PLATFORM FOR ELECTRO-MOBILITY

ELECTRO-MOBILITY IS READY TO TRANSFORM THE WAY WE MOVE

Introduction

Electro-mobility already **moves millions of people** and goods every day, and the **numbers are set to increase** even further in the future. More than half of the railway and metro lines in Europe are already electrified along with most urban trams. Electric cars, vans, trains, buses and bicycles are increasingly offering clean, quiet transport solutions and there will be many electric trucks and ferries in the future too.

As **battery performance improves**, costs drop and a **growing number of recharging stations are installed**, electric vehicles will become **increasingly affordable**, and practical solutions for all types of trips. With zero tailpipe emissions, electric vehicles **improve air and noise quality**.

More than half of Europe's electricity is already generated from carbon-free sources. This share is growing every year, so **electro-mobility** constitutes the principal pathway to **decarbonizing road transport too**. In the process, it is stimulating investment and creating jobs and growth to transform people's lives.

The Platform for Electro-mobility is working to create a sustainable, multimodal transport system in which people and goods are predominantly moved across land in Europe using sustainable electricity. The aim of the Platform is to drive the development and implementation of sustainable European Union policies, programmes and initiatives to move people and goods by electricity. This booklet shows how **electro-mobility transforms positively the way people and goods are moved.**

1 Electro-mobility is affordable

FUTURE

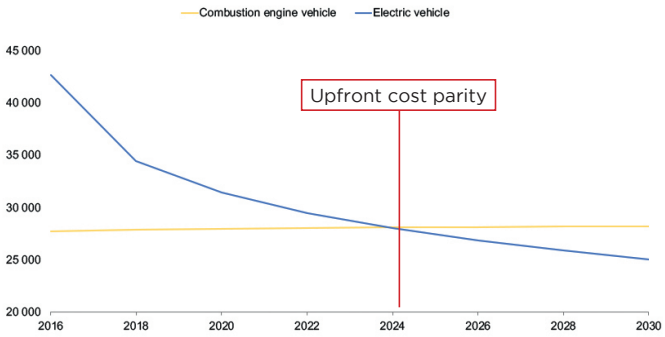
TOTAL COST OF OWNERSHIP KEEPS DECREASING

Over the life of an electric vehicle, the **Total Cost of Ownership** (TCO), meaning the cost of acquisition and use, **falls significantly below that of conventional vehicles**, even when the price of a home charging point is taken into account.

According to the European Alternative Fuels Observatory (EAFO), **the total cost of ownership of electric vehicles** in the small and medium vehicle segments in the EU will be the **same as traditional vehicles** by 2024 according to Bloomberg, or even 2022 according to the EAFO.

The **total cost of ownership of electric buses** with an autonomy of 250-300 km (the majority of EU urban bus lines) is **lower than that of diesel buses**. Moreover, within 2-3 years e-buses will be cost-competitive on a TCO basis in almost all configurations.*

**BloombergNEF "Electric Buses in Cities", March 2018*



Source: Bloomberg NEF "When Will EVs Be Cheaper Than Conventional Vehicles?", April 2018

2 The technology is ready for the uptake of electro-mobility

FACT 1:
MASSIVE DEPLOYMENT OF ELECTRIC VEHICLES AND BUSES

According to Bloomberg NEF, **55 new Electric vehicles (EV) models** will hit the market **by 2019-2022 (22 PHEV, 33 BEV)**, and 38% of passenger vehicles (about 314 million such vehicles) will be electric by 2040 in Europe. The growth of a large EV market will lead to a strong secondhand market. In 2018 there were around 425,000 electric buses on the roads at global level.*

In addition, 10 million electric bicycles were sold in the EU by the end of 2017, further spreading the advantages of electro-mobility use for commuting or leisure activities.

**BloombergNEF «Electric Vehicle Outlook 2019, May 2019*

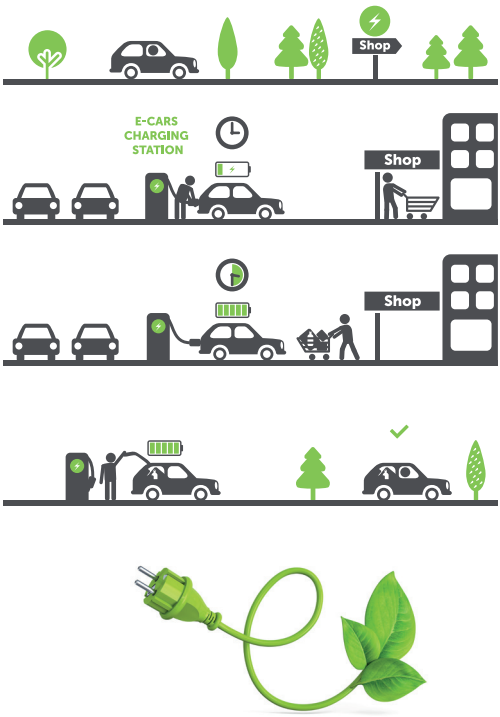
Even for longer journeys, a fully charged battery can take you 300 km under real conditions!

"The average distance that is daily driven in 6 member states ranges from an average of 40 km (UK) to an average of 80 km (Poland). Such distances can be comfortably covered by battery electric vehicles that are currently already available on the market."
- Driving and parking patterns of European car drivers: a mobility survey. JRC-European Commission-2012.

FACT 2 :
MANY TRAINS ALREADY RUN ON ELECTRICITY

Rail is a ready-made, widely available e-mobility solution. 4 trains out of 5 are already running on electricity, which is becoming greener. In the Netherlands electric trains are running 100% on wind energy, in Switzerland and Sweden 100% on hydropower.

3 Infrastructure is getting ready to support electro-mobility



FACT 1:
CHARGING INFRASTRUCTURE IS BEING DEPLOYED ACROSS THE EU...

The **number of publicly accessible charging points is growing fast**, with more than 160,000 already available in 2018* (136,755 normal chargers and 24,330 fast chargers).

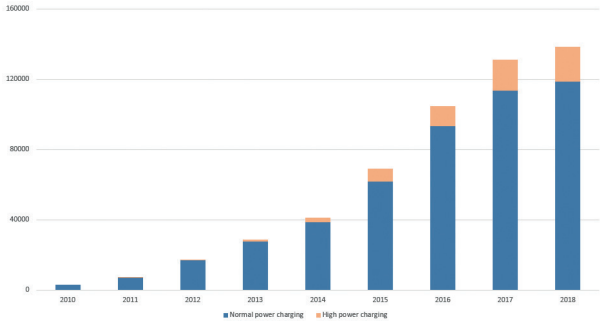
**EAFO www.eafo.eu/alternative-fuels/electricity/charging-infra-stats*

Approximately 138,000 public **charging points are available** in Europe for 1 million EVs on the road and existing commitments for **planned charging stations are more than sufficient to cover the expected demand from electric vehicles for 2020**. The accelerated deployment of charging infrastructure and facilities is expected to match the mass deployment of EVs after 2020.

For Heavy Duty Road Transport, **electric road systems are being implemented in a number of EU Member States.**

FACT 2:
... BUT ITS OPTIMIZATION NEEDS A PROPER FRAMEWORK

In order to keep developing the required infrastructure, we need to continue working on a **proper framework**, **cooperation with local actors** (such as cities and regional governments) and the **right market design** which will allow for the development of technological solutions including smart charging, interoperability among charging point operators and service providers (standards for plug and payment solutions), as well as innovative financing schemes.



Source: EAFO

4 The electric system is well designed to handle the increase in demand from electric mobility

FACT 1:
THERE WILL BE ENOUGH ENERGY TO POWER ELECTRIC CARS

Even **if electric cars were to represent 50% of the automotive fleet in 2035 in the EU** (about 125 million vehicles*), the entire electric fleet would consume **less than 9% of the total electricity consumption in Europe**. This represents a 0.5% increase in electricity demand per year, while the annual growth of electricity consumption has amounted to 1.3% per year since 1990.

**ACEA, 2016*

FACT 2:
ELECTRICITY GRIDS CAN SUPPORT AN UPTAKE OF THE EV MARKET WITH NO NEED OF IMPORTANT UPGRADES

EV charging will represent an additional electricity load for grids, which will nonetheless remain perfectly manageable for system operators:

- Quick and Fast recharging points require a power level similar to what is needed for a coffee shop or a small restaurant, whereas slow chargers (such as those used at home) normally require the same power level as an oven and a washing machine running at the same time. This is something **local power systems have been handling for decades**.
- Mass EV adoption **requires a charging infrastructure coverage for long-range trips as well** (including high-power chargers along main routes). However, in the UK the deployment of only 50 high-capacity charging points along motorways would bring 95% of drivers within 50 miles of a charging station.

Furthermore, thanks to **smart charging technologies**, EV loads will become an asset for grid management. Shifting the charging from high to low consumption periods, for instance, will reduce the impact of EVs on the peak demand and the need for grid upgrades, while delivering financial benefits to the customer.

5 Electro-mobility brings considerable environmental and health benefits

FACT 1:
ELECTRO-MOBILITY REDUCES EMISSIONS AND IMPROVES AIR QUALITY

Electro-mobility deployment is key to reducing CO_2 emissions by creating synergies between low emission transport and clean energy. Even today, an electric car powered by the current European electricity mix generates 30% to 50% less CO_2 emissions over its life span compared to even the most efficient internal combustion engine vehicle on the market.*

EVs have a key role to play in fighting climate change, reducing noise and improving the air we breathe, particularly in cities, as they do not produce polluting exhaust fumes. In May 2018, the World Health Organization updated the ambient air quality database, which now covers 4,300 cities in 108 countries, and found that 90% of people worldwide are breathing polluted, unhealthy air, which causes 7 million premature deaths each year.

**Ref 1* • *Low hand – M. MAARTEN, Life Cycle Analysis of the Climate Impact of Electric Vehicles, VUB MOBI, 2017. https://www.transportenvironment.org/sites/te/files/publications/TE%20-%20draft%20report%20v04.pdf*

Ref 2 • *Middle hand – A. SCHULLER, C. STUART, Addendum for EU 28, Spain, Italy, United Kingdom to M. CHERON, A. GILBERT-D HALLUIN, A. SCHULLER "From cradle to grave: electro-mobility in the French energy transition", Carbon 4, 2018.*

Ref 3 • *High hand – D. HALL, N. LUTSEY, Effects of battery manufacturing on electric vehicle life-cycle greenhouse gas emissions, ICCT, 2018.*

FACT 2:
BATTERY RECYCLING WILL DEVELOP ALONG WITH EV UPTAKE

Some European companies are already investing in EV battery recycling capabilities. However, large-scale recycling of EV batteries is not expected before 2020* due to the absence of substantial waste streams, adequate regulatory incentives. Increasing the collection and recycling efficiency rates of EV batteries in the EU can mitigate dependence on imported materials and help to retain the value of recovered materials in the EU economy.

A CEPS study** on battery recycling estimates that by 2030, at least €408 million in current prices could be recovered from the four key materials such as cobalt, nickel, aluminum and lithium in EV batteries. In 2040, these figures could at least increase to €1.9 billion.

Whereas battery manufacturers intend to reduce the use of cobalt in future battery chemistries, it is estimated that 100 kTonnes/ year of cobalt could potentially come from recycling by 2030, contributing to cover a significant part of the forecast demand for metals for EV batteries in that year (169 kTonnes) ***.

Further potential benefits include job creation for the collection, dismantling and recycling of EV batteries. Recycling certain materials in lithium-ion batteries, as opposed to extracting the raw material, may mitigate environmental impacts and CO_2 emissions. Aluminium is used in large quantities in the battery casing. Remelting existing aluminium requires just 5% of the energy of new aluminium production, thus yielding significant energy savings and CO_2 reductions (Material Economics, 2018). Improved lithium recycling may reduce the need for lithium mining (Shankleman et al., 2017) and the associated water-scarcity risks that lead to social and environmental problems.

**European Commission Report on Raw Materials for Battery Application*
***CEPS, "Prospects for electric vehicle batteries in a circular economy". Eleanor Drabik and Vasileios Rizos, July 2018*
****BloombergNEF, "Long-Term Electric Vehicle Outlook 2018", May 2018*

FACT 3:
ELECTRO-MOBILITY INCREASES ENERGY EFFICIENCY

Rail transport, in which the majority of traffic is carried out on electrified lines, is inherently a more energy-efficient mode thanks to the lower friction of steel wheels on rails. In addition, railways have improved their **energy efficiency** in both passenger and freight transport since 1990, notably through voluntary targets and R&D&I projects. **Moreover, both the electricity and the railway sectors aim for 100% carbon-free operations by 2050.**

6 Electro-mobility is a positive driver for jobs and growth in Europe

FACT 1:
A SHIFT TO PLUG-IN VEHICLES LEADS TO A NET INCREASE IN EU GDP

Petrol and diesel consumption will be strongly reduced during the 2020s as a result of the deployment of electric vehicles and anticipated climate policies to meet the Paris Agreement targets. By **2050, imported oil will be largely replaced by domestically produced energy**.

The amount of capital leaving the economy is thereby being reduced and that will lead to an additional 0.1% of annual GDP in 2030 and a 0.5% increase by 2050*.

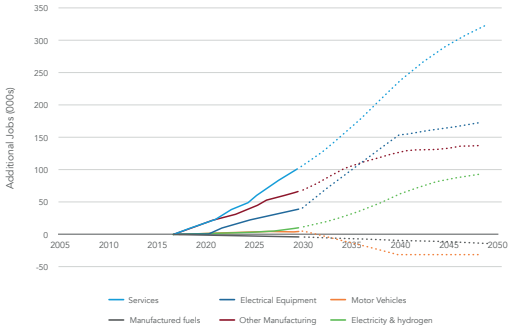
**P. Harrison,, 2018. Fuelling Europe's Future: How the transition from oil strengthens the economy, https://europeanclimate.org/fuelling-europes-future/*

FACT 2:
ELECTRO-MOBILITY RESULTS IN NET JOB CREATION

As a result of the economic shifts occurring thanks to electro-mobility in Europe, there will be a net increase in employment in the construction, electricity, hydrogen, service and most manufacturing sectors. **Employment in the automotive manufacturing sector will increase until 2030**. It is true that there will be fewer jobs in the refining sector but this industry is not labour-intensive (4 jobs only per € million of value added).

EV batteries will bring industrial renewal and new jobs in the EU. Thanks to the European Battery Alliance announced in 2018, to fulfill the need of 250GWh per year by 2030, several battery plants will be built throughout the European territory and create new jobs in the industry.

In total, 206,000 net additional jobs by 2030 can be created in the European economy as a consequence of the growth in electro-mobility, compared to a situation where passenger cars continue to run on legacy technologies, petrol and diesel.



The **shift to electro-mobility is already happening** and other non-EU countries are extending their lead in the electric automotive sector. Further delays in the adoption of EVs could therefore lead to the loss of European automotive leadership and eventually to job losses. In addition, the European bicycle industry has created 20,000 jobs over the past years, mainly due to the success of the electric bicycle.

Mobility costs are being reduced overall. This means savings for **consumers that can be spent on other goods** and services, thereby stimulating the European economy.

7 Electro-mobility creates new business models and new opportunities

FACT 1:
SMART CHARGING BRINGS BENEFITS BY OPTIMIZING ELECTRICITY DEMAND AND DEVELOPING RENEWABLES

Smart charging allows consumers to **charge when electricity price conditions are favorable**, while Vehicle-to-Grid technologies enable customers to **interact with the grid**. This will bring **benefits to both the grid and to customers** who will be able to extract an economic return from an optimized use of the battery in their car.

Therefore, smart charging will contribute to a **more flexible electricity system**, ensuring efficient management and infrastructure costs. By optimizing the electricity demand with these technologies we facilitate greater integration of renewable electricity.

FACT 2:
ELECTRO-MOBILITY CREATES NEW BUSINESS OPPORTUNITIES

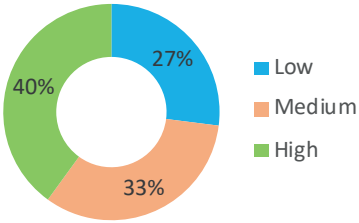
Smart charging can provide users with a source of income or a way to save money, making electric vehicles more competitive. This technology allows for adaptive charging habits, i.e. electric vehicles can be integrated into the power system in a grid- and user-friendly way.

Optimizing the power system also benefits users who do not drive electric cars by lowering the bill for all consumers. Dynamic pricing prevents charging when prices are high, spreading electricity demand more evenly throughout the day and night. The Fuelling Europe's Future report showed that, subject to market readiness, consumer benefits could amount to several hundred euros per vehicle per year.*

Smart charging is already a reality. There are many **apps already available** on the market that help users **manage their consumption.**

**Cambridge Econometrics-European Climate Foundation, Fuelling Europe's Future, p.19*

Estimated potential of EV charging to integrate renewables by 2030



Source: EDSO March 2018 paper / Smart charging: integrating a large widespread of electric cars in electricity distribution grids