



Oil and Fossil Fuels

Throughout 2020 we noted that there was an increasing focus on 'net-zero' and the reduction in the use of fossil fuels so we explored aspects of this through our blogs.

Can We Really Eliminate Fossil Fuels?



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Our climate crisis series has identified the issues the world will face as it copes with rising temperatures, and the concomitant crises of extreme weather, sea level rise, radical and unpredictable changes in land use, farming land availability, the spread of pandemic illness and of pests, and what seems like an endless list of potential crises and disasters.

Contributions to meeting this challenge have been varied – from a good start, the US seems to be on a retreat to a future where planting trees is thought to be a viable response whilst actively preserving and developing high energy demand, high polluting industries. The European Union is placing serious weight behind carbon neutrality. China has about one thousand gigawatts of existing coal capacity with a further 121 gigawatts of coal plants under construction, whilst at the same time leading the world in the electrification of its public transport fleets. The China Electricity Council has requested a further 300-500 coal plants to be cleared for construction between now and 2030. India continues to build new coal plants, and alongside the growth of its middle class, is increasing its oil imports. Australia is the world's largest net exporter of coal, accounting for 32% of global exports, with a government that has so far resolutely failed to even consider tackling its all too obvious climate issues.

Commitments to meet the Paris Accords are in place (except for the US, which will withdraw from them on 1 June this year). But oil, gas and coal demand continue to rise. Oil and gas provide 54% of energy demand now and will still be 48% of energy demand in 2040 (IEA World Energy Outlook).



According to BP's 2018 *Energy Outlook*, the share of the average oil barrel dedicated to transportation fuel will peak at 58% in 2025 and begin to decline. Oil consumed by industry, buildings, and power will also slump. Chemicals, however, will continue to grow, from 16% of oil demand in 2020 to 20% by 2040.

And it is this distinction which ensures that for the foreseeable future, the world will still need oil and gas. Demand for plastics – the most familiar group of petrochemical products – has outpaced that of all other bulk materials (such as steel, aluminium or cement), and has nearly doubled since 2000. Petrochemicals will be over a third of the growth in oil demand to 2030, and nearly half to 2050, ahead of trucks, aviation and shipping. Petrochemicals will consume an additional 56 billion cubic metres of natural gas by 2030, equivalent to about half of Canada's total gas consumption today.

Why? Because, if we wish to maintain our current living conditions, they are vital.

- **Plastic packaging** for food and other commercial products can be made from a range of petrochemical products, including polyethylene and polystyrene
- Globally, more than half of ammonia is converted to urea, which is in turn mainly used as a **fertiliser** used to increase crop yields and boost food production
- **Synthetic rubber** is a major component of tires for cars, trucks and bicycles, and is mainly derived from the petrochemical butadiene
- Many of the **laundry detergents** and items of clothing in our washing machines are derived from petrochemicals, such as surfactants and polyester fibre (<https://www.iea.org/reports/the-future-of-petrochemicals>)
- They are also found in many parts of the modern energy system, including solar panels, wind turbine blades, batteries, thermal insulation for buildings, and electric vehicle parts.

So the future is not, and cannot be, petrochemical free, under any realistic scenario. It is, quite simply, and at our current stage of replacement technology, impossible.

Much can be done. Vehicle electrification is an obvious route, but by no means the only one (and it is in itself fraught with issues – for a start, the power grids which supply service stations are not strong enough to allow for substantial implementation of electric charging points <https://www.ft.com/content/594345dc-20d0-11ea-b8a1-584213ee7b2b>). Increased electrification of rural areas in the developing world will minimise carbon emissions from cooking fires. The UK's entire energy reduction target could be met by a comprehensive system of house insulation to reduce household energy demand. Advances in power storage technology would make renewable energy properly able to replace power stations. Massive investments in



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carbon capture and storage would point a way to minimising and reversing the harm already done.

But – currently at least – the aim to eliminate the use of fossil fuels is a pipe dream. Not only is the world dependent on the energy they produce, petrochemicals are foundational to the developed world. Whilst pressure groups and environmental organisations campaign for a complete end to fossil fuel extraction and use, those of us who seek scenarios for the future where humanity survives and thrives on the planet may have to face the unpleasant reality that all our short term futures include the extraction, burning and use of fossil fuels. The trick is going to be developing swiftly enough that that use does not add to the carbon burden; and that the infrastructural issues which lead to energy waste are tackled with as much force as the issues that make for easy headlines.

Written by Jonathan Blanchard Smith, SAMI Fellow and Director

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Decarbonisation and the oil industry

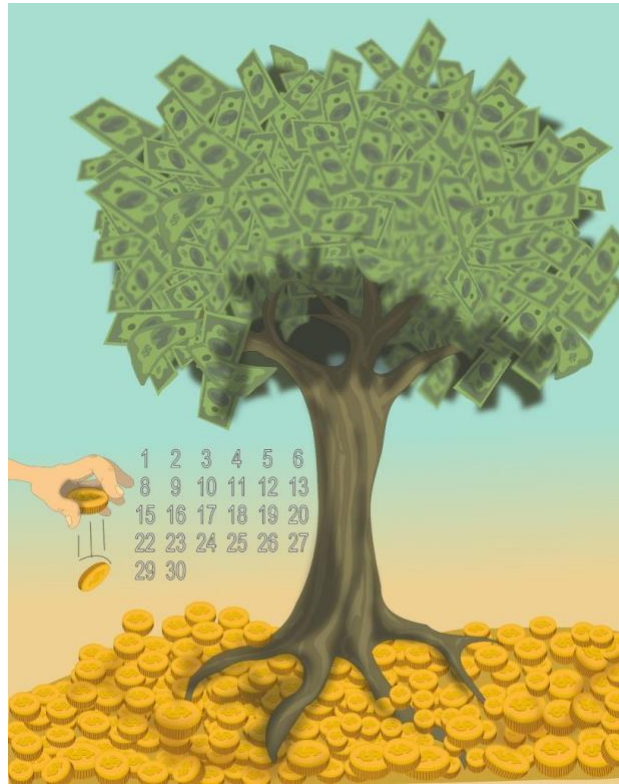


Image by Rilsonav from Pixabay

In recent years, and particularly the last 12 months, the news has been filled with reports detailing the climate crisis facing the world. Greta Thunberg's school strikes have hit a nerve; the wildfires in Australia have been the worst experienced to date; ever more rain and floods in the UK winter; Antarctic glaciers melting faster than ever and long-lasting droughts in the USA. There can't be many, at least in the Western world, who are unaware that we are facing some serious global issues with our warming climate – as the World Economic Forum warned in January 2020 'the climate crisis is the biggest threat to the world's economy' (although this was before the current coronavirus situation). And the businesses involved in the exploration and production of fossil fuels, especially oil and gas, have found themselves subject to demonstrations and blockades as well as investors seeking to find other, more ethical, places for their money.

All this has led to a number of the oil majors publishing goals in which they are pledging to become carbon neutral or even net zero– from ENI making a commitment back in late 2018, Repsol's announcement last December that it will be carbon neutral by 2050, Shell aiming to halve the greenhouse gas intensity of its emissions to BP's recent ambitious plans to get zero emissions from its own operations as well as its upstream production by 2025 along with cutting the carbon



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intensity of its products. This latest statement on 'reimagining energy' is certainly a bold move although details on exactly how this may be delivered remain unclear for now.

This is all great news and will, of course, help reduce overall carbon and methane emissions and so work to ameliorate the impact of global warming. Unfortunately, though, this is a limited response from a small number of oil companies and doesn't include the US majors – who appear still unconvinced by global warming – nor the NOCs (national operating companies) such as Saudi Aramco, Sonangol or Petrobras – companies that are not subject to the whims of investors nor climate change activists, all of which means they can continue to produce the fuels and products that we, the consumers, so desire to maintain, and enhance, our lifestyles.

What then does the future hold? Can we effectively decarbonise the world? Certainly these (relatively limited) moves from a subset of oil producers are helpful but does it encourage us, the consumers, to reduce our consumption? Or does it leave us simply feeling good whilst someone else is doing the difficult stuff for us?

These are not easy questions as they force us to interrogate our values and lifestyles. As we said in a previous blog, we will still need the petrochemicals (at least in the near term) – for packaging, fertilisers, synthetic rubbers and even products such as laundry detergents (needed even more now as the possibility of a coronavirus pandemic rears its head and we are encouraged to wash hands and clothes regularly).

In BP's annual Energy Outlook last year they posited a range of scenarios for the future of oil and gas (see the review in our blog) – from a base case that sees government policies and use of fossil fuels evolving in the much the same way as now through to something that they called 'Rapid Transition' which was a more hopeful look at a faster reduction in the use of fossil fuels and improving efficiency of energy use. Other scenarios (e.g. those of the IEA) show similar thinking – we either remain on course to exceed the Paris agreement significantly or we manage a major shift to a lower carbon future and avoid the worst of global warming.

Whichever set of scenarios we examine, in all of those that offer a successful and sustainable future – and a healthy planet – it's clear that we need to innovate, and quickly develop, products and methods that don't add to the carbon burden. So the recent statements by BP's new CEO (and from other companies) regarding their focus on low-carbon technologies are welcome and needed. It is, however, easier to say than to do.

And never more so than today with the oil price dropping rapidly in response to the latest OPEC meeting. With Brent crude trading at \$38 or so – quite significantly



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below recent forecasts – does this mean that innovation and development from the oil sector will be delayed whilst they try to figure out how to survive the latest shock? After all, in previous such shocks they have tended to return to the basics but this may not be sufficient this time. Is it time for a revolution?

Written by Cathy Dunn, SAMI Principal

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When oil demand peaks: thinking about the geopolitical impacts of peak oil.

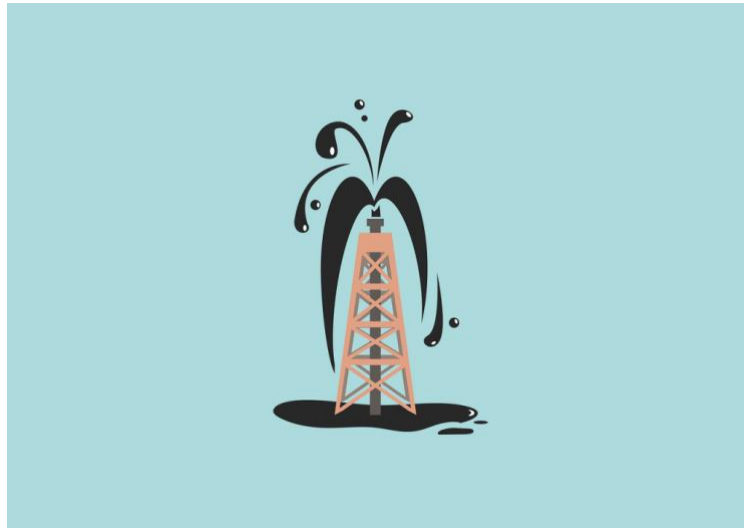


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What happens to oil producing countries when oil demand peaks? When petro-economies no longer are able to finance themselves through the extraction and export of oil products, what do they do?

The concept of “peak oil” has been around for as long as oil extraction. The debate used to be about what happened when the world ran out of reserves of oil; around the start of this century the debate moved to what happened when the world ran out of economically viable exploitable reserves (and the two concepts are absolutely not the same). And as the reality of climate change has properly started to bite, the debate is now around what happens when the demand for oil is so stultified by the development of renewable resources like wind or solar, that no-one wants to buy oil any more.

So we have moved from availability, to economic availability, to demand. In many respects, it is the demand drop which is the true “peak oil” – for if there is no demand, oil production simply becomes unviable.

The key driver here is the climate crisis. The recognition of its potential depth, and of the changes needed to maintain the Intergovernmental Panel on Climate Change’s long term temperature limits (1.5 degrees C to 2 degrees C), have broken through into national and international politics. In the UK, a ban on new petrol and diesel cars will come into force in 2030. The EU aims to be climate neutral by 2050.



President-elect Biden's Climate Plan aims for a 100% clean energy economy by no later than 2050. China aims for carbon neutrality by 2060.

Political action goes in lock step with changes in commercial behaviour. Perhaps most striking is BP's announcement in February 2020 that it would become "a net zero company by 2050 or sooner". Funds are disposing of their oil assets – most astonishingly, perhaps, was the decision by Norway's sovereign wealth fund, built almost entirely on oil revenues, to dispose of \$5.9 billion of oil stocks in October 2019 as part of its programme to ultimately divest itself of all its oil holdings. The Church of England voted in 2017 to begin divesting from oil and gas companies that are not taking their responsibilities seriously and sold £8.4 million shares in July 2020. If further illustration was needed, the former Governor of the Bank of England, Mark Carney, has become the United Nations special envoy for climate change and finance.

Rystad Energy's November 2020 projection gives perhaps the most up to date analysis. Oil demand will peak, they say, in 2028, at a level of 102 million barrels per day, falling to 62 million barrels per day in 2050. Whilst they add in the effects of the coronavirus – and anyone who lives in a city under lockdown will have experienced the wonderful clearing of the air – demand drop is mainly from the move to renewables.

And here is our first major point. Peak oil is not no oil. Peak oil is simply the peak of oil demand, and demand will fall from that peak, not stop. And other fossil fuels, particularly coal in China and natural gas in Europe, are not easily replaced at speed. Indeed, the European view of natural gas as a cleaner transition fuel between full fossil fuels and full renewables may have the effect of delaying the energy transition in Europe unless carefully managed.

As oil demand falls, oil prices will also fall; so producing countries are faced with a double bind. Saudi Arabia, for instance, needs oil to be sold at \$80 a barrel to balance its budget; Russia needs \$40. Russia could withstand oil prices of \$25-\$30 per barrel for 6-10 years. Riyadh, meanwhile, can afford oil at \$30 a barrel, but would have to compensate with selling more crude. And these prices assume that they are still selling the same amount of oil. Which – as we have seen – they won't. Oil demand will fall; oil output will fall; oil prices will fall.

Where will this hit the hardest? Oil dominant economies include Russia (compensated for in some small way by natural gas); Saudi Arabia and other Gulf States; Iran and Iraq; Nigeria; Venezuela; and since the fracking boom, the United States. (The UK has oil reserves but no longer to an economically significant degree; Norway is cushioned by having the largest sovereign wealth fund globally, now diversified into owning the equivalent of 1.5% of every listed company in the world. They can cope).



Oil revenues are used by governments to balance their books, especially when they have little other “real” economic activity; subsidise their population whether by explicit payments or by subsidising food, energy costs and the like; and by engaging overseas. Corruption, inevitably and always, swallows a large amount of the available cash. What, then, happens when that money runs out? Some possibilities:

- Russia: prolonged and tight austerity measures; whilst the defence budget is protected, all other state budgets are cut.
- Saudi Arabia: austerity; perhaps a cutback in support of overseas activities such as funding madrasas; a strengthening of regional alliances
- Iraq: there is little Iraq can do to replace oil revenues, which it urgently needs to continue rebuilding.
- Iran: has learned from years of sanctions regimes. It is used to not selling oil, and whilst it would find it hard, of all the oil producing states, it is probably most capable of living without it.
- United States: will have to learn to wean itself off oil, and fast. The new administration seems to understand this. Potential loss of influence overseas simply because available funds are needed at home.
- Nigeria and Venezuela would be in urgent danger of state failure.

It is not difficult to see what the social impacts would be: unrest within, possibly overflowing to violence. As they run out of money, though, their ability to impinge on their neighbours’ interests will diminish – geopolitical chokepoints such as the Persian Gulf and the Malacca Straits would diminish in importance.

Those states with no other assets, such as Saudi Arabia, would have to reposition at some speed; those with some other assets (such as Russia) would have time to transition, provided they were not overtaken by societal disruptions beforehand. Iran, rich in other resources and essentially capable of self-sufficiency, would adapt.

There are, though, some real winners as oil becomes less important. Renewable energy production needs the sun, the wind or the waves. Sun rich states will be energy exporters, wind- and wave-rich could benefit hugely. Provided the distribution systems can be put in place, states to the north and south of the Sahara could become solar superpowers. And if we get it right, Britain could be one too.

But let’s not be too optimistic. There is another resource curse just around the corner. Electricity generation from renewables, as well as transmission and storage, needs copper, graphite, lithium and rare earths. It so happens that many of these are concentrated in places with poor governance structures. Chile has the largest reserves of lithium; rare earths are in China, Russia and Brazil.



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As petro-economies diminish, the world's next flash points are going to be in the unstable rare earth economies: Bolivia, Columbia, Mongolia and the Democratic Republic of the Congo. Geopolitical impacts of peak oil stretch far beyond the oil fields.

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