

2022

November

COP27 and the Consequences for Fossil Fuel Demand



United Nations
Climate Change

COP27
SHARM EL-SHEIKH
EGYPT 2022



Energy Industry Report

The Al-Attiyah Foundation



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COP27 was held in a major oil- and gas-producing country but, unlike COP26, it featured substantial engagement from the fossil fuel industry. Although it ended with significant progress in some areas, particularly on climate finance and adaptation, progress on mitigation was limited. Nevertheless, around COP27, and looking forward to COP28, important deals concerning 'just transitions', methane, renewables, and hydrogen were struck.

What is the impact of COP27 on long-term demand for the major fossil fuels – coal, oil, and gas? What pathways have been laid for future changes? Where will COP28 take the next steps?

ENERGY REPORT

This research paper is part of a 12-month series published by the Al-Attiyah Foundation every year. Each in-depth research paper focuses on a current energy topic that is of interest to the Foundation's members and partners. The 12 technical papers are distributed to members, partners, and universities, as well as made available on the Foundation's website.





- COP27 in Egypt did not result in major breakthroughs in emissions mitigation or climate policy.
- Significant progress was made on "loss and damage" compensation. More limited advances occurred in carbon credit trading, the Technology Mechanism, and other specific areas.
- The impact of COP27 has largely been overshadowed by other developments, particularly relating to the Russia-Ukraine war and its energy impacts, major new policies in the US and EU, and global economic conditions.
- Progress following COP26 and the G20 meeting on 'Just Energy Transition Partnerships' (JETPs) with South Africa, Indonesia, Vietnam and potentially India and Senegal, is more directly consequential for emissions and energy use, as they target reducing coal use.
- Gas use could get a medium-term boost from the JETPs and from some of the coal- and methane-reduction pledges around COP27, but on likely trajectories, oil and gas demand are both set for substantial declines by 2050 (although not to the very low levels seen in net-zero compatible pathways).
- Major oil and gas producers have an opportunity to advance policies favourable to their interests, such as carbon capture, coal-to-gas switching, hydrogen, and more effective offsets, at COP28 in the UAE in November 2023. This will likely be the last COP in the broader Middle East region for some time, and will also involve substantial outside pressure against fossil fuel interests.

The 27th UN climate conference, COP27, concluded in Sharm El Sheikh, Egypt, on 20 November. This was the fifth to be held in Africa, and the second (after Doha in 2012ⁱ) to be held in the Arab world or the "Middle East" in the broad sense. It was dubbed the "African COP" and the "COP of Implementation".

COP28 in the UAE will continue the focus on the Middle East and on significant oil and gas-producing countries. Possible hosts for COP29 include Czechia, Bulgaria, and Australia, which will shift the regional focus (although Australia is a major gas and coal exporter). Therefore, COP27 and COP28 together are particularly important for the role of fossil fuels in the UN climate process and the Paris Agreement.

Against the backdrop of Russia's war in Ukraine and high energy prices, and with numerous representatives of oil and gas companies and hydrocarbon-exporting countries (in contrast to COP26 in Glasgow last year), the focus was more on climate finance and adaptation than emissions reduction. Progress on some issues should continue at COP28 in the UAE in 2023.

Overall, the commitments made around the conference were more significant for future fossil fuel demand than those arising formally from the negotiations. Some important initiatives also arose from the G20 Summit in Bali on 15-16 November 2022, and from the biodiversity summit in Montreal in December 2022. The overall impact of COP27 on emissions will probably be overshadowed by several other important events taking place around the same time, notably:

- The continuing effects of the Covid-19 pandemic, particularly on China.

- Russia's war in Ukraine, the strict sanctions imposed on its energy sector in response, and the cut-off of most of its gas supplies to Europe.
- The European Union's REPowerEU initiative introduced in May 2022 in response to the Russian invasionⁱⁱ.
- The US's Inflation Reduction Act (IRA)ⁱⁱⁱ, passed in August 2022, which introduced a wide range of incentives for low-carbon technologies.
- The EU's Carbon Border Adjustment Mechanism^{iv}, which would introduce tariffs on imports of various energy-intensive goods from countries without a comparably strict emissions reduction policy to the EU's, operating from October 2023.
- Supply chain constraints, rising inflation and interest rates, which could lead to a global recession or economic slowdown, and also relatively raise the cost of renewables, nuclear power and electric vehicles.



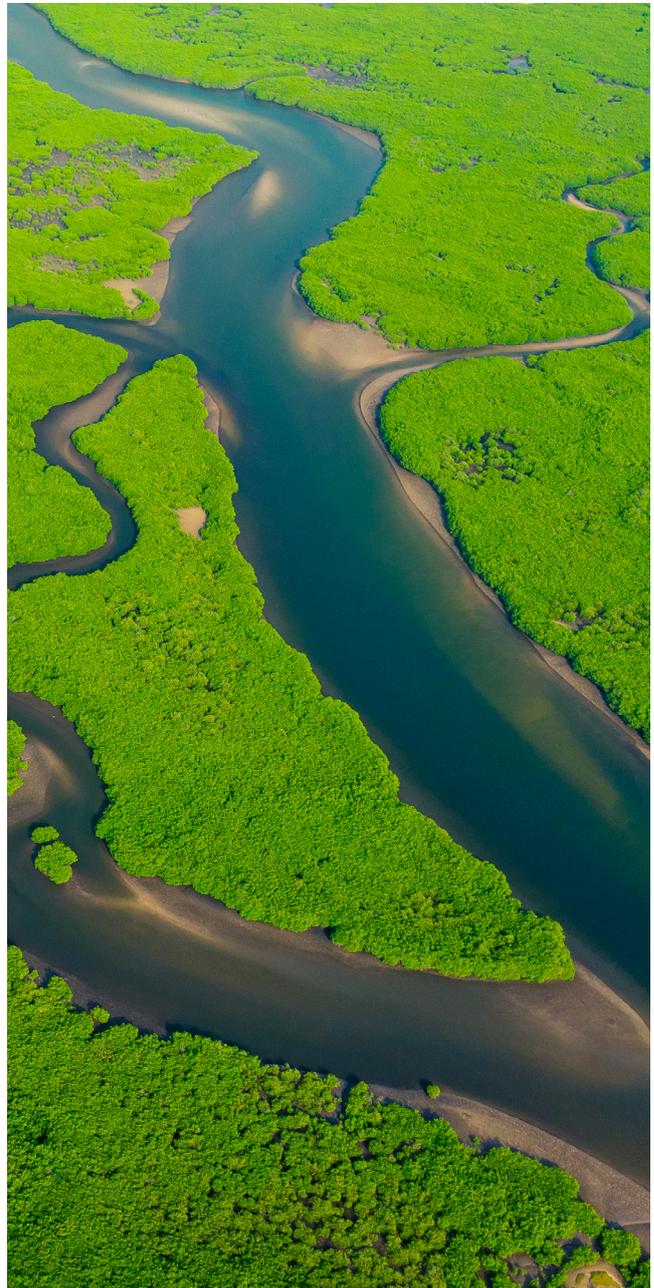
There were attempts to reach a commitment to "phase down" fossil fuels, an addition to COP26's pledge to phase down coal. However, these were not agreed. The implementation plan adopted recognises the need to cut greenhouse gas emissions by 43% between 2019 and 2030.

The final text contained a provision to increase "low-emissions energy", which was read by some as keeping the door open for natural gas, and by others as a reference to nuclear power and carbon capture, use and storage (CCUS), as well as renewables. It also warns of the danger of climatic "tipping points", such as the release of methane from melting permafrost, or the die-back of the Amazon rainforest to savannah.

There was a repeat of the call made at COP26 in the 'Glasgow Climate Pact' to strengthen countries' Nationally Determined Contributions (NDCs), but this remains non-specific. Very little progress was made in tightening NDCs or net-zero targets ahead of COP27, other than a greater commitment from Australia under its new government^v. The EU has slightly strengthened its 2030 emissions reduction target from 55% to 57%^{vi}. Only 34 out of 194 parties to the Paris Agreement have submitted new or revised NDCs since COP26. The Glasgow Climate Pact also called on countries to develop and update their strategies for 'just transitions' to net-zero carbon, but only 11 did so since COP26, bringing the total to 54 or about a quarter of the total Paris signatories. There was progress on the Mitigation Work Programme, which intends to expand ambition and implementation of emissions cuts up to 2030.

The US did unveil a plan to finance developing countries' switch from fossil fuels and leverage private-sector capital^{vii}.

In 2020, developed countries committed \$83 billion out of a promised \$100 billion annual expenditure on climate adaptation for developing countries. At COP27, attendees agreed to establish a new framework for this fund in time for COP28 in the UAE in 2023.



However, adaptation costs may be at least \$400 billion per year^{viii}, meaning current amounts are well short, particularly given high inflation this year eroding the real value of the pledge. Some advances were made in mobilising finance for forest preservation, nature-based solutions, and water management and degraded land restoration in Africa.

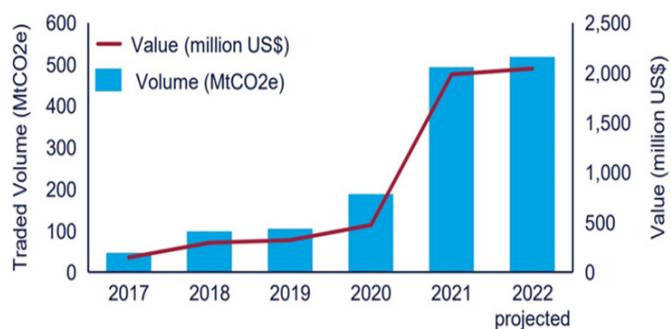
Wealthier nations will pay into a "loss and damage" fund intended to compensate lower-income countries for climatic effects. The details of this fund are to be settled at COP28.

Some African countries and civil society organisations campaigned against new oil and gas projects in the continent^{ix}. Other governments pointed to their low per-capita emissions, and the need for energy access and government revenues.

There was little real progress on carbon credit trading. Delegates deferred action on regulation and transparency into 2023. The two key articles of the Paris Agreement are 6.2 and 6.4. 6.2 allows for the trading of emissions reductions between countries; some advance was made on defining the rules, but concerns remain that international trades are not necessarily transparent. 6.4 covers a successor to the Clean Development Mechanism, allowing poorer countries to sell carbon credits to wealthier ones^x. Some guidelines on issues such as registries and expert dialogues did advance, but the important definition of which activities can generate credits, such as carbon capture and storage, was delayed. This is problematic as the mechanism is meant to be operational from 2023.

However, voluntary trading of credits has accelerated significantly in 2021 and 2022 (Figure 1).

Figure 1 Traded volumes of voluntary carbon credits^{xi}



Individual country actions by the US – potentially allowing purchases from low-income countries by American companies – and carbon registries or trading platforms in Saudi Arabia, India and Singapore do show some national-level progress.

The Technology Mechanism, established at COP16 in Cancun, is intended to drive technology innovation and deployment. Its Climate Technology Centre and Network provides technical assistance to developing countries. At COP27, the US, EU, Canada, and South Korea agreed to provide funding for a five-year work programme (2023–27) for developing countries under the Technology Mechanism. This includes hard-to-abate industrial sectors, especially steel and cement.

In events around COP27 but separate from the formal process, five more countries joined the Global Methane Pledge, which plans to reduce emissions by 30% from 2020 to 2030, taking the total from 100 after COP26 to 151. However, the number one, two and four global emitters – China, India, and Russia – are still not members.



International shipping and aviation are not covered by the NDC process, as they do not take place within national borders. Aviation produces about 2.1-2.5% of global carbon dioxide emissions, and its climate impact is higher when including the effect of condensation trails. Shipping accounts for about 2.9% of emissions^{xii}. These industries are regarded as hard to decarbonise; their emissions are growing (especially in the case of aviation); and they are systemically important to the world economy. Currently, they are powered almost entirely by oil (kerosene for aviation, heavy fuel oil and marine gasoil for shipping).

However, there was progress on decarbonising these industries too. Ten organisations signed the Joint Statement on Green Hydrogen and Green Shipping. This commits the signatories to cooperate to achieve: the deployment of zero-emission ships by 2030;

50% zero-emission fuels by 2030; 5.5 Mt/y green hydrogen in shipping by 2030; full decarbonisation by 2050^{xiii}.

Ahead of COP27, the International Civil Aviation Organisation (ICAO) adopted a goal of net-zero carbon emissions by 2050^{xiv}.

Around COP27, there were also several hydrogen partnerships: a commitment on green hydrogen for shipping, a pilot for nuclear-driven solid-oxide electrolysers in Ukraine, and agreements with Fortescue Future Industries for green hydrogen production and use in Kazakhstan and Kenya^{xv}. Several large renewable energy deals, including separate 10 GW wind farms in Egypt with the UAE's Masdar and Saudi Arabia's Acwa Power, were also announced. Ahead of COP27, ENI revealed plans for a small CCUS project in Egypt, while the Saudi Green Initiative announced a large carbon capture, use and storage (CCUS) hub.

The lack of much specific progress on mitigation at COP27 means it is hard to identify a direct impact on future emissions trajectories.

Climate Action Tracker, an NGO, assesses that current policies and actions would keep emissions by 2030 roughly flat on current levels of 52 GtCO₂e (Figure 1), at 50-54 Gt, and 47-54 Gt by 2050. Meeting current pledges and targets would yield 46-50 Gt by 2030 and 24-31 Gt by 2050. Compatibility with existing net-zero pledges results in 25-30 Gt by 2030 and 8-10 Gt by 2050.

Progress on implementation could therefore be considered to cut emissions by 4 GtCO₂e/year by 2030 and 23 GtCO₂/year by 2050. Indicatively, that is equivalent to about 43 EJ of coal consumption in 2030 (more than a quarter of current world consumption), and 264 EJ in 2050 (considerably more than current world consumption).

It is reasonable that successful implementation by 2030 could be carried out mainly by reducing coal emissions (including CCUS and coal-to-gas switching), along with some reduction in oil via electric vehicles, mass transit, efficiency, and alternative fuels.

By 2050, though, the implementation pathway would give emissions of only about half current levels. That would demand the near elimination of unabated coal, along with steep cuts in oil and, probably, unabated gas. (The cuts in the net-zero scenarios are even steeper, but since COP27 made little progress in that direction, it can be disregarded for the purposes of this paper.)

The trajectory by 2030 outlined above is roughly comparable to BP's "Net Zero" scenario (Figure 3). The range of climate outcomes that could be considered under the Paris Agreement is bracketed by the IPCC's High case for 2°C of warming, and its Low case for 1.5°C of warming, which actually requires negative emissions (net carbon removals) by 2050.

Figure 2 Emissions gaps to 2030^{xvi}

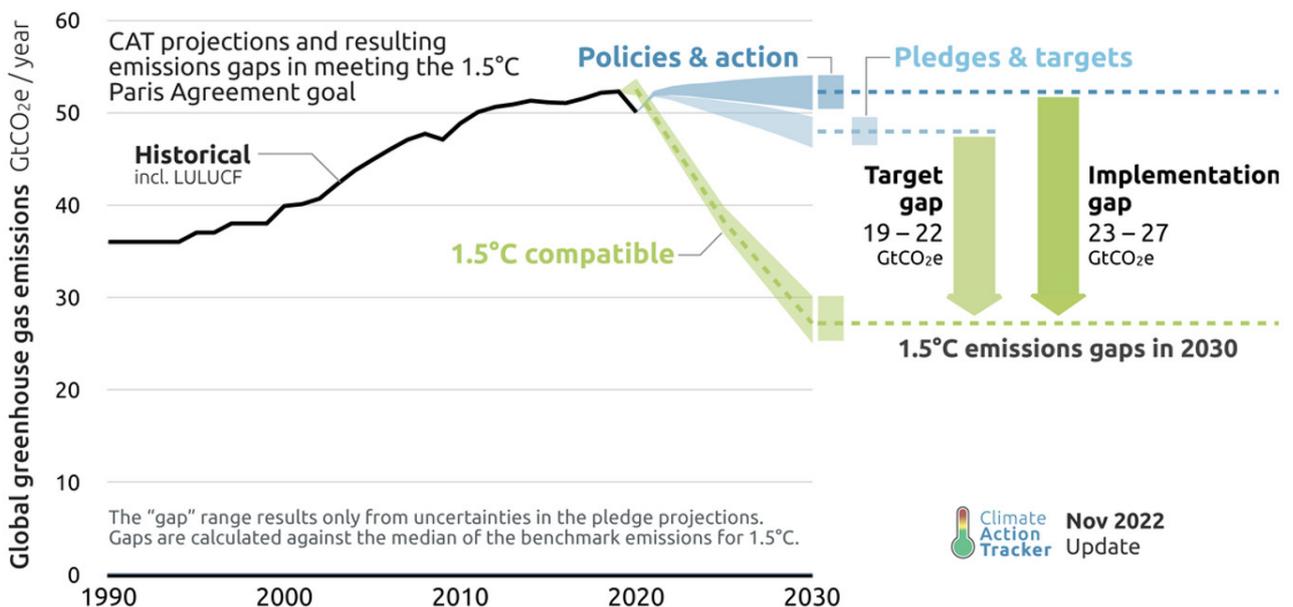
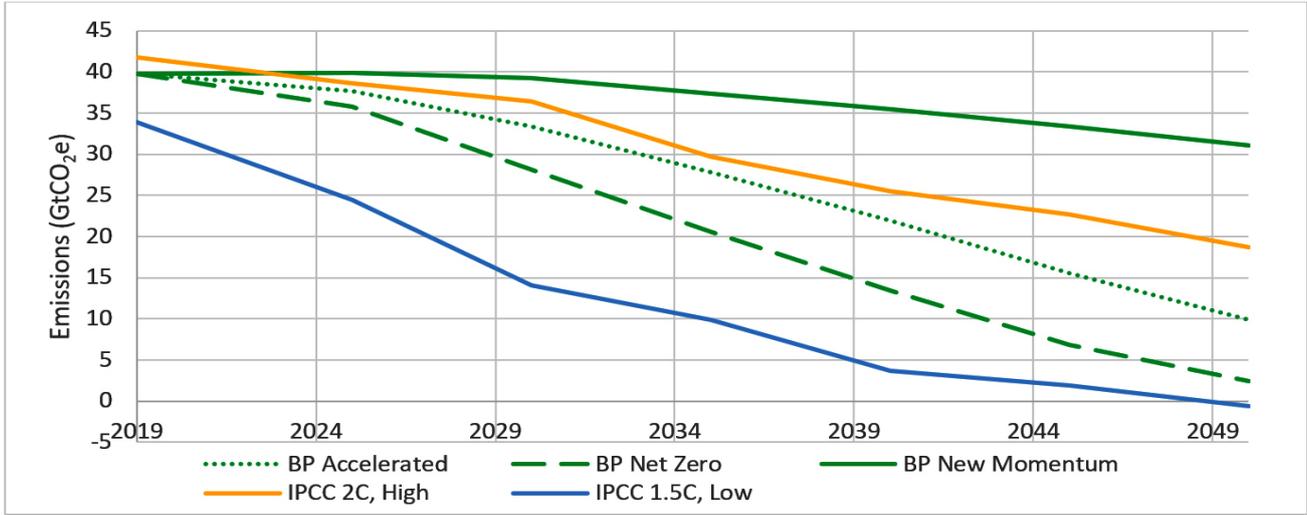


Figure 3 Emissions forecasts^{xvii}

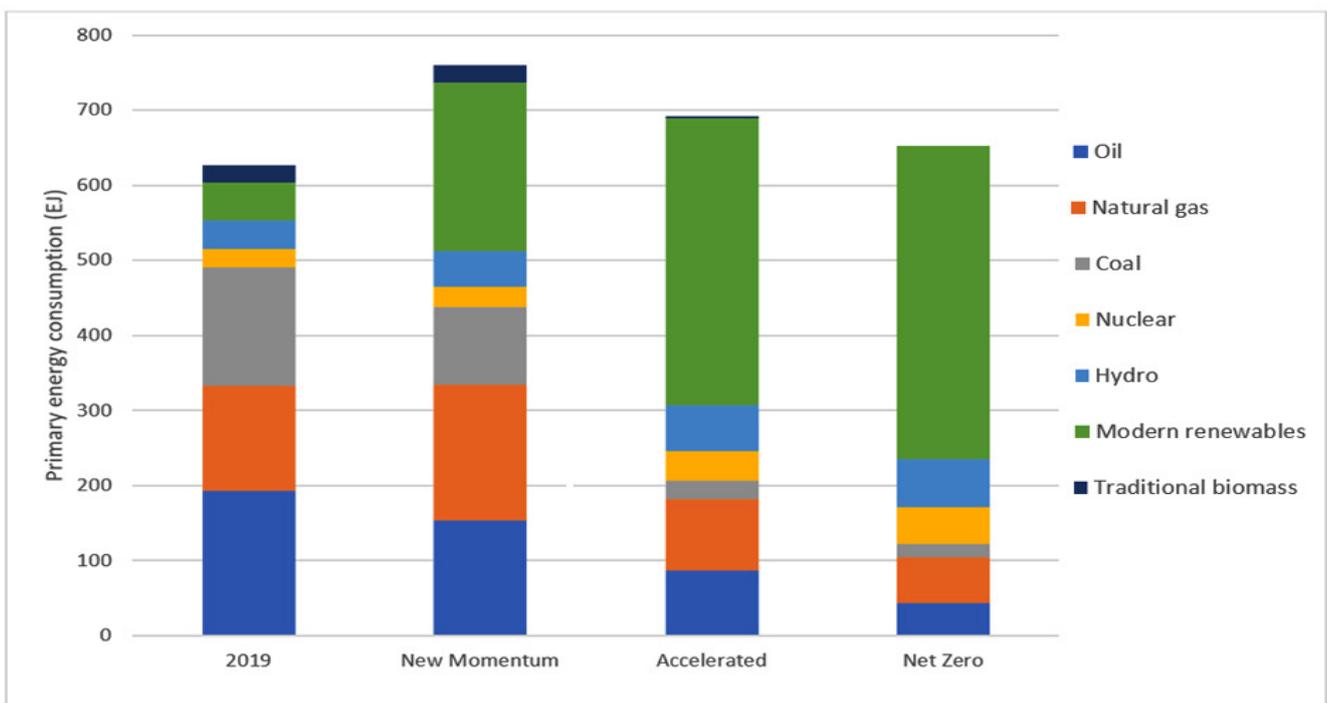


The implications of this for fossil fuel demand are shown in Figure 4. Oil demand would drop in all scenarios by 2050, but the fall ranges from 20% to 77% (in BP's Net Zero scenario). Gas could actually gain by 29% in the New Momentum scenario but falls 57% in the Net Zero scenario. Coal would only fall 35% in the New Momentum scenario but is virtually eliminated in the others. Non-hydro

renewables are by far the biggest gainers, rising 4-8 times on 2019 levels.

If we conclude that COP27 did not shift the world on to a Net Zero track, but at least it did not move us on to the New Momentum (high emissions) track either, we could read off BP's Accelerated scenario, which has oil consumption dropping 55% by 2050, gas 33% and coal 84%.

Figure 4 Primary energy consumption 2019 and 2050, different emissions scenarios^{xviii}



As noted, COP27 was intended to be an “African COP”. The progress on “loss and damage” and climate finance is indeed heavily applicable to Africa. But the continent accounts for only 4.4% of global energy related GHG emissions (South Africa 1.2% and Egypt itself 0.7%). Therefore progress (or the lack of it) on emissions mitigation in Africa is not highly material from a global perspective, at least not by 2030. However, the issue of a ‘just transition’ in African and other developing countries has gained increasing attention and importance.

The International Partners Group (IPG) of G7 countries, led by the US and Japan, launched the Just Energy Transition Partnership (JETP) at the G20. So far, JETPs have been announced for South Africa, Indonesia and Vietnam, three large developing countries and greenhouse gas emitters. These plans cover:

- South Africa: its JETP was announced at COP26 in November 2021 and expects to reduce emissions by 1-1.5 Gt CO₂ over the 2022-42 period, by closing coal power stations early and boosting renewable deployment^{xxix}. Wealthy countries have pledged \$8.5 billion. There have been some subsequent adjustments to the plan^{xx}.
- Indonesia^{xxi}: advance the net-zero target from 2060 to 2050; peak CO₂ from the power sector in 2030 instead of 2037; accelerate renewables to 34% by 2030; speed the retirement of coal power plants; mobilise \$20 billion over the next 3-5 years for decarbonisation, of which \$10 billion from the IPG and \$10 billion from the private sector.
- India and Senegal: these are in the second wave of potential JETPs^{xxiii}.

- Vietnam^{xxii}: advance the peak date for emissions from 2035 to 2030; limit the peak coal power from 37 GW to 30.2 GW; accelerate renewable deployment from 36% to 47% of generation by 2030; reduce emissions by 500 MtCO₂ by 2035; mobilise \$7.75 billion of financing from IPG members and international financial institutions, matched by \$7.75 billion from the private sector.



As Table 1 shows, the countries targeted for the first round of JETPs are all (with the exception of Senegal), large energy consumers and GHG emitters, and heavily coal dependent. They accounted for 18% of global coal consumption in 2021 (China made up 54%). Total estimated emissions from coal in 2021 in these five countries were about 2730 Mt, more than half their total emissions of 5291 Mt. The achievement of the JETPs (assuming one is concluded with India) would therefore be very material in reducing global emissions and coal use.

Although the JETPs focus on eliminating unabated (non-CCUS) coal, mainly by replacing it with renewables, there would also be a significant impact from coal-to-gas switching. The JETPs could therefore be supportive of gas demand at least in the medium term, particularly in the case of South Africa which has discovered new offshore gas resources, and for Vietnam which is planning to import gas from Indonesia.

The JETPs announced so far cover most of the developing world's large, coal-dependent economies (other than China). Other countries that could be included in such programmes include the Philippines, Morocco, and Kazakhstan. By focussing on the "just transition^{xxv}", including worker retraining, and providing significant government-to-government and private sector funding, the JETPs are intended to overcome some of the societal and political barriers to moving away from coal. However, at some point, JETPs could also address the needs of large, low-income oil and gas consuming countries too, such as Nigeria, Pakistan and Bangladesh.

The G20 also saw the launch of a rainforest leadership alliance between Indonesia, Brazil and the Democratic Republic of Congo. This could be important in slowing deforestation, and in making carbon offsets and biological carbon removal more trustworthy.

Table 1 Impact of JETPs^{xxiv}

Country	Emissions 2021 (Mt)	Emissions 2030, current policies	Emissions 2030, planned policies	Fossil fuel consumption, 2021 (EJ/y)		
				Coal	Oil	Gas
South Africa	499	482-518	416	3.53	1.04	0.14
Indonesia	954	1114-1320	NA	3.28	2.83	1.33
Vietnam	433	603-692	NA	2.15	0.94	0.26
India	3382	4059-4258	NA	20.09	9.41	2.24
Senegal	22.6	NA	NA	0.002	0.128	0.002

The Energy Transitions Commission estimated that to have a 50% chance of limiting warming to 1.5°C, emissions from 2020 to 2050 could be no more than 500 Gt of CO₂. Its current scenarios see emissions in that period as 570-725 Gt, suggesting the target is unachievable without a significant change of course. It identified six key areas for progress:

- Methane reductions.
- Nature-based solutions, where deforestation continues to outpace reforestation, a slowing of deforestation in Indonesia being exceeded by a worsening in Brazil.
- Power sector, where progress in renewables is being undone by higher use of coal to replace gas.
- Road transport, where electric vehicles are progressing faster than expected.
- Heavy industry, with advances in steel and green ammonia due to falls in the cost of green hydrogen versus the higher price of natural gas.
- Energy efficiency, where the 4% annual improvements required are not being met except in Europe.

Nevertheless, progress is being made outside the COP/NDC framework. The US, with its Inflation Reduction Act, is actually moving ahead of its NDC. China's planned target of 1200 GW of renewables by 2030, and a peak in emissions by 2030, are both likely to be exceeded.

Aerosols (small airborne particles) are released by the burning of fossil fuels and biomass, as well as by other sources such as dust. Black carbon has an important warming effect, sulphur dioxide a cooling effect (but contributes

to acid rain), and aerosols can contribute strongly to extreme precipitation, such as that seen in Pakistan's floods in June 2022. Reducing fossil fuel combustion and deforestation would cut aerosols, improving air quality but potentially accelerating warming. The issue of aerosols was not addressed in COP27^{xxvi}.



COP28 will be held in Dubai, UAE, in November 2023. Key items on the agenda will include^{xxvii}:

- The first steps in the Mitigation Work Programme.
- The outcomes of the first Global Stocktake (GST).
- The mobilisation of the promised \$100 billion of annual climate finance.
- Ocean-based solutions to climate change, food insecurity and energy insecurity.
- Adaptation to unavoidable climate change, given the focus on emissions mitigation at COP26 and 'loss and damage' at COP27.
- The role of agriculture and food security, at least at side events.

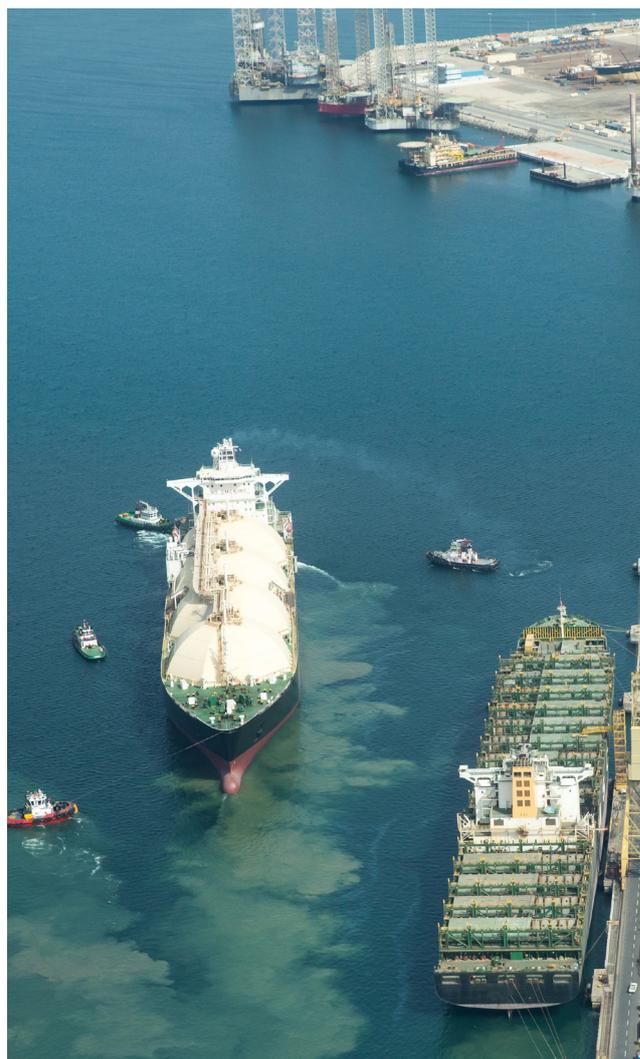
The GST is provided for in Article 14 of the Paris Agreement. It should assess lessons learned and opportunities and enhance ambitions for the next set of updated NDCs.

The UAE is, of course, a leading global oil and gas exporter. It is pursuing a broad range of climate solutions, including:

- Electrification of petroleum operations
- Blue and green hydrogen
- Reduction of gas flaring and methane leakage
- Carbon capture, use and storage
- Energy efficiency and subsidy reduction / reform
- Nuclear power
- Renewable energy, especially solar power
- 'Blue carbon', i.e. sequestration of carbon in maritime and coastal ecosystems, notably mangroves

It is an active and growing international investor in low-carbon energy, mostly in renewables, across Europe, the Middle East, Africa, Central Asia and elsewhere. As COP will likely not be held again in the Middle East for some years, 2023 is a key opportunity for major hydrocarbon exporters to secure policies in areas such as CCUS and hydrogen that safeguard their economies while cutting emissions.

At the same time, there will be more pressure to name fossil fuels explicitly as the main culprit for climate change, and to call for a "phase-down" or even a "phase-out".





COP27 did not result in major changes that would affect oil and gas producers.

The gradual progress on agreeing and formalising carbon trading rules could be important. Major petroleum companies that have committed to "net-zero" will need reliable and acceptable offsets to cancel out their remaining operational emissions, and their "Scope 3" supply-chain and end-customer emissions.

The JETPs, though, are significant. They will substantially reduce coal use in the targeted countries. This would become highly material if India also adopts a JETP. This will mainly affect domestic coal miners in each of the respective countries. However, in the case of Indonesia at least, it might lead to higher coal exports, and hence to more competition with gas sellers in Asia.

Although most of the coal reduction is intended to be met with renewable energy, it could also support coal-to-gas switching. Given current shortages of LNG on the global market, this would probably have most effect from 2026 onwards, when new LNG supplies are expected to become available from Qatar, the US, and other countries.

If we consider that COP27 roughly re-affirmed something like BP's 'Accelerated' scenario, that foresees a substantial drop in oil (-55%) and gas (-33%) demand by 2050. The petroleum industry could partly limit this by accelerating the deployment of CCUS (mainly for gas), 'blue' hydrogen, non-emitting uses (long-lived petrochemicals, non-metallic materials), and direct air capture of CO₂ as an offset to fossil fuel combustion. Indeed, major oil companies such as ExxonMobil, Saudi Aramco, ADNOC, Qatar Energy and Occidental are already adopting different selections of some of these approaches.



Overall, the direct impact of COP27 on reducing emissions and affecting fossil fuel use is small. It has kept the possibility of limiting warming to 1.5°C just about open, but it was already very challenging, and COP27 did not really advance the cause.

The major COP27 decisions on 'loss and damage' and climate finance are important for the countries concerned, but do not immediately concern emissions or fossil fuel use.

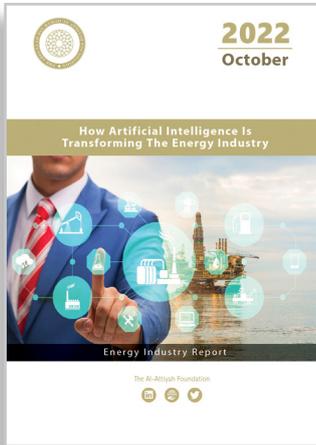
If we consider that COP27 essentially reaffirmed something like BP's 'Accelerated' scenario, this implies a substantial reduction by 2050 in demand for oil and gas and the

near elimination of coal. Nevertheless, gas demand would rise at least in the medium term. If COP28 or subsequent events shifts the world on to more like a net-zero track, the outlook for oil and gas is much weaker.

It will be particularly important to watch new NDCs submitted in the run-up to COP28 and the Global Stock-Take. These may raise ambition and offer new policies, particularly in the light of other changes in global politics and energy economics.

- i. <https://unfccc.int/process/bodies/supreme-bodies/conference-of-the-parties-cop>
- ii. https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/repowering-affordable-secure-and-sustainable-energy-europe_en
- iii. <https://www.congress.gov/bill/117th-congress/house-bill/5376/text>
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- vii. <https://www.ft.com/content/cf064250-e4ce-48c2-a4dd-dc96bc7660e2>
- viii. <https://www.woodmac.com/news/the-edge/cop-27--five-key-takeaways>
- ix. <https://www.chathamhouse.org/2022/11/cop27-what-was-achieved-and-what-needs-happen-now>
- x. <https://www.pemedianetwork.com/transition-economist/articles/net-zero-strategies/2022/cop27-yields-new-deal-on-loss-and-damage/?id=74194008>
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- xiii. <https://climatechampions.unfccc.int/green-hydrogen-and-green-shipping/>
- xiv. <https://news.un.org/en/story/2022/10/1129367>
- xv. <https://www.pemedianetwork.com/hydrogen-economist/articles/strategies-trends/2022/hydrogen-partnerships-flourish-at-cop27/?id=74194008>
- xvi. Climate Action Tracker, <https://climateactiontracker.org/global/cat-emissions-gaps/>
- xvii. Data from BP Energy Outlook 2022 <https://www.bp.com/en/global/corporate/energy-economics/energy-outlook/energy-outlook-downloads.html>
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- xxiii. <https://www.mofa.go.jp/mofaj/files/100364066.pdf>
- xxiv. Data from BP Statistical Review of World Energy 2021; <https://www.cia.gov/the-world-factbook/countries/senegal/#energy>; Climate Action Tracker
- xxv. See the Al-Attiyah Foundation sustainability report on Just Transitions
- xxvi. <https://www.nature.com/articles/d41586-022-03763-9>
- xxvii. <https://unfoundation.org/blog/post/climate-issues-to-watch-in-2023-toward-cop-28-and-faster-more-urgent-climate-action/>

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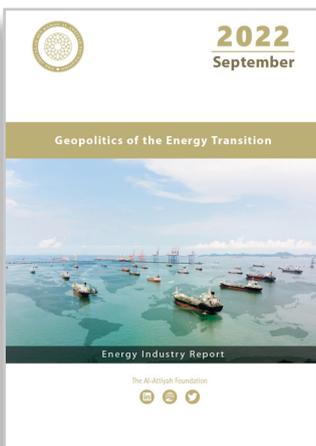
October – 2022

How Artificial Intelligence Is Transforming The Energy Industry

The amount of data that is generated by both humans and machines far outpace humans' ability to absorb, interpret, and make complex decisions from it. Imbedded sensors, wearable devices, drones, and satellites produce voluminous new data streams. Artificial intelligence (AI) forms the basis for all computer learning and is the future of complex decision-making.



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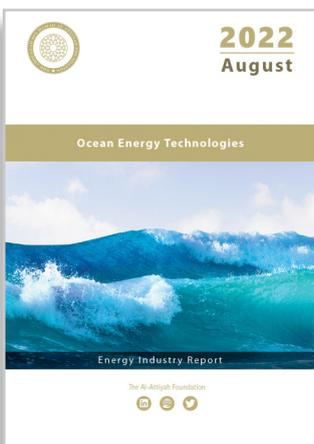
September – 2022

Geopolitics of the Energy Transition

The increasing penetration of renewables in the global energy mix, the rise of electrification from 20% currently to 60% by mid-century, and improvements in energy efficiency and storage are essential characteristics of the energy transition, which will have wide-ranging and profound geopolitical consequences.



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August – 2022

Ocean Energy Technologies

The world's oceans contain vast renewable energy potential, equivalent to more than double the global current electricity demand. Ocean energy is highly predictable, well-suited to provide baseload power, and could abate CO₂ emissions from power generation.



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