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FUTURES

US REPORT SUMMARY



Cambridge Econometrics
Philip Summerton
Hector Pollitt
Sophie Billington

The International Council
on Clean Transportation
Josh Miller
Cristiano Façanha

Pöyry Management Consulting
Gareth Davies
Brendan Cronin
Benedikt Unger

This is a summary of the report:
"Effects of low-carbon transport
policies on long-term oil prices and
the US economy"

[http://www.camecon.com/
OilMarketFutures.aspx](http://www.camecon.com/OilMarketFutures.aspx)

Key messages



Policies to tackle climate change are likely to lead to lower oil prices, according to the results of this analysis. As governments start implementing the Paris Agreement, they will increasingly need to cut carbon emissions from transport by curbing the combustion of petroleum fuels. Lower oil prices will prevail in this lower-demand scenario, compared to a business-as-usual scenario where oil demand would rise unchecked and in line with economic growth and expanding mobility trends.

Amid today's low oil prices, it is easy to forget the long-term fundamentals. The sharp fall in oil prices since mid-2014 has created considerable uncertainty in global energy markets. Although initial reductions in the oil price were due to low-cost US shale oil production and OPEC's response, more recently the volatility in prices has been due to short-term market uncertainty in light of unprecedented levels of oil stocks in rich countries, slowing economic growth in China, new supplies from Iran, among other factors. This follows a period in which geopolitical factors, such as conflict in Ukraine and the rise of the Islamic State in Iraq, helped push oil prices to \$100-\$120 per barrel over the period 2011-2014.

While short-term factors, such as geopolitics, speculation and sentiment, play a role in setting spot prices for oil, in the long-term the most important factors are those that affect the marginal cost of development. One such factor is the imperative to tackle climate change.

Governments are meeting this challenge by setting policies that signal a long-term direction of travel for investment in low-carbon solutions. For example, the US has set a target to reduce greenhouse gas emissions by 28% by 2025 in-line with a long-term ambition to reduce greenhouse gas emissions by more than 80% by the middle of the century. In the time horizon of 2025-2050, it is most relevant to consider oil markets in terms of the long-term fundamentals.

In a world without climate policies to drive investment in low-carbon technologies, this study finds that global demand for oil would grow from 94 million barrels per day (mbpd) in 2015 to 112 mbpd in 2030, an increase of 19%. By 2050, demand would grow by a further 35% to 151 mbpd, primarily driven by economic growth in Asia and higher demand for aviation.



The global crude oil market in 2015 had an excess of 2 mbpd of supply over demand due to rapid increases in US production and OPEC's strategic response to maintain market share. However, anticipated growth in oil demand out to 2020 should absorb this over-supply, and existing production will continue to decline, aggravated by under-investment amid current low oil prices. This would lead to a situation in the 2020s where significant investment in new non-OPEC production capacity is needed, and oil prices will need to rise to around \$80 per barrel to stimulate that production. Ultimately, without major new finds or step changes in production techniques, increasing demand would push world prices above \$90 per barrel by 2030 and over \$130 per barrel by 2050 (in 2014 prices).

By contrast, in a world where climate policies are being implemented to drive investment in low-carbon technologies, demand for oil will be significantly lower than in a business-as-usual case: by around 11 mbpd in 2030 and by 60 mbpd in 2050. This analysis found that vehicle efficiency standards implemented globally between 2000-2015 have already prevented the consumption of around 5 billion barrels of oil. In our Technology Potential scenario, policies that further push vehicle efficiency and electric-drive technologies into the market and reduce fuel consumption by aircraft and ships could lead to an inflexion point in 2025, after which oil consumption would steadily decline. Cumulatively, these policies could cut oil demand by 260 billion barrels between 2015 and 2050.

This reduction in demand delays the need to invest in extracting increasingly expensive oil from non-conventional sources, and the long-term market price of oil would settle around a stable band between \$83 and \$87 per barrel from 2030 to 2050. In other words, the global deployment of technologies to mitigate CO₂ emissions would cause oil prices to be lower than they would otherwise be in a business-as-usual scenario: Around 8.5% lower in 2030; 24% lower in 2040; and 33% lower in 2050, according to the results of this analysis.

The central findings of this study reinforce the findings of the International Energy Agency (IEA). In the World Energy Outlook (2015), the IEA projects that if mankind constrains atmospheric greenhouse gas emissions below 450 parts per million - a level generally seen as consistent with meeting the 2°C climate target - the global demand for oil in 2030 would be around 86 mbpd, compared to 104 mbpd in a scenario based on current policies.



While the IEA study uses slightly different assumptions, it finds a comparable impact on oil prices: Prices would settle around \$90 per barrel after 2030, rather than increasing to around \$150 per barrel by 2040 in the current policies scenario.

The US economy will be better off in the long run as a result of lower oil prices, despite the lost revenue for US oil producers. The US, which produced around 9.5 mbpd of oil in 2015, would see a small reduction in GDP arising from the fall in production to meet lower global demand for oil in the TECH scenario. However, this would be more than offset by the impact of lower oil prices, which lead to a net positive impact on the US economy.

Lower oil prices reduce inflationary pressure on consumers, increasing real incomes and allowing for more expenditure on other goods and services that provide larger domestic value-added for the US economy. As a result of the lower oil prices modelled in this analysis, US average incomes would be 0.4% higher by 2030 and 1.3% higher by 2050, relative to business-as-usual. US GDP would be 0.2% higher by 2030 and 0.5% higher by 2050. This would drive a 0.1% net increase in employment by 2050, equivalent to more than 172,000 extra jobs, which would mostly be created in the service sectors, reflecting typical household consumption patterns.

It is important to note that the economic benefits described above are the result of oil price impacts in isolation. The transition modelled here would also lead to other important shifts in the US economy. Additional economic benefits could arise from the increased investment in low-carbon technologies and energy sources, as well as from more efficient mobility, which allows a shift in spending away from fossil fuels and towards other areas of the economy. The study "Fuelling Europe's Future" shows that, for Europe, such a transition for cars and vans alone could deliver an additional 1% to EU GDP by 2050.

This study also delivers important insights into the long-term viability of exploration for unconventional oil sources. At the level of demand projected in the Technology Potential scenario, it would not be profitable to extract oil from the Arctic; from many deep-water oil reserves; as well as from in-situ tar sands.

In summary, if implemented globally, policies to tackle carbon emissions for transport will lower global oil prices, with a positive impact on many oil-importing economies and important implications for the profitability, or not, of unconventional oil extraction.

Executive summary



The scope of the study

The European Climate Foundation commissioned Cambridge Econometrics (CE), the International Council on Clean Transportation (ICCT) and Pöyry Management Consulting to carry out research into the potential of transport technology to reduce oil consumption and its subsequent impact on oil prices and the wider economy, by:

- developing alternative but plausible scenarios for global oil demand, which the ICCT developed by applying its policy and technology framework for transport
- analysing oil production and prices in response to changes in demand, through the application of Pöyry's Cronos oil market model
- modelling the wider economic impact of changes in crude oil prices, through the application of CE's macroeconomic model E3ME to understand the impact on the US economy

To improve the robustness of the findings, a series of sensitivities were undertaken to explore differences in demand projections and future supply expectations and supplier behaviour. Throughout the project, the research team consulted with stakeholders with a working interest in climate and energy policy who provided feedback and expert knowledge.

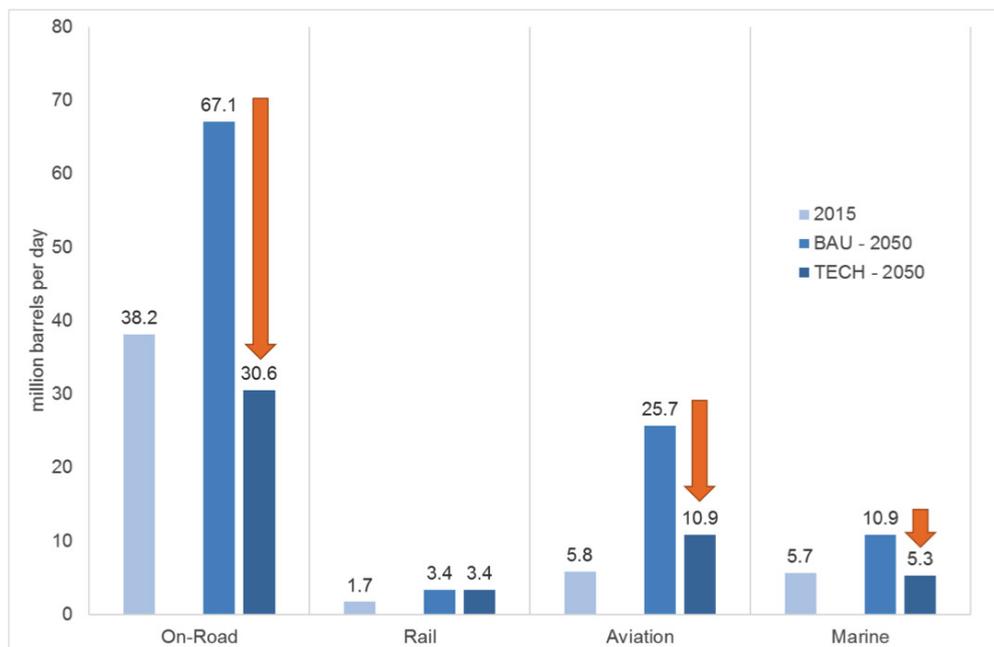
Oil demand scenarios

Two main scenarios of oil demand from transport were developed:

The Business-As-Usual (BAU) scenario takes into account the technology-forcing policies that have been adopted to date for on-road vehicles, aircraft, and marine vessels. Policies include the 95gCO₂/km regulation for passenger cars and 147gCO₂/km for light commercial vehicles in the EU in 2021 and 2020 respectively; light-duty vehicle standards for 2017-2025 in the US and Canada as well as Phase 1 regulations for Heavy-Duty Vehicles (HDV); Light-Duty Vehicle (LDV) regulation in China, Japan, India, South Korea, Brazil and Mexico; heavy-duty vehicle regulation in Japan and China; and the Energy Efficiency Design Index and the Ship Energy Efficiency Management Plan rules in the marine sector.

The Technology Potential (TECH) scenario presents the ICCT's view of an attainable yet ambitious adoption of transport technologies over the projection period. It considers the strengthening of technology-forcing policies for LDVs and HDVs, passenger aviation and international marine. It assumes an extension of existing vehicle efficiency regulations, as well as an expansion of these policies to the rest of the world.

Figure ES.1: Global oil demand from transport

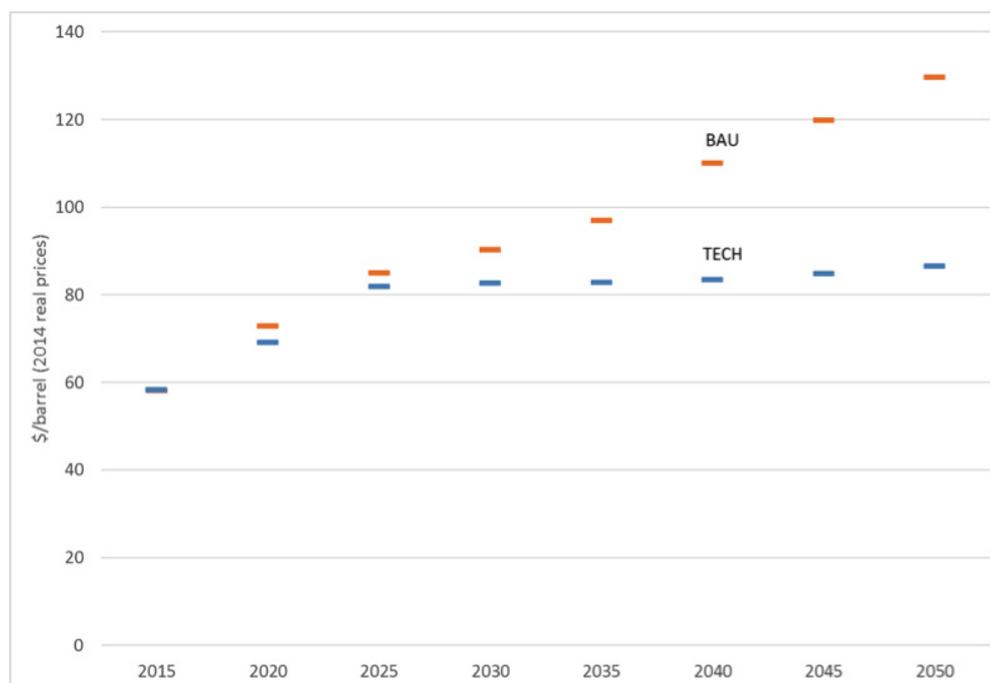


Modelling the scenarios leads to two very different projections of world transport oil demand (see Figure ES.1). By 2050, policies that push vehicle efficiency and electric-drive technologies into the market and reduce fuel consumption of aircraft and marine vessels (consistent with the TECH scenario) could reduce annual oil consumption after its peak in 2025, and avert a doubling of transportation oil demand from 2015 to 2050 that is projected under the BAU scenario. Cumulatively, the policies and technologies associated with the TECH scenario could cut oil demand by 260 billion barrels from 2015 to 2050 compared to the BAU scenario. Notably, the scale of these potential savings (56.9 mbpd) in 2050 is greater than the total level of transportation oil demand in 2015 (51.4 mbpd).

Oil prices

Reducing oil demand by 11 mb/d in 2030 and 33 mb/d in 2040 (the difference between the TECH and BAU scenarios) could reduce oil prices by \$8/barrel and \$27/barrel, respectively (see Figure ES.2). This reduction would save an average of \$330 billion in crude oil consumption each year between 2020 and 2030.

Figure ES.2: Oil price projections

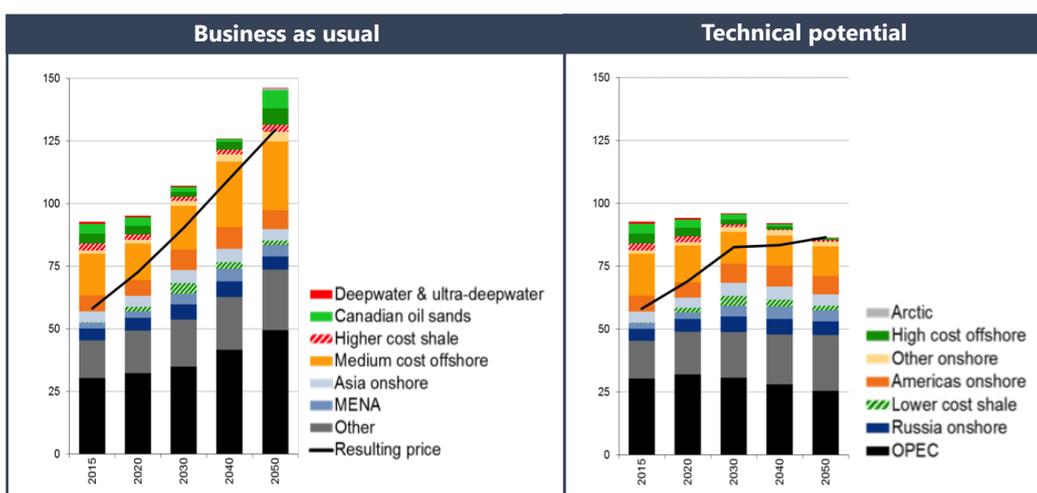


This difference may be as high as \$37/barrel in 2040 if the incremental reserves required in a high demand scenario are more difficult to access. When taking a more conservative assumption for non-OPEC source availability, more expensive sources are required both in the TECH and the BAU scenario. The price reduction potential in this case increases to 15% in 2030 and to 29% in 2040.

The modelling of long-term market fundamentals projects that for the BAU scenario, oil prices will recover to \$80/barrel by around 2020. The oil market in 2015 had an excess of 2 million barrels per day of supply over demand due to rapid increases in US production and OPEC's strategic response to maintain their market share. Oil demand will continue to grow to 2020 and existing production is projected to decline, causing prices to return to \$80/barrel after 2020 under the scenarios used in this study.

If OPEC pursued a more aggressive strategy, prices could be reduced further by 1.5-4% compared to the TECH scenario from the late 2030s. Performing a sensitivity on the TECH scenario with OPEC pursuing a strategy to increase its market share led to price decreases from \$82.7/barrel to \$81.5/barrel in 2030, and from \$83.5/barrel to \$81.0/barrel in 2040.

Figure ES-3: Oil production by source

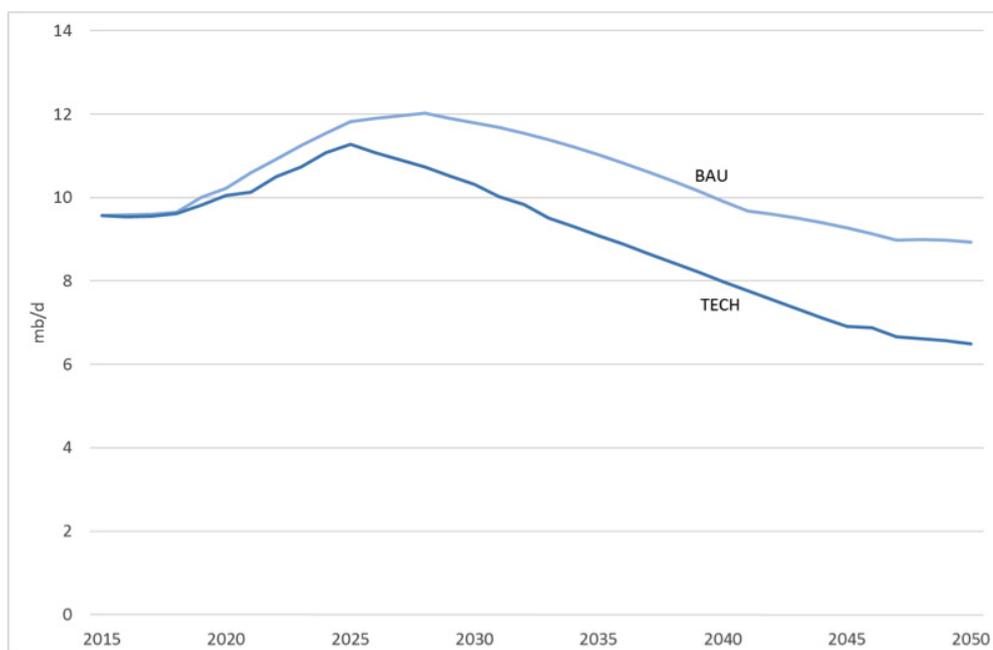


Oil production

As prices return to \$80/barrel in the 2020s in both scenarios, U.S. shale oil will return to production growth since most US shale is economical at this price. Although US shale oil production growth has been more resilient than expected in response to lower prices, the second half of 2015 has seen a reversal of production growth and a fall in production is expected in 2016 in light of very low prices. At least 75% of shale resources are economical to produce at prices above \$80/barrel and therefore as prices recover in all the scenarios we see an increase in US production until 2025 from around 9.5 mb/d in 2015 to 11.3 mb/d by 2025 in both scenarios (see Figure ES.4). After this date, more and more lower-cost shale oil sources are expected to be mostly depleted and more expensive sources are not economical at the \$80/barrel price that is maintained in the TECH scenario. As a result, U.S. production decreases from 2025, reaching 6.5mb/d in 2050 in the TECH scenario while in the BAU scenario, more shale sources are produced due to meet the higher demand.

In this case, OPEC market share could increase from 40% to 44% in 2040 and to 48% in 2050. As prices return to \$80/barrel in the 2020s in both scenarios, U.S. shale oil will return to production growth (see figure ES.3). We believe that around 75% of shale resources are economical to produce at prices above \$80/barrel, and therefore as prices recover in all the scenarios we see an increase in US production until 2025

Figure ES.4: US oil production





Given the very high cost of ultra-deepwater and Arctic sources, these would only be available at prices significantly above \$100/barrel. Reduced oil demand and lower prices are therefore expected to lead to prevent the need for production from deepwater and Arctic sources. While some of these sources are expected to be developed in the 2040s under the BAU scenario, they are not economically recoverable in the TECH scenario.

Impacts on the US economy

The US benefits from the oil market effects associated with a global transition to more efficient transport technologies. However, the impacts and economic flows following lower oil prices in the US economy are somewhat different than those in the EU, as reported in the European version of this study.

The net impact on GDP as a result of the lower oil prices and production in the TECH scenario is 0.4-0.5% by 2050, which is similar in scale to the GDP impact in the EU. The GDP impact can be decomposed into two impacts working in opposite directions. There is a positive GDP impact arising from lower oil prices of around 0.1-0.2% by 2030 and 0.6-0.7% by 2050. However, the US is a large producer of oil and as a result of the fall in global oil demand, there is a small reduction in US oil production which leads to a -0.2% impact on GDP by 2050.

The net impact on employment following the oil price and oil production changes in the TECH scenario reaches 0.1% (172,000 jobs) by 2050. The oil extraction sector has a low labour intensity, so the negative impact on employment in the US oil extraction sector and its supply chain is small, equivalent to a reduction of around 15,000 jobs by 2050).

Disclaimer

This report was commissioned by the European Climate Foundation, which itself is funded solely from private philanthropic organisations.

The ECF does not have financial ties to political bodies or to businesses.

The research presented in this report was reviewed by a panel of experts in energy and climate policy.

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Original concept & design by: glo.deglory@gmail.com
Updated design by: Cater Communications