



## Hyper-Network for electroMobility

*Horizon 2020 Programme*

*Grant Agreement No: 713794*

# NeMo Final Conference and Exhibition: Summary Report

Event held at Ca l'Alier, Barcelona  
Thursday 19 September 2019



*Prepared by ICCS and ERTICO*



*This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 713794*

## Introduction

**NeMo** is a 3-year project which addressed the issue of lack of interoperability in electromobility services. Its aims were to make electromobility more attractive, focusing on seamless interoperability of charging and other electromobility services.

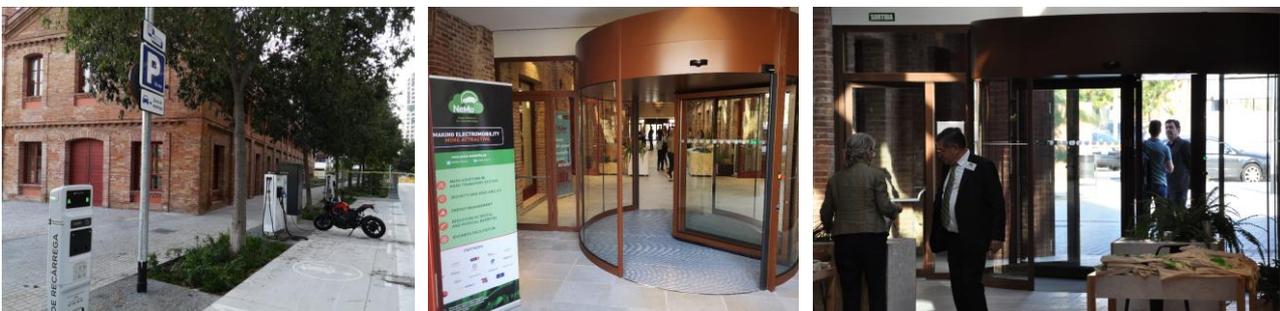
Specifically, NeMo has developed a **Hyper-Network of tools, models and services** to create an open, distributed and widely accepted ecosystem for electromobility. This allows charging points, roaming operators, the electricity grid, system operators and service providers and vehicles to connect with each other in order to exchange data and to provide electromobility ICT services in a fully integrated and interoperable way.

NeMo facilitates increased service availability, better planning and more secure electric grid operation, by making backend data and services accessible to the right actors and bringing down barriers. An Open Cloud Marketplace enables service providers to reach more users and provide more seamless services. By enabling better accessibility to charging infrastructure, ICT services and wider B2B interconnectivity, NeMo can boost the market share of electric vehicles.

The project started in October 2016 and ran for 3 years, until the end of September 2019. It included 19 partners and 1 associate partner, representing the automotive, research, software, operator, public authority and energy sectors. NeMo is co-funded by the Horizon 2020 Research and Innovation Programme of the European Union (grant agreement no. 713794).

This report summarises the outcomes of the **NeMo Final Conference and Exhibition**, which took place on 19<sup>th</sup> September 2019 at Ca l'Alier in Barcelona. This historic building (a former factory) is owned by Barcelona City Council / Ajuntament de Barcelona and was recently renovated as an urban innovation centre. The Final Conference was promoted under the banner "From project to market: Seamless electromobility services in Europe", to highlight the ambition to deploy the project's outcomes and ensure wide acceptance.

This document is a summary of NeMo Deliverable D8.6: Proceedings of the NeMo Final Event, which describes in detail all aspects of the event, including planning, organisation and materials presented. D8.6 is available for download at <https://nemo-emobility.eu/deliverables> (under section Work Package 8: Communication, Dissemination and Liaison).



*Charge points offered by the City of Barcelona (Ajuntament de Barcelona) at Ca l'Alier, roll-up banner at event entrance and delegates arriving at the event*

## Participation

A total of 75 persons registered for the event (NeMo partners included). Participants external to the NeMo consortium comprised representatives from the field of electric industry (mainly SMEs), policy makers, retailers, individuals and representatives from EU funded projects related with electromobility.

## Event Report

The conference began with a welcome address by the Commissioner for Economic Promotion, Enterprise and Innovation from the city of Barcelona. For the Project Coordinator, ICCS provided the introduction, summarising NeMo's achievements during the three years of the project.

After the opening speeches of the conference, the first technical session entitled "Creating a Hyper-Network for Electromobility" followed where partners analysed the results that they have produced.

In the second technical session, entitled "Business and Technical Demonstrations of the NeMo Hyper-Network", partners highlighted the features of the NeMo Hyper-Network through technical demonstrations.

The final session included a panel discussion organised on the topic "The future of electromobility", moderated by ICCS and comprising seven high-level panellists.

Please note that the presentations made at this event are available on the NeMo website at <http://nemo-emobility.eu/presentations>

Posters displayed in the exhibition area of the event are available at <https://nemo-emobility.eu/posters-from-the-nemo-final-conference-and-exhibition>

### Welcome and Overview: 09:30 – 10:00

**Luís Gómez**, Commissioner for Economic Promotion, Enterprise and Innovation, [City of Barcelona](#), provided the welcome address. He pointed out that the cities need to change their mobility schemes, and transform the mobility for improving the quality of life in the city, and in consequence transforming the industry. Countries like the USA, China, and Japan are innovating and rapidly adding value and money to be in the forefront of mobility change. European countries cannot lose out on this leadership and the EU needs to be a reference, with cities playing an important role in this. The City of Barcelona, for example, receives delegations from other countries to learn about the city's activities regarding mobility, autonomous transport, modelling how to build cities that are great to live in, etc. Barcelona, having its first charging point installed in 2009, is open and expresses the need to work looking at people's needs, together with small companies as well as major industries to change mobility.



*Opening and Welcome, Luís Gómez (Ajuntament de Barcelona)*

Representing the Project Coordinator at the [Institute of Communication and Computer Systems \(ICCS\)](#), **Dr Evangelia Portouli** thanked the City of Barcelona for hosting this conference and for their participation in the project. She provided a general overview of the project and its achievements. She also introduced Mr Volker Fricke, the NeMo Hackathon winner, who showcased his offered service from [e3charge](#) in the exhibition area.



*Evangelia Portouli (ICCS) presenting the NeMo achievements*

## Conference session: Creating a Hyper-Network for Electromobility, 10:00 – 11:30

**Thomas Walz** from [IBM](#)'s research and development centre in Germany, gave a high-level overview of the NeMo Hyper-Network: "***What it is and how it works***". He introduced the main IT challenges that were addressed in the technical development within NeMo based upon which the main architecture principles were formed. The Hyper-Network was developed based on a distributed hyper-ledger framework upon blockchain applications, with open APIs and Identity and Access management in order to secure applications and services.

The integration of business partners and their service provision are done via the NeMo Nodes, that can interact and make service to service calls via the integration bus and share the same service registry by the marketplace data replication across the node network. The single Node architecture was explained, and the current status of the Hyper-Network business partners and registered services was presented. A use case based upon the itinerary planning service developed within NeMo to share in-vehicle data to third party service providers, like the navigation service provider, using the NeMo Neutral server and the Extended Vehicle standard, which was demonstrated in an [ACEA \(European Automobile Manufacturers Association\)](#) working group, was showcased as this was implemented by three vehicle manufacturers (Renault, Fiat and Honda) and complied with the NeMo Common Information Models.

**Thomas Fousse** from the French-based electromobility roaming platform [GIREVE](#) presented the ***Open European Inter-Roaming Protocol***. The presentation explained the necessary communication flow that takes place between electromobility service providers (EMSPs) and charge point operators (CPOs) in order to allow a customer of the EMSP to charge at the CPOs charge point. The lack of interoperability in the explained access topologies was creating complexity and reducing overall efficiency. The needed integration of existing solutions came as a result of the project with the development of the Inter-Roaming protocol that enables the connection of the two e-roaming platforms within the project, Gireve and [Hsubject](#), and their exposure to the network, and increased the accessible charging points. Now a customer of an EMSP that is connected to the first platform can enable charging at a CPO (which is a customer of the second platform) seamlessly.

The technical process was standardised via the NeMo Common Information Models and the open interfaces, allowing for new services creation and deployment features. The business model to support these connections is also proposed within the project in order to define the contractual terms of the business agreements among the involved actors and will be the task of the future Business Alliance for Electromobility (BAEM).

**Christina Anagnostopoulou** from the [ICCS](#) presented ***NeMo Common Information Models (CIM)***. The need for a harmonised data management domain within NeMo was recognised from the beginning, coming to address the challenges of lack of interoperability in electromobility services, the need for common data and information modelling, the lack of standardisation in services provision and the diversity of electromobility actors.

The NeMo CIM provides models for all the physical objects and data structures relevant to the use cases of the project, based upon existing information modelling and data exchange standards in order to make data available to the correct actors in a consistent format. The agents called Data

Translators are enabling the translation of existing services to the NeMo CIM and their publication to the Hyper-Network. The business objects were categorized in 8 logical categories, with defined attributes per object and based upon the template of the emi3 specifications. The objects for the Electric Vehicle, the Smart Charging functionalities, the Charge Session, the Marketplace, the EV user, the eMobility Report, the Charging Infrastructure, the Vehicle preparation were presented and examples were given. CIM implementation is supported by the processes of service creation and invocation that allow for the dynamic translation from proprietary models to CIM and vice versa. Concluding, CIM support the standardization and interoperability in electromobility services and allow for integration of new smart services. The models are open and shared and will be taken over to achieve further liaison with stakeholder groups by the BAEM.

**Nils Masuch** from the [Distributed Artificial Intelligence Laboratory of the Technical University of Berlin](#) presented *Easy service creation*. The service creation domain supports the integration of existing services into the NeMo Hyper-Network, as well as the creation of composite services that include combining services that reside in the Nodes of different business partners of the network. Within this domain a toolchain is provided in order to search and find appropriate services, compose the found ones, test the final composition and describe the final service semantically in CIM, and lastly deploy it in the NeMo service registry.

**Stefano Persi**, CEO of [Mosaic Factor](#), presented *Smart electromobility services*. Within the Hyper-Network, the B2B (Business-to-Business) marketplace allows the provision of added-on functionality usable in the whole environment, connecting all electromobility actors, supporting the seamless interoperability of B2B and B2C (Business-to-Customer) services. Service providers can provide existing and new services, publish easily, combine other services for creation of smart added value services, and get a better knowledge of the users. The electromobility users can access global level services via a single easily accessible marketplace, combine different services and enjoy e-roaming interoperability. Services available in the Hyper-Network can support daily commute needs as well as occasional trips, for example charge point prediction service or service brokerage, to optimise selection and services upon criteria and personal mobility needs, etc., and a hands on example was provided based on the use cases of the project.

**Christophe Moure** from [Applus IDIADA](#) presented *Evaluation activities and NeMo impact*. The validation activities of the Hyper-Network were based upon the five test sites (in Spain, France, Germany, Austria and Italy) and the European Electromobility Test Drives, as well as the NeMo Hackathon organised in the spring of 2019, in order to engage external organisations into the usage of the NeMo open tools and evaluate their effectiveness. The winner of the Hackathon was announced according to the criteria set, to be the ChargeSharing solution from e3charge, allowing Charge Point Operators (including private owners of charging points) to sell access to their charging facilities to other users. The five NeMo test sites and their scenarios, the services involved in each and the outcomes of the analyses, were also presented in detail. The second European Test Drive of the project, which took place in summer 2019 across nine countries, resulted in a significant improvement of the driver satisfaction compared with the preliminary Test Drive in 2018 (across three countries), thanks to the implementation of the Inter-Roaming protocol.

This session of the conference concluded with **Andrew Winder** from [ERTICO – ITS Europe](#), who presented *From NeMo to a Business Alliance for Electromobility*. He explained that NeMo project developments will be continued and supported via the founding of the Business Alliance for

Electromobility (BAEM) that will build a self-sustaining business model for a solid future of the Hyper-Network and the associated services. The vision is to promote interoperability of electromobility services via participation in standardisation processes and act as a central operation hub in Europe for all electromobility actors, offering intelligence and added value via a unique marketplace. This Alliance will be founded as a not-for-profit association, open to all relevant stakeholders, building a B2B network to facilitate making business and ensuring the exploitation of the project's results. The value proposition and the key activities of BAEM were also presented, while it was explained that the revenue model will be based upon subscription fee for the business members. An open invitation was made to all participants that can further state interest via the project's web portal (<https://nemo-emobility.eu/nemo-forum>).

### **Conference session: Business and Technical showcase of the NeMo Hyper-Network, 11:50 – 13:00**

**Thomas Walz** from [IBM](#) introduced this session by outlining the ***Access and business features of the NeMo Marketplace***. This included the main architecture of the NeMo Nodes and the network with its current deployment with the Node of the partners, along with the different types and user roles.

A business partner can join the Hyper-Network with his own Node or as an affiliated of existing Node, being able to use the Node components and the offered functionality, have credentials to login and navigate the marketplace, where important information about partners' profiles and services can be found, search, register, offer and contract a specific service of interest. Insights to the marketplace and the provided information was given. Tools are also provided for constant monitoring of the node network.

**Thomas Fousse** of [GIREVE](#) presented the first technical demonstration, covering ***Registration of an atomic or horizontal service***, and ***Service offering and contracting***. From the perspective of a service provider, the project partner Gireve having joined the marketplace to offer to the whole ecosystem their services, presented the experience to publish services in the Hyper-Network and offer them commercially, by providing a step by step overview of the process. The existing service, that resides in Gireve's IT environment, is being semantically annotated via CIM and service creation tools, the transformation logic is provided via the mapping of the proprietary Gireve protocol to the NeMo CIM, the end point of the service is described, and all this information are registered at the business object of a NeMo service under the business profile of the company. The service now will appear at the company's services list and can also be offered via a service offering that when selected can be invoked based upon the already registered transformation logic.

**Nils Masuch** from the [DAI-Labor, TU Berlin](#) demonstrated the ***Creation of a composite service: Charging point search based on mobility needs***. In this phase, the open service creation tools are presented in detail, explaining the components this domain consists of as well as their position within a NeMo Node. The participants get a view of the Eclipse tool that is used as the visual representation tool of the composite service creation suite with the BPMN editor incorporated, and how this can be used, services found and combined and finalized, is being presented via a relevant use case example. The deployment and testing functionality are the final steps of this process. The service modelling is based upon the NeMo CIM, the Web Ontology Language format (OWL-s) for the semantic descriptions with an editor for defining relevant parameters and

restrictive specifications. Then any provider is ready to register the resulted service at the marketplace as previously described.

**Thodoris Theodoropoulos** from the [ICCS](#) then demonstrated the *Service execution, with focus on Integration bus and Translators*. The example follows the step of service invocation, either for an atomic or composite service, upon the NeMo-wide execution system architecture, the integration bus. Thus allowing for service-to-service invocation by the respective nodes both on the consumer and provider sides. The relevant API that is involved in this process and promotes interoperability in the system is also presented. The security aspect is equally important and the appropriate access control is realized via the Identity Access Management. The processes for service look-up, dynamic service translation before execution, and finally service invocation – for composite service invocations also, where multiple internal invocations are involved – were explained in detail.

Finally in this session, **Roberto Tola** from [Centro Ricerche Fiat \(CRF\)](#) provided a *Demonstration of a use case: Neutral server and Extended Vehicle standard integrated with the NeMo infrastructure*. This is based on the architecture developed for secured sharing of in-vehicle data to any third party service providers by the consent of the EV driver, enabling of added value service provision to the end user. The integration of the OEMs (vehicle manufacturer's) backend was realised via the Neutral Server and the Extended vehicle standard, fulfilling the EU guiding principles and the data privacy via the double consent approach. This was demonstrated at the Italian test site as well as to [ACEA](#) working groups, including implementation of NeMo proposed architecture by Renault and Honda. In the Italian test site, a Courtesy Assistant app as well as Navigation service provider were requesting information from the vehicle to allow for charge point booking, alert about the battery low level and CP rebooking upon the monitoring of the vehicle status and the road information.

The business and technical session ended with a question and answer session, where the following points were raised:

“There are several car sharing services and companies in BCN, extra to the municipality activities, and they are not in the project, how they can get connected? Can all these other existing initiatives in Barcelona be linked, and how?”

*NeMo response:* Everything in NeMo is open and the BAEM that will be taking over the Hyper-Network, invites all parties to join, and these initiatives will also be able to connect and join the network, starting by stating their interest to participate to NeMo. So all companies can join and get linked to the Hyper-Network as well as to each other. The City of Barcelona is a partner as a municipality, but also offers services and is connecting with service providers.

“Is it able to retrieve the State-of-Charge and State-of-Health of the battery to provide that to the right actors?”

*NeMo response:* This is relevant, the vehicle interface is able to do that, but the data openness and reliability is an issue on the supply chain, since it is complicated to provide live info. The Extended Vehicle standard described the interfaces, and the concept is involving with behaviour diagnostics – being regulated and e-mobility. The CIM defines some of the values, and the more use cases the more the defined parameters will be.

A public interface (Trustee Server) is provided in NeMo to get access to the vehicle data, not at the extend that we may need today but initially it is provisioned and it can be further extended.

The ACEA demo, where a real use case was demonstrated, successfully faced the problem of in-vehicle data provision to several third parties, with EV user consent.

“Is the architecture open to produce new variables to the user behaviour versus the forecasting of the State-of-Charge?”

*NeMo response:* The engagement of more companies will result in providing a variety of parameters that can be used – i.e. weather prediction/modelling companies, traffic information companies, etc. - to support the precondition of the car upon the forecast on the State-of-Charge. The backbone is ready via CIM and we are welcoming these actors to update the protocols and include these data sets in the future, we are open and everyone is welcome.



*Technical Question and Answer session*

### **Conference session: Panel discussion and conclusions, 14:00 – 15:30**

A lively panel discussion on the subject “*The future of electromobility*” featured seven senior panellists, chaired by Dr Evangelia Portouli from ICCS. Each panellist provided a short overview of his viewpoint, followed by an open discussion, also including the audience.

**Àngel López** (Director of Electromobility Strategy, Barcelona City Council) provided an overview of past, present and future of mobility from the cities’ perspective, and pointed out that the key still evolves around providing appropriate parking space for a city. An equation presented as a way to track the respective needs of the different eras. In the past, for example, we needed mobility and a place to park. Presently, pollution shifts the game to the plug level. We need a place to plug, a place to park and plug, and a plug to charge. Shared connected automated services is the prospect mobility future, shifting the mobility need to sharing, thus increasing complexity, and now adding to the equation not only space but also energy. For e-mobility success, people acceptance is

needed. NeMo project is the B2B project that worked in the technical complexity, mobility and accessibility, while the need now is for all to look ways for people acceptance.

**Christian Hahn** (CEO, Hubject) started stating that EV charging needs to be as easy as possible, as seamless as possible. This of course needs market collaboration. E-mobility roaming platforms Gireve and Hubject demonstrated collaboration within the project, but other players at local level, need also to collaborate. The topic of security, handling customer data and the need to do it properly, when still today most of FRID cards are not very secured, comes next. It is necessary to trust each other in security level, having clear guidance and regulation, again jointly.

End customer experience is the next focus point. Once the customer understands that the EV is better to use then the customer himself will make the shift. Lots of associations analysed the customer experience, and still drivers are facing issues when charging, when starting charging sessions, it is not clear who to call once something is not working, etc. Added value becomes the last focus point. Integration of EVs to the grid system is an innovative service and such services need to be broadly available.

A Ford study in the US about their EV perception resulted that 4/10 believe that EVs still need petrol. Educating people to understand the value of EVs and that they are better is essential. Businesses need also to stand up for specific activities, supporting sustainable processes in order to survive. This is absolutely essential to their success.

**Jean-Marc Rives** (Chief Technical Officer, Gireve) highlighted that we are in fact, in front of a big change in volume, while today e-mobility is considered small, the forecast is a higher growth of numbers. The reasons why people will choose to use an EV are not based on green mobility or reduction of CO2 emissions, but on the offered experience, because it will be fun, cool, pleasant, and convenient. Thus it is essential to be giving to the EV driver the means to have this type of experience. The vehicle now is quite good with relevant OEM investment, but charging still remains a bit complex, and the ecosystem is also staying behind.

EV charging needs reduced complexity in order to support the increase of the pleasure that an EV offers. We are certain to arrive in high numbers of EVs usage, and such a mass market needs to face the security issues that rise. Even yet the health and safety issues, ensuring payments or using a CP without e-shock, etc., need attention. Although today mainly it is about IT security that further needs improvement, the whole security domain needs to be dealt with. It is important to increase the power of infrastructure and enlarge the number of services and the different solutions provided. Mass markets need a clear market model, and still in electromobility there is confusion in actors, playing several roles.

Secondly, e-mobility is only a part of mobility. Car sharing, autonomous vehicles, new user behaviour regarding vehicles and mobility points out the need to improve the level of services quality for a seamless experience in the whole mobility domain, via openly merging the e-mobility with the rest of mobility ecosystem.

Third, let's not forget about energy: smart grids, smart cities, smart charge. Here also new smart services need to be available to allow for a connected energy domain and the uptake of the cross-benefits from the mobility domain.

Concluding, facing a mass market the progress in reducing complexity on data exchange, algorithms and IT, interconnected systems, real time info exchange (IT), etc., and compliance needs must be addressed, new services offered and a market structure clearly defined.

**Jan Cupal** (Senior Innovation Manager, VERBUND) explained how Verbund, the Austrian energy actor, has a long history celebrating even its 70th birthday this year, so based upon their past

experience we can look into the future, not in the sense of what will immediately happen tomorrow. Some an increase of e-mobility by 30-40% is expected, placing us at the beginning of the shift from oil gas value chain to the e-mobility value chain. The oil industry is very strong, when something disrupts this group, they react in panic although they have built-in buffers.

In electromobility, we have to electrify millions of vehicles. By 2040, 5 million passenger EV cars are estimated to be on the road. The energy players need to provide the amount of power and deliver it in REAL time (vs the oil market), via the DSO and transmission grid flow of power. The challenge lies in this key word: collaboration of all business partners involved, which is now missing as well as the framework to support that.

NeMo provided a first step towards that collaboration. In eRoaming we already saw an immediate benefit, for charging processes we need to also build the chain of collaboration. None energy player is prepared to do that. In NeMo, partners managed to test a very small use case towards this framework, of how these collaborations could work. But a lot of effort is needed.

**Ichiro Sakai** (General Manager, Honda Motor Europe) stated that in 2019, Honda became a member of ACEA (the European Car Manufacturers Association), to fulfil the need to incorporate other than their usual strong engineering structure. Mr. Sakai expressed how he has mainly lived in the ICE era, having experienced the EVs only in a testing environment, thus he is excited for the EV future although there is a struggle in front of us. In Frankfurt, recently Honda announced the Honda-e mass production with a small 35 kwh battery with driving range more than 200km. Honda also proposes an Integrated concept for a carbon free society using e-mobility. Solutions supporting that approach are a Honda power charger and charging management-bidirectional features to satisfy demand and supply. Charging also within the city can be facilitated by connecting the smart cable provided by Honda to a bulb or conventional CP and a smart meter with a set tariff.

Power management for charging at home is also essential. EVs should have a significant role and responsibility for a carbon free society. Batteries range and affordability is also a topic needing further effort. Connectivity to the network of actors is a key element also, made possible via NeMo.

**Alexander Kröller** (Research Manager, TomTom) expressed his vision on the e-mobility of the future. He envisioned an EV user that in the future would feel sorry for those who will still use an ICE vehicle, as these technologies will become increasingly troublesome to use, forbidden in controlled pollution zones, etc., making more difficult to have an ICE car in the future. EV numbers are already growing. But still this reflects a tiny portion of today's vehicles. The bad news is that we have to make things easier. Make easy for business customers to create services. EV charging services, routing optimization will allow for easy integration and easy usage by humans. Everything has not reached a level of completeness yet, thus the need to collaborate becomes stronger.

**Dr Noshin Omar** (CEO and founder, AVESTA Battery and Energy Engineering), agreed with the necessity of public acceptance, and the security enforcement, Dr Omar stated. EVs need to be first affordable, then sustainable from energy perspective. E-mobility fleet is now 2-3%. One of the challenges is energy storage. Battery accounts for about 40-50% of the cost of the vehicle. Battery manufacturing is presently mainly made in Japan, Korea, China and mostly not from green electricity. Solutions need to be sustainable and factory capacity increased. By 2030, batteries will have to provide double range extension at the same volume. If energy is doubled the cost of the vehicle can be reduced by 50%.

Once the million numbers of EVs are plugged and charging at 30-100kwh, can become sources of explosion, if something goes wrong, if the design is not appropriate or real time monitoring systems are not available. VW strategy, for example, is based on doubling of electric range targeting further public acceptance. Safe and sustainable solutions are needed, where the choice of charging based on green energy or not is available. Battery manufacturing needs to work towards improving affordability.

Concluding the session, **Dr Evangelia Portouli** gathered the key points of the discussion: the needed collaboration, energy management, security, easiness and seamless experience, battery manufacturing, smart and fun services offer. It was highlighted how energy must be produced at the time that is needed thus energy management is essential, along with charging scheduling so that the network is not overloaded. The question was raised, if we can really consider the possibility for energy to flow out of my battery to the grid. The relevant discussion is presented in the next session.

**Questions** raised and answers were:

Will battery technology support V2G?

*Response from Jan Cupal (Verbund):* If it will become technically feasible, then we all need to support it, and only then it will make sense financially, but now it does not support an economic possible case. The control can be done by just increasing or reducing the speed of charging. This does not qualify as an energy problem really, but rather a problem of lack of interconnected business processes. Smart charging does not make sense now, neither for the driver nor for the energy actors, as there is no business connection among them (no business case that profits all). DSO is a regulated business; and we will not act against our commercial interest. If more load is needed the energy actors will build more. So it really comes down on the need to interconnect the business processes. First step for the high demand of power (ultra-fast charging systems with 150 and 400kw each and more) was the super-fast charging, and here it makes sense to have a cooperation with the actors involved. NeMo involved smart exchange of CPO and power provider, but with no commercial framework. A business case for everyone involved needs be clear, otherwise it will not make sense for them. Charge demand is sent to CPO, and the CPO answers with the cost. In the future, you will select your CP based on cost. The current cost situation of the CPO is based on cost of power that is given to the CPO based on a complex contract. For a regulated energy system, now there is no incentive for DSOs to be integrated in such ways.

*Response from Ichiro Sakai (Honda):* Indeed, there are issues as regards battery deterioration by discharging energy in inappropriate temperature. But it can be possible in terms of cash flow.

*Contribution from Marc Bechler (Honda):* We cannot dismiss the possibility from DSOs perspective, as in some countries problems with the energy supply are supported by such bidirectional solutions, for example this would be needed in India.

*Contribution from Jan Cupal:* In the next years, I don't really see that happening in Europe, because the impact on the system, from the energy content of the batteries is not much, compared to what the grid capacity. But in terms of power, the impact is huge, once several charging is happening.

*Response from Noshin Omar (AVESTA):* We are at the beginning of electrification, where capacities are limited and still not significant at the moment. In the near years, it will not be required, but in future the business model will be there. India worked on the perspective to stabilize the grid,

because the impact in cost was high and they did it based on existing fleets of e-buses. The need is not really obvious for the near future.

*Contribution from Ichiro Sakai (Honda):* All influencing factors need to be of course considered - like country and environment – but providing such service to the customer, to be able to utilise the battery is of added value, and we cannot dismiss the prospect.

*Contribution from Angel Lopez (City of Barcelona):* If we need EVs to regulate and complete the power, then we need a plug in every place a car can park, that the street cannot support. Most of charges will take place at garages off the street and this needs planning. Same eternal problem for the cities of where to park, space being always an issue for us, we need to plan the garages and the places to plug. The idea of the user owning and using his battery, when users will not need to own a car in the schemes of future shared mobility, why would it make sense to own a battery? Sharing fleets and other initiatives can be a part of the grid in this cases. It's a problem of grid and energy market regulation but it is affecting the e-mobility solution.

*Response from Noshin Omar:* Now it is not allowed to sell electricity to a third party, even if technology is there, energy is also regulated market. Being able to sell from my battery to the neighbour will take time for European regulations to change and include these schemes.

*Contribution from Jan Cupal:* If we want to foster these technologies, we need to create business cases, simple so if you want to share electricity you will be able to. One application with a potential business case for V2G that could come first, is energizing your private house, feeding back to your own house, charging the battery from the RES on the rooftop. This will be the first business case that will emerge.

*Contribution from Ichiro Sakai (Honda):* This is within Honda scope, and if this is combined properly in this case, depending on several parameters, it might be very effective for avoiding infrastructure cost or other costs that come down to the customer.

*Contribution from Christian Hahn (Hubject):* You cannot be sure of the future, but we know that we need some flexibility and to improve the way we collaborate. It is a good time now to think how we can achieve this solution also. And support it by protocols, standards, etc., starting now.

*Contribution from Judit Bataye (SIX-TER, Ouishare):* From the case of our car sharing initiatives, we have experienced the collaborative cases, including green energy, Wi-Fi, other solutions, etc., so we really can collaborate and this is what you are showing now in NeMo. It is clear that we need to have an open approach.



*Panel discussion*

## Exhibition section

An exhibition featuring eight technical posters and seven electromobility services was also arranged in the conference hall. The posters are available for download at <https://nemo-emobility.eu/posters-from-the-nemo-final-conference-and-exhibition> and the demonstrations were as follows:

## **NeMo: the Block Chain based Hyper-Network. The NeMo Marketplace and Execution Node: What it is and how it works**

A live demonstration of what the NeMo Hyper-Network and its Nodes comprises. The demo showcased the available NeMo partner and user roles with respective access control, as well as the features available to business. In particular, it was demonstrated how a service consumer or service provider, can access a NeMo Node, how he finds and contracts a service and how to register a service and create a respective service offering via the NeMo Marketplace.

IBM, Technical University of Berlin, ICCS - Contact: [Thomas.Walz@de.ibm.com](mailto:Thomas.Walz@de.ibm.com)

## **Neutral server and Extended Vehicle standard integrated with the NeMo infrastructure**

A specific architecture for an Extended Vehicle and Neutral Server developed by NeMo, following the relevant work by ACEA (the European Automobile Manufacturers Association) and ISO was presented. It was deployed by 3 OEMs, the two project partners CRF (Centro Ricerche Fiat) and Renault, and NeMo Associate Partner, Honda. A key aspect is that the driver consents twice to sharing data from the electric vehicle with an external 3rd service provider through the Neutral Server and the NeMo Hyper-Network. In this way, the driver experiences improved services, as the service provider has access to real-time vehicle data.

CRF, IBM, TomTom, Renault - Contact: [roberto.tola@crf.it](mailto:roberto.tola@crf.it)

## **Demonstration of Double Consent functionality to get User consensus for Data Provision**

An important aspect in the Extended Vehicle standard, the Neutral Server concept and the NeMo Hyper-Network is the availability of vehicle data for the 3rd party service provider. Therefore, the driver must have the choice to decide with whom he or she wants to share this data. This demonstration showed how a driver can selectively share her or his vehicle data using the “Double Consent” concept in a very comfortable and transparent way; and also how 3rd party providers can make use of this concept for service provision.

Honda R&D Europe - Contact: [Marc\\_Bechler@de.hrdeu.com](mailto:Marc_Bechler@de.hrdeu.com)

## **Service Creation**

Demonstration of the creation of a composite service: Charging point search based on mobility needs.

Technical University of Berlin (DAI-Labor), fka, Politecnico di Bari - Contact: [Nils.Masuch@dai-labor.de](mailto:Nils.Masuch@dai-labor.de)

## **NeMo Battery Services**

The simulated battery services as developed in the project were presented. (Simulator device is provided as reference at the picture below, though it was not used at the final event due to logistic complications).

fka GmbH - Contact: [joerg.kuefen@fka.de](mailto:joerg.kuefen@fka.de)

## **Software for charge points enabling end-to-end communication for smart charging**

The solution demonstrates end-to-end communication through the EV – Recharging station – Central System entities providing smart charging features, like plug-and-charge, scheduled recharging, authentication, power balancing, rate negotiation etc. The key contribution is the software component developed for charge points that seamlessly integrates the ISO 15118 protocol and the Open Charge Point Protocol (OCPP). It can be considered as the “last mile” of NeMo Hyper-Network up to the vehicles. The demo reflects predefined use cases of the project related to smart charging.

BroadBit - Contact: [adam.knapp@broadbit.net](mailto:adam.knapp@broadbit.net)

**ChargeSharing solution integrated into the NeMo Hyper-Network** (NeMo Hackathon winner)

ChargeSharing from e3charge is a community-based network of private electric charging station providers. It allows owners of private charge points to rent out their use to others, without the user needing to create a new subscription or download a new app, but instead using standard well-known payment providers. The technical solution enables data on such charge points to be published in various charging station directories (online mapping) as well as in-vehicle navigation systems. This application was awarded the winner of the NeMo hackathon and e3charge was invited to the Final Conference to demonstrate the service, and how it has been integrated into the Hyper-Network.

e3charge - Contact: [info@e3charge.net](mailto:info@e3charge.net)