

# Electric vehicles: Large climate potential in the long term

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**Electric Vehicles (EVs) are a promising technology for drastically reducing the environmental burden of road transport. From the perspective of a low carbon future, their most important benefit is that they can drive on a whole range of low carbon energy sources. This brings large scale low carbon or even zero-emission mobility within reach, in the long term. In the short to medium term, however, the technology is not yet mature and will remain dependent on government support and ongoing R&D efforts.**

## **ELECTRIC VEHICLES IN THE EU**

In recent years, a number of electric passenger cars have come on the EU market and most car manufacturers have announced one or more EV models for the coming years. It is clear that the industry is taking this technology seriously and that the vehicle market might be on the verge of quite a significant technological transformation.

However, EVs are not yet competitive. Costs are still high and battery technology is still being developed. R&D investments worldwide are impressive, and various governments, including many EU member states, support both the development and the sales of EVs. These efforts are expected to lead to cost reduction and performance improvements in the coming years and decades. However, it is also expected that it takes at least one to two decades before electric driving becomes competitive on a large scale, and independent from government incentives.

In this context, CE Delft, together with ICF and Ecologic, carried out an extensive study on the potential impacts of market penetration of electric vehicles in the EU, commissioned by the European

Commission (DG CLIMA). The study covered full EVs (FEV), plug-in hybrid EVs (PHEV) and EVs with range extender (EREV). Impacts on both the transport and electricity sector were analysed as well as a policy implications.

## **EV MARKET DEVELOPMENTS STILL VERY UNCERTAIN**

Successful battery development seems to be the most crucial condition for market uptake of this technology. Batteries have a strong impact on EV costs and electric driving range, two key parameters that consumers will look at when considering to buy an EV. In addition, a number of other issues will play a role, such as availability of charging infrastructure and/or battery swap stations.

In the study for the EC, future market developments and impacts were predicted for three scenarios:

- Scenario 1 was based on current best estimates of cost and performance development of EVs and conventional cars, and current government incentives.
- Scenario 2 assumed that ICE vehicles remain the prominent technology also in the longer term, with strongly improved fuel efficiency.
- Scenario 3 assumed fast

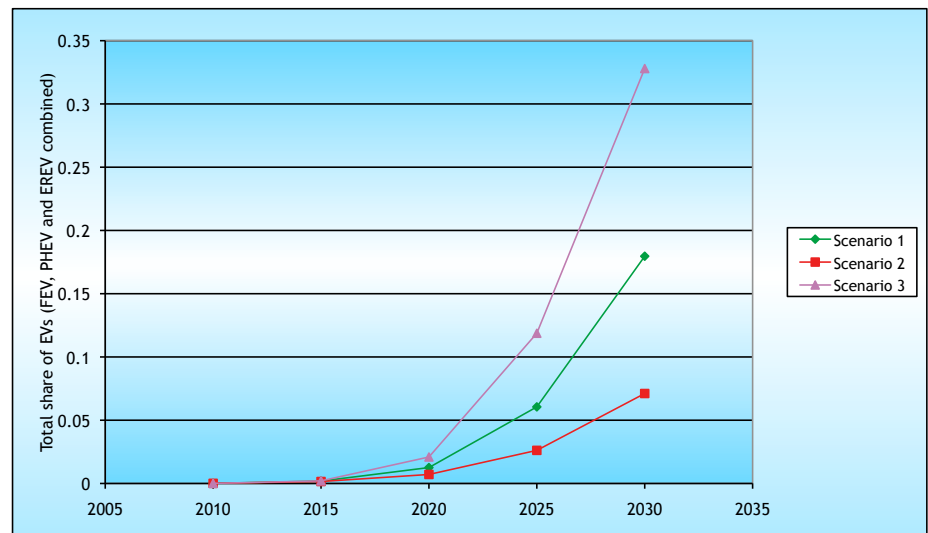


Figure 1 Total share of EVs in the EU car fleet, FEVs, PHEVs and EREVs

battery cost reductions and thus market uptake after 2020.

The total share of EVs in the EU car fleet in these scenarios were modelled, see Figure 1. Until 2020, the share of EVs will remain relatively low, but after that it could take up quickly, depending on the scenario. In all three scenarios, most of the EVs (about 60%) are expected to be Plug-in Hybrids.

The future EV market uptake will have a number of environmental and economical impacts. Petrol and diesel use will reduce, leading to lower greenhouse gas and air pollutant emissions of the vehicles themselves. On the other hand, electricity production will have to

increase, leading to additional emissions in that sector (of which the CO<sub>2</sub> emissions are covered by the EU Emission Trading System). In the study, various impacts are quantified, for the three scenarios given above.

#### POLICY RECOMMENDATIONS

Policies on many different levels (EU, national, cities) can play a role in EV developments and market uptake. In the short term, at least over the next five years, EV technology will not yet reached maturity and government support is needed to speed up innovation. In this phase, however, it is important to avoid unfair competition with other types of energy-efficient vehicle and sustainable biofuels. To prepare for the longer term, a consistent overall

fiscal and regulatory framework should be developed, providing consistent treatment and coverage of EVs and all competing technologies. ●

All reports of the study 'Impacts of Electric Vehicles' (five background reports and one summary report) can be found at [http://www.cedelft.eu/publicatie/impact\\_of\\_electric\\_vehicles/1153](http://www.cedelft.eu/publicatie/impact_of_electric_vehicles/1153)

The study was carried out by CE Delft, ICF and Ecologic.