

Briefing paper
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Green power for electric cars

Harvesting the climate potential of electric vehicles

A study by CE Delft

Commissioned by Greenpeace, Friends of the
Earth Europe and Transport and Environment

Introduction

Transport is the sector with the fastest growing greenhouse gas emissions in the EU. Since 1990 its emissions have increased by 38%.¹ European Commission President José Manuel Barroso recognised this problem in September 2009 in his 'political guidelines for the next Commission'. He said: *"the next Commission needs to maintain the momentum towards decarbonising the transport sector as well as the development of clean and electric cars."*

A number of European countries have launched national programmes and promotion strategies for electric cars ranging from support for research and development to purchase incentives. But current EU policies offer no guarantee that more electric vehicles on Europe's roads will lead to savings in carbon emissions over coming years.

Greenpeace, Friends of the Earth Europe and Transport and Environment have commissioned a study that:

- Analyses the impact of electric vehicles on the European power sector and on CO₂ emissions.
- Assesses how policies should be changed in order to maximise greenhouse gas emission savings from the introduction of electric vehicles.

The report is released as the EU begins to develop its electric vehicle initiative and action plan (announced for May 2010).

The study finds that electric vehicles can in principle substantially contribute to decarbonising road passenger transport. They compare favourably to (even advanced) internal combustion engine cars in that:

- They are substantially more efficient than conventional vehicles.
- They can be fuelled with electricity generated from a large range of energy sources, including renewable sources with virtually zero CO₂ emissions.
- They have no direct emissions.
- They can charge up with energy generated by renewables when there is a surplus of supply.

However, increasing the number of electric vehicles without a change in current legislation could result in:

- **An increase in oil consumption and CO₂ emissions in the EU car sector**, compared to a situation without electric vehicles.
- **An increase in coal- and nuclear-based electricity production**, instead of an increase in energy production from renewable sources.

Below are the main findings of the report and its recommendations to ensure that electric vehicles become an effective tool to reduce CO₂ emissions.

¹ Including emissions from international shipping and aviation. Source: Statistical Pocketbook Energy and Transport 2009.

1. Ensuring that electric vehicles reduce CO₂ emissions from the car sector

Existing EU legislation on car emissions allows manufacturers to use sales of electric vehicles to offset the continued production of gas-guzzling cars. So-called 'super credits' for electric vehicles allow carmakers to sell 3.5 high-emitting cars for every electric car they sell, without affecting the overall CO₂ target for their fleet. The report shows that this has the effect of actually increasing oil consumption and associated CO₂ emissions, compared to a situation without electric vehicles. It finds that increasing sales of electric cars to 10% of total car sales could lead to a 20% increase in both the oil consumption and CO₂ emissions of the overall fleet (conventional and electric vehicles).

The so-called 'super credits' for electric vehicles also reduce the contribution of electric vehicles to reaching the transport target of the EU's renewable energy directive. The directive requires that 10% of the energy supply for the transport sector in 2020 come from renewable sources (biofuels and renewable electricity). Biofuels and renewable electricity for vehicles are in direct competition to achieve this target. As long as biofuels remain largely unsustainable, renewable electricity is the greenest option.

Policy recommendations:

- a) **Abolish so-called super credits** for electric vehicles granted under EU legislation on CO₂ emissions from cars and under forthcoming legislation on CO₂ emissions from vans.
- b) **Ensure binding and ambitious 2020 targets for CO₂ emissions from cars and vans** that will increase overall efficiency for both combustion and electric vehicles.

2. Ensuring that the additional electricity demand resulting from the uptake in electric vehicles is met by additional renewable electricity

Carbon emissions from electric vehicles depend on the type of electricity they consume. When charged on renewable electricity, electric vehicles have a greenhouse gas impact of nearly zero. Charging them on electricity produced with coal results in equal or higher emissions than for comparable conventional vehicles.

The additional power demand for electric vehicles is expected to be relatively low. Assuming an uptake of up to 30 million battery electric and plug-in hybrid vehicles on EU roads, the increase would be less than 3% compared to current EU demand. But without demand management, any increase in energy consumption could simply increase fossil fuel and nuclear energy production.²

In order to avoid these market distortions, EU member states should boost the supply of renewable electricity. They should also monitor and report estimates of the share of renewable electricity used in cars for the purpose of reaching their 10% renewable energy transport target. This would stimulate the deployment of smart charging technologies that favour renewables and create an attractive market for electric vehicles.

Policy recommendations:

- c) Encourage member states to **raise their renewable electricity targets** in line with the additional demand for electric vehicles.
- d) Encourage member states to **report the estimated share of renewable electricity actually used in electric cars**, and not simply the share of renewables in national electricity production.

² Increasing electricity demand from transport is therefore likely to have an upward effect on the CO₂ price in the EU's emissions trading scheme. This effect has not been fully studied in this report, but is expected to remain small in the coming decade, as the additional electricity demand will be limited.

3. Enabling the use of renewable electricity in electric vehicles

To enable a greater share of renewable electricity in the power mix and in electric vehicles, the electricity system should be made more flexible to allow for the integration of energy from variable renewable sources, such as wind and solar energy. Electric vehicles can play an important role in this development, as they combine long periods of connection to the grid with large storage capacity in their batteries. But they will only do so if they are equipped with on-board metering systems. These would help them manage electricity input and primarily be charged when surplus electricity – mostly from renewables like wind and solar – is available on the power grid. Unless charging is properly managed, electric vehicles will not play a role in enabling the future renewable energy system.

To guarantee that car manufacturers apply the necessary technology for smart metering, the technology needs to be standardised and enforced through EU legislation. The standardisation and compatibility of such hardware and the ability of cars and electricity grids to exchange information would guarantee that drivers of electric vehicles could charge up anywhere.

Policy recommendations:

- e) **Develop smart cars and smart grids** that are able to exchange data and that favour the use of renewable electricity.
- f) **Standardise charging technology** to ensure that every driver can charge up anywhere in Europe.

Press release: www.greenpeace.org/eu-unit/press-centre/press-releases2/green-electric-cars-08-02-10
Report: www.greenpeace.org/eu-unit/press-centre/reports/green-power-for-electric-cars-08-02-10

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