



How partnerships are powering the path to decarbonisation

September 2023

Executive summary

Over the last 20 years, the finance industry has helped establish the renewable energy sector as the greatest decarbonisation success story to date, with annual investment in the sector growing from \$US32 billion in 2004 to \$US495 billion in 2022.¹ During that period, renewable energy costs have fallen sharply, helping solar and wind become key contributors to global energy supply and a mainstream asset class for institutional investors globally.

Decarbonisation efforts have spread to more sectors, spurred by increasingly ambitious government climate targets to reach net zero emissions by 2050, in line with the Paris Agreement goal of limiting global warming to 1.5°C. To reach these targets, however, the achievements made to date in the renewable energy sector need to be replicated in scaling up the technologies critical to supporting the next phase of decarbonisation.

Batteries, electric vehicles and green hydrogen can decarbonise energy supply by leveraging low-cost clean electricity generation through direct or indirect electrification. Biofuels, carbon capture and other emissions control equipment can help lower the emissions intensity of processes that cannot readily be electrified.

To scale these more nascent solutions, businesses will need to build expertise and make significant investments to upgrade or retrofit their operations, especially in carbon-intensive sectors² like oil and gas and heavy industry. Finance must work hand in hand with these actors to accelerate the development, de-risking and scale up of the required technologies.

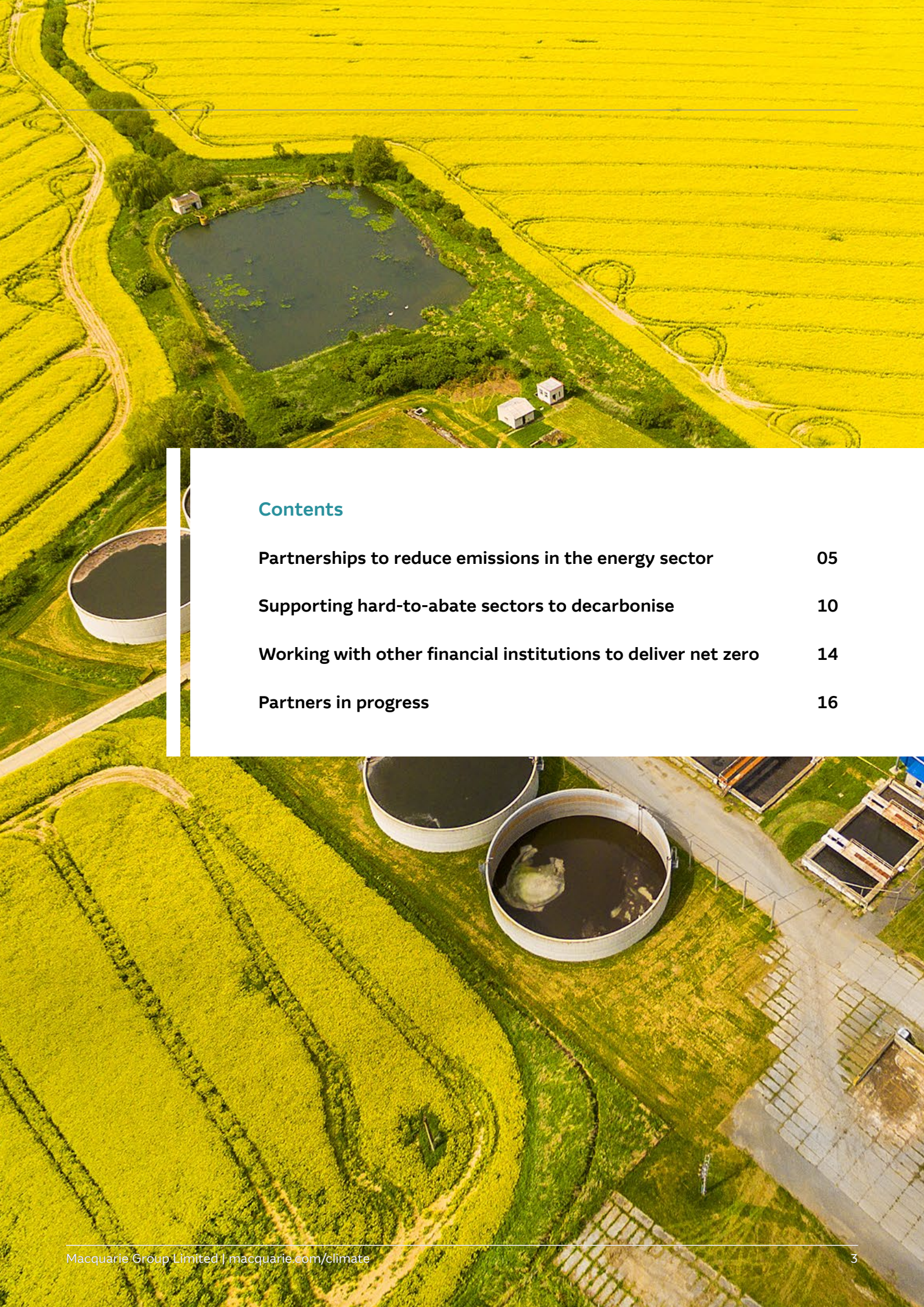
Macquarie works in partnership with clients that are leaders across sectors, including energy, industry, agriculture, mining and logistics, to accelerate the deployment of innovative climate solutions and to help these sectors meet their decarbonisation goals. In this paper, we share our perspective on the importance of private sector decarbonisation partnerships, an increasing trend, and highlight recent experience across different sectors and technologies, including:

1. Partnering with the energy sector to help reduce their emissions
2. Supporting other high-emitting sectors to decarbonise
3. Working with financial institutions to deliver net zero.

Regardless of the solution or the sector, our experience at Macquarie has shown that accelerating decarbonisation at the pace and scale needed to realise the goals of clients and communities, in a way that preserves and generates value, requires strong partnerships. Working together with carbon-intensive companies, combining our clients' deep technical expertise with our ability to offer flexible capital solutions that align with the operational requirements of companies as they embark on their transition, is critical to accelerate progress and scale innovative climate solutions.

1. Energy Transition Investment, BloombergNEF (accessed June 2023), <https://www.bnef.com/>

2. For the purpose of this paper, carbon-intensive sectors refer to the oil and gas industries and hard-to-abate sectors like heavy industry (such as aluminium, cement, steel, and chemicals) and heavy-duty transport (such as shipping and aviation).



Contents

Partnerships to reduce emissions in the energy sector	05
Supporting hard-to-abate sectors to decarbonise	10
Working with other financial institutions to deliver net zero	14
Partners in progress	16

The northern stretches of Brazil possess a mosaic of natural treasures – most notably the Amazon rainforest which dominates much of the territory. However, just to the east lies a land abundant in natural resources.

The Amazon basin is the source of a wide range of minerals and ores which have enabled the country to become one of the most important players in the global mining industry,³ and in recent years northeastern Brazil has emerged as key player in wind power. Indeed, the region now possesses around 90% of the nation's wind capacity,⁴ further highlighting the region's wealth of natural resources. This unique array of assets is why Norsk Hydro has been investing in the country for over a decade, first focussed on bauxite, alumina and aluminium production, and now on renewables.⁵

As one of the largest producers of aluminium globally, Norsk Hydro has committed to significantly reducing aluminium-sector emissions.⁶ This includes developing more sustainable products and decarbonising production processes by developing low-carbon energy.⁷ In doing so, Norsk Hydro has moved beyond its traditional aluminium business, establishing a renewable development company, Hydro REIN, and teamed up with partners across the value chain, including Macquarie, to achieve its ambitious decarbonisation plans. Since 2017, Norsk Hydro and Macquarie have worked together to develop renewables projects, including most recently in Brazil with Feijão, a hybrid wind and solar power project being developed to decarbonise Norsk Hydro's bauxite mine and alumina refinery in the north of Brazil.⁸ This push for greener operations in recent years has enabled Norsk Hydro to position itself as a leader in the energy transition of mining and metals.⁹

A few decades ago, only a handful of companies were investing in low-carbon solutions. However, the urgency of the climate crisis and the growing set of low-carbon business opportunities created in response to it, means leading corporates are now competing to deliver the best goods and services with the lowest climate footprint. Indeed, amid tightening regulation and customers that are increasingly mindful of their environmental impact, transition efforts are spreading to all industries. This includes carbon-intensive sectors such as oil and gas, steel, aluminium, chemicals, shipping and aviation.

With emissions reduction pledges having increased significantly since the Paris Agreement in 2015,¹⁰ these sectors are looking to accelerate their decarbonisation through clean-technology investment and innovation. They continue to face challenges, though. Much of the new wave of investment will go to projects that are first-of-their-kind for the businesses implementing them. This is true for solutions like clean hydrogen and carbon capture that need to be scaled fast but are complex and do not yet benefit from decades of operational experience. Getting these projects right requires companies to work in partnership – for example, to meet the decarbonisation challenges of multiple industries located in the same industrial hub, or to bring together the unique expertise of different players across the value chain of a particular climate solution.

Partnerships are a part of our approach at Macquarie and we are committed to working with carbon-intensive industries that are providing critical goods and services to the economy in support of their efforts to decarbonise, whether this involves oil fields, fossil-fuel power stations, industrial sector assets such as cement plants and steel mills, or consumer sector assets such as vehicles. We understand that in some cases, working with carbon-intensive clients and assets may see our financed emissions increase initially, whilst we deploy the transition capital and solutions needed to achieve permanent emissions reductions.¹¹

-
3. Regulatory Governance in the Mining Sector in Brazil, Recent performance of the mining sector in Brazil, OECD (accessed July 2023), <https://www.oecd-ilibrary.org>
 4. Brazil's wind energy production hits a record in 2021, gov.br, 29 March 2022, <https://www.gov.br/>
 5. Hydro secures bauxite supply in \$4.9 bln Vale deal, Reuters, 2 May 2010, <https://www.reuters.com>. Hydro Rein and Macquarie Asset Management's Green Investment Group to develop hybrid wind and solar project in Brazil, Norsk Hydro, 1 June 2022, <https://www.hydro.com>
 6. Norsk Hydro aims to reach net zero Scope 1 and 2 GHG emission by 2050 or earlier, and reduce its upstream Scope 3 GHG emissions per tonne aluminium by 30% by 2030. Annual report 2022, Norsk Hydro (2023), <https://www.hydro.com/>
 7. Annual report 2022, Norsk Hydro (2023), <https://www.hydro.com/>
 8. Hydro Rein and Macquarie Asset Management's Green Investment Group to develop hybrid wind and solar project in Brazil, Norsk Hydro, 1 June 2022, <https://www.hydro.com>
 9. Norsk Hydro ranked 3rd in 2021 and 4th in 2022 in BloombergNEF's company transition ranking of 53 major metal and mining companies. BNEF Mining Transition Scores 2022: Results and Analysis, BloombergNEF (2023), <https://www.bnef.com/>
 10. The UN [estimates](#) that 2030 emissions will be 20% lower if Unconditional Nationally Determined Contributions to the Paris Agreement are met compared to its pre-Paris scenario.
 11. For more detail, please see Macquarie's Net Zero and Climate Risk Report (2022), <https://www.macquarie.com/>

Partnerships to reduce emissions in the energy sector

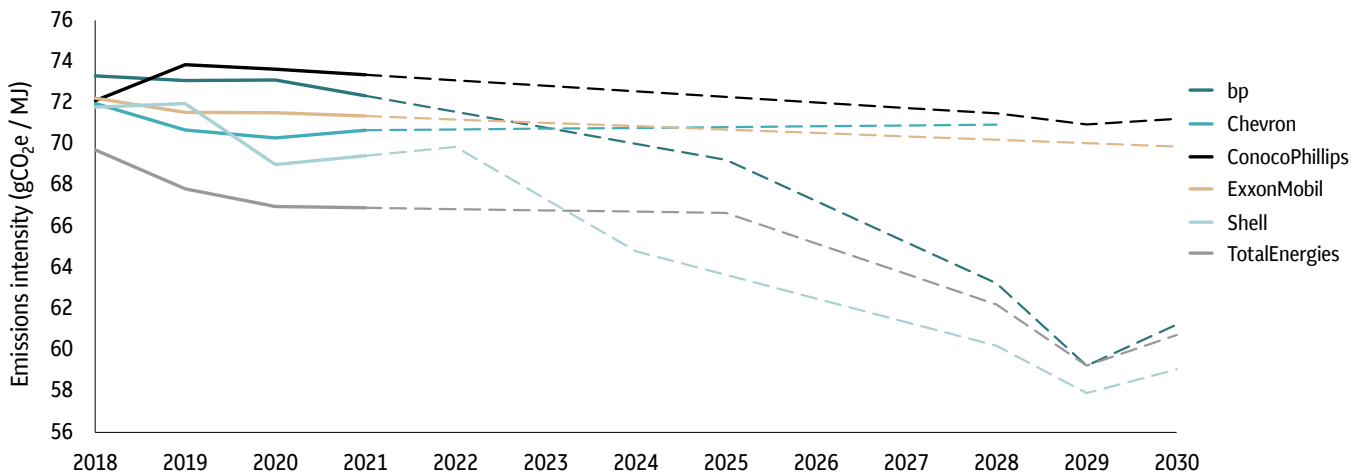
Cutting down on the energy industry’s operational emissions can play a significant role in helping oil and gas companies deliver on their decarbonisation strategy¹²

There are broadly two levers with which the impact of oil and gas consumption on climate change can be mitigated. First, energy transition investment, which enables a demand shift to clean alternatives. So far, this has primarily focussed on electrification but is increasingly moving towards clean fuels. The second is to directly reduce the emissions of oil and gas across the sector’s supply chain, from production to consumption.

Most climate scenarios foresee fossil fuel demand peaking over the coming decade before declining from around 80% of the total energy mix today to 25-60% in 2050. However, while the role of oil and gas is decreasing, it remains critical to the economy even in ambitious net zero by 2050 scenarios.¹³ Continued investment is needed to meet demand, but also to reduce the per unit climate impact of oil and gas consumption.

Before it is consumed, the extraction, transport and refining of oil and gas already generates between 10-40% of the full lifecycle emissions intensity.¹⁴ But several international oil companies have made commitments to reduce their operational emissions. For example, members of the Oil & Gas Climate Initiative (OGCI) – which includes bp, TotalEnergies and Shell – have reduced their upstream carbon intensity by 17% and their methane intensity by 44% in five years.¹⁵ Moreover, strong environmental performance and operational performance are not mutually exclusive. For example, bp announced in its 2022 full-year results that it had achieved stronger than anticipated improvements in operational reliability and commerciality across its portfolio. These operational efficiencies should contribute to greater emissions reductions than initially anticipated, with bp increasing its target reduction in operational emissions between 2019 and 2030 from 30-35% to 50%.¹⁶

Emissions intensity of energy production of select large, publicly traded oil and gas companies (reported and targeted emissions intensity)



Source: Transition Pathway Initiative¹⁷

12. According to the IEA, scope 1 and 2 emissions from oil and gas activities are responsible for just under 15% of total energy-related greenhouse gas emissions. Emissions from Oil and Gas Operations in Net Zero Transitions, International Energy Agency (2023), <https://www.iea.org/>

13. Today, the share of fossil fuels in the global energy mix is around 80% and, based on prevailing policy settings, that share would decline to just above 60% by mid-century according to the IEA. However, under the more ambitious IEA NZE Scenario or the IPCC AR6 Scenarios limiting warming to 1.5°C with limited or no overshoot, fossil fuels would account for 25-40% of primary energy in 2050. World Energy Outlook, International Energy Agency (2022), <https://www.iea.org/> (PDF) and Climate Change 2022: Mitigation of Climate Change, Working Group III, IPCC (2022), <https://www.ipcc.ch/> (PDF)

14. World Economic Outlook 2018, International Energy Agency (2018), <https://www.iea.org/>

15. OGCI Performance Data 2021, Oil & Gas Climate Initiative (accessed June 2023), <https://www.ogci.com/>

16. bp net zero ambition progress update, bp (2023), <https://www.bp.com/>

17. Oil & Gas, Transition Pathway Initiative (accessed February 2023), <https://www.transitionpathwayinitiative.org/>

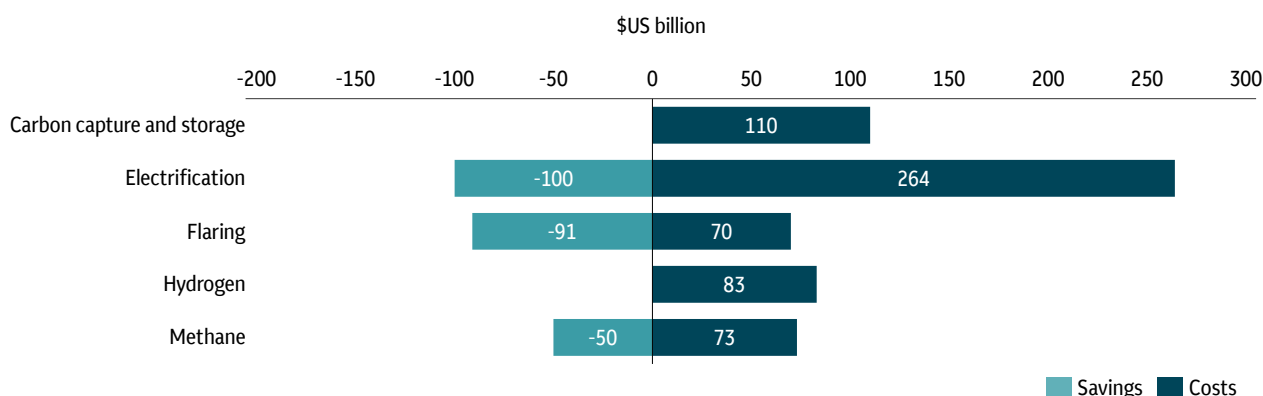
Oil and gas companies can reduce their operations' climate footprint by focussing on less carbon-intensive resources and through readily available equipment upgrades

The varying carbon intensity of different oil and gas assets reveals that climate change mitigation can be unlocked by moving to lower carbon intensity oil and gas fields. For example, emissions associated with the extraction and processing of oil from Canada's oil sands is almost twice as carbon-intensive as natural gas production and three times more carbon-intensive than conventional oil production in the rest of the country.¹⁸ As a result, several oil and gas companies have high-graded their production portfolio, focussing on assets that are both more productive and less carbon-intensive. Indeed, divestments have contributed the most to international oil companies' emissions reductions, particularly European majors. For example, 70% and 90% of bp and Shell's emissions reductions respectively have been attributed to divestments in recent years.¹⁹

Beyond focussing on lower-carbon fossil fuel reserves, one of the best opportunities available to limit the near-term effects of climate change, according to the International Energy Agency (IEA), is to limit flaring, venting and methane leaks. Indeed, gas wasted in flaring, venting and methane leaks from oil and gas operations led to around 2.7 billion tonnes of CO₂ equivalent emissions in 2021,²⁰ the same number of CO₂ emissions as the EU that year.

The IEA estimates that it is technically possible to avoid 90% of flaring using abatement technologies, such as lower-emissions equipment and vapour recovery units. Moreover, based on natural gas prices in June 2022, solutions to reduce flaring and methane emissions from oil and gas operations could be implemented at no net cost. Indeed, the outlays for the abatement measures would be less than the market value of the estimated 210 billion cubic metres of natural gas that could be made available to gas markets if non-emergency flaring were eliminated and methane emissions reduced.²¹

Achieving a 50% reduction in the emissions intensity of oil and gas operations by 2030 could require \$US600 billion in spending, but generate \$US241 billion in savings



Source: International Energy Agency, Net Zero Scenario

The technical and financial feasibility of emissions reductions has pushed policymakers to introduce stricter regulations. Under the [Global Methane Pledge](#), 150 countries have committed to reducing methane emissions by 30% over 2020-2030. The US has reinforced its pledge with a national commitment to reduce methane emissions by 87% between 2005 and 2030, underpinned by a charge on methane which will come into effect in 2024.²² The European Parliament also voted on the first EU-wide legislation aimed at cutting methane emissions in oil, gas and coal. The legislation, which is expected to be adopted into law in 2024, imposes stricter requirements to detect and repair methane leaks, and Members of the European Parliament (MEPs) urge the European Commission to establish a binding 2030 methane reduction target.²³

18. Emissions from oil sands mining, extraction, on-site production and upgrading amounted to 80.8 MtCO₂e in 2020, while the production of natural gas and conventional oil emitted 44.2 MtCO₂e and 25.4 MtCO₂e respectively that same year. Canadian Environmental Sustainability Indicators: Greenhouse gas emissions, Environment and Climate Change Canada (2022), [https://www.canada.ca/\(PDF\)](https://www.canada.ca/(PDF))

19. bp reduced its Scope 1 and 2 emissions by 22.5MtCO₂e between 2019 and 2022, of which 16MtCO₂e came from divestments. Similarly, 22.9MtCO₂e out of 25MtCO₂e of Shell's emissions reductions between 2016 and 2022 were attributed to divestments. Oil and Gas Divestment Trends 2022: Divestment Dropped, BloombergNEF (2023), <https://www.bnef.com/>

20. The energy security case for tackling gas flaring and methane leaks, International Energy Agency (2022), [https://www.iea.org/\(PDF\)](https://www.iea.org/(PDF))

21. CO₂ emissions in selected advanced economies 2000-2021, International Energy Agency (2022), <https://www.iea.org/>

22. Inflation Reduction Act Methane Emissions Charge: In Brief, Congressional Research Service (2022), <https://crsreports.congress.gov>

23. Fit for 55: MEPs boost methane emission reductions from the energy sector, European Parliament (accessed June 2023), <https://www.europarl.europa.eu/>



Utilising stranded gas for power generation

Macquarie structured an operating lease for a fleet of mobile gas turbines for an oilfield electrification services provider, to recover gases released during extraction processes. The turbines generate reliable electricity from stranded gas that would otherwise be flared or escape, eliminating the need to operate costly, high emissions diesel generators in areas without reliable access to grid power, while reducing operational emissions and particulate pollution.

The oil and gas sector already has the capabilities needed to scale up carbon capture, utilisation, and storage

Fatih Birol, Executive Director of the IEA, describes the value of carbon capture and storage (CCS) as “inescapable”, given its capacity to reduce and remove emissions in even the most carbon-intensive sectors.²⁴ Following a period of significant slow-down in activity between 2010-2019, global carbon capture capacity reached just over 40 million tonnes of CO₂ equivalent per annum at the end of 2022, with a growing pipeline of 107 million tonnes per annum of capacity in construction or advanced development.²⁵ However, this still falls short of the levels of CCS deployment needed to decarbonise the global economy according to climate scenarios – the IEA’s most recent net zero scenario relies on 6.2 gigatonnes by 2050.²⁶

Energy companies are particularly well placed to play a role in the scale-up of CCS. The technology can be leveraged at various stages of the oil and gas value chain, for example during natural gas processing, at liquefaction facilities or in refineries. Further, the sector possesses the technical expertise required, having used carbon capture in enhanced oil recovery for decades.

The policy landscape is also starting to shift favourably. The US and Canada have introduced generous tax credits to deploy CCS, and strict emissions targets and taxes, which will likely spur investment. Europe has followed suit with CCS standards for energy companies, and public grant and loan programs. This will complement its well-established carbon market, which recently broke the €100 per tonne of CO₂ mark, a price that should be sufficient to incentivise CCS across several heavy industries.²⁷



Investing in a pioneering carbon capture business

Macquarie has invested in Storegga, a UK-based independent, international developer of CCS, hydrogen and direct air capture (DAC) projects. It is best known as the lead developer of the Acorn CCS and Acorn Hydrogen projects, which are some of the UK’s most advanced CCS initiatives. Storegga is also partnering with Talos Energy to develop a CCS project in Louisiana and recently signed a memorandum of understanding with Malaysian national oil company Petronas to explore collaborating on CCS and related projects, including DAC, in Malaysia and internationally.

[Read more](#)

Oil and gas companies are increasingly committing to playing a leading role in the energy transition

Beyond reducing the emissions intensity of their operations, energy companies are increasingly tackling their climate impact by evolving their strategy and diversifying into clean energy. Some have chosen to undertake their transition rapidly, such as Ørsted - now the world’s largest developer of offshore wind. Others, such as bp, Shell and TotalEnergies, are taking an ambitious but gradual approach.

24.The world needs to build on the growing momentum behind carbon capture, International Energy Agency (2020), <https://www.iea.org/>

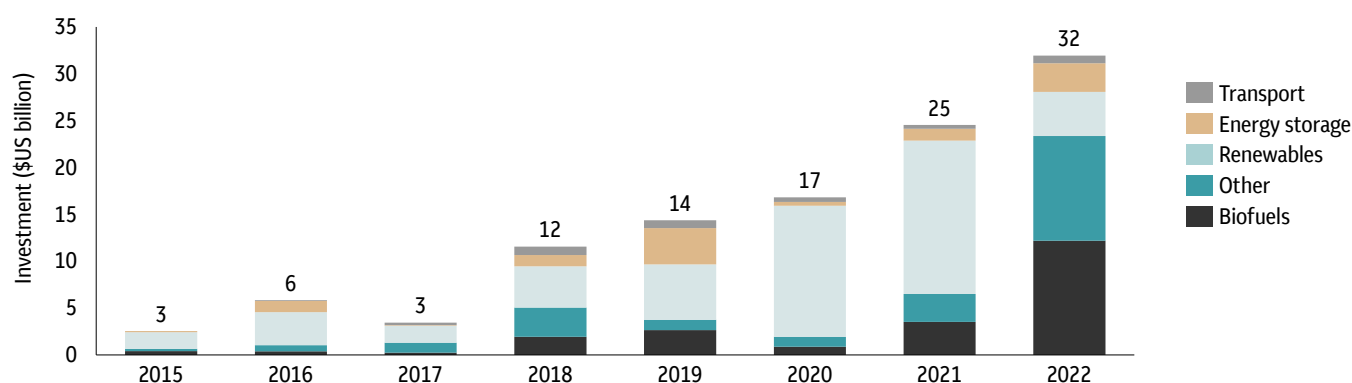
25.Global Status of CCS, Global CCS Institute (2022), <https://status22.globalccsinstitute.com/>

26.World Energy Outlook 2022, International Energy Agency, <https://www.iea.org/>

27.Rystad estimates that most CCS projects will reach cost parity between \$US75-100 per tonne of CO₂ by 2030, taking into account existing projects in the pipeline and an estimated carbon price of \$US100 per tonne. High carbon prices spurring Europe’s CCS drive, Upstream Online (accessed June 2023), <https://www.upstreamonline.com/>

Recently, oil and gas players have doubled down on their commitment to low-carbon solutions in the context of high energy prices and record financial results. Large oil and gas companies are increasingly utilising revenues generated from their core operations to finance their expansion into renewables and power. There is a clear shift from European oil majors in particular, who are expected to allocate a third of their capex to renewable and power businesses by 2030.²⁸ Equinor plans to increase the share of gross capex on low-carbon solutions from 4% in 2020 to 50% by 2030, while it plans to reduce the share from oil and gas from 96% in 2020 to less than 50% by 2030.²⁸ Whilst these European majors still leave some room to adjust their oil and gas production targets to respond to market dynamics, their investment into low-carbon technologies has continuously accelerated and increased significantly in recent years, making them an important contributor to the energy transition.

Annual energy transition investment by large publicly traded and national oil and gas companies²⁹



Source: BloombergNEF

As solar and wind have become cost competitive and commercially available – particularly offshore wind – an increasing number of oil and gas players have entered the market, developing projects themselves or acquiring stakes in renewable companies and projects. Thanks to technological advances, wind farms are being pushed further offshore where wind speeds are better – with capacity projected to grow substantially, from around 63 GW of installed capacity in 2022 to 519 GW in 2035.³⁰

The importance of offshore wind in a low carbon world is clear,³¹ and it is also a sector that is particularly attractive for oil and gas companies. Indeed, they already possess expertise in developing offshore assets, and there are synergies to take advantage of with green hydrogen production.



Partnering with energy players on offshore wind

Macquarie works with a range of energy players to accelerate the deployment of offshore wind projects around the world, including pioneering projects in new markets, floating offshore wind and hybrid projects linked to green hydrogen production.

Our portfolio company Corio has partnered with TotalEnergies on a number of projects around the world. The partners have around 6 GW under development across Korea, England, Scotland and France covering both traditional fixed-bottom, and innovative floating offshore wind technologies.

[Read more](#)

28. BloombergNEF includes the following companies in its list of European oil majors: bp, Shell, TotalEnergies, Equinor, Eni, and Repsol. Renewables Are No Match for Big Oil's Fossil Fuel Profits, BloombergNEF (2022), <https://www.bnef.com/insights>

29. Includes deals made by bp, Chevron, CNOOC, ConocoPhillips, Ecopetrol, Eni, Equinor, ExxonMobil, Galp, Neste, Occidental, Petrobras, Petronas, Repsol, Shell, and TotalEnergies amongst others.

30. 2H 2022 Offshore Wind Market Outlook, BloombergNEF (2022), <https://www.bnef.com/insights>

31. According to the IEA, offshore wind is expected to grow rapidly in the coming years as deploying turbines at sea takes advantage of stronger winds. The IEA estimates that in its NZE Scenario offshore wind accounts for more than 20% of the over 400GW of wind additions. World Energy Outlook 2022, International Energy Agency (2022), [https://www.iea.org/\(PDF\)](https://www.iea.org/(PDF))

Energy players can play a pivotal role in the scale up of green molecules

Though renewable energy will continue to bring significant opportunities, the sector is extremely competitive. Profit margins for clean-power projects are typically stable but compressed, and lower than the returns on capital usually delivered in oil and gas. But other emerging areas of the transition offer potentially higher return profiles and unique advantages for energy companies to complete their transition strategy beyond investing in renewables.

In the near - to medium-term, green molecules, molecules made from renewable sources typically hydrogen or biomethane, can be used to decarbonise the sectors that cannot electrify fully or cheaply, many of which are already major customers of the oil and gas sector. This proximity to their clients, specifically in large industrial sites, offers not just the opportunity to decarbonise their assets, but also to contribute to the wider decarbonisation of these sites. Refineries and pipelines can be repurposed to process and distribute clean fuels to nearby industries, attracting investment into the clean energy supply required by the industries that are amongst the hardest to decarbonise.



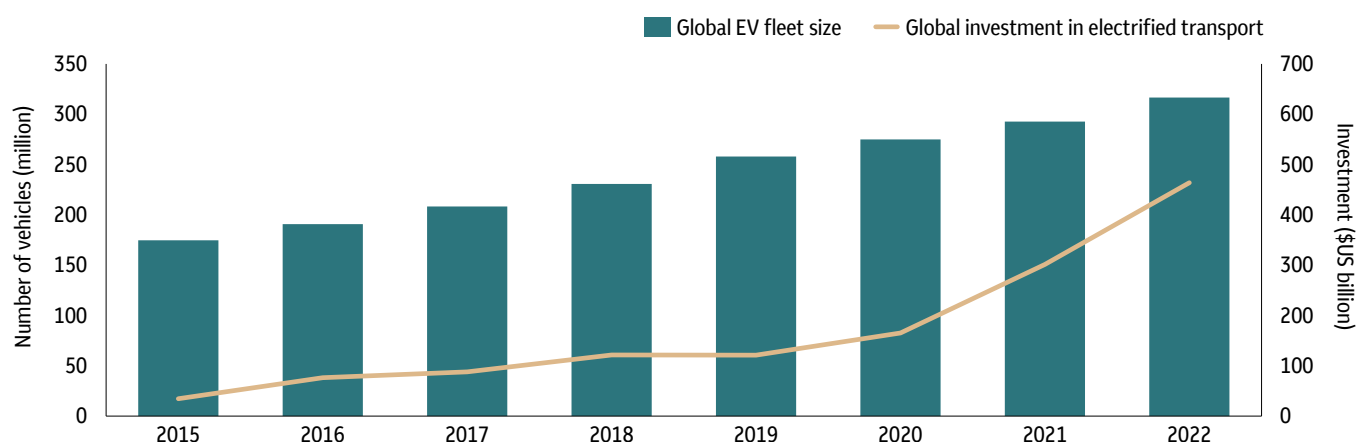
Creating a clean energy and industry hub in Western Australia

Alongside bp, CWP Global and Intercontinental Energy, we are developing the Australian Renewable Energy Hub (AREH), a clean energy project to be situated on a 6500 square kilometre site in the Pilbara region of Western Australia. It aims to develop up to 26 GW of combined solar and wind power generating capacity, in multiple phases, and produce around 1.6 million tonnes of hydrogen or 9 million tonnes of green ammonia per year. The project intends to supply renewable power to local customers in the world's largest mining region, with green hydrogen and green ammonia produced for the domestic Australian market and for export.

The oil and gas sector is key to delivering the charging infrastructure needed to meet surging EV sales

Electrified transport is the fastest-growing sector of the transition in terms of annual investment and is on track to becoming the largest from 2023.³² However, maintaining momentum in electric mobility requires continued investment in the roll-out of charging solutions for personal and commercial vehicles. In 2022, investment in electric mobility reached \$US466 billion, close to the \$US495 billion invested in renewables, but just over 6% was spent on charging infrastructure.³²

Global EV fleet size and electrified transport spending³³



Source: BloombergNEF

32. Investment in home and public charging amounted to \$US29.9 billion in 2022. Energy Transition Investment, BloombergNEF (accessed June 2023), <https://www.bnef.com/>

33. Global fleet size includes passenger EVs, e-buses, commercial EVs and electric 2-3 wheelers, and electrified transport spending includes investment passenger EVs, e-buses, commercial EVs, electric 2-3 wheelers, public and home charging.

Here too, the oil and gas sector can leverage decades of experience providing fuel to clients at gas stations or directly at commercial customers' operations. Installing EV charging points at these locations will serve a rapidly growing consumer base and leverage the existing commercial footprint. Several oil majors including Shell and bp have accelerated their efforts in this space by acquiring or partnering with EV charging companies to roll out charging points, including fitting new points at their fuelling stations.³⁴



Accelerating the rollout of the UK's charging infrastructure

Macquarie is accelerating its investments in the enablement of e-mobility, including along the motorway network to enable longer journeys. For example, in 2022, we acquired Roadchef, a leading UK motorway service area operator with 30 locations across the UK, serving over 52 million customers a year. We intend to support Roadchef to develop and accelerate the rollout of fast-charging infrastructure for electric vehicles across its estate. Roadchef plans to work with partners to quickly scale up the number of chargers across its facilities, and is exploring the potential for onsite renewable energy generation across its sites.

[Read more](#)

Supporting hard-to-abate sectors to decarbonise

Carbon-intensive industries have been collectivising their efforts to tackle net zero

To date, energy companies have faced the greatest pressure to decarbonise, both from governments and civil society. This has pushed them to commit to ambitious strategies and make significant investments in climate solutions far earlier than other sectors. However, changing consumer expectations, technological progress and the urgency of the climate crisis is spurring action in other industries – including steel, aluminium, chemicals, shipping, agriculture and aviation.

Indeed, the decarbonisation of high-emitting corporates is set to be a key focus of this year's COP28. Sultan Al Jaber, COP28 President, has said that "there is simply no path to net zero that does not include decarbonising these essential industries."³⁵ This has led to a rise in coordinated action, both public and private. For example, the Breakthrough Agenda, a coalition of 45 governments, is developing a 12-month action plan on the decarbonisation of steel. Other industry-wide initiatives have emerged, such as the First Movers Coalition for hard-to-abate sectors, the Sea Cargo Charter for shipping, and the Aluminium Stewardship Initiative. These aim to set industry standards and provide transition frameworks.

Despite the optimism as carbon-intensive industries speed up their net zero efforts, the majority are still at the very beginning of their journeys. Leveraging partnerships will therefore be critical to accelerating progress, starting with the increasing use of clean energy.

Establishing long-term portfolio solutions can help meet corporate demand for clean energy

The consumption of fossil fuels for power remains a significant source of emissions for most large businesses today, especially in manufacturing and industry. The rapid fall in the cost of renewables combined with the increasing sustainability goals of businesses have led to a surge in corporate power-purchasing agreements (PPAs) – the market grew from 4.7 GW of capacity contracted in 2015 to 36.7 GW in 2022.³⁶

However, with demand surging, clean energy suppliers are struggling to build capacity at the scale and pace required, putting corporate sustainability targets at risk. For example, the 390 RE100 members that have pledged to procure or offset 100% of their electricity demand with clean energy will need to purchase an additional 290 TWh of renewable electricity by 2030 to meet or maintain their targets.³⁷ This is more than twice the volume they have contracted to date.

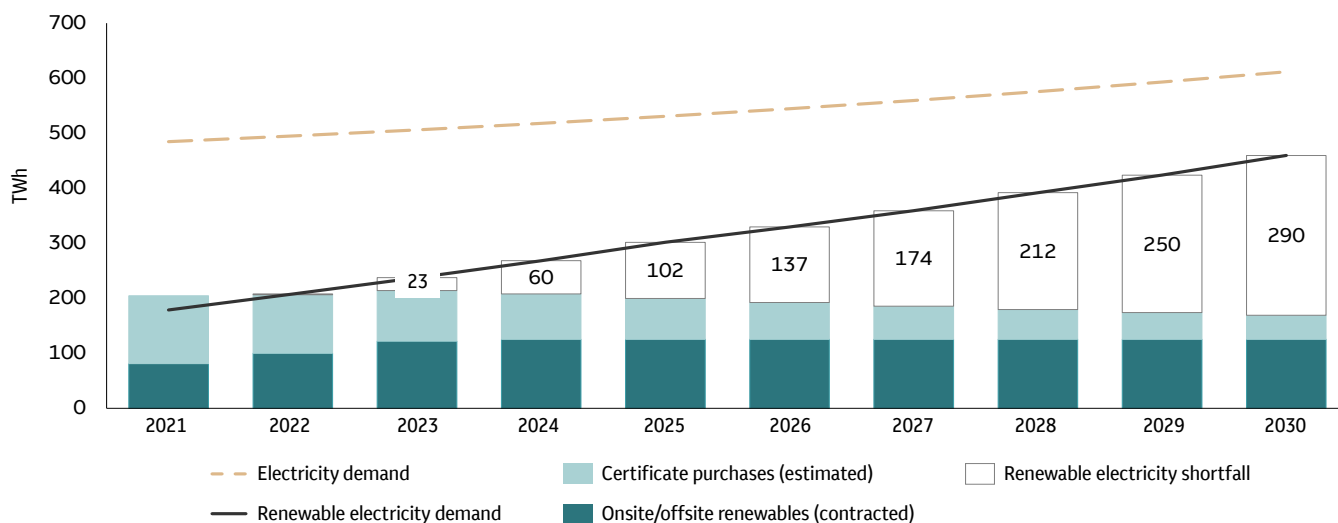
34. Big Oil Turns to EV Charging to Defend Fueling Revenues, BloombergNEF (2022), <https://www.bnef.com/insights>

35. COP 28 Primer: 'Hard-to-abate industries expect decarbonisation budgets to rise over next 3 years', Zawya (2023), <https://www.zawya.com>

36. Corporate PPA Deal Tracker April 2023, BloombergNEF (2023), <https://www.bnef.com/insights>

37. RE100 Data Viewer 1H 2023: Back on Track, BloombergNEF (2023), <https://www.bnef.com/insights>

Projected renewable electricity shortfall for RE100 members



Note: As of January 2023

Source: BloombergNEF

To overcome this bottleneck, a growing number of companies are moving beyond PPAs and choosing to invest directly in the development of purpose-built clean energy capacity and/or purchase stakes in existing assets. Electrifying a site with renewable energy directly, particularly hybrid renewable-storage projects, often has the added benefit of reducing operating costs, particularly for sites that would require large investments to connect to the grid, such as far-removed mines.

Meanwhile, large corporates with significant energy demand that cannot build clean energy directly on site can partner with project developers to build a pipeline of grid connected renewable assets. This enables them to secure zero carbon electricity to offset against their consumption, while also investing in an asset whose value may appreciate.

Corporates in these high emission industries can work with partners that have significant expertise in developing, investing, and marketing clean-energy projects around the world to find the right solution for their consumption profile. For example, a company may need to combine large-scale and smaller on-site clean energy assets, clean fuels, and electrification to meet its various energy needs. This expertise is particularly relevant in the current context as countries introduce incentives and regulations to attract new supply chain investments in critical industries.



Supporting the low-carbon transition in Brazil

Macquarie has developed a long-term partnership with Norsk Hydro, initially developing and structuring several PPAs for the aluminium company and is now working with the company's renewable entity, Hydro Rein, to develop new renewable projects. Since 2021, this partnership has enabled the development of 1.3 GW of renewable energy capacity, combining Macquarie's wind and infrastructure experience with Hydro's energy market expertise.

Most recently, Macquarie and Hydro Rein formed a joint venture to build and operate a 586 MW combined wind and solar power project in Brazil. The project will supply 100% of the electricity required for Hydro Rein's bauxite mine Paragominas and will further reduce carbon emissions from Hydro Rein's Alunorte alumina refinery, by enabling the switch away from coal boilers by 2030. The project will be an important enabler to reach Hydro's target to reduce its emission by 30% by 2030.

[Read more](#)

Improvements in distributed clean energy technologies are enabling on-site generation

Over the last decade, solar generation has surged as technologies have matured, making it the most widespread form of on-site renewable power. The flexibility of project structuring and strong cost declines – around a 70% fall in the US since 2010³⁸ – have made on-site solar generation an attractive solution for businesses. For one, it can help protect against volatile electricity prices. On-site solar stabilises energy costs as companies reduce their exposure to retail electricity rates and, in most jurisdictions, offers the potential to sell off excess power generated back to the grid. Moreover, when teamed with storage, on-site solar provides even greater flexibility, helping protect operations against demand charges.

The financing solutions have also improved, with a range of structuring options. Businesses can opt to finance the installation themselves, often realising tax benefits, or partner with a solar developer by contracting an on-site PPA, which avoids upfront capital costs. In both cases, the cost of the energy produced is often lower than the retail electricity rate.



Supporting businesses with flexible power generation

We have launched and supported a range of businesses across the world to help corporate and industrial consumers decarbonise their operations. For example, Clean Max has installed over 550 rooftop solar projects totalling 1 GW+ for companies across India, the UAE and Thailand.³⁹ Blueleaf Energy also provides large-scale corporate PPAs from solar and wind, and customised renewable energy solutions in countries such as Japan, Malaysia and Vietnam. Calibrant Energy, a joint venture between Siemens and Macquarie, also provides a variety of energy solutions including solar, storage and microgrids for commercial and industrial customers in the US.

Clean fuel supply must scale up to meet growing demand and policy expectations

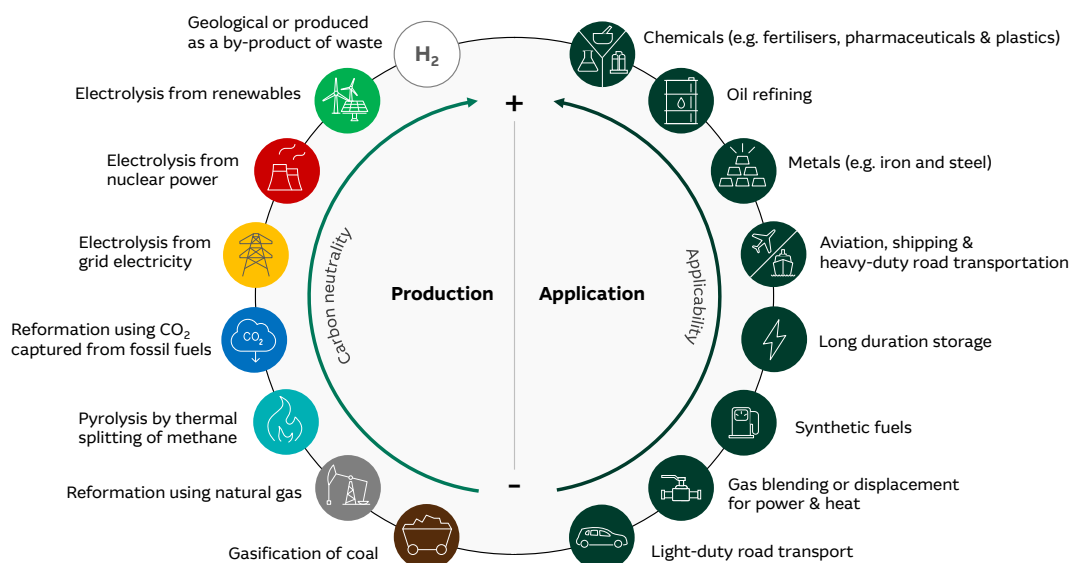
Like the oil and gas sector, industrials are starting to turn to green molecules to achieve their decarbonisation goals as they cannot readily rely on electrification to generate high temperatures in their processes or power airplanes or container ships, for example. As a result, there is growing focus from industry and policymakers to accelerate the production of clean fuels like biomethane and clean hydrogen. Policies aimed at accelerating the transition to a low-carbon economy, such as the US Inflation Reduction Act or the EU's RePowerEU, have made new funding available that will accelerate investment in the production of green molecules.

But there is still considerable complexity around these solutions, which means that broad stakeholder alignment will be critical to the scale up of the sector. Green hydrogen or CCS projects often require a holistic approach, as they involve a diverse network of assets and businesses, whereas traditional renewables can rely on well-established electricity markets. Cross-sector partnerships can unlock synergies by leveraging the expertise and infrastructure of different companies across the value chain, but also help bridge capital gaps given the significant investments required for these projects.

38. The average price of a commercial PV system in the US was \$US1.66 per Watt in 2022, down from \$US5.92 per Watt in 2010. U.S. Solar Industry Research Data, Solar Energy Industries Association (accessed July 2023), <https://www.seia.org>

39. For more information, please see the [Clean Max](#) website

The many ways of producing and using hydrogen will require a plethora of partners to scale this technology



Source: Macquarie

These partnerships are most valuable when enabling the transition of industrial hubs, as they usually offer economies of scale, concentration of demand and know-how, and the opportunity to repurpose existing infrastructure. Hub concepts are emerging in various countries where there are clusters bringing together industrial gas, steel, chemical or mining companies in decarbonising their operations such as Teesside in the UK, the Pilbara in Australia or the Gulf Coast in the US.



Joining forces to form a leading industrial green hydrogen player

We have partnered with Nobian to form the Hydrogen Chemistry Company (HYCC), a Macquarie fund portfolio company. [HyCC](#) is specialised in water electrolysis to produce green hydrogen from renewable power at an industrial scale and has already worked with a range of partners to develop hydrogen projects in Europe, including the H2-Fifty project in the Netherlands. H2-Fifty will be the cornerstone of the hydrogen vision of the Port of Rotterdam and will be one of Europe's largest green hydrogen production facilities. The planned electrolyser is expected to produce 20,000 to 30,000 tonnes of clean hydrogen per year, helping bp's Rotterdam refinery to replace all the grey hydrogen it imports today, as well as provide a low-carbon feedstock and residual heat to other industrial facilities in the area.

[Read more](#)

Decarbonisation of vehicle fleets can deliver emissions reductions in the near term

Transport, namely vehicle fleets, can be another source of emissions for commercial and industrial players. Companies are therefore increasingly looking at decarbonising their fleets, ranging from light vehicles and trucks to tugs and forklifts. The two technologies to achieve this - EVs and fuel-cell vehicles - already exist and are becoming increasingly cost competitive, setting the stage for the rapid adoption of clean vehicles by corporates within this decade.

The switch to a clean fleet requires significant upfront investment in new vehicles and charging infrastructure, but EVs are typically cheaper to maintain and operate in the long run as companies save on fuel costs. The opportunity to offset upfront costs with a reduction in operating costs is fostering a growing range of financing solutions to facilitate the transition to EVs. This includes fleet and charging-as-a-service solutions, which offer subscription-based EV packages to help companies manage a mixed fleet as they transition to clean vehicles, or fleet charging management systems, to optimise charging times and benefit from lower electricity costs.



Accelerating the electrification of medium and heavy-duty transport

We are providing and supporting commercial clients with e-mobility solutions across the globe. In the US, we are supporting the deployment of EV fleets and charging infrastructure through Macquarie fund portfolio companies Inspiration Mobility and Calibrant Energy. Inspiration Mobility is the world's first sustainable infrastructure platform exclusively dedicated to accelerating the electrification of transportation, while Calibrant Energy is providing charging solutions for corporate fleets. In India, we are leading the development of a new blended finance platform with a focus on e-buses, shared fleets and charging infrastructure. We also recently launched Fleete, a new electric vehicle infrastructure business to help operators of commercial fleets become fully electric. Fleete's offering aims to help companies in Europe accelerate their transition by providing a one-stop-shop for charging infrastructure and optimisation.

[Read more](#)

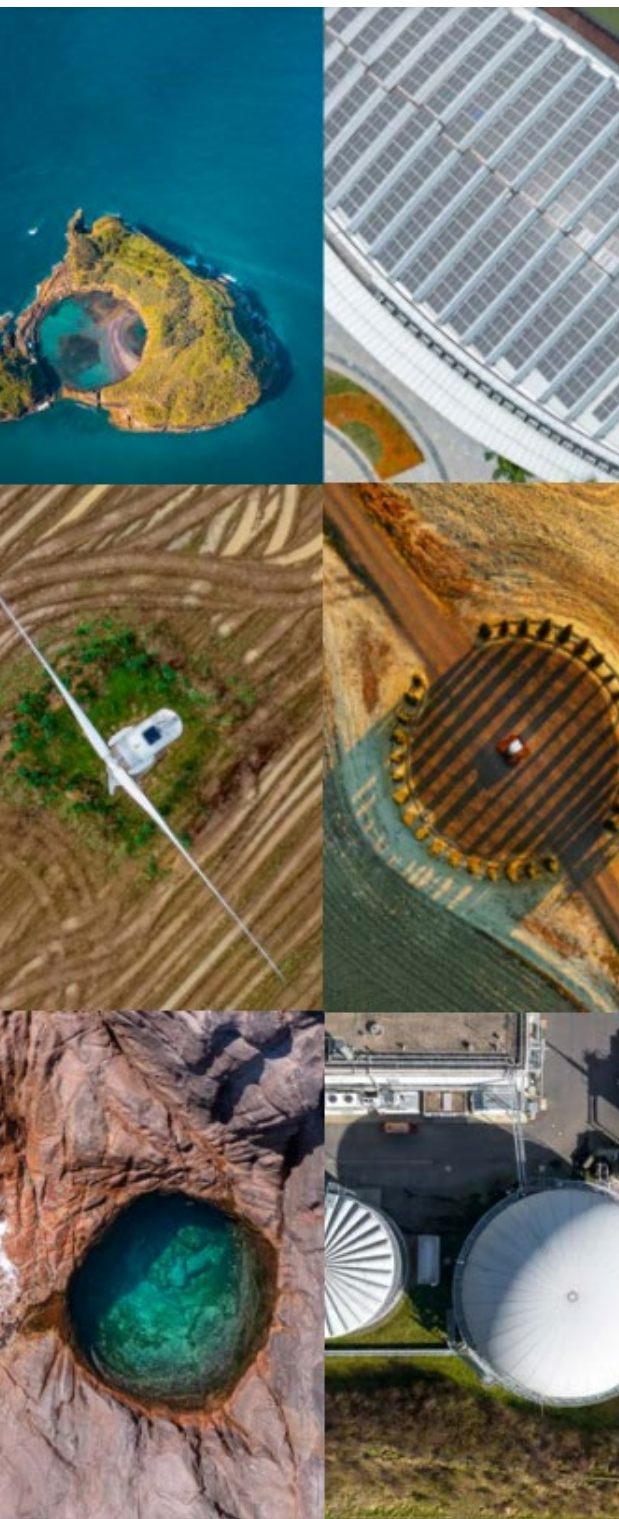
Working with other financial institutions to deliver net zero

To reach net zero, financial institutions must support their clients and portfolio companies' transition

Delivering the transition to a low-carbon economy requires the mobilisation of private finance at an unprecedented scale and speed. As the main providers or intermediaries of capital, financial institutions have a critical role to play in supporting this transformation.

Financial actors that focus solely on divestment and phase-outs of high-emitting activities fail to leverage the influence they have as advisors, assessors, partners and sponsors of their clients' projects and strategies. Global emissions are often concentrated in parts of the economy that typically rely on financial institutions to secure capital, such as energy companies and their power plants or oil fields, maritime companies and their ships, or consumers and the buildings and cars they own.

The introduction of more detailed climate targets across countries, increasingly including sector-level and nearer-term goals, is helping the financial sector work with its clients on identifying suitable transition strategies and ways to fund them. For example, EU initiatives such as the taxonomy for sustainable activities, the Industrial Emissions Directive, and the 2035 zero emissions from new cars target, provide visibility to financial institutions and clients on their transition journey. Industry associations have also stepped up their roles as climate standard setters where national targets are out of scope, as seen with the adoption of net zero goals by the aviation and shipping sectors in recent years. Together, these trends are enabling a growing number of financial actors to commit to their own net zero plans and ramp up their efforts to support the transition of their clients.



Macquarie's climate strategy and net zero commitment

Macquarie has been driving practical climate solutions for almost 20 years, with our first investments in renewables dating back to 2005. Since then, we have evolved our approach year-by-year, building capabilities to support the global transition to net zero.

Macquarie's climate strategy is built around four areas of action that reflect our focus on leveraging our core capabilities to drive positive and practical climate solutions:

1. Increase our investment in climate mitigation and adaptation solutions
2. Strengthen our support for clients and portfolio companies to help achieve their decarbonisation ambitions
3. Continue to reduce the emissions of our own business operations
4. Align our financing activity with the global goal of net zero emissions by 2050.

In 2022, Macquarie released its first combined Group [Net Zero and Climate Risk Report](#), which includes the introduction of physical emissions intensity reduction targets covering our equity and lending exposure to the oil and gas sector and motor vehicles. In line with the Net Zero Banking Alliance (NZBA) Guidelines, financed emissions are limited to our on-balance sheet lending and equity investment activities.⁴⁰

For coal, we set an absolute emission reduction target based on our pre-existing commitment to run-off our limited remaining on-balance sheet lending and equity exposure to coal companies by 2024.⁴¹ These targets are in addition to Macquarie Asset Management's announced plans to manage and invest its portfolio in line with global net zero emissions by 2040.

For our own business operations, we have committed to net zero emissions across Scope 1 and 2 by FY2025.⁴² We are also developing methods to measure and track emission reduction strategies across our own business operations Scope 3 emissions and developing Scope 3 operational value chain emission reduction targets aligned to science.⁴³ Since FY2010, Macquarie has been offsetting its Scope 1, Scope 2, and Scope 3 business travel emissions, and we are committing to continue offsetting residual Scope 1 emissions, purchasing 100% renewable electricity to cover Scope 2, and offsetting Scope 3 business travel emissions beyond FY2025.⁴⁴

Macquarie's net zero approach is informed by guidance of several international climate initiatives, including the Glasgow Financial Alliance for Net Zero, the Net Zero Banking Alliance, the Sustainable Markets Initiative and the Task Force on Climate-Related Financial Disclosures.

40. This refers to on-balance sheet lending and equity investment activities, excluding on-balance sheet securities held for client facilitation and market-making purposes (as opposed to held for investment). Lending refers to loan assets held at amortised cost and excludes certain items such as leasing, asset finance, trading assets and short-term financing (e.g., inventory finance). Note, for motor vehicles, we have also included novated leases, given availability of both methodology and data.

41. Given computational challenges associated with revenue shares (particularly in a world of high and volatile coal prices), we define a coal company as one that derives the majority (i.e., more than 50%) of its revenue from coal (both thermal and metallurgical) production, mine ownership or operation, or coal-fired power station ownership or operation. Refer to the Macquarie's most recent Net Zero and Climate Risk Report for further details.

42. When we refer to 'net zero' in relation to our own business operations Scope 1 and 2 emissions ambition, we are informed by recommendations from the SBTi Corporate Net Zero Standard, Draft Net Zero Banking Alliance Offsets Position Paper and The Oxford Principles for Net Zero Aligned Carbon Offsetting.

43. Scope 3 emissions included in our own business operations emissions relate to Categories 1-8, as defined under the Greenhouse Gas Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard.

44. In FY2022, the calculation of business travel emissions was expanded beyond air travel to include hotels, ground transportation (excluding rail) and food & beverages, and the calculation of air travel emissions was also refined to reflect the class of ticket flown (e.g., economy, business class).

Partners in progress

Our experience at Macquarie has shown us the value of collaborating with industry leaders, combining our expertise with flexible capital and technology solutions that deliver sound business outcomes and emission reductions. The set of technologies that need to be scaled up to deliver the transition is increasingly clear. The focus can now shift to the cross-sectoral business partnerships that can help accelerate the implementation of these solutions across complex value chains, with a focus on competitiveness and value preservation.

From the oil and gas sector to the heavy goods and chemical manufacturers, the businesses at the forefront of these industries are well placed to retain and further establish their leadership by accelerating their investment in decarbonisation and repurposing their assets, in line with tightening climate policy and growing consumer demand for sustainably produced goods.

While the actions of individual institutions are important, they are more powerful when pursued with partners. The global transition to net zero will demand strong partnerships between financial institutions and clients, between the private and public sectors, and with communities, whose ongoing support for this unprecedented global transition is critical. That's why Macquarie is committed to playing a leading role in the global transition to net zero emissions by strengthening these partnerships and supporting our clients and portfolio companies on their decarbonisation journeys.

Read more about our activity at macquarie.com/climate

Contact us



ciu@macquarie.com

Kate Vidgen

Executive Director
Macquarie Asset Management

Raphaëlle Johnston

Manager
Macquarie Climate Intelligence Unit

Janet Dietrich

Executive Director
Macquarie Commodities and Global Markets

Nicholas Gole

Executive Director
Macquarie Capital

Dario Traum

Associate Director and Team Lead
Macquarie Climate Intelligence Unit