

Context

The European Parliament and Council of Members are currently considering a new Commission proposal to reduce CO₂ emissions from passenger cars and vans.¹ Competitiveness issues are likely to be a key consideration in this debate, particularly since some companies are in the process of closing manufacturing plants to address longstanding over-capacity and in response to current weak sales in local markets. Vehicle manufacturers make repeated claims that regulations to improve the efficiency of cars damage the competitiveness of the automotive industry and affect employment, but typically provide limited or no evidence to support their assertions.

This briefing paper, and the supporting report upon which it is based, fill this evidence gap about the employment effects of lower carbon vehicles. They summarise a review of published literature undertaken by CE Delft. The study² considered employment effects of technologies to improve the efficiency of current conventional vehicles using internal combustion engines, and the possible consequences of a long term shift to e-mobility using electric or hydrogen powered vehicles.

The key conclusion from the study is that ‘employment benefits are likely’ to result from CO₂ regulations.

The European Commission Impact Assessment³ accompanying its recent proposal for CO₂ regulations to 2020 supports this conclusion.

Inevitably there will be winners and losers (notably jobs will be lost in refining and fuel distribution) but these are likely to be more than offset by new engineering jobs to develop and supply low carbon technologies for vehicles, and supply the electricity and the infrastructure to charge electric vehicles.

In the forthcoming debates in the European Parliament and Council about the Commission’s proposal, it is essential to distinguish between the employment benefits arising from the regulations and job losses in some companies arising from steps to address production overcapacity and weak sales.

The research

The research was funded by the European Climate Foundation; CE Delft reviewed a total of 30 studies: 20 considered the impact on employment of measures to reduce vehicle CO₂ emissions and fuel consumption; 3 focused upon the macroeconomic impacts of reduced oil imports. The results of 7 studies were disregarded as they reproduced other reviewed reports. 4 of the studies considered the EU as a whole; 7 the situation in specific EU countries (including 4 for Germany); 7 studies were global and 6 focused on the US. The studies were commissioned reports by governments or lobby groups and generally undertaken by independent consultancies.

Effects on direct employment

The evidence from published literature show that the introduction of a regulation to improve vehicle fuel efficiency and lower CO₂ emissions will generally have net positive direct-employment benefits. However, this is not necessarily true of the introduction of e-mobility (electric or hydrogen fuel-cell vehicles) that will predominately occur after 2020. The outcomes for different sectors are summarised in Table 1.

Impact	Fuel efficient/hybrids	E-mobility
Car manufacturing	Increase	Decrease
Maintenance/recycling	Neutral	Small decrease
Fuelling	Decrease	Small decrease
Infrastructure	Neutral	Increase

Table 1: Summary of direct employment effects

For **car manufacturing and automotive suppliers**, development and manufacturing of advanced technologies to make the engine and vehicle more efficient are labour intensive, creating a positive impact on employment. These are largely high quality engineering jobs that are less likely to be offshored. For example, Fraunhofer-IAO et al⁴ expect that worldwide a market volume growth of €43.4 billion will result from solutions to reduce CO₂ emissions from ICEs (internal combustion engines). On the basis of 1 job being created for each €300 thousand of added value, this is equivalent to approaching 145k jobs created through improvements in efficiency alone. Mckinsey⁵ estimates 110,000 new jobs will be created in the EU by 2030 in production and R&D, especially in chemicals and electronics through the need to produce more fuel efficient vehicles.

For electric vehicles the use of a battery (and/or fuel cell) replaces many components within a current vehicle. The possible resulting reduction in employment could be partially offset by ensuring Europe develops strong battery and advanced materials industries. To 2020, Mckinsey⁶ estimates a net 204.000 jobs could be created through the supply of electric vehicles. After 2020 the replacement of larger numbers of conventional powertrains with electric ones could lead to a net reduction in employment in vehicle manufacturing.

The cost of **maintenance** for fuel efficient vehicles including hybrids is similar to that of current vehicles and it is unlikely that there will be any significant impact on employment. It is possible electric vehicles will require less maintenance with a subsequent reduction in servicing costs and jobs. This may however also be offset to some degree by an increase in jobs in recycling.

Jobs will be lost in **fuelling** vehicles, in refining and gasoline stations, as a result of increased efficiency. The switch to e-mobility implies an even lower demand for oil but a higher demand for renewable electricity that has positive employment benefits. US research⁷ shows renewable energy investments generate 17 jobs per \$1 million value added, compared to 5 in refining. Since most European countries are net importers of oil and produce energy domestically, there

will be employment benefits from the shift.

The scale of the jobs created through building new **infrastructure** to support e-mobility (such as electric charging points) is not widely researched but will be positive. One German study indicates 20 thousand jobs could be created through establishing hydrogen infrastructure in Baden-Württemberg.⁸

Indirect employment effects

Indirect employment effects arise through changes to the labour market, additional consumer spending from savings on fuel bills, innovation and an improved balance of payments for oil importing countries. These are potentially very significant but poorly researched. A summary of the indirect employment effects is shown in Table 2.

Impact	Fuel efficient/hybrids	EV
Higher purchase costs	Decrease	Decrease
Lower mileage costs	Increase	Increase
Consumer spending (assuming that total cost over lifetime of car are smaller than in BAU)	Increase	Increase
Impacts on trade balance (oil imports)	Increase	Increase
Innovation and competitiveness	Increase	Increase
Rebound impacts labour market	Unknown	Potential increase

Table 2: Summary of indirect employment effects

The impacts on **consumer spending** depend on whether the switch to advanced vehicles is economical to consumers over the car lifetime. The European Commission's Impact Assessment supporting the recent regulatory proposal confirms that the total cost of ownership will decline (since lower running costs offset higher purchase costs over the lifetime of the vehicle). The resulting savings are likely to be reinvested through higher personal expenditure with strongly positive employment effects. The Impact Assessment states the cost of oil consumption for cars and vans are about €100bn per year; avoided fuel use as a result of more efficient vehicles "increases progressively over the decade 2020 to 2030 from €27bn per year in 2020-2025 to €36bn per year in 2025-2030." The effect is expected to increase GDP by around €12bn and annual expenditure on labour by around €9bn. This is since vehicle manufacturing is more labour and export intensive and purchase of fuels is import intensive. The Commission forecast positive impacts in demand for basic metals, wholesale trade, chemicals and rubber. The Commission confirm their findings are also supported by a number of other assessments.

Reduced oil consumption leads to lower **oil imports** that in turn results in: a fall in international oil prices; an economy that becomes more resistant towards 'oil shocks'; and an ability to increase investment in new industries, increasing innovation and competitiveness. The Impact Assessment quantifies these benefits. The European Commission Impact Assessment estimates the economic benefits of improved energy security arising from its proposed regulation of car and van CO₂ to 2020. The analysis calculates the aggregate energy security benefit between 2020 and 2030 is €20bn.

Regulations can also **stimulate innovation and increase competitiveness** in the automotive sector and fuel efficient technologies and vehicles have considerable export potential. Vehicle CO₂ targets are also warranted on economic grounds to mitigate the externalities from car ownership and use. A recommendation of the recent Cars 21 Group⁹ was that "The regulatory targets for light duty vehicle CO₂ emissions are essential for ensuring the reductions needed to meet the EU medium and long term climate objectives. These are also expected to drive innovation."

Conclusions

On the basis of published literature, CE Delft states that 'employment benefits are likely' to result from policies promoting more fuel efficient vehicles and e-mobility such as recent regulatory proposals for car and van CO₂ emissions to 2020. This is confirmed by the European Commission in its Impact Assessment. Inevitably there will be sectors that lose jobs, notably the (not very labour-intensive) refining and fuel distribution. However, these are likely to be more than offset by others such as new engineering jobs to develop and supply low carbon technologies for vehicle, supply the electricity and the infrastructure to charge electric vehicles.

More fuel efficient vehicles and e-mobility increase employment; production overcapacity will reduce it.

Notably, fuel efficient and e-mobile vehicles are cheaper to run with lower lifetime costs and as a result will spur additional consumer spending. The additional economic activity will create employment as more jobs are created through the domestic consumer spending (such as for entertainment) than if the money was spent on oil imports. Fuel efficient vehicles are therefore one way to reinvigorate consumer spending, benefiting the EU economy. Good planning and training can help to smooth the transition and ensure there are adequate and appropriately qualified engineers to ensure fuel efficient vehicles continue to be manufactured in Europe.

Many manufacturers are currently benefiting from a massive global increase in demand for vehicles (26%)¹⁰ in 2010. Whilst the market in some EU countries is undoubtedly depressed, those companies that have expanded into emerging markets are reaping considerable profits from their investment. These emerging markets are also demanding more fuel efficient vehicles either through regulation or consumer demand. Some job losses in vehicle manufacturing are inevitable in the next few years in those companies that are unable to benefit from the expanding global market; and in response to both depressed local sales and historic manufacturing overcapacity. For the wider economy the published evidence strongly suggests fuel efficient vehicles will nevertheless remain positive for employment.

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References

- ¹ European Commission, DG Climate Action, Policies, Transport, CO2 from Cars; available at: http://ec.europa.eu/clima/policies/transport/vehicles/cars/index_en.htm
- ² Literature review on employment impacts of GHG reduction policies for transport, CE Delft 2012, available at: [CE Delft 7708 koopman final revision.pdf](#) PDF, 842.0 KByte
- ³ Commission Staff Working Document Impact Assessment Accompanying the documents Proposal for a regulation of the European Parliament and of the Council amending Regulation (EC) No 443/2009 and Regulation (EU) No 510/2011 to define the modalities for reaching the 2020 target to reduce CO2 emissions from new passenger cars, available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52012SC0213:EN:NOT>
- ⁴ Wirtschaftsministerium, Baden-Württemberg, Fraunhofer-Institut für Arbeitswissenschaft und Organisation (IAO), Wirtschaftsförderung Region Stuttgart GmbH (WRS) (Hrsg.); Strukturstudie BWe mobil: Baden-Württemberg auf dem Weg in die Elektromobilität; Stuttgart : Fraunhofer-Institut für Arbeitswirtschaft und Organisation, 2010. Available at: <http://www.iao.fraunhofer.de/images/studien/strukturstudie-bwe-mobil.pdf>
- ⁵ Boost! Transforming the powertrain value chain - a portfolio challenge, S.I. : McKinsey & Company, 2011. Available at: <http://autoassembly.mckinsey.com/html/resources/publication/b Boost Transforming powertrain 2011-02.asp>
- ⁶ BMU (Hrsg.); Beitrag der Elektromobilität zu langfristigen Klimaschutzziele und Implikationen für die Automobilindustrie; Berlin : Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit; McKinsey 2010. Available at: http://www.bmu.de/files/pdfs/allgemein/application/pdf/elektromobilitaet_klimaschutz.pdf
- ⁷ Pollin, R. Garrett-Peltier, H., Heintz, J. & Scharber, H. for Center for American Progress and Political Economy Research Institute. 2008, available at: http://www.americanprogress.org/issues/2008/09/pdf/green_recovery.pdf
- ⁸ Studie: Mit Wasserstoff 20.000 Jobs in Baden-Württemberg möglich, available at: http://www.e-mobilbw.de/Pages/newssystem.php?ES3_100_State=Index&ES3_100_Id=124#.UDOMQ6N2w0E
- ⁹ Cars 21 Group High Level Group on the Competitiveness and Sustainable Growth of the Automotive Industry in the European Union: http://ec.europa.eu/enterprise/sectors/automotive/files/cars-21-final-report-2012_en.pdf
- ¹⁰ Organisation Internationale des Constructeurs d'Automobiles (OICA) 2011 Production Statistics <http://www.oica.net/category/production-statistics/>