AN ECONOMIC ASSESSMENT OF LOW CARBON VEHICLES

cambridge econometrics

RICARDO-AEA

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Acknowledgements

Technology analysis:

- Nikolas Hill, Knowledge Leader for Transport Technology and Fuels, Ricardo-AEA
- Adarsh Varma, Business Area Manager - Surface Transport, Ricardo-AEA
- Sujith Kollamthodi, Practice Director - Sustainable Transport, Ricardo-AEA

Economic analysis:

- Phil Summerton, Project Leader, Cambridge Econometrics
- Hector Pollitt, Director, Cambridge Econometrics
- Sophie Billington, Economist, Cambridge Econometrics

Project advisors:

- Paul Ekins, Professor of Energy and Environment Policy, University College London
- Peter Wells, Senior Research Associate for Automotive, Cardiff University
- Terry Ward, Managing Director, Alphametrics & Research Director, Applica

Independent reviewers:

- Peter Mock, Managing Director Europe, International Council on Clean Transportation

Editorial reviewer:

- Pete Harrison, Senior Associate, European Climate Foundation

The project team appreciates inputs from the Core Working Group, including the following organisations:

Executive Summary

Europe faces a significant economic challenge. Ahead lies the task of reining in public debt, revitalizing stagnant economies and creating new opportunities for millions of jobless workers. At the same time, the European Union has committed to playing a lead role in tackling climate change. Among the EU's headline climate initiatives, the European Commission's Transport White Paper sets a goal of reducing transport CO2 emissions by 60 percent by 2050. It is therefore important to understand the economic impact of the transition to low-carbon vehicles.

This technical and macro-economic study focuses on light duty vehicles -- cars and vans. It has been advised by a broad group of stakeholders in the move to low-carbon transport, including auto producers, technology suppliers, labour groups, energy providers and environmental groups. The resulting fact-base is anticipated to serve as a reference point for discussions around the low-carbon transition.

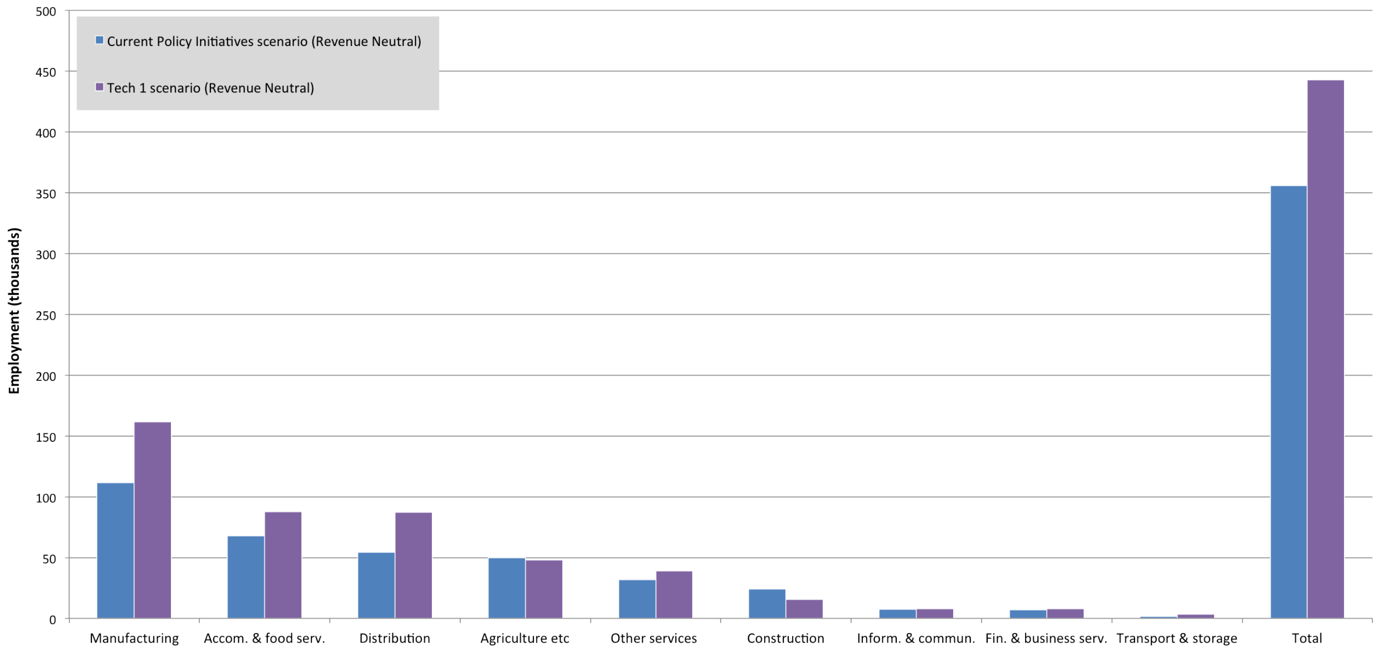
The model results show that a shift to low-carbon cars and vans increases spending on vehicle technology, a sector in which Europe excels, therefore generating positive direct employment impacts. This shift will also reduce the total cost of running Europe's auto fleet, leading to mildly positive economic impacts including indirect employment gains (Fig 1.1).

Data on the cost of low carbon vehicle technology has been largely sourced from the auto industry itself – Industry submissions for the European Commission's impact assessment on the proposed CO2 standards for cars and vans in 2020. This has been supplemented where necessary, for example by data from similar assessments for the UK and US governments.

Fuel price projections are based on the IEA's World Energy Outlook. Technical modelling was done using the transport policy scoping tool SULTAN (developed for the European Commission) and the Road Vehicle Cost and Efficiency Calculation Framework developed by Ricardo-AEA. Macro-economic modelling was done using the E3ME econometric model, which has previously been used for several European Commission and EU government impact assessments.

Fig 1.1 - Employment impact of low carbon vehicle scenarios in 2030

The results include both direct impacts from increased spending on vehicle technology and indirect impacts that result from lower fuel bills across the economy.



Source: Cambridge Econometrics

The project takes a phased approach. The first phase, presented in this report, examines the impact of improving the efficiency with which fossil fuels are burned in vehicles. Efficiency gains are delivered via improvement of the Internal Combustion Engine (ICE) vehicle, including light-weighting, engine-downsizing and hybridization. The second phase, to be presented in mid-2013, examines the impact of gradually substituting fossil fuels with increasing levels of indigenous energy resources, such as electricity and hydrogen.

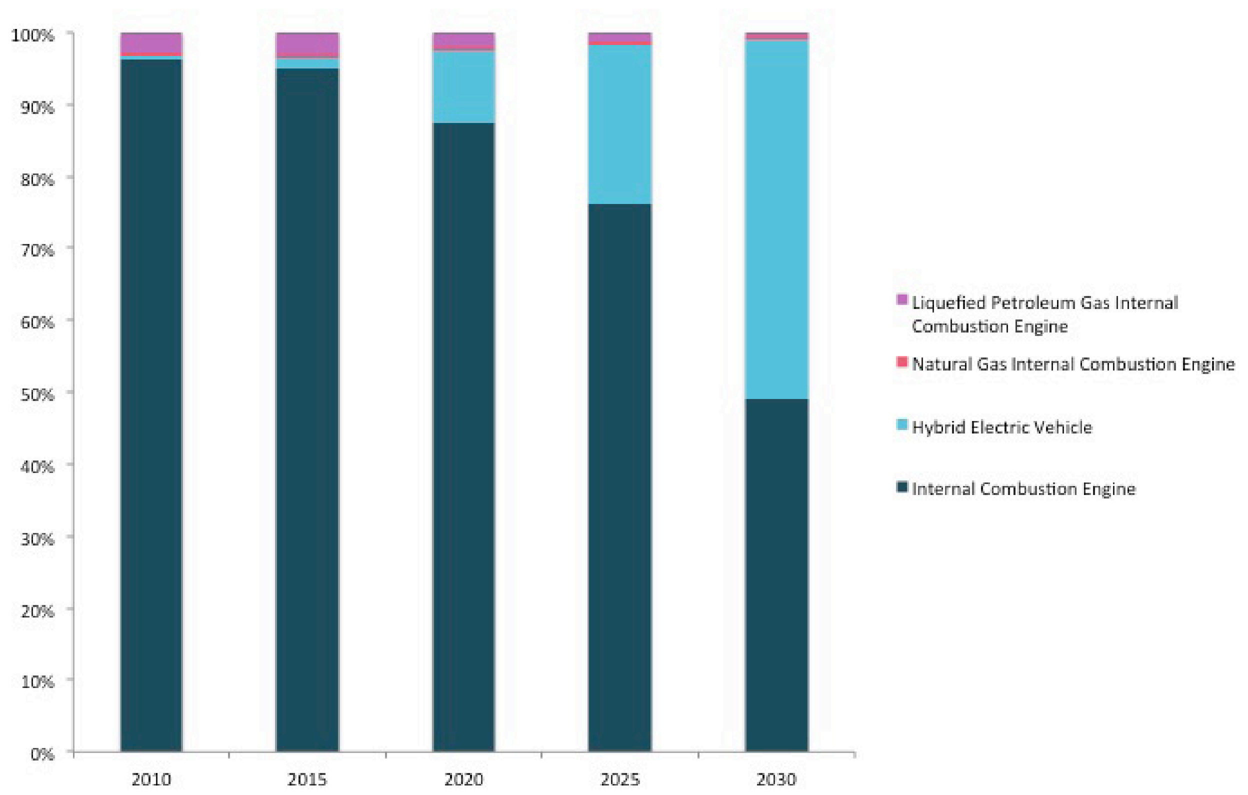
Two scenarios are assessed in this first phase of the project, by comparing them against a reference case in which vehicle efficiency is frozen at the current level. In the first scenario, named Current Policy Initiatives, cars and vans achieve the EU's proposed 2020 CO2 target of 95g/km and 147g/km respectively, but efficiency improvements moderate to a rate of less than 1 percent per annum thereafter. In the second scenario, Tech 1, cars and vans achieve slightly higher efficiency levels in 2020 and continue along a similar trajectory of around 3 percent annual improvement thereafter. Over-achieving on targets is a plausible scenario, because several automakers have already met their 2015 goals ahead of time.

In the Tech 1 scenario, gasoline and diesel Hybrid Electric Vehicles (HEV) are deployed at an ambitious rate (Fig 1.2). The scenario assumes market penetration of HEVs of 10 percent of new vehicle sales in 2020, 22 percent in 2025 and 50 percent penetration in 2030. The scenarios in this project are not an attempt to predict the evolution of future vehicle markets, which is highly uncertain, but to examine a range of possible future outcomes.

This report from Phase I of the project ignores the penetration of advanced powertrains, such as Battery Electric- or Fuel Cell Electric Vehicles, but this does not mean the group thinks such powertrains will not be deployed before 2030. Scenarios including the deployment of advanced powertrains will be modeled in Phase II of the project.

The model results show that the effect of reduced spending on fuel more than outweighs the impact of increased spending on vehicle technology to reduce carbon emissions.

Fig 1.2 - Rate of technology deployment in the Tech 1 scenario until 2030



Source: Ricardo-AEA

At an individual level, the cost of additional vehicle technology adds about €1,000 - €1,100 to the cost of the average car in 2020, compared to the average 2010-manufactured car. However, this is offset within several years via fuel savings. The owner of the average new car in 2020 will spend around €400 less on fuel each year than the owner of the average 2010-manufactured car.

At the EU level, the capital cost of the car and van fleet rises to €472 billion in 2030, in the Tech 1 scenario, compared to €426 billion in the Reference Case, where fuel-saving technology is frozen at current levels (Fig 1.3). This represents €46 billion of additional capital costs. In this same scenario, the EU fuel bill (excluding fuel taxes and duties) is €166 billion in 2030, compared to €245 billion in the Reference Case. This represents avoided fuel costs of €79 billion (Fig 1.4).

At the EU level, this makes the total cost of running and renewing the EU car fleet in 2030 about €33 billion lower than in the Reference Case. This efficiency improvement feeds through to the wider economy in two ways. Firstly, there is a direct benefit to GDP from reduced imports of fossil fuels, which improves the trade balance. Secondly, there are indirect benefits to households and businesses, as lower operating costs are passed on in the form of lower prices for customers. For households this means an increase in real incomes. For businesses this gives a boost to competitiveness against foreign firms.

Fig 1.3 - Total capital cost of the EU car and van fleet until 2030 under the 3 scenarios modeled (excl tax)

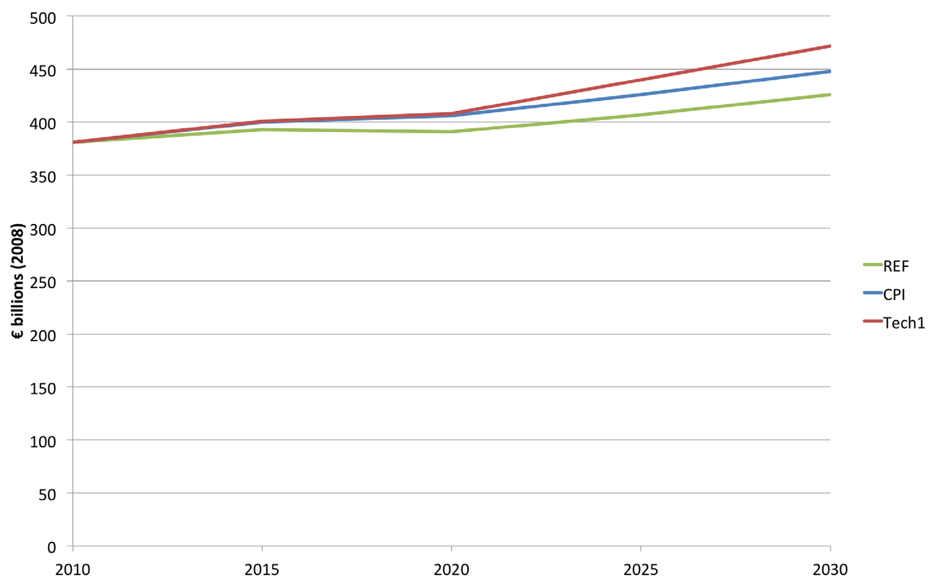
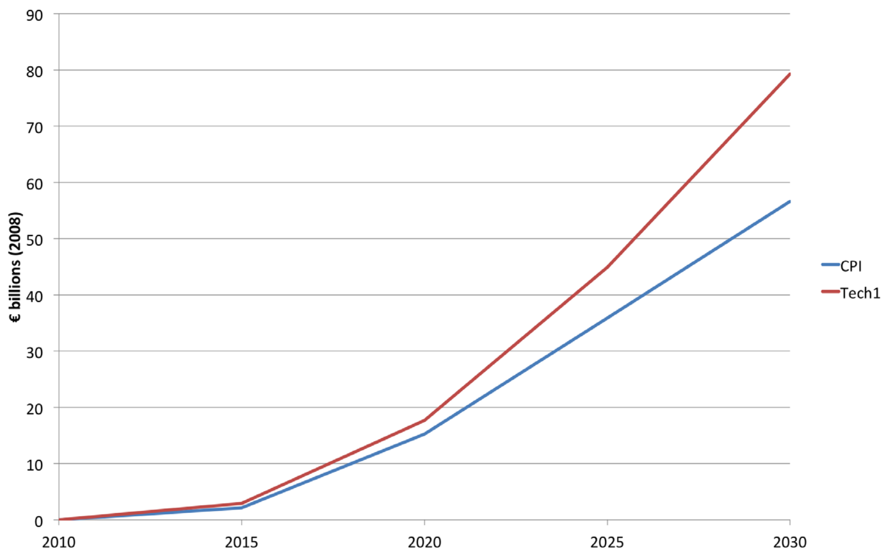


Fig 1.4 - Avoided fuel costs for the EU car and van fleet until 2030, relative to the Reference Case (excl tax)



The E3ME model results show that increased spending on the technology within vehicles leads to job creation. This derives from increased jobs in the manufacturing of fuel-efficient automotive components and from a general boost to the wider economy as a result of decreased spending on imported oil. The Tech 1 scenario could create around 443,000 net additional jobs by 2030, while the CPI scenario creates around 356,000 (Fig 1.1).

The combined impact on GDP is neutral to very mildly positive (+€10 billion to +€16 billion in 2030 in the two scenarios presented here) (Fig 1.5). Even when using the highest-case costs for technology, the GDP impact remains unchanged overall, while around 413,000 net additional jobs are created. This derives from the fact that most of the money spent on fuel leaves the European economy, while most additional money spent on fuel-saving technology remains in Europe as revenues for the technology suppliers. For example, EU companies that supply fuel-efficient start-stop mechanisms would benefit from an increase in revenue, due to an increase in demand for their products.

These economic and employment results are tax-neutral, meaning that total government tax revenues are modelled as equal in all scenarios. The results also take full account of negative impacts in the losing sectors in a low-carbon transition, such as the refining, distribution and retail of fossil fuels.

The positive impact on jobs and GDP was highest in sensitivity analyses with high international oil prices, due to the increased value of avoided fuel consumption. This will become an increasingly important economic factor in Phase II of the project, which looks at the timeframe 2020-2050, when advanced powertrains play an increasing role.

The impacts in Phase II are typified by higher costs of technology and greater avoided fuel costs. In addition, there is a new dimension from the substitution of oil, which is largely imported, with electricity and hydrogen, which are largely generated from indigenous energy resources. The findings will carry particular significance in light of concerns that rising costs of imported energy might act as a brake on Europe's future economic recovery.

Fig 1.5 - Economic impacts in 2030

Monetary figures are shown as absolute difference from the Reference Case (€2008). Results are provisional.

	REFERENCE		CURRENT POLICY INITIATIVE	TECH 1 SCENARIO
Capital cost EU car and van fleet (excl tax)	€426 bln	↑	+€22 bln	+€46 bln
Fuel cost (excl tax, duties)	€245 bln	↓	-€57 bln	-€79 bln
Total cost EU car and van fleet (excl tax) *	€803 bln	↓	-€35 bln	-€33 bln
Employment	230 mln	↑	+356,000	+443,000
GDP	€15,589 bln	→	+€16 bln	+€10 bln

Source: Cambridge Econometrics E3ME

* This number includes annual running costs such as maintenance, which is why it is higher than the sum of the capital cost and the fuel cost.

Cambridge Econometrics
Covent Garden
Cambridge CB1 2HS
United Kindgom

www.camecon.com

Ricardo-AEA
Marble Arch Tower
55 Bryanston Street
London W1H 7AA

www.ricardo-aea.com