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Energy Transition Report 2025

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Climate change goals for 2030 are achievable but acceleration needed

The United Nations' recently released report updating progress on Paris climate goals between January 2024 and September this year makes for sobering reading.

On the one hand, the body notes that ten years on from the adoption of the Paris Agreement, this 2025 nationally determined contribution (NDC) synthesis report provides new indications of real and increasing progress on actions to address climate change through national efforts underpinned by global cooperation.

Further the document noted the "new NDCs show a progression in terms of quality, credibility and economic coverage, with 89% of Parties [to the Paris Climate Accords] communicating economy-wide targets compared with 81% in their previous NDCs."

However, in a widely reported caveat, the UN also warned that "major acceleration is still needed in terms of delivering faster and deeper emission reductions and ensuring that the vast benefits of strong climate action reach all countries and peoples."

So A for effort, C-ish for execution, from the UN's perspective. The report did not mention another key event in the world's adaption to hard 2030 decarbonisation milestones. And that is a speech in September by the president of the United States addressing the hallowed company of a UN assembly in which Trump declared climate change as a con. The president referred to the notion of carbon footprint as "a hoax made up by people with evil intentions."

Uncertainty prevails but one basic truth remains: companies and governments alike are racing to meet 2030 climate goals. Five years is a speck in time when the goal 60 months hence is to bring down greenhouse gas emissions by 55% from 1990 levels.

Against this backdrop of set-in-stone deadlines clashing with climate-change scepticism, fund and asset managers, as well as lenders, are facing the head-spinning pace of change and focusing on the basics.

When considering their own role in supporting the global drive to make strides towards net-zero, these parties are zeroing in on the more niche areas such as sustainable aviation fuel (SAF) and decarbonisation of remote mining operations.

The more niche and the newer the technologies, the greater the need for upfront funding. Transitioning to SAF is not a matter of slipping a couple of gallons of sustainable fuel into the engine of a Boeing. Decarbonisation of mining extends beyond automation of dirty, laborious processes.

In the area of critical minerals, international partners are also bumping up against the political significance of these resources. To counter Mother Nature's decision to concentrate so much of world reserves in China, high-tech developers in Europe and the Americas are diversifying supply chains and trying to keep ahead of the ever-shifting landscape of tariff and export controls imposed by the US and China.

Shifting the balance of power away from China's dominance in the sphere of processed and raw critical materials is, if not Herculean, at least complex.

Systems for self-reliance will require more than leaps of faith. Funding, planning and international cooperation will all be part of the deals, which are hardening, softening and changing in real time.

Projects that cover the infrastructure and technology to test out greener ways of doing business don't come cheap and sourcing the raw materials is often an international adventure. Tariffs imposed by the US are yet another hurdle to be overcome.

Coal is one of the world's great polluters and many in the field are working to counter the fugitive methane emissions that represent 75% to 80% of the greenhouse gases linked to the mining of coal.

What is less obvious is how to make other types of mining less polluting. Again, sector players have been rallying ideas and money to work on technologies that can make the cleaner mining activities even greener.

In Europe, the infrastructure sector is awash with programmes that rely on newer tech, such as modular construction, to ensure that the development of vital buildings such as data centres, hospitals and schools serve the population that needs the facilities. They are also working hard to incorporate the most environmentally friendly tools into the supply and construction of these key structures.

As the UN report pointed out, 42% of parties [to the Paris Climate Accord] "underscored the private sector's role in innovation, including the development, transfer and deployment of low-carbon technology, with 22% of parties specifically noting micro-, small and medium-sized enterprises, start-ups and entrepreneurs as drivers of low-carbon development, innovation and green job creation."

The next five years promise to offer more exciting technical and scientific initiatives. The question is can these be adopted and implemented sufficiently quickly enough to make a meaningful contribution to cooling the planet.

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Critical minerals rise to the surface of the geopolitical plane

Critical minerals have moved from a niche policy issue to a central geopolitical strategy. Scarcity, geographic concentration and provenance weigh in as much as industrial necessity.

Many nations today agree they need to take the reins of production, processing and import of these minerals. The US, in particular, has produced a raft of domestic policies that are impacting markets worldwide.

Countries, particularly in the west, are scrambling both technically and politically to ensure supplies of these minerals flow easily from source to processing and onwards to manufacturers. Critical minerals security is increasingly a key issue for many countries and those concerns are influencing the mainstream metals sector.

The first step in shifting sector balance is to determine what is critical. A US draft list of critical minerals, released in August, contains more than 50 items, both commodities and minerals predominantly produced as by-product. Coal is also on the list based on an executive order from April.

Like the US, the UK has redefined what resources it considers as 'critical minerals'. Of greatest import, the UK has said, are antimony, bismuth, cobalt, gallium, graphite, indium, lithium, magnesium, niobium, palladium, platinum, rare earth elements, silicon, tantalum, tellurium, tin, tungsten and vanadium.

Under President Biden, and much more so with the current administration, the US has taken concrete steps to reshape flows of capital and supply. The second Trump administration made critical minerals a key priority from the get-go. In February 2025, President Trump established the National Energy Dominance Council (NEDC) to "expand all forms of reliable and affordable energy production."

The US Department of Energy last year issued Foreign Entity of Concern (FEOC) guidance that imposed limits on US companies' battery supply chain. It includes FEOCs "owned by, controlled by, or subject to the jurisdiction or direction of a government of a foreign country that is a covered nation" [China, Russia, Iran, and North Korea]. The Trump administration has withdrawn technology-neutral tax credits on any domestic power stations and storage projects that have too great a use of Chinese equipment and deny section 45X tax credits on US-manufactured products with too high an input from China, for example giving them control of projects or products.

"A growing share of global flows is being directed toward the United States, which is working to position itself as a key anchor market for critical minerals."

Gabrielle Goodrow, White & Case

China looms over any discussion of these minerals. According to various estimates, the nation accounts for 70% to 90% of the critical minerals market. Some analysts have calculated that China processes and controls 80-90% of refining and separation capacity, with an even greater percentage in magnets and components. China conducts 70% of rare earth mining and accounts for 90% of its refining. In other words, other producer jurisdictions that lack processing capacity ship minerals to China for processing, adding the country into the supply chain.

In response to actions elsewhere, China has been upping the ante. First it imposed export conditions on such items as target bismuth, indium, molybdenum, tellurium and tungsten. And in October, ahead of an APEC meeting in South Korea that Trump was due to attend, China issued new export controls on such minerals as holmium, erbium, thulium, and related magnets and materials. This in turn led to weeks of diplomatic see-sawing with Trump dialling up proposed import tariffs to 100% on all items from China. The threat was then put on pause with US Treasury Secretary Scott Bessent indicating discussions would continue over at least three months.

Amid the spirited rhetoric and shifting numbers, producer nations are recalibrating and deciding between securing product from China or other critical mineral rich nations such as Chile, Bolivia and Argentina (for lithium) and Indonesia (nickel).

As White & Case associate Gabrielle Goodrow noted, "Across the sector, supply chains are being realigned as producers respond to shifting policy signals and tightening export regimes. As countries reassess where their materials are headed, a growing share of global flows is being directed toward the United States, which is working to position itself as a key anchor market for critical minerals."

In September US Strategic Metals inked an MoU with Pakistan's Frontier Works Organization (FWO). The agreement will allow FWO to export such minerals as antimony, copper, gold, tungsten, and rare earth elements. In return the Pakistan entity will receive $500 million in investment.

Pakistan has placed all its cards on the table, literally, with local senators displaying a jewellery-box filled with samples of some of the nation's mineral largesse at the White House in October. Market rumours have also suggested the nation is planning to build and operate a commercial port in Pasni expressly to bolster commercial ties with the US. Pakistan's administration has since played down the news, indicating nonetheless that early talks on the matter are occurring.

India likewise shows signs of pivoting towards Russia. The State Scientific Research and Design Institute for Rare Metal Industry (JSC Giredmet, an institute

within Rosatom) of Russia and the Indian Council of Scientific and Industrial Research in May agreed a general research deal. The arrangement would cover "development and implementation of technologies for the comprehensive processing of rare and rare earth metals (RMs and REMs), raw materials for obtaining high-purity metals, their compounds, alloys and materials for the electronics, chemical and nuclear industries."

Since then market chatter has suggested India could go further and collaborate with Russian companies with a view to gaining access to processing technologies.

While changes to the current makeup of the critical minerals market seem to be swirling at breakneck speed, projects on the ground can struggle to overcome obstacles such as environmental opposition, permitting delays and midstream processing gaps.

In Alaska, the current US administration is taking action to expedite development despite possible local opposition. In early October, President Trump signed a memorandum approving Alaska Industrial Development and Export Authority's application to develop the Ambler Road Project transportation system that will grant miners access to critical minerals such as "cobalt, germanium, and gallium, which would reduce reliance on foreign sources." This memorandum reversed a Bureau of Land Management decision from 2024 that denied approval.

Development of mines can take a very long time. The Atlantic Council in October warned that "given the long lead times for the development of critical mineral mining, processing, and manufacturing assets, even aggressive expansion of new, derisked supply chain activity may not yet bear fruit in time to protect the US from a severe supply chain disruption."

Likewise, the Center for Strategic and International Studies (CSIS) in March noted that serious permitting bottlenecks have hindered domestic US mining projects that can languish in the pipeline. The EO setting up the NEDC explicitly mandate the entity "advise the President on improving the processes for permitting, production, generation, distribution, regulation, transportation, and export of all forms of American energy, including critical minerals."

In the US it can take decades to get a mine up and running, due in part to litigation risks, historic underinvestment and the complexity of regulatory processes.

NEDC executive director Jarrod Agen told Axios in September the entity has had a great deal of success "trimming down permitting, seeing what funding we can streamline…so the projects can get done." He also referred to executives frustrated with timelines for permission that can extend to 20 years.

Interviewed by *Politico*, NEDC senior counsellor Richard Goldberg referred to other agencies' efforts to boost critical mineral mining. The Department of Defense (DoD, since rechristened Department of War) in July this year said it would fork out $400 million to support MP Materials of Mountain Pass, California. Mountain Pass is the US's only integrated rare-earth producer that mines as well as processes advanced metals and magnets. It boasts more than 10% of the globe's supply.

A multibillion-dollar package of investments and long-term commitments from DoD is intended to allow MP Materials to construct a second domestic magnet manufacturing facility, the company said. Also, the DoD inked a 10-year agreement establishing a price floor commitment of $110 per kilogram for MP Materials' Neodymium-Praseodymium products stockpiled or sold.

In August the Department of Energy launched four funding initiatives totalling nearly $1 billion to expand domestic critical minerals production, processing, recycling and supply chain resilience, with heightened restrictions on foreign entities of concern. Of the total $50 million has been earmarked for such efforts as rare earth magnet supply chain processes. Another $135 million will support design, construction and operation of a demonstration-scale facility to extract, separate and refine rare earth elements from unconventional feedstocks.

Midstream processing gaps can also be a hurdle, notably in the UK. The government recently commissioned a hefty report on the subject, which in March found a "negative perception of mining and midstream processing which deters investment and talent." The report's authors called on the state to create a matched-funding programme that could "be strategically targeted on the midstream part of the value chain, for recycled and primary materials".

The midstream processing problem has not gone unobserved in the US. The Atlantic Council cautioned that while stockpiling is tricky in the minerals sector, "even a 'sufficient' stockpile of raw inputs may be ineffective if midstream bottlenecks persist."

Once a mine is operational, timelines to reach bankability can also drag on. In business in its current shape since 2017, MP Materials in its Q2 earnings statement indicated that adjusted EBITDA was $(12.5 million). In context, this represents a $14.5 million boost, with an 84% revenue increase year over year. And the markets are upbeat: MP Materials' July NYSE offering was upsized from $500 million to $600 million.

Financial success depends on factors other than luck and rich pickings underground. Nations and corporates will need to nimbly navigate tariffs, import restrictions and other roadblocks in the path of smooth trade flows and pricing. Proactive players will undertake offtake diplomacy along the lines of the DoD awarding Australia's Nova a $43.4 million contract to produce antimony trisulfide at the Estelle site in Alaska.

The market has likely been distorted for many years - decades even - but the hope is that new deal structures will continue to emerge as they have in recent years. White & Case noted in an April report on the topic that "given the significant glut of supply for many strategic metals and China's predominant share of refining, further policy interventions and innovations may be necessary."

Private equity will likely get in on what promises eventually to be a profitable act. Sustainability consultants SLR noted last year that "private equity investors are often drawn to critical minerals due to the significant growth potential in this sector, but they must also navigate an array of risks across the supply chain, from exploration and extraction to processing, transportation and end-use." And there are cases. One notable deal this year was the EUR 2.2bn investment by Advantage Partners' Japan Hydrogen Fund in France-based low-carbon iron producer GravitHy.

The UK has also seen crowdsourcing efforts in the critical minerals space. In September this year, IJGlobal reported that the UK's National Wealth Fund had invested £31m in Cornish Lithium, alongside current investor Techmet. The company is also looking to crowdsource some further funding, via the Crowdcube platform.

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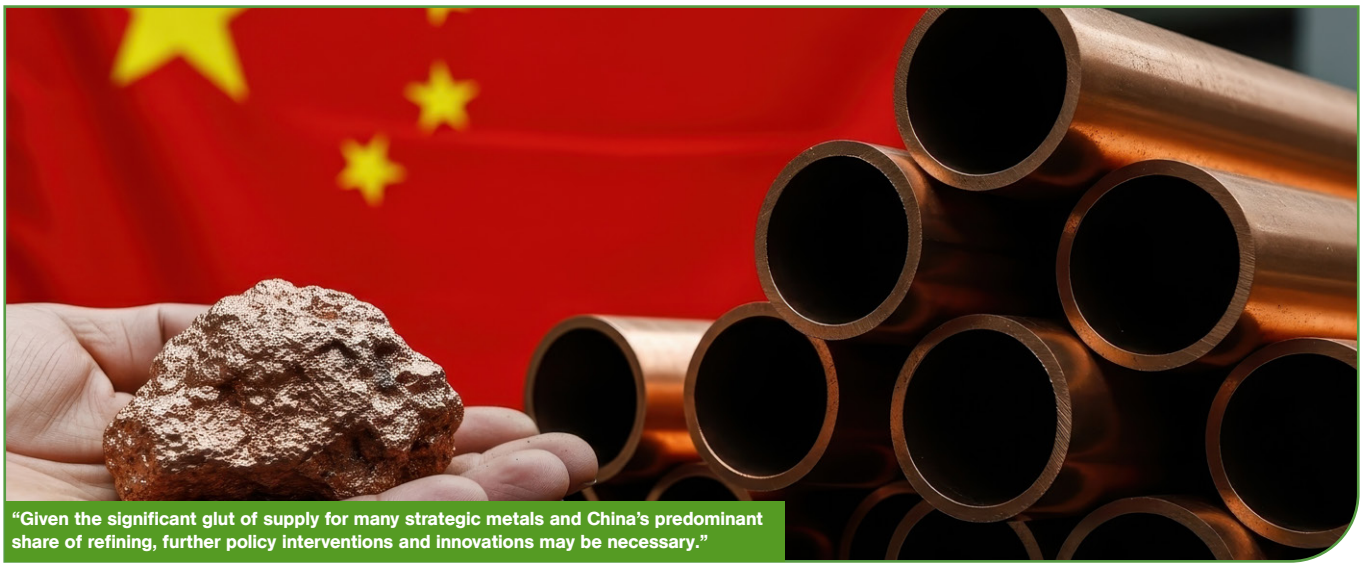

"Given the significant glut of supply for many strategic metals and China's predominant share of refining, further policy interventions and innovations may be necessary."

US corporates will likely become direct actors in upstream supply, a trend that has already begun. Ford Motors has since 2023 been in a nickel collaboration with both China's Zhejiang Huayou Cobalt and Vale Indonesia to advance more sustainable nickel production in Indonesia. Commercial operations are due to commence next year. Per IJGlobal, Lisa Drake, vice president for Ford Model e EV industrialisation, said: "This framework gives Ford direct control to source the nickel we need."

Ford competitor General Motors last year agreed to acquire a 38% asset-level ownership stake in Lithium Americas' Thacker Pass for $625 million in total cash and letters of credit. In a release on the transaction, Lithium Americas noted the deal illustrates "the strategic importance of Thacker Pass in creating a domestic supply chain for critical minerals." Interestingly, Lithium Americas' shares bounced recently on reports the Trump administration will be taking a 5% stake in the company and a further 5% in the Thacker Pass project.

In this context, M&A/JVs and the development of parallel supply chains will likely be part of the bigger picture, spurred by US sourcing requirements. In November, USA Rare Earth (USAR) of Oklahoma acquired Less Common Metals (LCM), a Cheshire, UK manufacturer of specialised rare earth metals and cast and strip cast alloys, for $100 million in cash and 6.54 million shares of USAR common stock. An ex-China producer of both light and heavy rare earth permanent magnet metals and alloys, LCM produces samarium, samarium cobalt, neodymium, praseodymium and others.

London-listed mining behemoth Rio Tinto in May agreed a joint venture with local partner Codelco to develop and operate a high-grade lithium project in the Salar de Maricunga in Chile. The deal is part of a broader strategic partnership that could see Rio Tinto invest up to $900 million in the Chilean entity and a further $50 million if the JV achieves its aim of delivering first lithium by the end of 2030.

CSIS noted that the US Small Business Administration is to give recommendations for legislation that can enhance private-public capital activities to support financing of domestic small business and junior mining companies in the minerals sector.

The United Nations Environment Programme recently urged investors to be innovative considering the vital nature of the sector. "A capital-intensive and high-risk industry, mining relies on diverse sources of finance – public, private or a mixture of both - for each stage of a project, including the closure of mines, as well as upstream activities in the minerals and metals value chain."

It's likely we will see ESG-linked loans and blended finance models wading into this space as an alternative to more established financing models.

Sector leadership will rest on many elements of the value chain, such as processing and recycling. Rio Tinto has said its Chilean JV will support the development of infrastructure such as power and roads, and apply extraction, processing and re-injection technologies to the project to maximise the recovery of minerals, minimise environmental footprint and support the energy transition.

Similarly, USAR stated that they will be able to leverage the capability of LCM to process recycled rare earth oxides, to enable USAR to recover materials from end-of-life magnets and its own swarf generated during magnet production.

As White & Case predicted, "No matter the uncertainty currently permeating the global economy, critical minerals are a growth business. A world of mounting geopolitical tension and security competition requires inputs for militaries; the adoption of AI needs metals for semiconductors; and increasingly competitive clean technologies need lithium, cobalt, nickel, phosphorus and more."

And to get there, many factors will need to be taken into account. Those are not limited to consolidation of juniors by majors, the rise of parallel supply chains and the importance of recycling and processing in determining leadership.

The US is not merely securing supply, it is reshaping the rules of the market. Critical minerals success is dependent on converting ambition into bankable, durable projects on home turf. Advisors and experts who can bridge policy, finance – not to mention the complexities of geopolitics – will be central to the next decade as events play out.

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The forecast for SAF – Sunny but risk of turbulence persists

As we head towards the end of 2025 we can cautiously mark this as a milestone year for sustainable aviation fuel (SAF). Throughout the globe, legislative and practical developments have taken place this year that will determine the long-term outlook for the technology.

To name a few, the passage in July by the 119th US Congress of HR 1 (the Big Beautiful Bill) substantially alters and modifies earlier provisions in the Biden era Inflation Reduction Act (IRA). While financial incentives remain in place, they are now less generous.

Across the pond, the EU put in place a requirement in January that aircraft operators departing EU airports must ensure that 90% of their fuel needs for such flights are sourced from within the EU to prevent the practice of carrying extra fuel from non-EU airports which increases flight emissions due to the additional weight of aircraft. Also in the EU, airlines have had the option to participate in a bloc-wide environmental labelling scheme. The labels are based on such factors as per-passenger carbon footprint and per-kilometre Co2 efficiency. The scheme is voluntary now but could become compulsory after 2027.

Meanwhile in the UK, also at the cusp of 2025, a mandate came into force that 2% of all jet fuel used by owners and suppliers of 15.9 terajoules (TJ) or more contain SAF.

In November last year, the Asia Sustainable Aviation Fuel Association (ASAFA) launched in Singapore to help accelerate pan-Asia production and use of low carbon fuels. The Asia-Pacific region is the largest consolidated market for air travel, accounting for almost 32% of global air passenger journeys, it lags behind both Europe and the US in SAF momentum, ASAFA noted in a press release.

ASAFA aims is to bring together a range of participants in the SAF sector, from feedstock producers to policymakers, to collectively address core challenges, including standardising regulatory policies across the region.

ASAFA noted some of the different approaches to mandates across APAC. Singapore will introduce a 1% SAF blending mandate from 2026 and plans to increase the ratio to 3-5% by 2030. Japan is progressing multiple SAF projects ahead of

The EU put into place a requirement in January that European aircraft operators "uplift" (i.e. incorporate some SAF into traditional fuel) 90% of the fuel powering commercial flights departing from major airports.

a 10% blending mandate from 2030. Other projects are planned, being studied, or are underway in China, India, Thailand, Vietnam, Australia and New Zealand.

These mandates pose challenges and exciting opportunities for asset operators, investors and sector advisors.

There has been a smattering of deals and partnerships across the globe forged with a view to bridging what White & Case Local Partner Ryan Gawrych refers to as "a large infrastructure gap." Gawrych elaborated that a key hurdle today is that "most airports lack the infrastructure for storage, blending, and distribution of SAF."

This absence of appropriate equipment and sufficient space in the right place may act as a barrier to entry. Sometimes the planets align, as was the case with a Pakistan-based project that reached financial close in March. Advised by White & Case, SAFCO Ventures inked the APAC region's first SAF-specific project financing arrangement to the tune of US$141.9 million. The sum covered a combined debt and equity raise for the design, construction and operation of a SAF facility in Sheikhupura, 38 kilometres from Lahore.

SAFCO Ventures had earlier secured a long-term offtake agreement with Shell Eastern Trading (Pte) Ltd for up to 145,000 tons of SAF annually once the facility becomes operational. The Sheikhupura project accounted for approximately 10% of anticipated global SAF production in 2024.

The project relies on technology from Axens of France, which allows for the conversion of waste vegetable oil feedstock into SAF.

The debt financing is made up of a total of $86.7 million senior debt from the Asian Development Bank. This includes syndicated B-loans from The Emerging Africa & Asia Infrastructure Fund (owned by the Private Infrastructure Development Group and managed by NinetyOne) and ILX, an emerging market asset manager based out of Amsterdam, focused on the United Nations' Sustainable Development Goals as well as climate private debt strategies.

The equity contribution was provided by the International Finance Corporation (IFC). $20 million of the equity contribution comes from the IFC's own account, plus investment of up to $10 million from a climate-related blended finance program that they launched as a partnership with the UK Foreign, Commonwealth & Development Office.

Ryan Gawrych

"Deal-making will occur in a business landscape "that will definitely be changing over the next 24 months. Again, there is a lot of appetite to meet decarbonization goals and find the right project."

It was a multinational effort and one that White & Case's Gawrych says is indicative of SAF's short-term future. Deal-making will occur in a business landscape "that will definitely be changing over the next 24 months. Again, there is a lot of appetite to meet decarbonization goals."

The Pakistan deal came together, Gawrych noted, due to a perfect confluence of events, some of them linked to fried food.

Yep, fried food. Labelled under the acronym HEFA for Hydrotreated Esters and Fatty Acids, the dominant class of SAF currently comes from used cooking oil feedstock and accounts for about four fifths of SAF production. The HEFA process refines vegetable oils, waste oils, or fats into SAF through a process that uses hydrogen (hydrogenation). In the first step of the HEFA process, the oxygen is removed by hydrodeoxygenation. The straight paraffinic molecules are cracked and isomerized to jet-fuel chain length.

But the whole thing starts with the fatty acids. And as Gawrych observed, a project like the Sheikhupura one manages to kill two birds with one project stone. Leftover oil from fried delicacies can represent an environmental and food safety risk. Processed into HEFA, it represents a major economic driver.

The HEFA site is adjacent to SAFCO's biofuel refinery. The facility will produce up to 200,000 tons per annum of SAF and bio naphtha, from waste-based feedstock, including used cooking oil.

There have been comparable projects developed or launched in the past 12 months or so, most involving multiple partners and diverse geographies.

IJGlobal reported in late May that SkyNRG was understood to be raising a total of over $1 billion in equity and debt to support a flagship bio-sustainable aviation fuel (bio-SAF) project in the Netherlands. SkyNRG's DSL-01 Delfzijl facility is set to be the first in Europe dedicated entirely to the production of SAF. It will produce 100,000 tonnes of SAF per annum as well as 35,000 tonnes of sustainable by-products, including bio-LPG and naphtha. Offtake partners hail from across the globe and include Bank of America, Boeing, KLM Royal Dutch Airlines and Microsoft.

Also, this summer in Malaysia, Sarawak Economic Development Corporation (SEDC), Sulzer, Apeiron Bioenergy and Oiltek formed a partnership for the development of an SAF pilot plant programme in Sarawak. SEDC signed an MoU with Apeiron Bioenergy of Singapore to develop a sustainable used cooking oil collection ecosystem in Sarawak. That site will have capacity of 15,000 tonnes per annum.

The US is a trickier geography at this moment due to uncertainty around the IRA. *International Airport Review* in March noted that the IRA included the 45Z tax credit for SAF production of $1.25 for each gallon from a qualified mixture and this in turn saw domestic SAF production balloon from five million gallons in 2021 to 93 million gallons in the first nine months of 2024.

Despite fears of the Trump administration withdrawing most environmentally friendly federal tax relief, HR 1 in the end extended 45Z by two years, rather than the four mentioned in earlier versions of the bill. The 45Z credit is now in place through to the end of 2029 but has been capped at the lower level of $1 per gallon.

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International Airport Review noted that some states, such as Illinois, Minnesota and Washington, have their own credit systems designed to foster the development of SAF. Through the greater Minneapolis-Saint Paul (MSP) partnership, the state of Minnesota is working with Bank of America, Delta Air Lines, Ecolab and Xcel to establish an SAF Hub.

The Minnesota SAF Hub was set up to bring commercial-scale volumes of affordable, low-carbon SAF to MSP International Airport from out of state. And at the end of 2024 DG Fuels announced the selection of a site for a roughly $5 billion manufacturing facility along with the creation of hundreds of jobs in Moorhead, western Minnesota. The Moorhead site will produce 193 million gallons per year of SAF using agricultural and wood waste as feedstock.

Further west in Seattle, Washington, carbon transformation company Twelve and Washington Governor Jay Inslee in 2023 announced plans to scale the production of E-Jet® fuel (Twelve's SAF made from CO2 and renewable energy) with a commercial-scale production facility in Moses Lake. The first customers to receive E-Jet fuel from the plant will be companies and major airlines with which Twelve has existing partnerships. These offtakers include Shopify, Alaska Airlines and Microsoft.

Likewise, *IJGlobal* reported in June that Par Pacific, Mitsubishi Corporation and ENEOS have agreed to establish Hawaii Renewables, a JV to produce renewable fuels in Kapolei. Construction is underway, with the facility expected to be operational by year-end. Hawaii Renewables will become the state's largest renewable fuels manufacturing site, producing around 61 million gallons annually of renewable diesel, SAF, renewable naphtha and low carbon liquified petroleum gases. SAF production will account for about 60% of output.

The issue, as with so many new technologies, is that of monetisation and return on investment. The major players will always have a leg up as illustrated by two contrasting cases from the UK. In September news came out that Ecojet, which plans to operate hydrogen-powered short-haul flights, had laid off most of its staff just two years after Dale Vince set up the company. *The Times* reported that launch of flights has been delayed to 2026 and the company was grappling with fundraising and securing an operating license.

The next few years will reveal the degree to which SAF really takes flight with new deals getting off the ground.

On the other end of the spectrum, the UK has been the launchpad for arguably the flashiest sustainable flight to date. Richard Branson's Virgin in late 2023 operated Flight VS100 from Heathrow for JFK in New York. VS100 flew on 100% SAF. Reporting on the Boeing Dreamliner that carried Branson himself and then UK Transport Secretary Mark Harper, *the Times* quoted a typically bullish Branson as dismissing his critics' concerns. "The world will always assume something can't be done, until you do it," Branson said.

White & Case's Gawrych said, "At the macro level the economic outlook for SAF globally is incredibly encouraging. There's a lot of investment that needs to be made. The market size at the moment is about 2,000,000 tonnes. It needs to get to about 12 to 15 million tonnes to meet the mandates for 2030."

The next few years will reveal the degree to which SAF really takes flight with new deals getting off the ground. If well structured and thought through, internationally relevant projects will continue to reach FID stage and generate long-term returns for investors. The skies ahead are looking blue.

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Remote but accessible: Powering far-flung mining operations goes green

The mining industry has historically been seen at odds with the energy transition, with HSBC noting in their 2025 Net Zero Transition Plan that the sector accounts for an estimated 4-7% of global greenhouse gas emissions, both directly from operations and indirectly from power generation.

Yet, mining operations located in remote areas present novel and unique opportunities for the mining industry and miners to decarbonise their operations, relying on new technologies and forms of financing. While remote sites come with a number of challenges, such as limited access to energy and transportation infrastructure, individual mine operators, conglomerates and governments are taking steps to turn remote mining operations 'green'.

Decarbonisation of mining is enabled by a number of different technology types that often work in combination. While there is an overlap amongst them, a half-dozen basic tools populate the mining community's playbook. These are notably solar, wind, hydropower, electrification, gas and further down the road, nuclear. Weather, access to transport and local cost usually dictate which of these tools, alone or combined, will best serve a particular mining project or group of projects.

Many parties involved in such decarbonisation efforts point out that an added benefit is improvement in the living standards of local communities. Access to new sources of energy, job creation and infrastructure upgrades present opportunities, not least economic ones. As the Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development (IGF) noted in 2024, "if harnessed and managed well, the [mining] sector has the potential to be transformative for current and future generations, as it can be leveraged to develop home-grown solutions, finance the energy transition, and fund climate change mitigation and adaptation."

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The IGF supports 85 member countries to advance sustainability goals through mining sector regulations and policies. Its paper calls for "coordinated efforts between governments, the mining industry, and international stakeholders to ensure that the surge in mining activity for the energy transition does not aggravate other planetary crises."

White & Case associate Raphael Papon sounded a positive note on where we are today. "There is significant activity in the field, a lot of interest coming from governments, from banks, and from miners themselves. Overall, [I see] a very promising outlook."

White & Case partner Jared Muller, who has worked on such remote mining projects, provides important context on balancing energy transition ambition with commercial reality, "The industry is serious about decarbonising by 2050, but it won't do so at any price. Leveraging government grants, incentives, concessional loans and other forms of innovative financings can be key to the success of a reliable green energy solution for any particular mining project."

A paper published after an EnergyandMines conference earlier this year in Perth, said that decarbonisation requires significant investments (capex) in new technologies like electric vehicles and renewable energy sources. While these projects can reduce operating costs in the long run, the upfront costs create risk, especially in a high-interest rate environment.

Banks keen to bolster green credentials

As a potential solution to these costs, banks, amongst other parties, have jumped on the bandwagon. HSBC earlier this year set a 2050 thermal coal-mining specific target of 70% reduction of absolute financed emissions. The bank intends to support energy transitions elsewhere in the sector through strategies such as carbon capture and storage technologies, boosting alternative beneficiation and extraction, and encouraging the mining of transition metals.

In France, Caisse des Dépôts in October this year announced the launch of a €1 billion sustainable bond that will support UN climate goals in such areas as decarbonising industry. Caisse's framework document on green investing indicates strong interest in supporting transition of energy supply and heating mechanisms.

Jared Muller

"The industry is serious about decarbonising by 2050, but it won't do so at any price. Leveraging government grants, incentives, concessional loans and other forms of innovative financings can be key to the success of a reliable green energy solution for any particular mining project."

Mining companies are themselves, of course, keen to explore and invest in technologies that will render remote mines more environmentally sound than they are today. The following sections discuss how mining companies are adopting alternative energy sources – such as solar, wind, and hybrid systems – to reduce their environmental footprint and drive innovation in remote operations.

Ivanhoe Mines in May 2021 announced a commitment to work with its joint-venture partners and underground mining-equipment manufacturers to ensure that Kamoa-Kakula mine in the Democratic Republic of Congo (DRC) became the first net-zero operational carbon emitter among top-tier copper producers.

Rio Tinto signed two new solar and battery hybrid services agreements this year with Edify Energy to increase the supply of reliable, competitively priced electricity to Rio Tinto's Gladstone aluminium refinery in Queensland, Australia. Under the agreements, Rio Tinto will purchase 90% of the power and battery storage capacity generated by the Smoky Creek & Guthrie's Gap Solar Power Stations for 20 years. Edify Energy will build, own, and operate the projects, with construction due to begin in late 2025, targeting completion in 2028.

Solar

One of the benefits of solar power is its movability, as the technical equipment is conveniently mobile and reusable once a project is completed. This year, African renewables developer CrossBoundary Energy signed a 17-year power purchase agreement (PPA) with Kamoa Copper to provide baseload renewable energy to the Kamoa-Kakula Copper mining complex, per IJGlobal.

The Kamoa-Kakula site, in often-sunny DRC, operates as a joint venture between Ivanhoe Mines (39.6%), Zijin Mining Group (39.6%), Crystal River Global Limited (0.8%) and the Government of the DRC (20%). Ivanhoe notes that Skarn Associates estimates they have among the lowest GHG emissions intensities per tonne of metal produced globally, and the lowest of any major copper mine.

Kamoa-Kakula relies on a combination of hydropower and solar energy. Franck Alloghe, business development director at CrossBoundary, informed IJGlobal, "this [PPA] agreement represents a change in energy supply for mining operations, indicating that diesel or heavy fuel-oil generators are no longer the only viable option for guaranteed baseload power generation."

Further in Africa, ZCCM Investments Holdings (ZCCM-IH) is set to purchase a 35% stake in Maamba Solar Energy (MSEL), a wholly owned subsidiary of Zambian independent power producer Maamba Energy (MEL), IJGlobal reported in October. The remaining 65% will be held by Nava Global PTE, previously Nava Bharat Singapore, and invested in the 100MWAC solar PV power project. Amongst other outcomes, ZCCM-IH anticipates that the stake purchase will provide long-term, sustainable, and clean power supply to mitigate load-shedding challenges.

In particular in South Africa, Ivanhoe's planned Platreef platinum group metal/nickel mine has its own 5-MW solar power facility, completed in Q1. Phase 1 production is due to commence in Q4,

followed by the Phase 2 expansion 2 years later in Q4 2027. Enpower Trading will also wheel 48.3GWh/yr from SolarAfrica's SunCentral power plant in De Aar, Northern Cape, to the mine in Limpopo as part of a deal signed earlier this year.

Solar has advantages but there are downsides. As Papon noted, "land can be scarce in some jurisdictions. [For] some developers of really large solar farms there are issues around permitting. For example, the impact on flora and fauna."

Wind

Wind has also been harnessed as a frequent power source for remote mines, especially in Africa. As Julien Bocobza has noted, wind "is more specific to certain jurisdictions such as Egypt, Morocco, Kenya, and South Africa."

Comparatively, Australia offers prospective territory for the deployment of wind power, as employed in the Agnew gold mine in Leinster, Western Australia. The site will rely on a hybrid microgrid, consisting of an 18 MW wind farm with five wind turbines, a 10,710-panel, a 4 MW solar farm, a 13 MW / 4 MWh Battery Energy Storage System (BESS) that underpins the security and reliability of the microgrid, and an 18 MW gas and diesel engine power station as back-up, all managed by an advanced control system.

Also in Australia, BHP in September this year inked a 100-MW baseload supply deal with Neoen of France to help power BHP's Olympic Dam, Carrapateena and Prominent Hill mines. The power will come from Neoen's Goyder South Stage 1 Wind Farm and Blyth BESS, IJGlobal reported in September.

And in Morocco, the Office National de l'Électricité et de l'Eau Potable signed an agreement with the Al Baidaa Desalination consortium for the flagship Casablanca Desalination Project public private partnership (PPP) in May 2025. The desalination process will use reverse osmosis technology entirely powered by the It Bir Anzarane wind farm. It is the first in a national pipeline of desalination PPPs aimed at strengthening Morocco's water security and climate resilience through sustainable, large-scale infrastructure. "This landmark financing represents a defining step for infrastructure development in the region, and we were proud to play a lead role in structuring this complex transaction. Delivered through a PPP and powered by renewable energy, it demonstrates how innovative financing models can deliver meaningful, sustainable and long-term benefits for millions of people. Contributing to a project of this significance underscores our commitment to transformative infrastructure projects," Bocobza said.

Julien Bocobza

"This landmark financing represents a defining step for infrastructure development in the region, and we were proud to play a lead role in structuring this complex transaction."

While wind and solar generated power offer significant benefits, they are intermittent energy sources requiring "firming" capacity when the wind isn't blowing or the sun isn't shining. As a result, many mining companies adopt hybrid systems to deliver reliable energy for their operations. Various options - such as hydro, batteries or gas-fired generation – can be used individually or in combination to strengthen firming capacity at remote locations.

As Muller put it, "reliable electricity supply from intermittent green energy sources depends on adequate firming capacity."

Hydropower

The Republic of Guinea a year ago secured funding for the Amaria hydropower project with support from China's TBEA. The government of Guinea noted that the project will support industry and improve living conditions for the local population. It has also linked Amaria to its Simandou 2040 program, which aims to align mining sector goals with state sustainable development goals.

Earlier this year, the World Bank provided an update on the DRC's Inga hydropower site on the Congo River between Kinshasa and the Atlantic Ocean, which it committed $250m to, after pulling its support for the project in 2016. The power from Inga "is expected to benefit approximately 100 communities (1.2 million people) through improved access to clean water, electricity, and roads. Approximately 10,000 people are also expected to benefit from skills and higher education training."

Likewise in Rwanda, the Ruzizi III Regional Hydroelectric Project is one of the largest infrastructure projects in the region comprising Burundi, DRC, and Rwanda. It is the first privately financed project in sub-Saharan Africa that will utilize a common regional water resource to generate power that will be shared between the three countries.

While neither Inga nor Ruzizi is specifically geared toward supporting mining, the three nations all house mining projects that will likely benefit from the improved energy security in the region. The DRC, for instance is home to the Kamoa-Kakula facility referenced above and a trove of other mining projects.

Gas

While referring to gas as a decarbonisation option may seem counter-intuitive the element can play a key role in the energy transition. Natural gas produces significantly less carbon dioxide per unit of energy

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North Africa boasts some of the highest solar irradiation levels globally, making it an ideal location for solar-powered hydrogen production

generated compared to coal and oil. Also, natural gas infrastructure can be adapted for future decarbonisation technologies, such as carbon capture and storage via the capture of emissions from the plants for storage underground.

In January this year, the African Energy Chamber said that Senegal and Mauritania started operations at the Greater Tortue Ahmeyim (GTA) development 10 kilometres offshore from Mauritania. Project developers BP and Kosmos Energy, alongside Senegal's national oil company Petrosen and Mauritania's NOC *Société Mauritanienne des Hydrocarbures* (SMH), have officially opened the first well of the GTA project, signalling the start of technical operations and a new era of gas-driven development and energy security in West Africa.

In a paper on the use of natural gas in Africa, the Atlantic Council stated such efforts are essential in a continent in which 42% of the people have no access to reliable electricity supply. And there needs to be openness to all options. Each country's energy transition must be feasible within the context of its economy, geography, and natural resources. Rather than offer "unhelpful generalisations," the international community must "embrace and support nuance and country-specific analysis," as Youba Sokona, author and vice chair of the Intergovernmental Panel on Climate Change, said in 2022.

The US Department of Energy (DOE), amongst other entities, has indicated that reforming low-cost natural gas can provide hydrogen today for fuel cell electric vehicles (FCEVs), as well as other applications. Over the long term, the DOE expects that hydrogen production from natural gas will be augmented with production from renewables, nuclear, coal (with carbon capture and storage), and other low-carbon, domestic energy resources.

In another paper the African Energy Chamber noted that "North Africa already has the requisite abundant natural resources and developing infrastructure to support a massive expansion in green hydrogen production. The region boasts some of the highest solar irradiation levels globally, making it an ideal location for solar-powered hydrogen production. Countries like Morocco and Egypt have already initiated projects like the Noor Ouarzazate Solar Thermal Complex and the Benban Solar Complex, respectively, which could serve as the backbone for the industry."

Electrification

Electrification also plays a major role in the route to decarbonisation as it applies to many aspects of the operating environment. For instance, electric vehicles produce fewer emissions, particularly when renewably charged. Electric heat pumps can replace gas boilers for heating and electrically powered industrial processes are cleaner than those relying on coal or gas.

Other examples include the Western Australian Government's recent announcement supporting the development of priority electricity transmission corridors in the Pilbara, proposed to link prospective renewable energy hubs to the major load centres in the region. One of the advanced transmission corridors, includes the proposed construction of approximately 550 kilometres of 330-kilovolt transmission lines, and associated infrastructure, to connect the proposed renewable energy hub to existing iron ore mines in the Pilbara region to help facilitate decarbonisation of the sector.

In Angola, Trafigura and engineering company ProMarks signed a memorandum of understanding (MOU) with the Angolan government last year to develop a PPP model for a major regional power transmission and supply project. The project involves building and operating a 2-GW high-voltage electricity to take surplus green electricity produced by hydroelectric dams in the north of Angola to the Democratic Republic of the Congo's Copperbelt and Zambia, integrating with the Southern African Power Pool.

Nuclear

Finally, there are isolated moves afoot to consider nuclear power, notably small modular reactors (SMRs), as sources of energy to remote mines. The Asian Development Bank has been reviewing a longstanding policy of not financing any nuclear-based projects. This follows on from the World Bank that recently ended its own ban on nuclear energy financing.

Muller noted that "nuclear could play a key role in achieving net zero commitments by 2050 – it offers firm capacity and is able to generate low carbon electricity – and the policy settings in a number of jurisdictions are changing with nuclear playing a substantial role in the energy mix". Noting, however "it does have its challenges, including concerns over waste disposal, security, public safety and cost - historically nuclear projects have encountered substantial cost overruns and schedule delays."

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The World Bank that recently ended its own ban on nuclear energy financing

The International Atomic Energy Agency (IAEA) earlier this year issued a report urging exploration of the technology to power Africa. The IAEA noted in its report that "SMRs are generally designed to be more flexible and could serve remote areas with no grid infrastructure or serve mining operations while also providing process heat or cooling, in addition to power generation."

The World Bank and the IAEA in June this year agreed to work together to "support the safe, secure and responsible use of nuclear energy in developing countries." One strategic priority the two entities identified is accelerating "the development of small modular reactors, which offer flexible deployment, lower upfront costs, and potential for wide adoption in developing economies."

Russia, with its mining-sector heavy industry, has been testing out nuclear applications for local mines. The World Nuclear Association in a study published in May 2025 noted that beneficiaries of Russia's steps at introducing nuclear power to industrial processes include Rosatom. The mining major is planning four optimised floating power units hosting at Cape Nagloynyn to supply 440 MWe to the Baimskaya copper mining project south of Bilibino and Pevek.

Nuclear is obviously far from risk-free. As recently as this year, the World Nuclear Association noted "strong awareness of the potential hazard of both nuclear criticality and release of radioactive materials from generating electricity with nuclear power." And in a more recent paper the same group noted that small modular reactors (SMRs) "offer additional flexibility in operation and wider deployment opportunities, allowing for nuclear to be used in more locations and for a greater range of applications."

Some key risks for remote power solutions for the mining sector

Cleaner greener power-supply efforts are not necessarily risk-free. Early in 2024, Sandfire Resources decommissioned their DeGrussa copper-gold mine, 900 km north of Perth, Australia. The site, powered by a solar hybrid power system, had been operational for seven years before being depleted. Power provider Neoen has indicated it is looking into ways of repurposing DeGrussa's 34,080 solar panels as well as inverters, transformers and battery pack.

Operator Neoen told Energy Source & Distribution early in 2024 the group was hoping to find further use for DeGrussa's solar panels and items such as inverters, transformers and battery pack.

As Muller pointed out this speaks directly to one of the key considerations for renewable energy developers working with miners. "For developers that provide energy solutions for remote mining projects, the stranded asset risk is a key risk requiring careful consideration."

He added, "Unlike traditional, fixed power generation plant and infrastructure, renewable and hybrid energy assets can be modular and redeployable. That flexibility allows equipment to be reused across multiple sites as mines close, change ownership or adjust production profiles, thus mitigating the stranded asset risk."

There are other concerns being raised, with cost being at the top of the list. While extolling the availability and capacity of solar power in Africa, it is important to note consumers and governments alike must deal with the financial constraints that can jeopardize solar project profitability. Barriers include upfront capital requirements, grid integration challenges, and weak incentives for private investment as the World Economic Forum noted in May 2025. However, WEF suggested that "renewables offer a way forward, though the journey will be challenging. Africa possesses abundant solar, wind, hydro and geothermal resources, but they remain largely untapped."

In a paper about the positive elements of green mining practices (GMPs), Swiss think tank Frontiers in a December 2024 paper concluded that "those mining companies that actively pursue green practices enhance environmental performance while making reasonably significant contributions to broader sustainability objectives."

Summing up the bigger picture for cleaning up remote mining, Bocobza was upbeat, "the transition is not going to be done overnight but it is happening."

Overall, there seems to be substantial global momentum where stakeholders across regions and industries are collectively advancing toward decarbonisation. With this widespread alignment, the transition to lower-carbon solutions in remote mines appears not only inevitable but also poised to accelerate as market forces and policy objectives converge

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Green infrastructure lending greases the wheels of European energy transition

The United Nations estimates that within just 25 years, the percentage of the world's population residing in urban areas will have climbed from about 55% today to 68% adding 2.5 billion people into cities and towns.

The UN notes that infrastructure planning will be key to making such changes work for people, administrations and companies in conurbations. "Many countries will face challenges in meeting the needs of their growing urban populations, including for housing, transportation, energy systems and other infrastructure, as well as for employment and basic services such as education and health care."

While the UN has focused on non-European areas, similar issues will face municipal planners within the Bloc and the UK. And working in consort with such authorities will be funds, notably those that focus on lending for sustainable urban development.

As IJGlobal noted in its H1 2025 Europe Regional Report $251.27 billion worth of infrastructure finance deals closed in the first half of the year. The most active sector was renewables with $51.03 billion of deals reaching financial close. While about a quarter of the investment will be going towards energy-specific projects, a subset of efforts in such areas as schools, pharmacies and hospitals, transport and other municipal construction come under the umbrella of energy transition.

Jean-Francis Dusch, Global Head of Infrastructure & Structured Finance for Edmond de Rothschild Asset Management (EDRAM), said in a recent IJGlobal podcast that the urban landscape contains energy-transition opportunities beyond energy projects per se. "The decarbonisation of utilities, including natural resources storage - boom! That's energy transition. When you build a school or hospital and use modular buildings and as a consequence maybe [you] use more sustainable material that you optimise in doing so, especially in hospitals."

Jean-Francis Dusch

"The investment market is super broad, super deep for the time being. We focus on the broad definition in Europe… Europe made the bet of energy transition to support the economy."

Specialist funds honing in on the green sector in this way include EDRAM's infrastructure debt platform BRIDGE, which has been in play for over 10 years. IJGlobal noted that since 2015 "BRIDGE has grown to more than €6 billion, with over 140 investments split across [their] Senior and Yield Plus strategies." With a significant portion of fundraising supporting energy transition projects.

BRIDGE added a growth strategy to support companies in accelerating the implementation of projects focused on energy transition and digital infrastructure.

IJGlobal added "these deals span across five sectors – social, energy, utilities, transport and telecoms – and 9 countries. Out of these deals, 56% were refinancings, showing BRIDGE's commitment to supporting brownfield investments as well as greenfield."

In BRIDGE's 2024 sustainability report Audrey Colin-West, head of Social and Transport, noted that urban infrastructure is a key piece in the sustainability jigsaw. "By 2050 green cities will become a key driver of sustainable investment, as funding is needed to address environmental concerns and contribute to long-term urban resilience and well-being. However, the speed and scale of urbanisation bring challenges such as meeting accelerated demand for affordable housing and viable infrastructure."

Infrastructure debt covers a wide swathe, Dusch noted. "The investment market is super broad, super deep for the time being. We focus on the broad definition in Europe… Europe made the bet of energy transition to support the economy."

What these efforts translated to in 2024 are debt financings in such tangible sectors as solar and wind, biomass, biogas, fibre and data centres, public transport including rail, energy efficiency projects in schools and healthcare facilities and the circular economy. More recently, Edmond de Rothschild's BRIDGE invested in battery storage and this year in its first green hydrogen plant.

The 2024 report also notes that its portfolio has lent to leisure projects in Belgium, transport development in Spain and fibre to the home in Poland. Key performance indicators for 2024 include contribution towards almost 1,000 care

home beds for the elderly. In terms of digital infrastructure, such areas as fibre, telecom towers and data centres now represent 20% of Assets under Management.

As Dusch told IJGlobal, "Some infrastructure is still about some more traditional needs. Our early positioning in data centres is paying off, so is our early move on biogas, battery storage and green mobility."

EDRAM has invested in a broad range of energy-transition projects. Among those are North Star's plans to add 40 hybrid service operation vessels (SOVs) credit line of up to £425 million ($566 million) to fuel its ambition to add 40 hybrid SOVs to its fleet by 2040. In November 2022, EDRAM, along with IBC, RBC Capital Markets and Scottish National Investment Bank topped up an earlier private-equity infusion.

As IJGlobal reported in 2024, the funds were infused to address a pressing need to expand and upgrade fleets, both as more projects seek operators and as technology evolves with larger fixed-foundation turbines and advancements in floating wind.

Through its Pearl Infrastructure Fund, EDRAM earlier this year acquired a 65% stake in Arbaflame, a Norwegian business producing black pellet solid biofuels to substitute for coal in industrial processes. IJGlobal reported that Arbaflame makes black pellets produced from waste wood and sawdust through a chemical process known as steam explosion, which separates molecules to produce a more coal-like product that is water resistant and more easily adaptable to industrial burners than traditional white pellets which are used at facilities such as the UK's Drax plant.

Pearl Capital's Pearl Infrastructure Capital II vehicle has a €400m fundraising target to invest in higher-value biomass production businesses, such as steam explosion and bio-ethanol production, coal replacement processes and other related technologies.

Also this year, French green hydrogen producer Lhyfe secured €53m from bonds and senior unsubordinated loans maturing in 2034, subscribed by EDRAM, Triodos Bank and Sienna Investment Managers, to support the development of green hydrogen production sites in France and Germany. IJGlobal reported this effort is the first project financing transaction of such sites for Lhyfe and a first of its kind in Europe.

As Dusch explains "We closed our first hydrogen investment this year. It took us 6 or 7 years. We believe in the sector. That first deal was investable. We could work in a very constructive way in partnership with the sponsors to put I would say a sustainable capital structure. A couple of years ago at the end of 2023 we closed our first battery energy storage investment. There's a sense we have done it but there's that sense of caution if you are one of the first to do it. Now we are set to deliver, we need our structure to be efficient and from a credit standpoint overperform."

EDRAM is far from alone in using debt funding to support green infrastructure in Europe. The UK government continues to support such developments. In September, Encyclis and the UK Government's Department for Energy Security and Net Zero reached agreement on a commercial framework to deliver the UK's first full-scale carbon capture plant for Energy-from-Waste near Ellesmere Port in Cheshire.

A new entrant into the sector, Denmark's Glentra Capital in October completed the final close of its debut Glentra Fund I, with total commitments of €565m and an additional €230m allocated for co-investments. In Europe it will commit to DVP Solar's agri-PV and BESS projects in Germany, Italy, and France as well as Kyoto, a provider of electrothermal heat-as-a-service solutions to European industries.

Brookfield's recently closed Global Transition Fund II has deployed more than $5 billion across 10 energy transition investments. One of those involved the 2025 take-private of France's renewables company Neoen. The independent producer of exclusively renewable energy has expertise in solar and wind power and storage on four continents.

Ideology, impact, purpose and convictions underpin much of this type of work. As Dusch noted, "I think when you work in infrastructure it's because you think that the finance world has another purpose and you try to really link finance with - at the end of the day - meeting society's needs. I don't want to be cheesy here, but that's the passion we have as a team."

It's not always easy being green but EU regulations provide strong guidance on how to go about it. The EU's Sustainable Development Disclosures Regulation (SFDR) has many goals, one of which is to contribute "to one of the EU's big political objectives: attracting private funding to help Europe make the shift to a net-zero economy."

The regulation doesn't force market participants to consider green criteria when investing. Rather, it sets out rules that require them to justify the sustainability claims that they make in relation to their financial products. These rules apply to financial market participants managing money on behalf of end investors: asset managers, insurance undertakers, occupational and other pension providers, as well as investment firms.

First set in motion seven years ago and effective from January of 2023, SFDR is currently in a consultation stage. For now it divides investors into three groups covered by Articles 6, 8 and 9, a sort of three-tier hierarchy of sustainability ethics. Article 6 investors do not consider sustainability, Article 8 promotes environmental but does not have sustainable investing as a core objective. The SFDR gold standard is covered by Article 9, for companies that have sustainable investment as a core objective.

BRIDGE has since 2022 – ahead of schedule - been taking steps to report under SFDR, as well as reported for the Principles of Responsible Investment (PRI) and bolstered its proprietary ESG review tool. In 2018, BRIDGE created the first sustainable sub-fund to be granted France's Greenfin label. Likewise, Prime Capital has noted that the government of Germany is pushing for green debt outlays. "Further acceleration is expected as a result of substantial fiscal packages announced by the German government in the first half of 2025. This very significant pool of financing requirements provides investors with opportunities for stable, largely cash-yielding, predictable and inflation-linked returns."

With individual nations and the EU on board and the need for infrastructure ever-expanding, green infra debt offers a world of possibilities. As Dusch told IJGlobal, "We never thought that there was a lack of appetite for infrastructure, even more so infra debt. But now we can see that we're back to a much more concrete appetite. I think now the allocations have been validated."

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A pioneer in infrastructure debt financing, Edmond de Rothschild offers innovative and diversified investments which, beyond the pursuit of financial returns, pave the way for resource conservation and technological and societal progress.

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The Edmond de Rothschild Infrastructure Debt Platform.

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EUROPE CASE STUDY

Foresight's acquisition of HEIT, UK

UK-based investor Foresight Group on 17 June (2025) completed the acquisition of London-listed battery energy storage system (BESS) fund Harmony Energy Income Trust for £210 million ($284 million), a major milestone in Foresight's ambition to build a pan-European BESS platform. By **Yancy Villarroel**.

Financed by Averon Park's Blackmead and Foresight Energy Infrastructure Partners II (FEIP II) through a special purpose vehicle (SPV) named PP BidCo, the takeover provides Foresight with immediate scale in one of Europe's most advanced storage markets. For HEIT's shareholders, the transaction delivered a substantial premium in the context of a prolonged period of trading at a discount to NAV, reflecting both the challenges in the UK BESS sector and the attraction of Foresight's long-term investment approach.

The outcome not only secured Foresight a portfolio of nearly 400MW of operational BESS capacity in its domestic market, but also underscored its determination to establish itself as a leader in the rapidly maturing European BESS sector.

HEIT and its portfolio

HEIT was listed on the London Stock Exchange in November 2021 to invest in BESS across the UK, targeting an 8% per annum quarterly dividend and an unlevered NAV total return of 10% per year over the medium to long-term.

Following a successful £210 million IPO, HEIT acquired an initial portfolio of 5 x BESS projects under development from its fund manager Harmony Energy. In September 2022, the company secured an additional £15 million and entered into an agreement to acquire 4 x further BESS projects from Harmony.

By October 2022, HEIT's portfolio comprised 9 x projects with a total capacity of around 500MW/1GWh. The fund divested the 99MW Rye Common BESS to Pulse Clean Energy in September 2023, leaving a portfolio of 8 x 2-hour BESS projects totalling 395.4MW/790.8MWh.

These 8 x sites were commissioned between December 2022 and December 2024:

- Pillswood (98MW/196MWh) in Cottingham near Hull, East Yorkshire – construction started in August 2021, partially commissioned in November 2022, and fully commissioned in December 2022, using 78 x Tesla Megapack XL batteries. Strategically located near National Grid's Creyke Beck substation, a key connection point for the Dogger Bank offshore wind farm.
- Broadditch (11MW/22MWh) in Kent – construction began in January 2022 and was fully commissioned in April 2023, using 6 x Tesla Megapack 2XL batteries

By October 2022, HEIT's portfolio comprised 9 x projects with a total capacity of around 500MW/1GWh. The fund divested the 99MW Rye Common BESS to Pulse Clean Energy.

EUROPE CASE STUDY

Despite the successful construction and commissioning of its projects, market conditions for the UK BESS sector became volatile in 2023, contributing to a 4.5% fall in HEIT's NAV per share as of 31 October 2023.

- Farnham (20MW/40MWh) in Farnham, Surrey – construction started in April 2022 and was fully commissioned in June 2023, using 11 x Tesla Megapack 2XL batteries
- Bumpers (99MW/198MWh) in Buckinghamshire – construction commenced in July 2022. The site was partially commissioned in October 2023 and fully commissioned in November 2023, using 54 x Tesla Megapack 2XL batteries
- Little Raith (50.0MW/100MWh) in Fife, Scotland – construction began in June 2022 and was fully commissioned in October 2023, comprising 27 x Tesla Megapack 2XL batteries
- Rusholme (35MW/70MWh) in Selby, North Yorkshire – construction started in April 2022 and was fully commissioned in August 2024, using 19 x Tesla Megapack 2XL batteries
- Wormald Green (33MW/66MWh) in North Yorkshire – construction commenced in February 2023 and was fully commissioned in December 2024, using 12 x Envision 2-hour duration systems
- Hawthorn Pit (49.9MW/99.8MWh) in County Durham – construction started in February 2023 and was fully commissioned in December 2024, using 18 x Envision 2-hour duration systems

The portfolio is supported by a £130 million debt package with NatWest and Rabobank maturing in February 2031, annual accounts show. HEIT amended this facility in February last year (2024) and it is priced at SONIA +275bp until February 2026, ratcheting up to 350bp by its final year.

Challenging environment

Despite the successful construction and commissioning of its projects, market conditions for the UK BESS sector became volatile in 2023, contributing to a 4.5% fall in HEIT's NAV per share as of 31 October 2023.

These conditions also led HEIT to postpone, and later cancel, its first quarterly dividend for the fiscal year ended 31 October 2024. Key drivers included:

- saturation of ancillary service markets – led to pursue arbitrage strategies, including wholesale market trading and the Balancing Mechanism (BM)
- reduced wholesale power price volatility and spreads – due to reduction in natural gas prices and increased energy imports from Europe via interconnectors
- implementation issues with National Grid ESO's (NESO) Open Balancing Platform (OBP) – the launch of the "bulk dispatch" software in December 2023 was curtailed due to technical issues. OBP was used intermittently, which limited BESS volumes in the BM and created uncertainty regarding daily capacity allocation for other strategies

The sale process

Considering the persistent discount to NAV since early 2023, HEIT's board decided in February 2024 to explore opportunities to maximise value for shareholders. Following informal approaches from multiple parties in H1 2024, HEIT hired Jones Lang LaSalle (JLL) to run an auction for either some or all of its portfolio in May 2024.

Harmony released teasers for the asset in July 2024 which IJGlobal exclusively reported in June 2024.

Foresight had been monitoring listed and private markets in search of undervalued assets with strong qualities, and saw a strategic opportunity when it learnt of the HEIT portfolio sale. At that time, the portfolio consisted of 6 x operating projects and 2 x projects with COD expected for late 2024, eliminating construction risk and reducing the time between investment and cash flow generation.

Foresight's rationale for bidding included:

- Valuable addition to the manager's energy transition assets
- Immediate access to a substantial portion of the UK's operational BESS market, with high revenue benchmarks
- The BESS market is expected to perform better in the future, with higher imbalance volumes providing growth opportunities, as well as improvements in the use of BESS in the BM by National Grid ESO
- HEIT's focus on 2-hour BESS enabled it to address market challenges more effectively than shorter-duration assets, providing a competitive advantage in terms of revenue generation
- The deal reinforces FEIP II's position to establish a pan-European BESS platform
- The British group then decided to participate in the auction for the portfolio, and in August 2024, the parties signed a confidentiality agreement.

EUROPE CASE STUDY

Non-binding offers were received in October (2024), and several bidders, including Drax and Atlantic Green, expressed interest in acquiring individual projects or the entire portfolio.

A standstill agreement between Foresight and Harmony was signed in November 2024. A month later (December 2024), HEIT began negotiations with Drax as the preferred bidder for the entire portfolio, with plans to close the deal in February (2025). It is understood that Foresight was the second highest ranked bidder.

Negotiations with Drax took longer than expected, and HEIT announced on 20 February (2025) the extension of the exclusivity period until 10 March (2025). On 11 March (2025), a second extension was announced.

In light of the delays, Foresight engaged with HEIT's board in March 2025 to explore an alternative approach, which resulted in the British group submitting an offer for the entire company for £190.8 million (84 pence per share) on 17 March. The main reason that led Foresight to submit a bid for the firm was the diversification and economies of scale offered by a broader portfolio, enabling better commercial terms and more attractive financing opportunities, the group told IJGlobal.

Drax launched a competing bid of £199.9 million (88 pence per share) on 25 March, which Foresight surpassed with a final offer of £210 million (92.4 pence per share) on 16 April, representing:

- 5% premium to the Drax offer
- 42% premium to the closing price of 65.2 pence per HEIT share on 14 March 2025 (last business day prior to the start of the offer period)
- 94% premium to the closing price of 47.8 pence per HEIT share on 29 May 2024 (last business day prior to the date of the announcement of HEIT's asset sale process)

Foresight's offer also stipulated that, following the closing of the transaction, PP BidCo would negotiate with Harmony Energy Advisors over the terms of an asset management agreement for the provision of asset management services to HEIT, replacing existing management agreements. The details of this agreement remain undisclosed.

Drax confirmed on 21 May (2025) that it would not submit a new bid, paving the way for Foresight to acquire the company.

With the acquisition of HEIT, Foresight now manages a diversified portfolio spanning 451MW of operational BESS assets, 99MW under construction, and 306MW in pre-construction.

HEIT's board of directors announced that it would recommend shareholders vote in favour of the scheme. Additionally, Foresight obtained several irrevocable commitments from various HEIT shareholders, including those of:

- Harmony Energy – 12.04%
- PrimeStone Capital – 11.44%
- Newton Investment Management Limited – 3.15%
- Nicholas Norman Cournoyer – 3.02%
- Ritchie-Bland Energy – 2.63%
- Church House Investments Limited – 1.50%
- Trinitybridge Limited – 1.15%
- Peter Kavanagh – 1.19%

The board announced on 30 May (2025) that the scheme had been approved by the majority of shareholders at the Court Meeting and the General Meeting.

The High Court of Justice in England and Wales sanctioned the scheme on 13 June, and following registration of the court order at the Companies House on 17 June, the transaction became effective, with Foresight's funds through PP BidCo — the SPV created by Foresight on 21 March (2025) — acquiring the company for £210 million:

- Blackmead – £107 million (51% stake in PP BidCo)
- FEIP II – £103 million (49% ownership in PP BidCo)

Foresight's Jemma Sherman, David Weeks and James Williams were appointed to HEIT's board of directors on the same day (17 June).

Towards a pan-European BESS portfolio

With the acquisition of HEIT, Foresight now manages a diversified portfolio spanning 451MW of operational BESS assets, 99MW under construction, and 306MW in pre-construction, strengthening its position in the UK while providing a foundation for expansion into Germany, Italy, Spain, and select opportunities across the Benelux and Nordic regions.

Looking ahead, Foresight intends to explore all avenues to enhance HEIT's value, including operational efficiencies and route-to-market optimisation. While specific details of future debt facilities remain confidential, the group will look to refinance the portfolio in time, after potentially adding floor schemes or tolling agreements to some of the projects, IJGlobal revealed in July (2025), in order to optimise the portfolio's capital structure and unlock further investment capacity.

Advisers

Advisers to Foresight include:

- RBC Capital Markets – financial
- Ashurst – legal
- Aurora Energy Research – due diligence

Advisers to HEIT in the company sale process:

- Panmure Liberum – financial
- Gowling WLG – legal
- Mazars – fair valuation
- Aurora Energy Research – due diligence

Adviser to HEIT in the portfolio sale process:

- JLL – financial

NORTH AMERICA CASE STUDY

Powered land: investing in renewable real estate, US

Powered land is emerging as an attractive opportunity to generate returns as infrastructure and real estate investment themes converge. By **Thomas Duffell**

The strategy involves acquiring real estate that comes with significant, reliable access to electricity.

La Caisse (formerly CDPQ) recently acquired a stake in Renewa by committing $200 million in primary equity. Renewa is a QIC-backed powered land company that provides long-term capital to renewable energy developers and landowners across the US.

"Several years ago, we looked fairly enthusiastically at US renewable investments, but it was very difficult to make the economics work in 2021/2022. We believed then, and we believe now, in the long-term energy transition story," Arash Shojaie, partner at QIC Infrastructure, told IJGlobal.

"The challenge for us was to find another way to get exposure to that trend, that theme, without necessarily being subjected to the risks that the hype was creating at the time."

QIC made its first investment in Renewa back in 2022, and by August 2023, had announced committed funding of $450 million. In just 3 years, QIC has grown its capital commitments to Renewa from less than $50 million in 2022 to $750 million today.

"You don't need to be a rocket scientist. If you're sitting there holding a lot of land that is doing absolutely nothing for 30-40 years but collecting cash, you're diversified across a number of different projects, you've got land collateral, and you're super senior in the cash flow stack, it really doesn't get any more core than that in our infrastructure classifications," added Shojaie.

In the nascent powered land space, there is not yet enough information on cap rates to compare across the assets, with rates varying widely depending on the risks of the corresponding renewables project and its underlying cash flows.

Renewa already owns the land or holds a ground lease under more than 140 projects in 30 US states and has exposure to approximately 26GW of renewable energy.

"QIC-backed Renewa is unlocking a critical piece of the renewable energy puzzle: access to land. Given the scale and reach of our global renewable energy projects, we see opportunities with their

Renewa already owns the land or holds a ground lease under more than 140 projects in 30 US states and has exposure to approximately 26GW of renewable energy.

NORTH AMERICA CASE STUDY

model," Emmanuel Jaclot, executive vice-president and head of infrastructure at La Caisse, said about the investment. The allocation was made through the investor's Sustainable Land Management strategy, launched in 2020 to support land-focused infrastructure assets.

More than 20 million acres of land in the US will be required to house the solar, wind and energy storage facilities required to achieve the country's net zero commitments, according to estimates in consulting firm Rowland Berger's 2024 report.

Shojaie said he expects Renewa to take advantage of that demand mostly through organic growth but added the company would be an active participant if consolidation opportunities were available.

Also recognizing the powered land opportunity, albeit in Europe, is Stonepeak which this month launched JouleTerra, a European land aggregation platform aimed at building a portfolio of grid-connected sites to support renewables across the region.

The asset manager plans to scale through acquisitions of existing platforms and undeveloped land, securing permitting and grid access prior to development, Stonepeak said in a press release.

Among JouleTerra's first investments is Electric Land, a UK-based developer and aggregator of powered land for renewable and flexible energy projects. The company owns 29 sites with 1.1GW of capacity and has a development pipeline of 9GW across the UK, Ireland and Germany. JouleTerra also acquired a stake in Generia Land, a platform established by Solaria in 2022 to aggregate land for solar, wind and battery storage projects across Spain and Italy.

The joint venture has secured thousands of acres for more than 4GW of renewables and will continue to expand under shared governance. Stonepeak intends to continue to invest behind Generia's strong near-term pipeline of growth opportunities, which is supported by Solaria's broader goals of developing 18GW of capacity for multiple technologies by 2030.

"At scale, this project is the first-of-its-kind internationally, leading the world in the hydrogen revolution. Harnessing the energy of NEOM's abundant natural resources."

Arash Shojaie, partner at QIC Infrastructure

Managing renewables risk

Despite record-breaking growth over the past few years US energy transition efforts today face serious growing pains. Clean energy developers are in a full sprint to break ground on wind and solar projects before pending federal guidance potentially narrows eligibility for tax credits and triggers stricter sourcing rules under the One Big Beautiful Bill (OBBB).

The landmark bill, passed on 4 July (2025), shortens the timeline for wind and solar projects to qualify for the current regime of clean energy incentives.

Beyond the regulatory squeeze, developers are navigating traditional pain points: tariffs, equipment shortages, long interconnection timelines, and tightening power purchase agreement (PPA) pricing.

For powered landowners this can be positive as the scarcity and option value of powered land increases.

Shojaie said, "What we're seeing at Renewa is the sharpest developers are really getting prepared for that race in engaging with us and with the other aspects of their development and construction activities to ensure that once the starting gun [on the safe-harboring rules] is fired, not a split second is wasted.

"If we really don't want to take a lot of these risks, we can just buy the land under an operating farm. It's there, it's functioning, there's really nothing to worry about. But we also have the luxury of surgically moving up the risk curve if and when we feel it is reasonable to do so."

Currently solar powered land projects make up the vast majority of Renewa's portfolio, registering at 82%, with its wind powered portfolio being the second biggest holding at 9%. And while QIC remains bullish on these renewables Shojaie pointed to other power forms for Renewa to bolster returns over time.

"As the energy transition unfolds, and we talk about electrification of mobility, hydrogen, baseload renewables – whether it's geothermal or other things, or carbon capture or direct air capture – the list goes on. None of these things are possible without dedicated land," he said.

And while Renewa and Stonepeak's JouleTerra remain focused on renewable energy powered land there are others who are looking at this trend through a slightly different lens.

Houston-based Calpine Corporation struck an agreement with Dallas-based data center business CyrusOne. The deal secures power, grid connection, and land to support a new CyrusOne data center currently under construction and expected to be operational by Q4 2026.

Rick Peña, executive vice president of corporate development at Calpine, said "This first-of-its-kind project establishes Calpine as a leader in reliable, scalable power solutions for hyperscale customers, leveraging our world-class fleet and powered land capabilities."

The growing overlap between infrastructure and real estate that is being driven by shared themes like energy transition and digitization make powered land deals ever more likely.

More than 20 million acres of land in the US will be required to house the solar, wind and energy storage facilities required to achieve the country's net zero commitments.

LATAM CASE STUDY

New rules and private PPAs bolster renewables, Peru

While the market in Peru remains small for greenfield developments compared to its neighbours Chile and Brazil, the country has been attempting to attract investors, lenders and developers in order to diversify its energy matrix. By **Alix Publie**

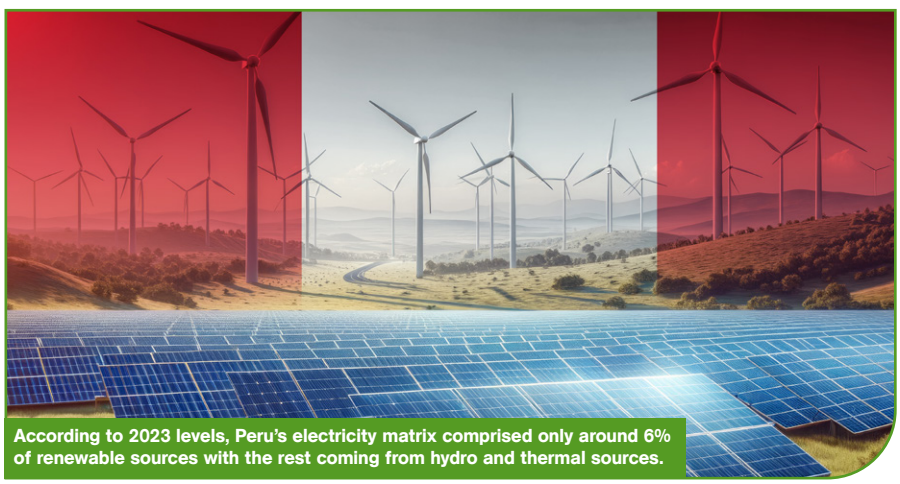
From offering cheaper technology to accommodating legal frameworks, the landscape is changing, which could pave the way for more large-scale renewable developments in the country. "This year has been very good for us in Peru," said an energy and infrastructure director at an international bank. "For the longest time Peru has been oversupplied, so there was no need for operational capacity. But as this starts to change and the demand starts growing, you will have more activity. We do see the country coming back."

Peru possesses ample wind, solar, and geothermal resources. Yet according to 2023 levels, Peru's electricity matrix comprised only around 6% of renewable sources with the rest coming from hydro and thermal sources.

"Everybody has these goals of new renewable capacity and achieving a greener grid. When you look in Peru, there's hydro but in terms of non-conventional, it's very small. There's space to grow. Having capacity awarded to renewables and this possibility of having capacity payment helps [to deploy renewables]," said the director.

Until very recently, locking in a PPA with an offtaker had been a regulatory challenge. Renewable energy from solar or wind sources is not considered "firm" energy because the sources are not continuous and subject to weather changes. This meant power pricing was treated differently, and renewable projects have not been able to participate in supply bids held by distributors.

"When it comes to solar and wind, regulations did not recognize firm capacity, probably due to the discontinuous nature of renewable sources, so those assets could not commit themselves to selling energy at the same level as conventional energy or hydro power (e.g. during off-peak and peak hours)," said Diego Harman, partner at Garrigues, based in Peru.



According to 2023 levels, Peru's electricity matrix comprised only around 6% of renewable sources with the rest coming from hydro and thermal sources.

Regulatory shortcuts

Historically, lenders have been reluctant to provide financing under a project finance structure to a greenfield project without a government-backed PPA.

Over the last year however, Peru has seen a rise of virtual private power purchase agreements, which allow sponsors to bypass some of the regulatory shortcomings and the typical corporate financing structures and actually land non-recourse project financings. The dollar-denominated PPAs usually run for 15 to 20 years.

In March (2024), Spanish developer Solarpack landed a $176.6 million senior financing package for the company's San Martín solar plant. The green financing was syndicated by a consortium of international lenders including Crédit Agricole, Natixis, BBVA and BNP Paribas.

The deal was a milestone in Peru as it was the first PV solar project to receive financing under a project finance structure in more than a decade in the country. This was in large part due to the fact that the project is backed by a private power purchase agreement. The San Martín solar is fully contracted under a long-term PPA with Peruvian generation and transmission company Kallpa Generación.

LATAM CASE STUDY

The San Martin solar plant is the largest solar asset in Peru. Currently under construction in the Arequipa province, the project will have an installed capacity of 300MW. Once operational in 2025, the project is expected to generate more than 819GWh per year. In addition to the senior financing, Solarpack also closed an up to $19 million revolving credit facility with BBVA to fund working capital requirements during the construction of the project.

In November (2024), another significant project followed suit. Malaysia based renewables developer Yinson Renewables secured a $59 million green financing from IDB Invest and Natixis for its Matarani solar project located in the department of Arequipa. The financing was structured as a mini-perm project finance facility. The project has an installed capacity of 97MWp and generates around 260GWh of output per year. It also includes the construction of the Chaparral substation.

As with San Martin, Matarani is fully contracted under a 15-year power purchase agreement with Orygen (formerly Enel Peru). "The key to accelerate renewable energy deployment across Latin America is corporate buyers and moving towards corporate PPAs," said an energy banker at an international bank with operations in Latin America.

But finding a good offtaker can also be a challenge for sponsors in a market like Peru.

"It's difficult to find PPAs not only because the market is relatively small but also because you need to find an offtaker that has sufficient creditworthiness to support a project finance deal. When you structure a project finance deal for one of these solar and wind projects, the credit quality of the project is basically akin to that credit quality of the offtaker. Banks generally only feel comfortable financing projects on a project finance basis if the offtaker is at least investment grade, unless there is some form of sponsor support from a creditworthy sponsor," said Harman.

On 12 December 2024, however, the Peruvian Congress passed a set of bills that seek to amend Law 28832 that establishes the legal framework for the country's generation and distribution of energy in order to make it easier for renewable projects to sell their output.

Among a series of amendments made to the law, there will be a decoupling of the sale of energy from capacity, removing a significant barrier that prevented solar and wind power from executing traditional PPAs with end-users. Additionally, distributors will now be entitled to purchase energy in hourly blocks, effectively allowing all power technologies to compete in electricity supply tenders.

The San Martin solar plant is also the largest solar asset in Peru. Currently under construction in the Arequipa province, the project will have an installed capacity of 300MW. Once operational in 2025, the project is expected to generate more than 819GWh per year.

"It's difficult to find PPAs not only because the market is relatively small but also because you need to find an offtaker that has sufficient creditworthiness to support a project finance deal."

Diego Harman, partner at Garrigues

"One thing that moves the demand a lot in Peru, are mining projects, and you need to mine a lot of the minerals for the energy transition. For a long time, there were a lot of issues that delayed some of those projects. But as some of them start coming in, it translates into a significant increase to the electricity consumption. They are massive projects that require massive amounts of energy," said Jean Valery Patin, head of energy, resources and infrastructure for Latin America at BNP Paribas.

In December (2024), power generation company Celepsa signed a long-term power purchase agreement for 160MW of renewable energy with mining company and Glencore subsidiary Minera Antapaccay. The 10- year agreement will help reduce the company's carbon emissions by 15% by the end of 2026 compared to its 2019 levels.

The Peruvian power generation company Celepsa is looking to implement a 700MW renewable pipeline in the country for which the company secured a $100 million sustainability-linked loan from Scotiabank and Banco de Crédito e Inversiones (Banco Bci) in July.

Brownfield was also dynamic in Peru this year with Actis taking over one of the largest mixed generation portfolios for $1.4 billion. In May (2024), the fund manager acquired Enel's 2.3GW portfolio as Enel looked to exit the country and refocus on its core markets. The portfolio included 12 operating plants and 1 project under construction and comprises hydro, solar, wind and thermal capacity. The fund manager then launched its new energy platform, Orygen, in June.

To finance its acquisition, Actis landed a total of $1.45 billion to refinance the company's acquisition of Enel's generation portfolio in Peru. This included $1.2 billion in a senior secured notes 144A/Reg S offering, a $100 million medium-term syndicated loan and a $150 million revolving credit facility. BNP Paribas, Santander, BBVA and Natixis acted as joint lead arranger and bookrunners on the deal.

As Peru keeps working towards fostering a hospitable environment for renewable investments, the market is turning into an attractive option in the region in 2025 and beyond.

APAC CASE STUDY

Ørsted's Greater Changhua 4, Taiwan

Danish renewable energy developer Ørsted achieved a significant milestone in December 2024 by reaching financial close on its 583MW Greater Changhua 4 Offshore Wind Farm in Taiwan.
By **Manju Dalal**

The transaction - code-named Trinity - marks a first for Taiwan, as it features a substantial local investor, Cathay Life Insurance, raising hopes for increased domestic participation in the country's growing offshore wind sector—the largest in Asia.

"The deal demonstrates that international developers, especially, Ørsted remain very much committed to Taiwan," says Ji Yuan (*featured right)*, head of infrastructure finance, North Asia for HSBC, the foreign financial adviser to the deal. CTBC Bank is the local adviser

Taiwan has over 30 offshore wind farms at various stages of operations/construction. From 2.25GW of capacity in 2023, the country hopes to touch 5.7GW of offshore capacity by this year (2025), despite ongoing geo-political challenges.

Trinity's FC has emerged as a beacon of hope for the sector, especially as Ørsted faces significant impairments in its US business.

In December (2024), Ørsted announced Taiwan's Financial Supervisory Commission (FSC) approval to the NT$27.32 billion ($855 million) investment in the wind farm.

The approval supports the sale of 50% stake in the project to Cathay Life Insurance and its affiliate Cathay Wind Power Holdings, for around DKK11.6 billion ($1.64 billion).

Cathay Wind Power is 99% owned by Cathay Life Insurance, with Cathay Power holding the remaining 1%.

Cathay Life is a subsidiary of Cathay Financial Holdings, who is no stranger to offshore wind sector, having previously invested in Ørsted's Greater Changhua 1 Offshore Wind Farm, through its Cathay Private Equity affiliate. That investment was, however, small.

However, Greater Changhua 4 is the largest so far from a Taiwanese life insurer in the wind power sector.

"Trinity has kicked off a new phase, overcoming many of the hurdles for state-owned banks to start participating in Taiwan offshore wind farms," said Hong Kong-based Yuan, emphasizing the cascading impact of a significant local investor involvement in the deal.

He reckons the transaction achieved several other key milestones, including being the first deal in Taiwan to obtain project financing solely off the back of a corporate power purchase agreement (CPPA).

EPC Wrap

Notwithstanding the unique aspects of Trinity, Ørsted's projects are executed on the back of an unconventional structure that adds complexity for financiers.

For example, Greater Changhua 4 wind farm is owned through a joint holdco, which in return is equally split between Cathay Life and Ørsted.

Until Cathay Life came on board, the state-owned Danish developer used its own funds to start work at the farm.

Cathay became the borrower of the latest financing, while Ørsted structured and led the "EPC Wrap" financing package and provided additional support.

"In this model, project finance loans are typically placed at the investor shareholder level, rather than at the asset-owning project company (SPV) level," said William Wu a shareholder and Head of Taiwan practice at Greenberg Traurig (GT).


Ji Yuan

"The deal demonstrates that international developers, especially, Ørsted remain very much committed to Taiwan."

The international law firm represented Cathay Life in its investment in the Greater Changhua 4 project.

"This (holding structure) creates a level of separation between the financiers and the underlying asset, complicating risk management," Wu explained.

Ørsted's support for the financing process was instrumental, as lenders were able to rely on direct agreements allowing them to step in under specific conditions, such as a default.

Additionally, Ørsted mitigated some risks through project documentation by offering performance guarantees, creating a framework that facilitated the involvement of incoming investors.

APAC CASE STUDY

Financing support

The financing package, signed on 11 December 2024 and followed by financial close the next day, involved 15 lenders in a multi-tranche structure.

The 19-year loan has a repayment period of 18 years, excluding around 20 months of construction.

IJGlobal understands the overall debt and equity financing for Cathay's 50% share is just shy of $2 billion.

Citibank Taiwan and the Korea Development Bank also participated in the financing, which also has a small euro tranche.

About 80% of the financing package is backed by guarantees from 6 export credit agencies (ECAs):

- Credendo
- Export Finance Australia
- Export and Investment Fund of Denmark (EIFO)
- Korea Trade Insurance Corp (K-Sure)
- UK Export Finance
- Taiwanese National Credit Guarantee Administration (NCGA)

For the Danish ECA, exposure to Taiwan's offshore wind market ranks among its top 3 globally while for NCGA this was the first-ever participation in a Taiwan offshore project. According to Peter Boeskov, Chief Commercial Officer at EIFO, the Greater Changhua 4 project marks the sixth transaction the ECA has supported in Taiwan since 2018.

"Taiwan is a very important market in terms of offshore wind resources and the export opportunities it offers for Danish companies," Boeskov said.

The agency's involvement has been critical in shaping Taiwan's offshore wind market, which is fraught with logistical challenges.

"Taiwan has very short weather windows, and you've got to make sure that everything happens on time to avoid any costly delays," Copenhagen-based Boeskov said, adding that their board approval for participation in the project came as far back as February 2024.

The short campaign period that also affected Yunlin and strict local sourcing requirements – which are being eased – have impacted the sector. Ørsted skipped the latest 3.2 auction round.

Over the years, EIFO and other ECAs have played a key role in catalyzing Taiwan's offshore wind sector, particularly as commercial banks and other institutional investors remain cautious.

EIFO was among the first ECAs to back projects in Taiwan, and its involvement in Greater Changhua 4 followed prolonged discussions.

EIFO's earlier Taiwan OSFs investments include:

- Formosa 1
- Formosa 2

William Wu

"In this model, project finance loans are typically placed at the investor shareholder level, rather than at the asset-owning project company (SPV) level."

- Yunlin
- Greater Changhua 1
- Changfang
- Xidao

While the agency continues to participate in offshore wind transactions, it is shifting its focus toward smaller investments.

"We helped get the market going, and we would still like to be involved, but we are probably, for the medium term, looking at participating with smaller tickets than we did in the past," Boeskov said.

EIFO has provided about DKK1 billion ($141.6 million) in the financing for Trinity.

The Greater Changhua 4 project also marks a significant milestone for EIFO. "In contrast to other transactions, this is the first time we're involved with a corporate PPA in Taiwan," Boeskov highlighted.

The offtake structure has evolved in the Taiwan offshore market. In 2024,Northland-led Hai Long project became the first farm to achieve FC backed by a CPPA with Taiwan Semiconductor Manufacturing Company (TSMC), though a PPA from state-owned Taipower also backstops the transaction.

In Greater Changhua 4, TSMC is the sole offtaker.

The following 13 lenders provided $1.2 billion -equivalent of local financing.

Lenders	Allocations in NT$
ANZ, Taipei Branch	2,041,292,725
Credit Agricole CIB Taipei Branch	3,572,262,268
DBS Bank (Taiwan)	2,041,292,726
HSBC Bank (Taiwan)	2,551,615,906
Standard Chartered Bank (Taiwan)	2,957,322,836
OCBC, Taipei Branch	3,061,939,088
Societe Generale, Taipei Branch	1,020,646,363
CTBC Bank Co	3,572,262,272
Taipei Fubon Commercial Bank Co	3,572,262,268
E.SUN Commercial Bank	2,551,615,907
First Commercial Bank	4,037,052,963
Mega International Commercial Bank Co	4,037,052,963
Land Bank of Taiwan	4,037,052,963
Total	**39,053,671,248**

APAC CASE STUDY

Investor shift

As Taiwan's offshore wind market matures, other key trends are reshaping its dynamics. A notable shift is in sponsorship, with domestic players becoming more active, Greenberg Traurig's Wu said.

"The most likely buyers for assets are increasingly local players, signalling a significant shuffle in ownership over the coming years," Singapore-based Wu said.

EIFO's Boeskov also foresees an increasing role for local stakeholders in Taiwan's offshore wind projects.

Local insurers and corporates are starting to play a more prominent role in Taiwan's offshore wind market.

The investor shift comes with operational assets coming back to the market. For instance, in the operational Formosa 2 refinancing, the deal mitigates construction risks. Taiwan's J&V Energy Technology has also taken over Macquarie's stake in Formosa 2, along with other Taiwanese investors.

Also, Ørsted's 2 upcoming wind farms code named Lotus,– Greater Changhua 2a 288MW and Greater Changhua 2b 336MW – will be substantially ready when they will hit the market.

"This simplifies the process of ownership transfer compared to earlier projects like Trinity or Mercury (Greater Changhua 1), which were far more complex due to their stage of development and structure," Wu added.

"This evolution is expected to streamline transactions and reshape the landscape of asset ownership."

Peter Boeskov

"Taiwan is a very important market in terms of offshore wind resources and the export opportunities it offers for Danish companies."

By making substantial investment in the Greater Changhua 4 project, Cathay Life has taken some development risk—a first for a local insurer at this scale.

"This opens the possibility for other international consortiums to partner with local insurers in the future," said Wu.

When asked if the Taiwan offshore market can attract overseas insurers, Wu said insurers, particularly outside Taiwan, remain cautious due to regulatory restrictions and their inherently conservative approach.

"Their risk profiles are designed to limit potential exposures, which poses challenges for entering markets like Taiwan, more specifically for highly complex deals such as an offshore wind project," he said.

For instance, Japanese insurers may still find it difficult to commit to Taiwan's market with large-scale investments.

That said, the presence of insurers already operating in Taiwan is a positive sign. "This can serve as a reference point and help insurers justify their decisions internally, as it's easier to align with a precedent set by peers in the field".

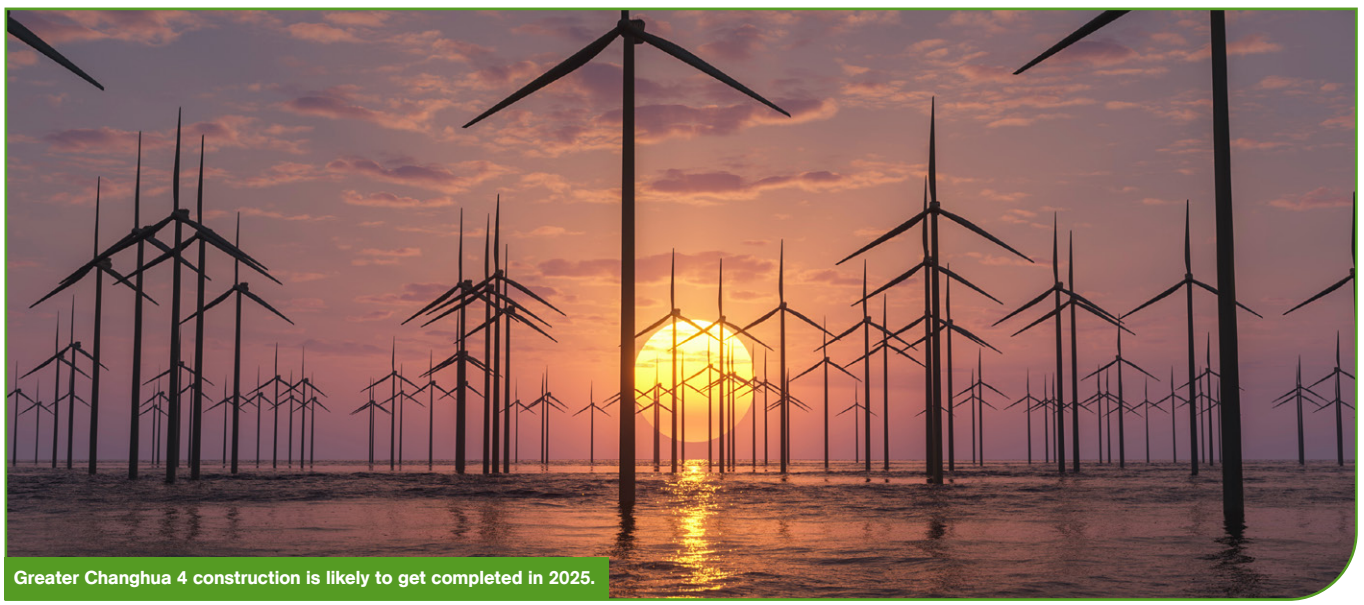
Wu also highlighted the interconnected nature of Taiwan's financial holding structures.

"When an insurer invests in a sector, it can create a ripple effect, making it easier for affiliated institutions within the same group to follow suit".

Greater Changhua 4 construction is likely to get completed in 2025.

Advisers:

- HSBC – FA (international)
- CTBC – FA (local)
- Greenberg Traurig – legal to Cathay Life stake purchase
- White & Case – legal to lenders
- Linklaters – legal to Ørsted on equity divestment
- Gibson Dunn – PF documentation for Cathay Life
- Riskbridge Associates – hedging and market risk to Ørsted



Greater Changhua 4 construction is likely to get completed in 2025.

MENA CASE STUDY

Casablanca's renewable desal plant

As part of a country-wide initiative, Morocco's Office National de l'Électricité et de l'Eau Potable (ONEE Water) inked an agreement with the Al Baidaa Desalination consortium for the flagship Casablanca Desalination Project PPP in May 2025. By **Nathan Alleyne**

Morocco is experiencing its worst drought in over 40 years, straining its agriculture, water resources and economy.

In its January 2023 drought assessment report brief, humanitarian information portal ReliefWeb notes that "Morocco's drought periods have increased in frequency and intensity over the past 2 decades, mainly due to global climate change and water shortage in the country".

"This has caused increasingly severe challenges to the economy, agriculture, and food security, which affects rural and urban households differently," ReliefWeb concludes.

These problems have only been amplified by growing demand due to tourism, industry, commerce and domestic consumption.

In a bid to tackle this issue, Morocco has implemented the 2020 - 2027 National Program for Drinking Water Supply and Irrigation, with reports indicating the programme holds an investment value of around $13 billion.

Located in Sidi Rahal, around 40km south of Casablanca, the Casablanca Desalination Project will provide 300 million m^3 per year of desalinated water, serving 7.5 million people in Casablanca, Settat, Berrechid, Bir Jdid and beyond.

The Al Baidaa Desalination consortium reached financial close for the €613 million ($700 million) desalination plant in May (2025), with it being slated to be the largest in Africa powered entirely by renewable energy.

Morocco's Water Security Push

The Casablanca Desalination Project began taking shape in November 2021, when Morocco's Ministry of Equipment, Transport and Water announced plans for the development of a large-scale seawater desalination plant.

ONEE Water released the tender as part of its Priority Drinking Water Supply and Irrigation Programme in September 2022, receiving a total of 6 responses to its RFQ that July.

ONEE Water prequalified 3 consortia for the project in September of that year, including:

- Acciona, Afriquia Gaz, Green of Africa
- Nareva, Suez, Itochu, CIMR
- IDE, Mitsui, SGTM, SOMAGEC

Three consortia were disqualified:

- ACWA Power, Fipar Power, SEPCO3, Cobra, Lantania
- Engie, Abengoa
- TAQA, Veolia

The Acciona-led Al Baidaa Desalination consortium was announced as the winning bidder in November (2023), with an equity share of:

- Acciona – 50%
- Green of Africa – 45%
- Afriquia Gaz – 5%

Privately owned Green of Africa is a joint venture between AKWA Group and O Capital Group specialising in the development of renewable energy power plants. Afriquia Gaz is an energy supply specialist and subsidiary of AKWA Group.

The Casablanca Desalination Project will provide 300 million m^3 per year of desalinated water, serving 7.5 million people.

MENA CASE STUDY

The desalination process will use reverse osmosis technology entirely powered by renewable energy and is the first in a national pipeline of desalination PPPs aimed at strengthening Morocco's water security and climate resilience through sustainable, large-scale infrastructure.

Spain's secretary of state for trade, Amparo López Senovilla, said at the time of close that the project "not only responds to a vital need such as sustainable access to water, but also symbolises the excellent moment of economic relations between Spain and Morocco, based on mutual trust, respect and growing business cooperation".

With the winning consortium in place and contracts signed, construction began in April 2024 – ushering in the execution phase of a project expected to set a new benchmark in African desalination.

Wind Meets Water

Under the PPP framework, Acciona will take the lead on the DBFOM of the plant for 27 years – not including the 2-year build term – in collaboration with ONEE Water and its Moroccan project partners.

Casablanca Desal will provide 300 million m^3 per year of desalinated water, with around 250 million m^3 earmarked for drinking water for the population and up to 50 million m^3 for regional agriculture each year.

The plant will be operational in 2 phases. The first, scheduled for February 2027, will produce 548,000 m^3 of drinking water per day. The second phase, in August 2028, will bring the total capacity to 822,000 m^3 per day.

Construction of the asset officially began in April (2024), financed by equity from the Al Baidaa Desalination consortium shareholders. Eiffage Énergie Systèmes won the contract to execute full EPC construction of the 400kV substation that will supply power to the desalination asset.

This is the second contract awarded to Acciona's water division in North Africa, following the construction of the Fouka desalination plant in Algeria in 2007.

An essential component of the desal plant is the 360MW Bir Anzarane wind farm in Dakhla, which will dedicate 47% of its output to the new facility, with the remaining being fed into the grid.

Bir Anzarane is being developed by Vinci (70%) and Green of Africa (30%) and reached financial close in April (2025).

The 4.8 billion dirhams ($523 million) asset secured around 3.8 billion dirhams ($414 million) from 3 banks:

- Attijariwafa Bank
- Banque Centrale Populaire (BCP)
- Bank of Africa

Construction for the wind farm has already begun, with the aim of commissioning in Q4 2026. Bir Anzarane is a symbol of the energy transition in Morocco and is part of the Kingdom's aim to increase the share of renewable energy to more than 52% of the national energy mix by 2030.

Financing

The desalination plant's construction will be project financed – structured 80% debt and 20% equity – with around €500 million ($570 million) in debt being provided by a consortium of lenders, including:

- Fondo para la Internacionalización de la Empresa (FIEM) through Instituto de Crédito Oficial (ICO) – €250 million ($284 million)
- Attijariwafa Bank, Banque Centrale Populaire, Bank of Africa – 1.8 billion dirhams ($196 million)
- Société Générale with 80% coverage from Spanish export credit agency Cesce via the Green Investment Policy – €70 million ($80 million)

Spanish multinational financial services company Caixa supported the project with €31 million ($35 million) in financing drawn from the Fund for Investments Abroad (FIEX), tapped to cover part of Acciona's stake in the project company.

Spanish development finance company Cofides also matched Caixa's €31 million ($35 million) loan for the project from its Fund for Foreign Investment (FIEX) and its own funds. It is unclear what the financing has been earmarked for.

The sponsoring consortium also received a €120 million equity bridge loan to support development prior to financial close.

Miguel Ángel Ladero, corporate director of the Cofides investment department, said during the announcement of its investment: "This is an emblematic project for the sector and will be the largest desalination plant in Africa. In addition, access to water is vital not only for health and food security, but also to guarantee development and economic growth.

"With this project, Acciona contributes to addressing water scarcity and the effects of climate change, so it is very gratifying to accompany the company in this operation."

An essential component of the desal plant is the 360MW Bir Anzarane wind farm in Dakhla, which will dedicate 47% of its output to the new facility.

Advisers

Adviser to ONEE Water:

- Synergy Consulting – financial

Advisers to sponsors:

- Deloitte – financial
- Clifford Chance – legal

Adviser to lenders:

- PwC España – financial
- White & Case – legal (international)
- ADNA – legal (local)

Advisers on Bir Anzarane wind farm:

- Clifford Chance – legal

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