

## Fact Sheet: World Energy Outlook 2016

- ▶ The **energy transition is redefining energy security**. Deployment of renewables and energy efficiency play an important role in moderating oil and gas imports, providing an extra tool to mitigate traditional energy security concerns. On the other hand, the increased role of electricity in all economies and the rising share of variable renewables (wind and solar) in power generation put electricity security under the spotlight.
- ▶ The **pledges made as part of the Paris Agreement have accelerated the pace of change in the energy sector**. Low-carbon fuels and technologies, mostly renewables, along with natural gas, win the race to meet the growth in energy demand, accounting for more than 80% of the increase to 2040. The share of oil and (especially) coal, the largest fuels in today's global energy mix, falls back.
- ▶ Although developing countries account for almost all of the 30% increase in energy demand to 2040, **many millions are still set to be left without basic energy services**. The new UN Sustainable Development Goals include a commitment (in SDG 7) to universal access to modern energy services by 2030. But, despite increased efforts, this target is missed in our projections: more than half a billion people, increasingly concentrated in rural areas of sub-Saharan Africa, are still without access to electricity in 2040 (down from 1.2 billion worldwide today). Other elements of SDG 7 are though met in our main scenario, including the target to double the rate of global improvement in energy efficiency.
- ▶ **Investment is shifting towards lower-carbon sources of energy**. Over the last 15 years, some 70% of the money going into energy supply projects went to fossil fuels. Of the \$44 trillion in investment in energy supply over the period to 2040, the share going to fossil fuels declines to 60% and an increasing share of this goes to natural gas. The amount for low-carbon investment rises, a significant shift in spending given the anticipated cost reductions for key renewable energy technologies, as does spending on electricity networks. A 2 degree pathway would require a much deeper and faster reallocation of capital, including much greater spending on improvements in energy efficiency.
- ▶ **Implementation of the climate pledges slows the projected rise in energy-related CO<sub>2</sub> emissions** from an average of 2.4% per year since 2000 to 0.5% per year to 2040. This is a major achievement (that is accompanied by reduced emissions of the main air pollutants), limiting the rise in global average temperature by 2100 to around 2.7 °C. But it is not enough: the goals of the Paris Agreement require not just a slowdown in growth, but an early peak and decline in emissions. In our main scenario, the entire carbon budget for a 2 °C future is used up by the early 2040s.
- ▶ **The value of subsidies to fossil fuels fell sharply in 2015 to \$325 billion, down from almost \$500 billion in 2014**. Lower fossil-fuel prices were the main reason for the drop, but lower prices have also given additional impetus to pricing reforms in many countries, both fossil fuel importers and exporters. Even with the drop in 2015, the amount going to subsidise fossil fuels is still more than double the \$150 billion spent on subsidies to renewable energy.
- ▶ **Renewable energy is the growth story of WEO-2016**. In our main scenario, nearly 60% of all new power generation capacity to 2040 comes from renewables and, by 2040, the majority of renewables-based generation is competitive without any subsidies. In a scenario compatible with 2 °C, significantly faster growth means that, in the four largest power markets (China, the United States, the European Union and India), variable renewables become the largest source of generation.

- ▶ **The operation and design of power systems need to be transformed to integrate high shares of wind and solar.** System integration measures are essential to give power systems sufficient flexibility: these include stronger grids, the availability of plants ready to dispatch power at short notice, incentives for system-friendly deployment of renewable technologies, demand-response and energy storage. Without such measures, variable renewables risk being idled in times of abundant generation and lose effectiveness as decarbonisation options.
- ▶ **Another year of low upstream oil investment in 2017 would risk a shortfall in oil production in a few years' time.** The conventional crude oil resources (e.g. excluding tight oil and oil sands) approved for development in 2015 sank to the lowest level since the 1950s, with no sign of a rebound in 2016. If there is no pick-up in 2017, then it becomes increasingly unlikely that demand (as projected in our main scenario) and supply can be matched in the early 2020s without the start of a new boom/bust cycle for the industry.
- ▶ **Almost all of the projected growth in oil demand to 2040 comes from freight, aviation and petrochemicals,** sectors where alternatives are scarce. Growth in oil consumption slows but reaches 103.5 mb/ by 2040. Even though the total vehicle stock almost doubles, fuel demand for passenger vehicles declines because of fuel efficiency gains, biofuels and electric vehicles. Sales of electric vehicles rise rapidly, gaining consumer appeal as more models appear on the market and the cost gap with conventional vehicles continues to narrow.
- ▶ **A more flexible global gas market, linked by a doubling of trade in LNG, supports an expanded role for natural gas in the global mix.** Gas faces strong competitive pressures, from coal in some markets, from renewables in many. The development of a more globalised market and its status as the least-polluting of the fossil fuels helps gas gain ground, overtaking coal in the global mix. Changes in market operation, business models and pricing arrangements are catalysed by a new diversity among suppliers, with North America, Australia, East Africa all emerging as major exporting regions.
- ▶ **Coal has fuelled China's rise, but it is now stalling as a result of China's transition.** There are sharp regional contrasts in coal use, from the declines seen in many OECD economies to the continued rises seen in India and Southeast Asia. China remains by far the largest coal consumer and producer, and the projected fall in coal consumption to 2040 transforms the global outlook: barring an unexpectedly dry year for hydropower, Chinese coal use is likely to have peaked in 2013.
- ▶ **The links between energy and water use are set to intensify.** The energy sector is a major water user, mainly for power generation and biofuels but also for fossil fuel production, requirements that are set to grow to 2040. The water sector is a major energy user (quantified for the first time in *WEO-2016*) for water supply and treatment, and energy consumption for water supply more than doubles to 2040, with the largest increase coming for desalination. Managing these energy-water linkages is pivotal to the prospects for successful realisation of a range of development and climate goals.