Science for Environment Policy
DG Environment News Alert Service
European Commission

12 July 2012

GHG policy should cover 'upstream' electric vehicle emissions

Regulators should establish a process to consider the full lifecycle greenhouse gas (GHG) emissions of electric vehicles, according to a new US study. This would help ensure that vehicle emissions regulations are placed on a sound scientific basis, manufacturers continue to improve the efficiency of electric vehicles, and the full benefit of regulations to limit GHG emissions from vehicles are realised, say the researchers.

Governments around the world use various different regulatory schemes to control GHG emissions from cars and other vehicles. In the US, this takes the form of average emissions limits across a manufacturer's entire fleet of vehicles, with the limit falling each year. The EU also sets an average emissions limit: by 2012, 65% of a manufacturer's vehicles must emit no more than 193gCO_2/mile (120g CO_2/km), rising to 100% by 2015. By 2020, the target average emissions fall to 153g/mile (95g/km)[1].

Under these schemes, both the EU and USA credit electric vehicles with GHG emissions of 0g/mile. However, unlike petrol vehicles, a significant proportion of the emissions generated by electric vehicles occur 'upstream', that is, when the electricity is generated. This means that current regulations, which only consider exhaust emissions, do not fully capture the GHG emissions from such vehicles.

The researchers examined alternative regulatory schemes that take account of upstream GHG emissions from electricity generation. They began by looking at the upstream emissions for electric vehicles in the USA and how the 0g/mile standard would affect current regulations. They then examined the effects of retaining the 0g/mile rate, requiring manufacturers to buy carbon credits to compensate for the 0g/mile rate, or switching to a full lifecycle analysis.

They found that, when upstream emissions were included, an electric vehicle powered from the American electricity grid emitted an average of 56% less CO_2 than a similar new petrol car (104g/mile compared with 238g/mile). This changed depending on the emissions from the electricity grid in the state in which the electric vehicle was charged.

Looking then at the regulatory options, the researchers found that, as the emissions limits are averaged across a manufacturer's entire fleet, the inclusion of 0g/mile electric vehicles would allow average GHG emissions from the petrol vehicles in the fleet to rise. By 2020, assuming 10% of cars sold are electric, this could result in a loss of 20% of the benefit from regulations designed to reduce vehicle GHG emissions.

By requiring manufacturers to buy additional carbon credits, either in the form of renewable energy credits, low carbon fuel standards or from carbon markets, regulators could retain the simplicity of the 0g/mile incentive while still accounting for upstream emissions. A voluntary carbon credits scheme would also allow manufacturers to demonstrate their commitment to tackling environmental issues.

The final regulatory option examined by the researchers was full lifecycle analysis. Although more complicated than the 0g/mile options, lifecycle analysis would ensure GHG regulations were scientifically rigorous and could accommodate future energy technology developments. It would also encourage manufacturers to sell their vehicles in areas with low-emissions electricity grids. However, it would require the collection of more data on GHG emissions from the electricity grid and may make electric vehicles less attractive to manufacturers, reducing their incentive to invest.

1. http://ec.europa.eu/clima/policies/transport/vehicles/cars/index_en.htm

Source: Lutsey, N. & Sperling, D. (2012). Regulatory adaptation: Accommodating electric vehicles in a petroleum world. *Energy Policy*. 42: 308-316. Doi: 10.1016/j.enpol.2012.02.038.

Contact: nplutsey@gmail.com

Theme(s): Climate change and energy, Sustainable mobility