

Occo Roelofsen,
Namit Sharma,
Rembrandt Sutorius,
and Christer Tryggstad

Is peak oil demand in sight?

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Our latest research suggests lower long-term growth in demand for oil than previously forecast. This warrants a fresh, critical look at energy investments.

Energy outlook: Key insights

Our business-as-usual case integrates the latest McKinsey view on economic-growth fundamentals and granular sector and regional insights. Six key points have emerged:

1. Growth in global energy demand will decelerate to 0.7 percent per year through 2050, a rate 30 percent slower than we had previously forecast.
2. Emerging and developing countries¹ will drive all growth in energy demand, while European and North American demand will decline.
3. Chemicals will grow at more than double the rate of total energy demand, while light-vehicle demand will peak around 2023.
4. Demand for electricity will outpace demand for other energy sources by more than two to one. Solar and wind will represent almost 80 percent of net added capacity and 34 percent of generation by 2050.
5. Fossil fuels will dominate the total energy mix through 2050, but their share of total energy will decline to 74 percent from 82 percent. While gas is a relative winner (growing at almost twice the rate of total energy demand), coal will peak by 2025, and oil demand growth will flatten to 0.4 percent.
6. Energy-related carbon dioxide emissions will flatten and start to decline around 2035 as a result of the transformation of light vehicles (more-efficient combustion engines and more electric vehicles on the roads) and the strong shift to wind and solar in power generation.

¹ Emerging and developing countries are defined as all countries outside the Organisation for Economic Co-operation and Development (OECD).

Could peak oil demand be in sight?

The total demand for liquid hydrocarbons will play out as a tug of war between growth in the petrochemical sector and declining demand from passenger cars. Petrochemical feedstock will drive 70 percent of the growth in demand for liquid hydrocarbons through 2035. Demand for liquids, excluding chemicals, will peak and flatten by 2025 because of a decline in demand

from light vehicles. The petrochemicals demand will drive the growth of light end products, a large share of which are not made from crude oil.

Petrochemicals. The industry's traditional rule of thumb is that chemicals demand grows at 1.3 to 1.4 times the rate of GDP. Globally, we see this relationship changing, especially as mature markets reach a saturation point for plastics. Markets such as Germany and Japan are clearly declining in per capita plastics demand. As a result, we see chemicals demand growing at only 1.2 times GDP in the short term, from a global perspective. In the long term, that growth will decline to match the GDP growth rate. Two elements could transform chemicals demand further: plastics recycling and plastic-packaging efficiency. If we imagine that global plastic recycling improves from today's 8 percent rate to 20 percent in 2035 and that plastic packaging use declines by 5 percent, demand for liquid hydrocarbons driven by chemicals could be approximately 2.5 million barrels per day below our business-as-usual case.

Light vehicles. McKinsey's latest automotive consensus suggests that by 2030, electric vehicles (including hybrids and battery-powered plug-in vehicles) could represent close to 50 percent of new cars sold in China, the European Union, and the United States, and about 30 percent globally. Also, for the first time, our business-as-usual case includes autonomous-vehicle adoption and car sharing. If the market penetration of electric, autonomous, and shared vehicles accelerates, oil demand driven by light vehicles could be approximately 3 million barrels lower in 2035 than assumed in the business-as-usual case. Together, this accelerated adoption of light-vehicle technologies and the adjustment of plastics demand could reduce 2035 oil demand by nearly 6 million barrels per day. An important result is that oil demand will peak around 2030, at fewer than 100 million barrels per day in this scenario.

Structural shifts in fundamentals drive a lower demand outlook

Underlying these outcomes, the McKinsey Global Institute (MGI) sees reduced macroeconomic growth for the coming decades, including changes to the structure of growth.

The global population is aging. By 2050, about 25 percent of the population of developed economies, including China, will be 65 or older—this means a lower proportion of workers in the total population. This relatively shrinking labor force will lead to a global macroeconomic downshift. Assuming current trends continue, with no unexpected uptick in productivity, MGI expects growth in GDP to be 40 percent lower during the next 50 years compared with the previous half century.

Additionally, the structure of GDP growth is shifting toward services. MGI's latest research suggests that China, today's second-largest energy consumer, is shifting its economy from heavy industry to services to keep growing. At the same time, the surge of energy-intensive industrialization that we have seen in China during the past decades will likely not be replicated elsewhere. That means a greater share of global GDP will be driven by services, which are less energy intensive.

The energy intensity of GDP growth is declining further as a result of structural shifts at the individual-sector level. For example, during the past 35 years, internal combustion engines in passenger cars have become approximately 20 percent more efficient. The industry expects another 40 percent improvement in efficiency through 2035. Accounting for all sectors of the economy, the energy intensity of global growth will fall by 50 percent through 2050.

Potential implications, and questions to answer

The downgrading of our energy-demand outlook has material implications for investments, including decisions being made today.

This is our business-as-usual case, which has significant sensitivities. For example, it would be affected by changes in GDP growth. Oil prices could decline, which could increase demand, thereby affecting the overall-demand outlook. Acceleration of technology development and adoption could alter the economics of alternatives (for example, lower electric-vehicle-battery prices). Individuals and businesses could change their behaviors (for instance, making residences more energy efficient). Changes in policies and regulations could realign incentives for suppliers and consumers (such as carbon taxation). We will deepen our analyses on all of these issues in the coming months.

However, the business-as-usual outlook suggests that resource holders and incumbents in the energy sector need to quickly develop a position on the following questions:

- What are the pockets of growth and investment?
- Where are the value pools across the system?
- What are the shaping moves and new business models required to capture value?

For more, visit Energy Insights, our unit combining analytical models, benchmarking capabilities, and proprietary insights for critical decisions on strategy, investment, and performance. [□](#)

Occo Roelofsen is a senior partner in McKinsey's Amsterdam office, where **Namit Sharma** is a partner and **Rembrandt Sutorius** is a solutions general manager with Energy Insights; **Christer Tryggestad** is a senior partner in the Oslo office.

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