

ANALYSIS

Decarbonisation needs to accelerate

Although decarbonisation is rising rapidly on industry and government agendas, the pace needs to accelerate to meet the Paris Agreement, according to DNV GL's new report forecast. Brian Davis reports.

There's no room for complacency in terms of the pace of energy transition, according to DNV GL's latest *Energy Transition Outlook* forecasts. The consultancy estimates the oil and gas sector is set to reduce its carbon emissions by about a third (32%) by 2050. However, world emissions will remain stubbornly high until the mid-2030s.

The report emphasises the importance of scaling hydrogen and carbon capture and storage (CCS) technology as a critical catalyst to spur deep decarbonisation of the oil and gas value chain after 2035. Partnerships between government, industry and associations will be vital in accelerating the timeline on decarbonisation to reduce the risk

of missing climate targets and ambitions.

Indeed, DNV GL says the energy transition is 'nowhere near fast enough' to deliver on the COP21 Paris Agreement, which aims to keep global warming well below 2°C and ideally limit the increase to 1.5°C. Alarming, DNV GL's forecast claims the world will exhaust the 1.5°C carbon target under the Paris Agreement by 2028 and exceed the 2°C budget in 2051.

'Pressure is increasing in the oil and gas industry to decarbonise, and this is coming from all sides – from society and governments, from investors, and also from people within the industry itself. The sector is increasingly putting the energy transition at the centre of its agenda. But climate change and ambitions to reduce it are outpacing action. The industry needs to prepare for an energy system that simply does not accept the release of carbon emissions,' comments Liv Hovem, CEO of DNV GL – Oil & Gas.

The focus of oil and gas companies is currently largely directed at decarbonisation of oil and gas production, ie Scope 1 and 2 emissions. Solutions include

electrification of oil and gas assets, reduction of flaring and venting gas during production, increased efforts to detect and stem methane leaks (see *Petroleum Review*, October 2020), and improved efficiency through digitalisation. However, oil and gas production accounts for only a quarter of the industry's carbon emissions. The majority of emissions occur during the combustion and use of oil and gas, ie Scope 3 emissions.

By 2050, DNV GL expects the industry will not be measured broadly by carbon emissions per barrel of oil or gas produced, as it is today, but by 'lifecycle emissions' per barrel of oil or gas consumed. However, there are limited options to reduce emissions from oil consumption other than shifting to another energy source – like electricity – and natural gas consumption, which can be decarbonised using CCS technology.

The 2050 energy mix

DNV GL forecasts rapid energy transition between now and 2050 and expects to see the energy mix split roughly equally between fossil and non-fossil sources by mid-

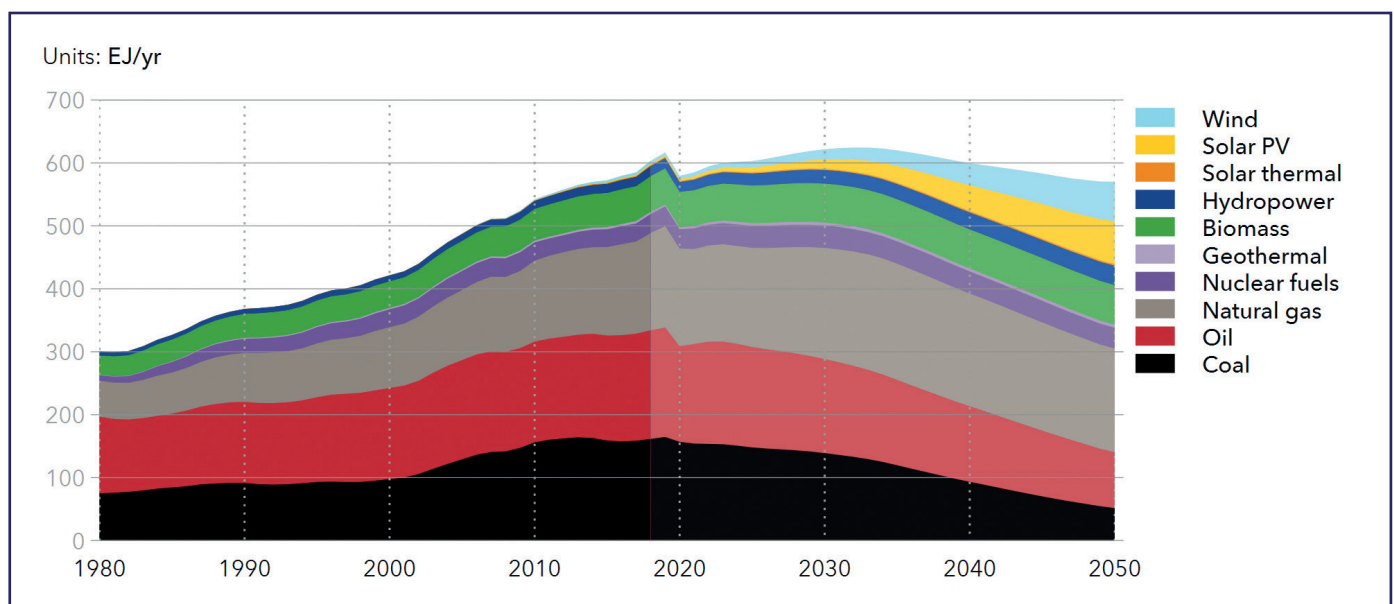


Figure 1: World primary energy supply by source – we are approaching a future where the world will need less energy, even as the global population increases and the economy continues to grow, due to large energy efficiency improvements in all sectors, accelerated by electrification

Source: DNV GL 2020; Historical data source – IEA (web 2019)

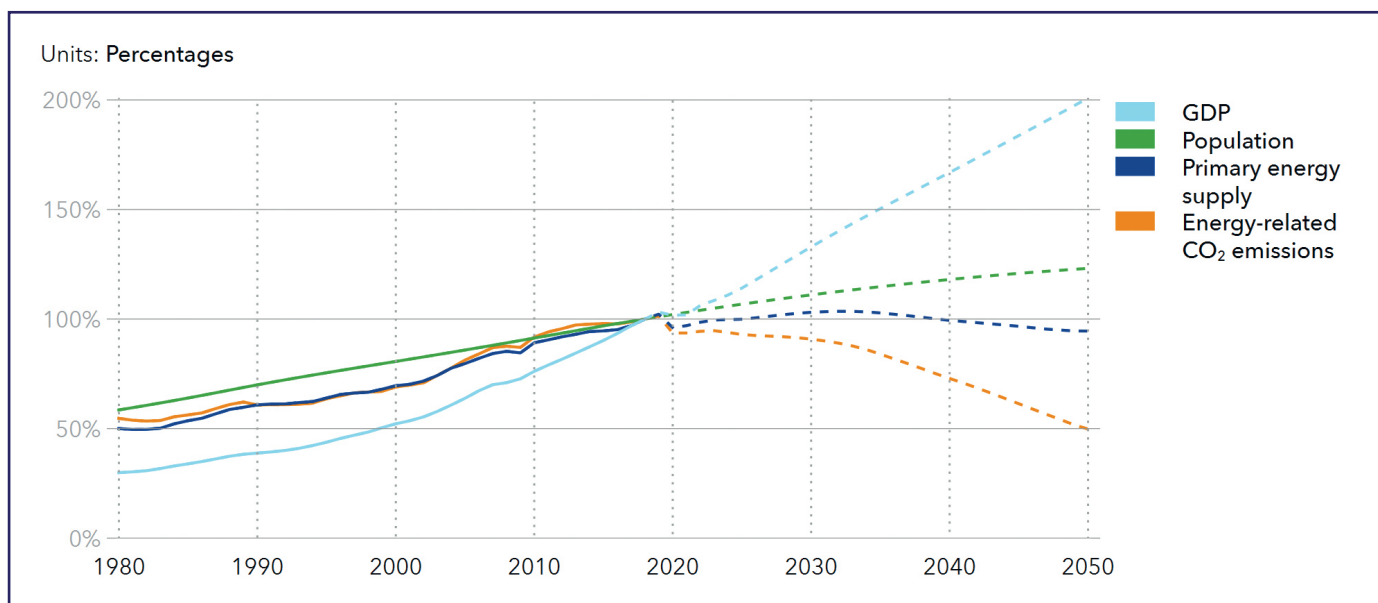


Figure 2: The decoupling of economic growth from other key parameters – economic activity (GDP) will continue to grow rapidly compared with population growth, which will rise relatively slowly; primary energy growth will first increase, then essentially flatten out; meanwhile, energy-related CO₂ emissions will almost halve by 2050
Source: DNV GL 2020; Historical data sources – UN (2017), World Bank (2018), Gapminder (2018), IMF (2020) IEA (web 2019)

century. Fossil fuels are forecast to account for 54% of primary energy supply in 2050, compared to around 80% today (see **Figure 1**). Much of this supply will come from natural gas, as it is set to become the world's largest energy source from the mid-2020s.

The consultancy expects just 13% of natural gas will be decarbonised in 2050, with 12% of world energy emissions captured by CCS – mostly from natural gas. The transformation to decarbonising gas is not expected to scale for another 15 years and will only really get going in the 2040s.

According to Hovem: 'The transition to renewables and efforts to cut carbon intensity will significantly reduce emissions. But natural gas is unlikely to be deeply decarbonised, though the world's energy system will depend upon it for years to come. It is only by removing the carbon from natural gas – before or after combustion – that the oil and gas industry can deeply decarbonise, reaching hard-to-abate sectors throughout the value chain.'

Decarbonised and green gases are forecast to have a bright future in the transition, enabled by growing use of hydrogen and CCS, complemented by renewable electricity, advancing battery technology and alternative low carbon fuels such as ammonia to provide a secure, affordable supply of clean energy.

DNV GL forecasts massive, ongoing electrification of the global energy system. Whereas electricity accounts for less than 20% of the energy mix today, it will more than

double its share by 2050. During that period, solar photovoltaics (PV) will grow 25-fold and wind 10-fold, in roughly equal shares, which will together be responsible for over 60% of the electricity generated by 2050.

In a virtual press conference launching the report, Remi Eriksen, Group President and CEO of DNV GL, emphasised: 'The plunging costs and technological advances in renewables is remarkable, and nowhere more so than in fixed and floating offshore wind.' He sees electricity powered by renewables as 'the main driver of accelerating efficiency gains in our global energy that will outpace both population and GDP growth, such that the world will reach peak primary energy supply in just over a decade from now'.

COVID-19 impact

Eriksen recognises the continuing impact of COVID-19 and anticipates energy demand will fall 8% this year. Predicting a slow recovery, he says: 'Our whole energy demand forecast is rebased downwards by 8% relative to our previous forecast through to 2050.'

Energy demand is expected to peak in the mid-2030s because efficiency gains will outpace population growth and economic growth. And efficiency gains will be largely related to the steady electrification of our global energy system. 'The net effect is that 9.4bn people in 2050 will be using almost the exact same energy as 7.8bn use today,' remarks Eriksen (see **Figure 2**).

The pandemic has also brought

forward peak emissions and will lead to an earlier plateauing of oil use. He points out that: 'Unfortunately, this is not doing much to advance the pace of decarbonisation. Solutions exist [as mentioned]... but these need a significant policy push to scale.'

The consultancy forecasts that pandemic-linked behavioural shifts, like remote working and reduced commuting, will have a lasting effect lowering energy use. According to its analysts, energy-related CO₂ emissions appear to have peaked and been brought forward by the pandemic. The report points out that transport energy use peaked in 2019, and COVID-19 has brought peak oil demand forward to such an extent that oil use may never again exceed 2019 levels. Meanwhile, natural gas is expected to peak in 2035.

But Eriksen warns: 'The alarming news is that even with peak emissions behind us and flattening demand ahead, [carbon] emissions will not fall fast enough for the world to meet the Paris ambition of net zero emission by 2050. In fact, if we want to be on track for 1.5°C of global warming, the world will have to make the same level of emissions reductions that we have seen in this pandemic every year from now until 2050. Clearly that is not sustainable, as emissions reduction this year [due to the pandemic] has come at enormous cost in lives and livelihood. To get further emission cuts in the future, we really have an enormous challenge ahead to find ways to decarbonise that

are economically sustainable and which will make a positive social impact.'

In 2030, emissions are expected to be 10% lower than the consultancy's pre-pandemic prediction, and in 2050, global energy-related emissions are forecast to be 17 GtCO₂/y, exactly half the present level. Although post-COVID stimulus packages may alter the speed of transition, the analysts remain uncertain whether COVID-19 will speed up the energy transition.

DNV GL considers that technology will be key to delivering a Paris-compliant future 'if scaled properly'. However, encouraging progress is being made and is expected to continue for solar PV, wind and battery storage.

Nevertheless, the report warns: 'Market forces alone will not fix hard-to-abate sectors. Stronger policies and regulations are required.' Generally, decarbonisation of high-heat processes in industry, heating of buildings and heavy transport is proceeding too slowly. Though solutions exist, including hydrogen, CCS and further energy-efficiency improvements, these need a policy

push to scale.'

Looking longer term, Eriksen maintains: 'In the space of a single generation we will see a dramatic shift in energy supply and demand. By the middle of the century the energy will be flipped in equal shares between fossil and non-fossil sources.'

Rapid electrification will transform the energy mix by 2050, with the share of electricity in the 2050 demand mix more than double from today's level. Solar PV and wind – in equal shares – will dominate power generation. Electrification, powered by renewables, will drive decelerating energy intensity, which will see energy use peak worldwide in 2032. Significant investment in connectivity and flexibility will enable a 62% variable renewable share by 2050. 'But the pace is still not fast enough,' says Eriksen.

As mentioned, natural gas will take over as the largest energy source this decade and remain so until 2050. However, only 13% of natural gas used mid-century will be decarbonised.

Energy demand is likely to flatten in three main demand categories – transport, building and manufacturing. In the transport

category, demand is expected to decline only a little bit compared with today despite a 66% increase in road vehicles, which will use less energy due to electrification. By 2041, passenger electric vehicles (EVs) will outnumber internal combustion engine (ICE) vehicles on the road, and EVs are about three times more efficient than fossil fuel cars. There will also be significant energy efficiency gains in manufacturing and the heating, lighting and cooling of buildings.

Ultimately, despite flat energy demand and a growing renewable share, the energy transition is unlikely to deliver on the Paris Agreement. DNV GL believes 'most likely we are heading towards 2.3°C warming by the end of the century'. A lot more renewable power, decarbonisation, energy efficiency improvement and carbon capture is needed.

However, on the positive side – the world will be spending an ever-smaller share of GDP on energy, allowing for additional investment to further speed up the transition. ●

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