

E-mobility: European Energy and Transport Policies at cross-roads

The challenge of infrastructure deployment

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In supporting the objective of deployment of 8 million electric vehicles in 2020 and ensuring e-mobility services throughout the European Union (EU), the European strategy for low-emission mobility¹ reminds Member States of their obligation to install publicly accessible infrastructures for electric vehicles by the end of the decade, as defined in Directive 2014/94². The strategy points towards an extension beyond the 2020 horizon of low-emission policies not only in car transportation, but also in goods transport (lorries), in public passenger transport (buses), and international aviation.

It comes in the context of two major policy downturns. First, the Volkswagen scandal last October 2015 put a blow on the European cars manufacturing industry, as much as on the EU's oversight role in car emissions standards. Second, the sustained low prevailing carbon price is signalling that no emission abatement is taking place in the EU carbon market (European Emission Trading Scheme) covering power plants and industrial facilities. In car passenger transport, emissions can indeed be abated with electric vehicle, if the underlying system from which electricity is drawn is decarbonised.

European Strategy for Low Emission Mobility: turning the steering wheel towards electric mobility

As part of the Clean Power Transport Package³, the European Strategy for low-emission mobility leans upon the Directive 2014/94 on Alternative Fuels Infrastructure, which requires Member States to roll out an infrastructure connecting electric vehicles (EVs)⁴. However, it is

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not giving any additional requirements for natural gas vehicle nor hydrogen-based vehicles (fuel cells). Among all forms of low emission vehicles (EVs, CNGs, hydrogen, biofuels), this new strategy orientation is promoting an electric charging infrastructure (charging stations) supporting the uptake of electric vehicles. It comes at a point where the binding objective of 10% of renewables in transport (in place for 2020) may not be pursued towards 2030⁵, thus limiting the adoption of biofuels as a fuel for transportation⁶. As part of the strategy, the Commission is also examining the option of promoting the installation of electric vehicle re-charging points in residential buildings.

European Electric Vehicle market in its infancy

So far, EV car registrations in the EU remain at a very early stage of development. According to the Joint Research Center (JRC)⁷, a total of 153,633 electric cars were registered in the EU between 2010 and 2014, and expectations are for a market surpassing 200,000 registrations end 2016. In 2014, EV accounted for only 1.4% of total car registrations according to ACEA, the European Automobile Manufacturers' Association. So far, market dynamics mostly depend on subsidies and nationally-framed policies, related to purchase rebates, tax reduction or exemption, but also privileged access to traffic lanes, CO₂ emissions' standards⁸, R&D support, or possibly the phase out of diesel vehicles in densely populated areas. Voices are being raised in Europe, notably in the UK and in the Netherlands⁹ to support such a shift in order to overcome negative environmental impacts (air pollution).

Today, Norway is by far the leader in EVs, with the Netherlands and Sweden at some distance. In 2015, a record was achieved in Norway with EVs accounting respectively for 22% of new car sales¹⁰ while these represented respectively 9.6% and 2.4% of new car sales in the Netherlands and in Sweden.

In the cases of Norway and the Netherlands, public accessible infrastructures amounted to 7 633 and 23 456, respectively¹¹. Despite the leading position of Norway in new car sales, the number of publicly accessible charging stations remains far below the threshold¹² that would be applied under European legislation if it were to grow its share to 30% of sales by 2020.

Member States required to shift public support to charging infrastructures

The European Strategy for low-emission mobility complements the 2014/94 Directive on the deployment of alternative fuel infrastructure, which has already detailed technical standards for recharging points and mandated Member States to set up national plans regarding the deployment of public recharging points by November 2016¹³.

Charging infrastructures for electric vehicles¹⁴ are located either on public spaces (parking) or semi-public locations (motorway; retail market parking). They are constituted of electric plugs and connections feeding energy supply to the battery in the form of electricity. The number of charging stations to be envisioned depends on the charging mode, as the amount of time required for fast charging stations is six times lower than for slow charging stations¹⁵¹⁶.

Charging points can also provide multi services (billing services, mobility-weather services, battery swaps)¹⁷. The Commission reminds therefore in its strategy that the charging system and its associated e-mobility services should also be designed such as to ensure smart charging in a secured environment.

Long road ahead towards an EU market for e-mobility

In this highly interconnected environment, functional requirements related to the charging mode (slow charging vs fast charging) and equipment standards like vehicle plugs' standards are being designed under a coordinated European wide policy. Since 2009, there is an ongoing process of interoperability coordination between e-mobility and smart electricity grids standardization. In this context, a specific legal mandate has been given by the European Commission to European Standardization Organizations¹⁸ for the interoperability of electric vehicles', deriving from the mandate to establish smart meters in electricity. A particular focus is given to safety both for customers and for the grid. A smart charging concept is being developed in order to associate price and technical signals in relation

to different grid security constraints (such as overload risk, lack of balance between production and consumption, peak demand capacity of a network). A standard for fast charging has already been adopted under the impulsion of German and US car manufacturers in the Clean Fuel Directive¹⁹.

Beyond standardization, the specific interoperability conditions of sub-national frameworks should provide the foundations for an efficient market in terms of roaming services. In paying roaming charges, a passenger should be allowed to drive its electric vehicle over an infrastructure that stems across national borders and systems, as is comparable in the mobile telecommunication industry²⁰. Otherwise, an addition of sub-charges leading to an uncompetitive EU roaming market may pose a major barrier to the market uptake. In addition, there are still many challenges as to the prevailing levels of security of data exchanged between the different actors²¹.

Since early 2010, the uptake of electric vehicles in Europe remains mainly driven by national considerations and public subsidies.

In order to support the uptake of e-mobility services and overcome range anxiety²², a clear framework for non-regulated infrastructures needs to be evaluated. In particular, an increased convergence between functional requirements (EV smart charging) and equipment standards (plugs and surrounding electrical equipment) is crucial. This would allow the development of fast charging services and new commercial offerings based on mobility solutions. In this context, charging service operators (operators and/or owners of the charging infrastructure) would gain recognition as new entities that operate and maintain the e-mobility data (frequency, location, volume of charging)^{23 24} between the different actors²⁵ accessing this new type of infrastructure.

Turning the steering wheel towards electric mobility is still a long road ahead. It is not only a matter of aligning the decarbonisation of both transport and electricity generation under a single policy agenda or reforming policy instruments (regulating by standards versus regulating by markets). It also depends on new innovative models for non-regulated infrastructures built upon a clear framework of interoperability between e-mobility and smart grids.

1. SWD (2016) – 244, <http://ec.europa.eu>

2. Directive 2014/94 – Alternative Fuel Infrastructure

3. The Clean Power Transport Package, adopted in September 2014, includes a Communication for a European Alternative Fuels Strategy [COM(2013)17]; a proposal for a Directive on the deployment of alternative fuels recharging and refuelling infrastructure [COM(2013)18]; Impact Assessment [SWD(2013)5]; A Staff Working Document - LNG in the shipping sector [SWD(2013)4].
4. The term Electric Vehicle covers Battery Electric Vehicle, running solely on battery, and Plug in Hybrid Vehicle, combining a fuel combustion engine and a battery system.
5. www.euractiv.com
6. Biofuels do not require any additional infrastructure as it is used as a blended fuel on existing fuel stations.
7. C. Thiel, J. Krause and P. Dilara, "Electric Vehicles in the EU is full Scale Commercialization Near", *JRC Science and Policy Report*, 2015.
8. EU GHG emission limit at 95g CO₂/km for passenger cars in 2021, together with standards for buses, cars or for lorries (Euro IV norm on Nox, HC, Carbon Monoxide, Particulates).
9. J. Staufenberg, "Climate Change: Netherlands on Brink of Banning Sale of Petrol-fuelled Cars", *The Independent*, August 18, 2016, www.independent.co.uk.
10. European Alternative Fuels Observatory, <http://insideevs.com/>.
11. *Ibid.*
12. One publicly accessible charging point for every ten electric cars - Directive 2014/94.
13. Number of public recharging points in 2020: France / 97 000, Germany / 150 000, Italy / 125 000.
14. Charging points/stations are referred as Electric Vehicle Supply Equipment – EVSE.
15. International Energy Agency, "Global EV Outlook 2016: Beyond One Million Electric Cars", 2016.
16. For Fast Charging, charging takes only 20-30 minutes.
17. France - Renault Fluence ZE.
18. CEN/CENELEC/ETSI - EU Regulation (1025/2012).
19. CCS (Combo) is the European standard for fast-charging. A transition period through 2019 allows installing CHAdeMO (Japan) for fast-charging stations.
20. T. Harrup, "Orange France and Tesla in agreement", October 17, 2014, www.fleet europe.com.
21. T. Zgajewski and E. Papers, "Smart Electricity Grids: A very Slow Deployment in the EU", February 2015.
22. Range Anxiety is the fear by the driver that his vehicle has insufficient battery charge until its destination.
23. Commission de Régulation de l'Énergie (CRE) – Smart Grids Recommendations, www.smartgrids-cre.fr.
24. The fee includes a cost component associated to the metering of electricity used when charging the vehicle's battery device.
25. "Deploying Publicly Accessible Charging Infrastructure for Electric Vehicles: how to Organize the Market?", Eurelectric Concept Paper, July 2013 – See concepts of e-mobility service provider and charging service operator.