

Phasing out oil

Report by Fredrik Lundberg



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Introduction

This briefing is on oil, what it is used for and how to get rid of it, with an emphasis on Europe. To do that well with limited time and space requires a person with an encyclopaedic knowledge of the oil industry and a really great analytical mind, as well as considerable hubris. Well, it ain't me, babe!

This is a rough sketch, a simple picture of a complex problem and its complex solutions, with occasionally thin research backed up with anecdotal evidence. I hope it still can be of use.

“It’s a big animal”, an oil lobbyist warned me in Brussels in the 1990s, when I said I wanted to get a grip on the oil industry, the big picture.

It is indeed a big animal.

The evils of the oil industry were depicted as a gigantic octopus in a famous US cartoon in 1904. It is still an apt description for its size, flexibility, slipperiness, and pervading presence.

Oil is a big problem, for the wellbeing of the planet and its people. We need to essentially get rid of it, and soon.

It is a big adversary. It is complicated to get rid of oil, because it is upstream and downstream and because of finance and taxes and subsidies and political influence and corruption and technological solutions and transport and heat and whatever.

On the other hand, it is simple.

If production is halted, it can't be burnt, and then people and companies will have to find other means to supply the services – transport, heat, packaging materials – that oil now provides.

If consumption is dwindling, because other means to supply those services have been found, production will cease, as there is no market for the product.

That was what Saudi Minister of Petroleum, Ahmed Zaki Yamani of Saudi Arabia must have had in mind in 1973 when he quipped that: “The Stone Age did not end because of we ran out of stones”.

Everything oil can do can be done by other means. The proof that it can be done is that it is already happening. Oil for power is disappearing. Vehicles use less oil than before, and a rapidly growing proportion – several percent of new cars – run on electricity.

The oil industry can be defeated either on the supply side, by strangling it, or on the demand side by starving it. Or both, which is actually happening. We are at, or near, Peak Oil consumption, globally. More and more nations are making commitments to stop producing and using fossil fuels and to stop financing them, though this hits oil less than coal and is only in the beginning. Still more regional and local governments and companies and organisations are working to the same end.

Decreasing demand makes the supply more vulnerable to attacks. Oil prices were low in 2017, when, after a long fight, the Keystone XL pipeline was effectively killed by President Obama. It would have been more difficult in 2010–2014 when oil prices were high.

More legal requirements, uncertainty over new oil (and infrastructure) projects and dried-up financing create a logic of their own. Many economists will tell you that the only result of a halt in oil production in one part of the world is that prices go up and make oil more profitable somewhere else. The rebound effect, they call it.

But that is not all there is to it. Man is a social animal. If one university or pension fund says no to fossil investments, it is by no means sure that the next university and pension fund will take up its place. People and institutions are not just profit-maximising. They also act according to social norms, some of which are encoded in law. That is how the Paris Agreement is supposed to work.

A top coal lobbyist in Paris 2015 at COP21 complained that after the Agreement “we will be hated like slave traders”.¹

When the UK abolished slave trading, first at home in 1806 and then in the empire in 1833, it did not lead to a blooming slave trade in the rest of the world. By the 1860s, slavery had been abolished in both the United States and Russia.

Some of these changing social norms are embodied in the Paris agreement. This is a game of Pride and Shame rather than Crime and Punishment.

The Nationally Determined Contributions are part of a system in which a nation makes a promise, notes that its peers have promised more, improves its NDC, and then the next nation sees that its NDC is not up to scratch and submits a new and better one.

This kind of “never-ceasing improvement” has been used in quality and environmental management systems such as ISO 9000 and ISO 14000 for a long time and can serve as an antidote to greenwashing.

In 2021, Exxon included greenhouse gas emissions from their end customers (so-called Scope 3) into its accounts for the first time,² with references to the Paris Agreement. They now not only account for the emissions from their own operations, but also for the emissions from the petrol, diesel, etc., that their customers buy. This totalled 650 million tons in 2020, which is a lot for a company or even a country. Poland emitted 391 million tons (2019). This is a first acknowledgement of responsibility for the climate consequences of the #1 oil company in the world. Even Exxon, which is not a green or greening company by any standard, will feel the need do something to avoid even more shame.

1 <https://www.euractiv.com/section/energy/news/coal-lobby-chief-cop21-means-we-will-be-hated-like-slave-traders/>

2 <https://corporate.exxonmobil.com/Sustainability/Energy-and-Carbon-Summary/Scope-3-emissions>

There are, in abstract terms, two ways to reduce oil consumption. One is through lifestyle change: doing things differently from before, such as traveling less by car. The other is through technology: doing the same thing but without oil, such as driving an electric car.

In politics and day-to-day decisions, lifestyle changes and technological changes happen all the time and present new opportunities to change things for the better.

Getting rid of oil is not very demanding technically or economically. There is an enormous toolbox, containing both technological tools and policy instruments.

The hard part is politics. The oil industry wants to stay on, and it has tremendous political power and power over our minds.

Oil's power over our minds is sometimes subtle, and sometimes not so subtle. Over just three years, 2017–20, the most prestigious British universities (Oxford, Cambridge, etc.) took 89 million pounds from oil companies.³ Imperial College London alone took 39 million from Shell. Imperial's research claims that carbon capture and storage is the solution for the climate,⁴ which is what Shell also says,⁵ but that may be sheer coincidence. Imperial's president Alice Gast had a salary of £554,000, and is also on the Board of Chevron⁶ where she earns about as much again.⁷

Money can buy you love, it seems.

Many of the oil men know that they will lose in the end but they will use their political power and media machinery to keep oil running a few more years. They are playing for time.

Time is of essence for us, too. As Bill McKibben of 350.org put it:

“Winning slowly is the same as losing”.

Stockholm, December 2021

Fredrik Lundberg

3 <https://www.theguardian.com/education/2021/dec/11/uk-universities-took-89m-from-oil-firms-in-last-four-years>

4 <https://www.imperial.ac.uk/news/197635/world-likely-capture-store-enough-carbon/>

5 see <https://www.shell.com/service/search.html?q=carbon%20capture>

6 https://en.wikipedia.org/wiki/Alice_Gast

7 <https://boardofdirectorssalary.com/chevron/>

A third of the problem

According to Global Carbon Project projections,⁸ global emissions in 2021 were as follows, in billion tons of CO₂:

coal	14.5
oil	12.5
gas	7.7
deforestation ⁹	4.1
cement	1.6
total	39.7

Oil accounts for about a third of the problem of anthropogenic CO₂ warming.

To bend the CO₂ curve down – the concentration in the atmosphere measured in ppm at Mauna Loa and other stations – there will have to be cuts in all CO₂ sources.

It is not enough to stabilise CO₂ concentration. Warming will still go on unless the concentration falls.

Target years may be practical from an administrative and political perspective, but what really matters is the **carbon budget**, the grand total of anthropogenic greenhouse gas emissions from now on. The budget perspective puts the emphasis what we do in the next 10–15 years, not on promises for 2050 or 2045, because if we fail to cut enough in the near future, we will exceed 1.5 degrees even if we hit “zero zero” by 2050.

UNEP’s annual production gap report¹⁰ has tried to weigh the need for cuts, fuel by fuel. It says:

“In 2030, governments’ production plans and projections would lead to around 240% more coal, 57% more oil, and 71% more gas than would be consistent with limiting global warming to 1.5°C.”

Getting rid of coal and reversing deforestation – no simple tasks in themselves – will not be enough. A rapid decrease in oil is necessary.

This is not what we have seen so far. Global oil production and consumption have increased almost every year for the last several decades, except for 2020 and current projections for 2021.

That is not to say it had to be that way.

Many countries reduced their oil use after the oil price shocks of the 1970s, and, more hesitantly, in the 2010s. In the EU, the 2006 peak of 749 million tonnes was reduced by almost 16 percent by 2019, during a period of (modest) economic growth, about 1 percent per year. It dropped even more during 2020, but

8 <https://www.globalcarbonproject.org/carbonbudget/21/presentation.htm>

9 estimated annual average for 2010–2020 also from globalcarbonproject 2021

10 <https://productiongap.org/2021report/#R2>

that may (or may not) mainly be a temporary effect of Covid. The US peak oil consumption was in 2006.

Oil is more difficult to get rid of than coal and gas. Coal and gas have very large points of consumption, especially power. Much of it can be replaced with wind and solar, and fast. When a coal or gas power plant is shut down, it immediately stops emitting CO₂.

The end points of oil use are small and dispersed. Most of oil production is used in cars, and other vehicles, totalling around 66 percent in both the EU¹¹ and the United States¹² Some is used for heating and plastics. Oil is more difficult and will take longer to phase out because most of the vehicles already on the roads and those that will hit the market in the next few years will use petrol and diesel. Some of them will be around for a long time.

Oil vs peace and democracy

Climate change is not the only bad thing about oil.

Big Oil has always meant power. Standard Oil misused its monopolistic power in the US to such a degree that President Theodore Roosevelt, Congress, and the Supreme Court acted together to break up what was deemed to be an illegal monopoly into 34 independent companies in 1911. It took a long fight to get there, and the result was not long-lasting.

The first killer app for the oil industry was kerosene (lamp oil). Then came fuel for ships and tanks, and then buses, cars, lorries, heating and power and lubricants and aeroplanes.

The United States' oil embargo against Japan was a major reason for the Japanese attack on Pearl Harbour in 1941, which brought the United States into the second world war. The US-Japan war was from a Japanese perspective fought (and lost) over oil. Earlier that same year, Nazi Germany attacked the Soviet Union; control over oil in the Caucasus was a strategic target, so important that axis forces were diverted from Stalingrad, where they lost the war. The north African front was also widely fought over for control of oil supplies. Chevron and Texaco had discovered enormous oil reserves in Saudi Arabia, and the dying president Franklin Roosevelt took time on his trip to the momentous Yalta summit in February 1945 to meet the Saudi King and to form an alliance that has lasted ever since.

After the second world war, geopolitics mainly centred on two issues: the cold war and oil.

The Middle East became of strategic interest mainly because of oil.

The “seven sisters” ruled the world of oil.

11 https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Oil_and_petroleum_products_-_a_statistical_overview#Use_of_petroleum_products

12 <https://www.eia.gov/energyexplained/oil-and-petroleum-products/use-of-oil.php>

They were BP, Shell, Gulf, Texaco, Standard Oil of California, Standard Oil of New Jersey (Esso), and Standard Oil of New York.

Before the 1973 oil crisis the seven sisters controlled 85 percent of the world's petroleum reserves. They were incredibly rich and powerful. They defined modern life. Together with the car manufacturing industry, they destroyed much of public transport and the fabric of cities and towns to make room for the unlimited spread of cars, and in the process accounted for many millions of deaths through accidents and air pollution.

They have known about the danger of climate change¹³ since at least 1968, but ignored it and funded climate sceptics. Exxon does so even now. They are still lobbying against effective climate policy¹⁴ in 2021 and intend to keep on doing so.¹⁵

They have also subverted democracy, on several occasions. The Anglo-Persian Oil Company, which would later become BP, the British government and the CIA together toppled the democratically elected regime in Iran in 1953 and made the Shah dictator for 26 years.

The seven sisters (and some minor siblings) merged into four: BP, Shell, ExxonMobil and Chevron. They were joined by others: Saudi Aramco (which was nationalised by the Saudi government, having been owned by US companies from 1973 to 1980), China Petroleum & Chemical Corp, PetroChina, Gazprom (Russia), Lukoil (Russia), Total (France), ENI (Italy), National Iranian Oil Company, PDVSA (Venezuela), Petrobras (Brazil), and Petronas (Malaysia).

Some are private and exert a huge political influence. Some are owned by a government, but who really owns who is a tricky question.

Big Oil still has a lot of muscle.

Saudi Arabia is a ruthless gangster state,¹⁶ has inflicted mass death and starvation¹⁷ on Yemen, and has been a consistent saboteur of climate negotiations,¹⁸ But money can buy friends. If you google for pictures of “Mohammed bin Salman” + “prime minister” or “president”, you will find almost every major and minor national leader shaking hands with the war criminal and murderer.¹⁹

13 <https://www.smokeandfumes.org/documents/document16> See also <https://exxonknew.org/>

14 <https://www.businessinsider.com/exxonmobil-lobbyist-climate-change-green-biden-infrastructure-bbc-channel-4-2021-6?r=US&IR=T>

15 <https://ieefa.org/oil-executives-testify-they-wont-stop-lobbying-against-climate-initiatives/>

16 <https://www.hrw.org/world-report/2021/country-chapters/saudi-arabia>

17 <https://www.theguardian.com/global-development/2021/sep/23/16-million-in-yemen-marching-towards-starvation-as-food-rations-run-low-un>

18 https://www.researchgate.net/publication/23546969_Striving_for_No_Saudi_Arabia_in_the_Climate_Change_Regime

19 https://www.washingtonpost.com/world/national-security/cia-concludes-saudi-crown-prince-ordered-jamal-khashoggi-assassination/2018/11/16/98c89fe6-e9b2-11e8-a939-9469f1166f9d_story.html

Saudi money has also largely financed nuclear arms in Pakistan, and the Saudis can expect to get nuclear warheads from Pakistan when they deem necessary.²⁰ Saudi Arabia is thus part of three nuclear arms races, between India and Pakistan, between themselves and Iran, and between Israel and the Moslem world.

Oil money, most of it from Saudi Arabia, is behind hate preachers in mosques spread all over the world, which provide the infrastructure for radical Sunni terrorism.

Oil has been a strong factor behind many wars (countless in the middle East but also in Africa), failed states (Libya, Somalia), and Western support for cruel dictators and terrorists, including Saddam Hussein, the Shah of Iran, the Taliban and Usama bin Laden, several emirs, Haile Selassie and above all Saudi Arabia. Oil is behind most failed, or nearly failed states: Iraq and Syria until the so-called Caliphate was defeated in 2019, Somalia for decades, Libya from 2011, Venezuela, and in 2021 Lebanon.

In late 2021, executives at the Swedish company Lundin Oil, later Lundin Energy, were charged with war crimes in South Sudan,²¹ committed in 1999–2003, when the Swedish former Prime Minister Carl Bildt, later Foreign Minister, was on its board.

Angola's oil was its curse, leading to protracted civil war from 1975 until 2002 as it was caught between strategic oil interests. On one side were CIA-sponsored terrorists, China and South Africa, and on the other, Gulf Oil (later merged into Chevron), protected by Cuban troops and the Soviet Union. An absurd but not so funny situation for those involved.

The 1965 US-sanctioned military coup in Indonesia and the ensuing murder of 0.5–1.2 million people, one of the worst crimes against humanity since 1945, was partly motivated by oil interests.

One reason why there is so much military conflict and so many wars in the oil countries and their neighbours is that there is always a deluge of either foreign military assistance or arms sales to them.

It is a curse for a country even to be a neighbour of an oil country. Ethiopia was of strategic interest in the cold war, first becoming a US client state under the increasingly mad dictator Haile Selassie, then becoming a Soviet client in 1977 under the even worse Mengistu regime, leading to famine and mass murder. Egypt has never been a big player in the oil business itself, but is very influential in the oil-soaked Arab nationalism and its conflicts in surrounding nations. Turkey has little oil but was near enough to the Middle East to become strategic, which meant 1) a good place for US military bases 2) worthy of military assistance without consideration of its human rights record. A swollen military sector has made the military strong in politics, sometimes leading to military coups but also maintaining influence in between.

20 <https://www.bbc.com/news/world-middle-east-24823846>

21 <https://apnews.com/article/business-middle-east-africa-sudan-stockholm-2d711419cb14f0c81aebf0da864613e9>

Oil is a force for authoritarian rule, for corruption, for bad and unstable governments, violence and war, not just in the Middle East but arguably also in the United States, where fossil interests are a strong force in the radicalisation of the Republican party.²² “Drill, baby, drill!” was chanted at the Republican convention in 2008 and was the slogan of vice president-candidate Sarah Palin in the 2008 campaign and again in 2010.

There has never been a war or a coup d'état for the control of solar power, wind power, batteries or heat pumps.

Oil, the economy and the financial sector

Oil is not a large part of the economy in any big OECD country. But it has been large part of the *financial* sector and though most oil companies are worth far less²³ than they were in 2007, they are still very big players.

When a small part of government-owned Saudi Aramco was offered to the stock market, it was the biggest listing ever in the world,²⁴ at 25.6 billion. The money was needed for the war in Yemen.²⁵

Saudi Aramco was worth \$1896 billion in November 2021. It is the #3 company in the world, behind Apple and Microsoft but bigger than Google and Facebook.

Exxon, Shell and Chevron are also among the top 100. They used to be even weightier. Exxon was #1 in the Fortune top 500 for many years, as Aramco was not listed until 2006.

Oil and gas investments require a lot of money, globally about \$500 billion, most of it with high expected return and with high risk.

Hedge funds thrive on volatile markets, such as oil. The services and manufacturing sectors are more predictable: the next year will be much like the last year. Investments in other forms of energy, such as solar or wind power, also have lower risk and lower return.

With oil, there is no way to know what the price will be in 12 months' time. There is a large demand for hedging these bets, i.e. for hedge funds.

The deregulation and extraordinary growth of the financial sector in the UK and the United States in 1980–2008 is the usual explanation for the great recession of 2008. This deregulation was the result of strong lobbying from the oil industry.

22 See for example https://en.wikipedia.org/wiki/Political_activities_of_the_Koch_brothers

23 See for example <https://www.statista.com/statistics/263264/top-companies-in-the-world-by-market-capitalization/>

24 <https://www.arabnews.com/node/1594696/business-economy>

25 <https://www.ibanet.org/article/6feadf09-6418-466a-813c-812da7aca2f9>

Oil determined the fate of the Soviet Union. High oil prices propped up the Brezhnev regime for many years. Mikhail Gorbachev's efforts to reform the system was doomed from the start, as oil prices dropped dramatically in 1986. The economy fell off a cliff. Later, the Putin regime was bolstered by rising oil prices.

Oil and an overstimulated oil-based finance sector create a centripetal force that does strange things with politics.

The economist Paul Krugman wrote a column about why an overly dynamic and creative financial sector, as existed in the 1920s and 1980–2007 (and with minor reforms still exists in 2021) is a threat to stability and welfare, and exclaimed “Bring back boring banking!”²⁶ One step towards a more stable and more risk-averse financial sector would be to reduce oil dependence.

The outsize financial sector was very visible in the UK during the Thatcher years when the North Sea oil flowed, and the financial sector grew especially fast in London.

The oil and finance sectors sometimes use national states to promote wars that further their interests, but they are not very rooted or patriotic. They shift profits to tax havens,²⁷ thus undermining the finances of other governments.

Oil reduction options, lifestyle change and technology

Most oil and oil derivative use can be either reduced or substituted for.

One way is through lifestyle changes such as reducing the transport of goods and travel by car and air. This is what happened in 2020 because of the pandemic. Oil consumption fell 9 percent worldwide.

The other is to do the same as we do now, or as projected, but with less oil use. This has already happened to a modest extent in the OECD and the EU, where oil consumption peaked in the years before the 2008 recession. In the EU, consumption fell from 636 to 535 million tons between 2006 and 2019 (and to 462 in 2020). This was not the result of any lifestyle change, but of slightly more fuel-efficient vehicles and less use of oil for power and heat.

The choice between technological solutions and lifestyle changes is not just a case of either or. They are not absolute opposites.

When president George HW Bush said in 1992 that “the American way of life is not up for negotiations”, he was plainly wrong. Our lifestyles are up for negotiation all the time. Lifestyles change for all kinds of reasons.

Think of smartphones, Wikipedia, Facebook, internet banking, streaming audio and video, zoom meetings, internet booking, surveillance cameras, faster trains, fewer bus queues, cleaner air, higher fuel taxes, the absence of air travel taxation.

26 <https://www.businessinsider.com/henry-blodget-krugmans-horrifying-solution-make-banking-boring-2009-4?r=US&IR=T>

27 <https://www.reuters.com/article/global-oil-tax-havens-idUSKBN28J1IK>

We usually adapt.

Changes to any part of the tax system decide where and how people can live, work and travel.

Sometimes technology does the same thing faster or cheaper, sometimes it does something completely different.

Technology is sometimes lifestyle-neutral. A hybrid car uses less petrol than an equivalent car without a hybrid system, but the driving experience is not very different. Even a battery car is not so different. For consumers, electricity from solar or wind is the same as electricity from fossil fuels. The light from a LED lamp is much the same as that from an incandescent. The main difference is that you never have to replace it.

What president Bush had in mind was probably the notion that saving energy, especially oil, would come at a cost for the people. After the 1974 oil shock there was a fairly common notion that it would be endured by essentially “showering cold in the dark”.

This was not practical in the longer term. Instead, we got improved insulation, better windows, low-energy lighting and Japanese fuel-efficient cars, as well as nuclear power and more coal power. Apart from the latter two, we were on the right track, but when such measures drove oil prices down, all was soon forgotten until the climate entered the international political agenda in 1987–88 (the Brundtland UN report “Only One Earth” which launched the concept of sustainable development, as well as US senate hearings).

We had many of the tools to fight climate change but did not use them. It was technologically possible to cut CO₂ emissions using 1988 technology. It was not a question of economics. Lifestyle was actually not an issue.

The reason for the missed opportunity was that our politicians, with some exceptions, were not determined enough to confront fossil fuels’ vested interests. A good example is the EU Large Combustion Plant Directive of 1988. Its purpose was to cut emissions of SO₂, NO₂ and particles, but it did so in a manner that was consistent with continued fossil power. Coal power and oil power stations were allowed to emit much more pollutants per kWh than gas power. (The emissions limit values were expressed in grams of pollutants per cubic metre, which are different for liquid, solid and gaseous fuels.)

A (minimum) tax on pollutants instead of limit values would have been an implicit carbon tax, and would have promoted energy efficiency, (emerging) wind power and solar heating.

This did not happen because the oil industry, the coal industry, the power industry, and the car industry fought against it and won.

Now we have much cheaper and better options to get rid of oil compared to 1974 or 1988. Electric vehicles, wind power, solar power and several efficiency technologies are ready at huge scale to terminate oil and other fossil fuels.

We also have more and better political tools. There is much better data on emissions and on the effectiveness of a large number of instruments, from the ETS and feed-in tariffs to vehicle emission standards and congestion tax.

But the fossil lobby will fight change every inch of the way. They will try to portray the fight as if it is about technology, our lifestyle and our economy, when in reality it is about their money and their power.

It is all about politics, about political muscle and about power over our thoughts. Both muscle and perceptions can be bought on the market, but they can also be defeated in the political arena and in the marketplace.

George HW Bush's quip about the American way of life was factually wrong but not mistaken. It was carefully calculated to identify oil with conservation of security and safety and family values.

Bush was in the oil business, which was why the family moved to Texas, before he went into politics.

Oil is not a requisite for good, secure jobs, a good living standard or for national security. It is exactly the opposite. It creates intense, but unsustainable, local booms. The owners, management and some employees make a lot of money in a short time. They spend it too fast, distorting the markets for hotels, restaurants, real estate, luxury cars and boats. The cascading flow of oil money makes everything more expensive for those who are not part of it, people who work in schools, hospitals and manufacturing outside the oil sector. And after the boom comes the bust. Real estate prices and several markets crash.

This is happening in overdrive, over and over again in the fracking industry in the US, because a fracking well does not last more than a couple of years.

Oil countries

Oil resources are distributed very unevenly.

Hosting governments usually do their best for "their" oil industry, but not always. This is not based on any conspiracy theory, it is just how things work. Norway has a strong oil and gas industry, which provides a lot of income for the state, as well as many well-paid jobs. Any politician worth his or her salt is sure to acknowledge that. Sweden has no oil or gas, and is not heavily invested in oil interests. Sweden instead has a very strong and well organised lobby for forestry, timber, paper and pulp. Germany has a huge lignite industry, which has generally defeated an also strong environmental movement, and continues planning for many decades ahead. In 2019 it was given a 2038 deadline, which in November 2021 was moved forward to 2030. In Denmark, the wind power industry (Vestas) is a major force, and the state oil and gas company Dong Energy has been transformed into Orsted, a global player in offshore wind and other renewables. In 2020 this made it possible to set an end date for production of oil and gas, by 2050. New exploration is also banned but actually ended²⁸ in 2016.

28 <https://www.spglobal.com/platts/en/market-insights/latest-news/natural-gas/120420-den>

The figures for oil production per capita say something about how dependent a country is on oil, and how strongly the oil lobby influences the government. It is interesting to note that no EU member state hosts a large oil industry in absolute or relative terms.

Country	Oil production 2020 (bbl/day)	Oil production per capita bbl/million people
United States	11,307,560	35,922
Russia	9,865,495	73,292
Saudi Arabia (OPEC) ²⁹	9,264,921	324,866
Canada	4,201,101	100,931
Iraq (OPEC)	4,102,311	119,664
China	3,888,989	2,836
United Arab Emirates (OPEC)	3,138,249	335,103
Brazil	2,939,950	12,113
Iran (OPEC)	2,665,809	49,714
Kuwait (OPEC)	2,625,145	721,575
Nigeria (OPEC)	1,775,940	10,752
Kazakhstan	1,756,705	88,686
Norway	1,712,937	313,661
Mexico	1,710,303	17,142
Qatar	1,530,000	500
Angola (OPEC)	1,249,678	61,417
Algeria (OPEC)	1,122,432	33,205
Oman	948,967	217,178
United Kingdom	947,208	14,284
Colombia	791,844	18,452
Indonesia	712,112	3,192
Azerbaijan	693,88	85,71
India	627,415	554
Egypt	586,735	6,86
Malaysia	541,017	21,202
Venezuela (OPEC)	527,063	18,821
Ecuador	479,371	33,47
Argentina	440,335	11,644
Libya (OPEC)	408,074	159,383
Australia	351,18	14,04
Congo-Brazzaville (OPEC)	282,541	60,168
Thailand	202,117	3,667
Ghana	199,478	3,564
Vietnam	193,264	3,194
Turkmenistan	184,579	42,549
Gabon (OPEC)	173,634	106,528
South Sudan	162,475	–

29 OPEC is a cartel of oil producing countries with a big influence on oil supply and oil prices: Algeria, Angola, Equatorial Guinea, Gabon, Iran, Iraq, Kuwait, Libya, Nigeria, the Republic of the Congo, Saudi Arabia, the United Arab Emirates and Venezuela.

Equatorial Guinea (OPEC)	147,563	125,068
Chad	115,817	7,393
Italy	100,514	1,189
Brunei	98,642	257,959
Guyana	83,174	–
Pakistan	79,112	400
Denmark	71,339	24,369
Romania	67,574	25,469
Cameroon	66,749	3,983
Yemen	66	797
Sudan	64,74	–
Turkey	61,757	622
World	76,124,800	10,798

https://en.wikipedia.org/wiki/List_of_countries_by_oil_production, retrieved 2021-11-22

Saudi Arabia, the Emirates, Qatar, Kuwait, Iran and Iraq and Russia are among the top producers, as they have been for half a century. But not everybody knows that Canada is #4 and that the United States is the biggest oil producer in the world, having increased its production by 147 percent in 2008–2019, overtaking Russia in 2017 and Saudi Arabia in 2018.

A poor country is of course also more dependent on its oil than a rich country, other things being equal. This cannot be seen directly in the table, but for example Angola gets a third of its GDP and 90 percent of its exports from oil, which leaves it very vulnerable. There are no such countries in the EU.

To judge from the table, the only country in Europe (west of Russia) that is thoroughly dependent on oil is Norway, which has a poor record for emissions, despite getting all its electricity from hydro. Norway has much higher per capita emissions than the EU, neighbouring countries, or the UK. Its CO₂ emissions actually increased from 35 Mtons in 1990 to 42 Mtons in 2019.

Norway has for a long time aligned with the Umbrella group of other countries that have tried (successfully) to stop climate action. The others are Australia, Belarus, Canada, Iceland, Israel, Japan, New Zealand, Kazakhstan, the Russian Federation, Ukraine, and the United States.

Norway has been a consistent champion of carbon offsets and other “somewhere else” solutions, such as carbon capture and storage and anything else that avoids cutting emissions from the production and consumption of its oil and gas. Despite its small population, Norway has had a strong influence on the international climate debate. It has handled the climate issue with great skill since at least Kyoto in 1997. Under the Kyoto agreement, OECD countries were generally given targets to cut emissions by 8 percent between 1990 and 2010. Norway was allowed an increase of 1 percent, and this target was only met with creative accounting in the LULUCF column. Norway has a reduction target of

50 percent by 2030 but has no clear domestic target³⁰ and is heavily dependent on offsets abroad.³¹ Norway does not recognise any responsibility for downstream emissions from its oil and gas, which are (of course) much larger than the emissions from its oil and gas fields.

Oil production figures do not tell the full story of the oil lobby's muscle. Two other factors are downstream operations and where the oil companies have their head offices. Shell Oil is located in the Netherlands and also has large refinery capacity there. The Netherlands has a poor climate policy record, which may partly reflect Shell's influence. In 2019 the Netherlands had the second highest per capita CO₂ emissions in the EU after the Czech Republic: 8.98 ton/capita by comparison with 5.35 in Denmark and 5.46 in the UK, actually even worse than Poland (8.43 ton).

Refinery output in European countries

Thousand barrels per day.

	1990	2019
Germany	1839	1763
Italy	1556	1355
Spain	1017	1318
Netherlands	994	1217
United Kingdom	1568	1044
France	1437	978
Belgium	507	693
Turkey	462	675
Poland	265	546
Greece	289	462
Sweden	348	337
Norway	256	265
Romania	475	244
Finland	191	240
Portugal	210	223
Lithuania	192	191
Austria	161	183
Czech Republic	160	158
Denmark	146	154
Bulgaria	167	137
Hungary	163	137
Slovakia	127	103

Refineries, and downstream products (petrol, diesel, heating oil, etc.) are closely connected to the oil exploitation industry. The top three gasoline brands in the US are Shell, Exxon and Chevron.

30 https://wwf.panda.org/discover/our_focus/climate_and_energy_practice/ndcs_we_want/reviewed_ndcs_norway/

31 <https://cicero.oslo.no/no/posts/nyheter/climate-neutrality-the-norwegian-way-carbon-trading>

Refineries represent big investments and exert a disproportionate political influence. A refinery with one thousand employees is a very much stronger political force than for example a thousand hairdressers or a thousand web designers, and that applies to any regime, democratic or otherwise.

Top oil companies

Oil companies are usually vertically integrated. They are active in the whole chain: exploration, production, refinement, and distribution of oil and gas.

The top oil-producing companies are as follows, as of 7 October 2021:

Rank	Company	Market cap, B	country
1	Saudi Aramco	\$1,979	Saudi Arabia
2	ExxonMobil	\$257.30	United States
3	Chevron	\$205.29	United States
4	Shell	\$175.28	Netherlands
5	PetroChina	\$162.55	China
6	TotalEnergies	\$130.56	France
7	Gazprom	\$121.77	Russia
8	ConocoPhillips	\$95.93	United States
9	BP	\$93.97	United Kingdom
10	Rosneft	\$84.07	Russia
11	Equinor	\$83.60	Norway
12	Enbridge	\$82.82	Canada
13	Sinopec	\$80.48	China
14	Novatek	\$79.18	Russia
15	Duke Energy	\$78.08	United States
16	Petrobras	\$69.91	Brazil
17	Southern Company	\$66.64	United States
18	Lukoil	\$64.70	Russia
19	CNOOC	\$52.04	China
20	Enterprise Products	\$50.37	United States

<https://www.visualcapitalist.com/ranked-the-largest-oil-and-gas-companies-in-the-world/>

Those companies form the core of anti-climate resistance, even though they differ somewhat from one another. They and their trade organisations such as the American Petroleum Institute and front organisations with other fossil interests such as Climate Coalition³² have consistently disseminated doubt, defamation and diversionary tactics to stop effective action against their interests. One example is the so called “Climategate” affair of 2009, when emails from climate scientists were stolen in a sophisticated attack and used selectively and out of context to imply hidden political motives for unwarranted scientific conclusions on climate change, just before the Climate Convention COP15 Copenhagen Summit. The scientists were cleared of all wrongdoing.³³

32 https://en.wikipedia.org/wiki/Global_Climate_Coalition

33 <https://www.bbc.com/news/av/science-environment-48925015>

The oil companies knew about the threat of climate change well before it entered the political agenda in 1987–88. They took the guts out of the Climate Convention in 1992. They made the US senate vote down the Kyoto Protocol 95-0 in 1997, and then tried to wreck it a few years later.

In the United States, the resistance to any serious climate action has been strong, open and unashamed ever since the 1980s, though there are opposing forces on all levels.

In Europe, climate change has been acknowledged by the EU and practically all leading politicians in every EU country since 1990, so European oil companies have worked in a different environment. BP, Shell, Total and Equinor have avoided outright denial of climate change science and have sometimes dissociated themselves from such campaigns and front organisations.

But they are still doing their best to carry on business as usual, and usually getting away with it. But not always. In 2021, Shell lost a court case brought by Friends of the Earth Netherlands and is now required to cut its CO₂ emissions by 45 percent compared to 2019 levels, to comply with the Dutch climate legislation.

“Security of supply”. Rich consumer countries as part of the oil lobby

In 1973 the oil-producing countries, mainly in the Middle East, used their OPEC cartel to increase oil prices. The rich oil-consuming countries of the OECD formed the International Energy Agency (IEA) as a kind of anti-OPEC think tank. It recommended more nuclear and coal power, which were universally implemented, and to some extent renewables and efficiency, which were largely ignored.

The IEA, though influential, has no power.

But the rich oil-consuming countries it represents have enormous power: bargaining backed up by brute force. Three of the OECD countries have nuclear weapons, nuclear submarines, aircraft carriers etc. All three – the US, the UK and France – have been involved in several oil-related wars and exported weapons to Saudi Arabia etc.

The notion of “security of supply” is a key concept for the IEA and the EU that means “oil for us, at prices we accept”, rather than adapting to a life with less oil, more expensive oil and eventually without oil.

“Security of supply” is a concept that comes with a nasty nationalistic undertone, especially in the US. The oil crises were part of a narrative in which “they” (the Arabs, the Muslims, the Iranis) took away “our” oil. The high petrol prices were portrayed as an attack from outside, like the “humiliation” of the Teheran US Embassy hostage drama in 1979, and this narrative was cultivated for years and years. It was reinforced by the 9-11 attacks. There is a dotted line from 1979 to

Donald Trump's anti-Muslim populism in 2017 when he banned travel to the United States for citizens of Iran, Iraq, Libya, Somalia, Sudan, Syria, and Yemen.

“Security of supply” implies the use of force, as has happened many times. The Iraq war in 2003 was not about weapons of mass destruction, as it was well known that they did not exist. It was not about al-Qaeda bases, as they did not exist. It was certainly not about democracy, which has never been a priority for US or UK policy for the region. It was about power and oil.

Real security of supply is about not being dependent on oil, by eliminating the need to use it.

Another buzzword is “affordability”, which is used by Exxon, for example, to imply that low energy prices are a basic human right. What actually is a human right is defined in article 25 in the UN Universal Declaration of Human Rights of 1948:

“Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control.”

There's nothing about the price of petrol or heating oil in there.

An associated idea is that of “energy poverty”, which is often used in euro-speak and is even measured.³⁴ There is poverty, period: not enough money for food and shelter. There is no such thing as energy poverty. The concept is a pretext for more fossil subsidies or lower taxes on fossil fuels.

Phasing out oil – both supply and demand

Not so long ago “Peak Oil” was about whether there would be enough oil to meet demand. That is a question nobody asks now, since first the Great Recession of 2008 and the oil price hike of 2010–2014. Low prices hurt oil business profits and high prices hurt longer-term demand.

The US fracking industry has led the way to more oil through booms and busts, and as an analysis from the Institute for Energy Economics and Financial Analysis puts it:

“Even though the continent's energy industry was producing unprecedented volumes of oil and gas, it had submerged itself in a sea of red ink.”³⁵

There is certainly enough oil for the future, for better for worse, for richer for poorer, so to speak. The pertinent question is now instead: can we leave enough fossil fuels in the ground to avoid catastrophic warming?

34 https://ec.europa.eu/energy/eu-buildings-factsheets-topics-tree/energy-poverty_en

35 <https://ieefa.org/the-goldilocks-predicament-for-oil-and-gas-there-are-no-just-right-prices/>

In principle, the flow can be throttled either on the supply side or on the demand side. We have to do both.

NGO campaigns against the extraction of oil (and other fossil fuels) are often spectacular and, in a good sense, newsworthy. They put fossil fuels in the spotlight and bring up questions of responsibility and accountability.

Demand-side measures are less polarizing. The energy industry does usually not mobilise campaigns against EU directives for more efficient boilers or appliances. Cutting energy demand and specifically oil demand has been official policy for much of the time in many countries since 1973, but with varying levels of sincerity, emphasis and attention to detail. Whatever the reason, cutting demand has so far been more successful than strikes against supply. EU consumption of oil peaked at almost 700 million tons in 1979, but was “only” about 500 by 2020–2021. There are several reasons for this, one of which is a lot of rather unglamorous NGO work.

The phasing out of oil is unlikely to be smooth or planned. Oil prices have fluctuated in the past. They are likely to fluctuate even more in the future, as different measures to stop the chariot to hell are set in abruptly in different market segments and different regions. Some big projects will grind to a halt because of lacking finance, others because of flagging demand, and still others because of political resistance and legal issues, including corruption and war crimes³⁶ or high CO₂ prices or new taxes. Nevertheless, huge profits will be made from many existing wells when prices are high and some of that money will go into the exploration and development of more oil.

In April 2020 we got a foretaste of the future when, for the first time, negative oil prices were recorded. Ship owners had to pay to unload their oil. Prices soon recovered and spiked in 2021 at levels not seen since 2014.

Options for reducing demand

EU oil consumption structure

In 2019, the majority of oil (66 percent) was used for transport: road transport (48%) air transport (9%) and sea transport (9%) in the EU.³⁷ As for other sectors, the statistical categories are vague and not fit for political analysis.

36 <https://apnews.com/article/business-middle-east-africa-sudan-stockholm-2d711419cb14f0c81aebf0da864613e9>

37 https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Oil_and_petroleum_products_-_a_statistical_overview#Use_of_petroleum_products

Vehicles

Cars and lorries

Most of the oil is used for transport. The automotive industry is quite separate from the oil industry. They have different owners and different industrial clusters.

The main automotive manufacturing countries in Europe are Germany, Sweden, Italy, France, Czech Republic, and Spain, none of which can be described as an oil country.

But the automotive manufacturing industry also has a shared interest with the oil industry to resist change. They do not want stricter fuel efficiency for vehicles. They, the manufacturers, lie, deceive and cheat to keep on producing big cars with big engines and huge emissions of pollutants and CO₂. Where they have not been able to stop legislation, they have created large loopholes in it.

They have been quite successful for a very long time. Nissan responded to the oil shocks of the 1970s by starting to produce its Micra in 1982, with a consumption of 5 litres of petrol per 100 km. It did not set the standard in Europe. Toyota made great progress in fuel efficiency in 1996 with its Prius hybrid. It sold well but had little influence on other manufacturers in Europe and did not set the standard.

A 2008-model Volvo XC90³⁸ was no more efficient at 16 miles per gallon than a Ford Model T built almost 100 years ago, at 13–21 mpg.

One achievement of automotive lobbying in the EU was the switch from petrol to diesel, which did not cut oil demand very much, but was responsible for large and unnecessary health and environmental problems from particles and NO_x. Even some NGOs supported the diesel campaign, as a diesel car has lower CO₂ emissions than a petrol car, all other things being equal, though the difference is not very big³⁹ – especially not under honest and realistic test conditions.

The automotive industry and the oil industry are not the same, but sometimes they work together to block legislation on efficiency.⁴⁰

We could have achieved an orderly exit from oil from the 1970s on. The car and oil lobby stopped it. Climate policy, in the form of higher taxes on automotive fuels, became political poison in the late 2010s, as exemplified by the Yellow Vests in France. Most people, especially those on lower incomes or living in rural areas, have second-hand cars that are 10–15 years old and have high fuel consumption, and they cannot afford to replace them easily. Their grievances may sometimes be overblown by media, especially motor journalists, and used for political purposes, but represent a real political problem. Those who feel left

38 <https://www.fueleconomy.gov/feg/noframes/24694.shtml>

39 <https://ec.europa.eu/jrc/en/jec/activities/wtw>

40 <https://www.nytimes.com/2018/12/13/climate/cape-emissions-rollback-oil-industry.html>

behind are actually often left behind, and those who feel they are not listened actually do not have much of a say or representation. They pay the price for other people's success, without having done anything wrong other than having been born in the wrong place.

It will take a lot of skill and attention to settle those grievances.

Policies that could mitigate the consequences of higher petrol and diesel oil prices for poor people in rural areas and in rust belts include: more investment in public transport, schools and broadband, better general welfare (minimum wages, unemployment benefits, pensions), more investment in depressed areas and better representation of poor people in the parties and elected assemblies. Programmes for more energy-efficient buildings and renewables can be directed to poorer areas.

If people see a political package which as a whole will make life better, not worse, for them, they would probably accept increased energy prices. Germany used wind and solar power in the former Eastern states in an effort to integrate them with West Germany. Wind power was even installed in areas that were not very windy, as it brought along jobs.

If the Yellow Vest issue is not addressed by the traditional parties, right-wing populists are sure to take advantage, and they don't care much about the climate.

The automotive industry can build new electric battery cars or hydrogen cars or possibly bio-fuel cars, if it wants to. They generally don't want to, with the odd exception. At least Tesla is different.

Collectively they try to make the change as slow as they can, which is very slow indeed. Even the non-fossil Tesla lives off fossil fuel carmakers, by selling emission rights to them so they can carry on much the same as usual.

Battery cars have been boosted by generous subsidies in many countries. The subsidies have not been very efficient or fair – the poor are paying the rich for their new cars. But electric cars are here now.

Electric vehicles (EV), including battery electric and plug-in hybrids, made up 7.2% of global car sales⁴¹ in the first half of 2021, up from 2.6% in 2019 and 4.3% in 2020. This includes plug-in cars which may, or may not, be mainly run on electricity, but most are true battery cars.⁴² If one new car in 20 is all-electric now, all new cars could be electric within a few years. With 80 percent growth per year, it would take five years to eliminate fossil cars, well before 2030, when Joe Biden wants half of passenger cars to be electric, or the proposed EU ban⁴³ in 2035.

41 <https://www.utilitydive.com/news/global-ev-sales-rise-80-in-2021-as-automakers-including-ford-gm-commit-t/609949/>

42 at least in 2020 see <https://www.iea.org/reports/electric-vehicles>

43 <https://www.reuters.com/business/retail-consumer/eu-proposes-effective-ban-new-fossil-fuel-car-sales-2035-2021-07-14/>

If 80 percent sounds like a lot, compare it with the US car market some 100 years ago, for the Ford model T.⁴⁴ It sold 239 cars in 1908, 12,176 in the next year and 783,000 in 1917.

Henry Ford had more difficult problems to solve in those days – developing the production technology (the assembly line), the supply chain and creating a market for cars and fuel – so between 1909 and 1917 he only achieved 68 percent growth in car sales, but that was enough to completely change the United States.

Compared to that, switching from fossil cars to electric cars using already existing car factories is not much of a challenge.

The global sales of electrical vehicles more than doubled in 2021, according to the IEA.⁴⁵ The problem has been solved, technically. We know now what to do: battery cars. We know how to do it: the manufacturing technology is working at scale. It will cost nothing: the electric car is still more expensive than a petrol car, but electricity is cheaper than petrol, so the resulting lifetime cost is the same or slightly less⁴⁶ for the EV.

A fast rollout of electric vehicles is possible, and it is happening right now, but there is no guarantee for the next few years. The car industry cannot be expected to take any kind of responsibility. It needs to be kept on a very short leash by politicians, which is not happening in the EU.⁴⁷

Hydrogen and biomass

Aside from battery cars, hydrogen is a fossil-free alternative, if the hydrogen is produced from green electricity.

The drawback of hydrogen is obvious. Direct electric drive is more efficient. One kilowatt hour of electricity will drive a battery car more kilometres than a hydrogen car.

It looks now as if batteries have won, following a rather heated debate. That may not yet be certain. Hydrogen fuel cell vehicles have some advantages:

Higher energy density, which makes them better suited for lorries, buses, aeroplanes and ships, where batteries will not give enough power.

Faster recharging for a car.

Longer range for a car.

Hydrogen can be used as feedstock for the production of other fuels such as ammonia or methanol.

44 <https://www.mtfca.com/encyclo/fdsales.htm>

45 <https://www.iea.org/commentaries/electric-cars-fend-off-supply-challenges-to-more-than-double-global-sales>

46 <https://www.vanarama.com/electric-leasing/cars/running-costs-guide>

47 <https://www.transportenvironment.org/discover/electric-vehicle-boom-set-to-stall-as-lost-decade-looms/>

Where hydrogen is produced in large quantities for other purposes, e.g. direct reduction of iron, or ammonia production, the hydrogen as by-product may be relatively cheap. Hydrogen production should usually take place when and where electricity is cheap.

Battery production may meet bottlenecks. Then it is good to have an alternative.

Hydrogen cars have been produced in much smaller numbers than battery cars, so they should have more room for improvement on weight, performance, and economy.

Toyota and Hyundai have hydrogen cars on the market. Toyota has invested heavily in fuel cell technology. Toyota is the world #2 manufacturer and Hyundai #10.

Toyota, it should be added, has been accused of climate-delaying because of its lack of enthusiasm for battery cars.⁴⁸

Biofuels, if used with judgement, could be a way to replace oil. Though the resource is limited, it is large. It is needed for fossil-free plastics, lubricants and chemicals, and to some extent also for vehicle fuels. It can be used in existing vehicles to replace diesel, petrol and kerosene, which electricity and hydrogen cannot. Biomass includes a wide range of materials: banana and potato peels, sewage, residues from the agriculture, food, paper and forestry industries. Sustainability criteria for biomass are needed and also need to be much stricter than in the EU today.⁴⁹

Biogas is a relatively clean fuel that can be used for cars and taxis and other vehicles with a limited range. If produced from manure, it can also reduce emissions of methane and N₂O.

Other methods to cut vehicle emissions

The climate perspective is short term. What needs to be done, has to be done mainly by 2030 or 2040. That is not a long time to replace road transport with rail and sea freight, or to build new public transit in cities. But some public money should be moved from asphalt to rail.

However, as the pandemic showed, some changes can happen fast. Zoom meetings have replaced considerable travel by air and road and can continue to do so in the future.

New or improved bus services can be put in place within a year or so.

Congestion tax is used to shift the times people travel by car, rather than to reduce car travel, but in practice it does both. It saves money for the public purse as fewer new roads will have to be built.

48 <https://www.nytimes.com/2021/07/25/climate/toyota-electric-hydrogen.html>

49 <https://www.greenpeace.org/eu-unit/issues/nature-food/45765/eu-renewables-rules-destroying-estonias-forests/>

Air travel is heavily subsidised, in many ways. Ryanair, the #1 European airline, got many of its airports for free in the 1990s when the military abandoned them. The airline companies don't pay any tax according to the Chicago convention. One of the most appalling freebies is in the EU trade emission scheme, where CO₂ from aeroplanes is charged at a much lower rate than emissions from power stations. The airlines win even when they lose. They got at least €38 billion⁵⁰ in Covid bailouts in the EU alone, without green conditions.

With slightly improved policies, air travel should stop growing and decrease somewhat. That is a faster and cheaper way to cut emissions than new fuels or new kinds of aeroplanes, though they too need to be developed.

Power

Oil power once supplied almost 24 percent of all electricity in the OECD countries,⁵¹ in 1974. This figure fell to 9 percent in the wake of oil price increases. It decreased from a 1370 TWh worldwide⁵² peak in 1990 to 758 TWh in 2020. In the EU, oil power peaked in 1998 at 212 TWh, and dropped to 43 TWh in 2018, an almost 80 percent cut.

Even though it has decreased a lot, it is still a big emitter of CO₂. The plants are old and inefficient. In the US, oil power emits almost one tonne⁵³ of CO₂ per MWh, the same as coal. It also emits large amounts of SO₂, NO_x, and particles.

What is left of oil power should be replaced with renewables and efficiency improvements, which should not be very difficult.

Heating

15 percent of household heating⁵⁴ and 8 percent of heating in services (offices, schools, etc.) in the EU came from oil in 2019. Industry uses a lot of oil and oil products, but it is not known how much of this is for heating.

Much oil is used for heating of buildings. This could be reduced first and foremost by improving building efficiency: more insulation, better windows, more efficient hot water heaters, exhaust air heat pumps, etc.

Solar water heating is not a very sophisticated technology, but is in fact a huge energy source (or energy saving) with about 35 GW_{thermal} installed⁵⁵ in the EU in 2019, and 500 GW globally, not very far behind solar photovoltaics, which totalled 581 GW in 2019. Solar heating is mainly small scale, but is also used in large farms, for district heating.

50 <https://www.greenpeace.org/eu-unit/issues/climate-energy/2725/airline-bailout-tracker/>

51 <https://www.iea.org/data-and-statistics/charts/share-of-oecd-gross-electricity-production-by-source-1974-2020p>

52 BP stats for 1985-2020

53 <https://www.eia.gov/tools/faqs/faq.php?id=74&t=11>

54 <https://www.odyssee-mure.eu/publications/efficiency-by-sector/households/heating-energy-consumption-by-energy-sources.html>

55 <http://solarheateurope.eu/wp-content/uploads/2020/12/ST-Market-in-EU-28-Switzerland-Total-and-Newly-Installed-Capacity-glazed-collectors.png>

A combination of photovoltaics and production of warm water is an option, as cooler PV panels have higher efficiency.

Electric heat pumps using ground-source water or air can replace heating oil (and fossil gas). For every unit of electricity, they deliver 3–4 units of heat. Heat pumps, especially groundwater heat pumps, can be used to balance variable renewables so as to make room for more wind and solar power.

District heating using geothermal, solar and industrial waste heat can be an option for areas with a high density of flats, houses, or offices.

The “green gas” option, to use hydrogen or biogas for heating is limited. Biogas is a limited resource. It is generally not a good idea to use electricity to produce hydrogen, instead of using the electricity as it is.⁵⁶ “Blue” hydrogen, i.e. from fossil fuels with carbon capture, cannot produce green gas, and is an expensive diversion.

If green gas is to be used at all, it should mainly be as a substitute for fossil gas.

Biomass heating is common in some countries, but it is neither likely nor desirable that it should be increased. Biomass is a limited resource, because logging must be restricted. The biomass resource is required for other purposes: timber, textiles and biofuels.

Plastics

Plastics are a large heterogeneous group of materials, useful for some purposes but evidently harmful for the environment. In 2018, global plastic production was 359 million tons. It is increasing globally but decreasing in the EU.⁵⁷

It is not one of the top emitters, like transportation, power, cement and steel, but it is still significant at about 2 percent of global anthropogenic CO₂.

“Globally, in this year alone, researchers estimate that the production and incineration of plastic will pump more than 850 million tonnes of greenhouse gases into the atmosphere.”⁵⁸

A great deal of plastics use can be avoided or reduced, reused or substituted.

A large proportion of plastics (some 40 percent) is used for packaging. It is obvious that this could be and would be reduced, if the polluter pays principle were followed. Some plastics are problematic during the production phase, for workers or the environment, and during use, due to fires (for example PVC in buildings). Plastic waste is also a problem, as some plastics last for a very long time.

56 [The EU consumer organisation BEUC has quantified this https://www.beuc.eu/publications/goodbye-gas-heat-pumps-will-be-cheapest-green-heating-option-consumers/html](https://www.beuc.eu/publications/goodbye-gas-heat-pumps-will-be-cheapest-green-heating-option-consumers/html)

57 <https://www.euractiv.com/section/energy-environment/news/while-global-plastic-production-is-increasing-worldwide-it-is-slowin-down-in-europe/>

58 <https://www.wwf.org.au/news/blogs/plastic-waste-and-climate-change-whats-the-connection#gs.hqwucg>

Plastic shopping bags are not the biggest environmental problem, but experience gained from charging for them shows that consumers can change their behaviour by re-using single-use bags several times or using a more durable bag, or none at all, and considerably reduce the amount of waste. If plastic packaging were to carry a substantial tax or fee per ton of plastic, consumers would soon find other solutions or materials.

If plastic bottles were more expensive, one option would be to use reusable bottles (as has become common) or to improve tap water quality.

Another large share of plastics (some 20 percent in the EU) is used in buildings, as tubes, mats and as insulation materials. Some of those are more problematic for other reasons than the climate. There are also many options for recycling plastics in the building sector.

To the extent carbon capture can be made cheap (even without storage) it may be combined with hydrogen to create new plastics. The potential may not be very big or available soon, and if the CO₂ is of fossil origin it does not eliminate emissions, it just cuts them in half (by using the carbon twice, before it is emitted into the atmosphere).

Recycling of some plastics is a much bigger short-term option. If sorted in the right way, most plastics can be reused in one way or another. Even if they are mixed, new technology exists for separating them.^{59,60}

For applications where plastics are necessary or at least better than other materials, bioplastics offer a strong option. If wood is used in buildings, bark and sawdust, etc. can be used as feedstock.

Plastic waste incineration

Large amounts of oil are used to produce plastics that end up as plastic waste. Most of this plastic waste is either thrown into nature, landfilled, or incinerated as mixed waste.

Sweden produces and imports large amounts of plastic that is incinerated for district heating and power in Stockholm and many other cities and towns. This is now a larger source of CO₂ than coal, gas, oil and peat together in Sweden. Fortum Heat in Oslo, Norway also burns imported mixed plastic waste for heat and power. Both countries import waste from the UK.

Mixed waste is not just a cheap fuel. It actually has a negative price. The companies that import and burn it are paid well to do so. This relieves the exporting countries of the burden of organising their own waste processing.

In Stockholm, Fortum Stockholm Exergi is planning a Bio-CCS plant with expected huge support from the EU, for which it has passed the first gate.⁶¹ A Norwegian plant has also applied for EU support.

59 <https://www.stockholmexergi.se/nyheter/ny-anlaggning-for-okad-plastatervinning-invid-i-brista/> (in Swedish)

60 <https://www.svenskplastatervinning.se/en/about-plastic-recycling/>

61 https://ec.europa.eu/clima/eu-action/funding-climate-action/innovation-fund/large-scale-projects_en

The idea of burning plastic together with other household waste and then making the taxpayer pay for carbon capture and storage takes system irresponsibility and greenwashing to a new level. It will be very expensive and locked-in. A gigantic system is required to collect the waste, to transport it for incineration at an expensive incineration and processing plant, and then on top of it all to capture the carbon.

A better solution would be to improve building efficiency, so less heat is needed.

The heat needed for district heating should be produced by electric heat pumps, surplus heat from industries and offices, and a small contribution from biomass.

That would mean less demand for heat and less income from burning waste for district heating companies. They will not do it unless they are forced to do so.

Plastics should not be incinerated at all. They should be reduced, re-used and recycled.

But as things stand now, district heating in some countries, mainly in Northern Europe, is a stumbling block for efforts to minimise plastics.

Stockholm Exergi, to its credit, has an alternative waste strategy, which is to sort out the plastic from the waste, as mentioned above under Plastics. But if the CCS project goes ahead, thanks to the EU Innovation Fund, it would put the innovative plastic-sorting project at risk.

Plastic waste and other oil derivatives as landfill

Assuming plastic is collected, and not allowed to be incinerated, it would, logically, have to be processed and stored.

The resulting mountains of plastic could, at a cost, probably be compacted and dried to a carbon-rich, relatively inert product, a kind of artificial coal, which would not emit methane or CO₂.

This is not very circular, but at least it is a visible problem with a visible cost, calling for political attention. It is preferable to incineration with CCS, which looks like a solution but is really just kicking the can further down the road.

A similar fate could be imagined for other oil residues, such as pet coke or asphalt.

Pet coke

Petroleum coke is a heavy emitter itself and is a source of income for producing the worst fuels (oil sand, heavy oils). It is used to make anodes for aluminium, steel and titanium production, although there are alternatives. If pet coke cannot be sold, it becomes a liability instead of an asset. Metals can be produced by other methods, such as inert anodes for aluminium and green hydrogen for steel.

Lubricants

Lubricants do not contribute greatly to carbon emissions. But they are high-value products of the petroleum complex. On the other hand, renewably sourced lubricants and other special chemicals would help build up a green industrial complex.

Asphalt and other heavy products

Oil refineries do their best to extract as much petrol, diesel, and kerosene as possible from crude oil. At the bottom of the barrel are black, thick residues like asphalt and heavy oil. If these fractions cannot be sold, but instead treated as waste, they carry a cost for disposal that is incurred by the entire industry.

Asphalt may not pose a big climate problem, as the alternative in the short run is often concrete. The cement part of the concrete – which glues together sand and pebbles – has a huge climate impact, unless the cement industry makes radical changes. Asphalt for roads could be seen as just moving carbon from oil wells on to roads. But it leaks CO₂ and other pollutants during each step of production.

Heavy fuel oil has been used as ship fuel, but much of that market dried up when high-sulphur oil was banned from 2020. Many ships continued using heavy fuel oil by fitting scrubbers, which pollute the marine environment. There are several alternatives for the medium perspective: electric propulsion for short distances, or biofuels, hydrogen or hydrogen derivatives (ammonia or methanol).

Stopping the flow of oil from the supply side is not easy, as oil-producing countries and companies tend to plan on doing what they already do, as the UNEP gap report shows.

Less demand for heavy products from the refineries would shift demand away from high-sulphur and high-carbon crudes and associated refineries. A strong climate policy will make the worst kinds of oil worthless first.

On the production side

Stop financing all oil supply projects

At the Climate Convention Conference of the Parties (COP26) in Glasgow in November 2021, the United States, Canada and 18 other countries committed to stop public financing of fossil fuel projects abroad by the end of next year and divert their spending into clean energy instead.

Some pension funds are withdrawing their money from oil and other fossil business. The Dutch fund APB⁶² intends to pull €15 billion from companies like Royal Dutch Shell by 2023.

62 <https://www.theguardian.com/environment/2021/oct/26/abp-pension-fund-to-stop-investing-in-fossil-fuels-amid-climate-fears>

The European Central Bank took a decision in July 2021 that was described by NGO350.org as a real step to “ditch fossil fuel finance”.⁶³

Even Exxon, with its long history of financing climate denial and confusion, felt the wind of change in June 2021, when activist shareholders, led by a teachers’ pension fund, forced a shakeup in the boardroom. They want the company to be more transparent about the climate and reduce exposure to climate policy risks.⁶⁴ But kicking the habit is hard. In August, Exxon was thrown out of the Climate Leadership council after one of its lobbyists admitted that he had lobbied several senators to remove or weaken measures in the Infrastructure Investment and Jobs Act that were intended to halt climate change.⁶⁵

Stop exploration of unconventional sources and investment in extraction

The worst fossil fuels are lignite, shale, and peat, followed by hard coal, unconventional oil and fracking, then conventional oil and gas. (Unsustainable biomass, such as deforestation of rainforests comes somewhere in between.)

There has been a long fight against fracking in the US. It has produced mixed results, with growing production in the country as a whole, but with a ban in New York state,⁶⁷ and a ban on new wells in California⁶⁸ from 2021.

In Europe, the frackers have lost out so far.

Fracking is even more problematic than conventional oil and gas, as it can pollute the water and is strongly suspected of causing large methane leaks.⁶⁹

A halt on fracking anywhere has quick benefits for the climate. The life of a borehole is only a year or two,⁷⁰ so without new holes production will soon fall. Fracking is more expensive than conventional oil, so it is also much more vulnerable to low prices.

Another high-priority target should be tar sand oil in Canada, which emits at least 30 percent more CO₂ than conventional oil. The reserves of tar sand, mostly in Canada, are enormous, and it won’t peak until 2039 according to government projections.⁷¹

63 <https://350.org/ecb-strategy/>

64 <https://www.bloomberg.com/news/articles/2021-06-01/exxon-mobil-may-be-big-oil-s-canary-in-the-coal-mine-green-insight>

65 after wikipedia, original <https://reenergizexom.com/materials/engine-no-1-issues-message-to-exxonmobil-shareholders>

66 <https://www.reuters.com/business/exxon-suspended-climate-advocacy-group-it-helped-form-2021-08-06/>

67 <https://www.nrdc.org/experts/marisa-guerrero/new-york-state-codifies-fracking-ban-budget>

68 <https://www.sfchronicle.com/climate/article/Newsom-administration-denies-fracking-permits-16304643.php>

69 <https://www.bloomberg.com/features/2021-methane-hunters-climate-change/>

70 https://www.eia.gov/analysis/drilling/curve_analysis/

71 <https://oilprice.com/Energy/General/Can-Oil-Sands-Be-Banned.html>

There is considerable resistance,⁷² even from unexpected directions: asset manager “Blackrock now lumps the oil industry with civilian firearms, tobacco and other pariah sectors. Some insurers are pulling away, and several banks have said they will not finance new oil sands projects”, according to the Financial Times.⁷³

One step in the right direction is the end of the Keystone XL project.

Other targets are Enhanced Oil Recovery (using the CO₂ from fossil combustion to force out more oil), and refinery expansion, especially for residual and heavy oils. But the most important ways to cut oil production must be to stop exploration for new oil wells and subsequent investment in new wells.

Many NGO campaigns have been directed against oil exploration and production in sensitive areas, such as the Arctic.

Response strategies from oil interests

Oil companies and oil countries have a number of strategies to meet the climate challenge, which are combined in different ways. The same strategies are used by governments of all countries with a large oil industry. Here are six response strategies

1. Denial of responsibility

One way to solve the conflict between private good and common destruction is to say that the responsibility rests with someone else, and that it should be solved at another time and in another place.

This is the position of the new centre-left Norwegian government following its election in 2021, as well as the previous right-wing government. They will continue prospecting for oil. Prime minister Jonas Gahr Støre received the first “Fossil of the Day” award from Climate Action Network⁷⁴ for claiming that Norwegian gas (and oil) is not the problem, but a part of the solution.⁷⁵ The same exceptionalism (more or less “because I’m worth it”), was developed by Gahr Støre in a Financial Times interview,⁷⁶ in which he stated that the \$1400 billion oil fund is the property of the Norwegian people and structured to “last for eternity”. This fund invests some of its revenues into green businesses, but has also invested in Canadian tar sand operations and has large holdings in Exxon and Chevron.

72 <https://www.greenpeace.org/canada/en/story/3138/everything-you-need-to-know-about-the-tar-sands-and-how-they-impact-you/>

73 <https://www.ft.com/content/102a1c89-632b-4e41-8af1-4bad95a5b017>

74 <https://climatenetwork.org/resource/fossil-of-the-day-02-november-2021/>

75 <https://www.aftenposten.no/norge/politikk/i/KzGWLg/stoere-talte-fn-midt-imot-mener-norsk-gass-er-en-del-av-loesningen-paa>

76 <https://www.ft.com/content/cbf5bc66-660f-46da-a4f7-4f26eb752298>

2. Defocus

Another strategy is to defocus oil's climate issue through lobbying, propaganda, greenwashing and diversionary solutions (CCS, nuclear, geoengineering), in order to win at least few more years of business.

One way to defocus is to blame the customer: “gaslighting the public by suggesting individual actions could stop the climate crisis, rather than systemic change to the fossil fuel industry”, as attempted by Shell in a spectacularly failed campaign⁷⁷.

This line of argumentation that “we are all to blame” was also used by Vattenfall in the noughties when they encouraged people to switch from beef to chicken to save Vattenfall from cutting its production of lignite power.

Some of the fossil interests, nations and companies are very much pro-nuclear (Australia, Poland, Russia, Canada, the UK, often the US) but the oil industry is quite separate from the nuclear industry. They are not operated by the same companies and often not even in the same countries. About half of the biggest oil producers do not have a single nuclear plant or plan for the near future, including Saudi Arabia, Indonesia, Iraq, Kuwait, Norway, Qatar, Kazakhstan and Nigeria. In countries where they coexist, such as the United States, Canada, Russia, Iran, UAE (Emirates), China and Brazil, they are built and operated by different companies.

Chevron supports a nuclear fusion power project,⁷⁸ and there may be more examples, but generally nuclear is more aligned with the coal power industry.

3. Carbon Capture and Storage

The main strategy for the oil industry is now CCS.

“ExxonMobil chief executive Darren Woods and Occidental Petroleum chief executive Vicky Hollub have both stressed ... that the world still needs oil and gas. So instead of attacking fossil fuels, they argue that governments can mitigate global warming by helping the industry to develop carbon capture and storage technologies and strengthen markets where polluters buy and sell the rights to emit carbon.”⁷⁹

Aramco promotes CCS on its home page:

“We believe carbon capture and storage is a central part of efforts to reduce emissions, whilst ensuring the world can continue to thrive.”⁸⁰ The world, indeed!

77 <https://www.theguardian.com/business/2020/nov/03/shells-climate-poll-on-twitter-backfires-spectacularly>

78 <https://www.reuters.com/article/us-chevron-investment-nuclear-idUSKCN25831E>

79 <https://www.argusmedia.com/en/news/2192137-reduce-carbon-not-fossil-fuels-exxon-oxy-ceos-2-3-2021>

80 <https://www.aramco.com/en/creating-value/technology-development/globalresearchcenters/carbon-management#> retrieved 18-11-2021

Norway is by no means alone in promoting CCS, a technology it has pioneered and hyped since prime minister Jens Stoltenberg called it “our moonlanding” in 2007. Since CCS was made part of US energy policy when George W. Bush came into power in 2001, it has been used as an excuse for fossil fuel extraction around the world. Actual results, measured as tons of CO₂, have been extremely meagre: in the EU, including the UK before and after Brexit, the grand total is zero, despite huge political support and generous financial grants from the EU and member states. They aimed to have 10–12 large-scale demonstration plants running by 2015, but achieved nothing by then, or in any year up to 2021.

That did not deter the G20 under Saudi leadership in 2020 from pinning high hopes on CCS under the name of a Circular Carbon Economy.⁸¹ It actually defines the problem as one of scarcity of carbon atoms! This was echoed in an EU communication⁸² – “Sustainable Carbon Cycles” – in December 2021.

The level of PR nonsense is baffling.

“Carbon dioxide (CO₂) performs a delicate life-sustaining function on Earth”,⁸³ according to Saudi Aramco.

(Implication: there was no life on earth before the oil industry.)

“Carbon is the main element for many chemical products, as well as for a large variety of products varying from food to materials”, says CEFIC,⁸⁴ the European Chemical Industry Council.

(Without plastics, at present production levels and qualities, there would be nothing to eat.)

CCS also featured highly in a stealthy lobbying campaign at COP26 by Saudi Arabia, Norway, Argentina, Japan and Australia, uncovered by the media just before the event.⁸⁵ They attempted to delete or water down the urgency of phasing out fossil fuels and give CCS a bigger role.

Exxon claims to be the global leader in CCS.⁸⁶ Most of its CCS facilities are for enhanced oil recovery.

81 <https://www.kapsarc.org/research/publications/achieving-climate-goals-by-closing-the-loop-in-a-circular-carbon-economy/>

82 <https://www.euractiv.com/section/climate-environment/news/leak-eu-strategy-seeks-to-remove-carbon-from-atmosphere/>

83 <https://www.aramco.com/en/sustainability/climate-change/managing-our-footprint/circular-carbon-economy>

84 <https://cefic.org/a-solution-provider-for-sustainability/circular-carbon/>

85 [COP26: Document leak reveals nations lobbying to change key climate report 21-10-2021](https://www.bbc.com/news/science-environment-58982445)
<https://www.bbc.com/news/science-environment-58982445>

86 <https://corporate.exxonmobil.com/Climate-solutions/Carbon-capture-and-storage#Carboncapturelocations>

Some oil companies say they are moving in a green direction. They should be judged by numbers, not by words. BP “aims to produce 1GW of CCUS-enabled blue hydrogen and start-up in 2027” at Teeside in north-east England by 2030 and “targets”⁸⁷ 60 megawatts of green hydrogen by 2025. The blue hydrogen project, i.e. burning fossil gas with CCS, is described as “CCUS-enabled”, so the only sure thing is that they will burn gas, with the option of CCS. Even if it is realised in full, the ratio of greenwashed fossil gas to real green hydrogen is 100 to 6.

It is also worth remembering that a similar project by BP, ConocoPhillips and Shell was announced in 2005 for Peterhead in Scotland, but never materialised.⁸⁸

BP is a late-comer to offshore wind with its first project and talks of “low-carbon investments” and increasing “the proportion of investment we make into our non-oil and gas businesses”, which is none too specific. “BP’s purpose is to reimagine energy for people and our planet”, they say.

4. Hedging the bets – carry on as usual but with some greening

Oil companies are also into natural gas but usually not into coal. So one line of defence for digging up fossil fuels while taking climate change very seriously is that natural gas is good for the climate because gas is better than coal. That is the official line of Norway as well as Exxon.

One option is to transform or at least hedge their bets: diversifying into renewable energy and green chemistry, areas outside the traditional oil sector.

Exxon and BP were in the photovoltaics business but left it. A possible explanation is that photovoltaics has little in common with oil, gas refineries and service stations. The renewables industries have generally not grown out of the oil industry. Most oil companies are not really into electricity production.

This may change. By 2030, Shell aims to sell more than 560 TWh of power worldwide a year (a little less than Germany).⁸⁹

Shell has recently ventured into solar and batteries with the acquisition of utility-scale solar and energy storage developer Savion, with a project pipeline of more than 18 GW. This is in line with an early 2021 strategy of investing 2–3 billion dollars per year into such things. To put it in context the EBITDA of Shell in 2018 or 2019 was 60 billion USD.

87 <https://www.bp.com/en/global/corporate/news-and-insights/press-releases/bp-plans-major-green-hydrogen-project-in-teeside.html>

88 https://www.gem.wiki/Peterhead_Carbon_Capture_and_Storage_project

89 <https://www.power-technology.com/news/shell-savion-acquisition/>

It remains to be seen if Shell is really transforming from fossil fuels to green. We have seen it before, when BP rebranded itself as “Beyond Petroleum” under its 1995–2007 CEO, John Browne (later Baron Browne). Perhaps this was sincerely meant; the supposed transformation took place in the aftermath of the Kyoto Protocol in 1997. But as Forbes put it: “under financial pressure, BP eventually sold off many of its solar and wind assets, quietly abandoning the 2001 rebrand”.⁹⁰

Now (2020) BP is saying much the same as they did in 2001: they are aiming for 50 GW of renewable electricity⁹¹ by 2030. This is much less than the above Shell target, and should we take any of them at their word this time?

For oil companies that run service stations it is not a long step to providing charging for electric cars. That could bring them into the business of consumer electricity, or hydrogen if that developed into something big.

If oil companies want to diversify from their production side (wells and refineries) they may go into offshore wind power, biofuels and hydrogen:

Offshore wind power because they have the technology to build oil and gas offshore platforms.

Biofuels for vehicles because the refinery technology is much the same as oil refining. Service station chains can handle biofuels in the same way as petrol and diesel.

Hydrogen because it is a big process industry like refineries, with lots of tubes, high pressures and meticulous elimination of fire hazards.

Total Energies is more of an energy conglomerate than just an oil company. It intends to keep drilling and pumping, but also aims to build 100 GW of renewable electricity by 2030, to produce 4–6 TWh of biomethane and 5 Mtons of renewable fuels. It is developing offshore wind in the North sea together with Sinopec and Uniper. One of the projects will produce green hydrogen.

Total Energies also claim to be working on CCS, as a part of the Norwegian Northern Lights storage project, which hopes to store 1.5 million tons per year, which would be about 0.5 Mton for Total as it shares the project with Equinor and Shell. The company emits 488 Mtons of CO₂ per year.⁹² Either it is a case of thin greenwashing, or a lack of faith in CCS. If the renewables target is to be reached, it will take a much, much stronger commitment.

90 <https://www.forbes.com/sites/scottcarpenter/2020/08/04/bps-new-renewables-push-redolent-of-abandoned-beyond-petroleum-rebrand/?sh=352a0c221ceb>

91 <https://www.bp.com/en/global/corporate/news-and-insights/press-releases/from-international-oil-company-to-integrated-energy-company-bp-sets-out-strategy-for-decade-of-delivery-towards-net-zero-ambition.html>

92 <https://www.greenpeace.org/luxembourg/de/aktualitaet/12678/greenpeace-protest-against-greenwashing-at-total-energies/>

Shell, BP, Statoil/Equinor, Engie, Dong/Orsted have hedged their bets and invested in one kind of Plan B or other.

Saudi Aramco, the biggest oil company in the world and one of the biggest of any kind, has nothedged its bets until very recently and on a small scale.

Engie, which is more a gas and electricity company than an oil company, has moved into wind, solar and geothermal across the globe.

5. Real green transformation

One example, possibly the only one, of a complete transformation from oil and gas is Dong (Danish Oil and Natural Gas). It exited from oil and gas and was renamed Orsted. The company became, and is still, a world leader in the installation of offshore wind power. (Another unrelated Danish company is the world leader in the manufacture of wind turbines on and offshore.) The company also installs onshore wind, solar and is developing hydrogen projects.

The Beyond Oil and Gas Alliance BOGA, formed at COP26, will seek a managed phase-out of oil and gas production to align with Paris Agreement goals. Its core members are Costa Rica, Denmark, France, Greenland, Ireland, Quebec, Sweden and Wales, while California, New Zealand and Portugal are associate members. Italy has also joined as a “friend” of BOGA.

Iceland later in November made similar commitments.⁹³

6. The shrinking option

One response strategy is to accept the inevitable, to shrink core activities (exploration, R&D, opening new fields) while still making a profit. This involves buying back shares instead of investing, to support the share price.

Such a strategy is done, not said. Exxon,⁹⁴ BP⁹⁵ and Chevron⁹⁶ have travelled some way down that road.

They have slowed production.⁹⁷

93 <https://www.energyconnects.com/news/oil-and-gas/2021/november/iceland-s-new-cabinet-raises-climate-goal-as-glaciers-melt/>

94 <https://www.reuters.com/business/energy/exxon-mobil-posts-highest-quarterly-profit-nearly-four-years-2021-10-29/>

95 <https://www.reuters.com/business/energy/bps-third-quarter-profit-beats-forecasts-lifted-by-energy-prices-2021-11-02/>

96 <https://www.bloomberg.com/news/articles/2021-10-29/chevron-crushes-estimates-as-gas-refining-spur-cash-flow-record>

97 <https://www.nytimes.com/2021/10/14/business/energy-environment/oil-production-state-owned-companies.html>

A just transition

Phasing out oil creates winners and losers between countries and within countries.

Few people will feel sorry for Saudi Arabia or the Emirates should they lose a lot of oil business. But in order to form a strong and stable global alliance for decarbonisation, it is not a good idea to dismiss the voices of the losers.

Not all oil-rich countries are rich. A disorderly transition will hit the people, not only the leaders, of countries such as Angola, Azerbaijan, Ecuador, Iran, Iraq, Nigeria, Russia, and the United States. In several other countries, where the oil industry does not make up a large share of the national GDP, it can still be regionally important and exert a political strength out of proportion to economic significance.

The wider issues of decarbonisation cannot be discussed at length here. It is more obvious for coal, where the closure of a coal mine and coal power station is normally a social catastrophe, with unemployment and a vicious circle of falling demand – fewer shops, reduced services, etc. – unless actively mitigated through government job creation, training, early retirement schemes, etc. Richer countries can use the transition itself for compensation: much of the investments in wind, solar and energy efficiency can be directed to poorer areas.

The loss of offshore oil jobs has fewer such consequences, and many of the workers can move from oil to offshore wind. But a policy of subsidising battery cars for the rich and financing them with higher petrol prices for the poor is arrogant, stupid and dangerous, as the emergence of the *Gilets Jaunes* demonstrated in France.

At a certain point, when second-hand battery cars of reasonable quality reach the market at a reasonable price and the necessary charging infrastructure is in place, a “cash-for-clunkers” scheme may persuade the less affluent to scrap their fossil cars and use the money for a battery or hydrogen car. At least they would have a fair choice.

It is, however, unlikely that a just transition can be created entirely within their own framework.

As for poor countries that are highly dependent on oil revenues, it is clear and fair that they should get assistance from the rich nations. The rich countries’ oil demand created the problem, and they should pay to solve it.

