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ENERGY SCENARIOS OF THE FUTURE

“By 2035 improvements in vehicle efficiency are expected to improve fuel economy by 38%, while electric car sales could account for 36% of the market by then”

There are many scenarios attempting to forecast energy demand, a number of which are shown here – predicting growth in a range of 0.4 to 1.5% per year to 2040. Each is driven by underlying assumptions about how the world might develop in terms of macroeconomics, policy and technological developments.

McKinsey Energy Insights' Business as Usual scenario sees a world where energy demand grows at an average of 0.8%/yr to 2040, primarily driven by GDP growth, estimated at 2.7% per year. Our projections differ from others as we have taken greater account of structural changes in economic growth, including an ageing population and the shift to less energy-intensive activities, particularly in developed countries and China, where 1 in 4 people will be over 65 by 2040.

We expect all energy demand growth will come from non-OECD markets, adding around 190 million TJ between 2013 and 2050 – while demand from OECD markets falls by roughly 30 million TJ.

Slowing population growth and falling fertility rates will eventually

see the global workforce plateau, and according to the McKinsey Global Institute, industrialisation at the level seen in China is unlikely to be replicated elsewhere. This means a greater share of global GDP growth will also be driven by services, which are less energy-intensive. Hence we expect a decline in overall energy intensity of 50% in the next 35 years.

Looking at the sources of demand in more detail, there are 3 sectors of interest:

- Light vehicles – by 2035 improvements in vehicle efficiency are expected to improve fuel economy by 38%, while electric car sales could account for 36% of the market by then, reducing energy demand from the light vehicle sector by 0.2% per year from 2013 to 2050.
- Chemicals – demand is expected to grow at double the rate of the rest of oil demand, potentially adding 7.5 mbd by 2035. This is especially true in developing regions, where substitution of basic materials such as wood, steel and paper are providing market opportunities.

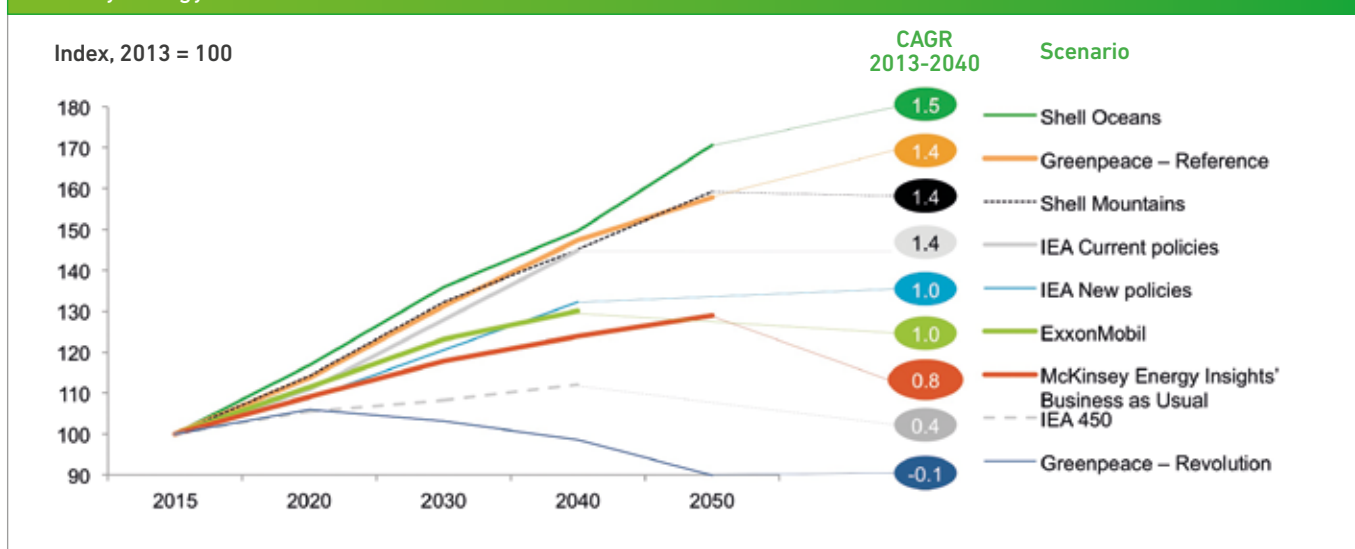
- Power – electricity demand is expected to grow at twice the rate of all other energy sources, creating many opportunities for new generation technologies. Demand will be mainly driven by building and industry electrification in China, India and other developing

countries. Solar and wind generation are expected to grow 4-5 times faster than the rest, leading to a 34% share by 2050, while coal declines after 2025.

Even with significant disruptions taking place in the McKinsey Energy

Insights' Business as Usual scenario, we expect fossil fuels to meet roughly 75% of the rise in energy demand from non-OECD countries, complemented by renewable energy sources (solar, wind, biomass, geothermal and marine), which will account for about 19% of the mix by 2050. ●

Primary energy demand^{1, 2}



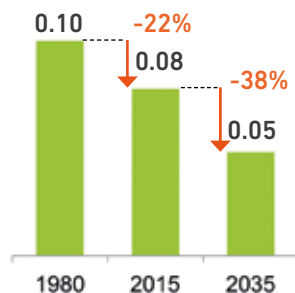
¹ Primary energy consumption is fuel into power generation and other transformation activities, fuel used in energy sector and final consumption excluding electricity/heat.

² Base years for forecasts, GEP, IEA 2013, Shell 2012, ExxonMobil 2010. Indexing assumes linear growth between base year and 2013.

Source: IEA World Energy Outlook 2015/ Shell New Lens Scenarios 201; Greenpeace Energy Outlook 2015; ExxonMobil Energy Outlook 2015; McKinsey Energy Insights.

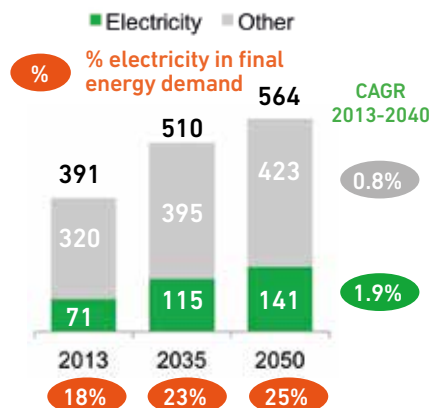
The growth is becoming increasingly energy efficient

Litres/kilometres for passenger cars



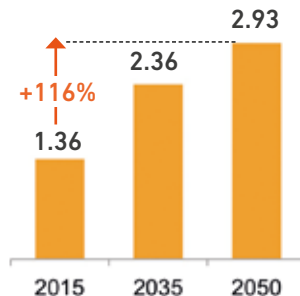
Electricity growing at twice the rate of other energy sources

Final Energy Demand, million TI



Production of organic chemicals more than doubling by 2050

Production of Organic Chemicals, Billion Tons



Source: ICIS Supply and Demand; United States Environment Agency; McKinsey Energy Insights.