points, such data, when available, may include information on real-time accessibility as well as historical and real-time charging information.*"

Therefore, the information to be made publicly accessible to EV users could be grouped into 'static' or 'dynamic' (or real-time) information.

Authorities shall ensure the following minimum information is provided:

*In the following table, the column "level" describes the relevant level in the data model (as defined in chapter 4.1) for each data attribute:*

1. *Charging Pools*
2. *Charging Stations*
3. *Charging Points = EVSE*
4. *Connectors (Plugs and sockets)*

*Legend last column: M = Mandatory, O = Optional.*

| Data type | Description | Example | Level | M/O |
|---|---|---|---|---|
| **Charging Pool data attributes** | | | | |
| **Charging Pool Id** | Unique id to identify the Charging Pool in all data. See chapter 5.3 for correct format.<br><br>Refer to SGEMS D3.1 (3.1 SGEMS subgroup deliverable) | FR*S77*P12345ABC | 1 | M |
| **Charging Pool Name** | Name of the Charging Pool. This is used by software and end users to identify the pool when choosing the destination or when problems arise. Ideally this describes the Charging Pool uniquely. This should be mandatory as many software applications use the name of the Charging Pool to click to more information | Charging Pool Name | 1 | M |
| **Charging Pool Latitude** | The Latitude of the Charging Pool location. As Charging Stations are not always connected with an address, this should be mandatory. The Charging Pool Latitude and Longitude combination should be the centre of the set of Charging Stations. Latitude and Longitude should be in WGS84 decimal standard. | 50.876838<br>(Double – WGS84) | 1 | M |

| Data type | Description | Example | Level | M/O |
|---|---|---|---|---|
| **Charging Pool Longitude** | The Longitude of the Charging Pool location. As Charging Stations are not always connected with an address, this should be mandatory. The Charging Pool Latitude and Longitude combination should be the centre of the set of Charging Stations. Latitude and Longitude should be in WGS84 decimal standard. | 4.705699<br>(Double – WGS84) | 1 | M |
| **Charging Pool Altitude** | The altitude of the Charging Pool location.<br>Useful in mountainous regions.<br>The Altitude is given in meters. | 1234 m. | 1 | O |
| **Street Name** | The Street Name where the Charging Pool is located. Optional as not all locations have Street Names. | Village Street | 1 | O |
| **House Number** | The House Number where the Charging Pool is located. Optional as not all Charging Pool locations will be close to a house number. | 32 | 1 | O |
| **House Number Addition** | The House Number addition where the Charging Pool is located. This can be additions like A, Bis, II etc, but should not contain street name, postal code or city information. | A<br>Bis<br>II | 1 | O |
| **Postal Code** | The Postal Code where the Charging Pool is located. This should be the main Postal Code and can include alpha/digit characters. | 1011AB<br>SE24 0WG<br>75001<br>09013 | 1 | O |
| **Postal Code Addition** | The Postal Code addition (used in some countries) where the Charging Pool is located. This is optional as this is not used in all countries. | 230 | 1 | O |
| **City/Location** | The City/Town/Location where the Charging Pool is located. | Copenhagen<br>Milan<br>Malaga | 1 | M |
| **Country** | The Country where the Charging Pool is located. This should be the ISO 3166-1 Alpha-2 Country Codes.<br><br>*(we use the ISO Alpha-2 code, because this code is used in the C.Pool Id structure)* | AT<br>BE<br>DE | 1 | M |

| Data type | | Description | Example | Level | M/O |
|---|---|---|---|---|---|
| **Opening Time (AnnualClosing, Regular Opening, Annual Openings)** | | 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.<br><br>This is a complex type of data as it will include several different components to define the times when the Charging Pool can be used. See Appendix II for more detailed information on these values. | | 1 | O |
| **Accessibility** | | A value to indicate the conditions for access to the Charging Pool. The information has 2 data elements: Access type and Description | | | M |
| | Access Type | Describes the accessibility of the Charging Pool. Enumerated values<br>• 0 = Unspecified<br>• 1 = Publicly accessible<br>• 2 = Restricted access | 1 = Publicly accessible | 1 | M |
| | Description | Additional information (comment) | At the entrance to parking house turn left to 2nd floor, and then right<br>Available only for company employees and guests<br>Available only for clients *(for example in shopping malls)*<br>During the night and weekends please call the number xxx<br>(String) | 1 | O |
| **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. | +/- x / UTC | 1 | O |
| **Charge Point Operator Code** | | The Id of the Charge Point Operator as described in the SGEMS deliverable 3.1. This id is structured as<br>• Country code (ISO alpha 2)<br>• "*" separator (optional)<br>• 3 characters operator Id<br><br>*Mandatory in country where an Id issuing agency is active.* | FR*S77<br>DE*BOS | 1 | O/M! |

| Data type | Description | Example | Level | M/O |
|---|---|---|---|---|
| **Charge Point Operator Name** | The name of the Charge Point Operator of the Charging Pool.<br><br>*Mandatory when Operator Code is missing.* | Operator Name | 1 | O/M! |
| **Charge Point Operator Telephone** | Telephone number of 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. 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. | +33 140633900<br>+33 222020-43657 | 1 | M |
| **Charge Point Operator Website** | Website URL of the Charge Point Operator. This can be used by end users to find either contact details or more details regarding access and payment methods.<br><br>This should be the web url without http:// or https:// and should consist of a www (or other subdomain). Maindomain. Country or type code. | www.chargepointoperator.com | 1 | O |
| **Last-StaticData-Update-Timestamp** | DateTime on which the static data has been changed or upgraded. This date can be used for transactional systems to only update those Charging Stations that have changed data. This will limit the amount of data transferred through those systems.<br>DateTime needs to be indicated according to ISO 8601 and shall content the time-zone part (related to UTC). | 2016-05-10T16:54:00-02:00 | 1 | O |

| Data type | Description | Example | Level | M/O |
|---|---|---|---|---|
| **Charging Station data attributes** | | | | |
| **Authentication and identification methods** | By which method can the end user authenticate and unlock the use of the charging station. As there can be multiple authentication methods this data field has to be a list of Authentication-Method-Id.<br><br>The valid values are according to a standardized list as available in Appendix IV. | 0<br>12<br>128<br>2050 | 2 | M |
| **Payment methods** | By which method can the end user pay the use of the charging station. As there can be multiple payment methods this data field has to be a list of Payment-Method-Id.<br><br>The valid values are according to a standardized list as available in Appendix V. | 0<br>12<br>128<br>2050 | 2 | M |
| **Charging Station Latitude** | The Latitude of the Charging Station. This Latitude will be on the exact location of the Charging Station itself. This is optional, but should be used on larger Charging Pools with a high number of Charging Stations. Latitude and Longitude should be in WGS84 decimal standard. | 50.876838<br>(Double – WGS84) | 2 | O |
| **Charging Station Longitude** | The Longitude of the Charging Station. This Longitude will be on the exact location of the Charging Station itself. This is optional, but should be used on larger Charging Pools with a high number of Charging Stations. Latitude and Longitude should be in WGS84 decimal standard. | 4.705699<br>(Double – WGS84) | 2 | O |
| **Last-StaticData-Update-Timestamp** | DateTime on which the static data has been changed or upgraded. This date can be used for transactional systems to only update those Charging Stations that have changed data. This will limit the amount of data transferred through those systems.<br>DateTime needs to be indicated according to ISO 8601 and shall content the time-zone part (related to UTC). | 2016-05-10T16:54:00-02:00 | 2 | O |

| Data type | | Description | Example | Level | M/O |
|---|---|---|---|---|---|
| **Charging Point data attributes** | | | | | |
| **Charging Point ID** | | The 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 chapter 5.3 for correct format.<br><br>Refer to deliverable 3.1 | FR*S77*E12345ABC | 3 | M |
| **ChargingSolutions** | | Describes and lists the technical features and capacities available on this EVSE<br><br>Cardinality 1..N<br><br>This data is a list of a structured data based on 2 elements: the mode and the power | | 3 | M |
| | Mode | Charging mode according to IEC-61851 terminology<br><br>Cardinality 1..N (corresponding to the number of Connectors of Charging point) | Enumerated string according to IEC-61851 charging modes: Mode1-AC-1p; Mode1-AC-3p; Mode2-AC-1p; Mode2-AC-3p, Mode3-AC-3p; Mode4-DC; Legacy-Inductive | 3.1 | M |
| | Power | The rated power level the EVSE is capable of delivering under normal operation conditions. | 22 000 W | 3.1 | M |
| **Last-StaticData-Update-Timestamp** | | DateTime on which the static data has been changed or upgraded. This date can be used for transactional systems to only update those Charging Points that have changed data. This will limit the amount of data transferred through those systems.<br>DateTime needs to be indicated according to ISO 8601 and shall content the time-zone part (related to UTC). | 2016-05-10T16:54:00-02:00 | 3 | O |

| Data type | Description | Example | Level | M/O |
|---|---|---|---|---|
| **Connector data attributes** | | | | |
| **Type of charging interface** | The Plugs / Connectors / Induction plates that are available for each EVSE. If there are multiple types of charging interfaces for the same EVSE, multiple lines of data need to be delivered to guarantee inclusion of the data. The interface type naming has to be delivered according to a standardized list as available in Appendix VI. | 18<br>20 | 4 | M |
| **Max Power at Socket (charging interface)** | 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. | 64 | 4 | M |
| **Cable Attached** | Value to indicate whether a cable is available at the point or not. The following values are valid: “Floating” when NO cable is attached to the Plug, “Attached” when a cable is attached to the Plug | Yes (attached)<br>No (Not-Attached) | 4 | M |
| **Last-StaticData-Update-Timestamp** | DateTime on which the static data has been changed or upgraded. This date can be used for transactional systems to only update those Plugs that have changed data. This will limit the amount of data transferred through those systems.<br>DateTime needs to be indicated according to ISO 8601 and shall content the time-zone part (related to UTC). | 2016-05-10T16:54:00-02:00 | 4 | M |

| Data type | Description | Example | Level | M/O |
|---|---|---|---|---|
| **Dynamic Information**<br>**Despite not being legally mandated by Directive 2014/94/EC, when drawing on existing experiences and best practices, the provision of dynamic data has been important in rectifying EV user anxieties, minimising excessive queuing at charging stations, and rendering EV ownership easier altogether. When available, the following dynamic data should be considered by Member States:** | | | | |
| | | | | |
| **Charging Point data attributes**<br>**These attributes are related and refer to the Charging Point** | | | | |
| **Real-time-status** | The Real-time-status of an EVSE is dynamic information that can change any minute of the day. If it is available, the data should be available through a service or API for integrators of the data. The service should provide an update mechanism that sends updates from the stations status within ten minutes after the status change was received by the CPO. The Real-time-status will have two components: the EVSE's operational availability and physical availability. From the user-perspective, it is important for real-time updates on 'physical availability' to be accompanied with real-time information on 'connector type' availability.<br><br>See Appendix X for available values for this attribute | Available<br>Charging<br>Faulted<br>Unavailable | 3 | O |
| **Energy Source** | To be indicated as a percentage of green electricity (which could fluctuate over time, thus the 'dynamic' component). This data attribute allows consumers to make informed choices about electricity consumption. | % green vs. grey energy source | | O |
| **Last-DynamicData-Update-Timestamp** | DateTime on which the dynamic data has been changed or upgraded. This date can be used for transactional systems to only update those 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 shall content the time-zone part (related to UTC).<br><br>*Dynamic data are optional, but if they are managed, Last-DynamicData-Update-Timestamp is mandatory* | 2016-05-10T16:54:00-02:00 | 1, 2, 3 and 4 | O |

*Legend last column: M = Mandatory, O = Optional.*

**Privacy settings**.

There is no "personal data" in the list described above.

However, it could be interesting to collect, analyse and identify data on the Charging Point's use patterns: periods of high use ratio, and periods of statistical availability among others. This kind of information would be particularly useful for users. There are several ways to get this information. Some of them could be based on "charging sessions data analysis". Because this session data could include users and customers related data, the data processing would have to protect the users and customer privacy, by eliminating any non-useful personal data and protect the useful one.

The following lines list some principles about the way such data has to be managed.

Data related to drivers' activities should be treated according to Directive 95/46/EC[1] on the protection of individuals with regard to the processing of personal data, and to some extent to Directive 2002/58/EC in the case telecoms operators are involved - or someone is accessing computer devices integrated in the car. More specifically and amongst other things, the data collection and reporting procedure should be:

- processed fairly and in accordance with Directives 95/46/EC and 2002/58/EC as well as other national laws
- collected for specified, explicit and legitimate purposes and not further processed in a way incompatible with those purposes – with the purpose to be communicated to consumers;
- relevant and not exceeding the purposes for which they are collected;
- kept for a duration not exceeding the one specified for the purpose;
- The possibility to share personal data with third parties should be strictly limited, and if there are any marketing purposes, consumers should be able to object to his/her data being shared/processed. In the case of any data being shared with third parties, this shall be communicated to consumers along with the identity of these third parties and the purposes data is shared for.

Furthermore, EV users should give their consent for the monitoring of their activities when using the Charging Points and they should also be able to decide whether to share personal data or not. In the case of a positive answer, the use of user data should be anonymous and should include only general information[2]. Consumers should also be able to withdraw consent and stop giving access to his/her location data at any time.

## 5.3 Object identification and Identifiers management

As seen in chapter 5.1 "*Electric vehicle charging infrastructure elements: Models*" page 8, the two main objects are **Charging Pools** and **Charging Points**. These two objects are manipulated in several use-cases as "Search and Find" (Charging Pools), "Navigation to a Charging Pools", "Booking" (Charging Pools and Charging Points), Access and authorisation (Charging Points).

It means that systems will have to exchange information about these objects, while referring to these objects. This is the reason why precise objects identification methods should be defined to ensure unambiguous unicity ("unequivocallity").

The eMI3 group proposes a simple way to identify these two objects. This identification rule is based on the definition of special data type format (InfrastructureIdType) which anticipates a separation of the Id in three parts:

- The operation Identifier

[1] http://ec.europa.eu/justice/policies/privacy/docs/95-46-ce/dir1995-46_part1_en.pdf . Please note that this Directive will be repealed and replaced by a new piece of legislation - also known under the General Data Protection Regulation (GDPR) See: http://ec.europa.eu/justice/data-protection/reform/index_en.htm

[2] JRC (2014): Data Collection and Reporting Guidelines for European electro-mobility projects. http://www.greenemotion-project.eu/upload/pdf/data_collection_guidelines_report_v19_online_version.pdf

- The object Type
- The unique identifier, inside the operation

The listed parts of the Id are optionally separated by asterisks (*).

The operation identifier, identifies unequivocally the Charging Point Operator and is composed of two parts

- The country code (ISO 3166-1 alpha-2 code)
- The operation Id, which has to be unique inside the country (defined by the country code).
  *The SGEMS 3.1 group is currently defining and proposing a way to manage such Id: Some "Id-issuing-agencies" should be in charge of delivering these identifiers. Please refer to SGEMS 3.1.*

The country code and the operation Id are optionally separated by asterisk (*).

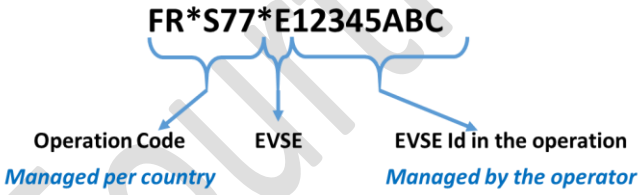
The object Type is

- "P" for Charging Pool
- "E" for Charging Points / EVSE

The unique identifier, inside the operation, which is defined by the operator. The operator has to ensure that this Id is unique inside its operation.

Example of identifier of a Charging point (EVSE):

FR*S77*E12345ABC identifies a Charging Point (EVSE: see "E") operated by FR*S77 and that has the Id 12345ABC inside the FR*S77 operation.




The identifiers of Charging Pools have the same structure, but with letter "P" as the 8th character.

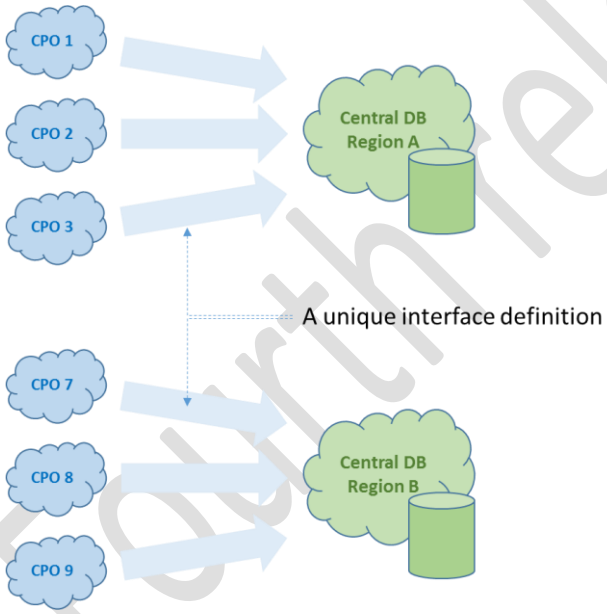
# 6 Access modes

## 6.1 Architecture proposition - Upload

Static charging infrastructure description data shall be published on one designated online location per country, or per group of countries. This location is named, in the following lines the “Central-Database”. This database could be per country or per group of countries in the case several countries agree on. Some already existing platforms (national data warehouses, roaming platforms or other databases…) may be used or extended, in order to reduce the costs and simplify the architecture. The National Access Points of the ITS Directive shall be used when available and accessible.

The providers of data for Central-Database are the Charging Point Operators. The users of data stored in Central-Database are E-Mobility Service Providers, Navigation Service Providers, different authority bodies etc.

The CPO backend systems will produce this set of information and push it periodically to the “Central-Database”. A CPO shall have to upload data to a single one “Central-Database”: The one of its country or group of countries.



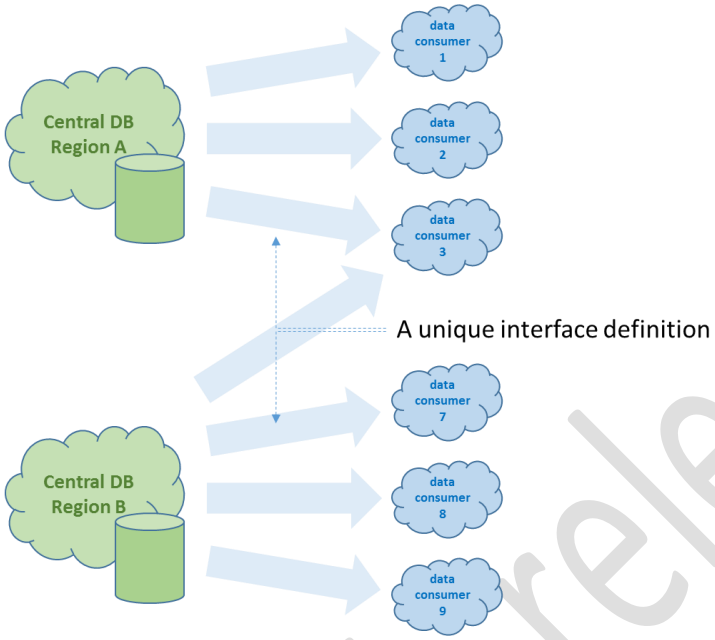

In case of several Central-Databases, a unique interface description shall be defined to ensure that, the CPOs which should operate in different regions, they would have to develop only one interface.

This interface should have to be capable of

- “Real-Time” static data upload. Could be periodical. Period should be daily)
- “Real-Time” dynamic data upload.

## 6.2 Architecture proposition - Download

Authorities will make sure that such a location is available, with reasonable and non-discriminatory conditions to anyone who wants to download the data and also will grant the user rights to use the data.




In case of several Central-Databases, a unique interface description shall be defined to ensure that, for actors which should operate in different regions, they would have to develop only one interface.

This interface should have to be capable of

- Static data download.
- Dynamic data download.

Dynamic and Static data may be available through different databases (not recommended). In such a situation, Charging Pool and Charging Point identifiers shall be exactly the same on static and dynamic databases to make a data connection between these two data sets possible.

## 6.3 Architecture proposition - Availability

Authorities will make sure that the content is accessible at any given time of the day with a maximum downtime of 0.3% per year (cumulated unavailability duration, smaller than 26 hours per year).

Authorities will make sure that there is a contact person available for any issues related to the data stored in Central-Database, upload and download issues and or user login and registration issues. Any issues violating the set standards shall be solved within 30 days.

# 7 Creation and update processes and rules

The following chapter contains information about how to populate the database with data the first time and how to keep the data updated. This has been defined separately for static data and dynamic data.

## 7.1 Static data:

The static data will have to be copied towards the Central-Database (either per country or service by multiple countries) by each data provider. After the first upload of all data, only data updates (changes) shall be communicated in order to reduce data traffic towards the Central-Database. These updates should be performed within 14 days and can best be performed during the night. This means that after erection of new Charging Station(s) or modification of parameters of the existing one(s) the content of the Central-Database related to this Charging Station(s) will have to be updated within 14 days after the change on the field. The Charging Station Operator is responsible for this update.

## 7.2 Dynamic data updates:

The Real-time-status of a Charging Point is dynamic information that can change any minute of the day. If it is available, the data should be available through a service or API for integrators of the data. The service should provide an update mechanism that sends updates (changes of Charging Point status) to Central-Database within ten minutes after the status change was received by the CPO. The Charging Point Operator is responsible for the update of the content.

## 7.3 Quality level

To make sure that data quality is maintained after first delivery of the content we can define four quality metrics.

For each of these metrics we can define some specification on how the content needs to be delivered.

### 7.3.1 Freshness:

*How fast a change in reality is reflected within the data*

Authorities will make sure that any update that is performed in the real world on a Charging Pool is reflected in the Central-Database within 14 days after the change has happened.

Any change in the data attributes should 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. Availability:

*The availability of the data compared to the real world situations of Charging Pools, Charging Stations and EVSE*
Authorities shall make sure that data of all publicly accessible Charging Pools are available in the Central-Database. Information about any newly created infrastructure object in the real world should be made available in the Central-Database preferably 14 days before its creation, but not later than 14 days after creation.

**Important:**
Data about newly created Charging Pools and Charging Stations can be added to the existing data before they have become operational or remain in testing phase. This has to be marked in the “Last Evolution” attribute. When the location becomes available for the public, another update should be performed within 14 days on this attribute to indicate that the infrastructure object is in operation. Proposal is to add a new value to the current Last Evolution attribute in the eMI3 model.

Data about any infrastructure object that is removed should remain in the Central-Dbase for at least 6 months after the removal in real world, but with the indication “Removed” in the “Last Evolution” attribute. This is needed to give everybody the chance to remove the infrastructure object from other data processes in a transactional way.

### 7.3.2 Completeness:

*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.
Dynamic data shall be provided when available.

### 7.3.3 Consistency:

*Defines if data is delivered in the data set as is defined in the standards.*

Authorities will make sure that all content is delivered according to the specification as defined in chapter 4. Any deviation of this data shall be rectified within 30 days. Authorities will have a contact available for any user of the data to indicate issues to the data or violations to the specifications.

# 8 Get and publish data: Costs elements and estimates

In the case of Nobil a total of ca. EUR 100,000 was spent by Enova (Norwegian state-owned agency) for the establishment of the entire database, including the technical development of the basic database, data collection, PR and information activities. The cost associated with the provision of real time data through the Nobil Intelligence Module (NIM), on the other hand, reached ca. EUR 26,000.

Noteworthy is that the scope of this data is limited to cost estimates incurred by Enova for the establishment of the Nobil database and the provision of real time data. While reportedly negligible and by far outweighed by the benefits to EV drivers, exact figures on operational costs incurred by CPOs in Norway for connecting to and using the database are missing in this analysis. It is important to take into account that the set-up costs for CPOs (i.e. ensuring an internet connection, setting up compatibility with the specific database) will vary from country to country.

# 9 Appendix I: Compilation of best practices and lessons learnt

**Norway's EV Charging Station Database, Nobil**

***Rationale behind Nobil:***

Norway's first nation-wide efforts to roll-out its public EV charging infrastructure were undertaken in 2009. In order to maximise the benefit from existing infrastructure, the government proposed the establishment of a central data base to collect all necessary data and distribute it to EV users. This would render EV ownership easier and more practical, which in turn would increase the number of EV buyers. Nobil has been considered successful in Norway in terms of addressing consumer anxieties in a landscape of non-standardised connector plugs and payment methods.

***How Nobil works?***

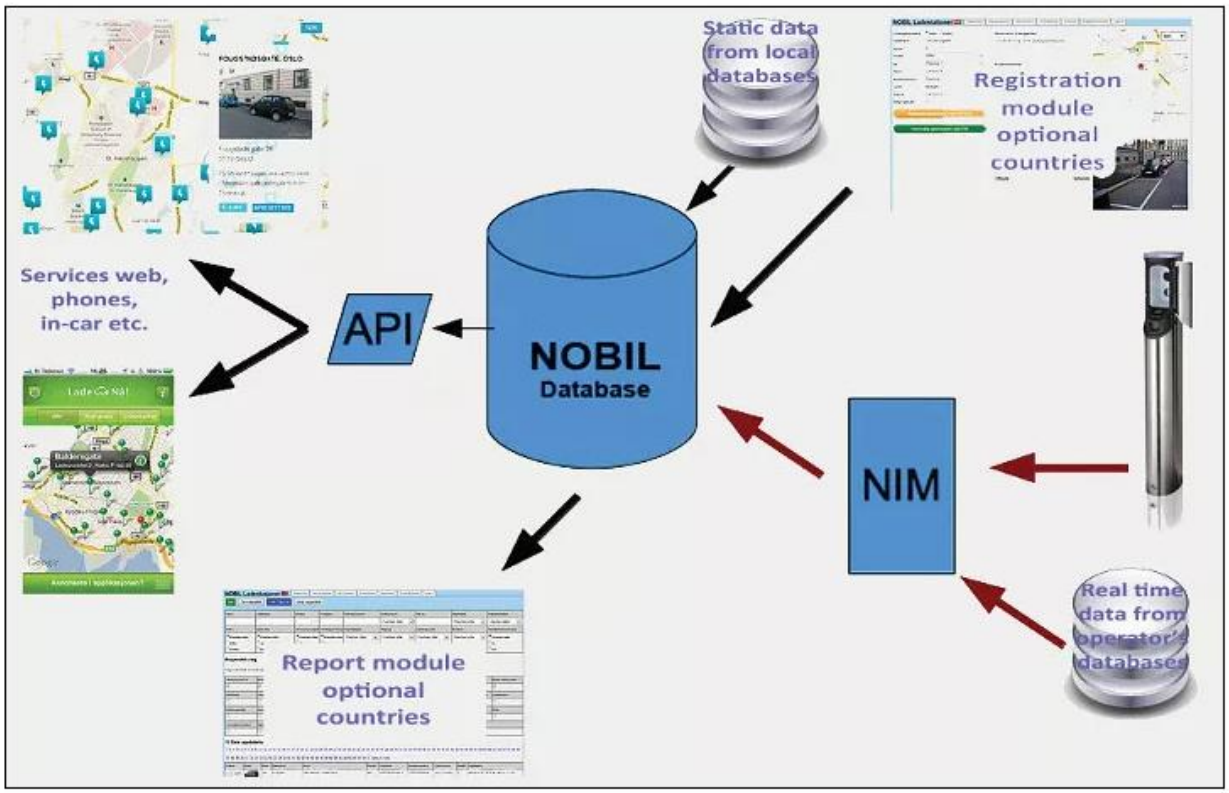
Nobil is an open, centralised database funded by Norway's state-owned agency, Enova, and maintained by the Norwegian EV Association. Information is collected from EV users, charging station owners and operators and other contributors, and is made available through an API to different service providers as car navigators, smart phones and on the Internet. Nobil does not make possible operations such as charging spot reservation or payment.

***Type of data provided by Nobil:***

Nobil provides both static and dynamic data. The static data displayed includes: the charging station name and address; number of Charging Points per charging station; operator name and contact details; payment options (RFID card, SMS, etc. and specify whether subscription-based or pay-as-you-go possible); parking scheme (including information on fee and if time limit exists); charging capacity; connector type(s); availability (public vs. private); directions to charging station; and image of the charging station.

Since 2012 the provision of dynamic data was added to the database through the Nobil Intelligent Module (NIM). The dynamic data includes two types of data, namely 1) connector availability and 2) operational availability (whether the connector is operational or not).

Dynamic data on EVSEs has proven especially important for the rapidly growing network of fast chargers in Norway in terms of minimising time spent looking for an appropriate Charging Point, providing clarity to the EV driver as to whether a fast Charging Point is operational before planning a trip and avoiding excessive queuing. **In recognition of the associated benefits, Enova makes its provision of funding to public charging stations conditional on their provision of real time updates on availability to Nobil.**




Source: Nobil http://www.elbil.no/nobil/index.php/english

***Recommended design features and principles based on experience with Nobil:***

- ***Public ownership***: it is preferable for the database be publicly owned to ensure it would include data from all charging infrastructure operators and owners without discrimination and be accessible to everyone.
- ***Active involvement of EV users***: The database should provide key data that meets EV users' needs. Therefore, EV users need to be active in the development of the database in order to ensure its usability and attractiveness. A crucial aspect is to define the types of information to be included in the database, and to prevent other companies from accessing business sensitive information.
- ***Data quality***: giving priority to a high level of quality and reliability of data through a thorough verification process as opposed to prioritising registration speed.
- ***Open source programming tools***: the use of non-proprietary programming tools enables the data base owner to change suppliers when needed.
- ***User friendliness***: all participants should be granted easy access to the data base through the web-based user interface. User friendliness should be ensured by including tools for automatically finding a city by zip code, municipality and region. Making the database too complicated would limit the participation of charging station owners.
- ***Standardisation of data and data streams***: this is key to ensuring efficiency in data updating process.
- ***Dynamic data provision***: the provision of dynamic data is particularly important in the early stages of EV market development, while Charging Points are still rather scarce and can often be out of service.

***Limitations and lessons to be learnt from Nobil:***

- Whereas dynamic data is automatically collected from the Charging Point operators' back office systems, the static data updating process has been done manually; which means that the data is only approximate. Once Charging Points become more numerous it might be necessary to develop an automated system.

- Nobil provides dynamic data on the connector-level, which might pose a challenge as not all connectors at an EVSE can necessarily be used simultaneously. This can lead to a connector being shown as available, even if it not possible to actually charge from it (even if it is physically free). A recent development is that some of the Charging Point operators are now able to set up their back office systems in such a way that both plugs at the EVSE are shown as in use if one car is charging, and if only car can charge at the time, even if the other connector is physically free. So this challenge is solvable, and is an issue also for the operators in Norway. From the user-perspective, it would be quite important for real-time updates on availability to be accompanied with real-time updates on 'connector type' availability.
- From the user-perspective it could be quite important to not only have access to dynamic information but also be able to reserve a charging point.
- When Nobil was being set up, 'energy use per charge' was taken into account among the static data to the provided, but this idea was not implemented.

# 10 Appendix II: Opening hours and days

The Openings hours' description as taken from the eMI3 standard. All values are optional.

| Sub item | | explanation | type | example |
|---|---|---|---|---|
| **Annual Closings** | | ***Information about annual closing hours*** | | |
| | **From** | Start date of the period | Iso 8601 : yyyy-mm-dd | 2012-12-25 |
| | **To** | End date of the period | Iso 8601 : yyyy-mm-dd | 2012-12-31 |
| **Regular Openings** | | ***Information about regular opening hours*** | | |
| | **Days** | List of days for regular openings | WeekdayType | Monday Wednesday Thursday |
| | **Hours** | List of hours for regular openings | | |
| | **From** | Start time of opening hour | Time UTC | 07:00:00 |
| | **To** | End time of opening hour | Time UTC | 18:00:00 |
| **Annual Openings** | | ***Information about annual opening hours*** | | |
| | **Days** | List of days for regular openings | WeekdayType | Monday Wednesday Thursday |
| | **Hours** | List of hours for regular openings | | |
| | **From** | Start time of opening hour | Time UTC | 07:00:00 |
| | **To** | End time of opening hour | Time UTC | 18:00:00 |

# 11 Appendix III: Last Evolution

The last evolution attribute can be used by Operators and Integrators to define the changes to the Charging Point for a longer period of time. Together with the timestamp this value can be used to integrate only newly created or updated content. It can also be used to determine which Charging Stations have to be removed.

The following values have been taken from the eMI3 standard:

| Status | Value | Explanation |
|---|---|---|
| 0 | Unspecified | Unspecified |
| 1 | created | The element has been installed since last evolution. |
| 2 | working | The element is working, meaning: can charge a car no matter if it's currently charging or not. This status is the status of the element at the moment of the last update. |
| 3 | removed | The element has been dismantled since last evolution. |
| 4 | under maintenance | The element cannot be used to charge at the moment. |
| 5 | upgraded | At least one attribute or one sub-element of the element has been modified since former evolution.<br>Modification of Status attributes and time update attributes are not considered. |

# 12 Appendix IV: Authentication and Identification methods

The Authentication and Identification methods is a mandatory attribute and should have at least one value.

| Value | Meaning / description |
|---|---|
| 0 | Unlimited access (No authentication / identification) |
| 1 | No access |
| 2 | RFID Card / Phone NFC - Mifare Classic |
| 4 | RFID Card / Phone NFC - Mifare Desfire |
| 8 | RFID Calypso |
| 16 | PINPAD |
| 32 | Apps |
| 64 | Phone (active RFID chip) |
| 128 | 15118 – PLC |
| 256 | 15118 - over the air |
| 512 | Phone (dialog with platform) |
| 1024 | Phone (SMS) |
| 8192 | Pre-Paid card |

# 13 Appendix V: Payment methods

The Payment methods list is a mandatory attribute and should have at least one value.

| Value | Meaning / description |
|---|---|
| 0 | Unspecified means of payment |
| 1 | Free charging service |
| 2 | Paid charging service, operator contract |
| 4 | Paid charging service, credit card |
| 8 | Paid charging service, cash |
| 16 | Paid charging service, prepaid card |

# 14 Appendix VI: Connector type

***Please, note that this list has to be updated with recent types of connectors and plugs, and with induction interfaces.***

| Value | Specifications / Description | Standard (for precision) |
|---|---|---|
| DOMESTIC-A | **Standard/Domestic household, type "A"**  | |
| DOMESTIC-B | **Standard/Domestic household, type "B"**  | |
| DOMESTIC-C | **Standard/Domestic household, type "C"**  | |
| DOMESTIC-D | **Standard/Domestic household, type "D"**  | |
| DOMESTIC-E | **Standard/Domestic household, type "E"**  | |
| DOMESTIC-F | **Standard/Domestic household, type "F"**  | |
| DOMESTIC-E-F | **Standard/Domestic household, type "E+F"** | |
| DOMESTIC-G | **Standard/Domestic household, type "G"**  | |
| DOMESTIC-H | **Standard/Domestic household, type "H"**  | |
| DOMESTIC-I | **Standard/Domestic household, type "I"**  | |
| DOMESTIC-J | **Standard/Domestic household, type "J"**  | |
| DOMESTIC-K | **Standard/Domestic household, type "K"**  | |
| DOMESTIC-L | **Standard/Domestic household, type "L"**  | |
| DOMESTIC-M | **Standard/Domestic household, type "M"**  | |

| Value | Specifications / Description | Standard (for precision) | Combination with cable attached |
|---|---|---|---|
| IEC-62196-T2-F-NOCABLE | **Mennekes type 2 (IEC 62196 Typ 2) socket** | **IEC 62196 Type 2** | socket or attached |
| IEC-62196-T2-F-CABLE | **Mennekes type 2 (IEC 62196 Typ 2) cable attached** | **IEC 62196 Type 2** | socket or attached |
| IEC-62196-T3C-F-NOCABLE | **Type 3C** | **IEC 62196 Type 3** | socket |
| IEC-62196-T1-M-CABLE | **Type 1, attached cable** | **SAE J1772-2009/IEC 62196-2** | |
| IEC-62196-T1-F-NOCABLE | **Type 1 socket** | **SAE J1772-2009/IEC 62196-2** | cable attached |
| IEC-309-2-1PH | **IEC 309-2 single phase (IEC 60 309-2)** | **IEC 60 309-2** | socket |
| IEC-309-2-3PH | **IEC 309-2 three phases (IEC 60 309-2)** | **IEC 60 309-2** | Socket |
| CHADEMO | **CHAdeMO** | | cable attached |
| IEC-62196-T3A-F | **Type 3A (= SCAME)**  | | Socket |
| NEMA-5-20 | **NEMA** 5-20  | | Socket |
| TESLA-SPECIFIC | **Tesla** Connector  | | cable attached |
| AVCON | **AVCON** Connector (compatible with SAE J1772 as November 2001)  | (compatible with SAE J1772 as November 2001) | cable attached |
| LARGE-PADDLE | **Large Paddle Inductive** | | cable attached |
| SMALL-PADDLE | **Small Paddle Inductive** | | cable attached |
| IEC-62196-T2-COMBO | **Combo type 2 based**  | | cable attached |
| IEC-62196-T1-COMBO | **Combo type 1 based**  | | cable attached |
| CHINA-PART2 | **China GB part 2**  | | socket or attached |
| CHINA-PART3 | **China GB part 3**  | | socket or attached |
| BPLC-SPECIFIC | **Better place socket** | | socket |
| MARECHAL | **Marechal socket** | | socket |
| IEC-309-2-DC | **IEC 309-2 DC plug** | | socket |

# 15 Appendix VII: ITS Directive (2010/40/EU)

*This appendix has been written by Stephanie Leonard, Policy Officer - European Commission - DG Mobility and Transport).*

The ITS Directive represents a policy and legal framework to accelerate the deployment of innovative transport solutions across Europe to help support the development of a cleaner, safer and more efficient European transport system. The directive focuses on intelligent transport systems for road and its interface with other modes of transport. This Directive is an important instrument for the coordinated implementation of ITS in Europe. It aims to establish interoperable and seamless ITS services while leaving Member States the freedom to decide which systems to invest in and where to deploy.

In accordance with ITS Directive, the Commission is empowered[3] to adopt Delegated Acts to define technical, functional and organisational specifications in relation to the six priority actions and an additional number of priority areas.

The Directive foresees these specifications to be binding and aims at ensuring the interoperability and continuity of services, where possible based on existing standards and technology, with a set of enabling conditions supporting the growth and operation of services. Such specifications encompass a common set of prescribed rules and provisions but in accordance with Article 5 of the ITS Directive only apply to Member States where the relevant ITS service already exists or will be deployed in the future.

http://ec.europa.eu/transport/themes/its/road/action_plan/

## 15.1 Priority Areas

Four priority areas have been defined:

- Optimal use of road, traffic and travel data
- Continuity of traffic and freight management ITS services
- ITS road safety and security applications
- Linking the vehicle with the transport infrastructure

The following table shows, for each action, its status and its relevancy for ITS D1.2.

| Priority Action | Status | Relevant for STF D1.2 ? |
|---|---|---|
| **(a) The provision of EU-wide multimodal travel information services (MMTIS)** | **Final stages of adoption** | **Yes** |
| **(b) The provision of EU-wide real-time traffic information services (RTTI)** | **Adopted 2015** Commission Delegated Regulation (EU) 2015/962 | **Yes** |
| (c) Data and procedures for the provision, where possible, of road safety related minimum universal traffic information free of charge to users; | **Adopted 2013** Commission Delegated Regulation (EU) No 886/2013 | No |
| (d) The harmonised provision for an interoperable EU-wide eCall; | **Adopted 2013** Commission Delegated Regulation (EU) No 305/2013 | No |
| (e) The provision of information services for safe and secure parking places for trucks and commercial vehicles; | **Adopted 2013** Commission Delegated Regulation (EU) No 885/2013 | No |
| (f) The provision of reservation services for safe and secure parking places for trucks and commercial vehicles. | **Frozen (no action foreseen)** | No |

[3] Article 7 of the ITS Directive in accordance with Article 290 of the Treaty on the Functioning of the European Union

## 15.2 Relevant electromobility data required by priority actions (a) and (b)

What relevant electromobility data is required by priority actions (a) and (b) and how and by when if it already exists?

| Priority Action | What static and dynamic data? | How it is accessed/ stored? | What data format/ standard | What network coverage? | What is the deadline? |
|---|---|---|---|---|---|
| **(b) RTTI** | **Static (required)** location of charging points for electric vehicles and the conditions for their use;<br><br>**Dynamic (required)** availability of charging points for electric vehicles | Via the National Access Point (NAP).<br><br>(see info below) | DATEX II is the required data format for the relevant data.<br><br>If DATEX II can be used for this data is must be used at the NAP | **TEN-T Network** | 13th July 2017 for both static and dynamic data – if it already exists. |
| **(a) MMTIS** | **Static (required)** location of publicly accessible[4] charging points for electric vehicles and the conditions for their use;<br><br>**Dynamic (optional)** availability of publicly accessible charging points for electric vehicles | Via the National Access Point (NAP).<br><br>(see info below) | DATEX II is the required data format for the relevant data.<br><br>If DATEX II can be used for this data is must be used at the NAP | **Entire EU transport network** including urban areas | **Static:**[5] Covering the TEN-T – 1st December 2020<br><br>Covering the whole network 1st December 2023<br><br>**Dynamic –** no deadlines as MS decides if they include the dynamic data |

## 15.3 What is a National Access Point?

The goal of the National Access Point (NAP) is to ensure that data can be accessible at national level without discrimination. Technically, different solutions are feasible. It can be:

- a national data warehouse or market place or other database;
- a national registry pointing towards the different data sources (i.e. data owners' access points, websites, datasets, databases) providing that :
  - the information is digitalised,
  - the data are in the right format, up to date and ready for re-use,
  - the path towards the data sources is self-explanatory.

The TEN-T project "European ITS Platform" and its continuation "European ITS Platform +" will explore the different possible solutions (i.e. functional, organisational, technical requirements and associated cost estimates) and develop recommendations towards a harmonised concept for "national access point".

*Examples of already established NAP: National Data Warehouse of the Netherlands*

[4] Priority action 'b' did not distinguish between public and private but priority action 'a' did

[5] As part of the negotiations, MS agreed to cover the entire transport network as long as they were given sufficient time and could focus on the TEN-T network first.

## 15.4 Who is responsible for the National Access Point (NAP)?

Member States are responsible to develop and implement the NAP but each data provider is responsible to upload and feed its data to the NAP. Mechanisms for update and distributed authorisation of access (i.e. feed and download) are recommended to safeguard the quality of the data, and equality of access.
Documentation about the data (including sharing and re-use conditions) can be drawn up by the data providers and Member States.

# 16 References

## 16.1 Documents

| Reference | Location - Name | Content |
|---|---|---|
| Ref-1-eMI3_BO | Website: http://emi3group.com/documents-links/<br>DocName: eMI3-standard-V1-Part-2-v1.00-Final.pdf | Main e-mobility business objects description. Structure, attributes and identifiers. |
| | Website:<br>http://www.elbil.no/nobil/index.php/english | Description of Nobil attributes |
| | | |
| | | |
| | | |