ENERGY TRANSITION TRENDS 2024

The energy transition requires a massive and increased rate of investment from both the public and the private sectors. Here we explore some trends which will shape the year ahead, focusing on the innovations and legal developments that we are seeing in clean hydrogen, carbon capture and storage, green fuels, carbon pricing, digital transformation, innovative finance and incentives to mobilise capital.

Climate change, wars and elections

2024 is predicted to be a year of uncertainty: ongoing conflicts in Ukraine and Gaza, disruption to shipping in the Gulf of Suez and tensions rising in the Strait of Hormuz, a vital gateway for the oil industry. With elections looming in many countries – more than half the world’s population will head to the polls this year – governments will be keen to keep energy prices down. The odds of extreme weather events occurring this year are high, with the El Niño effect expected to last until at least April, contributing to temperature increases. This will provide momentum for policymakers to act on their climate pledges.

Following COP28, countries are likely to look at their Nationally Determined Contribution (NDC) commitments and to review their policies to implement the commitments that they have made. The Global Renewables and Energy Efficiency pledge is intended to support the tripling of renewable energy capacity globally and double the global average annual rate of energy efficiency improvements by 2030. While energy efficiency is acceptable politically, it is a complex challenge and progress has been uneven. It also requires action in disparate areas, from housing and construction to transport and consumer behaviours.

There is a recognition that carrots (subsidies) will not be enough and that stronger sticks (essentially a price on carbon) will be needed to meet Paris targets. With countries moving at different speeds, mechanisms such as the EU’s carbon border adjustment mechanism (CBAM), which comes into force in 2026, will be needed to make such costs domestically acceptable. CBAM addresses carbon leakage by imposing an emissions-based levy on imports of certain products, so preventing cheaper high carbon imports replacing more expensive domestic low carbon products. The UK has said it will set up a CBAM in 2027. The mechanism has given rise to controversy, in particular from lower income economies who see it as not being WTO-compliant and unfairly and unilaterally based on the cost of carbon mitigation in Europe. On the positive side, it will encourage some countries to take further decarbonisation measures. It remains to be seen whether there will be US reaction to CBAM.

We should also expect to see a continued blurring of policy at the intersection of climate change, national security and increased economic protectionism. You can read more in our briefing: Energy Transition: Energy security, affordability and the impact on climate change.

Governments looking to improve the resilience of their economies through national security policies are seeing climate change as an acceptable lens through which to introduce subsidies and tariffs. With globalisation no longer the dominant economic trend this is likely to lead to increased protectionism in domestic policies.

What is happening with hydrogen?

Clean hydrogen has an important role to play in energy transition efforts. The hype around clean hydrogen is subsiding and a focus on viable, sustainable and ‘ready-to-go’ use cases should continue in 2024, along with continued clarification of regulations. This in turn should lay a foundation for clean hydrogen investment, with a wide range of strong investors positioning to capitalise on opportunities, both in the short term and through to
2030, including in markets traditionally dominated by oil and gas. There are some clear signs of progress:

- **More price discovery**: there is now good data on levelised cost of hydrogen (LCOH) trends, and this will be even better in 2024.
- **Established use cases**: Green steel has emerged as an established use case. Refineries, petrochemicals and other industrial end users offer similarly ‘ready-to-go’ use cases. We expect to see more final investment decisions in these areas.
- **Long-haul trucking and buses**: Hydrogen producers are using trucking and buses as anchor offtakers. These businesses can scale up as other transport cases emerge, such as shipping and, potentially, aviation, most likely via e-fuels.
- **Electricity suppliers**: the role of electricity retail suppliers in delivering power to hydrogen projects in mature electricity markets will become clearer in 2024.
- **Shipping**: 2024 is the year shipping will become part of the EU Emissions Trading System. We are seeing significant activity around e-methanol and ammonia as fuels for shipping.
- **Export markets**: large-scale production projects in places such as Oman, Egypt, Namibia, Chile, Australia and Saudi Arabia will be driven by the import strategies and subsidy regimes of Japan, Korea and Europe.
- **More “whole system” thinking**: The role of hydrogen and midstream solutions in the power sector will become clearer. It remains to be seen when and how transport and storage emerges on a large scale and how markets can organise to take advantage of curtailed power to feed a large-scale storage system.

We expect 2024 to be a year of significant progress, but there are challenges:

- **Is there sufficient capital?** Estimates suggests that there will be of hundreds of billions of US dollar investment by the end of the decade. Experience tells us that debt markets are capable of providing that kind of money, if parties present bankable cash flows.
- **The regulatory framework**: those bankable cash flows will require a regulatory framework for production, transport and certification. Regulation needs to be consistent on a transnational basis.
- **The supply chain**: Projects need to be timed correctly. In the short/medium term, both GW scale and smaller scale projects are aiming to achieve commercial operation between now and 2028. These projects need to carefully navigate developing global supply chains to procure electrolysers of the right size and at the right time.

The hype around clean hydrogen is subsiding and a focus on viable, sustainable and 'ready to go' use cases should continue in 2024

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The market for CCUS is maturing, but flexibility is vital

While there is a growing consensus that carbon capture, utilisation and storage, or sequestration (CCUS) has an important role to play in achieving net zero emissions, the pace and manner of CCUS market development varies significantly across the globe.

In the US, the market has continued to mature over the past year, coalescing around various aspects of CCUS contractual arrangements and both emitters and sequestration providers becoming more comfortable with their respective obligations. Section 45Q tax credits continue to be the primary driver of CCUS transactions as parties seek to take advantage of the increased value provided by the Inflation Reduction Act (IRA), including (where available) direct air capture (DAC) projects. Despite the general move toward alignment, flexibility in approach remains vital for sophisticated parties seeking to balance available CCUS monetisation and associated risks and liabilities.

The UK government has announced £20 billion worth of support for the CCUS industry and enacted the Energy Act 2023 to provide enabling legislation for emerging CCUS models. Four CCUS clusters have been identified to move forward between now and 2030: HyNet, Teesside, Humber and Acorn. Preferred projects have been identified, business
The anticipated increase in demand for green fuels could lead to supply chain constraints

“models advanced, negotiation of final form agreements is underway, and the market anticipates the opening debt launches by first mover projects in the coming months. Expectations are high for continued tangible progress across the market in 2024. However, a lot of things need to move together, and market and government collaboration is more critical than ever.

By contrast, Europe’s progress has been more measured. Norway and the Netherlands led the way – and have since been joined by other European countries; however, progress remains slower than in the US. This can be attributed to a variety of factors – a less predictable carbon price, different regulatory approaches to mandatory versus voluntary sequestration, nascent regulatory experience at both national and EU Commission levels, the need for open access systems under competition law, and ongoing concerns regarding Emissions Trading System (ETS) liabilities along the value chain. The reliance on government and EU subsidies adds further complexity, particularly for transnational projects. Nonetheless, with the recognition of CCUS’s role in meeting the EU’s climate targets, projects are advancing, funding is becoming available, and innovative solutions are emerging.

Globally, the drive towards CCUS is not only motivated by the potential for tax credits, subsidies and environmental benefits for base products, but also by the desire to enhance the value of existing facilities, secure financing for new developments, and create sustainable fuels and materials. As the market for these sustainable products grows in tandem with supply, the demand for CCUS providers and infrastructure is poised to rise.

Green fuels will take off in 2024

Increased regulatory certainty

The long-awaited EU legal framework for advanced biofuels and renewable fuels of non-biological origin (mostly hydrogen-based synthetic fuels, or e-fuels) was finalised in October 2023 through the revision of REDIII and the adoption of the REFuelEU Aviation and FuelEU Maritime regulations, which apply from January 2024 and January 2025, respectively. The increased certainty and the binding e-fuel consumption and decarbonisation targets should boost demand, and we expect to see more projects coming to market in 2024. Momentum has been gathering in Asia Pacific and is set to pick up further in 2024, although activity will remain varied across the markets. In more developed markets such as Australia, South Korea, Japan and Singapore, policymakers are introducing a combination of blending mandates, targets and sponsorships for pilot projects, which has encouraged regional offtakers and fuel producers to consider opportunities for the development of green fuels in the region.

The new EU framework has binding targets for airlines and fuel suppliers – aviation fuel suppliers will have to blend increasing amounts of sustainable aviation fuel (SAF) with e-kerosene, starting with a 2% minimum blend in 2025 and rising to 70% in 2050. The UK Government has also said that it will implement a SAF specific “revenue certainty” model and has plans for at least five plants to be under construction by 2025 and for at least 10% of jet fuel to be made from SAF by 2030. The UK has a track record of delivering bankable revenue support models, which are targeted and have a tangible impact; for example, the renewables CfD, with similar models for hydrogen production now close to being rolled out. Although the APAC region is lagging slightly behind Europe and the US, driven by more fragmented regulatory regimes and the location of SAF production facilities, more facilities are being commissioned in Asia (notably in Singapore) to assist Asian airlines in adopting greener fuels. Japan is a front-runner in terms of regulatory requirements, with a target of 10% SAF use required for Japanese airlines and international flights at Japanese airports by 2030.

Infrastructure is in place

For e-fuels, such as e-methane, e-kerosene and e-methanol, produced from renewable electricity, CO2 and green hydrogen – in contrast to other clean hydrogen-based products – the necessary infrastructure already exists to
bring them to the end user. For example, SAF can be substituted directly for fossil fuel-based products with no need for any change to the midstream or end user infrastructure, and uptake could be rapid.

**Biofuel feedstock availability and supply**

For biofuels (which are derived from plant material or animal waste), feedstock availability and supply constraints are a significant challenge for production facilities, particularly for those projects seeking third-party debt financing. Biofuels can significantly reduce CO2 emissions compared with fossil fuel-based equivalents, but the list of allowed feedstocks is restricted within the EU due to food security and sustainability concerns. The UK benefits from its existing waste-to-energy and biomass supply chains. The APAC region has a significant number of refiners and more abundant availability of potential feedstock; however, concerns around the robustness of sustainability standards mean that the import of feedstocks or fuels produced in Asia may lead to increased scrutiny.

There are non-edible alternatives – for example HEFA, particularly that made from used cooking oil, is a good potential feedstock – but there is a lack of infrastructure to collect and transport the used cooking oil at scale. Instead, some parties are looking at technologies to allow for the pre-processing of other feedstock to mitigate limited supply availability. There is also a lack of feedstock aggregators.

The anticipated increase in demand for green fuels could also lead to supply chain constraints for equipment and technologies similar to those seen in the hydrogen sector with electrolyser suppliers.

**Flexibility is needed**

The growth in this sector will provide opportunities for investors and flexibility will be needed to take account of the different production methods: (non- SAF) biofuel projects are generally smaller, so M&A and finance transactions in this sector are more likely to be structured on a portfolio basis (sometimes also including district heating or heat-to-power assets connected to the biofuel plants); whereas SAF plants and e-fuel production are typically larger, so the capex costs could be material enough to warrant project financing on a stand-alone basis. Aside from regulatory requirements, sustainability-linked financing structures are driving the adoption of greener fuels in the maritime and aviation industries.

For all of these projects, regardless of technology, ensuring that the plant has access to renewable power to satisfy RFNBO requirements (where applicable) and/or the fuel has the required carbon intensity (with appropriate quality certification) will be key. Looking ahead, the inclusion of products derived from hydrogen in the EU’s Carbon Border Adjustment Mechanism (CBAM) could have an impact on imported fuel products, but there is currently some uncertainty about how to factor in the costs of embedded emissions for such products, which could impact investment decisions. You can read more in our briefing: 10 questions on the EU Carbon Border Adjustment Mechanism.

**Digital transformation to support the energy transition**

Digital technology is being used across the energy sector to optimise energy distribution, manage energy use and facilitate greater reliance on lower carbon sources of energy.

Artificial intelligence (AI) and machine learning software is expected to play an increasing role in enabling the transition to a less carbon-dominated energy system through assisting with management of generation, distribution and demand in order to maintain power system stability. Smart grid usage of AI is being explored for more accurate demand prediction and closer-to-real-time adjustments to generation scheduling, as well as triggering storage of excess energy for future use. Use of AI and connected devices in demand management will also be a continued growth area. Such digital transformations can support a shift to individual domestic and commercial energy customers playing greater contributory roles. For example, we are already seeing retail energy providers...

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**Green fuels - Spotlight on China**

In 2023, China set a goal to produce up to 200,000 tonnes of green hydrogen per year and to run 50,000 hydrogen-fueled vehicles by 2025. Biofuels policies are a priority: feedstock prices are rising, and there are limited imports due to high tariff constraints, but Chinese ethanol fuel production is increasing, as is the importation of biomass-based diesel (BBD). The market for green fuels is expanding. PRC exports surged due to EU demand as China replaced Argentina as the primary exporter of fatty acid methyl ester (FAME) to the EU in the fourth quarter of 2022.

The renewable energy and green fuels market will benefit from these enhanced policies. China relaunched the China Certified Emission Reduction (CCER) scheme in 2023. This is a voluntary carbon market where projects that reduce or capture carbon emissions can earn CCER credits, and companies can use the CCER credits to offset a portion of their annual emissions quota. China has also broadened the scope of its domestic renewable energy certificate scheme to cover all kinds of renewables projects, not only solar and onshore wind. Under the expanded scheme, all renewable energy projects will now be eligible to generate Green Electricity Certificates (GECs), which are then purchased by Chinese companies to certify that their energy comes from renewable sources.

The steady growth in the sector will provide opportunities for investors. However, the market is still facing two main challenges: how to effectively collect, store and transport feedstock in order to achieve production capability, and how to improve manufacturing technology and decrease costs.
In retail energy, the collection, use and sharing of personal data and other valuable datasets from smart meters and IoT-enabled domestic devices will be key to successfully leveraging distributed energy resources. Navigation of privacy and other data laws (such as the EU Data Act) will become a significant focus area for due diligence processes and FDI analysis during both M&A transactions and as part of governance and compliance programmes.

Interest in the use of digital twins in the energy sector is growing. One area of focus will be the use of this technology to improve energy production – for example, by mapping production processes to drive efficiencies and sustainability improvements. Used in combination with IoT devices, digital twins can be particularly powerful for predictive and remote maintenance of energy production assets, such as offshore wind turbines. Given the increasing decentralisation of the energy system and number of interacting assets, we expect that digital twins will also be increasingly used to model and monitor the impact of system changes, thereby informing policy decisions around the strategic decarbonisation of energy.

Digital technology can also play a role in enabling the sourcing of energy supplies – for example, blockchain can be used to establish the provenance of energy resources, including by allowing real-time time-stamping at the point of energy generation to provide transparency of energy origin and (increasingly) its ‘greenness’. We expect that the uses of digital technology to manage ‘greenwashing’ risk will increase.

The increased role of digital technology as an ‘enabler’ for certain aspects of the energy transition is likely to result in increasingly complex technology stacks with multiple points of potential cyber vulnerability or supplier failure. Ensuring that the grid and its connected assets are technically secure and resilient to cyber threats will be a priority and in many cases, will also be a legal requirement, particularly for critical infrastructure providers or processors of personal data.

**Blended finance techniques will continue to produce innovative solutions**

The strategic use of public money and development finance to reduce risk is critical to mobilising private capital on the scale required to address the energy transition funding gap. Blended finance structures are particularly useful for ensuring that the least developed countries have access to the finance required to enable them to achieve their climate ambitions. There has been increasing international momentum behind expanding the capacity of multilateral development banks and finding ways to better utilise international commitments. There are now a good number of examples of structures being deployed to help governments make funds available in different ways to attract investors. We have seen development banks providing subordinated debt, guarantees, liquidity facilities and acting as cornerstone investors, to incentivize the private sector. However, blended finance has struggled to grow, as projects are bespoke and their structures are often complex. Blended finance can catalyse private sector investment, but more is needed. A number of initiatives were announced at COP28, often combining the public and philanthropic sectors. You can read more in our briefings: **COP28: What it means for businesses** and **Funding the energy transition: Mobilizing private finance for net zero**.

Innovative approaches such as debt-for-nature and debt-for-climate transactions provide an opportunity for host governments to support domestic climate initiatives while reducing debt service costs. These structures are versatile and can be applied to different objectives. More is needed, and as more transactions are executed, the challenge will be to standardise these structures so that they are more easily accessible. You can read more in our briefing: **Debt-for-Nature Swaps: A New Generation**.
Governments and investors are also using the development tools that have been successfully deployed in the past to finance renewables and other critical infrastructure projects for new technologies and sectors. However, there is no “one-size-fits-all” approach for a successful energy transition project, and increasingly the momentum building behind high-profile pathfinder projects challenges transaction parties to be more flexible in their approach in order to get projects over the line. This will help to build precedents for well-structured projects and solutions and provide opportunities for investors of private capital to create value.

Despite market disruption, private capital investment remains resilient

Higher priced debt and increased costs of nearly everything else will continue to disrupt M&A markets and make the deployment of investment capital challenging in the intermediate term. However, we expect that investment in sectors exposed to the energy transition will remain resilient, driven primarily by strong demand for clean energy generation and decarbonisation solutions, increasing need for “brown-to-green” investment, and continued investor appetite to allocate capital to this space. Some of the features we expect to see in the year ahead include:

• deal maker creativity bridging the gulf between buyer and seller expectations (primarily on price) through tools such as structured equity that protect buyers against downside risk or earnouts that delay sellers’ realisation of full value until development pipelines take shape;

• emerging technologies that were seen as niche or untested just a few years ago, now consistently attracting the attention of the world’s largest financial investors with more landmark, large-scale M&A transactions in areas such as utility-scale batteries, carbon capture solutions, the EV battery supply chain, and large bets on brown-to-green transformations of industrial giants; and

• national regulators increasingly referring to net zero and decarbonisation considerations when clearing transactions; for example, Australia’s ACCC expressly noting the likely benefits of the accelerated rollout of renewable energy generation (and such benefits outweighing competition and other concerns) when approving Brookfield’s (ultimately unsuccessful) proposed takeover of Origin Energy.

Last year was challenging for fundraising, with longer closing periods, strong competition for capital and many Limited Partners looking to consolidate the number of General Partner relationships they are managing. Energy transition and renewables strategies have featured among the more resilient asset classes, in particular with increased demand for sustainable and transition-focused infrastructure debt strategies. Consistent with the interest in maturing technologies referred to above, we also have seen more specialist products being launched, focused on hydrogen or CCUS, for example, as well as more differentiation within renewables strategies (for example, dedicated offshore wind product lines in addition to generalist renewables strategies). We have seen a slight increase in open-ended and semi open-ended fund products seeking to address the expected funding profile and long-term nature of some of these investment strategies, and as well as bespoke features in closed-end fund products designed to address the challenges of matching asset funding needs to the periods in which investors expect a return of their investment. In 2024, we expect to see continued interest in infrastructure debt strategies in the energy transition space, and we anticipate it being a buoyant year for infrastructure secondaries across the board.

Government incentives and mobilising capital

Governments are now implementing the incentive policies that they have enacted in the past couple of years. The measures taken by the US – the Inflation Reduction Act (IRA) and the Bipartisan Infrastructure Act – to improve its economic competitiveness, innovation and industrial productivity, prompted the EU to respond with a package of legislative and regulatory reforms. These include the Critical Raw Materials Act, the Net Zero Industry Act and the European Hydrogen
Bank which will be implemented in 2024, but we will not see new legislative proposals given the upcoming EU elections and the end of the mandate of the current EU Commission. However, there are some recent measures which are likely to have an impact:

- Under the EU’s recovery plan, Next Generation EU (NGEU), 37% of the EUR 672.5 billion Recovery and Resilience Facility (RRF) will be spent on climate-related objectives, while an overall climate target of 30% applies to the total amount of expenditure from the long-term EU budget for 2021-2027.
- In 2023, the EU Commission’s proposal for an EU Sovereignty Fund that would offer fresh cash was not approved by the Member States and was replaced by the Strategic Technologies for Europe Platform (STEP), which instead relies on the reallocation of funds under existing EU instruments and on an additional budget of EUR 10 billion. Overall, the Commission estimates that STEP could leverage up to EUR 160 billion of investment, of which EUR 110 billion would be triggered by the additional budget.
- The European green bond standard was created in October 2023. The proceeds from European green bonds must be invested in economic activities that are aligned with the EU taxonomy for sustainable activities.
- The Commission aims to accelerate and simplify the award of green subsidies, by adopting a targeted amendment to the General Block Exemption Regulation (GBER) and extending the applicability of the Temporary Crisis and Transition Framework until 31 December 2025.

Meanwhile, in the US, the Department of the Treasury and the Internal Revenue Service have announced new regulations to implement the clean hydrogen production tax credit envisaged under the IRA. Ease of compliance with these regulations will be a determining factor for the size and scale of the US hydrogen market. You can read more in our briefing: Focus on Hydrogen: Proposed regulations for clean hydrogen tax credit.

However, we expect to continue to see concerns about national security, energy security and control of supply chains, including limiting reliance on raw material imports, impacting investment flows. In the US, for example, two separate measures, one designed to block imports and the other focused on foreign investments in the US, have come into play. Under the Uyghur Forced Labor Prevention Act (UFPLA) goods, notably silica products and solar panels, are being detained by the US Customs and Border Protection Agency (CBP) on a rebuttable presumption that they have a connection to forced labour. With regard to investments, the Committee on Foreign Investment in the United States (CFIUS) is reviewing national security implications of investments by foreign entities into US companies and operations, including those directly related to the energy sector, including, for example, electric power generation, natural gas pipelines and renewable energy storage.

And of course, there are the US general elections in November – would a new Administration and/or Congress walk back or double-down on energy transition initiatives? There is good reason to believe that some of these job-producing initiatives would survive the politics, but an affirmative prediction on that point is difficult to make at this time. What we do know is that certain investors may be waiting for additional guidance from the U.S. government following the election before making further investments in the energy transition space.
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