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**BEFORE THE PUBLIC UTILITIES COMMISSION  
OF THE STATE OF CALIFORNIA**

Order Instituting Rulemaking to  
Consider Alternative-Fueled Vehicle  
Programs, Tariffs, and Policies.

Rulemaking 13-11-007  
(Filed November 14, 2013)

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**OPENING COMMENTS OF KNGRID ON THE AMENDED  
SCOPING MEMO AND RULING OF THE ASSIGNED  
COMMISSIONER AND ADMINISTRATIVE LAW JUDGE DATED  
MARCH 30, 2016**

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## **I. Introduction**

KnGrid appreciates the opportunity to provide comments on the California Public Utilities Commission's (CPUC or the Commission) Amended Scoping Memo and Ruling R.13-11-007 dated March 30, 2016. KnGrid appreciates the Commission's continued focus on fostering accelerated decarbonization of both mobility and California's electric system and the meaningful steps it has taken to advance these vital goals.

## **II. Background**

KnGrid's mission is to accelerate revolution-scale adoption of plug-in electric vehicles (PEVs) by simplifying the consumer refueling experience while enabling grid-friendly smart charging based on the ISO 15118 global VGI interoperability standard. In February 2016, the company entered into a Joint Venture with RWE New Ventures, a U.S. subsidiary of RWE, a global energy leader based in Germany. The company participates on VGI standards committees as well as EPRI's Infrastructure Working Council. The company currently operates a CEC demonstration project at UC San Diego of 26 AC Level 2 charging stations that employ the standard. By year-end, over 80 ISO 15118 vehicles are on campus and using these charging stations. Further, with the support of the California Energy Commission, KnGrid is currently developing the world's first Demand Clearinghouse (DCH) to enable any utility,

balancing authority or site host to provide pricing and grid constraints to all connected vehicles via a single cloud-based data connection. Utilities can connect to the DCH with whichever smart grid or demand response protocol they prefer, providing a simple solution to cover the entire state.

**III. How the CPUC and Investor Owned Utilities (IOUs) can best leverage the work of their sister utilities and other California entities, such as the California ISO, to promote transportation electrification.**

We applaud the Commission's stance on reducing barriers to PEVs by supporting IOU investments in charging infrastructure at underserved long-dwell charging locations, principally workplace and multi-unit dwellings.

Without shortchanging the importance of this effort, KnGrid wishes to focus these comments on our area of specialty: vehicle-grid integration standards and their use as a means to:

1. minimize ratepayer costs by maximizing distribution grid asset-utilization,
2. accelerate adoption by delighting consumers with refueling simplicity,
3. leverage PEV charging to cross-contribute to reducing GHG and criteria air pollutant emissions from the operation of the electrical system, and
4. avoid stranded investments in non-VGI capable assets.

These comments are intended to:

1. Bring the Commission's attention to the need for California to standardize VGI investments both within and across utility boundaries now,
2. Highlight the existence and attributes of a global interoperability standard for VGI that enables items 1, 2 , 3 and 4 directly above, and
3. Future-proof California's options as automakers close in on series-production vehicles capable of re-feeding energy back to the grid, also known as vehicle-to-grid) V2G.

### **ISO 15118 - A Global VGI Standard**

The ISO 15118 standard was proposed eight years ago to the ISO and IEC standards bodies with the goals of:

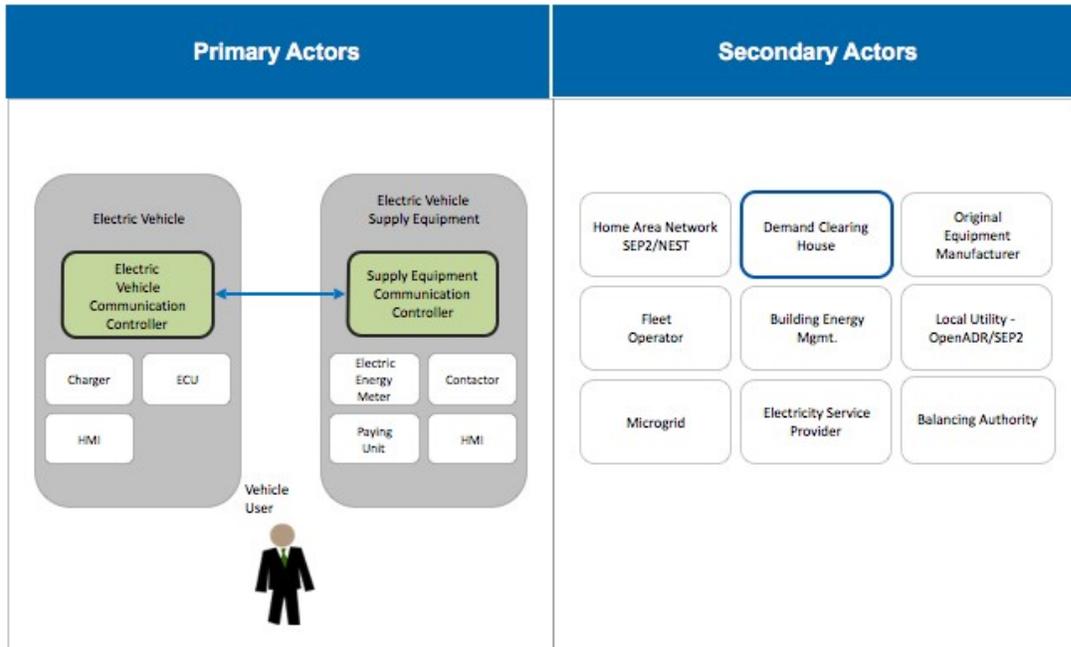
- simplifying refueling for consumers
- enabling mass-market uptake of electric vehicles without requiring massive upgrades to the distribution grid
- maintaining the highest level of cybersecurity
- respecting driver needs
- maintaining system reliability as intermittent renewables replace fossil fuel generation.
- potentially lowering the Total Cost of Ownership of a PEV by creating a distributed energy resource (DER) that can be energy market-certified, aggregated and dispatched.

During its development, the ISO 15118 Joint Working Group has been comprised of 138 utility, automaker, and ICT (information and communication technology) specialists from 13 countries (including all major auto manufacturing countries). Additionally, 14 passive countries and over 6,000 official comments have been received during the standards progression through the ISO approval process. The ISO 15118 standard is now complete and multiple OEMs around the world are implementing the standard for both DC Fast Charging, using the combined charging system (CCS), and AC Level 2 smart charging.

**How ISO 15118 works:**

ISO 15118 unifies two primary actors in order to form a DER:

1. The PEV
2. The Electric Vehicle Supply Equipment - EVSE - (including the energy meter)



Upon connection:

- The PEV authenticates its valid account via the cloud (no RFID or App required)
- The PEV informs the EVSE of two key pieces of smart charging data:
  - Energy purchase need (expressed in kWh)
  - Planned departure time
- The EVSE requests pricing and power availability information from the DCH based on conditions at all layers of the grid:
  - Renewable energy output and other power plant information

- Location Marginal Prices at the transmission take-out nodes
  - Distribution substation load forecasts and congestion issues
  - Load forecasts at the local transformer as well as charging plans of other PEVs downstream of the common transformer
- The DCH responds with a “Secondary Actor Schedule Tuple” (SAST) that contains current price and power availability forecast over the next several hours
  - The PEV selects a Load Plan and shares it with the EVSE
  - The EVSE updates status and shares the Load Plan with the DCH

In order for the standard to work, both the charging station and the PEV must be equipped to support it. This point should be emphasized in the following way: if the charging station ecosystem is NOT populated with ISO 15118 stations, automaker investments to implement the standard will largely go to waste.

Automaker investments will be wasted as the standard specifies how the vehicle authenticates itself with a power-line carrier (PLC) modem via encrypted data and digital certificates (with public and private keys). The PLC modem and corresponding smart controllers must be present on BOTH the vehicle and the charging station to exchange messages as defined within the ISO 15118 standard. Furthermore, the PEV is equipped with onboard logic to ‘select’ optimized load plans. Without corresponding 15118 charging stations, the PEV receives no SAST and cannot select a Load Plan.

**Not choosing a standard is still a decision about standards:**

There's no way to sidestep this issue. A global standard exists that is designed to preserve all VGI options while simplifying the PEV owner's experience. California either supports the standard or doesn't. Not supporting the standard with infrastructure investments tells automakers all they need to know about California's commitment to VGI.

**California's VGI future without a standard:**

Failure to standardize on ISO 15118 means:

- ISO 15118 PEV owners won't know where they can roam 'seamlessly' with ISO 15118 'Plug and Charge' technology that allows them to charge anywhere. In other words, PEV owners will experience frustration and confusion about one issue that slows PEV adoption the most: refueling. This is because EVSE procurement decisions won't be guided by, and EVSE manufacturers won't implement, the standard. Additionally, many OEMs won't implement the standard. As a result, California will end up with a fragmented ecosystem of public, semi-public and even privately owned EVSE.
- VGI approaches and technologies will fragment both within and between IOU boundaries, further confusing potential consumers and the PEV dealers themselves. Each month, a new and different gadget or kluged approach to demand response (that doesn't account for energy purchase need or planned

departure time) will be peddled to the consumer or to fleet managers as 'VGI,' with few understanding what VGI really is.

- Billions of dollars' worth of stranded ratepayer investments will be made in non-VGI-capable EVSE.
- Confusion and fragmentation over refueling slows PEV adoption overall.
- When a one hour power outage happens in the middle of the night, PEVs at MuDs and other public charging stations stop their charging sessions. When the power is restored, they cannot re-authenticate themselves to resume their charging session. Millions of PEV owners wake up and find their vehicles without adequate range to get to work.
- Uncoordinated PEV charging leads to lower distribution grid asset utilization and requires that the costs of expensive upgrades be passed on to ratepayers.
- Eventually, one of two things will happen: either automakers will abandon efforts to implement this VGI standard or they will push for the replacement of all the non-standard equipment already installed leading to massive re-investment to replace non-standard charging stations. Both of these scenarios imply higher costs for ratepayers than building the ecosystem right the first time.

#### **California's VGI future with ISO 15118:**

- All EVSE in the state employ ISO 15118
- All automakers implement the standard to avoid the 'feature deficit' label (cars that don't offer the convenience of "Plug and Charge.")

- Consumers experience “Plug and Charge” roaming regardless of what utility or charging station network they’re connecting to
  - No need to join networks on trips to weekend or ‘one-time’ destinations
  - Utility investments in EVSE will all enable VGI now and into the future
- Utilities can each implement whatever VGI tariffs they want without confusing the consumer
- Machine-learning algorithms are developed and implemented that enable increasingly granular VGI capabilities that consumers are completely unaware of in their daily use of their PEVs
- Innovations from automakers and EVSE manufacturers flourish
- The cost of 15118-enabled EVSE collapses with scale economies
- Existing distribution grid asset-utilization increases without expensive capacity upgrades as PEV Load Plans are automatically and intelligently staggered without compromising consumer refueling needs
- Consumers are insulated from the complexity of any dynamic pricing offers in utility VGI tariffs as the vehicles automatically optimize their Load Plans harmoniously with grid conditions
- When a short power service disruption occurs, PEVs at Multi-Unit Dwellings (MUDs) and public charging stations automatically re-authenticate and resume smart charging with full respect for planned departure time and energy purchase need intact

- Fleet operators can leverage public and semi-public charging infrastructure seamlessly and without any roaming issues
- Both the State and ratepayers benefit from crosscutting benefits for renewables integration from all PEV loads in the system
- V2G implementation arrives on series production vehicles to enable PEVs to act as both a flexible load and as a distributed generator in concert with real-time grid conditions
- CAISO control-room confidence in connected PEVs as an energy resource grows as the revolution-scale PEV adoption occurs and this scalable control system proves itself without confusing drivers or jeopardizing their mobility needs
- New balancing authority markets and grid-support applications are developed that specifically leverage the special capabilities of distributed storage in managing:
  - Nodal congestion resolution
  - Peak shifting
  - Ramping periods
  - Energy balancing

**Can OVGIP and multiple non-standardized approaches achieve the same benefits as ISO 15118?**

Simply put, no. OVGIP punts on two of the key ‘must haves’ of VGI: meter association and respect for grid topology. In fact, several European automakers have withdrawn

their support for OVGIP. OVGIP rests on the belief that automaker telematic systems will suffice for a robust VGI future. KnGrid asserts that using disparate automaker approaches via telematics represent an unreliable method for:

- Smart-meter association
- Local grid topology awareness
- Standardizing data that must achieve scalability, reliability, and cybersecurity.

OVGIP, while well-intentioned, represents a failure to standardize. It has the allure of standardization, but not the benefits of scalable, secure data and meter association. In the OVGIP scenario, not a single charging station will be installed with the smart controller or PLC modem needed to enable true smart charging. As OVGIP is mentioned in PG&E's presentation as something to "build on" at the CPUC workshop on April, 29 in San Francisco, it's important to highlight its shortcomings now and avoid embracing this approach.

### **The ISO 15118 standard is gaining momentum:**

All automakers are global players. Subsequently, global standardization efforts are extremely helpful to both manufacturers of charging infrastructure and PEVs in gaining scale economies. The ISO 15118 standard already supports the Combined Charging System (CCS) which covers both AC Level 2 and DC Fast Charging in both North America and Europe<sup>1</sup> (See Appendix A). For any PEV today that employs CCS for DC Fast Charging, the communications software stack and the "HomePlug

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<sup>1</sup> <http://www.charinev.org/ccs-at-a-glance/ccs-specification/>

GreenPHY” power line carrier modem are already built-in to the vehicle. A market signal from the State of California that supports ISO 15118 as the common, unique VGI standard can coalesce all EVSE and auto manufacturing around this single solution throughout North America and, importantly, globally.

#### **IV. Conclusion:**

As of April 2016, the ISO 15118 standard is being implemented by 9 of the top 12 global plug-in vehicle manufacturers. More are on the way. Furthermore, in Europe, “CharIn e. V.”<sup>2</sup> an organization dedicated to promoting the CCS standard, shows growing membership and support as the European Commission continues to lend support for a ‘common, unique standard.’

KnGrid meets regularly with automakers that are implementing the ISO 15118 standard. In April of this year, KnGrid sponsored the 4th International ISO 15118 ‘Interoperability Testing Symposium’ in San Diego. These international events bring automaker representatives and charging station manufacturers together in order to test and demonstrate charging and VGI interoperability standards. At that event, KnGrid counted approximately 35 PEV models that have planned rollouts with the ISO 15118 standard in the next three years. ISO 15118 provides a future-proof path to VGI that California needs. It has been painstakingly crafted with full documentation<sup>3</sup> over the last 8 years. In Europe, automakers and auto-parts

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<sup>2</sup> <http://www.charinev.org/members/>

<sup>3</sup> [http://www.iso.org/iso/home/store/catalogue\\_tc/catalogue\\_detail.htm?csnumber=55365](http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=55365)

manufacturers associations (ACEA and CLEPA) have already formally declared their reasons and intentions to congeal around ISO 15118 for both AC Level 2 and DC Fast Charging. (See letter and attachment to the European Commission in Appendix A).

California IOU investments in charging infrastructure at the scale now contemplated forces California's regulatory hand on standards. There can be no question about this central fact. Both the PEV market and the state of California are at a crossroads. KnGrid asserts that the CPUC, in coordination with the IOUs and other regulatory agencies, has a unique and important opportunity to send a clear market signal that will and should have global importance and benefits. To understand this, we simply have to ask ourselves what our 'why' is. Why are we doing any of this? The answer is simple: global climate change.

Globally, all eyes are on California as the state shows the way forward on dealing with climate change while, at the same time, maintaining a vibrant and dynamic economy that is the envy of the world. The unpleasant truth, reaffirmed each week with ominous signals from our natural world, is that humanity is crossing over invisible time boundaries that limit our ability to 'manage the unavoidable and avoid the unmanageable.' ISO 15118 delivers on everything California says it needs and wants from VGI. For California to sleepwalk past ISO 15118, a scalable global solution to a global problem at this pivotal moment in human history, would send a terrible message: that we couldn't get our act together to build one of the key 'pathway

accelerators' needed to solve the threat to human civilization that climate change poses. Worse, all would know that we failed in spite of the fact that a robust global standard was presented as an option.

In December of 2015, 195 nations joined in France to adopt what is now known as the Paris Agreement. KnGrid urges the Commission to heed the spirit of the Paris Agreement, signed by the United States in New York on April 22nd, to show the world how VGI is done right, to channel the relentless focus of California's own Governor on climate change, and choose the better, sturdier bridge to a sustainable future.

Respectfully submitted,  
/s/ Stephen G. Davis  
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## Appendix A

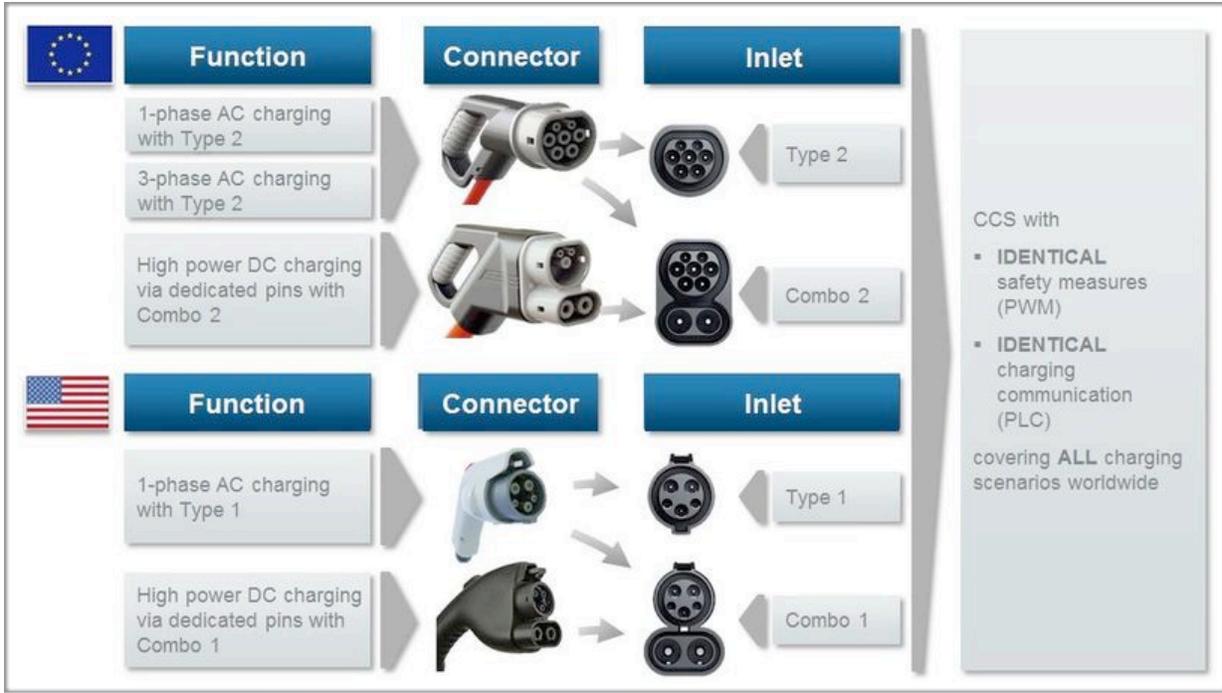
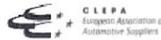


Exhibit 1

Exhibit 2



Mr. Antonio Tajani  
Vice-President  
European Commission  
BE – 1049 Brussels

Brussels, 24 May 2012

Dear Vice-President, *Dear Vice-President,*

Please find attached the updated ACEA position and recommendations for the standardisation of the charging of electrically chargeable vehicles, that reflects the latest development in this field and the main changes are focusing on the communication between vehicle and grid. All other major issues remain unchanged, including clear preference of the automobile industry for the Type 2 connector.

It is also a pleasure to inform you that the ACEA position is fully supported by CLEPA and the position expresses the willingness of the whole automotive industry for a unique and simple solution for charging in Europe.

Please do not hesitate to contact us should you have any further questions on this matter.

Yours sincerely,  
*ian chadwick*

*File*



**ACEA position and recommendations for the standardization of the charging of electrically chargeable vehicles**

Following the previous commitments made and updated ACEA position from 2 March 2011 ([http://www.acea.be/news/news\\_detail/acea\\_members\\_address\\_the\\_challenge\\_of\\_standardising\\_the\\_charging\\_of\\_electri](http://www.acea.be/news/news_detail/acea_members_address_the_challenge_of_standardising_the_charging_of_electri)) ACEA members are continuing to contribute to the on-going debate within EU institutions on standards for electrically chargeable vehicles.

Having recognised the progress made during last months, namely in the CEN/CENELEC Focus Group and progress made in TEC (Trans-Atlantic Economic Cooperation), ACEA members present final agreement and joint recommendations on interface between cars and relevant infrastructure.

ACEA members express their urgent need to finalise European agreement for standard AC charging and present vision for common agreement on quick charging that also creates a room for global solution and simplification

From the perspective of the automotive industry, presented agreement and solutions will have positive effects for the consumers (having unique EU wide solution, cost reduction for all stakeholders and fulfilling all safety requirements), for the infrastructure providers to have clear indication about the future development and for the OEMs to reduce costs and progress more quickly on the market uptake of electrically chargeable vehicles. Quick progress and EU-wide agreement for standard charging is a pre-requisite for quicker market uptake of electric vehicles and higher investment into quick charging network.

However, it is important to note, that the current joint position and recommendation is based on today's best knowledge of the current situation and state of technical development. That applies both for connectors/ modes and communication. Certain technical solutions may still need to be validated in detail, as the technical specifications have not yet been finalized in the different International Standardization Groups. Also learnings and outcomes of demonstration projects and testings could eventually result in a set of different recommendations.

Concerning Europe, ACEA members call upon the European Commission and relevant standardization bodies and other stakeholders to support those recommendations and use it as a basis for the development of common European standards. Concerning global view, ACEA is strongly supporting the IEC standardization process for a global solution. In this framework, ACEA recommends one defined "envelope" for vehicle inlet supporting single phase AC, three phase AC and DC charging, including safety requirements as well and ACEA members will fully respect agreed global solution if found in the future.

Considering the ACEA common position regarding charging connectors and its communication, we, automotive industry, will make further efforts in promoting e-mobility solutions and services. We believe that such is only possible based on co-operation with utilities, infrastructure companies, and the automotive industry, supported by the governments. ACEA also urges the need to implement ACEA recommendations and encourages all stakeholders involved in standards setting mentioned below.

<sup>1</sup> See Annex III of the position

**Annex I: ACEA position and recommendations on connector types (IEC 62196), charge modes (IEC 61851) and communication standards for the charging of electrically chargeable vehicles (passenger cars and light-commercial vehicles)**

**Executive summary:**

- \* ACEA continues and stresses the need to divide the timeframe into two fundamental phases - Ongoing period till approval of relevant standards (Phase 1) and approval of relevant standards with sufficient lead-time for implementation (Phase 2).
- \* Current agreement covers both Phase 1 and Phase 2 for passenger and light-commercial vehicles only for AC and DC charging.

\* **Phase 1 reflects current situation** and should be seen as a preparatory step for a broader introduction of electrically chargeable vehicles in the EU. Public authorities are welcomed to consider the voluntary agreement made by the industry and pilot projects in urban areas should be streamlined on the infrastructure side accordingly.

\* **Phase 2 suggests a uniform EU solution enabling global charging standards to be applied** that reduces the variety of solutions in the market.

\* Harmonized rules for phase 2 should apply for new vehicle types starting 2017, providing the industry with needed lead time to implement these new solutions in their vehicle development programs and to make necessary adaptation in the infrastructure.

\* In line with the joint EU-US TEC discussions ACEA presents a definition of global vehicle inlet “envelope” as a key step for global solution, enabling simple switch between US and EU standards (see annex III).

\* Concerning the connector types/modes and communication, ACEA agrees on following key principles and recommendations:

**i) As for proposed uniform EU solution (Phase 2 starting in 2017 for all new vehicle types on vehicle side), ACEA suggest **Type 2/Type 2 Combo to be used in the EU** as a standard for AC/DC charging both on the vehicle and public charging side as long as it meets required national safety requirements**

**ii) Standardization of joint “envelope” profile paves the way to real global solution.** Having in mind two different operational conditions (namely from the side of grid and electricity power in grids), simple single solution cannot work between US and EU. **Joint “envelope” profile** facilitates the exchange of Combo 1/Combo 2 solutions and will lead to significant simplification of charging mechanisms for consumers and cost reductions for the industry.

**iii) No direct communication between vehicle and grid is foreseen for the moment**

**iv) Preference **PLC communication** between EV and EVSE shall be ISO/IEC 15118 compliant**

**v) If in the future communication between EV directly to the grid will be established, it shall follow an international standard (to be defined, but it should be compliant at least with ISO/IEC 15118)**

**vi) International standards ISO/IEC 15118 and IEC 61851-23/-24 shall cover the needs of communication for most modes of charging.**

**vii) As for the communication technology, ACEA decided to **concentrate all efforts on of IEEE 1901 Profile Green PHY on CPLT/PE.****

**viii) For the wireless communication, industry decided to select a PLC technology for the communication, **wireless solutions should be developed in the future****