Sustainable Transport Forum - STF Report

Eurelectric comments

October 2020

Eurelectric represents the interests of the electricity industry in Europe. Our work covers all major issues affecting our sector. Our members represent the electricity industry in over 30 European countries.

We cover the entire industry from electricity generation and markets to distribution networks and customer issues. We also have affiliates active on several other continents and business associates from a wide variety of sectors with a direct interest in the electricity industry.

We stand for

The vision of the European power sector is to enable and sustain:
- A vibrant competitive European economy, reliably powered by clean, carbon-neutral energy
- A smart, energy efficient and truly sustainable society for all citizens of Europe

We are committed to lead a cost-effective energy transition by:

investing in clean power generation and transition-enabling solutions, to reduce emissions and actively pursue efforts to become carbon-neutral well before mid-century, taking into account different starting points and commercial availability of key transition technologies;

transforming the energy system to make it more responsive, resilient and efficient. This includes increased use of renewable energy, digitalisation, demand side response and reinforcement of grids so they can function as platforms and enablers for customers, cities and communities;

accelerating the energy transition in other economic sectors by offering competitive electricity as a transformation tool for transport, heating and industry;

embedding sustainability in all parts of our value chain and take measures to support the transformation of existing assets towards a zero carbon society;

innovating to discover the cutting-edge business models and develop the breakthrough technologies that are indispensable to allow our industry to lead this transition.

Dépôt légal: D/2020/12.105/62

WG E-mobility

Contact:
Petar GEORGIEV, Advisor Climate & E-mobility,
pgeorgiev@eurelectric.org

Eurelectric comments on STF report

Contents

PAGE 24 – Power levels 2

PAGE 26 – grid integration 3

PAGES 56-57 – Hardware interoperability 3

PAGES 58-60 – Access and authentication 4

PAGES 61-66 – Communication standards and protocols 5

PAGES 68-70 – smart (re)charging 10

PAGE 71 – Vehicle to grid 12

PAGES 83-85 – User-friendly and ad hoc payment 12

PAGE 95 – data ownership 13

PAGE 108 – electricity supply requirements 13

RECOMMENDATIONS 14

- 5.3.7.3 User-friendly ad hoc payment
    - "offering an easy payment option on the spot, that shall as a minimum allow for payment by debit or credit card (e.g. contactless payment via NFC reader)."
        - We do agree that payment systems for ad hoc payment need to be optimized in the interest of the customer. However, we do not see a debit or credit card terminal as the most reasonable option due to the usage rates at charging stations, the wide-spread acceptance of digital payment methods in society and the implementation effort of such a solution. Therefore, we propose (as detailed in our position paper) a web-based payment systems for ad hoc charging with a unified look & feel and access process across all charging stations. Web based should comprise browser- based as well as app based.

PAGE 24 – Power levels

2.3.1.4 Power levels

The typical use of recharging points depends on their power level. Essentially, three recharging strategies can be distinguished, based on the enhanced categorisation of Table X:

(i) long-time recharging or overnight recharging at normal or rapid power recharging points: many vehicles are stationary for a significant part every day when owners are at home or at work. This time can be used to charge the vehicle's battery at relatively low power levels ($P \leq 22$ kW). This way of charging has the advantages of lower load on the electricity network and less complex hardware. As a result, the cost of this type of recharging infrastructure is lower compared to that of fast charging.

(ii) high power recharging in places where people charge for a top-up (e.g. supermarkets, convenience stores, charging plazas, park-and-rides).

(iii) high power or ultra-high power recharging: when the vehicle range is not sufficient to reach a destination, a driver will have to charge their vehicle. As slow charging will lengthen the duration of the trip significantly, a driver may prefer to charge at higher power. This is also known as fast charging. The main advantage of fast charging is the shorter period required to charge an equal amount of range; often this however comes with a corresponding price tag for the EV-driver.

High power recharging points require less time to provide an equivalent vehicle range. However, the cost of such recharging points is higher, thus impose higher charging price for users, and they impose a higher burden on the electricity network.

Moreover, EVs are normally constrained (by the on-board converter, battery or the power inlet) in the power level at which they can recharge. Therefore the benefits of high power or ultra-high power recharging points cannot be reaped by all passenger cars and vans on the market. Future EVs are expected to be able to cope with higher power-levels. High and ultra-high power recharging may therefore seem like an overinvestment in the short term, but are likely to be more fit-for-future.

We would like to question the proposed power level categorisation based on the reality of available chargers in the market and the reality of charging powers of electric vehicles in the market.

Such a classification results in the fact that all charging stations with P < 350 kW (e.g. with 300 kW) would be in the lower C category, although twice the minimum power is available.

This does not reflect the market reality, as

- current (& announced) e-vehicles are not able to charge >=350 kW (even state-of-the-art Porsche Taycan only has a peak power of ~270 kW). Coming generation will not break this level.
- there are multiple charging stations that provide 200 kW, 225 kW or 300 kW which are widely available (e.g. in GER, NOR, AUT, ITA, CZE, NLD)

Planning on the **basis of <u>high peak performances</u> has negative effects on the dimensioning of the network connection** and thus on the **network expansion of charging infrastructure**

In the end, we do not understand the technical justification or any market reality which would support such a classification – and therefore should be reconsidered to appropriately reflect the market.

PAGE 26 – grid integration

On the capacity of the power sector to integrate electromobility into the grids (p. 26), we would like to underline that electromobility does not represent a main issue. According to the French TSO RTE, which prepared in 2017 scenarios on the electricity consumption in 2030, the park of 15 million electric vehicles by 2030 in France would represent only 7% of the annual national electricity consumption (34,4TWh). Furthermore, the French DSO Enedis prepared a study (which you can find attached) showing that French grids are ready to integrate the surge of electric vehicles by 2030, and concluding that the needed investments to reinforce the grids' capacity only represent 10% of the total investments for the period.

PAGES 56-57 – Hardware interoperability

4.2.1 Hardware interoperability

The Alternative Fuels Infrastructure Directive 2019/94/EU ("AFID") currently requires that all recharging points are, for interoperability purposes, equipped at least with socket outlets or vehicle connectors of Type 2 (for AC normal and high power recharging points) and connectors of the combined charging system, CCS/Combo 2 (for DC high power recharging points).90 Figure X provides a graphical overview of these requirements.

At the same time, AFID does not prohibit the addition of other connectors to a recharging point. While prior to the adoption of AFID, a number of recharging points with AC connectors other than Type 2 were deployed in the EU, the prescription of the Type 2 standard through the Directive put an end to this. By contrast, while it has been a requirement for all DC high power recharging points constructed after the entry into effect of the Directive to be equipped at least with CCS/Combo2 connectors, it has become a *de facto* standard to install recharging points equipped with an additional CHAdeMO connector, in particular 50kW recharging points. CHAdeMO is the international standard connector developed in Japan and so far needed to recharge Japanese brand vehicles and also some models of certain European brands, such as certain Citroëns and Peugeots. Recently, however, there has been a tendency of those brands91to only offer CCS inlets on their cars destined for the European market.93 As a result, more and more providers of high power recharging points choose to equip their stations with CCS/Combo 2 connectors only. Although equipping DC high power recharging points with one type of connector only will have cost advantages, it may go at the expense of half a million CHAdeMO EV users as well as certain foreign EV models such as Tesla, which will not be able to recharge at that recharging point.

RECOMMENDATION: In their tender specifications, public authorities should require that all recharging points comply at least with the technical specifications set out in point 1.1 or point 1.2 of Annex II of the Alternative Fuels Infrastructure Directive or, more precisely, the national transposition of those standards. Tender specifications should require that:

i. Alternating current (AC) normal and high power recharging points for electric vehicles shall be equipped at least with socket outlets or vehicle connectors of Type 2 as described in standard EN 62196-2.

ii. Direct current (DC) high power recharging points for electric vehicles shall be equipped at least with connectors of the combined charging system 'Combo 2' as described in standard EN 62196-3.

while leaving it to the market to decide to add other connectors, such as the multi-standard chargers with CHAdeMO connector(as described in standard EN 62196-3) that have become the *de facto* standard in the EU.

PAGES 58-60 – Access and authentication

4.2.2.2 Access and authentication

(p59)

Although still in its development phase in Europe, there seems to be a growing interest of different market parties for the potential of automatic authentication technologies. These are technologies that allow EV users to recharge their vehicle by simply plugging the recharging connector into the vehicle without any further administrative or other requirements on the EV user. The vehicle simply communicates automatically with the recharging point and the underlying communication protocols do the rest: authenticating the vehicle, possibly its state of charge and requested recharge, log the amount of electricity effectively recharged and possibly the time for recharging (in case of time-based fees) and transfer all these data to the CPO and eventually EMSP back-end for billing purposes.

Different solutions to enable such 'automatic' authentication and recharge exist (Tesla for instance uses a proprietary technology to enable it) or are being developed, but one of the most prominent developments in this area is the ISO/IEC 15118-20 standard.98 The 2019 STF stakeholder consultation however found that this standard is not fully ready yet, and subject to some competition concerns in particular regarding lock-in effects and free choice for consumers of their EMSP – a concern reiterated by some CPO's contributing to these Recommendations (for a more detailed overview of responses on this, see section 4.2.2.3 below) and Eurelectric (a STF member, see its position paper;

https://www.eurelectric.org/media/4563/20200709_eurelectric_features_and_implementation_of_iso15118_final-2020-030-0464-01-e-h-330B2A5B.pdf.)

(Footnote 98)

ISO 15118-20 (under development) is part of the existing and widely used ISO 15118 standard, a protocol for communications between the electric vehicle and recharging point. ISO 15118-20 will introduce a number of new features, summarised as follows:

(i) Energy management: earlier version of the standard allows smart recharging while version -20 will allow bi-directional recharging

(ii) Some value added services, including internet access while being connected to a recharging point;

(iii) Plug'n'Charge: automatic vehicle recognition when plugged-in to initiate a charging session, allow billing etc.

(Footnote on P60)

For these features to work in a cybersecure way, both recharging points and electric vehicles need to be uniquely identifiable. To enable this, stakeholder are currently working on a framework for and the development of one or more Public Key Infrastructures (PKIs), which are systems for managing digital certificates that are used for securing digital communication. Within the PKI, a trusted authority called Certification Authority (CA) –or Root Certification Authority (Root CA) in case of larger PKIs– issues certificates, which contain information on the owner of a specific key, the validity period of that key, who issued it and the digital signature of the CA to authenticate the key. The keys are subsequently used to encrypt and decode messages between market parties, providing the required security for their communication. The issues around PKI and Root CA, including the means of communication, are being discussed among international experts, thus any rough-and-ready standardization should be avoided.

PAGES 61-66 – Communication standards and protocols

4.2.2.3 Communication standards and protocols

(p62)

* Correction: IEC 61851-1→**IEC 61851**

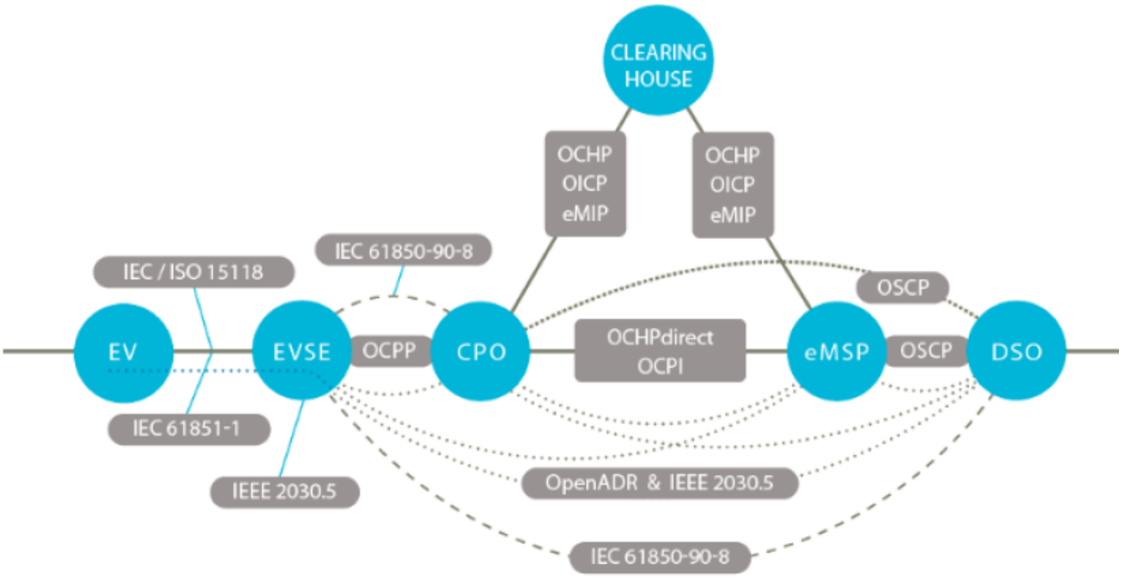
Table X: Overview of main EV communication domains and relevant protocols/standards

Communication domain	**Overview - Use cases of current protocols/standards**	
EV – Recharging point	IEC 61851-1	EV recharging modes (current/intensity/tension/communication)
	ISO 15118	Communication between EV and CPO, authorize charging session, reservation, smart recharging (V2G - future version)
Recharging point - Back-end/network management system	OCPP	Authorize recharging session, reservation, billing, CPO management, smart recharging
Roaming	OCPI	Authorize recharging session, reservation, billing, roaming, provision of CPO information
	OICP	Authorize recharging session, reservation, billing, roaming, provision of CPO information
	OCHP	Roaming, peer communication between market parties and EV clearing house
	OCHPdirect	Roaming, peer communication between market parties
	eMIP	Authorize recharging session, reservation, billing, roaming, provision of CPO information
Distributed energy resources	OSCP	Smart recharging, grid management, capacity forecast
	OpenADR	Smart recharging, demand response, price and load control
	IEC 61850-90-8	Object models for EVs, smart recharging, integration with other DER types like PV, wind, etc.
	IEEE 2030.5	EV-home energy management system, demand response, exchange of metering data, usage and billing information

(p63)

＊Correction: IEC 61851-1→**IEC 61851-24**

Figure X: schematic overview of most common emobility communications protocols



(p64)

＊Add " **IEC 61851-24**" in the field of EV-Recharging point of the table,

as below

<Standards>

IEC 61851-24: Digital communication between a DC EV charging station and an electric vehicle for control of DC charging

＊Correction: ISO15118→**ISO15118-20**

Table X: Overview of main EV communication domains and possible future harmonisation

Possible Future Harmonized Scenario		
Communication domain	**Standards**	
EV – Recharging point	ISO 15118	Vehicle to grid communication interface
Recharging point - Back-end/network management system	IEC 63110	Management of EVs recharging and discharging infrastructures
Roaming	IEC 63119	Governing of information exchange of EV roaming services
Distributed energy resources	IEC 61850	Exchange of information with distributed energy resources

(Footnote 99 on P64)

Germany argues that, as an extension of CCS, the ISO 15118-20 standard can be regarded as the prevalent and most advanced standard of its kind in Europe; the power line communications (PLC) ; this standard offers is a lot more secure than existing RFID cards and the communication via the protocols that are currently in use (including the current version of 15118); this standard offers the user-friendly Plug&Charge function without having to resort to several proprietary systems; the standard offers smart recharging and vehicle-to-grid functionalities that will become necessary in the future; unlike other communication protocols (e.g. CPO to EMSP) it was developed in the process of an international standardisation organisation that was (at least initially) open to every industry player. We should bear in mind that the broadband Power Line Communication (PLC) technology that ISO 15118 requires has never been widely adopted compared to more modern, robust, and affordable solutions (both wired and wireless). PLC is only used in CCS while some 90% of all DC chargers in the world use CAN (Controller Area Network) communication; moreover, due to its technical characteristics, unlike narrowband PLC (e.g. G3) broadband PLC is not suitable for use in the power-grid.

(p66)

1) EV – Recharging point

Software interoperability - Communication standards and protocols

- "It is recommended that public authorities ensure that recharging infrastructure is future-proof and thus 'ISO 15118-ready', so that it can be upgraded to this standard easily and possibly at no extra cost to the contracting authority in the near future."

- This recommendation seems elusive and lacks clarity from our point of view – leading to differing interpretations from public authorities.
- A mandatory one-sided obligation of ISO 15118 for charging infrastructure is not reasonable, which we fear will be achieved through the recommendation.
- The reality is, that the ISO 15118 standard heavily distorts the market competition and the possibilities for all players to compete on an level playing field. These issues first have to be tackled and market rules have to be defined before any obligation is reasonable.

While IEC 61851-1 standard is currently being mandated in certain tenders, others may be gradually moving towards the ISO 15118 standard. It is recommended that public authorities ensure that recharging infrastructure is future-proof, user-friendly and technologically neutral, thus public authority should not mandate any specific communication standard, as long as the interoperability is ensured and leaving the door open for all existing and upcoming technologies.

The way the text about communication protocols is phrased at the moment (page 65 /66) states that within two years the current global open standard OCPP will be replaced by a draft IEC standard. This is both inaccurate and immature and the statement in itself could be harmful to the standardization of charging infrastructure.

The draft IEC 63110 is still in the early stages of development and the standard is not yet available for the broader industry to comment on. Assuming that the industry will embrace this standard – as they have OCPP- remains to be seen. There are some controversial aspects currently in the draft, the IP policy of the IEC 63110 is not yet clear and - as things are evolving now - the 63110 standard will significantly deviate from OCPP. All these aspects will lead to a slow adoption rate in the industry. It is therefore wise to support OCPP until the industry is ready to move to the draft IEC standard.

PAGES 68-70 – smart (re)charging

4.3.2 Smart (re)charging

(PAGE 68)

RECOMMENDATION: In their tender specifications, public authorities should require that all recharging points are “smart charging ready”.

We are aware of the fact that “smart charging ready” does not have a conclusive European definition, which is why we propose that in the next period (until EU guidelines are developed) national guidelines for “smart charging ready” should serve as criteria.

Despite the fact that until now in Europe “smart charging ready” has not been fully defined yet we support the pursuit of "smart charging ready”. This concept will enable to manage the capacity with which EVs can be charged or discharged. This issue is relevant to several stakeholders, first and foremost EV owners.

This connectivity as well as the appropriate hardware and software enable the EV owner / charging point owner to execute smart charging. This in turn allows the EV owner / charge point owner to adjust the charging capacity to (new) network tariff schemes and other flexibility services. In addition to enabling contractual smart charging, it is also necessary that the technical feasibility is guaranteed.

We promote that all charging stations are “connected” and “smart charging ready”, including charging stations on private and semi-private terrain above a certain capacity demand.

(PAGE 70)

Table X: overview of smart (re)charging standards and current status

Code	**Title**	**Application**	**Development**
IEC 61851	Electric Vehicle Conductive Charging System	Safety requirements for charging with plugs and cables (AC or DC) and the basic communication between the charging station and the EV	Published
ISO 15118-2	Road vehicles — Vehicle to grid communication interface	Detailed communication between an EV (battery EV or a plug-in hybrid EV) and a charging station	Currently under review
SO 15118-20	Road vehicles — Vehicle to grid communication interface – Part 20 : 2nd generation network and application protocol requirements	High-level communication between a charging station and an EV for the control of charging services	To be published in mid-2021
IEC 61851-23/24	Electric vehicle conductive charging system - Part 24: Digital communication between a DC EV charging station and an electric vehicle for control of DC charging	High-level communication between a charging station and an EV for the DC smart (re)charging services (reference) IEC61851-1 : AC smart (re)charging	Currently under review and to be published in mid-2021, The CHAdeMO protocol based on which Ed2 discusses V2X was already published in 2014
EC 63110	Management of Electric Vehicles charging and discharging infrastructures	Remote management of charging stations by charging station operators and their integration with energy management systems	To be published in mid-2021
IEC 63119	Charging Service Providers	Roaming and payment in the context of EV charging services	To be published in 2022
EN 50549	Requirements for generating plants to be connected in parallel with distribution networks	Definition of technical requirements for the protection functions and the operational capabilities for generating plants	Published
EN 50491-12-2	Smart Grid interface and framework for Customer Energy Management	Management of power flows inside buildings, including exchanges with EV charging	To be published in 2021

PAGE 71 – Vehicle to grid

4.3.3 Vehicle2Grid

Renewable energy sources such as wind and solar are less 'managable' than fossil fuels in terms of where and when electricity is generated. This may lead to imbalances of supply and demand of energy. Storing electric energy in batteries at times when more is generated than required and using the stored energy when the situation is the other way around could be (part of) the solution to this challenge. Car batteries could be used for this purpose at the time that they are connected to an energy generating or energy demanding unit. This principle is also referred to as 'Vehicle-2-Everyting' or V2X. V2X is a collective name for the following technologies:

 Vehicle-to-Grid (V2G): Using an electric vehicle (EV) battery to interact with the electricity grid, both in charging and discharging modes. This is different from smart recharging (only) approaches and includes bidding electricity to ancillary service market to make the grid stable and participating in the energy market, where possible.

 Vehicle-to-Building (V2B): Using EV batteries to optimize local building energy consumption and generation.

 Vehicle-to-Home (V2H): Optimizing home energy consumption and generation or using EVs as emergency back-up power.

 Vehicle-to-Load (V2L): Any other instance of an EV battery providing energy to a load.107

Today, CHAdeMO (EN 61851-23, -24, 62196-3) is the only DC charging standard that enables these functions with mass production EVs and bi-directional chargers readily available in the market. Bi-directional DC recharging points are typically around 6 to 10kW and rapid DC recharging points around 20-25 kW are equally very much in demand.

Potentially, large-scale use of this technology for example by aggregating many EV batteries and managing their discharging can reduce the burden on the electricity network, which leads to lower network reinforcement costs, better exploiting of existing grid capacities and reduced system costs overall in particular by providing local flexibility. This is especially suited for fleets, including public service fleet, to optimize the energy use without overloading the grid as well as help support the integration of renewable energy sources (RES) in the grid, which can potentially lead to financial rewards, justifying and compensating for the more expensive initial investment in the DC bi-directional chargers. Currently, however, recharging points offering V2G possibilities are still relatively costly given the limited volume compared to their benefits. With mass-uptake of EVs, the benefits of such technologies may however become larger.

Generally, more positive approach needed to show the advantages of EV/RES synergies. The use of V2X technologies will guarantee a supply-demand electricity balance, and could be a useful tool to integrate and increase RES penetration rate in the electricity mix.

PAGES 83-85 – User-friendly and ad hoc payment

4.4.4 User-friendly ad hoc *payment*

(p85)

RECOMMENDATION:

Public authorities should require in their tender specifications that any EV-user is able to recharge at any publicly accessible recharging point:

(i) with a one-off agreement, that is concluded when the user starts charging the vehicle and ends with payment for that recharging session, without there being any longer-lasting mutual obligations;

(ii) without any need to enter into any written agreement with the recharging station owner or operators;

(iii) without any need to download a dedicated smartphone application (e.g. from the charge point operator);

(iv) without any need to identify or register himself; and

(v) offering an easy payment option on the spot, that customers have transparency and freedom of choice to access to all existing and widely used payment methods(NFC-based compliance via credit/debit cards, via wallets such as pre-installed smartphone apps and the phone's NFC chip or via web access like apps or browsers).

PAGE 95 – data ownership

Recommendation on data ownership regarding the following:

We recommend the open availability of data useful for smart charging (and other means) for all market parties.

After all, this is one of the preconditions for fair market circumstances (for smart charging).

PAGE 108 – electricity supply requirements

We have some concerns over limiting the electricity used in recharging EVs to the electricity produced from RES (cf. p. 108, 'Electricity supply requirements'). On the same issue, we think that, in the first paragraph of the subsection 4.4.7.1 (p. 91), it should be underlined and clarified that there is no physical difference between the electricity used in mobility and the electricity produced in general, contrary to what exists for other energies where such different targets can be justified. Keeping track of the renewable electricity used in electromobility would be indeed difficult and the MS' energy mix should remain the best proxy. Further investigation could be however carried out on how the supply from additional RES capacities could be fostered to integrate renewable electricity into the overall electricity mix. The priority should remain the whole decarbonisation of the power sector rather than pushing for specific electricity sources depending on electricity uses. Eventually, the energy carbon footprint (well to wheel) should be more considered than the energy production sources in the report.

RECOMMENDATIONS

- 5.3.5.2 Software interoperability - Communication standards and protocols
  - "It is recommended that public authorities ensure that recharging infrastructure is future-proof and thus 'ISO 15118-ready', so that it can be upgraded to this standard easily and possibly at no extra cost to the contracting authority in the near future."
    - This recommendation seems elusive and lacks clarity from our point of view – leading to differing interpretations from public authorities.
    - A mandatory one-sided obligation of ISO 15118 for charging infrastructure is not reasonable, which we fear will be achieved through the recommendation.
    - The reality is, that the ISO 15118 standard heavily distorts the market competition and the possibilities for all players to compete on a level playing field. These issues first have to be tackled and market rules have to be defined before any obligation is reasonable.
- 5.3.7.5 Price transparency
  - "Public authorities should require that (all elements of) the ad hoc price are displayed at any publicly accessible recharging point in a visible and transparent manner."
    - This section should specify that the ad hoc price can be displayed to customers through digital means (e.g. an app). See also next point.
- 5.3.7.3 User-friendly ad hoc payment
  - "offering an easy payment option on the spot, that shall as a minimum allow for payment by debit or credit card (e.g. contactless payment via NFC reader)."
    - We do agree that payment systems for ad hoc payment need to be optimized in the interest of the customer. However, we do not see a debit or credit card terminal as the most reasonable option due to the usage rates at charging stations, the wide-spread acceptance of digital payment methods in society and the implementation effort of such a solution. Therefore, we propose (as detailed in our position paper) a web-based payment systems for ad hoc charging with a unified look & feel and access process across all charging stations. Web based should comprise browser- based as well as app based.

Eurelectric pursues in all its activities the application of the following sustainable development values:

Economic Development

- Growth, added-value, efficiency

Environmental Leadership

- Commitment, innovation, pro-activeness

Social Responsibility

- Transparency, ethics, accountability

Union of the Electricity Industry - Eurelectric aisbl
Boulevard de l’Impératrice, 66 – bte 2 - 1000 Brussels, Belgium
Tel: + 32 2 515 10 00 - VAT: BE 0462 679 112 • www.eurelectric.org
EU Transparency Register number: 4271427696-87