E-MOBILITY AS AN ENERGY RESOURCE

Collection of best practices to drive regulatory changes

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FOREWORD BY TRANSPORT COMMISSIONER **ADINA-IOANA VĂLEAN**

The European Green Deal sets out Europe's ambition to become the world's first climate-neutral continent by 2050. In order to reach this goal, transport emissions have to be reduced by 90%. A central element to achieve this reduction is the shift from conventional fuels to decarbonised alternative fuels. Electro-mobility will be key in this transition, specifically in road transport.

By 2025, we expect to have 13 million electric vehicles on our roads and that, gradually, electric or other zero-emission vehicles will replace the full fleet of more than 250 million conventionally-fuelled passenger cars in Europe. In addition, a significant share of our bus, light-duty and possibly heavy-duty vehicle fleets will become electric over time. This is not only a major challenge for our car industry but also for the electricity sector that needs to be adapted to accommodate efficiently the additional load from electric vehicles.

In order to manage the energy and transport transition in an efficient manner, smart charging and vehicle–to-grid will be key. For this, the energy markets and system operators need to be incentivised to accommodate flexibility resources, such as car batteries, as already addressed in the recently adopted revision of the electricity directive. The charge-points themselves need to become smart to control the charging and de-charging of vehicles. Finally, interoperable communication protocols need to be in place, such as between the re-charging point and the vehicle.

Making this transition a success will require we all play our respective roles with determination and conviction. The European Commission will support the transition by putting in place the right rules for ensuring an efficient sector integration by, among others, removing remaining barriers for smart charging and vehicle to grid.

1

EU 2050 CLIMATE NEUTRALITY:

OPPORTUNITIES TO DRIVE BUSINESS MODELS IN E-MOBILITY THAT BENEFIT THE ENVIRONMENT, ECONOMIC GROWTH AND ALL EUROPEAN CITIZENS

Climate neutrality in 2050 is the EU's man on the moon. To achieve this vision, a significant shift in our economy and society is needed. New business models and innovative solutions are emerging and will increasingly be deployed to contribute to this European growth strategy. New policies are also needed to eliminate regulatory barriers, drive clean investments in different sectors, ensure a just and inclusive transition and create green jobs.

Although the greenhouse gas emissions in the EU have gone down by 23% compared to 1990, the EU is set to reduce only 60% of greenhouse gas emissions by 2050[1] under the current regulatory framework. Much remains to be done in the coming decade to achieve climate neutrality by 2050, starting with more ambitious climate action in the transport sector.

Transport accounts for a quarter of the EU's greenhouse gas emissions. 71.1% of these greenhouse gas emissions come from road transport[2]. To achieve climate neutrality, a 90% reduction in transport emissions is needed by 2050[3]. The electrification of vehicles (charged by clean energy) and the deployment of smart charging infrastructure are no-regret options in the path towards decarbonisation.

Climate neutrality also requires a sectorial integration between the transport and energy sectors. As outlined in smartEn's White Paper "Making Electric Vehicles integral parts of the power system", the clean energy transition transforms vehicles from mere transport assets to decentralized energy resources. They can increase system efficiency, help integrate an increasing amount of variable renewable energy and empower consumers to participate in the energy system as prosumers.

Time is of the essence. The European Commission is well-positioned to propose an ambitious and harmonised framework across Europe to support e-mobility in the European Green Deal strategy. This is an innovation and competitiveness agenda for the benefit of our industry and European citizens.

"The clean energy transition transforms vehicles from mere transport assets to decentralized energy resources"

There are three major regulatory opportunities to drive this agenda:

- The correct and timely implementation of the Electricity Market Design;
- The revision of the Alternative Fuels Infrastructure Directive (AFID), including minimum requirements in public tendering for charging infrastructure;
- A new EU building policy to ensure e-mobility is accessible to all Europeans.

This collection of best practices identifies examples of innovative business models that should be supported by these regulatory frameworks.

[1] European Commission, Communication on the European Green Deal, 11 December 2019
[2] European Commission, EUSEW2020 promotion, 2019
[3] Ibid

2 THE ELECTRICITY MARKET DESIGN:

GIVING ELECTRIC VEHICLES ACCESS TO BECOME AN INTEGRAL PART OF THE POWER SYSTEM

While mobility is ultimately the primary purpose of road vehicles, the energy system is becoming an increasingly relevant factor. The electrification of the transport sector - a crucial step towards decarbonisation - requires the sectorial integration of transport and energy. EU policymakers must address the implications of this sectorial integration for the energy system from the beginning of the e-mobility (r)evolution.

The electricity system simply cannot cope with the increased uptake of electric vehicles (EVs) unless their use of the electricity system is smartly managed. If charging is not managed smartly, EVs could be a burden to the energy system, particularly in congested zones and during peak hours. However, if charging is done smartly, the impact of a growing EV market could be neutral to the energy system. More importantly, massive EV deployment could even have an overall positive impact if vehicles serve as bidirectional energy assets that can extensively interact with the grid.

In order to avoid unnecessary grid reinforcements, while ensuring the overall most efficient energy system and empowering consumers, EVs must be considered a grid flexibility solution for the power sector.

Innovative services and technologies can support this objective. The increased complexity of the future electricity system can be managed with existing smart solutions that dynamically match each driver's charging needs with the system's needs and capabilities. Pioneering business models allow the integration of new and dynamic loads situated at the edge of the distribution system without upgrading all infrastructure or significantly increasing generation capacity, while allowing drivers to charge and drive their cars at their convenience with the electricity of their choice.

DEFINITIONS

Charging can be considered "smart" when the charge can be remotely measured and controlled.

There are two types of smart charging:

V1G:
When the charging of the vehicle can be controlled, slowed, accelerated, stopped, or postponed. V1G services stop once the battery is full.

V2G (Vehicle-to-Grid):
When the vehicle can exchange energy with the grid in two directions, charging or discharging, as long as it is plugged-in.

Recent studies, for example those led by the French Transmission System Operator, RTE[4], have shown that the electrical system could cope with the foreseen increase of power demand at almost any time of the day and year if some smart solutions, including smart charging for EVs, could help to smooth out the demand and increase the resilience of the electricity system.

RTE established that the flexible charging of EVs would allow low cost generation plants to be optimised and social welfare to increase by more than 1 billion € / year in France.

[4] RTE, "Enjeux du développement de l'électromobilité pour le système électrique", May 2019

smartEn believes that if the following two objectives were successfully achieved, this would pave the way for further success of the e-mobility sector:

- EVs are treated as a grid resource, in the same way as other decentralised energy resources, to provide a full range of services to the grid;
- smart charging infrastructure is deployed to foster a win-win interaction with the grid which is beneficial for both EVs and grid.

Although not targeting the specificities of e-mobility, the Electricity Market Design, adopted by EU decision makers in December 2018[5], set out an ambitious regulatory framework for all decentralized sources of flexibility. It contains specific provisions on energy storage facilities, including principles to enable EVs to be treated as a grid resource. Importantly, the Electricity Directive enables all end-users (who own an energy storage facility) to actively participate in the energy system, fosters aggregation services, and incentivizes system operators to procure flexibility services from all decentralized energy resources.

In line with this framework, third parties can aggregate individual vehicles and fleets for market participation while meeting the individual driver's charging and mobility needs. EVs can also be aggregated with other energy assets in mixed pools of energy resources. The aggregation of decentralized flexibility assets and their subsequent participation in the electricity market can help enable system reliability. Aggregators play a central role in enabling decentralized flexibility assets, as they can demonstrate to system operators that they are able to deliver the required services (which would be difficult for individual EV drivers). Aggregators have the final responsibility for optimizing their portfolio, knowing the capabilities of the pooled assets, and provide services to both Transmission and Distribution System Operators.

A correct and timely implementation of the Electricity Market Design by 2020 in all Member States is essential to unlock the demand-side flexibility potential in Europe and foster innovative business models such as the aggregation of (bi-directional) EVs for balancing services and redispatch schemes, such as the ones illustrated in Boxes A, B and C.

A AGGREGATION OF BI-DIRECTIONAL EVs OFFERS FLEXIBILITY

NUVVE

By allowing EVs to be aggregated into virtual power plants across large geographical areas, they can constitute distributed energy resources capable of bidding into demand response programs, ancillary services markets, and engage in renewable energy capacity firming. These opportunities allow EVs to become integrated resources, deployed as markets require, able to respond to external price signals beyond the retail price of energy.

BEST PRACTICE

Millions of EVs will be on our streets over the next decade. EVs are not only transport assets, but also decentralised energy resources.

[5] The Directive on common rules for the internal market for electricity (EU) 2019/944 and the Regulation on the internal market for electricity (EU) 2019/943

Third parties such as Nuvve can aggregate individual and fleet vehicles for market participation while meeting the individual driver's charging and mobility needs. This solution has been implemented for three years in Eastern Denmark by Nuvve under the auspices of Energinet, Denmark's TSO. Allowing EV aggregators access to price signals that reflect the needs of the grid at multiple levels will shift perceptions of EVs from an unpredictable problem to a ubiquitous grid flexibility resource which can increase renewable penetration.

Building such an industry requires working with customers whose natural driving behaviors make the EV available at relevant times. Nuvve currently works with Commercial and Industrial clients who employ EV fleets that follow a regular schedule, allowing Nuvve's GIVe aggregation platform to easily fulfil the customer's charging and mobility needs without requesting any change in routine to facilitate grid services. The GIVe platform ensures the customer will always have enough charge to drive their customary routes and can override Nuvve's control at any time for an immediate charge via Nuvve's app.

Nuvve charges customers a fixed mobility fee that includes energy for driving, EVSE maintenance, and access to live dashboards for monitoring EV states of charge and usage.

On the grid service side, the GIVe aggregation platform ensures second by second control of bi-directional and normal EVs and Electric Vehicle Supply Equipment (EVSE), compensating for removal of an EV as a customer drives away by redistributing bid capacity to other EVs in the fleet in real time. Nuvve is thereby able to transform a group of EVs from an unpredictable load to a stable capacity appropriate for bidding into ancillary services markets.

This model of buying and selling energy from behind a retail meter without net metering is facilitated by Denmark's decision to exempt EVs from the 49% Elaftgift tariff on retail energy. Revenue from providing FCR-N in the DK2 (Zeeland) region averaged over 2017 and 2018 for an EV at a 10 kW charger was €1860 per car per year.

The benefits of Nuvve's GIVe platform accrue to both sides of the energy system: customers have consistent energy bills and assured states of charge for their EVs, while system operators have predictable EV loads and new distributed resources for evolving energy markets.

A coordinated effort to remove unintentional disincentives and barriers to market participation and grid-integration of electric vehicles was necessary to leverage EVs as a resource.

COMPANY: Nuvve

Nuvve is a San Diego based company operating in Denmark and internationally whose mission is to lower the cost of EV ownership while supporting the integration of renewable energy sources, such as wind and solar. Nuvve's Grid Integrated Vehicle platform, GIVe™, transforms EVs into grid assets when those vehicles are charging, while guaranteeing the expected level of charge at the time the owner or driver needs it for transportation.

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B ELECTRIC CAR BATTERIES FOR GRID STABILITY

Virtual Power Plant (VPP) operator Next Kraftwerke and Jedlix, an EV aggregator and smart charging platform provider, cooperate in an international pilot project to deliver secondary control reserve (aFRR) through the batteries of electric cars. Tendered by TSO TenneT, Next Kraftwerke and Jedlix were selected for the 2-year pilot project that will assess Tennet's technical feasibility of aFRR delivered by new technologies, as EVs. Results so far are that project partners succeeded to make a redesign of the market and multiple cars are pre-qualified to deliver balancing services for TenneT.

BEST PRACTICE

There are two trends which strongly influence the balance in the power grid. Increasingly, more people drive electric cars and there is an increasing use of sustainable energy sources. To maintain the balance on the energy grid TSO TenneT spends 400 million euros on a yearly basis. Essential innovations are requested by TSOs: electrical systems connected in private homes can contribute to TenneT's most demanding ancillary services.

Jedlix and Next Kraftwerke joined forces and entered a new program of Tennet which allows these distributed assets to enter balancing market of the Netherlands. Jedlix has developed a solution to unlock the flexibility of EVs and reward EV drivers for making their cars' flexibility available. The flexibility of the EVs is integrated in the portfolio of leading VPP operator Next Kraftwerke with other flexible sources to bundle the strength of different asset classes. EVs provide a large amount of flexibility potential in the night while other assets are more available during the morning or day. Jedlix will be able to combine user preferences, car data, and charging station information for a continuous forecast of the available capacity. This is then used by Next Kraftwerke in the bidding process.

The cooperation between Jedlix and Next Kraftwerke leads to a reliable and valuable contribution of EVs to grid stabilization. Jedlix vehicle drivers will be introduced to the service through a user interface app, which Jedlix offers to all EV drivers in The Netherlands. Results so far are that the project partners succeeded to make a redesign of the market where EVs can participate and deliver balancing services for TenneT. The first set of EVs are pre-qualified by Tennet and used to deliver these balancing services.

The replication of this program by other TSOs will enable the development of prosumers. The involvement of more OEMs in this initiative will help unlock the value of the flexibility of EVs charging process at scale, reduce the Total Cost of Ownership of the cars and enable their sustainable integration into the energy grid.

COMPANY: Jedlix

Jedlix is the leading software Platform for car-centric smart charging of Electric Vehicles in Europe. Jedlix teams-up with Jaguar, BMW, Tesla, Renault and multiple energy partners to unlock the value of the flexibility of EVs charging process at scale, reduce the Total Cost of Ownership of the cars, and enable their sustainable insertion into the energy grid.

C ELECTRIC VEHICLES FOR MORE EFFICIENT TSO REDISPATCH

THE MOBILITY HOUSE

The increase of renewable energy poses challenges for the security of supply. Transmission grid congestions in Germany between feed-in centers in the North and consumption centers in the South/West have become increasingly frequent, leading to redispatch and curtailment of renewables. EVs can contribute to mitigate this problem and support the energy transition efficiently. Together with TenneT and Nissan vehicles, the technology company The Mobility House utilizes the flexibility potential of EVs. By storing energy and feeding it back to the grid (V2G), EVs offer flexibility to the TSO, increasing network stability and decreasing the costs for redispatch.

BEST PRACTICE

The increase of renewable energy poses challenges to power grid stability and security of supply. Situations of grid congestion become increasingly frequent due to the geographical and temporal imbalances of decentralized energy supply and demand on the one hand and outdated electricity grids on the other hand. TSOs traditionally meet this challenge by performing redispatch or curtailing renewable energy.

While upgrading electricity grids helps to meet this challenge, energy storage is another cost-efficient and carbon friendly source of flexibility. With an increasing number of EVs, a large amount of storage capacity becomes accessible (e.g. with 10m EVs in Germany by 2030, 500GWh storage capacity is sitting idle at parking places during >20 hours a day).

In a pilot project in Germany, The Mobility House (TMH) aggregates Nissan EVs with V2G capability and provides their flexibility to a platform operated by the TSO TenneT. TMH's smart charging and energy management software solution controls the charging process of the vehicles based on the TSO's flexibility requirements, the EVs' state of charge and the drivers' mobility needs. During idle times, flexibility offers are communicated to TenneT's platform, considering energy prices on the market. Receiving call signals according to the TSO's needs, the software solution controls the charging and discharging of the vehicles within seconds while ensuring the respective mobility needs.

Integrating the flexibility of mobile and decentralized EV batteries into the power grid offers a range of benefits. Bottlenecks and congestions in the power grid can be mitigated, while reducing the cost of redispatch by drawing on available storage. The carbon footprint of grid flexibility is reduced, as redispatch usually relies on fossil power plants. Additionally, the cost of ownership of EVs can be reduced for the EV users. Vehicle-grid-integration can provide substantial monetary value (650 EUR/EV/a for a private car in Germany) to the EV owner as well as a large contribution to reaching the EU's carbon reduction targets (close to doubling the CO2 reductions of an EV).

COMPANY: The Mobility House

The goal of The Mobility House is to create a zero-emission energy and mobility future. We unite the automotive and energy sectors and integrate vehicle batteries into the power grid using intelligent charging, energy and storage solutions to increase renewable shares, stabilize the grid and make electric mobility more affordable.

3 REVISION OF THE ALTERNATIVE FUELS INFRAESTRUCTURE DIRECTIVE

FOR A SMART CHARGING INFRASTRUCTURE BENEFICIAL BOTH TO DRIVERS AND TO THE POWER SYSTEM

A specific focus on electricity charging infrastructure through the revision of the Alternative Fuels Infrastructure Directive (AFID) is necessary to ramp-up the rate of electrification in the transport sector without putting too much stress on the grid.

At the EU level, the AFID revision, whose legislative procedure will start in 2020, should be consistent with the Electricity Market Design framework, while targeting the specificities of e-mobility, and make EVs integral parts of the power system in a just and fair transition.

"The AFID revision should be consistent with the Electricity Market Design framework to make EVs integral parts of the power system"

KEY OBJECTIVES FOR THE AFID REVISION SHOULD BE:

1. Clearly define **smart charging and smart charging infrastructure**. There is no consolidated definition across Europe, leading to confusion among businesses and end-users. EU policy makers need to fill this gap. V2G capabilities should also be included due to their significant potential to contribute to the energy system. For example, V2G solutions could lower the costs for EV charging infrastructure by up to 90% and in 2030 could cover up to 65% of demand for battery storage powering grids globally[6].

2. Consider the **status of the electricity system** when planning charging infrastructure. Public authorities shall take into account the status of the electricity system (i.e. possible congestion areas, digitalisation and flexibility of the grid), beyond fleet and traffic volumes and spatial requirements, when planning the deployment of charging infrastructure.

3. Set **mandatory national deployment targets for smart (normal power) charging infrastructure**. Although most of EV charging will happen in buildings (workplaces and homes), the European Commission foresees that by 2025, about 1 million public charging stations will be needed for the 13 million zero- and low-emission vehicles expected to be on European roads[7]. This is a significant increase compared to the 185.000 current public charging points. In a recent research by Transport & Environment, this number could even go up to 3 million in 2030[8]. Public charging infrastructure should not only be high-power fast charging infrastructure, but also, and mainly, normal-power (7kW-22kW) charging infrastructure (for overnight or for long duration charging during work hours or for drivers who do not have off street parking). Smart charging is most valuable for the power system when vehicles are plugged-in for a longer duration, making normal charging much more valuable to the grid than fast charging.

[6] World Economic Forum, "A Vision for a Sustainable Battery Value Chain in 2030", 2019
[7] European Commission, Communication on the European Green Deal, 11 December 2019
[8] T&E, "EU public charging infrastructure needs until 2030", 8 January 2020

4. Public authorities should be responsible for efficient planning and a comprehensive strategy with targets for smart charging infrastructure, public and semi-public, in residential buildings, workspaces, public parking lots, kerbside parking, etc. Each Member State should set a national target to ensure proper deployment of smart charging infrastructure which enables the flexible interaction of EVs with the energy system. When setting these targets, public authorities should consider the evolution in EV uptake, ensure an alignment with requirements set for buildings[9], differentiate between new and existing parking slots and define a timeline with intermediate milestones. Member States should specifically address urban areas, where the greatest number of people live, work and charge. Furthermore, Member States should provide every European with fair, inclusive and easy access to electric mobility, without putting less wealthy citizens without off street parking at a disadvantage. They should enable market actors (when authorized by consumers) to have **open, secure and easy access to vehicle data** (e.g. state of charge, state of health, planned departure time, energy load and capacity) to deploy flexibility. These market actors include charge point operators (CPOs), aggregators and other Electro Mobility Service Providers (EMSPs) which pool electric vehicles in a mixed portfolio and provide vehicles owners with innovative services, while respecting confidentiality and security conditions. Currently, only vehicle manufacturers control access to this data. Today, it is not always clear who can authorise smart charging and ultimately benefit from offering these services.

5. At EU level, define **minimum requirements for transparent public tendering procedures** which should include the following features in order to enable investments in innovative charging infrastructure that integrate EVs into the power system:

- Make **smart charging capabilities a requirement in public tenders** for public fleet vehicles and public vehicles in urban areas and in remote highway areas, as highlighted in Box D; When a public body invests public funds, its electric vehicles and charging infrastructure should benefit society as a whole as much as they can (i.e. also when they are parked);
- Include the **freedom to choose an energy supplier** when using charging infrastructure as a required functionality in public tendering procedures, as already successfully implemented in The Netherlands and described in Box E;
- When already defined, apply open technical standards to prevent vendor lock-in for publicly funded infrastructure;
- Also cover **installation and maintenance** costs to ensure the provision of e-mobility services and not just the technology to charge EVs.

D FAST CAN BE SMART:THE PERFECT COMBINATION OF EV CHARGING AND ENERGY STORAGE

Fast charging enhanced by onsite energy storage and an energy management system can reliably provide adequate power to EV drivers and support the grid, especially in remote locations. This setup further makes the integration of locally produced, renewable energy sources into the energy mix possible and could eventually provide other services for the grid.

[9] Art. 8 of the Energy Performance of Buildings Directive (2018/844/EU)

BEST PRACTICE

In many places, especially more remote highway areas, the electricity grid does not provide adequate power for reliable fast charging of electric vehicles.

To address this problem, and to create other opportunities, GreenWay installed energy storage systems called Wattboosters, at 8 Fast Charging locations in Slovakia and Poland. These Wattboosters are large batteries with an energy management system connected to EV fast charger(s). Wattboosters are able to offer grid support and flexibility as well as simultaneous EV charging capabilities.

As presently configured, when EV drivers plug vehicles into the charging station, the vehicle will draw power first from the grid, and whatever additional power is needed is provided by the battery.

When the charging session is over, the Wattbooster begins to immediately recharge itself, drawing power slowly from the grid or renewables if available.

Because multiple users can recharge at the same time, Wattbooster is able to help direct adequate energy to all vehicles, and draw that energy from the battery.

When the Wattbooster system is connected to a solar array, the recharging of the battery pack is done first from the solar power, and then from the electricity grid. In some locations the Wattbooster system is using 2nd life batteries, which are past their automotive lifetime, but still able to store energy.

Overall, the benefits which Wattboosters and onsite energy storage provide are:

- Relief of the grid - reduction of reserved grid capacity supports faster charging at the charging station, lowering the requirements on reserved capacity;
- Storage for on-site renewables – maximalization of usage of local renewables and adapting the Wattbooster battery state of charge according to weather/renewable production forecast;
- Energy demand shifting – energy storage during the periods of low electricity price to cover the supply during high electricity price periods;
- Services for the grid - through an aggregator, Wattboosters are able to offer services for the grid;

COMPANY: GreenWay

GreenWay is dedicated to making the use of EVs the realistic and preferred transportation option for all people. We build and manage EV charging infrastructure throughout Central & Eastern Europe and work with people, companies, organizations, and governments to develop and expand the electromobility ecosystem.

E FREEDOM OF CHOICE OF ENERGY SUPPLIER AVAILABLE ON PUBLIC EV INFRASTRUCTURE

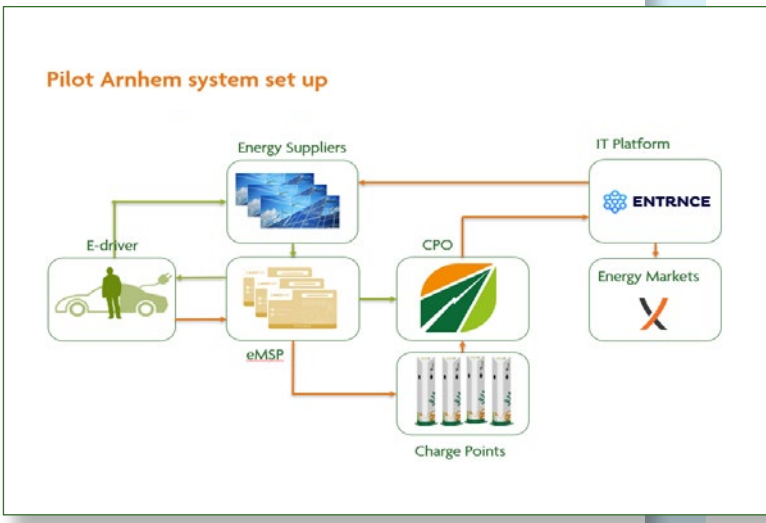
The smart and innovative functionalities on charging infrastructure are still very much under development. Our smart EV infrastructure network is helping to make the grids smart and enables the roll out of new functionalities like the Freedom of Choice of Energy Supplier. This is a feature which will help prioritise the integration of renewable energy in the electricity mix and increase the use of renewables in transport. Win-win for transport, the climate and consumers alike.

BEST PRACTICE

It is important that the EV driver has access to public charging station and can choose from which energy supplier he/she wants to purchase electricity for a given period. On most public charging infrastructure available today the freedom of choice of energy supplier functionality does not exist. The Charge Point Operator (CPO) typically arranges the concession that determines what type of energy and supplier is in place on a specific infrastructure. Typically, these concessions are in place for several years leaving little choice for the EV driver.

Allego, together with our project partners, EXE, EnergyZero, Vandebron, NieuweStroom and Mijndomein Energie set up a pilot to break through this constraint and enable EV drivers to choose a preferred energy supplier.

The pilot put the consumer interest at heart the project and demonstrated that it is possible to allow multiple energy suppliers to supply energy to one public charging station. This is similar to a home connection where occupants have the freedom to choose their own energy supplier. This opens innovation and competition: energy suppliers can distinguish themselves by putting their own proposition to EV drivers, enabling them to choose what suits them best. While giving consumers a freedom of choice between renewable energy sources and service packages, the project aimed to increase the share of renewable energy in the electricity mix and its use in transport.



The test took place on the public charging stations in the municipality of Arnhem (The Netherlands). The trial started in January 2019 and ran for 6 months. During this period, an EV driver had the opportunity to choose in advance, when subscribing to the service, among three energy suppliers in Arnhem: Vandebron, NieuweStroom & Mijndomein Energie. The EV driver could not change energy supplier during the trial. Upon completion, the trial was deemed a success: the freedom of choice of energy supplier was a required functionality in subsequent public tendering calls for charging infrastructure in the North East of the Netherlands (Groningen & Drenthe) and more recently in the Southern province of Brabant as well.

COMPANY: Allego

Allego was founded in 2013 in the Netherlands. Today, Allego is the leading independent European provider of EV charging solutions. The company designs, realizes, owns and operates EV Charging Solutions throughout Europe. At present Allego is active in more than 12 European countries with a network of more than 17,000 charging points. Allego also offers independent EV cloud services and delivers 2,8 million kWh of clean power to EV drivers every month.

4 A NEW EU BUILDING POLICY

WHICH ALLOWS EVERY EUROPEAN TO BENEFIT FROM E-MOBILITY

Electric driving has increased exponentially in recent years. More and more people are becoming aware of the option to drive an electric car. In the short to mid-term, of all the kWh used for charging, about 20% will be consumed through charging at public sites in and between cities, while 80% will be consumed through charging at private sites (at home or at work)[10]. The majority of the latter will be in buildings where normal-power smart charging points (between 3,7 and 22 kW) will be enough.

A new EU building policy for the promotion of e-mobility is necessary to foster the uptake of smart charging points, tackle the specificities of EV charging in buildings, and integrate transport and buildings sectors through electrification. The EU needs a just and inclusive transition to e-mobility that gives all Europeans, whether they live in detached homes with off street parking or in apartment buildings, the possibility to reap the benefits of integrating their vehicle with the grid.

The 2018 Energy Performance of Buildings Directive (EPBD) is not fit for this purpose as It only sets weak minimum requirements for ducting infrastructure and charging points for certain types of new buildings and in case of major renovations, without requiring smart charging functionalities.

Charging EVs without smart chargers would put an unnecessary additional burden on the individual building's energy load and to the grid at large. EV can also provide services behind the meter at customer site and this should be fostered through smart charging in buildings.

In view of an ambitious "renovation wave" which integrates different policy priorities,

IT IS OF THE UTMOST IMPORTANCE TO REVISE KEY PROVISIONS OF THE 2018 EPBD BY AT LEAST 2023, IN ORDER TO ENSURE:

1. Only **smart charging infrastructure** is installed in both new and renovated residential and commercial buildings, or at least infrastructure that makes buildings ready for smart charging (i.e. ducting & cabling including communication wire and electric protection devices for bidirectional flows of electricity). The definition that should be included in the revised AFID will become the reference and define the minimum functionalities to drive innovative business offers such as the "Easy Button" in residential buildings, as explained in Box F.

2. Smart charging infrastructure in new and refurbished commercial buildings shall be able to **communicate with Energy Management Systems in a secure way**. Such an Energy Management system should be able to communicate with the grid in order to enable automated flexibility and optimize energy consumption, as outlined in Boxes G, H and I.

[10] ChargePoint, September 2018

PRESSING THE "EASY BUTTON" FOR SMART, FLEXIBLE HOME EV CHARGING

SIEMENS
Ingenuity for life

Xcel Energy in Minnesota (USA) piloted a solution with two features:

- Turn-key provision, installation, operation and maintenance of a smart charger for a fixed monthly fee;
- provision of electricity needed for the consumer's EV at a flat monthly subscription price, provided the charging is performed off-peak.

BEST PRACTICE

Two of the problems faced by consumers considering EV purchases are easy access to home chargers and understanding how electric fuelling costs will compare to fossil fuels. Getting a charger requires learning about a new technology, handling installation issues, and being able to operate and maintain the unit. Fuelling by using electricity requires learning about kWh and kW, understanding different pricing at different times and locations, and comprehending pricing that is sometimes per kWh and sometimes per minute. The "Easy Button" solution is a one-stop shop for receiving a charger and all the off-peak electricity needed for charging at simple, fixed monthly prices – a model similar to mobile phones.

The consumer's electricity retailer provides, installs, and operates the charger while providing a flat monthly fee for the electricity consumed in charging the EV. The charger is smart – meaning it has communications and sub-metering – so the consumer can control and program it remotely to stay off peak. And the sub-meter tells the electricity retailer how many kWh are consumed, so the retailer can deduct these kWh when calculating the consumer's electricity bill.

There are two key results. First, consumers considering buying an EV can easily understand what will be needed to charge their EV at home, what they will need to implement a charger, and how much both the charger and the electricity will cost. They can then make an "apples-to-apples" comparison with a fossil-fuelled vehicle and understand the savings – therefore increasing EV adoption. Second, after buying the EV, the owner has an easy way to implement and manage charging. Use of off-peak power results not only in lower fuelling costs, but also in less need to reinforce the grid to support charging, with other flexibility benefits as well. These can include increasing the charging rate to take advantage of excess wind or solar power.

COMPANY: Siemens

Siemens is the first corporation of its size to commit to net-zero carbon by 2030. Creating efficiencies for our customers at workplaces, transit, government, utilities, and fleets, Siemens' Plug to Grid™ eMobility product portfolio encompasses hardware, software and services currently deployed in 35 countries – and geared to maximize the abilities of EVs to act as Distributed Energy Resources.

LOWERING ENERGY COSTS WHILE EXPANDING ACCESS TO FREE CHARGING FOR EMPLOYEES

ChargePoint Enterprise Charging Optimization (ECO) is an enterprise-grade EV charging optimization platform. It provides an energy management solution that smooths out demand by managing the total energy use across the buildings and charging spots at a given location. ECO Site helps organizations implement an EV charging strategy that best fits the business requirements of today and is fully configurable to grow as those needs evolve.

BEST PRACTICE

A large number of ChargePoint's employees drive electric cars which need to charge every day at dozens of spots at headquarters in Campbell, California (USA). This created a high demand for energy that also led to spikes in demand and expensive energy bills. ChargePoint needed a better way to charge several vehicles at the same time while managing the overall energy use. ECO Site was installed in the headquarters to:

- Reduce energy costs without negatively affecting EV drivers' ability to charge;
- optimize energy use across air conditioning, heating, high-power equipment like EV chargers and more, to enable peak performance at predictable costs.

ECO Site requires users to set a ceiling for power use. This can be done manually or automatically based on the average energy use over the last three months. The solution relies on a network connected smart meter to help the software track and manage energy use in real time. The product tracks energy use in 15-minute intervals, matching the timeframe utilities use to bill for demand charges.

The pilot program at ChargePoint headquarters has been a success, reducing energy costs without noticeably affecting charging time for drivers and reducing considerably the company's energy bill. ECO Site works automatically to manage demand. Its progress can be checked on an online dashboard and settings can be reconfigured anytime. ECO Site also helps utilities keep grid performance more predictable and manageable.

ChargePoint is currently implementing this solution at its new office (and R&D center) in the UK.

COMPANY: ChargePoint

ChargePoint has been committed to making it easy for businesses and drivers to go electric since 2007, with the largest EV charging network and most complete set of charging solutions available today. From workplaces to fleet, residential to retail, ChargePoint is creating the new fuelling network to move all people and goods on electricity. To date, ChargePoint's network has grown to more than 171,800 places to charge with drivers plugging in approximately every two seconds while delivering more than 71 million charges.

HIGHEST CYBER-SECURITY LEVELS FOR VEHICLE-TO-GRID

tiko Energy Solutions has demonstrate that, when using EVs charged at home for the stabilisation of the grid, hacking attacks can be avoided and storage of data is guaranteed in case of communication losses.

BEST PRACTICE

By storing excess energy produced and providing it back to the grid during high load periods, the battery of an EV can effectively stabilize the grid in times of fluctuation due to variable production of electricity by renewables. Vehicle-to-grid (V2G) technology when used for a virtual power plant (VPP) can help renewable energy become a base load electricity technology.

For this to happen, a secure communication between the grid, the charging station, and the vehicle electronics has to be guaranteed.

tiko Energy Solutions provides a VPP solution enabling highest cybersecurity standards: the communication from the VPP control center down to the individual controlled device is not continuously based on IP. The solution foresees an interruption of the IP communication: when processing data from EVs charged at home, the information is transferred from one to another information medium in the transmission chain of data processing. In this way, hacking attacks are avoided and cybersecurity is guaranteed.

This is the basis for the successful TSO prequalification for grid services based on residential loads.

COMPANY: tiko Energy Solutions

The tiko platform combines the power of a Virtual Power Plant and an award-winning Smart Home Energy Management system designed to connect Residential and SME assets. With its active VPP deployments, tiko Energy Solutions is one of the biggest real-time Smart Grids in the world.

COST-EFFECTIVE EV FLEET CHARGING WITH A SCALABLE LOAD CONTROL SYSTEM AND REMOTE SUPERVISION

The installation of a scalable load management system enabled Renault to more than triple the number of charging stations without having to upgrade the existing electrical distribution infrastructure, which makes the solution very cost-effective. The EV energy management installation handles a cluster of charging stations that share a static/dynamic current and allow local/remote supervision.

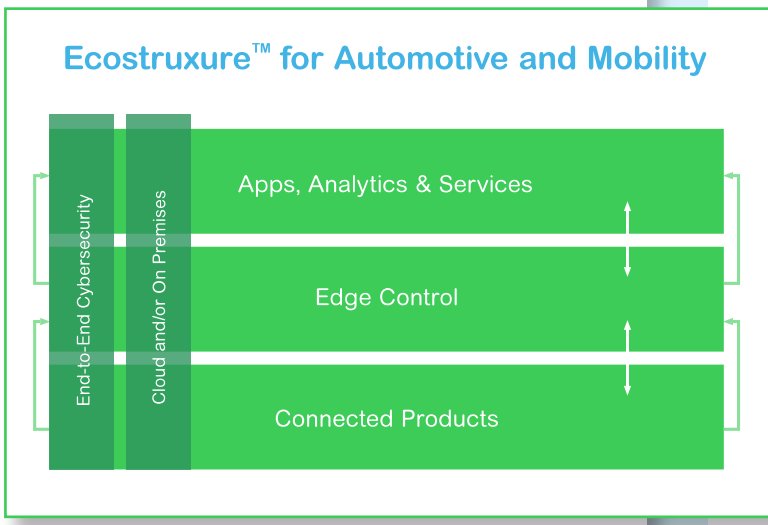
BEST PRACTICE

The car manufacturer Renault wanted to increase its EV charging capacity from 20 to 50 smart charging points, each with a 7kW capacity, without having to upgrade or reinforce the existing electrical low-voltage distribution infrastructure. In order to address the increasing needs of their growing EV fleet, Renault additionally required that the cost of the infrastructure is reduced by lowering the cost per charging point, that the installation is less complex, and most importantly that the solution is scalable.

Schneider Electric installed an EVlink Energy Management System, a scalable EV Charging Management solution with reduced complexity, reduced cost of installation and improved usability. EVlink enables energy management allocation in real time with key data transfer to supervision tools to deliver other services, e.g. for billing, advanced functionalities or remote graphical interface.

EVlink Energy Management System is a cost-effective solution because it:

- Leverages the existing electric infrastructure, avoids unnecessary grid reinforcements;
- allocates and distributes energy in real time based upon available power;



- uses the data gathered by the supervision tools to manage other services to end-users;
- efficiently manages additional demand– it's a perfectly scalable solution;
- it is easy and quick to install;
- and, provides a seamless employee experience

COMPANY: Schneider Electric

At Schneider Electric, we provide energy and automation digital solutions for efficiency and sustainability. We combine world-leading energy technologies, real-time automation, software and services into integrated solutions for Homes, Buildings, Data Centers, Infrastructure and Industries.

5 CONCLUSION

The European energy transition will only be successful when every European can benefit from playing an active role in it. E-mobility can contribute to the successful energy transition by empowering end-users to evolve from mere drivers to active customers in the energy system. No one should be left behind. The transition to a society transported by e-mobility and the integration of EVs into the power system should be just and fair. Regulatory barriers should be removed and price signals that properly reflect the value of flexibility should be given to leverage the flexibility potentials of EVs. Technological lock-in should be avoided by favouring future-proof approaches.

"The European energy transition will only be successful when every European can benefit from playing an active role in it"

The implementation of the Electricity Market Design, the revision of the Alternative Fuels Directive and a new building policy for the promotion of e-mobility are the EU legislative frameworks that can make this vision a reality for Europe.

In this light, the value of the flexible interaction of EVs and all other decentralised energy resources with the grid should be duly recognized. Any European should be able to reap the benefits of this interaction.

Demand-side flexibility must be politically supported as the third pillar of the clean energy transition as it helps increasing system efficiency while facilitating the integration of variable renewables. Merely increasing energy efficiency and installing more renewables are not enough to achieve climate neutrality in 2050.

Along with the development of smart buildings and industries, the e-mobility (r)evolution should offer the grid more resources and foster their flexible interaction with the energy system.

Innovative flexibility services and technologies are already on the market. EU policy makers should now frame legislations to drive them to the benefit of the EU economy, society and environment in a just transition.

smartEn is the European business association integrating the decentralized solutions of the clean energy transition. We create opportunities for every company, building and car to support an increasingly renewable energy system.

Our vision is that every European benefits from playing an active role in the clean energy transition.

www.smarten.eu

Power2Drive Europe is the international exhibition for charging infrastructure and e-mobility. Under the motto “Charging the future of mobility!” it offers manufacturers, suppliers, distributors and start-ups the ideal industry meeting point to present solutions and technologies for clean transportation and make new business contacts. Power2Drive Europe takes a look at current global market developments, showcases the potential of e-mobility, and reflects the interconnection of electric vehicles with a sustainable, environmentally friendly energy supply on a global scale.

Power2Drive Europe is part of The smarter E Europe – the continent’s largest platform for the energy industry. The energy exhibitions Intersolar Europe, ees Europe, and EM-Power are also held at the same time. Power2Drive Europe is organized by Solar Promotion GmbH and Freiburg Wirtschaft Touristik und Messe GmbH & Co. KG (FWTM).

www.PowerToDrive.de