



The Energy Union Strategy - a plug-in plan for making Europe the world's leader in electro-mobility

"Electrification of transport is important to break oil dependency and to decarbonise transport, especially for road (short and medium distance) and rail transport. Europe needs to speed up electrification of its car fleet and other means of transport and become a leader in electro-mobility and energy storage technologies. This requires a full integration of electric vehicles in urban mobility policies and in the electricity grid, both as energy consumers and potential storage facilities".

Energy Union Communication, February 2015

Presently, transport is the only sector bucking the trend on emission reductions. Transport currently accounts for 34% and a growing share of emissions from all sectors not covered by the EU emission-trading system (ETS)¹. Electro-mobility, i.e. the sustainable electrification of all modes of transport, is a key to deliver on all Energy Union long-term objectives: supply security, a fully integrated energy market, improved energy efficiency, emission reduction and advancing research and innovation. Reversely, the Energy Union Strategy will be crucial for deploying electro-mobility's full potential with a series of important legislative milestones expected in the coming months. This paper identifies measures to ensure that Europe will be the leader on a fast and effective transition to electro-mobility.

¹ Ricardo AEA SULTAN model of GHG emissions reduction potential in transport, 2016 https://europeanclimate.org/wp-content/uploads/2016/02/ECF-Transport-GHG-reduction-for-2030_Final_Issue21.pdf.



More Energy Security: Put the brake on the EU's GDP leakage by reducing oil imports

Electro-mobility offers a compelling solution

- The transport sector is the biggest driver of oil demand at EU level – two-thirds of final demand for oil comes from transport, and this amount has been increasing. In 2015, a year of historically low oil prices, total spending on crude oil imports in the EU was €187 billion. Russia accounts for 30% of our oil imports, while often geopolitically instable regions in Africa and Middle East account for an additional 31%.
- Electrification of transport shifts the energy supply from imported and expensive sources, that often come from politically instable regions, to domestic, secure, clean and cheaper sources, thus increasing EU's energy security. Electrified transport also ensures the money spent on fuels remains in the European economy: The shift from fossil to hybrid and electric vehicles would allow Europe to save €47 billion by 2030 on imported crude oil or oil products.²
- Electric mobility is not limited to short and medium distance but offers a full-on alternative to fossil fuels including on longer distance. Furthermore, as battery technology and prices improve, Electric Vehicles (EVs) will even soon become a cheaper and more convenient alternative than internal combustion engine vehicles.


How to plug electro-mobility into the EU framework:

- Europe needs a **comprehensive strategy for electro-mobility**, including policies stimulating deployment of vehicles, public transport, charging infrastructure, energy markets and storage.
- **Post-2020 fuels policy** should specifically encourage a large-scale, cost-effective wide usage of low-carbon and renewable electricity. Low-carbon electricity used in transportation will have a double emission reductions effect – both in power and in transport sectors. As such, it is essential to harmonize and coordinate electric fuel support policies with the EV charging infrastructure measures. Only if the two are developed in parallel can they yield wide-scale consumer adoption of EVs.
- Hence, a fast, coordinated and appropriate roll-out of EV charging infrastructure as per the **Alternative Fuels Infrastructure Directive (AFI)** is crucial for creating an EV market and freeing the EU from the foreign fossil fuel dependence. Member States as well as EU policy makers need to ensure an open and coordinated implementation of the AFI Directive throughout the EU that both promotes convergence around common and interoperable standards but also continues to promote technical innovations, in particular in high power charging solutions.

² European Climate Foundation, Fuelling Europe's Future, http://www.camecon.com/Libraries/Downloadable_Files/Fuelling_Europe_s_Future-How_auto_innovation_leads_to_EU_jobs.sflb.ashx



- It is also key to **remove regulatory barriers to the deployment of charging infrastructure in the private domain** (homes, apartments/office/commercial buildings) to enable convenient daily charging solutions for users.
- While normal power charging (from 3,7 to 22kW) in the private and public domain is the backbone for the daily recharging of passenger EVs, especially in urban areas, **European public investments should focus on deploying multi-standard, downward compatible 150 kW high power charging infrastructures** along EU major highways where transport demand is highest, in particular along Trans-European Networks for Transport (TEN-T) corridors. Having a fast charging infrastructure along major EU's highways with charging services accessible for all will allow easy, long-distance cross-border travel. Focusing on TEN-T first is essential to ensure that the e-mobility market is set up in a harmonised way. Boosting growth of an energy secure, renewable and digital transport economy, they need to be a core element of the EU's infrastructure funding, such as the Connecting Europe Facility or the EFSI (Juncker Plan).



Accelerate the reform of the internal electricity market: Ensure synergies between power and transport sectors

Electro-mobility offers a compelling solution

- E-mobility is a key solution for establishing much needed bridges between the power, buildings and transportation sectors. Connecting these sectors requires fully operational, union-wide smart-grids.
- EVs can make an important contribution to balancing power from renewable energy sources and help the integration of even higher percentage of renewable electricity. They can contribute to the decarbonisation of the electricity sector by providing flexible consumption using smart charging solutions.
- Smart charging is essential for integrating electric vehicles and for balancing a modern, low-carbon grid. The European Climate Foundation estimates that smart charging could allow the integration of more than 20 million electric vehicles in France, compared with only 4 million under a passive charging scenario³. Smart charging can achieve additional annual savings of €1,863 million as a result of avoided costs on CO2 emissions in 2050.⁴

How to plug electro-mobility into the EU framework:

³ European Climate Foundation, En Route pour un Transport Durable, <http://www.camecon.com/EnRoutePourUnTransportDurable.aspx>

⁴ http://www.camecon.com/Libraries/Downloadable_Files/Fuelling_Europe_s_Future-How_auto_innovation_leads_to_EU_jobs.sflb.ashx



- **Electricity Market design reform:** the upcoming revision of the Electricity Directive needs to adjust the following elements.
 - Firstly, **defining storage** and **clarifying roles and responsibilities** of energy market participants with regard to storage and aggregation is essential. This will help removing current regulatory barriers, such as double grid fees.
 - Secondly, it should ensure that existing grid-to-vehicle and vehicle-to-grid solutions can in the future actively participate **in ancillary services markets**. Ancillary services markets need to be open and adjusted to allow for new sources of flexibility to participate. In particular **demand response** programs should be further enhanced by allowing participation of demand in all markets on an equal footing with supply.
 - Thirdly, **time-varying** and **cost-reflective network tariffs are essential** for vehicle smart charging and for efficient operations of energy markets.
 - Finally, the energy market needs to be designed to incorporate active participation of new market entrants in energy market activities. This is essential for enabling electric vehicles fulfill their potential of acting as energy storage.
- **Renewable Energy Directive (RED):** the upcoming revision of the Directive should create an **enabling framework for self-consumption** to allow charging EVs with locally produced renewable electricity. Regulatory barriers to self-consumption such as the obligation to inject all the electricity produced into the network or dedicated taxes on stored electricity should be lifted.
- Consumers should always remain **free to choose between different electromobility service providers. Furthermore, roaming options should enable them to be served and billed by their chosen service provider, even when charging at charging stations operated by other service providers.** Having access to various service providers – which can contractually guarantee the origin of electricity used - is key to provide consumers with multiple choices and hence guarantee competition.

Energy Efficiency: Ensure a better use of energy

Electro-mobility offers a compelling solution

- Electro-mobility ensures a more efficient use of energy compared to fuel-based solutions: electric rail, public transportation and electric vehicles are much more efficient than combustion engines per distance covered. For example, an internal combustion engine car travelling 50km a day consumes on average 40kWh/day, whereas a comparable EV only consumes around 10kWh for the same distance.⁵ Electric-powered public transport is even more efficient thanks to their higher capacity. Lesser energy usage per kilometer traveled directly results in reduced cost of travel and reduced GHG emissions. With such efficiency improvements, a 100%

⁵ David John Cameron MacKay: Sustainable Energy – Without the Hot Air, Cambridge, 2009.



car electrification could lead to a net reduction of 137 Mtoe (million tons of oil equivalent) per year in the EU.⁶

- If integrated with buildings and smartly coupled with self-generation facilities such as solar panels, EVs will help to increasing the percentage of self-consumed electricity and reducing the primary energy demand of buildings.

How to plug electro-mobility into the EU framework:

- **Energy Performance of Buildings Directive:** the upcoming revision of the Directive should incentivize Member States to **equip all new and newly refurbished buildings – commercial and residential - with recharging points for electric vehicles by 2018**. These need to be two-way charging points able to both charge and discharge a vehicle. Analysis shows that the capability to discharge can provide monetary benefits for the EV owner (via an aggregator), as he or she will be able to optimize electricity use by offering reserve control services and/or portfolio optimization.⁷ This should be combined with a **set of indicators** included in the Energy Performance Certificates, in order to prove the ability of a building to (smartly) charge EVs.



Decarbonise transport: Drive the world into a low-emission future

Electro-mobility offers a compelling solution

- Transportation is not covered under the EU Emissions trading scheme (EUETS) and as such falls under the sectoral emission reduction targets together with the agriculture and building sector. An EU's legislative proposal on sectoral emission targets presented in July 2016 is aiming to reduce emissions in the non-EU ETS sectors 30% by 2030⁸. Therefore, measures to accelerate electro-mobility will have to be part of EU Member states' future transport policy to meet these 2030 emission targets.
- In this context, any shift from oil to electricity in the transport sector would substantially reduce our overall CO2 emissions: Transport contributes to 34% of the European Union's emissions, out of this share, 70% of emissions come from road transport⁹. In addition, half of the European power mix is already decarbonized today and by 2030 this will be the case for about 75% of the power mix.
- Shipping is also a major cause of air pollution in Europe, by 2020 it could produce more nitrogen oxides (NOx) than all land-based sources of emissions combined¹⁰. In harbour cities, ship emissions have become a dominant source of pollution in

⁶ EURELECTRIC, Smart Charging: steering the charge, driving the change http://www.eurelectric.org/media/169888/20032015_paper_on_smart_charging_of_electric_vehicles_finalpsf-2015-2301-0001-01-e.pdf

⁷ EFS & GNV GL: What's driving tomorrow's electricity grid. <https://www.dnvgl.com/energy/brochures/download/emobility.html>

⁸ compared to 2005, varying depending on countries' GDP

⁹ EEA greenhouse gas-data viewer, 2012 emissions data

¹⁰ EEA, The impact of international shipping on European air quality and climate forcing, 2013: <http://www.eea.europa.eu/publications/the-impact-of-international-shipping>



particular when considering fine particulate matter (PM) emissions. This pollution can be mitigated by the use of shore-side electricity supply (i.e. enabling ships at berth to plug to the national grid and so to shut down their engines), and by progressively electrifying maritime transport such as local ferries.

- Besides increasing Europe's energy security, saving money and reducing the Union's GHG emissions, electrification of the transport sector in Europe would contribute to its fair share of achieving the global emission reduction target. According to the IEA three-fourths of global car sales will need to be EVs or plug-in hybrids by 2050 if the transport sector is to do its part in meeting the 1.5°C target agreed at COP21.¹¹
- According to the European Commission's 2016 EU's Low Emission Mobility Strategy, the shift towards low- and zero-emission vehicles will have to be supported by a "wide range of measures at all levels of policy-making to engage both manufacturers and users." The Commission insists in particular on the need to "incentivise low- and zero-emission vehicles in a technology neutral way, such as setting specific targets for them", as these will have gained significant market share by 2030. In addition to road transport, the strategy recognises the importance of electric rail services for both passengers and freight, as well as it recognizes that making transport more efficient requires multimodal solutions.

How to plug electro-mobility into the EU framework:

- **Effort sharing decision:** Strong support for electro-mobility will have to be part of the national measures by which Member States will meet the mandatory emission reduction targets in the transport sector (Effort Sharing Decision). The sector has to deliver 70 % of emission reductions by 2050 compared to 2008 levels.¹²
- **CO2 emission performance standards for light Duty Vehicles:** 2017 will see the proposal for post-2020 **CO2 emission limits for Light Duty Vehicles**, which will inter alia assess the opportunity of setting an intermediate target before 2030¹³. Electric vehicles are and will need to be increasingly part of car makers' product strategy in order to meet these targets¹⁴. A dedicated framework **for ultra-low-carbon vehicles** will significantly enhance the European market roll-out of ultra-low emission vehicles and should be part of this regulation.
- **Clean and Energy Efficient Road Transport Vehicle Directive (Clean Vehicles Directive):** the current review of the Directive should be used to **further foster incentives** for the uptake of electro-mobility for Public Transport Authorities and Public Transport Operators.. This requires discussions with the sector and potentially a definition of 'clean vehicle'. Any changes to this Directive should be aligned with the parallel review of criteria for Green Public Procurement in the transport sector.
- **Stronger support to electrification of maritime transport:** technical specifications related to shore-side electricity set out in the AFI directive¹⁵ should be fully enforced as soon as possible. In addition, the European Commission and Member States should encourage port authorities to deploy this technology in

¹¹ IEA Global EV Outlook Report (April, 2013):

http://www.iea.org/topics/transport/subtopics/electricvehiclesinitiative/EVI_GEO_2013_FullReport.pdf

¹² – according to Commission's analysis –

¹³ [http://ec.europa.eu/transport/themes/strategies/news/doc/2016-07-20-decarbonisation/com\(2016\)501_en.pdf](http://ec.europa.eu/transport/themes/strategies/news/doc/2016-07-20-decarbonisation/com(2016)501_en.pdf)

¹⁴ https://www.transportenvironment.org/sites/te/files/publications/Low-Emission-Car-Measures_FINAL_15Apr13_v2.pdf

¹⁵ EU Directive 2014/94/EU – Annex II Art. 1.7



berths close to residential/commercial areas for ships requiring more than 1 MVA, and in all cruise ships and ferry terminals, by 2020. Different tools could be used such as tax reduction, or campaigns to raise awareness about funding opportunities (e.g. EFSI, ERDF, TEN-T, etc).



Truly innovative Research & Development:
Develop new solutions

Electro-mobility offers a compelling solution

- Electrification brings innovative technology more quickly into the market and adds value to European R&D and industry. For example, European suppliers, market leaders in the field of rail transport, are exporting their electrification know-how to the bus and truck markets. Electric mobility can be a catalyst for green growth in Europe as a key sector combining a market for renewable energy, storage solutions, and innovative transport technology. Quick investments are crucial: An analysis of OECD patents has shown alarming signs that EU carmakers are falling behind Japanese and Korean competitors in obtaining patents for advanced technologies (hybrid, plug-in hybrid, battery and fuel cell vehicles), partly due to the EU's focus on conventional Diesel technology not replicated in other major vehicle markets.¹⁶

How to plug electro-mobility into the EU framework:

- **SET-Plan and Strategic Transport Research and Innovation Agenda (STRIA):** a further mutual reinforcement among these two supporting frameworks should be ensured as part of the Energy Union Integrated Research, Innovation and Competitiveness Strategy (EURICS). Some of the areas that need bigger attention are **battery investment and research needs along the entire battery value chain**, from powder to power. Focusing on batteries, smart charging stations and other EV-related technologies such as open, accessible interoperable EV charging services would help boost Europe's technology sector while at the same time would help have a cleaner, reliable, modern electric grid and a larger number of electric vehicles on streets.
- **Innovation Fund:** the currently ongoing reform of the EU ETS has envisaged the establishment of an Innovation Fund to support innovation in and deployment of low-carbon technologies. The expansion of its eligibility criteria should apply to innovative technologies and projects in the transportation sector as well. Some examples of this would be assisting electric battery sector to further bring down the costs or financing smart-charging pilot projects to gain insight on how to minimize the impact on the electric grid.

¹⁶ https://www.transportenvironment.org/sites/te/files/publications/2015_06_2025_CO2_regulation_position_paper_long.pdf



Conclusion

Electro-mobility directly supports each of the pillars of the Energy Union. It increases our energy security. It offers new solutions to deepen the achievement of the internal energy market by better linking the electricity and transport sectors. It helps better use our energy. It is a major driver of decarbonisation. And it pushes innovation forward.

The upcoming legislative proposals in the coming months all offer an opportunity to ensure that Europe can fully grasp these multiple benefits.

