Transport represents almost a quarter of Europe’s greenhouse gas emissions and is the main cause of air pollution in cities\(^1\). The development of Electric Vehicles (EV) represents a major opportunity for the entire sector to contribute to decarbonize the European economy and restore clean air in cities.

The uptake of EVs is not only changing the current mobility landscape, it also represents an important evolution in the way electricity is consumed: from residential purposes, it is progressively moving towards mobility uses.

This evolution implies that all consumers will have the ability to take an active part in the development of these new electrical uses and in the energy transition. This is precisely the ambition of the Clean Energy Package, whose main objective is to make consumers central and active players in the energy market.

Based on this ambition, it is essential that consumers are given the freedom of choice in the EV ecosystem. In an open European Union, cross border mobility is crucial for economic and social interactions. Freedom to choose a single electricity supplier for e-mobility leads to more transparency for EV drivers and allows for a more competitive market, which benefits the entire system. Costs of mobility decrease and the EV drivers get access to energy products which are in line with their aspirations. Freedom of choice also prevents long term lock-ins on charging infrastructure which slows down the development of new services for EV drivers.

In that perspective, the implementation of roaming of electricity supply, where mobility and electricity products are left to the choice of the consumer, is a logical and feasible measure to put in place. It allows EV drivers to benefit from a seamless and transparent service by choosing a supplier based on their own preferences. It creates a fairer competition between all market players, which keeps charging prices reasonable. It also contributes to reducing the impact of EVs on the grid.

All in all: an open market with freedom of choice benefits EV drivers, supports the competitiveness of energy and mobility markets in the European Union and accelerates the transition towards clean mobility.

The European Alliance for Freedom of Choice is a consortium composed of a wide range of EV related interests gathering energy suppliers, charging point operators, mobility operators and other stakeholders. Today, we are advocating for the implementation of roaming of electricity supply which places the EV driver at the centre of an open market and in line with the principles of the Clean Energy Package.

Roaming of electricity supply is a logic and executable step enabling freedom of choice for EV users as this paper will further explain.

What is the roaming of electricity supply?

From the user’s view:

1. Ms SMITH has just bought an electric vehicle.
2. In order to recharge, Ms SMITH subscribes to a mobility package.
3. In her contract, Ms SMITH chooses her preferred electricity supplier.
4. For each charge, Ms SMITH benefits from the electricity she has chosen.
5. Ms SMITH controls her consumption thanks to detailed records of her charges.

Ms SMITH is wholly satisfied and can easily change her supplier at any time.

Fig 1: The user experience for roaming of electricity supply

The roaming of electricity supply is an organisational model that allows EV drivers to sign up to an electricity supplier at the same time as they subscribe to an e-mobility contract.

Once this choice has been made, the EV driver is assured that his supply of electricity follows him wherever he charges.

The diagram left shows the sequence of actions of a typical user experience of roaming of electricity supply.

Roaming of electricity supply makes it possible to take into account the many expectations of EV users: simplicity, price, transparency, sustainability, fair competition …

If a consumer is explicitly requesting energy from a renewable source, energy suppliers should substantiate their energy supply with a reliable energy attribute certificate such as the Guarantee of Origin.

From the system’s view:

In order to be operational, roaming of electricity supply simply depends on individualised metering of electricity consumption at each charging point, as well as the transmission of this data to the concerned parties. This model is very close the existing architecture for mobile phone networks (see illustration below) and is compatible with the dispositions of the Directive EU 2014/94-EU on the deployment of alternative fuels infrastructure in Europe.

Fig 2: How roaming of electricity supply works
What are the advantages of roaming electricity supply?

1) Roaming of electricity supply allows freedom of choice for EV users

EVs are expected to account for up to 50% of household electricity consumption\(^2\). Therefore, freedom of choice and transparency regarding actual volumes and pricing of electricity supply of EVs seems a necessity as it will become a major part of the energy market. By offering end users the option to choose their preferred electricity provider, roaming of electricity supply allows them to simply choose, once and for all, the type supply that corresponds to their expectations regarding cost or sustainability. For example, the choice given makes it possible for consumers to opt for a 100% renewable electricity supply and hence to have an impact at their level in favour of energy transition. Another benefit brought by roaming of electricity supply is the possibility given to the end-user to choose the same supplier for vehicle charging as for home electricity consumption, thus simplifying user experience and billing.

![Without Electricity Roaming](image1.png)  
**Fig 3: Advantages of Roaming of electricity supply in favours of transparency**

2) Roaming of electricity contributes to transparent and comparable pricing for EV users

By unbundling the cost of the electricity from charging point locations and pairing it to e-mobility service providers, the roaming of electricity supply allows more transparent and comparable prices for EV-drivers. Today, EV drivers are not able to compare the price they pay per kWh when publicly charging with the cost they pay at home. Moreover, they do not know how much of the total cost is linked to the different parts of the charging session: access to the infrastructure, parking, electricity consumption, ... With roaming of electricity supply, costs are split into an energy part and a service part. Prices become more transparent and comparable. A split bill also increases users’ awareness on their electricity consumption.

3) Roaming of electricity supply stimulates competition in the energy sector and prevents from lock in situations

By unbundling the energy part from the e-mobility contract, roaming of electricity supply allows both markets to become more transparent and competitive, thus increasing benefits for EV drivers and the civil society as a whole. As it is already the case for energy

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\(^2\) White paper on charging infrastructures for decarbonized vehicles (in French), April 2011
supply at home or for mobile phone operators, it would be technically straightforward to propose an easy method to switch electricity supplier on the basis of a simple standardized client reference, like Mobile Number Portability (MNP) for mobile phones operators and the PDL number in France for home energy supply. End-users would be able to switch suppliers, even independently from their e-mobility operator.

Dynamics in the energy market are different from the ones which apply to the e-mobility market. Especially with public charging points, tenders for electricity supply are usually bundled and then last for long periods of up to 10 to 15 years. Emerging and sustainable suppliers are consequently unable to deliver energy to this increasingly important part of the electricity consumption and will be excluded from them in the following years. By unbundling the energy contract from the infrastructure contract, both markets become more competitive, which increases benefits for EV drivers and the civil society as a whole.

4) Roaming of electricity contributes to improve the balancing of the power grid

The increase of EV vehicles in volumes will have a very profound impact on the global functioning of the power grid, particularly because of the increase of the electric peak it will generate. The growth of EVs in Europe, which may exceed 4 million vehicles in 2020 based on targets set forward by EU member states, may have a considerable impact on the electric system. The French regulator for instance estimated that it could lead to an 11% increase of the electricity consumption peak. In order to reflect the system’s technical constraints at a time of an important demand, it is essential that a coherent price signal is sent directly to the end-consumer, which is a natural role of electricity suppliers. He will thus benefit from a clear understanding of the dynamic impact of his charge on grid balancing.

Challenges linked to roaming of electricity supply

The setup of roaming of electricity supply is today facing the following challenges:

- Energy consumption metering of each charging session.
- Data clearing to relevant players involved in roaming.
- Political will of public entities to perform regulatory adjustments of current market rules.
- Harmonisation of the regulation at the European level (for cross Member States implementation).
- Take up of the e-mobility market, which would imply large economies of scale.

All these topics represents challenges to the system and deserve appropriate solutions. However, they have to be compared to the overall large benefits that the roaming of electricity supply provides to EV users and the civil society in the long run.

In addition, most of these costs can be considered as marginal compared to the global cost of the charging infrastructure, which represents hundreds of millions of charging stations over across the European Union and an accordingly high number of software systems.

Roaming of services is already seen as a must feature by all players in the ecosystem. Based on the assumption that the e-mobility ecosystem will soon be able to perform roaming of services, the cost of implementation of roaming of electricity supply based on the same technical architecture is limited to extremely marginal investments.

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1 Public consultation of Commission de Régulation de l’Energie on the development of Smart Grids (in French), 2013, p. 6