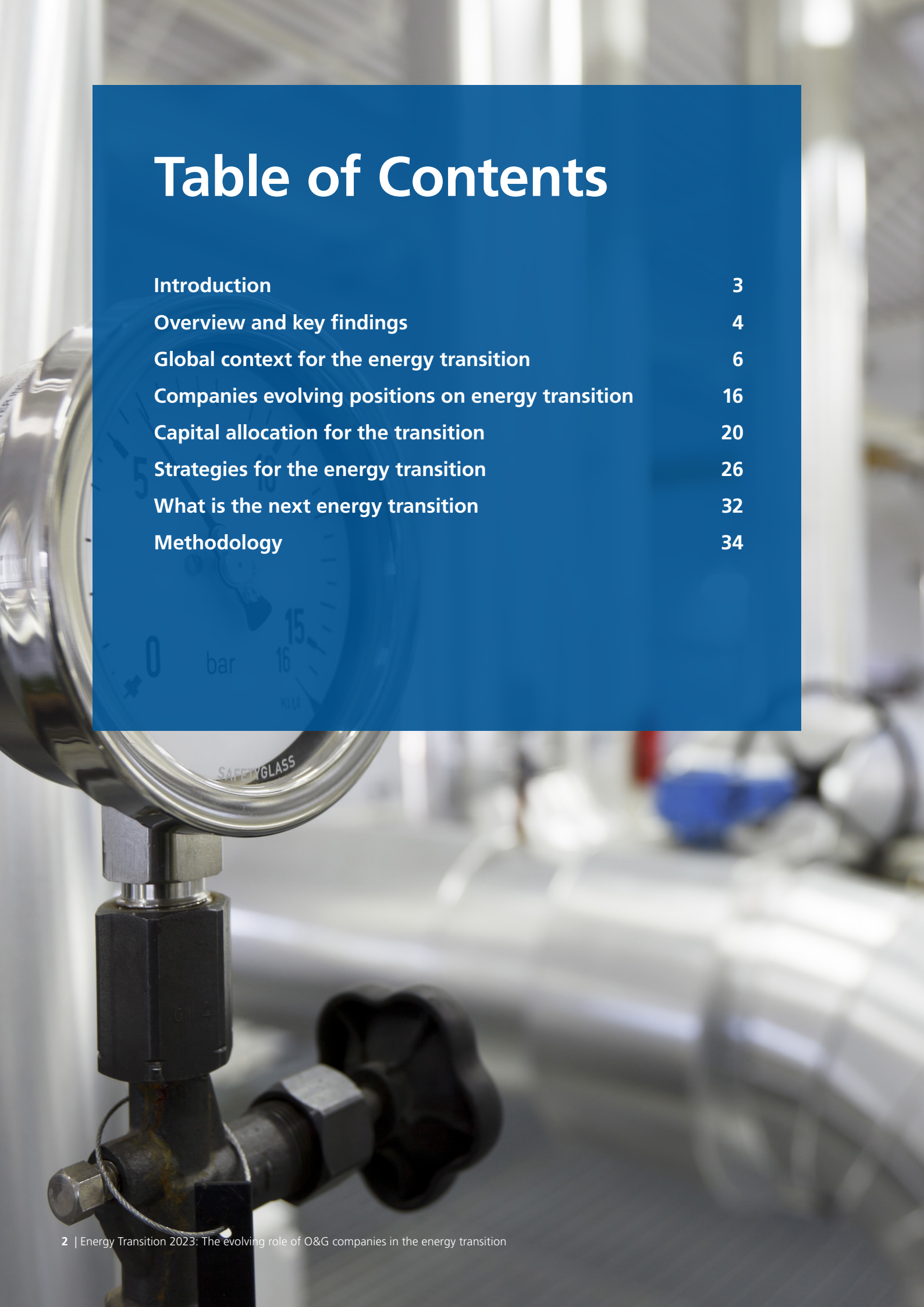
Energy Transition 2023: The evolving role of O&G companies in the energy transition

2023

Net Zero Pathways



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Introduction

As the world seeks to balance energy security and affordability with the broadly agreed imperative to address carbon emissions, this report seeks to provide a timely update on how major oil and gas companies are navigating the energy transition based on an analysis of their published data.

While there is an expanded awareness and also ambitious goals coming out of fora like the COPs and policy developments such as the EU's REPowerEU initiative, the continuing year on year increase (aside from in the Covid years) in global CO2 emissions serves as a reminder that the transition to a low carbon global economy remains enormously complex, challenging, and a work in progress.

This report illuminates how oil and gas majors across three key regions - Europe, North America, and Asia - are responding to the ongoing transition. We see growing alignment around net zero emissions targets for 2050, aggressive methane reduction goals, and more standardised sustainability reporting frameworks. However, companies are pursuing quite differentiated strategies based on their specific geographic and policy contexts, shareholder pressures, and existing asset bases.

European firms like Shell, TotalEnergies, Eni and Equinor are diversifying most aggressively into large-scale renewable power generation, leveraging not only growing policy support but also their resources and expertise as utilities serving European markets. In contrast, U.S. majors like ExxonMobil, Chevron and ConocoPhillips are maintaining comparatively more focus on their core oil and gas portfolios while directing investments into developing lower carbon solutions for their fossil fuel customers - seen by many as a pragmatic strategy given uncertainty around U.S. national climate policy. We see state-owned national oil companies in Asia and the Middle East charting pathways reflecting their home countries' evolving climate priorities and development needs.

While overall spending on renewables and low carbon initiatives averaged 7.4% of capital expenditure in 2022 for the sampled companies, the wide variances between individual companies underscores how the energy transition remains in its early days as a collective strategic priority. The majors must still make difficult tradeoffs balancing investments to maintain returns from existing oil and gas assets with staking out a future space in the wider landscape opened up by the energy transition. As yet, there are no uniform pathways or dominant models.

This report seeks to provide objective benchmarks to assess how the oil and gas industry is progressing on the road towards a net zero carbon economy, recognising that the pivotal years still lie ahead.

Preparing this report illuminated the complexities of any comparative analysis, which is why transparency and information sharing is likely to become increasingly essential. For an economic shift as monumental as the global energy transition there are no easy answers or straight lines. Honest dialogue and innovative thinking will be required to maintain affordable access to energy while ensuring buy-in to measures addressing the impact of our energy choices on climate change.

The companies assessed here face pressures from all sides. But their commitments and initiatives demonstrate the energy transition is nevertheless now underway and augmenting business as usual, even as the destination for each of them remains unclear.

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Overview and key findings

In the aftermath of the global pandemic and the ongoing Russian invasion of Ukraine, the need for a secure and affordable supply of oil and gas throughout the duration of the energy transition has been at centre stage. Companies are now committing their capital expenditures to both ongoing oil and gas activities, as well as progressing their own path along the energy transition. Transparency around their intent has increased.

Though there is no specific global energy transition plan, the need to limit climate change to less than 2-degrees C remains. The concept of "net zero emissions by 2050" has emerged as a goal that can achieve the limit to the change in global temperature.

The companies in our analysis have responded to this relatively recent global aim. Thirteen of the companies in our analysis have embraced a net zero emissions ambition by 2050, up from nine in 2021.

All companies are working towards methane reduction in their operations, with eleven having pledged near zero methane emissions by 2030.

Company strategies toward the energy transition are coalescing around three trajectories which are still evolving. They are largely using the same strategies for carbon removal and developing low carbon solutions. Development of hydrogen as a clean fuel is progressing both on the demand and supply side.

"Diverse portfolio" companies include the six European majors in our analysis. The key differentiator of this strategy is a strong commitment to renewable power generation beyond their own oil and gas operations. These companies are also actively supporting their national energy strategies, which are relatively well articulated compared to their non-European peers. In some cases, the companies are also national utilities, which explains the high commitment to renewable electricity.

Oil and gas companies are still assessing and evaluating their strategies to the energy transition. A clear model for the future of oil and gas companies has yet to emerge.

The "core focus" trajectory is encapsulated in the activities of the three US-domiciled firms in our analysis. None of these companies has ambitions to become an electric utility, so renewable power generation is something supporting their existing operations. Their activities, instead, are focused on developing lower carbon energy and industrial solutions which will be prominent for their customers in the future. These companies are also primarily driven by the demands of their shareholders and have taken significant steps in recent years to be seen as responsive towards emissions reduction. Nevertheless, the distance between European and US majors on their energy transition strategies has closed considerably.

We identify the other six companies in our analysis as "national champions" because their overall strategy and activities reflect how their home countries are evolving along the net zero pathway. The companies are more focused on the individual potential within their own economies to progress the climate-related policies of their home country.

Global context for the energy transition

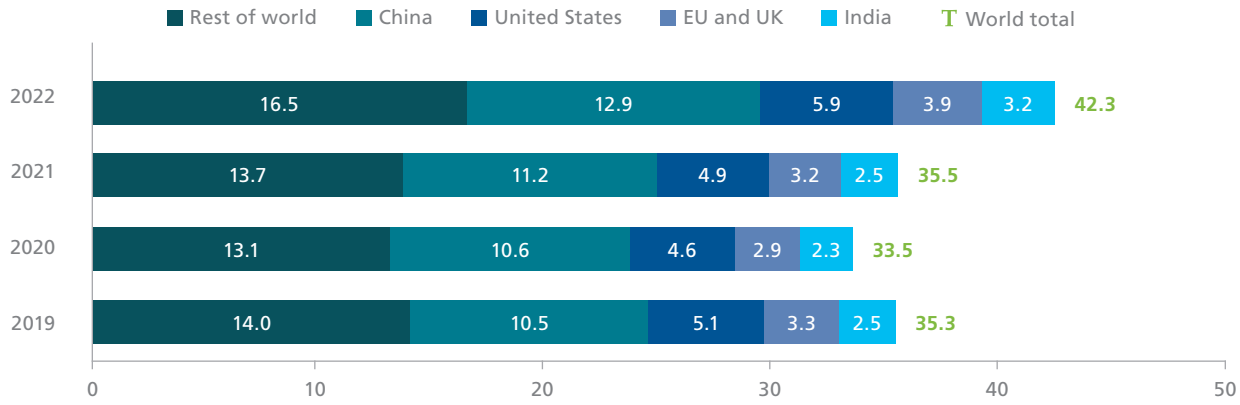
— Beginning with the post-pandemic recovery in 2021, the world has taken a step back in terms of its progress on reducing emissions and decreasing dependence on fossil fuels.
— The war in Ukraine has spurred further action in the energy transition. Europe has accelerated its clean energy transition and is eliminating Russia as a supplier, while also taking steps to effect security of oil and gas supply in the short term. The USA has enacted legislation which aims to tackle climate change at a national level.
— Peak oil demand could occur as early as 2029 given faster than expected decarbonisation in the transport sector.
— Security of energy supply has played a role in accelerating renewables, investment in which now outpaces that in fossil fuels, particular for power generation.
— Europe's commitment to climate change goals has provided investors with the confidence to expand investment in ESG instruments even as the regulatory environments in other countries are still evolving.

Expanded global awareness has not yet translated into lower emissions

It is widely accepted that greenhouse gases (GHG) emissions from human activities have been the cause of rising global temperatures. The main components of GHGs are carbon dioxide (CO2), methane, nitrous oxide and three groups of fluorinated gases – sulphur hexafluoride, hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs).

Despite widespread understanding and, arguably acceptance, that reducing GHGs, in particular CO2, is a necessary goal for the global community, the transition to a lower carbon future has not been a smooth road. It was not surprising that global CO2 emissions rebounded strongly by 9.8% alongside the recovery in global economic activity in 2021. However, the marked gain in emissions of 27.4% in 2022, which was broad-based across economic sectors, was unexpected.

Global CO2 emissions (gigatonnes CO2)



Sources: Capital Economics and Carbon Monitor

This jump in CO2 emissions occurred despite progress on the policymaking front following the COP26 summit in Glasgow, Scotland, which concluded on 13 November 2021. The conference resulted in a higher level of global cooperation on climate change in many specific areas. A key element was the adoption of the Global Methane Pledge, which aims to reduce global methane emissions by 30%, based on 2020 levels, by 2030.

Methane is the second largest component of GHG emissions and is estimated to account for roughly half the net rise in global average temperature since the pre-industrial era. Furthermore, agricultural uses and the energy industry account for about 80% of methane emissions.

In the oil and gas industry alone, implementing existing technology alongside known best practices could cut global methane emissions by 11%. Since methane falls within Scope 1 and Scope 2 emissions[1], having targets for methane reduction could help many companies to make progress on their goals in the short term, even as they progress towards what is largely a net zero ambition by 2050.

More broadly, coordinated progress on reducing methane emissions could be a relatively easy win for the industry since decreasing methane emissions would have a more immediate and direct effect in halting the rise in global temperatures than would be possible with the current policies announced for reducing CO2. In fact, 11 companies reviewed for this report have signed on to the Aiming for Zero Methane Initiative, sponsored by the members of the Oil and Gas Climate Initiative (OGCI). See the box on the next page' instead.

[1]There are three levels of CO2 emissions identified. Scope 1 covers emissions from sources that an organisation owns or controls directly. Scope 2 refers to emissions that a company causes indirectly when the energy it purchases and uses is produced. Scope 3 encompasses emissions that are not produced by the company itself, and not the result of activities from assets owned or controlled by them, but by those that it is indirectly responsible for, up and down its value chain, such as emissions from consumer motor vehicles and aircraft.

Aiming for Zero Methane Initiative

Following the establishment of The Global Methane Pledge in November 2021 at the COP26 meetings in Glasgow, Scotland, the members of the Oil and Gas Climate Initiative (OGCI) launched the Aiming for Zero Methane Initiative.

OGCI members include 11 of the 15 in our sample, namely: bp, Chevron, Eni, Equinor, ExxonMobil, Petrobras, PetroChina, Repsol, Saudi Aramco, Shell and TotalEnergies.

The text of the initiative is as follows:

We, the signatories of the Aiming for Zero Methane Emissions Initiative, believe that virtually all methane emissions from the industry can and should be avoided.

1. We will strive to reach near zero methane emissions from our operated oil and gas assets by 2030, and we will encourage our partners to achieve similar results.

2. We will put in place all reasonable means to avoid methane venting and flaring, and to repair detected leaks, while preserving the safety of people and the integrity of operations.

3. Signatories will report annually and transparently on their methane emissions.

4. As technology evolves, we will supplement methane emissions estimates with more monitoring and measurement technologies, and introduce new solutions to avoid methane emissions. We welcome the continued improvement of measurement, reporting and verification (MRV) mechanisms.

5. We support the implementation of sound regulations to tackle methane emissions and encourage governments to include methane emissions reduction targets as part of their climate strategies.

Sources: Capital Economics and Aiming for Zero Methane Initiative (https://aimingforzero.ogci.com/)

Europe is accelerating its energy transition strategy

Prior to the invasion of Ukraine, Europe was the destination for 75% of Russia's natural gas and around 20% of its oil. In response to the invasion, the EU placed embargoes on Russian oil and faced a near total cut-off from Russian gas supplies.

The EU has now taken concrete steps to make itself independent of Russian fossil fuels by 2030 via the REPowerEU initiative, launched in March 2022. The policy has resulted in the EU forging deals with international partners on energy supply, including increased liquefied natural gas (LNG) from the USA and Canada and increased gas supply from Norway. In addition, the REPowerEU plan accelerates the pace for increasing the share of renewables, with a target of renewables in final energy consumption equal to 45% of the total by 2030.

In June 2022, the EU Council adopted its "Fit for 55" package, initially presented by the EU Commission in July 2021. This set of measures is aimed to enable the European Union to reduce its net GHG emissions by at least 55% by 2030 compared to 1990 levels. The EU member states adopted a common position on the EU emissions trading system (EU ETS), effort-sharing between member states in non-ETS sectors (ESR), emissions and removals from land use, land-use change and forestry (LULUCF), the creation of a social climate fund (SCF) and new CO2 emission performance standards for cars and vans.

In the United Kingdom, seabed leases have been awarded to eight offshore wind projects which will connect directly to oil and gas infrastructure, providing electricity and reducing carbon emissions associated with oil and gas production. This Innovation and Targeted Oil and Gas Industry (INTOG) initiative demonstrates the nuanced approach that will be required to properly manage the energy transition.

Charlie Denham

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The USA is now investing in the energy transition at a national level

With the Bipartisan Infrastructure Law adopted in November 2021 and the Inflation Reduction Act (IRA) signed in August 2022, the USA is on its way towards entrenching policymaking for the energy transition at a national level.

Together these initiatives provide US$370 billion to accomplish three goals: accelerate the move towards clean energy, reduce energy costs, and cut carbon emissions by 40% by 2030. The IRA encourages investment in various clean energy sources such as nuclear and hydrogen, as well as carbon capture, utilisation and sequestration, clean energy vehicles and energy storage, as long as they are carbon neutral. It offers Investment Tax Credits (ITCs) and Production Tax Credits (PTCs) for firms generating clean energy.

There have been concerns from the EU that such large subsidies in US clean technology will put US firms at an advantage over EU-based firms, potentially undermining the EU's green transition. However, alternatively the Act may encourage the EU and other countries to step up green interventions of their own. Indeed, in January 2023, the European Commission unveiled its Green Industrial Plan in response to the IRA.

Peak oil demand is even nearer on the horizon

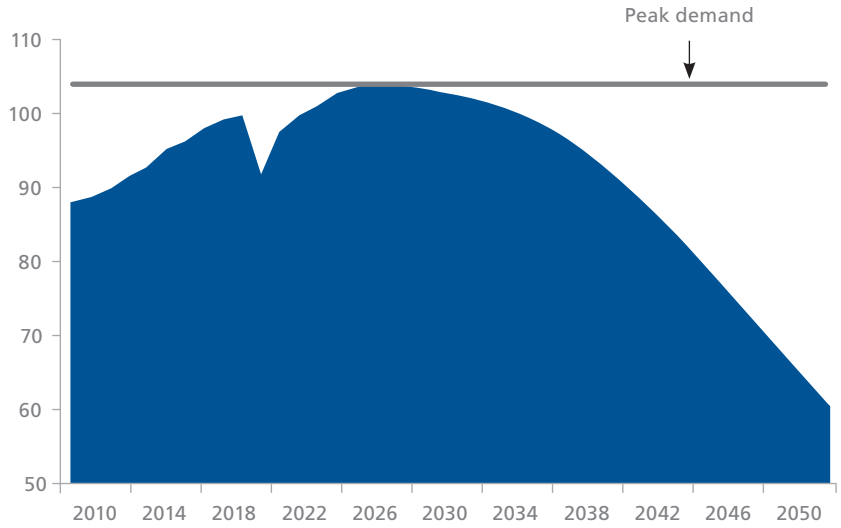
Oil and gas companies face a challenging task ahead – often colloquially referred to as the "trilemma". They must be able to provide the world with the oil and gas it needs through the energy transition, and it must be affordable. At the same time, they must also progress their own energy transition, reducing GHG emissions, primarily CO2 and methane.

Evidence of the progress of the energy transition from a consumption standpoint is the assessment of peak oil demand. In 2020, Capital Economics estimated the peak would occur by 2030, and decline thereafter. Based on developments during the last two years, such as faster EV and hybrid vehicle adoption, peak oil is now likely to occur in the latter part of this decade, perhaps as early as 2029 according to the IEA.

Oil consumption is expected to decline at an average annual rate of 1.5% between 2030 and 2040 but to pick up the pace of decline and fall faster at an average annual rate of 3.7% between 2040 and 2050.

Peak consumption of natural gas is unlikely to occur before the mid-2030s given its importance in electricity generation in the near term, both as a way to displace coal-fired generation but also to act as a stop gap until investments in wind and solar power can be accelerated.

Global oil consumption, 2010–2050 (billions of barrels per day)



Sources: BP and Capital Economics forecasts beginning in 2022

Global investment in renewables is outpacing fossil fuels

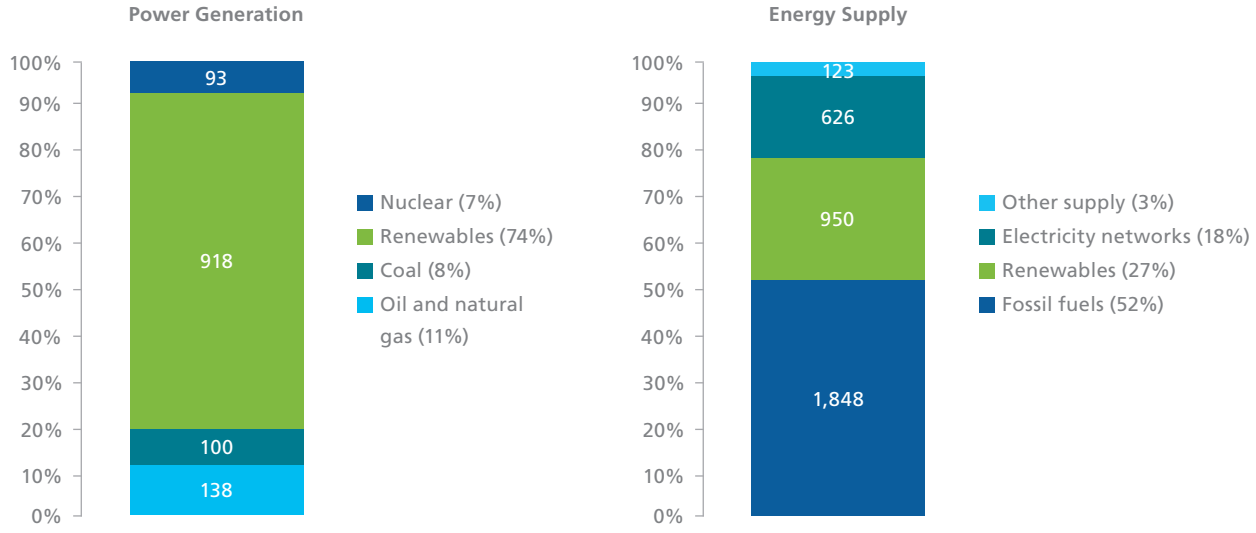
Data from the International Energy Agency (IEA) indicate that energy investment totalled US$2.2 trillion in 2021 and nearly US$2.4 trillion in 2022. The share of clean energy investment has been increasing over time and is now the majority, comprising 59.3% in 2021 and 60.2% in 2022.

The proportion of energy investment directed toward renewables rose to 74% in power generation and 27% in energy supply. This compares to 64% and 20%, respectively, in 2017.

Fossil fuels investment remains a large portion of the investment in energy production and supply at 52%, but its share has been shrinking, down from 59% five years ago.

In terms of power generation, investment in coal-fired generation has fallen significantly by 27% cumulatively since 2017. Although investment in gas-fired generation has increased during the last two years, it had been declining since 2016 and remains 15% below that peak.

Global energy investment in 2021 and 2022 combined (USD bn and share of totals, %)



Sources: Capital Economics and International Energy Agency

In the near term, in terms of energy supply, until more power generation can be diverted towards renewables and away from natural gas and coal, we expect investment in natural gas supply, particularly LNG, to continue as countries diversify their sources. New investments in electricity networks, particularly in the case of the US, will be necessary to handle the expansion of renewable power generation. Thus, fossil fuels may not be the majority source of allocation of funds in energy production and supply for much longer.

As for power generation, we expect the allocation to renewables to remain high for the foreseeable future as countries press to meet their announced commitments on climate change.

The conflict in Ukraine has enhanced the focus on both oil and gas and the energy transition across CEE, not only due to the imperative to modernise electricity systems but also to provide geopolitically resilient sources of energy.

Varinia Radu

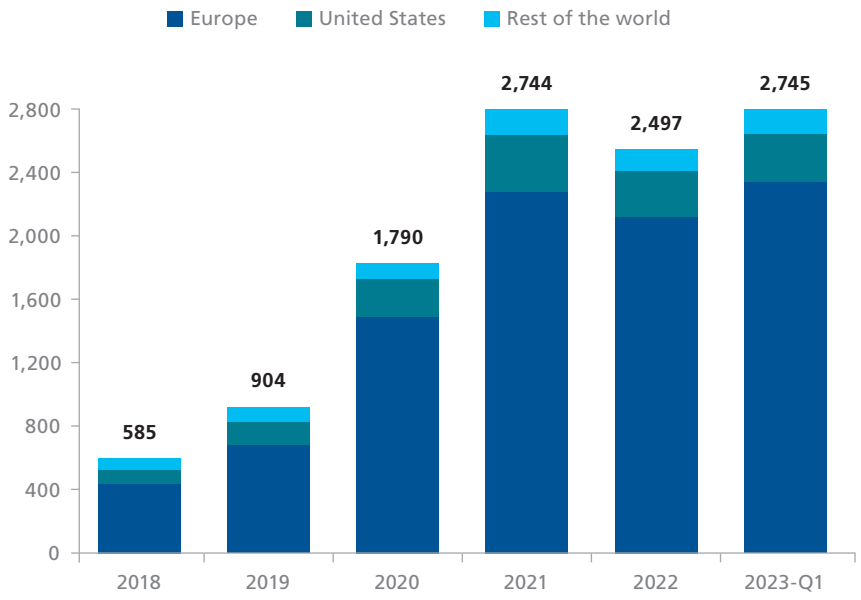
Head of Oil & Gas for CEE at CMS

Investor interest in ESG instruments explodes in Europe

Investor interest in capitalising on developments related to Environmental, Social and Governance issues (ESG) gathered momentum after 2018. Assets under management (AUM) in ESG funds increased by 55% in 2019, 96% in 2020 and another 53% in 2021, raising total AUM to more than US$2.7 trillion. Investments in ESG instruments declined 9.9% in 2022 but in Q1-2023 have rebounded 9.9%.

Europe has always been at the forefront of this investment strategy and has continued to expand and gain share. According to Morningstar, AUM in European ESG funds accounted for 83.6% of total ESG fund assets in Q1-2023. The USA is a distant second at 10.9%, with funds invested by the rest of the world making up the balance of 5.5%.

Global ESG funds, assets under management (USD bn)



Sources: Capital Economics and Morningstar

Europe has been a global leader in solidifying its climate policy, which has made it possible to generate the confidence investors in the region need in order to allocate funds to an ESG strategy. However, other jurisdictions may begin to gain ground given that new regulations have been proposed and/or implemented during 2021 and 2022.

Major regulatory developments in 2021 and 2022

Country	Regulation
Global	International Sustainability Standards Board (ISSB)
European Union	Sustainable Finance Disclosures Regulation, the Corporate Sustainability Reporting Directive and the EU Taxonomy for Sustainable Activities
United Kingdom	Mandatory Taskforce on Climate-Related Financial Disclosures reporting
United States	SEC disclosure rules
China	Mandatory environmental reporting

Sources: Capital Economics, UNCTAD, International Energy Agency, IFRS Foundation

The International Financial Reporting Standards (IFRS) Foundation is a non-profit organization that focuses on setting standards for financial reporting. IFRS introduced the International Sustainability Standards Board (ISSB) in November 2021 and will work to create a global standard for companies disclosing sustainability-related items for their investors.

The EU, UK, and China also created regulations around reporting and disclosing sustainability-related activities in order to provide investors with optimal information on a company's position and goals related to sustainability.

In the US, ESG reporting requirements will begin to phase in during 2023, even though the rules have not yet been finalised by the Securities and Exchange Commission (SEC). This follows an SEC ruling in March 2022 proposing disclosure of Scope 1, 2 and 3 emissions for publicly traded companies. It is worth noting that US oil and gas companies are already reporting this information in some form.

These efforts to produce more unified standards around ESG investing and reporting are welcome, particularly considering the various criticisms surrounding the investment segment. Not only have ESG fund providers been criticised for the "non green" companies that they hold in their portfolios but in the US, specifically, ESG is being drawn into the political culture wars which are pressuring state and federal level pension funds to stop utilising the investment strategy.

From an oil and gas company standpoint, compliance with increasing ESG requirements in various jurisdictions as well as being able to access third party capital will be key in their thoughts across the coming months and years.

In Latin America, the energy transition is progressing at a slower pace. From a policymaking standpoint, regulations being discussed or even being passed lack enforceability, reducing the impact on most energy transition efforts.

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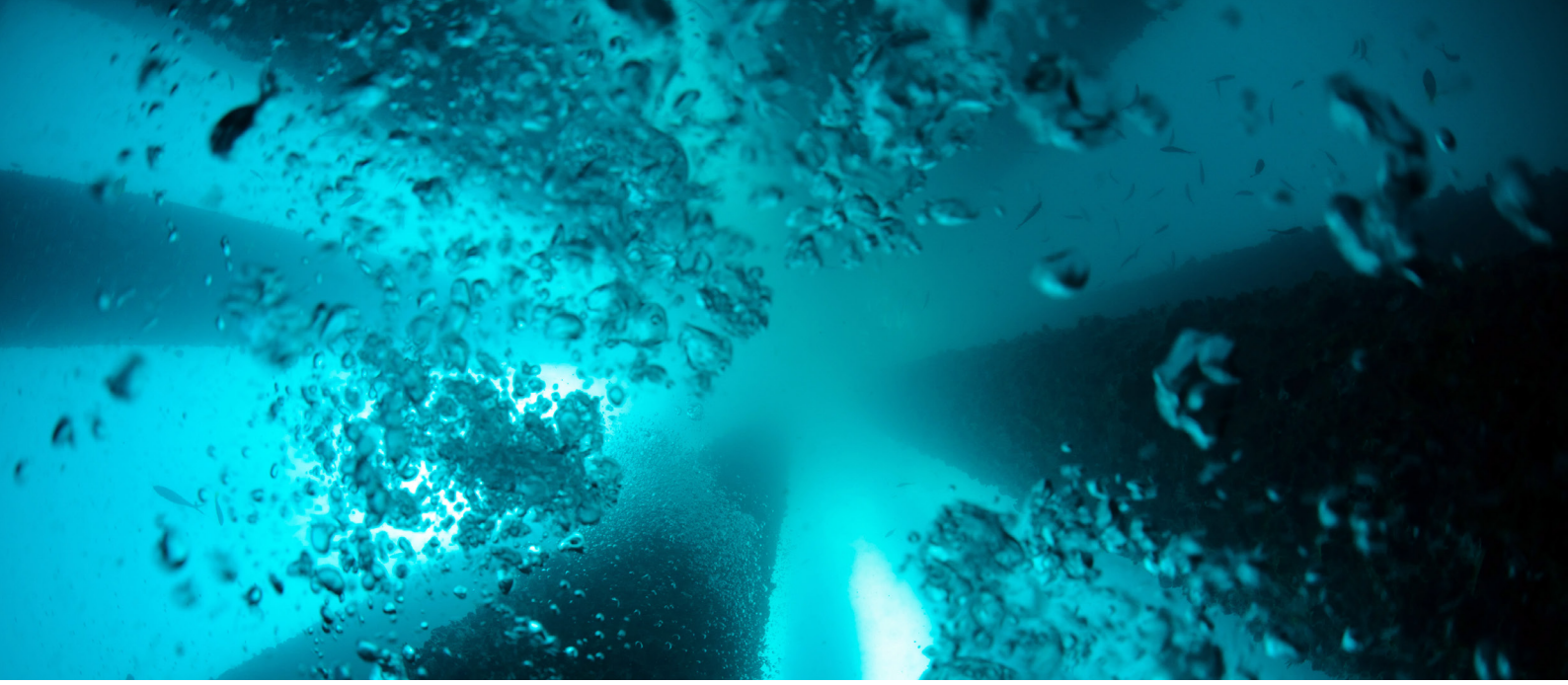


Companies evolving positions on energy transition

We first undertook this analysis of the oil and gas majors relative to the energy transition using financial reporting for 2018. At that time, there was less of a global consensus on how to tackle climate change. Many countries did not have clear commitments or strategies in place. Companies took different approaches depending on their home jurisdiction and their own activities and spanned the gamut of fully embracing the Paris climate agenda to asserting the need for oil and gas companies to continue on as they were.

Five years have passed and much has changed. The goal in terms of climate change has largely coalesced around reaching a net zero condition on GHG emissions by 2050. The UAE will host COP28 in November 2023, at which time the world will take stock as to where things stand in creating a lower carbon future. Although the COVID-19 pandemic demonstrated the extent to which limiting daily economic activity could reduce carbon emissions, the war in Ukraine reminded the world just how necessary oil and natural gas is to the global economy and reinforced the need for energy security, access and affordability as it transitioned to a lower carbon future.

In reviewing company reports and websites in the first half of 2023, while it is clear that the companies have embraced, to an extent, the energy transition as part of their corporate identity, at the same time there has been some retrenching and communications from some European oil and gas companies around slowing down the drive to transition partly as a result of profitability versus peers. This now seems to be reversing as profits realised from high commodity prices due to the war in Ukraine recede. In the table below, we have compiled the companies' own statements about their strategy, mission and purpose.

Company statements on their mission and purpose

Company	Statement
ADNOC	Maximum energy. Minimum emissions.
bp	Our purpose is reimagining energy for people and our planet. We want to help the world reach net zero and improve people's lives.
Chevron	Our purpose is to develop the affordable, reliable, ever-cleaner energy that enables human progress.
ConocoPhillips	Our core mission is to invest in the development of the energy supply essential to human and economic progress, while effectively managing social and environmental concerns, including climate change.
Eni	We are an energy company. We concretely support a just energy transition with the objective of preserving our planet and promoting an efficient and sustainable access to energy for all.
Equinor	Energising the world. Empowering people.
ExxonMobil	Working to solve the "and" question: delivering the energy and products society needs and reducing our own and others' greenhouse gas emissions.
Pemex	To contribute to energy security through the production, processing, distribution, marketing and sale of hydrocarbons and hydrocarbon derivatives, while ensuring profitability and sustainability for the benefit of national development.
Petrobras	To provide energy that ensures prosperity in an ethical, just, safe, and competitive way.
PetroChina	Pursuing green development and supplying reliable energy to fuel the growth of our customers and power people's happy life.
Petronas	Passionate about progress. Our passion for progress drives us to create better solutions that benefit people, our partners and the planet.
Repsol	An energy company committed to a sustainable world.
Saudi Aramco	Energy security for a sustainable world.
Shell	Powering progress.
Total	More energy, less emissions.

Sources: Capital Economics, company reports and websites

It is worth stating that these 15 companies do not just extract fossil fuels from beneath the earth's surface. To varying degrees they also consume energy, produce industrial and retail products, and participate in the energy transition both within and outside their commercial activities. These are large corporations generating a significant level of revenue for either shareholders or their countries. As a result, they face a variety of factors related to the energy transition, many outside their control, to which they must respond and adapt.

First, their "home" jurisdiction will have a policy related to climate change. However, that policy could be very well articulated – as in the case of the EU – or it may still be in the formation stages – as in the case of the US and China, for example. Thus, the regulatory environment and incentives are subject to change in ways in which they might not yet expect.

Second, the business of some companies may be more exposed to global developments which align with or contradict what their home country is doing. Thus, depending on their asset base, companies may be caught between contradictory expectations as the energy transition evolves.

Third, their core activities may bring them into contact with countries whose development goals are not in sync with either global or national views on climate change. Yet, these companies still need to produce oil and natural gas and are under some pressure to do so depending on where they are operating.

Finally, companies have different ownership structures which are adapting and responding to the three conditions noted above. A company with a single national stakeholder or certain private equity investors will be faced with different accountabilities when compared with companies that are held by institutional investors or some other type of agenda.

Given this complex web of interactions that companies are trying to navigate, we can identify three distinct trajectories along which the companies are evolving. Each of these routes is simply a different way to get to the same place, rather than a progression that each one needs traverse in order to reach that endpoint. The three trajectories are:

Diverse portfolio	National champions	Core focus
— bp	— ADNOC	— Chevron
— Eni	— Pemex	— ConocoPhillips
— Equinor	— Petrobras	— ExxonMobil
— Repsol	— PetroChina	
— Shell	— Petronas	
— TotalEnergies	— Saudi Aramco	

Source: Capital Economics

"Diverse portfolio" companies have intentionally expanded, and continue to expand, their asset base to include cleaner power generation activities that are utilised beyond powering their own operations.
"National champions" are companies which are key players in promoting their own country's broader ESG agenda. Government policy is a fundamental driver of their strategy and investment choices. We note that ADNOC and Saudi Aramco are both more global facing than the others in this group given that their resources far exceed the demand for fuel in their own home markets.
"Core focus" companies are those which are concentrating on displacing their current portfolio of products with the low carbon and clean energy solutions which their customers will need in a net zero future. It is not surprising that these three companies are domiciled in the US, where (despite the Inflation Reduction Act) a national climate strategy is not wholly formed. These companies have been subject to competing shareholder pressures to, on one hand, align with global climate ambitions and, on the other hand, to generate profits for their shareholders through their core fossil fuel activities.
In the coming sections of this report, we will refer to these trajectories as a way to compare how companies are allocating capital and prioritising their energy transition activities.
The table below sets out the company targets, as per their own sustainability reports, annual reports, strategic plans and websites.

Company targets for GHG emissions

Company	Emissions target	Carbon intensity target	Methane reduction	ESG reporting	Climate ambition
ADNOC	x		x		Reducing the intensity of our operational GHG emissions by 25% by 2030 and complementing the UAE's drive to achieve net-zero emissions by 2050
bp	x	x	x	x	Net zero operations, production, sales by 2050
Chevron	x	x	x	x	2050 net zero aspiration for equity upstream Scope 1 and 2 emissions
ConocoPhillips	x	x	x		Net zero scope 1 & 2 emissions by 2050
Eni	x	x	x	x	Net zero GHG lifecycle emissions and carbon intensity by 2050
Equinor	x	x	x	x	Net zero emissions and 100% net carbon intensity reduction by 2050
ExxonMobil	x	x	x		Net zero operated scope 1&2 emissions by 2050
Pemex		x	x	x	Targets for reduction in carbon intensity of operations set through 2027
Petrobras	x	x	x	x	Neutralise scope 1&2 emissions in activities under our control and influence partners to achieve the same goal in non-operated assets by 2050.
PetroChina	x	x	x	x	Strive to achieve near zero emissions by 2050
Petronas	x		x	x	Net zero carbon emissions by 2050
Repsol	x	x	x	x	Net zero emissions by 2050
Saudi Aramco	x	x	x	x	Net zero emissions from wholly owned operations by 2050
Shell	x	x	x	x	Net zero emissions energy business by 2050
TotalEnergies	x	x	x	x	A net zero company by 2050, together with society

Sources: Capital Economics, company reports and websites

When we last undertook this analysis of the companies' activities, ten of the companies had a net zero emissions ambition. Currently, 13 have made that pledge, with ADNOC and Pemex progressing a lower carbon future on a different timeline. In those cases, ADNOC has published a Sustainability Strategy to 2030 on its website, and states it supports the UAE's net zero by 2050 commitment. In terms of Pemex, the Mexican government agreed a national net zero target by 2050 in a meeting with U.S. Special Presidential Envoy John Kerry during COP27 in November 2022. The country's pledge occurred a few months after the country had revised its General Law of Climate Change in August 2022 which stated the country planned to generate at least 35% of power with clean technologies by 2024 and reduce emissions by 50% by 2050, compared to 2000. Pemex's Strategic Plan for 2023-2027 sets out carbon intensity targets for its operations through 2027 and these will likely be the foundation of the longer-term targets of the company that are developed as the country solidifies its net zero pathway.

Despite the differing trajectories of the companies, there is now much more similarity in the GHG targets to which the companies are now committed. All have some target for either carbon intensity or at least Scope 1 and 2 emissions. Most are working on Scope 3 emissions and with their other business partners to decarbonise their value chains.

Again, regardless of any company's particular trajectory in the energy transition, company reporting is also becoming more standardised in terms of the way ESG is treated. The UN's Sustainable Development Goals now feature prominently in many companies' reports. Several European companies – Eni, Equinor, Repsol and TotalEnergies – produce an integrated financial and sustainability report, which is reflective of their "diverse portfolio strategy" towards their activities. These companies are also quite far along in terms of integrating the SDGs into their company strategies and operations as well.

ADNOC, ConocoPhillips and ExxonMobil did not adopt the style of ESG reporting of their peers in their 2022 public documents. That said, all three do comment on their own ESG activities, just not along the lines of the standardised format seen in the other companies.

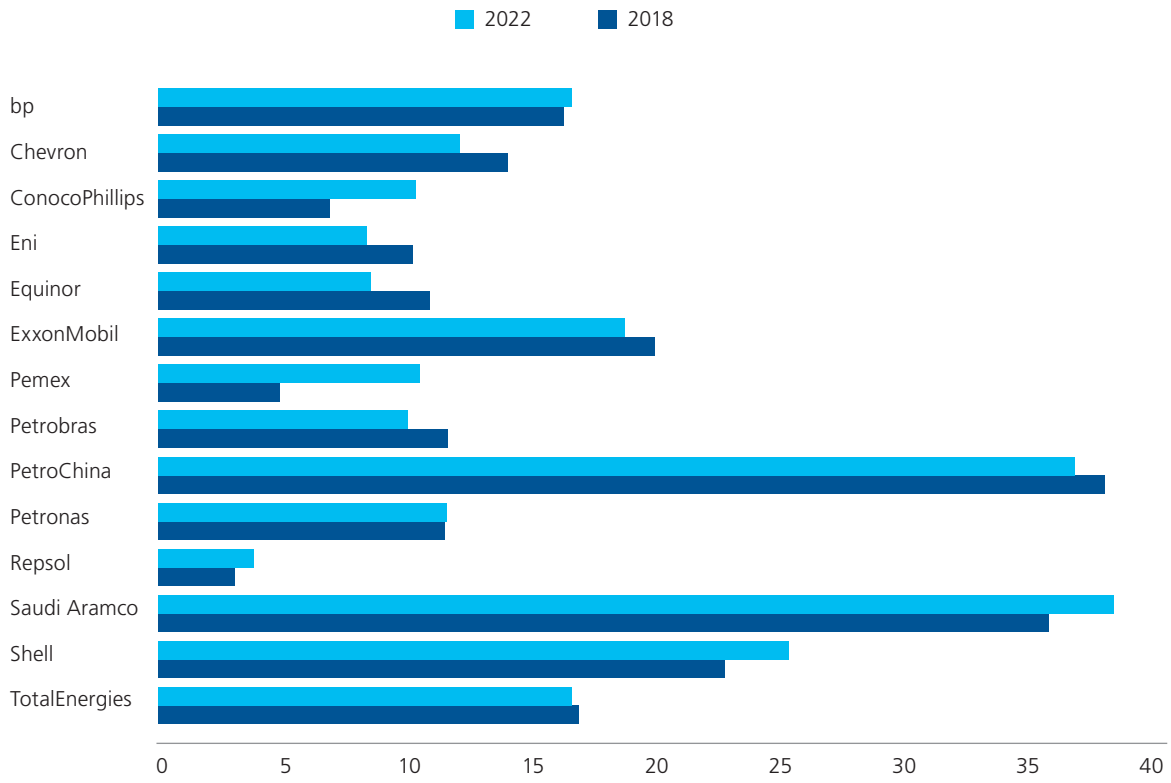
Capital allocation for the transition

The goal of providing affordable energy to the world during the energy transition, knowing that demand for their core outputs is projected to fall in the future, presents the companies in our sample with a difficult scenario in terms of setting financial priorities during the transition.

While it is one thing to corporately embrace the drive to energy transition, a significant focus of investors and the population as a whole will be on whether the companies are themselves diverting capital from fossil fuel activities to energy transition, to meet those aims.

Despite strong profits in 2022, the combined total capital expenditures (CAPEX) reported by the companies in our analysis was US$223.6 billion, about 5.5% lower than total CAPEX in 2019 but only 0.7% lower than in 2018.

Total CAPEX by company in 2018 and 2022 (USD billion)



Sources: Capital Economics, company reporting. ADNOC does not produce a unified financial report for its entities so we have not included it.

Among the publicly traded companies, CAPEX in 2022 was largely within or slightly better than the guidance they presented early in the year. This is in strong contrast to 2020 when companies did not meet their CAPEX targets as a result of the pandemic and associated slowdown in global economic activity.

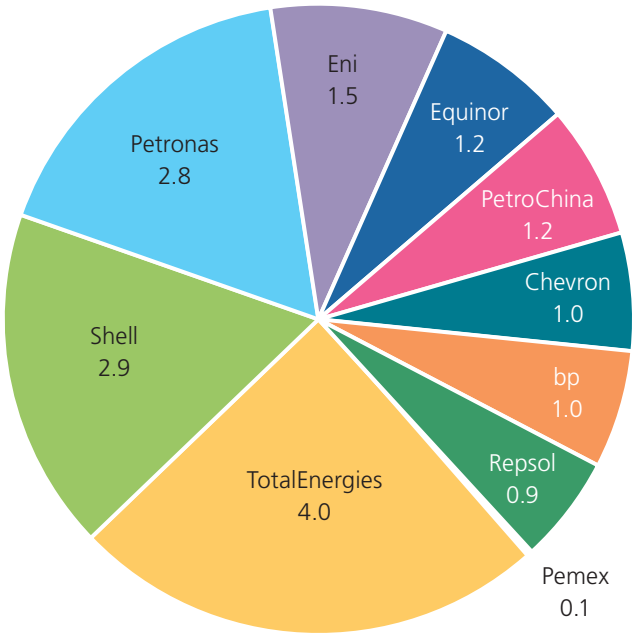
Given the increased focus on energy security and affordability which has been highlighted by the invasion of Ukraine, company CAPEX for maintaining and even increasing their oil and gas production has taken on a greater importance. Thus, in the absence of another significant global slowdown, CAPEX for their own operations, as well as that for their climate goals, is likely to remain on track.

Across the companies in our sample, there is not a uniform way of how capital is being allocated to their various activities towards the energy transition. Some companies provide very clear breakdowns between these and their other activities but some do not. Furthermore, definitions of what goes into the energy transition category varies widely across companies as well.

Our previous analysis reported on CAPEX for renewables. However, it is not possible to focus only on renewables spending because of the way that companies are now reporting their investments relative to their energy transition. In addition, several companies do not provide enough detail for us to extract their spending on the transition that does not include other core activities, so we have not included them in this list.

For 2022, CAPEX allocated to the energy transition, as reported by the companies, totalled USD16.5 billion, representing an average 7.4% of total CAPEX for these companies.

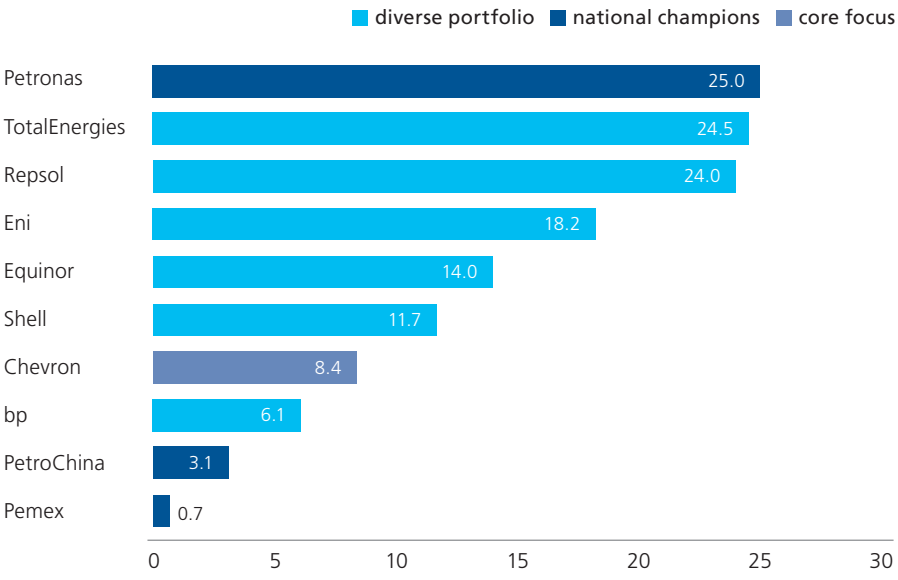
CAPEX for the energy transition, 2022 (USD billion)



Sources: Capital Economics, company reports

While the chart above provides information on the overall outlays on the transition, the companies do vary in size and total capital budgets so a total value figure can be misleading as to their focus on their energy transition. The chart below shows the share of each company's CAPEX for the transition relative to its total CAPEX.

Share of total CAPEX spent on renewables and/or low carbon activities in 2022 (%)



Sources: Capital Economics, company reporting

TotalEnergies had previously stated targets for CAPEX on renewables at 11% during 2021-2025. It now reports its CAPEX to "low carbon energies", which includes renewable power generation, EV charging, biofuels, and polymers recycling in this CAPEX spending. In its most recent climate and sustainability presentation, it has set a target of allocating around one-third of its CAPEX to these low carbon activities.

Repsol is one of the companies which is very specific about reporting its spending on renewable power separately from the rest of its CAPEX. In 2022 that spending accounted for roughly 24% on a US dollar basis. Its most recent investor outlook for 2023 indicates it plans to devote 24% of CAPEX to renewables in the coming year.

Eni had previously stated a target for their spending on renewables at an average of 21% for the 2021-2025 timeframe. In its 2023 Capital Markets Update, however, the company has stated a target for CAPEX on its Plenitude renewable power division along with its "sustainable mobility" activities – which include bioenergy, fuels and convenience – of about 20% of total CAPEX through to 2026. So, the company appears to be relatively close to achieving that aim already.

We note that Equinor reports its capital expenditures as renewables and low carbon solutions at 14% of its gross CAPEX in 2022. It defines low carbon solutions as hydrogen and CCS. In its most recent sustainability report, it plans to spend over 50% of total gross CAPEX on these activities.

Shell previously had a target of investing 26% of its CAPEX in renewables by 2030. Shell's Renewables and Energy Solutions business includes renewable power generation, investments in CCS, hydrogen and its carbon removal activities, as well as trading natural gas and power. In 2022, excluding the trading activities, CAPEX on renewables and energy solutions, excluding trading activities, accounted for 11.7% of the company's total cash CAPEX.

Spending by bp on its "low carbon fuels" – renewables plus hydrogen – amounted to 6.1% of its total CAPEX in 2022. The company plans to devote a range of 21% to 28% of CAPEX to this activity by 2030.

Petronas is a "national champion" but has a high expenditure on renewables due to its national mandate for net zero by 2050. Its Gentari division is dedicated to investing in both decarbonisation and clean energy and it focusses on three solutions – energy, hydrogen and green mobility. Its main expenditures in 2022 were on electric vehicle charging and renewable power. As it expands its plans for generating electricity from renewable power, its CAPEX share to renewables is likely to remain above the average for this peer group.

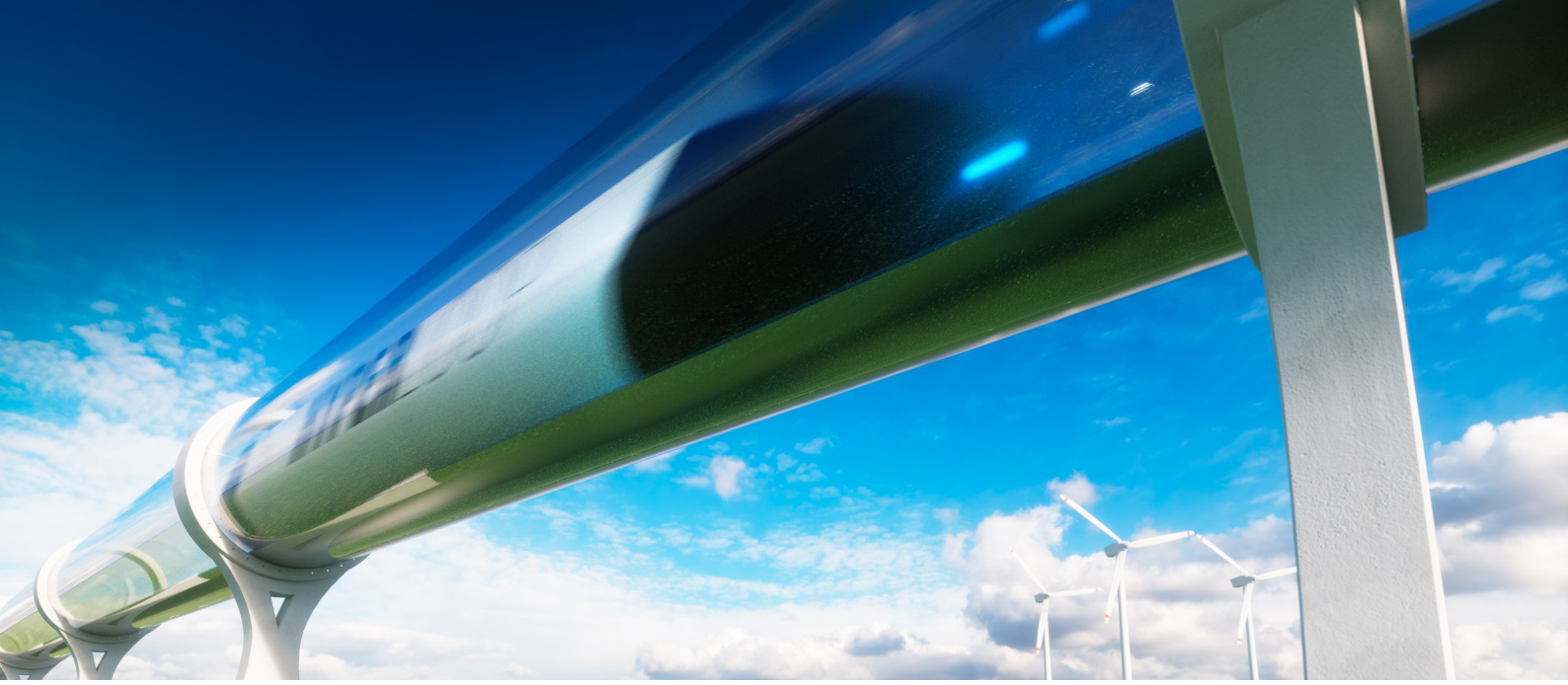
PetroChina noted in its most recent annual report that it would be growing its capabilities in renewable generation as well as other low carbon activities.

Pemex has completed a redrawing of its corporate strategy through 2023-2027 so formulation of its future expenditures is still in progress.

Chevron is the only "core focus" company that provided detail on its "lower carbon" CAPEX. Their investments include those which are focussed on increasing renewable fuels production capacity.

Given record profits, oil and gas companies are thinking twice about doubling down on renewables in order to protect their existing market position and not lose out to rivals who remain committed to fossil fuel development – there may even be a fear of acquisition by rivals in the event of an ongoing differential in share price.

Norman Wisely
Partner in the Oil and Gas Team at CMS



Strategies for the energy transition

The companies provide more detail on the individual initiatives they are undertaking to achieve their energy transition pathway. To develop a picture of how the companies are acting on the energy transition, we have reviewed the most recent company financial reports, sustainability reports, websites and press releases.

The information we present below has been highlighted by the companies themselves in their recent reporting. It is not intended to account for every single initiative undertaken in the last reporting year and it is not meant to include activities prior to 2022, though some may be ongoing.

Company initiatives for progressing the energy transition fall into four broad categories: carbon removal, low carbon fuels, renewable generation and hydrogen development. The table below sets out what we have observed from the most recent company reporting.

Initiatives for progressing the energy transition

	Carbon Removal			Low Carbon Solutions		Renewable Generation		Hydrogen
	Nature-based	Carbon capture & storage	Third party Credits / Offsets	Low carbon fuels	EV charging points	For own O&G operations	For external generation	
ADNOC	x	x					x	x
bp	x	x		x	x	x		x
Chevron	x	x	x	x		x		x
ConocoPhillips		x	x			x		x
Eni	x	x		x	x	x	x	x
Equinor		x				x	x	x
ExxonMobil	x	x		x				x
Pemex	x							
Petrobras	x	x	x	x			x	x
PetroChina	x	x					x	x
Petronas	x	x	x		x	x	x	x
Repsol	x	x		x	x		x	x
Saudi Aramco	x	x	x	x			x	x
Shell		x	x	x	x		x	x
TotalEnergies	x	x	x	x	x		x	x

Sources: Capital Economics, company reporting

Carbon removal strategies involve existing solutions and new technology developments

Carbon removal strategies exist to offset the ongoing generation of emissions in order to achieve the companies' emission targets. There are essentially three ways in which companies pursue this strategy.

Nature-based solutions promote the absorption of CO2 through environmental stewardship and biodiversity. These activities have the advantage of promoting broader ESG goals both in their home countries and in the jurisdictions in which they are operating. This strategy is used by 12 of the 15 companies.

One of the common initiatives is tree plantings. Chevron is expanding its reforestation of bald cypress trees in Louisiana, USA by increasing the number of trees it plants as well as more than doubling the land area it is re-foresting. PetroChina is involved in planting trees nationwide in both existing forests and land set aside for carbon sequestration. Saudi Aramco is participating in a nationwide initiative in the Kingdom to plant mangrove trees. ADNOC is also involved in mangrove plantings.

Pemex has established two ecological parks as "voluntary conservation areas" to provide environmental services such as carbon capture, water harvesting, and pollinator protection. TotalEnergies is developing carbon sinks in both Guatemala and Peru which will benefit Central and South American emissions reduction aims.

Carbon capture, sequestration and storage (CCS) is an existing technology which is also evolving towards larger scale commercial solutions. With fourteen of the companies in our analysis highlighting CCS as a part of their strategy over the last year, ongoing expansion and development is something that cuts across the three trajectories on the path to net zero.

The oil and gas majors are key players in expanding carbon capture and storage, particularly given the similarity of projects to their core operational specialisms. Their activities encourage both other oil and gas companies, as well as new entrants, to make the transition into this space and there are many great examples of collaboration.

Paula Kidd

Partner in the Oil and Gas Team at CMS

Depleted oil and gas fields are one of the main options for CO2 storage, though not all depleted sites offer this potential. If storage is feasible at a site, there is the opportunity to repurpose the existing infrastructure, thereby reducing decommissioning costs. Policy support could accelerate development and adoption of CCS in future.

For the moment, companies are in varying degrees of exploring and utilising CCS. ADNOC, bp, Chevron and ExxonMobil all have facilities that are currently operating with this capability. ConocoPhillips is evaluating sites along the US Gulf coast. PetroChina plans to construct regional CCS facilities in industrial centres. Saudi Aramco has identified several key assets for CCS and has sought out international partners to develop additional projects. Equinor and Shell have partnered to transport and store CO2 with the Northern Lights partnership and Yara, a major global producer of fertiliser.

Carbon offsets are a way for the companies to invest in activities outside their business and acquired credits to reduce their own emissions tally. The companies utilising this activity are largely investing in funds which, in turn, invest in nature-based carbon removal solutions around the globe. As such, the companies are participating in the greater global aim of reaching net zero, not just their own company mandates. At the same time, companies have noted they are purchasing carbon credits through marketplace mechanisms, or include it as a potential option, in order to reach their stated emissions targets.

Low carbon downstream products look to the net zero future

Low carbon solutions are those which will displace fossil fuel energy with something less carbon intensive, now and in the future. Many of the companies with significant downstream operations and distribution networks are involved in the development of biofuels and synthetic products, some of which are already being marketed to consumers and industrial customers.

Perhaps the most high profile statement around what the future looks like for the oil and gas majors with important downstream operations, ExxonMobil has recently stated that it has assessed that the value of its low carbon solutions business, which it created in 2021, is likely to be larger than current value of its upstream operations today.

An example outside the passenger vehicle market is Repsol, which has developed an aviation biofuel from its waste streams that is used by Iberia Airlines on long-haul flights.

Several of the companies – bp, Repsol, Shell and Petronas – have invested in the installation of electric vehicle (EV) charging points. Whether this is at their own service stations or at a new service site, this represents replacing a core downstream activity with an adjacent one promoting the energy transition. While Petronas is a national champion, the other three companies are domiciled in Spain and the UK, where their automotive customers have pledged to end production of combustion engine vehicles within the next 20 years.

Hydrogen makes progress

Hydrogen is a clean energy solution which continues to evolve, particularly in natural gas intensive operations like fertilisers and chemicals, albeit there tends to be criticism of blue hydrogen as a less viable long-term contributor to the energy mix than green hydrogen, the latter being much less carbon intensive than the former. As an example, ADNOC is building a facility to produce blue ammonia at its new TA'ZIA industrial ecosystem and chemicals hub. While the project will not be fully operational until 2025, it has sold its first demonstration cargoes of blue ammonia. ConocoPhillips has invested in hydrogen production technology with Ekona Power, Inc. and is working with JERA to evaluate the development of green and blue ammonia from the US Gulf Coast.

Petronas has signed agreements with 12 international partners to produce hydrogen. Repsol has joined SHYNE, a consortium to promote renewable hydrogen in Spain.

The end markets to utilise hydrogen as a fuel replacement for gasoline or natural gas are still being developed, which is constraining the progress that the companies can make. This is an instance where national policy could help accelerate adoption but companies are moving ahead in any case. Specifically, Chevron is partnering with BNSF (a railway) and Progress Rail (which is a division of Caterpillar) to develop a locomotive power by hydrogen fuel cells.

CAPEX dedicated to renewables aligns along company trajectories

The one area which has separated the "diverse portfolio" companies from their peers in our sample group is in the implementation of renewable generation for activities outside powering their own oil and gas operations. It is not surprising given the location of the facilities that the US domiciled companies have found ways to utilise solar and wind generation in their own operations but have not acquired or developed generating assets beyond that because, unlike many of their peers, they are not electric utilities and do not have ambition to enter that line of business. As an example, ConocoPhillips is performing a study of an offshore wind project to power operations at the Ekofisk complex in the North Sea which would include two 11MW wind turbines and be operational by 2026.

The European-based companies have all invested in renewables generation over the last five years and many continue to do so. There is not a single, common strategy that is being employed, but rather a mix of activities which involve acquiring renewable energy developments, as well as developing their own projects, either alone or in partnership.

Equinor is developing its own onshore wind and solar projects to power its operations and has among many other things acquired BeGreen, a Danish solar developer with a strong project pipeline.

Repsol was particularly active in this regard. It acquired three wind farms and two solar plants from ABO Wind, adding another 250 MW to its existing 3,200 MW portfolio of renewable projects in Spain. The new assets will interconnect with Repsol's own PI wind project and will begin operating by 2025. The company also acquired Asterion Energies, incorporating a 7,700 MW portfolio of renewable generation in Spain, Italy and France. Outside of Europe, along with partner Ibereólica Renovables, the company began to generate electricity at their second joint wind farm in Chile with 165MW installed capacity.

Shell purchased Nature Energy, a renewable natural gas producer, Holland Hydrogen 1, and renewable power developer Sprng Energy. It also integrated Savion, a solar and energy storage developer in the USA, into its asset base.

TotalEnergies increased its renewables spending through the acquisition of US-based Clearway Energy, which has a portfolio of solar and wind generation assets.

In the Americas, Brazil's state-owned Petrobras has revamped its corporate strategy and now includes a renewables commitment in its future CAPEX plans.

Saudi Aramco has publicly announced a change in how it will approach the energy transition. Instead of committing the company to a renewable energy target, it is, instead, investing US$ 1.5 billion in a fund to promote low carbon technologies.

ADNOC, as part of the UAE strategy to become net zero by 2050, entered into a partnership in late 2022 under the Masdar name. The company has a committed capacity of over 23 GW of renewable energy, with the expectation of reaching well over 100GW by 2030.

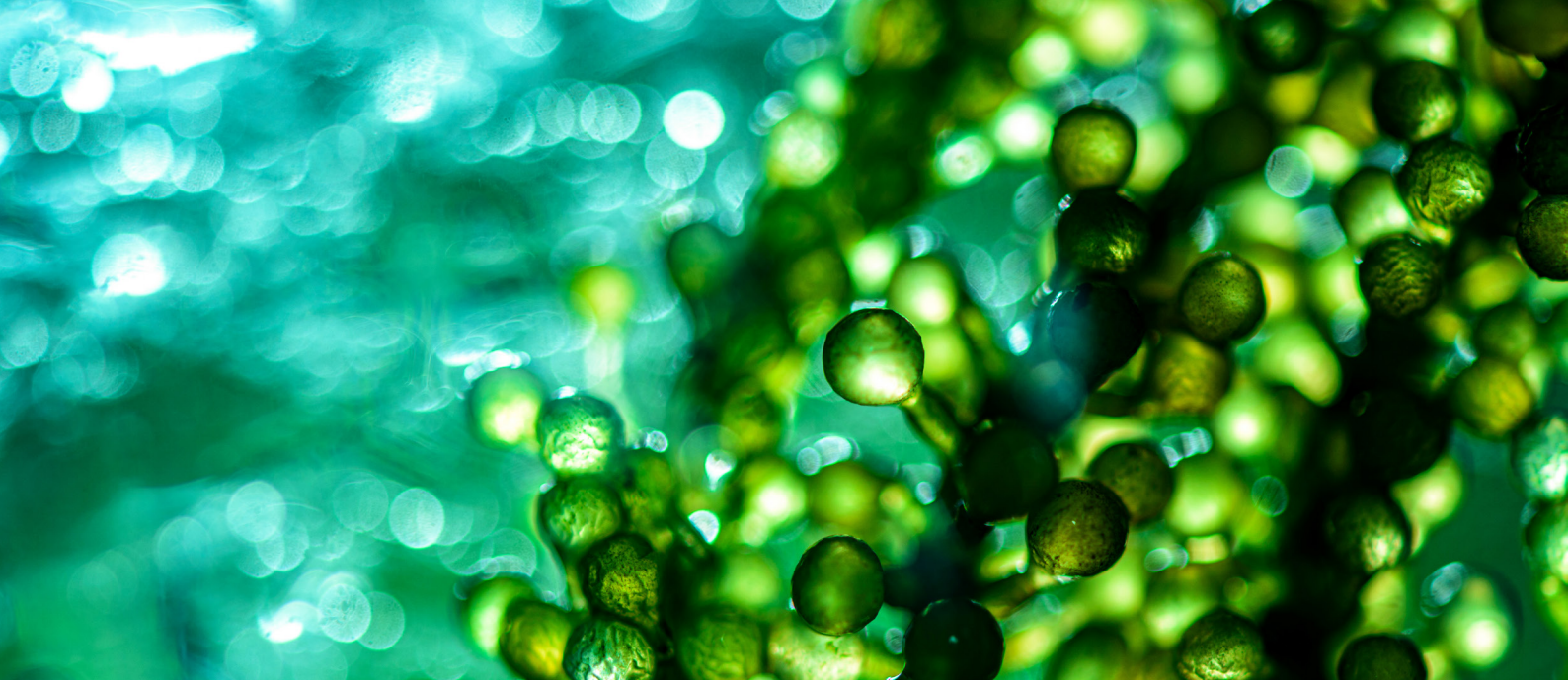
Similar to what ExxonMobil did with its downstream low carbon solutions business, both Eni and Petronas have created specialised "satellite" business units which aim to develop, acquire and provide clean energy solutions in the future. Petronas said it intends to generate 30-40 GW via renewables by 2030.

PetroChina has a broader aim of utilising biomass, wind, solar and geothermal to reduce its carbon footprint in the future.

The percentage increase in CAPEX dedicated to renewables is remarkable. However, the absolute figures are still relatively small and subject to year-to-year distortions arising from the implementation of particular projects

Charlie Denham

Senior Associate in the Oil and Gas team at CMS



What is the next energy transition

The energy transition will be ongoing for quite some time. Based upon the developments in the energy transition during the last two years, as well as the information that companies have presented in their most recent reporting, there are a few things we can expect as the energy transition progressing in the near term.

- Globally, the direction of climate change policy will continue to solidify around a clearer target of limiting temperature change to less than 2-degrees C. We will see more countries implementing and refining their strategies toward this overall goal, though there is unlikely to be full global cooperation along these lines.
- Near and medium term, oil and gas companies will still continue to invest in oil and gas, balancing that with the energy trilemma regulators and governments are wrestling with globally – the need for energy security, energy cost-effectiveness and the drive to energy transition.
- Reporting and financial disclosure around emissions, targets and climate finance will become even more unified. All the companies in our sample will eventually produce a report which conforms to that type of disclosure. That said, the US-domiciled companies will likely continue to produce separate financial and sustainability reports since the US is likely to lag in terms of accepting the UN SDG framework in the near future.
- The "diverse portfolio" companies will continue to expand their renewable power generation asset bases. They are also the most likely to divest higher carbon operations since European targets are more stringent than in most of the rest of the world (albeit there is some criticism of companies reducing carbon intensity by divesting as opposed to decommissioning, given the carbon generating activities do not disappear as a result – they simply transfer from one entity to another). We envision these companies to forge partnerships with companies in economies for which fossil fuel energy remains a priority but where renewable power might fit into a company's resource base.
- The companies with a "core focus" trajectory are unlikely to adopt renewable power generation as a new business aim. They will, however, look for opportunities to expand use of renewable power as a way of producing the electricity they consume in their own activities. Their investments are likely to focus on helping their customers to decarbonise for the future, using solutions the companies develop with them to create a lower carbon

future. They are also likely to put more investment into development of carbon capture and hydrogen and spreading the adoption of these technologies in industrial settings.

— Each of the "national champions" will develop their net zero path in line with their own country's goals for climate change and emissions reduction. As a result, these strategies might fluctuate somewhat as countries solidify their national goals. These companies are likely to continue to expand upon their existing strengths. They will tap into global best practice in the new areas they pursue that are in line with their national mandate.

— The demand for oil and gas depends largely on the adoption of electric vehicles (EVs) and on the speed at which natural gas power generation is replaced by renewables. In both cases, the energy transition has been progressing faster than expected. If this continues, the oil and gas companies will have to accelerate their decarbonisation efforts.

— Use of petroleum for feedstock is an often overlooked part of the hydrocarbons industry and will also play into the future considerations of oil and gas companies and their move to energy transition - this is separate from the energy transition in many ways and projected to increase from today's requirement of around 15% of global oil demand.

Methodology

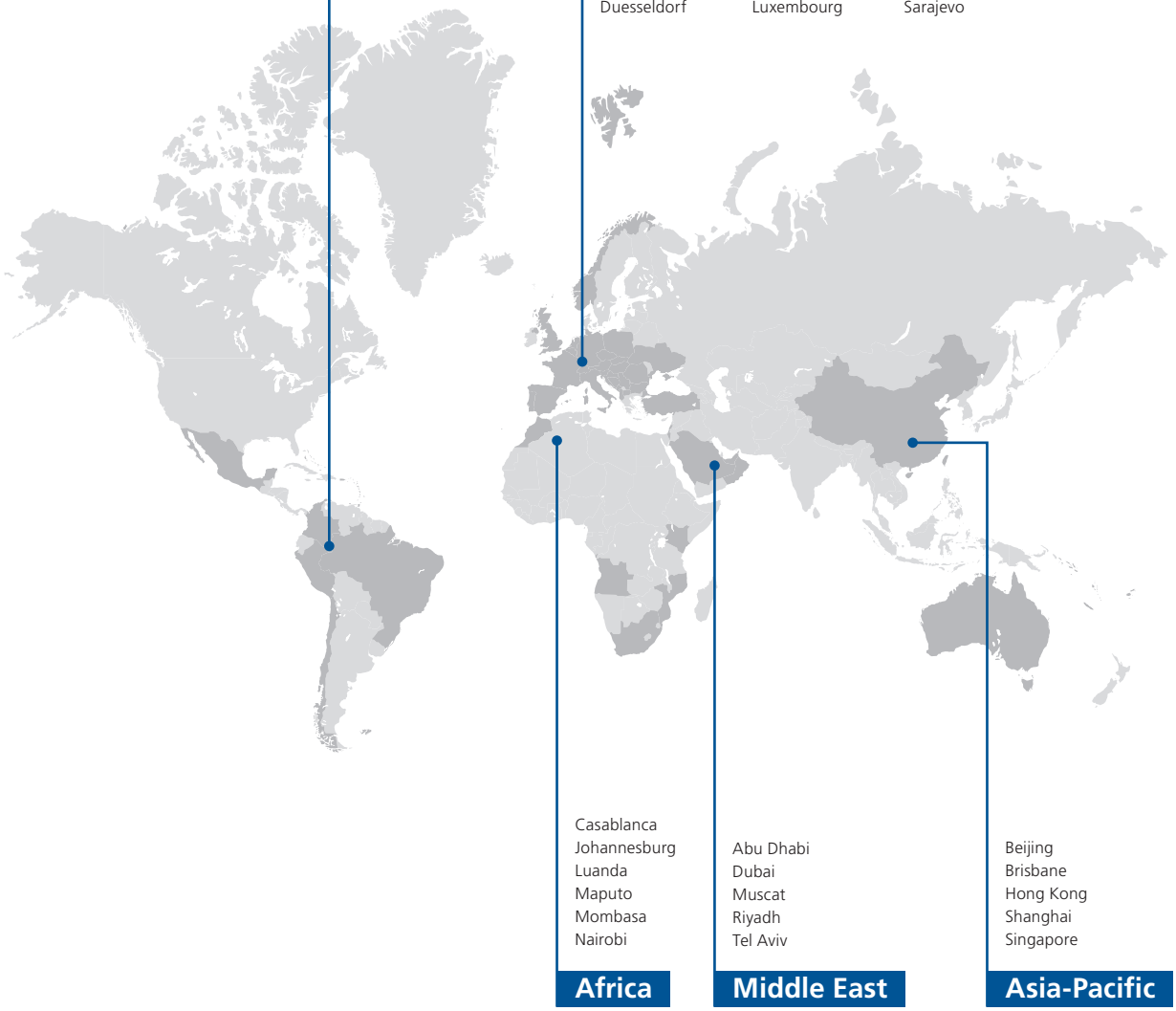
Capital Economics has been commissioned by CMS to assess the strategies and activities undertaken by the major oil and gas companies related to the energy transition. The focus is on how the companies present information about their own activities.

This report is an update of the analysis last produced in 2021.

Our report and findings are based in part on an extensive literature review, which includes individual company reports, financial statements and stated strategies of our sample of fifteen oil and gas majors.

In addition, we drew on respected public sources to inform our views on the current state of, and future longer-term trends in, the global energy mix. These include the International Energy Agency (IEA), the International Renewable Energy Agency (IRENA), Carbon Monitor, Morningstar and bp.

CMS map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