ALLEN & OVERY

Perspectives on the energy transition in emerging markets

Emerging markets across the Middle East, Africa and Asia

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Much has been made of the need for a just energy transition, where developing economies are supported to achieve Net Zero. But there's also a vast amount of climate innovation taking place outside the West that has the potential to deliver global benefits. Here, our teams share a range of perspectives on the energy transition in emerging markets. By Joe Clinton.

A global challenge with regional nuances

The challenges involved in delivering Net Zero look very different depending on where you are in the world. In the West, one of the primary tasks facing governments is how to create the right policy incentives to accelerate private investment in low-carbon infrastructure. Political leaders in emerging markets have a different set of priorities, from fostering economic development to improving standards of healthcare and education – as well as tackling some of the worst effects of climate change itself.

This divergence has given rise to plans such as the Bridgetown Initiative, through which the government of Barbados is hoping to "reform the global financial architecture" in support of climate investment in developing economies. It also formed the backdrop to COP27 in Egypt, where the just transition – the role of developed nations in helping poorer countries decarbonise their economies – topped the agenda.

The conference ended with a historic agreement to establish a "loss and damage" fund through which Western governments will help vulnerable countries respond to climate disasters. Since then, there has been intense debate around how best to leverage public money to support Net Zero in the emerging markets, culminating in COP28 in the UAE.

Exploring the different perspectives

Allen & Overy is one of the world's leading advisors in energy, natural resources, renewables and infrastructure. We have been at the forefront of some of the most innovative and impactful transition projects in the world, delivering everything from solar to wind, hydro, geothermal, biomass and waste-to-energy.

In recent years, we have advised on the development and financing of one of the world's largest carbon capture facilities, as well as a first-of-its-kind green hydrogen and green steel project.

This report features the perspectives of our global team on some of the issues that will define the energy transition in emerging markets. Our authors work in different sectors, geographies and product lines, each giving their own take on a topic associated with their practice.

It is a stark reminder that energy transition is relevant to every one of us, even if we might approach, or even define, the problem by looking at it through our own lens.

Taken together, the articles paint a picture of how nations from Africa to the Middle East to Asia are approaching decarbonisation and the individual challenges they face. We address themes from the evolution of carbon markets to the electric vehicle battery sector and the importance of hydrogen and ammonia in the transition agenda across Asia. In Africa, we look at the role of renewables, financing challenges, its hydrogen potential and why there is a real reason for optimism. The report also addresses global themes that will help create a transition pathway that supports economic growth alongside reducing emissions, such as the development of sustainable aviation fuels.

Gulf states prove a nexus for technological development

With the UAE the host for COP28, many of the articles examine what Net Zero means for the Gulf states. We explore efforts to develop carbon capture and storage at scale in Saudi Arabia, the prospects of the region becoming a global producer of green hydrogen, and how the UAE's construction boom is helping produce some of the cleanest real estate in the world.

Elsewhere, we look at the role of Islamic finance in delivering a just transition, explore the emergence of sustainability-related financial regulation in the UAE, and take a closer look at Net Zero priorities across several post-Soviet states – some of which have vast fossil fuel reserves while others rely on creaking Communist-era infrastructure to deliver their power.

Innovations could deliver global benefits

What is clear is that the energy transition in emerging markets is about more than requests for financial support from richer nations. Indeed, our teams have identified examples of world-leading innovations that have the potential to help developed countries to decarbonise their own economies – including significant investments in CCUS that could turn the Middle East into a global carbon sink and how offshore wind has a key role to play in the energy transition agenda in emerging Asia.

We hope you enjoy the insights in this report. If you would like to discuss any of the issues raised – or another energy transition-related challenge – we would be delighted to arrange a session with our experts.

Middle East

Carbon capture and storage – challenges and potential in the GCC

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While renewable generation and electrification will be responsible for the bulk of emissions reductions globally, they won't be able to reduce emissions to Net Zero alone and CCS will need to be part of the story

Carbon capture and storage is increasingly being put forward as a key part of reaching Net Zero. As the technology, regulation and market strategies evolve and new projects are commissioned around the world, Joe Clinton and Mike Campbell assess whether the GCC can be a key player in capturing, storing and putting CO2 to new uses and how this new industry might develop in the region.

What is CCS and what does it involve?

Carbon capture and storage (known as CCS or simply carbon capture) is a way to make fossil fuel industrial processes cleaner by collecting carbon dioxide that would otherwise be emitted into the atmosphere and pumping it deep underground into depleted oil and gas reservoirs and saline aquifers, where it ultimately turns into rock and does not contribute towards climate change.

The processes and the basic technology are well proven and were originally developed decades ago by the oil and gas industry to improve efficiency of extraction by injecting carbon dioxide into subterranean oilfields to increase field recoveries, a process known as enhanced oilfield recovery (EOR).

EOR has formed the use case so far for most of the world's existing commercial carbon capture facilities but the idea of permanent sequestration of CO2 underground for the sole purpose of reducing carbon emissions was first floated in the late 1970s and put into practice commercially in the 1990s. Since then, the CCS industry has seen various false starts but is being increasingly proposed as a key part of reaching Net Zero by 2050.

The key public concern is around CO2 leakage and here geology is key: provided sites are chosen and operated responsibly, the risk of leakage and seepage of carbon dioxide is minimal, with one study estimating an upper bound for diffusive migration at 'a few millimetres to a few centimetres on a 1,000-year time scale'[1]. The Intergovernmental Panel on Climate Change (IPCC) also concluded as far back as 2005 that 'the fraction retained in appropriately selected and managed geological reservoirs is very likely to exceed 99% over 100 years and is likely to exceed 99% over 1,000 years'[2].

[1] Kivi, I. R., Makhnenko, R. Y., Oldenburg, C. M., Rutqvist, J., & Vilarrasa, V. (2022). Multi-layered systems or permanent geologic storage of CO2 at the gigatonne scale. Geophysical Research Letters, 49, 2022GL100443. https://doi.org/10.1029/2022GL100443
[2] https://www.ipcc.ch/site/assets/uploads/2018/03/srccs_summaryforpolicymakers-1-1.pdf

Carbon capture's vital role in decarbonisation

While renewable generation and electrification will be responsible for the bulk of emissions reductions globally, they won't be able to reduce emissions to Net Zero alone and CCS will need to be part of the story.

The IPCC[3] predicts storage of up to 800GtCO2 and sees 'rapid deployment' of CCS as characteristic of 1.5C pathways, and the International Energy Agency (IEA) sees a growing role for CCS in the race to decarbonise, estimating that it could account for some 15% of the cumulative reduction in carbon emissions that must be implemented[4].

Crucially, CCS can play a central role in decarbonising so-called 'hard to abate' industries such as steel, chemicals, fertiliser and cement production.
These sectors are difficult to decarbonise with electrification and renewables alone, partly because they often have extremely high heat energy requirements and partly because around a quarter of emissions from industrial processes come from chemical processes that are difficult to avoid. CCS will work with existing fossil fuel heat processes and can capture those other process emissions.

Picking up pace but more progress needed

The need for widespread CCS is clear but progress so far has been relatively slow. Today there are almost 40 commercial carbon capture facilities up and running globally, with a capacity to capture and store more than 45m tons of CO2 per year[5]. This is a drop in the ocean compared to the 36.8 billion tons[6] of CO2 emitted in 2022 from energy and industrial processes. The pace is now picking up and another 200 facilities are planned or in active development (lifting capacity to nearly 300m tons per year), but this is still a fraction of what will be needed to meet the Net Zero target.

In a 2022 report, consultants McKinsey & Company argued that CCS uptake will need to increase by a factor of 120 by 2050 to achieve that goal, with annual investment rising sevenfold to USD150bn in that time.

Encouraging investment on this scale will be a mighty challenge, requiring massive public and private sector financing, accompanied by some far-reaching regulatory change, further improvements in the effectiveness and cost of capture, transportation and storage technology, and innovative market reforms to make CCS a viable decarbonisation tool.

The key challenge to the development of a large CCS industry is a financial one. While EOR provides a business case for pumping CO2 underground, there is no equivalent case for long-term sequestration: currently it is cheaper to emit carbon dioxide than it is to pay to store it and government incentives are needed to overcome this hurdle.

We are seeing progress on many of these issues around the world, but these are still early days and there is a long way to go.

Recent developments globally

The IEA reported:

– the U.S. unveiled major incentives for CCS project development, such as new funding from the 2021 Infrastructure Investment and Jobs Act and improved CCS tax credits from the 2022 Inflation Reduction Act;

– the EU introduced the Net Zero Industry Act in March 2023, setting a 2030 goal of injecting 50 Mt CO2/yr through CCS and streamlining the permitting process for CCS projects;

– the UK announced GBP20bn in its Spring Budget 2023 for the early deployment of CCS projects;

– Indonesia became the first country in the region to adopt a legal and regulatory framework for CCS in March 2023, enabling CCS activities to proceed; and

– in China, three new projects came online in 2023, while Japan chose seven potential projects for funding to help them reach commercialisation.

[3] https://www.ipcc.ch/sr15/
Rogelj, J., D. Shindell, K. Jiang, S. Fifita, P. Forster, V. Ginzburg, C. Handa, H. Kheshgi, S. Kobayashi, E. Kriegler, L. Mundaca, R. Séférian, and M.V. Vilariño, 2018: Mitigation Pathways Compatible with 1.5°C in the Context of Sustainable Development. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 93-174, doi:10.1017/9781009157940.004.
[4] https://www.iea.org/reports/about-ccus
[5] https://www.iea.org/energy-system/carbon-capture-utilisation-and-storage
[6] https://www.iea.org/news/global-co2-emissions-rose-less-than-initially-feared-in-2022-as-clean-energy-growth-offset-much-of-the-impact-of-greater-coal-and-oil-use

A lens on the Middle East

The GCC already has several significant carbon capture projects in operation, including Qatar's 2.2 Mtpa LNG liquefaction operations in Ras Laffan, Abu Dhabi's 800Ktpa Al Reyadah steel project in the UAE and the 800Ktpa Hawiyah NGL CCS project in Saudi Arabia. Those three alone store around 3.7m tons of CO2 per year, making up a significant proportion of the world's current storage capacity. There are other facilities capturing carbon on a large scale too, including facilities in Kuwait, Qatar and Saudi Arabia which, instead of storing it underground, use it in other processes (including in the food and beverage industry and the production of urea and methanol): this is known as carbon capture and utilisation (CCU).

While there is a firm foundation for CCS and CCU in the region, there are plans for millions of tons of new capacity to be developed. All GCC countries have either included the use of carbon capture in their national determined contributions to meet their Paris Agreement commitments or else included it in their official Net Zero strategies. Some of the region's leading state-owned national oil and gas companies (NOCs) have also made carbon capture a key pillar of their individual sustainability strategies and large projects have been announced in Qatar, Saudi Arabia and the UAE. This focus on CCS in the GCC is for two main reasons: first, there are clear benefits to developing CCS infrastructure for the region's hydrocarbon exporting economies and, second, the region is well suited to CCS.

The benefits of carbon capture storage

CCS offers many benefits for GCC countries, including the possibility of reducing emissions from oil and gas production, which are already low compared to other producers, to stay ahead of the competition as customers demand ever cleaner energy and decarbonising the GCC's 'hard to abate' industries so they can be competitive in increasingly regulated markets while still allowing exploitation of the region's plentiful and accessible gas reserves. There is also the possibility of exploiting those gas reserves cleanly to create low carbon blue hydrogen by applying CCS to existing carbon-intensive H2 production processes. Finally, CCS can form an industry in its own right, allowing GCC countries to develop proprietary technology and specialist skills and creating employment opportunities for GCC nationals.

An excellent place for carbon capture storage

The Middle East region has natural advantages when it comes to implementing CCS, including geology ideally suited to storing carbon deep underground in saline aquifers and depleted oil and gas fields at depths of 800 metres or more. These are prime sites for reliable storage.

These storage sites are also often located close to established industrial zones including Jubail, Ruwais and Ras Laffan, which incorporate pipeline corridors already, and this should make it easier to build pipeline grids to collect emissions from many different emitters and transport them to the storage site, thereby lowering overall development costs and providing a pathway to reducing emissions to wide segments of industry.

The region also has an obvious wealth of skills and experience in building and operating energy infrastructure, treating and transporting gases and in subsurface operations, not to mention a long history of successfully deploying project finance to develop large projects and of providing a supportive regulatory environment for foreign expertise.

Finally, many countries in the region are able to implement new laws and regulatory frameworks and to approve new projects relatively swiftly (in the U.S., delays of seven years for permits are not unheard of).

How will CCS develop in the region?

The shift from EOR to long-term storage seen elsewhere in the world is beginning to play through in the region too. GCC countries have set themselves ambitious decarbonisation targets and have announced large investments and ambitions for CCS. A range of outcomes is possible, from individual projects and partnerships sequestering their own carbon to carbon clusters based in industrial zones.

Industrial hubs and carbon clusters

Inevitably, much of the focus for future projects is likely to be on established industrial areas like those already mentioned, potentially leading one day to significant CO2 grids in industrial hubs across the region, connecting emitters by pipeline to storage sites. This could be similar to the clusters we are seeing planned in the UK and to the networks being developed to link dozens of ethanol plants in the U.S. Under this model, emitters in particular areas could be offered access to transport and storage services in exchange for paying a transport and service fee.

The Middle East region has natural advantages when it comes to implementing CCS, including geology ideally suited to storing carbon deep underground in saline aquifers and depleted oil and gas fields at depths of 800 metres or more

National oil companies (NOCs) at the centre of storage

Given CCS' genesis in EOR, it is no surprise that the region's NOCs have been the key players on large developments so far and, as a result of their expertise, subterranean knowledge, operational ability and centrality to the economies of the GCC, NOCs are likely to remain at the forefront.

Substrata rights are a very sensitive matter for GCC countries and NOC management of underground storage (in particular) may very well be a non-negotiable requirement of GCC governments even if capture and transport can ultimately be put out to tender by the private sector.

We might therefore see state-owned NOCs in each country effectively providing storage as a service to emitters, in contrast to the licence-based storage models seen in the U.S. and the UK, for example.

Economic incentives

As there is no intrinsic benefit to storing carbon dioxide underground, government action is needed to ensure that CCS projects go ahead and emitters are incentivised to capture emissions.

There are many ways governments can do this, from direct capital grants (such as those provided by the UK government) and other forms of direct and indirect subsidies for both capex and opex to tax credits (which form the foundation of the incentive model in the U.S.).

Under a cluster model with storage provided by NOCs, an indirect government subsidy could be provided by NOCs effectively providing their services at a discount as an alternative to direct subsidy to support initial capital costs upfront or over time.

Other incentive measures include environmental regulation and government mandates on emission levels, cap and trade schemes and carbon pricing, which could increase the costs of emitting to make storage more attractive and could be imposed by GCC states themselves (in support of their own ambitious Net Zero plans).

Border adjustments and tariffs in target export markets (such as the EU's carbon adjustment border mechanism or CBAM) and increasing international regulation could also provide a need for GCC producers to capture and store their emissions if they want to continue to compete in other markets with home producers who are required by their own governments to reduce their carbon footprints.

The recent introduction of corporate taxation in many countries in the region has put in place institutions and mechanisms that might one day allow the possibility of providing tax credits to incentivise CCS (perhaps similar to 45Q tax credits under the Internal Revenue Code in the U.S. which currently provides an incentive of USD85 per ton sequestered).

Given that CBAM payments on imports may be reduced by carbon taxes paid in the home jurisdiction, GCC governments may one day take the view that it is better to impose emissions-based taxes themselves rather than see tariffs imposed by other countries.

External financing and expertise

The large-scale operating storage projects in the region so far have been carried out without using external financing. While the GCC's economies can deploy enormous amounts of capital, it is likely that we will see external financing being provided on at least some of the future CCS projects in the region. There is a long tradition of large-scale financings in the GCC to spread the capital cost of large developments and to maximise the impact that available funds can have within the oil and gas industry and across society more broadly.

Beyond providing finance, external involvement is likely to be important in other ways too. There is now a long history in GCC markets of tendering power and water and, more recently, social infrastructure projects to the private sector. Typically these are structured on availability-based tariffs and this might provide a relevant model for capturing and processing emissions and then for transporting CO2 by pipeline.

Foreign partnerships could also provide technology and expertise, as evidenced by MOUs entered into by various NOCs with certain international energy companies, wider industrial companies and CCS technology providers.

Regulation and risk allocation

As noted previously, the risk of leakage and seepage from well selected and managed sites is low. Nonetheless, a clear framework for allocating risk and liability would no doubt be welcome and various GCC governments are working on draft laws to provide clarity. CCS laws in other jurisdictions include criteria for site selection as well as clarifying liability for leakage and seepage, particularly over the longer term, given the intention is for emissions to be stored for many decades, if not centuries.

One way of addressing this latter issue that has been adopted in other countries, including the UK, Norway and EU jurisdictions, is for the state to assume liability for fugitive carbon dioxide for a certain number of years (typically 15-20+) after storage sites are closed and provided certain handover conditions are met, often including the provision of financial support and there being no evidence of any leakage. A similar regime could be introduced in certain GCC countries (though many NOCs could of course comfortably assume these risks).

Clearly a role in addressing the perceived leakage and seepage risk will also develop for insurance providers (including NOCs' well capitalised captive providers) in future as data continues to be collected and the likelihood and impact of risks become ever better understood.

As a final note, the private sector would no doubt also welcome streamlined and fast track permitting procedures to prevent project delays and overall clarity on what role it can play within the sector.

> Carbon capture forms a core part of strategic energy transition planning for the major economies of the GCC

A bright future for carbon capture in the region

Carbon capture forms a core part of strategic energy transition planning for the major economies of the GCC. CCS will allow NOCs to cut their emissions over the coming decades and to maximise value from reserves by being among the most price- and carbon-competitive producers of the hydrocarbons that will continue to be needed in almost all transition scenarios. It also offers an opportunity to develop export industries which can comply with increasingly strict environmental standards and border mechanisms, while continuing to leverage the region's natural gas supplies.

For these reasons, the CCS pipeline in the GCC is only likely to grow.

Low-carbon hydrogen projects – how do you get from concept to financial close?

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Middle Eastern countries have expressed clear ambitions to be leaders in a future global green hydrogen market

As the appetite for giga-scale low-carbon hydrogen projects grows, major questions arise about what it takes to actually get these projects financed, built and into production at a speed and on a scale needed to meet Net Zero objectives. Elliott Sawford, Rachel O'Reilly and Christine Yassa look at some of the key learnings from live projects across the globe.

The spotlight is on the Middle East

Middle Eastern countries, notably the UAE, Oman, Saudi Arabia and Egypt, have expressed clear ambitions to be leaders in a future global green hydrogen market.

Oman's Hydrom (owned by Energy Development Oman) is well underway with its auction process for awarding rights to develop green hydrogen projects in Duqm and Dhofar, and the Egyptian government is pursuing a significant pipeline of projects following the signing of framework agreements with a number of developers at COP27 in Sharm El-Sheikh in 2022.

In addition, many MOUs that could see significant production capacity built in the region have been signed.

But, beyond the basics of a site that offers the right natural resources for lowest cost production and logistics to access global markets, what is involved in moving from concept stage through to financial close on a low-carbon hydrogen project?

What can be learnt from the low-carbon hydrogen projects currently under development?

Three key decisions

Three key decisions made at the outset of a project will be the most significant factors in its journey towards financial close.

(a) **Project perimeter**: The extent to which parts of the production chain are included or excluded from the financing perimeter will greatly impact the risk profile of the project, and its passage towards financial close. For instance, will one project company own and operate the renewable generation facilities, electricity transmission assets, electrolysers and (if relevant) ammonia production assets? If the project is divided into its constituent parts, how will the resulting complex interfaces and "project on project" risk be managed? The consequences of a non-integrated project may be reduced equity and debt capacity and this approach will almost certainly increase the need for detailed due diligence and mitigation, including potentially increased sponsor completion support. On some projects, adopting a "non-integrated" approach is unavoidable for regulatory reasons. In other cases, advantages such as being able to access different pools of liquidity may make the added complexity worth it. In any event, splitting the production chain across different sub-projects will introduce added execution risk and the project timetable will inevitably be extended.

(b) **Offtake strategy**: Much has been written on the topic of low-carbon hydrogen offtake agreements. It is clear that the terms of a project's offtake agreement(s) are imperative in providing the stable and assured cashflows needed to underpin an investible and bankable project. What is less obvious is how to secure such long-term revenue certainty in the context of nascent global demand for hydrogen and its derivatives and an uncertain pricing trajectory and global regulatory environment. Projects that have been able to do so have been able to get to financial close.

In practice, projects are generally following the lead of early LNG models, seeking to obtain long-term contracts with no price reopeners and damages payable for failure to lift. In the absence of a credible green hydrogen price index, investors and lenders will be wary about taking price risks and so pricing models are likely to be based on a "cost plus" approach for the foreseeable future. Different approaches are being taken to adopting single or multiple offtaker strategies, and offtaker types vary from localised use cases through to futures traders and export markets. Aligning interests by inviting offtakers to participate in the project equity is another tool that low-carbon hydrogen projects can use to secure their offtake commitments.

(c) **Construction philosophy and completion support**: Low-carbon hydrogen projects require the combination of multiple building blocks, and thus the procurement of disparate equipment and engineering skill sets. Given the need to procure renewable power energy generation, electricity transmission, battery storage, water, electrolysis, H2 storage, process plant and pipelines/export/bunkering infrastructure, while at the same time minimising construction cost and risk, clarity on the construction philosophy and any sponsor support to lenders needs to be established from the start. The availability of robust completion support will increase debt capacity and facilitate a faster financing process. While there is no single "correct" answer to each of these structuring decisions (the approach to which will largely be driven by project-specifics and developers' appetite for risk), the outcome of these decisions will have a significant impact on the success of a project.

In general terms, the simpler you can make the structure, the easier it is to get these deals to a final investment decision and through to a successful financial close.

The right government support

To make hydrogen and its derivatives a viable alternative to other energy sources, it needs to be cost competitive. There needs to be significant investment in infrastructure and innovation that will lower costs of production through economies of scale and technological improvements. This requires government action. Only with clear policies, regulations and financial incentives from policymakers can the industry succeed.

But the terms of that support are critical. Governments see this as a long-term investment, promising significant and sustainable financial and environmental returns, are far more likely to succeed in nurturing the development of green hydrogen at scale and in attracting investment. This has been most clearly demonstrated through the impact of the U.S. Inflation Reduction Act, the generosity and simplicity of which has re-directed investment and seemingly re-shaped future trade flows of hydrogen and hydrogen derivatives.

Global competition for investment is already fierce and is likely only to intensify.

Projects that can structure themselves to access that support and which benefit from a regulatory and policy environment conducive to speedy development of projects will be better placed to reach financial close.

For example, projects that design their offtake strategies so as to direct their product to Japanese or European markets may be able to benefit from support under the Japanese subsidy programme and H2Global regimes – and while dollars or euros of subsidy per tonne of hydrogen will grab the headlines, the "one-stop shop" and 18-month maximum permitting period envisaged under the Net Zero Industry Act will help hydrogen projects in Europe move more swiftly to financial investment decision.

Alignment of interests

Given the uncertainty that surrounds green hydrogen projects (for example, question marks over their technical performance, a current deficiency in bankability precedent and unpredictable development costs, to name a few), industry players are looking to partner up through joint ventures to promote synergies, share competencies and divide the risk.

Parties may also seek to enter into such joint ventures to benefit from their partner's access to capital. Though the industry is still emerging, there is already some evidence that projects are more likely to reach financial close or final investment decision if parties are able to secure a long-term alignment through participation in equity.

Enhancing available liquidity

The level of government financial support for projects, as well as domestic liquidity, is pivotal in inspiring other investors to join the financing party and critical in getting projects across the line. Obviously, projects that can access a deep and diverse pool of financing, both public and private, have a significant advantage.

In addition, given the nature of the supply chain for green hydrogen projects, there is particular value in including export credit agency (ECA)-supported debt in the financing mix. For example, the biggest manufacturers of electrolysers are located in regions outside the Middle East, most notably in the U.S. and Europe. So where Middle Eastern projects involve key equipment coming from these jurisdictions, ECAs have an important role to play.

The appropriate precedent

Core to an investor's assessment of project risk is the benchmarking of risks to those it has taken elsewhere and on what terms. But what is the appropriate benchmark for early low-carbon hydrogen projects?

Is it closer to a power project with a watertight state power purchase agreement and tight debt service cover ratios, or a merchant petrochemical project with less risk transfer and more fat in the project economics?

The projects more likely to achieve financial close will adopt a clear and consistent view to project risk allocation and financing terms that enable the application of orthodox credit decision-making. The even more successful projects, however, will structure themselves to get the best of both worlds.

Ability to deal with new issues

This remains a young industry with players on a steep learning curve in terms of technology, regulation, risk calculation and deal structuring. Successful projects will need to overcome a number of new issues that have not been worked through before, and on which there is no "go-to" precedent.

For example:

(a) How green is my hydrogen?

In the absence of agreed international standards on what qualifies as "green" hydrogen, projects face a dilemma in making a product that will meet buyers' environmental expectations and/or meet the standards needed to secure subsidies or a "green premium".

In agreeing offtake contracts, project developers and buyers must decide what criteria they will use to judge how green the hydrogen being sold is. Is it best to do this contractually or by reference to some external legal standard?

How then do you take account of changes in regulation and who is best placed to take this risk?

What happens if the product fails to meet an agreed green standard? Does this result in a price reduction? Does the product get reclassified as grey hydrogen and sold on that basis? If so, what is the impact on price, and how does that affect debt sizing? Can the buyer reject the product if it fails to meet the green requirements?

And finally, should parties agree to a process of self-certification, or rely on an independent third party to carry out that process? The latter option is difficult at a time when international standards are only just beginning to take shape. Participants may want the flexibility to pivot to such a standard when it becomes available.

(b) When is the project "complete"?

Reaching agreement over when an industrial plant has reached a required level of demonstrated operations such that committed equity support can be released is a critical question on all projects. In the context of a first-of-a-kind hydrogen or ammonia production plant, this is even more challenging. Do developers have to demonstrate a level of performance from the integrated project, or can they agree to a more modular approach, signing off on the constituent parts, from renewable supply, through to production, export, and sale?

(c) What should the electrolyser supply terms be?

Funder expectations as to performance warranties and long-term service provision for renewable generation equipment is well established. This is not the case for energy transition supply chains, including electrolysers where the size of the market is expected to grow to USD3.7 billion by 2032.

Manufacturers of electrolysers sometimes argue that they do not yet have sufficient data on which to base an offer of extensive warranties, although this issue should change as the technology matures. Developers may also look for far greater flexibility in the long-term servicing arrangements for such equipment so that they can take advantage of future improvements in the technology and potentially reduced prices down the line, possibly by switching to alternative suppliers as they emerge.

This presents a challenge for lenders, who typically look for far greater financial certainty around these arrangements from the outset, sizing debt and reserves accordingly. It is important for developers and lenders to work with advisors who understand the technology and can translate the challenges it presents into appropriate and realistic contractual arrangements.

(d) Is the water supply a utility or critical feedstock?

The supply of renewable power is a critical factor in any green hydrogen project, but it is not the only one. The supply of water is also a vital element, given that 9kgs of water is required to produce a kilogram of hydrogen.

Typically, water required by industrial process plants is treated as a utility supply, with contracts based on standard terms with limited risk transfer. For hydrogen projects, a key question is whether water should be treated more like a critical feedstock, with supply contracts including remedies for the project developer if there is any shortfall in supply, or if the water is of the wrong quality.

This is particularly the case where desalinated water is used, given that desalination is a carbon-intensive process, so use of water produced in this way will affect the overall carbon intensity of the hydrogen being made and potentially its ability to meet “green” requirements.

Challenges ahead but a bright future

Low-carbon hydrogen could drive cross-sector decarbonisation in transport, industry and power. While hydrogen’s exact role in a low-carbon energy system is hotly debated, we are expecting significant levels of activity in the green hydrogen market over the coming years. It has enormous potential, but we are only beginning to tap into the possibilities. This is a crucial time for the industry’s growth and its impact on the world’s Net Zero goals.

Nevertheless, this is a nascent industry and, despite early successes in getting large scale projects over the financing line, many challenges remain in bringing green hydrogen to scale. Developers, project financiers and buyers of the end product, helped by expert advisors, have many issues to work through if we are to fully exploit the potential benefits of this game-changing clean energy resource.

Low-carbon hydrogen could drive cross-sector decarbonisation in transport, industry and power. This is a crucial time for the industry’s growth and its impact on the world’s Net Zero goals

Building a pathway to green real estate in the UAE

Ian Bevan
Partner – UAE

Ejiro Otu
Associate – UAE

> Now we are seeing the country applying sustainability and environmental standards in its booming construction and real estate sector, adopting regulations that are increasingly compatible with some of the world's most exacting building standards

The UAE is leading the way in the Middle East in incorporating sustainability and environmental standards in construction and real estate. Ian Bevan and Ejiro Otu discuss that there is still more to be done to incentivise green building solutions.

Where sustainability is concerned, the UAE is no stranger to firsts.

By way of example, the UAE was the first Gulf country to ratify the Paris Climate Accord, and the first in the region to commit to reducing emissions in all economic sectors by 2030, while it also took the lead in committing to achieving Net Zero by 2050.

Now we are progressively seeing the country applying sustainability and environmental standards in its booming construction and real estate sector, adopting regulations that, in some areas, are increasingly compatible with – if not identical to – some of the world's most exacting building standards.

In addition, we are seeing some exciting city-scale developments take shape which set a high bar for sustainability, liveability, and environmental design.

The UAE has created a strong base on which to build further, and we fully expect to see real estate and construction regulation continue to develop as the country looks for ways to develop sustainably.

The federal context

Regulatory action on the environment has been taken at both the federal level and within individual Emirates.

At the federal level there has been a focus on laws and regulations to promote energy and water conservation, the roll out of renewables and other measures to reduce greenhouse gas emissions, many of which have been in place for some time.

A Federal Law on the Protection and Development of the Environment has been in place since 1999. This establishes the general principles and obligations for protecting the environment, giving the Ministry of Climate Change and Environment powers to issue regulations around such things as energy efficiency and conservation.

The UAE Vision 2021 and UAE Green Agenda 2015-2030 include national goals for environmental protection, energy efficiency, renewable energy and low-carbon development.

Forward looking targets on reducing CO2, diversifying energy sources, increasing the share of clean power in the overall energy mix, and enhancing the country's resilience to climate change impacts are also included in both the Energy Strategy 2050 and the UAE Climate Change Plan 2017-2050.

Where construction is concerned the UAE Cabinet approved Green Building and Sustainable Building standards to be applied country-wide, as early as 2010. In 2022 the Cabinet approved further measures under a new set of National Building Regulations and Standards, with a target to cut energy use in buildings by 25% and water consumption by 16%.

Action at Emirate level

We are seeing the most decisive action on real estate regulation and standards within individual Emirates, notably Abu Dhabi and Dubai, which have both developed their own standards for green construction and energy efficiency in the building sector.

Abu Dhabi's Estidama is a sustainability framework that includes a rating system for the built environment.

Launched in 2010 by the Abu Dhabi Urban Planning Council, it requires all new buildings and developments to meet and comply with standards in four key areas – environmental, economic, social and cultural. Developments must achieve at least one pearl rating to achieve accreditation, although government buildings must achieve two pearls.

The standards also apply to all existing buildings that are being renovated or redeveloped but do not apply to other existing buildings. Estidama also provides guidelines on the design, construction, operation and maintenance of sustainable buildings and communities.

Dubai launched its Al Safat building rating system in 2016 and it is now the most important standard in the Emirate rating developments based on four categories – ecology and planning; building vitality, energy efficiency, and water; materials; and waste management.

Under Al Safat, all new buildings and developments must at a minimum achieve the Silver Sa'fa rating, although developers can opt to aim for the higher Gold or Platinum rating by meeting more stringent requirements.

The standard puts an emphasis not just on environmental performance but also on innovation in key areas such as use of green technologies and efficient electrical and mechanical systems, all with the aim of reducing energy consumption and cutting carbon emissions.

Standards in action

A number of high profile and large-scale developments in the UAE, involving both government-backed and private developers, show how work to create a greener real estate sector is progressing.

The Masdar City project, started in 2006 and set for completion in 2025, includes a range of academic, commercial, and residential developments where the Estidama Pearl Rating system has been applied. It also includes a number of buildings that meet stringent international building standards. The Siemens regional headquarters building, for instance, was the first LEED Platinum certified office project in Abu Dhabi and is now setting the pace for sustainability standards in the country.

Dubai's Sustainable City – a project led by the private sector group, Diamond Developers – is the region's first community designed to achieve Net Zero. It is built around an integrated sustainability plan covering all aspects of street, housing and amenity design, winning Diamond Developer of the Year at the Smart Build Environment Awards 2022.

The Abu Dhabi Global Market (ADGM) on Al Maryah Island, the first international financial centre to achieve carbon neutrality, includes a four-tower development offering some 200,000 square metres of office space built to exacting international standards. It was the first development in Abu Dhabi to be awarded the prestigious LEED Core rating and Shell Gold Pre-Certification by the U.S. Green Building Council.

International comparisons

While the UAE has made good progress in implementing sustainability standards for real estate and construction, there are some key differences with other markets.

Regulations in the UK are largely mandatory, including building regulations that are enforced by local authorities and energy performance regulations requiring all buildings to have an Energy Performance Certificate when they are built, sold or rented. These mandatory regulations are backed by BREEAM, a voluntary scheme to assess and rate the environmental performance of buildings and covering aspects such as energy, water, materials, waste and pollution.

By contrast most standards and rating schemes in the UAE are voluntary. However, they often closely reflect other international systems, notably BREEAM and the U.S. LEED rating systems, while being tailored to the climate and environmental conditions in the region. For instance, water and energy performance in the Estidama Pearl rating system are given the highest priority and weighting to reflect local environmental pressures. Both Estidama and Al Safat do in most respects compare with the UK's building regulations in terms of the scope and criteria.

In all these jurisdictions regulations and standards are to a large extent dictated by the building stock in the different markets. The UK, for instance, has a mature and diverse building stock and policy therefore focuses on both new and existing buildings, both of which must meet regulations such as the requirement for Energy Performance Certificates.

The UAE's stock is relatively young, so policy focuses mostly on new developments, renovation and redevelopment. It currently lacks any minimum standards for existing stock that is not being redeveloped.

> We are seeing exciting city-scale developments take shape which set a high bar for sustainability, liveability, and environmental design

Challenges to overcome, opportunities to grasp

The UAE has come further and faster than other countries in the region in devising and applying sustainability and environmental standards in its fast-growing real estate sector.

But there are clearly challenges to be overcome.

One obvious area that needs addressing is in applying standards to existing building stock, which is being neither refurbished nor redeveloped. Despite the pace of new development in the country, there still remains a large stock of older buildings and houses that would benefit from more rigorous standards. Greening these buildings will be an important part of the UAE's journey to greater sustainability.

Perhaps the biggest challenge – and therefore the area of greatest opportunity – is around the development of financial incentives and mechanisms to encourage green development. The lack of these is undoubtedly acting as a barrier to sustainable development, blocking developers, owners and occupiers from making greater progress.

The UAE has the chance to develop a range of incentives – including grants, loans, guarantees, tax credits and rebates – which would greatly increase the availability and affordability of green building solutions, including access to innovative technologies.

Unlocking these financial incentives will help to dispel a belief that has sometimes been apparent in the region, as elsewhere, that the cost of transitioning to green construction is too high even though it would propel the country even further and faster on the road to sustainable development.

We fully expect to see such incentives being devised in the years to come and for that transition to accelerate further.

Sustainable lending – a growing role for Islamic Finance and Middle Eastern financiers

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There are clear synergies between key ESG goals and the fundamental principles of Islamic Finance

The aims of ESG investing and Islamic Finance structures are already closely – though not perfectly – aligned. Middle Eastern governments are looking to diversify away from oil and gas. This, Samer Eido and Afsha Karim explain, opens the possibility for Middle Eastern financial institutions to play a much bigger role in financing the transition to Net Zero.

The last few years have seen a steady expansion of sustainable lending practices tied to achieving environmental, social and governance (ESG) goals as the world looks for new ways to meet the huge costs of decarbonisation and sustainable development.

Financing decisions are increasingly focused on matching up the interests of financiers and borrowers with sustainability goals, such as reducing carbon emissions, securing access to clean water and sanitation, promoting social inclusion and diversity, and improving the transparency of governance systems.

This trend is likely to accelerate as the world races to achieve Net Zero by 2050. Some predict that sustainable lending will become one of the biggest, if not the dominant, financing market in the near future.

Middle Eastern governments are increasingly aware of this market potential as they also pursue their own decarbonisation agendas and diversify their economies away from oil and gas dependence. Regional financial institutions also see the chance to develop a whole range of new financial products that not only address the ESG agenda but – in a market where Islamic Finance exerts considerable influence – can also complement the principles-based ethos that underpins the Shariah compliant Islamic Finance practice.

Responsible investment activity has been spurred on by various international climate conferences. The fact that COP27 was held in Egypt and that this year's COP28 will be held in Dubai (the first time that successive COPs have been held in Middle Eastern countries) should give this trend further impetus.

The UAE was the first to join the "Race to Zero", committing to Net Zero by 2050, and Saudi Arabia has set its sights on achieving that goal by 2060.

However, financing the transition to clean and low carbon technologies that are essential to achieving Net Zero remains a significant challenge, requiring huge investment.

ESG/Islamic Finance – identifying the synergies and differences

There are clear synergies between key ESG goals, such as achieving Net Zero, and the fundamental principles of Islamic Finance, including the aim of promoting environmental stewardship, social justice, and economic development.

Philosophically they are closely aligned, with an emphasis on long-term stable investment towards a goal of creating positive and sustainable environmental and social outcomes.

Shariah-compliant finance has, for instance, a prohibition against profiteering from lending, and extra charges on delayed payments often take the form of a donation to charities, often with ESG-related aims.

Beyond pure Shariah compliance, the Arabic word "Tayyib", often translated as pure or wholesome, is increasingly being used in the context of Islamic Finance to align it with the principles of environmental stewardship and social justice.

Where Islamic Finance and ESG investing diverge is mostly around goal setting, with ESG seeking evidence that businesses have a positive purpose, rather than relying on excluding businesses which serve specific prohibited markets, such as the production of alcohol and tobacco, or arms manufacturing.

ESG investing also puts a stronger emphasis on engaging actively with businesses and promoting sustainability through ongoing engagement between the financier and the borrower.

Types of investment targeted by Middle Eastern financial institutions

Three types of ESG-related investment are attracting the attention of Middle Eastern financial institutions: transition financing, green and social financing, and sustainability linked financing.

Transition financing is aimed at businesses with a high carbon footprint that are eager to decarbonise in line with targets set out in the Paris Accord.

This type of investing is still nascent in the Middle East, partly because there is no clear consensus on the criteria for such financings, unlike in green and sustainability-linked deals. However, some examples exist, such as the USD600 million transition Sukuk (or Islamic bond) for Etihad Airways.

Green financing funds specific infrastructure projects with a clear environmental objective, for instance the construction of renewable energy facilities, green transportation, and investments in sustainable water and sanitation.

Where ESG investing is concerned, the Green Loan Principles that have been developed by the Loan Markets Association (LMA) set out conditions that need to be met for projects to be considered "green". Financing documents, for instance, must:

– contain a purpose clause showing how funds will be deployed in a green project;

– identify how the project's green credentials have been evaluated;

– explain how the funding will be disbursed and managed; and

– carry an obligation to report on the project's environmental benefits and to update any certifications to make sure it remains green over time.

We are now seeing these kinds of frameworks being used by financiers in the region. For instance, the Dubai Islamic Bank is just one institution that has issued a Sustainable Finance Framework explaining how it will finance projects on principles similar to the Green Loan Principles.

Bahrain-based Infracorp issued its first green Sukuk to enable more sustainable infrastructure development across the Gulf, North Africa and South Asia, aligning with the market appeal for investments that have both a financial and an ESG impact. There have also been several real estate financings which have incorporated internationally recognised green building standards, such as Leadership in Energy and Environmental Design (LEED), which is encouraging for a region that is developing its infrastructure at an aggressive pace.

> Sustainability-linked financing provides scope for financial institutions to advance decarbonisation

Social financing is similar to green financing but focuses on financing or refinancing activities with a clear social benefit, such as affordable housing, health and education, social inclusion, and humanitarian relief.

Sustainability-linked financing is the area in which we see the most scope for greater involvement by financial institutions and a real opportunity to advance decarbonisation, achieving Net Zero and other sustainability goals in the region.

Rather than being tied to a particular green project, the money invested via this route can be used for any purpose but the conditions of the financing are tied to sustainability related key performance indicators (KPIs) that the borrower must meet and that go beyond current regulatory targets, relating to, for instance, reducing carbon emissions.

Where a borrower fails to meet those KPIs, this would normally trigger a built-in variation in the financing terms, usually resulting in an increase in pricing.

To avoid a situation where a financier might profit from a failure to meet targets by receiving higher pricing, some financiers have pledged to donate any gains to ESG focused charities. As we discussed earlier, making donations in this way is very much in line with Islamic Finance principles.

Majid Al Futtaim's USD1.2 billion sustainability linked financing is a key example of how corporates in the region are embracing ESG as a strategic priority.

This approach to financing the transition to Net Zero and other sustainability goals has obvious attractions, not least that it makes financing available to a wide range of businesses and can strongly influence how companies run their operations and the choices they are making around decarbonisation, offering a real incentive to making progress.

Initiatives already underway

There are clear signs that the shift towards sustainable financing is already underway in the region.

The green and sustainable bond and Sukuk market in GCC economies grew sharply in 2022, reaching USD28.5 billion, as banks and government-related entities increased their issuances. This was a significant jump from the USD605 million issued in 2021.

From a corporate finance perspective, Abu Dhabi Future Energy Company (Masdar) launched its syndicated revolving credit facility – the first "green" RCF in the Middle East.

At a project finance level, an interconnection project – which would allow countries in the region to exchange up to 3,000 MW of power has broken ground. This project included financing of a green loan from an international export credit agency and international banks.

Financings of this nature demonstrate that partnerships between international agencies, investors and financial institutions are vital in getting these critically important projects underway.

Overcoming challenges

Middle Eastern banks and financial institutions need to overcome several significant challenges in order to offer products with an ESG focus on a mass business and consumer level.

One challenge is transparency – there is no real history or culture of reporting on ESG matters in the region, partly due to the shortage of skills and expertise in this area.

However, as the focus on ESG intensifies in the region, particularly in light of COP28, we could see this changing quite dramatically. We expect that COP28 will foster public/private sector partnerships to improve the conditions for sustainable finance practices, which are vital for addressing the challenges of implanting effective ESG practices.

There are a range of internationally recognised standards and reporting frameworks that institutions in the region can lean on to address this challenge.

These include the Global Reporting Initiative and the Sustainability Accounting Standards Board. As banks become more familiar with the Green Loan Principles and the Sustainability Loan Principles published by the LMA, this will also provide a consistent and transparent framework for financiers, borrowers, sustainability coordinators and/or external reviewers to assess, monitor and report on the sustainability impact and benefits of their financings.

Another challenge is the region's heavy dependence on oil and gas as a driver of the economy, despite the ambitious plans of several countries in the region to diversify their economies. As long as this dependence remains high, banks that are heavily reliant on oil and gas revenues will not face the same pressure to finance the transition as international banks with strong retail customer bases, unless there is a concerted effort at a regulatory level to implement ESG-related taxonomies.

The risk of greenwashing and the potential reputational damage and regulatory and even legal action that could also result from exaggerated claims of being "green". As institutions move further into the ESG space, it is essential that financiers and borrowers exercise real care and caution over the green pronouncements they make, ensuring they are factually accurate and, where possible, verifiable.

Building a sustainable financing strategy

So what steps can banks and institutions in the region take to advance sustainable lending? There are many, including:

– from a policy perspective, implementation of ESG standards and certification, as well as lobbying for legislation that will incentivise ESG growth;

– focusing on education to develop talent and the technical expertise in Net Zero accounting and risk management;

– incorporating ESG assessments into all lending decisions as part of the screening and selection process and, from an Islamic Finance perspective, using “Tayyib” criteria;

– looking for impact investment opportunities, directing financing towards projects that generate positive environmental or social outcomes;

– publishing regular reports on ESG performance to increase transparency;

– developing internal policies and processes to guide investment decisions, with an emphasis on creating positive ESG outcomes; and

– collaborating with other financial institutions, industry associations, and international partners and, with respect to Islamic Finance, working with Shariah scholars to create best practice innovative solutions based on common experience and shared ideas.

A major market opportunity

We are in no doubt that the sustainable lending market will continue to grow as institutions and investors unleash capital to meet the demand for trillions of dollars of financing necessary to fund the race to Net Zero and other sustainable development goals.

Increasingly, we see great scope for Middle Eastern banks and, with some adjustment to their already well-established principles-based approach, for Islamic financial institutions to have a significant impact. Middle Eastern financial institutions can play an important and growing role in this dynamic market, not only within the region but also globally, working in concert with like-minded international investors pursuing a compatible ESG agenda.

Middle Eastern financial institutions can play an important role pursuing a ESG agenda

UAE looks to sustainable finance to boost transition

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Regulators, policymakers, investors and financial institutions see that sustainable finance strategies can be the key to mobilising the trillions of dollars of capital needed to decarbonise the global economy

There is a growing awareness and demand in the UAE for sustainable investment opportunities. To meet this demand, Jodi Norman and Will Tunstall-Prince explain how recent reforms are now putting sustainable finance at the heart of the UAE's energy transition strategy.

On the face of it, financial markets and energy transition do not seem like natural bedfellows.

Traditionally there has been a tendency to see financial markets as largely driven by the need to create short-term returns for investors, rather than being a valuable tool in finding long-term solutions to the climate crisis.

However, with increasing focus on the environmental, social and governance (ESG) agenda, perceptions are changing.

It is clear that regulators, policymakers, investors and financial institutions see that sustainable finance strategies can be the key to mobilising the trillions of dollars of capital needed to decarbonise the global economy.

To date, markets like the EU have taken the lead and made invaluable contributions in developing the sustainable finance agenda.

Other jurisdictions are taking action too, however, with the UAE leading the field in the Middle East.

Net Zero and an issue of supply and demand

The UAE was the first country in the Middle East to commit to achieving Net Zero by 2050, a commitment which is being applied to both private and public sector bodies.

In order to meet this deadline, big private sector organisations are beginning to put their own Net Zero plans and policies in place.

Meanwhile, wealthy regional and domestic investors conscious of the need to tackle climate change are looking for opportunities to make a difference and invest in genuinely sustainable financial products.

But these are early days for ESG investing and the demand for sustainable financial products and services currently outstrips supply. While that's the case, there is a clear moral hazard that products will be brought to market which claim to be sustainable, but really do not come close to qualifying for that label.

Regulators are therefore increasingly looking for solutions that will offer investors real certainty that their money is having the positive impact that they want and are taking steps to combat greenwashing by financial institutions.

At the same time, they are trying to balance necessary intervention with the need to stimulate the development of a much wider range of sustainable investment opportunities, acutely aware that overzealous action could stifle innovation and have other unintended consequences.

It's a fine balancing act, but progress can be expedited by the way financial services are governed within the country.

The role of free zones

The UAE has three distinct financial services regimes – two "offshore" regimes located within financial free zones (FFZs), set up in both Abu Dhabi and Dubai, and one "onshore" regime covering all of the UAE outside the FFZs.

The onshore regime is regulated by the Securities and Commodities Authority, and has the look and feel of a more traditional Middle Eastern financial services market.

For the FFZs, the Abu Dhabi Global Market (ADGM) is regulated by the Financial Services Regulatory Authority, while the Dubai International Financial Centre (DIFC) is regulated by the Dubai Financial Services Authority.

The ADGM and DIFC are governed by their own financial services laws and regulations, predicated on English law. The FFZs tend to be more nimble than the onshore regime in bringing about new regimes to cover novel investment products, practices and services.

This is principally due to the FFZs' nature as global and regional platforms for the provision of investment services, where resident firms will more typically be focused on serving an international and sophisticated client base rather than retail clients in need of greater protection. The FFZs are consequently where we are seeing the quickest progress in the development of sustainable finance regimes.

This being the case, we are also seeing efforts to develop best practices between the UAE's three financial services regimes through the Sustainable Finance Working Group (SFWG), which includes regulators, stock exchanges and other relevant public bodies.

The Group provides a platform for collaboration and aims to promote greater regulatory consistency across the UAE. Amongst other things, the SFWG has advanced sustainable finance reforms in the UAE by promoting ESG risk management and governance, and in September 2023 has proposed principles for sustainability-related disclosures made by certain participants in financial markets.

The proposed principles, which are subject to consultation at the time of writing, are intended to represent a common declaration of understanding between SFWG members that will guide the implementation of specific disclosure frameworks within their respective jurisdictions.

The ADGM sets the pace

Whilst many groups in the UAE continue to make valuable contributions to the sustainable finance agenda, the ADGM and its financial services regulator appear to be the current leader in the field. A good example of progress spearheaded by the ADGM's Financial Services Regulatory Authority is its implementation of a new labelling framework for 'green' and 'climate transition'-aligned funds and segregated portfolios.

The labelling framework represents a voluntary initiative for funds or segregated mandate services to demonstrate their sustainable finance credentials by qualifying for either a 'green' or 'climate transition' designation endorsed by the ADGM. To qualify, funds or portfolios must meet certain 'green' or 'climate transition' criteria attached to the assets invested in, compliance with which is verified by a third party.

An applicant must prove that a majority percentage of the assets in the fund are invested in 'green' or 'climate transition' projects as well as meeting a restrictive criteria to not invest in assets deemed to run counter to the fund or portfolio's 'green' or 'climate transition' objectives.

For determining what constitutes an asset that furthers the 'green' or 'climate transition' agenda, it is worth noting that the UAE has not yet developed its own taxonomy of the sort that underpins regulation in other markets.

In the short term, the ADGM has sought to leverage taxonomies already developed elsewhere in the world, and institutions are invited to measure their products against standards and benchmarks that are widely accepted as credible.

Where next for ESG in the UAE?

It remains to be seen whether the UAE will ultimately decide to develop an ESG taxonomy of its own, rather than use existing and credible frameworks developed elsewhere. In our experience, the FFZs are pragmatic and will generally not see value in reinventing the wheel where this comes at the cost of implementing needed regulation quickly.

A key challenge we see is the trend in many markets to view ESG holistically and combine the three elements into one agenda. This may cause problems where investments furthering one of the three elements of the ESG agenda may concurrently run counter to another.

Further, even the most sophisticated regulatory regimes have yet to develop convincing taxonomies, particularly around the 'social' element to ESG. Differences in culture and values may also impede development of a truly global consensus of what constitutes impactful investment on the social level, and could lead to that element falling by the wayside in favour of the 'green' agenda.

Consequently, the question for regulators in the UAE is whether they follow the trend of combining all three elements of ESG in their financial regulations – something that financial institutions will be accustomed to seeing in other markets – or decide to separate the 'E', 'S', and 'G' out into their constituent parts and develop regulation on that basis.

It is an issue that we know regulators worldwide are grappling with, and for our view, on this basis the direction taken in the UAE to first tackle the environmental agenda in isolation is justified.

A more nuanced approach to ESG that separates the three elements and addresses each individually could be an innovative step for the UAE to take. It's one that may potentially avoid some of the pitfalls and trade-offs that have led to what we perceive as a lack of development on the social dimension in other markets.

Whether the UAE will pursue this path, and how it will balance the interests and expectations of its diverse stakeholders, remains to be seen.

Sustainable aviation fuel – on the ascent

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SAF is expected to make the most critical contribution towards decarbonising aviation

As the aviation industry pins its hopes on sustainable aviation fuel (SAF) to achieve Net Zero carbon emissions by 2050, Joe Clinton, Matthew Townsend, Richard Chamberlain and Ying-Peng Chin outline the regulatory, investment and production challenges of taking SAF production to scale and the impact on the Middle East.

The aviation industry continues to recover strongly from the economic shock of Covid-19 – widely seen as the worst crisis in the industry's history.

Now airlines face a challenge that, arguably, poses a bigger threat to their long-term sustainability: the race to achieve Net Zero by 2050, in line with the Paris Agreement.

This is a significant challenge, considering that aviation is a notoriously hard-to-abate sector. Achieving this goal will require advancements in technology, operations and infrastructure. It will also require effective regulations and strategies, including measures to dramatically increase the supply and use of SAF, improve system efficiencies both in the air and on the ground and continuously modernise fleets and develop carbon removal technologies. It is also likely to rely on emissions trading systems and offsetting schemes such as the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA).

In the second half of this century, important disruptive aircraft and propulsion technologies will have a significant impact, including aircraft powered by hydrogen, electricity or hybrid systems. These are, today, in the very early stages of development and their impact ahead of the 2050 deadline is likely to be minimal.

In the short term, SAF is expected to make the most critical contribution towards decarbonising aviation. The International Air Transport Association (IATA), the airline industry's main trade body, anticipates that SAF could contribute around 65% of the emissions reduction necessary to decarbonise the aviation industry by 2050.

For this to become reality, the production of SAF needs to increase sharply – according to the International Energy Agency, SAF currently accounts for less than 0.1% of all aviation fuels consumed. SAF is currently in short supply and is still expensive to produce. To bring the SAF market to scale, massive investment is required across all stages of the supply chain, including upstream renewable energy, sustainable feedstock, refineries and blending facilities, and distribution networks.

Despite these challenges and the fact that SAF production is still in its infancy, we expect to see a significant increase in production in the coming years, as the push for Net Zero accelerates.

The industry prepares for take off

There is strong commitment globally, at an industry level and inter-governmental level, for the aviation industry to attain net-zero carbon emissions by 2050.

Notably, in the last two years, IATA, committed to the Fly Net Zero 2050 programme; and the International Civil Aviation Organization (ICAO), the specialised agency of the UN that sets regulations for the aviation industry adopted a long-term global aspirational goal for international aviation to be Net Zero by 2050.

The ICAO has also adopted CORSIA, an offsetting scheme aiming to freeze global aviation emissions at a baseline. Any emissions above the baseline must be offset by operators through the purchase of offsets or the use of eligible fuels, which include SAFs that meet certain criteria. After an initial period of voluntary application, the CORSIA requirements will become mandatory from 2027 for all international flights, with a few exceptions.

A key role for sustainable aviation fuel

The aviation industry is convinced that SAF will make by far the biggest contribution (65% according to IATA) to decarbonise a sector that, according to the IEA, accounts for 2% of global energy-related CO2 emissions.

It is no surprise that the industry is pinning its hopes on SAF production being brought to a mass scale. SAF is widely designed to act as a "drop-in" replacement for conventional jet fuels, ready to be used without having to modify aircraft engines or fuelling infrastructure.

The demand for SAF is robust and will only increase, considering Net Zero ambition. Most major carriers are already using SAF to some degree as drop in fuels blended with conventional jet fuels. Many airlines have set clear short-term goals to increase their use, with the majority targeting 10% of SAF in their fuel mix by 2030.

However, the deadline for scaling up SAF production is tight, given that this remains a nascent manufacturing process requiring billions of dollars of investment.

The statistics clearly spell out the distance that needs to be travelled:

– Although the airline industry bought all 100 million litres of the SAF produced in 2021, this represented a tiny proportion (just 0.03%) of the total demand for jet fuel.

– Production was increased in 2022 but still accounted for less than 0.1% of demand, and the fuel produced cost between three and five times more to make. Industry players have stated that electricity-based synthetic fuel is currently ten times more expensive than conventional jet fuel.

– To reach the industry's own Net Zero target, it is estimated that nearly 450 billion litres of SAF will need to be produced a year, requiring the construction of many hundreds of production plants.

It is a huge challenge.

Strong impetus for scaling SAF production

The impetus for scaling SAF production is strong – and is getting stronger – with clear incentives to act and equally strong reasons to avoid inaction. These include:

Regulatory factors

– **Regulations bolstering SAF uptake** – Across the globe, jurisdictions such as the U.S., Canada, the EU and its member states, Brazil, China, Japan, Singapore and Indonesia are taking steps to get the SAF industry off the ground.

– **Sustainability reporting and disclosures** – As reforms to sustainability reporting and disclosure regimes gather pace, companies in the aviation supply chain will face greater scrutiny as they come under pressure to be increasingly transparent and precise about their environmental and broader sustainability impacts. Notably, the International Sustainability Standards Board issued reporting standards in June 2023 that require entities to disclose scope 1, 2 and 3 GHG emissions. These standards are expected to be incorporated into the laws of many jurisdictions. The EU, being a front-running jurisdiction in sustainability reporting, has already passed laws requiring businesses to report their material impacts on the environment, including GHG emissions. As more data is disclosed, investors and broader stakeholders will have unprecedented visibility of how entities are progressing towards Net Zero. Those who fail to pursue decarbonisation solutions like SAF will be viewed unfavourably compared to their front-footed competitors.

– **Environmental labelling** – Environmental labelling schemes are beginning to emerge in aviation. In the near future, the EU will likely introduce a voluntary EU label that certifies the environmental performance of flights, on the basis of the expected carbon footprint per passenger and the expected CO2 efficiency per kilometre.

– **Carbon taxation** – The likelihood that increasingly punitive carbon taxes will be imposed to limit CO2 emissions – a threat heard in the EU's proposed Energy Taxation Directive – should act as a significant incentive to move away from the use of fossil fuels in air transport, given the huge potential cost of such taxation on the aviation sector.

Public sentiment and activism on ESG issues:

– Aviation is an industry that is harder to decarbonise than others, so its current share of contributions to global emissions is set to grow as other sectors decarbonise, with an inevitable impact on public opinion. Attitudes to frequent flying among leisure and business travellers alike are clearly changing while the industry's environmental impact remains so significant. Offering passengers the chance to offset carbon emissions from their flights will not be enough.

– We are already seeing some powerful investors adopt activist shareholder tactics to force portfolio companies to decarbonise at a much faster pace, including the threat of withdrawing investment. Climate activists are also likely to continue targeting the aviation industry, particularly as they gain greater visibility of the environmental impacts of individual entities through increased regulatory reporting and disclosures, as discussed previously.

> The aviation sector's current share of contributions to global emissions is set to grow as other sectors decarbonise

The impact on the Middle East

Whilst much of the current regulatory reform and activism is centred in the West, these impacts will ripple through into the emerging markets in two key ways. The first is prevalence of major (usually government owned) airlines in the Middle East in particular whose business model relies on using their home base as a hub for transit passengers. These airlines will need to comply with regulations in the countries they fly to in order to be able to continue to operate in those jurisdictions. As such, access to long-term cost-effective SAF supply will become increasingly imperative to their ongoing business.

Secondly, the Middle East has access to various resources which have the potential to make it a major centre for SAF production. This includes technological expertise gained through its existing hydrocarbon facilities, practical experience of bringing new large-scale industrial facilities to operation within a regulatory and permitting environment that allows this to happen quickly and at scale, and access to abundant renewable energy resources which are required for the production of SAF through the P2L pathway.

Three key challenges

Challenges around regulation, investment and technology need to be overcome before we see SAF production ramp up to the necessary levels and, given the scale of the task, it could take ten to 15 years before we see mass production become anything like a reality.

SAF-related regulations give rise to risks and opportunities

Regulatory authorities and policymakers will play a vital role in incentivising the expansion of SAF supply and end use, the reduction of the cost of SAF, and the enhancement of the sustainability of SAF.

A supportive regulatory environment is likely an important reason why the U.S. has the largest number of known planned SAF production facilities in the world (around 30 according to third-party research as of May 2023). The U.S. SAF Grand Challenge is underpinned by policies and actions designed to support the industry in achieving domestic production of 3 billion gallons of SAF by 2030, and to supply 100% of projected domestic aviation jet fuel use by 2050. In addition, the U.S. Inflation Reduction Act contains a range of generous tax breaks and subsidies to promote the development of green technologies, including SAFs.

In the EU, multiple pieces of proposed and in-force legislation have been designed to bolster investment in SAF, most notably the RefuelEU Aviation regulation, the Renewable Energy Directive (III), the EU Taxonomy Regulation's Climate Delegated Act, and the Energy Taxation Directive. In particular, the RefuelEU Aviation Regulation will require aviation fuel suppliers to ensure that all fuel made available to in-scope aircraft operators contains a minimum share of SAF (increasing progressively from 2% in 2025 to 70% in 2050), which includes a sub-target for synthetic fuels.

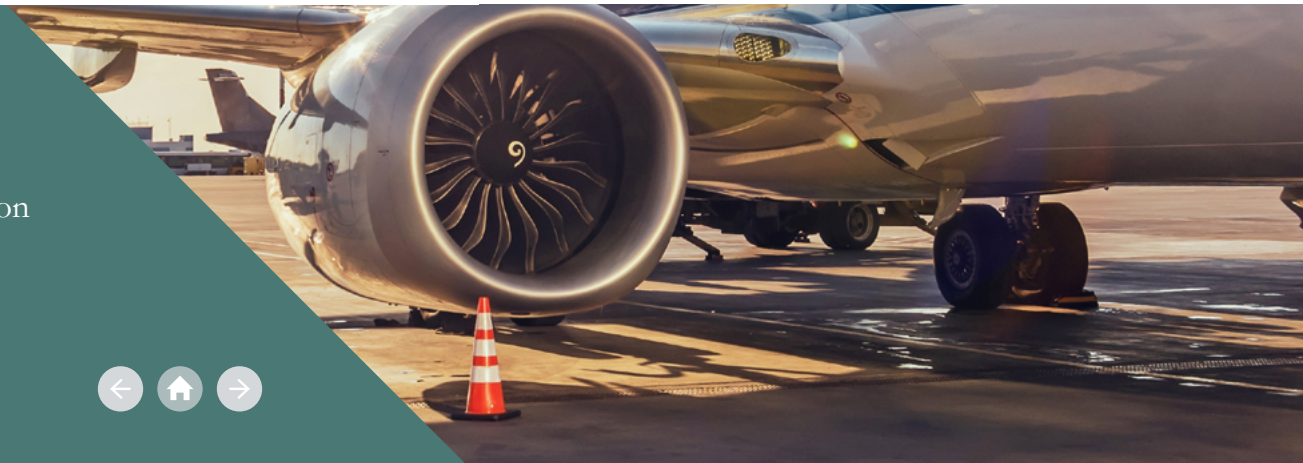
The EU Climate Delegated Act may also bolster investment in SAF by treating certain SAF-related activities as EU Taxonomy eligible.

The UK is also a jurisdiction to watch for SAF investment opportunities. The UK government plans to introduce a SAF mandate in 2025 to require at least 10% of jet fuel to be made from sustainable feedstocks by 2030. It also announced that it will introduce a revenue certainty mechanism to support SAF production in the UK and boost its uptake.

Out-of-sector measures also play a crucial role in incentivising SAF uptake. Schemes such as CORSIA and emissions trading systems (ETS) can incentivise airlines to use SAF by regarding SAF as eligible offsets or as zero emissions, which do not require the purchase of ETS allowances.

Regulation around SAF is only beginning to take shape, with the EU, UK and U.S. setting the pace. The approaches in these jurisdictions will likely influence how other countries, including the emerging markets, develop and implement their own national policies to promote SAF uptake.

The Middle East has access to various resources which have the potential to make it a major centre for SAF production



Investment uncertainty amidst an evolving regulatory landscape

The emerging patchwork of regulations aimed at bolstering SAF uptake globally will be a challenge for the industry to grapple with.

Investors and fuel suppliers in particular will be concerned to understand the sustainability and GHG emissions saving criteria that fuels must meet in order to qualify as "SAF", which differ across regulatory frameworks. For example, the UK proposes that SAF must have a carbon intensity reduction of at least 40% relative to fossil kerosene, whereas the EU Renewable Energy Directive (and the proposed amendments) require emissions savings of at least 70% for synthetic fuels and of at least 50-70% for biofuels.

Understanding the nuances and variation of different sustainability and GHG emissions saving criteria is important, considering that the fulfilment of those criteria is necessary for accessing benefits and discharging obligations under applicable regulatory frameworks.

The challenge is a persistent one, given that sustainability and GHG emissions saving criteria are expected to evolve continuously as SAF technologies emerge and mature over time, and as policy makers grow in ambition.

While this remains the case, there is inevitable uncertainty around the financing of new SAF production capacity. Investors financing a hugely expensive production plant will look for certainty that what the facility produces over its 30-plus year lifespan will continue to be classified as SAF. If not, it will lose its green premium and will simply be reclassified as conventional fuel.

Overcoming this uncertainty will require sophisticated contractual arrangements between buyers and sellers, where the risk of any change in regulation or law is clearly apportioned between the producer and the offtaker.

Attracting debt financing for these projects may face another challenge: lenders will only be willing to invest if they can ensure that the end-buyer – the airline – is good for the money. Without that assurance, projects quickly become unbankable.

Before Covid-19, the traditionally highly volatile airline industry had entered a prolonged period of greater financial stability. The pandemic, for obvious reasons, changed all of that and few airlines today have a credit rating of BB or above, which will make many investors cautious, at least in the short term.

That raises the possibility that projects involving airlines with strong sovereign backing, such as the major Middle Eastern carriers, might be among the first to get projects off the ground. It is notable that big carriers in the region have formed SAF production or testing alliances and ventures, such as Etihad's MoU with Masdar, the renewable energy tech company, to develop SAF production from household waste; and Emirates' MoU with GE Aerospace and Boeing to conduct test flights using 100% SAF.

Production pathways – challenges around feedstocks and supply

SAF is already being produced today through various manufacturing processes, known as production pathways, where feedstock is converted into aviation fuel.

Generally speaking, different types of SAF fall into two broad categories:

– **Fuels derived from biomass and waste** – for example, from animal manure and sewage sludge, crude glycerine, biomass fraction of mixed municipal or forestry waste, fatty acids, used cooking oil or animal fats.

– **Power-to-Liquids (P2L)** – synthetic or so-called e-fuels that are produced through a process of fuel synthesis using renewable hydrogen and carbon captured either from the atmosphere or from industrial sites.

Different types of SAF made from blending up to 50% biofuels with conventional jet fuels have been approved for use as drop-in fuels. Their carbon emissions saving capacity varies depending on the production pathway and source of the feedstock, but is known to be up to 80% when measured on a life cycle basis.

All fuels have pros and cons, which will need to be weighed up carefully, particularly at the policy-making stage and at the investment stage. Biofuels rely on feedstocks that may come with risks of wider environmental damage. For instance, fuels derived from specially grown plants might involve land being displaced that could otherwise be used for growing food, or, without careful controls, might involve deforestation. The EU's SAF mandate specifically excludes biofuels produced using food and feed crops, and this approach is likely to be followed elsewhere.

In addition, there are uncertainties on biofuel feedstock availability for the SAF industry. For example, fuels made from hydroprocessed esters and fatty acids (HEFA) may divert feedstocks from road transport, where they are still needed to transition to zero emission road vehicles.

There are warnings that the demand for animal fats will be hard to meet and could force other industries like pet food manufacturing to resort to environmentally damaging palm oil as an alternative. The world only produces so much used cooking oil.

By contrast, household waste could be a credible feedstock, given the urgency to divert waste from landfill and with the advantage that SAF producers may be able to acquire it at no cost or may even be paid to take it away.

The emerging patchwork of regulations aimed at bolstering SAF uptake globally will be a challenge or the industry to grapple with

The case for P2L

Perhaps the most promising long-term pathway for SAF is so-called power-to-liquid fuels or “e-fuels”. P2L production relies on inputs which are abundantly available: upstream renewable energy (eg wind, solar and hydropower) to create renewable hydrogen, which is used to convert carbon into synthetic gas. The synthetic gas is then upgraded to finished fuels. Synthetically produced P2L fuels are known to achieve carbon emissions savings of between 90% and 100% on a life-cycle basis, making it potentially the cleanest of all SAF production. This is good news for the Middle East with its abundant solar resource, expansive plans to become a green hydrogen production hub and expertise in industrial processes.

This makes e-fuels look the most attractive in the long run, but there are obstacles here too around efficiency, cost and technology.

Currently, they are only produced at very high cost and in low volumes, although both of these issues should diminish as the production of green hydrogen scales up.

In the short term, biofuels look likely to have the upper hand, but most expect synthetic SAF to dominate once the technology is refined, the costs reduced and the efficiency boosted. The production and uptake of synthetic SAF will be bolstered as more jurisdictions prescribe minimum shares of synthetic SAF (such a mandate is already found in the ReFuelEU Aviation regulation and is expected to be introduced in the UK).

Shaping a sustainable future for air travel

The race to Net Zero clearly presents the aviation industry with an existential challenge. Without real action to address the industry’s climate impacts, it will become increasingly unsustainable, and its growth potential will be snuffed out.

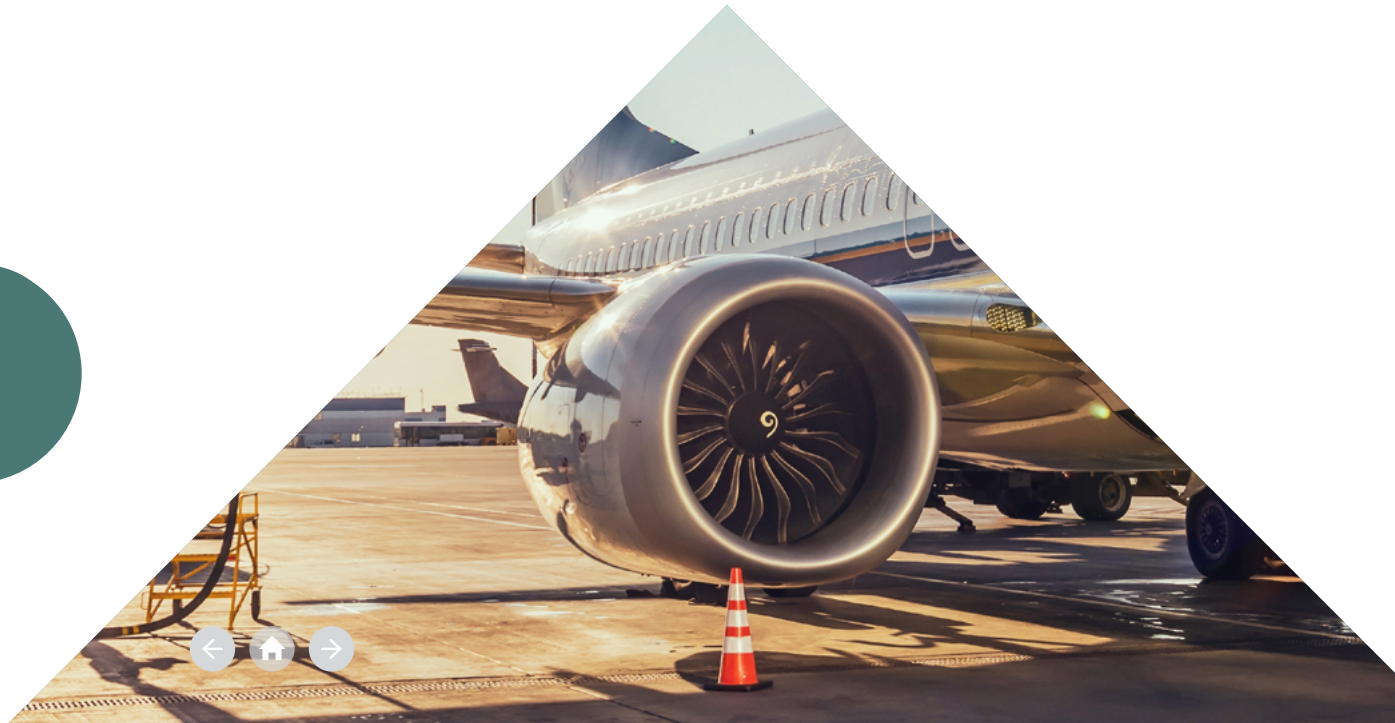
Airlines, fuel suppliers, airports and airframe and engine makers alike need to translate targets into action at a rapid pace. The deadline to achieve Net Zero by 2050 may seem relatively far away but, given the challenges ahead, it remains incredibly tight.

SAF presents a real opportunity to decarbonise the industry and, when done at scale, in potentially dramatic ways.

But regulators need to keep holding the industry’s feet to the fire with measures that incentivise urgent action while providing the clarity investors need to finance the widespread production of SAF. Investors, for their part, need to recognise that transition is not only critical but offers a very real and rewarding opportunity.

Aviation must change radically. For now, SAF looks to offer the best chance of meeting that challenge.

SAF presents a real opportunity to decarbonise the industry in dramatic ways. But regulators need to keep holding the industry’s feet to the fire



Avoiding disputes in projects aimed at reducing emissions

Kirsten O'Connell
Partner – UAE

Daniel Garton
Partner – London

Rachel Green
Associate – UAE

While the region has previously focused on traditional energy projects, it is rapidly emerging as a significant player in clean energy projects

The Middle East's ambitions for achieving Net Zero mean there is a wealth of opportunity for projects aimed at reducing carbon emissions. However, these projects will require careful navigation of the growing labyrinth of risks. Proactive engagement will be essential to success, according to Kirsten O'Connell, Daniel Garton and Rachel Green.

The UAE's strategic initiative to achieve Net Zero for carbon emissions by 2050, and its commitment to reduce emissions in all economic sectors by 2030, align with the objectives of the Paris Agreement. Across the Middle East, countries in the region have declared their own national strategies to achieve Net Zero by 2050 or 2060, and implemented national climate strategies. However, to achieve these goals it will be necessary to substantially increase the availability of clean energy and also significantly reduce carbon emissions. The pathway to Net Zero will require the successful completion of projects aimed at providing clean energy and reducing emissions.

The types of projects envisaged, some of which are discussed in this publication such as green hydrogen and carbon capture and storage, will require the successful completion of complex construction projects to achieve the planned outcomes. However, in any construction project there will be claims arising out of any number of different issues, such as delays, disputed variations, ground conditions, force majeure, issues with suppliers, and other issues that require careful consideration throughout the life cycle of the project, ranging from negotiating the contract to avoiding and resolving disputes.

When it comes to implementing projects aimed at supporting the achievement of Net Zero, in addition to the usual grounds for claims in complex projects, these projects will also face additional risk factors that are unique to the huge opportunities of the green revolution. The backdrop to this is that, as governments around the world face increasing pressure to address the challenges of decarbonisation and move towards a more sustainable future, we can expect to see a global increase in the number of disputes concerning climate change and energy transition.

This global shift towards decarbonisation raises challenges for the Middle East

While the region has previously focused on traditional energy projects, it is rapidly emerging as a significant player in investment and activity in clean energy projects. Ambitious plans for renewable energy are largely based on solar and wind, but green hydrogen and sustainable aviation fuels also have significant potential, thanks to the region's potential for scalable production as well as export capacity. Yet the complexity of these large projects increases the risk of disputes arising. Indeed, the rapid growth in the construction industry in the UAE, host of the upcoming COP28 climate talks, highlights the challenges faced by the region in reducing its carbon footprint.

These challenges will involve, among other things, managing the various risks inherent in the construction and operation of clean energy projects, including the types of disputes that are likely to arise along the way. It is vital that these risks are considered from the outset of projects and managed carefully throughout the project life cycle.

Challenges faced

Supply chain volatility. One of the key challenges the region faces is resource availability. As with a number of other Middle Eastern countries, the UAE relies heavily on imported materials for construction. The rapid growth of clean energy has led to a significant increase in the number of commercial projects as well as to supply chain squeezes with some key raw materials. For example, a study by McKinsey has estimated that the rare earth metals used in wind turbine generators and electric vehicles will face a significant shortage by 2030. Add in price volatility and supply-demand imbalances in some of those materials, and the risks arising from a less than resilient supply chain become clear.

New entrants. The opportunities presented by energy transition have led to a number of new players entering the market, as well as the Middle East region, for the first time. Some are already well established in the construction sector while others are not. The latter will sometimes assume risks unknowingly or may not understand what the required risk allocation has been in an agreement.

Disputes happen when a party encounters a particular risk, which in reality turns out to be too much for that party to bear. The reliance on contractual risk allocation is not always possible if the risk was not anticipated or clearly defined in the contract.

Other new entrants to the market may have difficulties navigating factors specific to the region, such as local regulatory requirements or the relevant ground conditions, which can cause significant delays and result in unexpected costs. At times, parties may have too little margin for error to handle the demands that can accumulate when issues arise.

New technologies. Clean energy projects rely on new technologies that are continually evolving. In the UAE, a lot of capital is flowing towards renewable projects and business cycles are being influenced by a race to implement new technology, while aiming at ambitious targets.

While the new technologies involved in solar energy projects are now relatively well tested, including hydrogen, ammonia and other types of clean energy products where new technologies are in scope, there will be an evolving understanding of the potential risks that can arise. For example, potential risks include delays to regulatory and planning approvals, a lack of developed industry standards and an increased design uncertainty associated with "first-of-a-kind" projects. In addition, for projects that are reliant on new or fast-evolving technologies, where those projects experience significant delays, the parties may find the technology that had been incorporated into the project has quickly become outdated, leading to further delays in procurement and overall progress, and increasing costs.

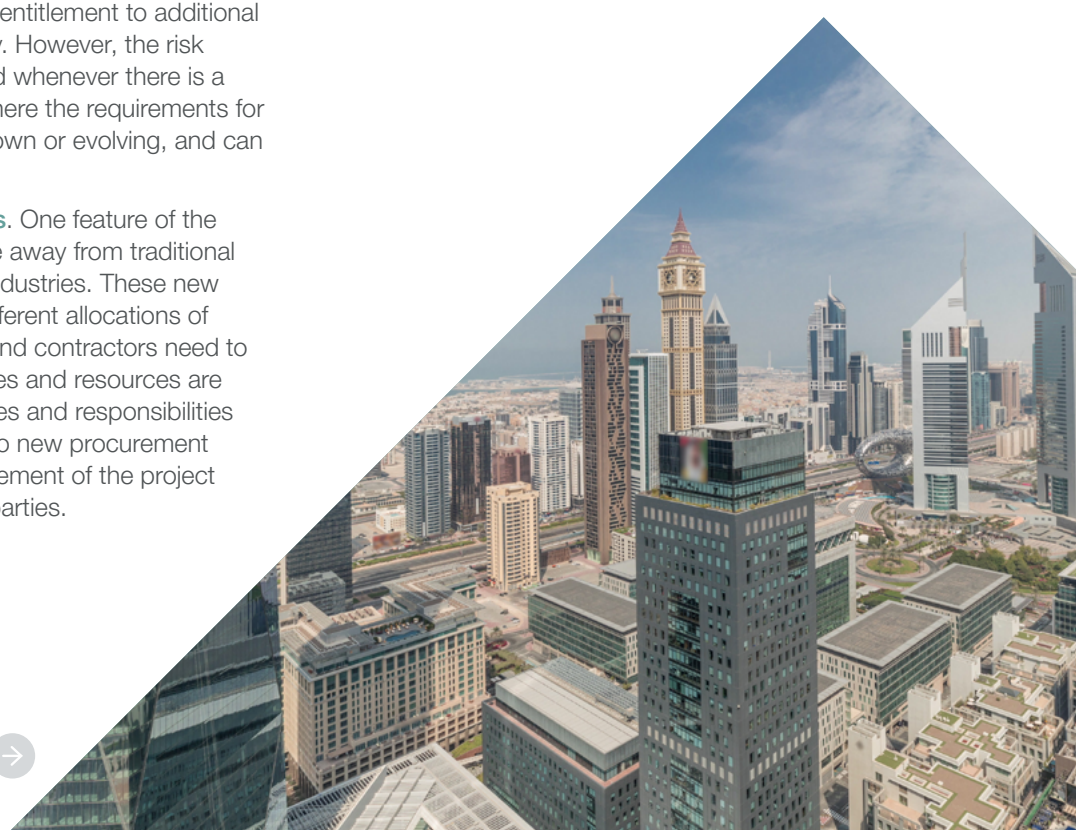
Delayed approvals. Claims regarding delays due to obtaining approvals from the relevant authorities are a common feature of projects in the Middle East. This is commonly addressed in the contractual risk allocation, often with the contractor responsible for obtaining the relevant approvals not having any entitlement to additional time or cost for any resulting delay. However, the risk of delayed approvals is heightened whenever there is a "first-of-a-kind" type of project, where the requirements for obtaining approvals may be unknown or evolving, and can increase the likelihood of claims.

Changing contracting structures. One feature of the energy transition has been a move away from traditional contracting structures of certain industries. These new procurement structures involve different allocations of risk and responsibilities. Owners and contractors need to ensure their internal team structures and resources are adequate to address their new roles and responsibilities in projects and a failure to adjust to new procurement structures can result in mismanagement of the project and major disputes between the parties.

Well-established risks. Clean energy projects are not immune to the risks that are already well established in more traditional projects. Claims such as delay, unforeseen ground conditions, changes in scope and disputed variations will be just as likely to appear in clean energy projects as in more traditional energy and infrastructure projects. The consequences, however, may be more pronounced depending on the complexity and magnitude of the project at hand.

Proactive engagement and claim management

Parties must stay on top of risks as they emerge in their project, armed with the knowledge of how risks have been allocated, and ensure that this allocation is implemented to avoid unintentionally "modifying the bargain". Successful and proactive management of risks, and the resulting claims, as they arise will be the key to achieving completion while minimising unnecessary delays and increased costs, allowing progress to be made on the pathway to energy transition.



Private capital's moment in the Middle East's energy transition

Ben Ward
Partner – UAE

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Partner – UAE

A renewables revolution is now underway as private capital is being invested into large-scale, technologically sophisticated infrastructure projects, many involving public-private partnerships, and some focused on digital assets

Ambitious plans for renewable energy projects will create long-term opportunities for private funds and sovereign investors in the region, say Ben Ward and Kamar Jaffer. They explore the trends in private markets and what they could mean for the future of energy transition.

When the U.S. Inflation Reduction Act (the IRA) passed in 2022, its tax credit and subsidy provisions unleashed a wave of infrastructure fund investing and fundraising that is already writing a new chapter in the global energy transition.

That is not only because of the impressive number and size of the solar power, electric vehicle, battery and wind projects to which investors have so far committed, it is also down to the effect the IRA has had on spurring private capital into renewable infrastructure in other parts of the world, and the Middle East in particular. That has been driven by the IRA's effect in encouraging a greater focus on, and refinement of, energy transition policy in other regions, including the Middle East.

In a region that has long been known for its leading role in fossil fuel development, a renewables revolution is now underway as private capital is being invested into large-scale, technologically sophisticated infrastructure projects, many involving public-private partnerships, and some of them focused on digital assets.

The challenge of delivering the renewable energy solutions required for this are of course daunting but encouraging at the same time – daunting because of the sheer scale of financing required, and encouraging given the technological promise that comes with them.

Such projects are not mere add-ons to the traditional pathway for the region's energy journey, anticipating the eventual depletion of oil and gas reserves, they represent a new, purposeful down-payment on a permanent renewable energy future for the Middle East as its governments launch landmark nation-building projects aimed at generating the growth drivers of the future.

That is because the region, while still engaged with fossil fuel development, is at the same time highly vulnerable to its own climate change challenges, including rising temperatures combined with humidity, scarcity of water resources, high levels of aridity and long coastlines threatened by rising sea levels.

Indeed, according to the International Energy Agency (IEA), "between 1980 and 2022, temperatures across the Middle East and North Africa (MENA) increased by 0.46°C per decade, well above the world average of 0.18°C".[7]

The IEA pointed out that the MENA region is one of the world's regions "most affected by climate change, imposing challenges on energy systems that are already straining to meet the demands of economic growth, energy security and social welfare".

"Even as they expand renewables generation to meet rising electricity demand and emission reduction goals, the region's energy systems will also have to build in more climate resilience to cope with expected increases in climate impacts," the agency added.

[7] https://www.iea.org/commentaries/climate-resilience-is-key-to-energy-transitions-in-the-middle-east-and-north-africa

Private capital's outsized role

The extent of activity in private capital needed for the associated energy transition to help tackle this challenge is hard to overstate. Up to 70% of clean energy investment will need to be made by private developers and financiers, the IEA estimates.[8]

Much of this is already flowing into the Middle East, as sovereign wealth funds seek partnerships to grow exposure to the energy transition. They are teaming up with government-related entities and, crucially, global private sector funds to boost local and cross-border investment in support of domestic and regional development agendas.

Such global funds have started to arrive in the Middle East in force, bringing a shared interest in energy transition and digitalisation, looking to raise infrastructure funds that often involve "anchor" commitments from sovereign investors.

A big part of this involves increased allocations of big-ticket funding to renewable infrastructure, such as wind, solar and carbon capture and storage.

One of the latest examples of this came in March this year when Rakiza, an infrastructure fund focused on Oman, announced that it had raised USD1 billion for its first investment vehicle.

That came four months after PIF, and U.S. asset manager BlackRock, agreed to jointly explore infrastructure projects in the region. This followed an earlier initiative under which BlackRock has partnered with the Kingdom's National Development Fund to operate a multi-year infrastructure fund.

There has been an accompanying surge in merger and acquisition (M&A) activity, with a robust pipeline of renewable asset joint ventures and other transactions setting up the market infrastructures required for carbon trading and driving the energy transition.

Data centres and fibre optic cables

Beyond sectors such as solar and wind, one area where we have seen significant ramping up of private capital activity in the last 12-18 months is data centres, backed by regional and sovereign funds.

The explosive growth of applications such as artificial intelligence, combined with countries' digital ambitions generally, require a corresponding increase in the supply of processing capacity. The region's policymakers recognise that the region must catch up on data capacity with the U.S., Europe and Asia so that start-ups and larger businesses are able to develop innovative solutions to grow.

Data centre capacity in Egypt, Saudi Arabia and the UAE is forecast to more than double over the next two years, with improved data protection laws and subsea cable connectivity driving activity. Analysts at real estate company CBRE say the data centre capacity of these three markets is estimated to total around 336 MW but is expected to grow to 707 MW by 2025. Saudi Arabia and the UAE are expected to add the bulk of the additional capacity.

Much of this is being driven by the development of so-called smart cities, where technology — such as digital solutions to make older buildings greener or electric bus charging infrastructure — is helping the decarbonisation journey.

In Dubai, for example, smart city initiatives have been underway since 2021, with the city ranked, along with Abu Dhabi, among the top 20 in the latest global Smart Cities Index published by IMD, the Swiss-based executive business school.[9]

Yet there is legitimate ongoing debate about the balance between the utility of data centres in providing computing power and the impact they may have on countries' Net Zero targets given that they are highly energy intensive.

A report by Arizton predicts that the market for green data centres, which use less energy and emit less carbon, will expand by 15% annually in the Middle East and Africa from 2021 to 2027. Industry players in the region have found ways to make their data centres more eco-friendly. For example, Khazna teamed up with Emerge, a joint venture of Masdar and EDF, to build a solar power plant that will supply renewable energy for Khazna's data centre expansion in Masdar City. Khazna also uses pre-cooling and free cooling techniques to reduce its dependence on conventional cooling systems and cut down its carbon footprint.

As a result, investment and interest are both growing from a mix of international technology, infrastructure and real estate fund investors looking to capitalise on the region's increasing need for data processing, storage and cloud computing.

The next frontier beyond data centres may be fibre optic cables, based on our conversations with funds and industry players. One of the main sustainability advantages of fibre optics is its low energy consumption levels. A number of funds in Europe and the U.S. are already investing in fibre optics amid a focus on building out cable connectivity across continents in order to be able to handle burgeoning data traffic.

The Middle East looks set to be next, as the region ramps up fibre transformation as 5G networks proliferate amid the smart city trend and this also has wider sustainability benefits.

[8] IEA, The cost of capital in clean energy transitions, 17 December 2021. Available here
[9] https://www.imd.org/wp-content/uploads/2023/04/smartcityindex-2023-v7.pdf

Trends on the horizon

Funding formulas and structures look set for evolution as the landscape shifts.

Environmental, social and governance

ESG factors remain at the top of the agenda and a key area of concern in the Middle East. Many investors have made ESG part of their investment policies, with specific ESG policies relating to private market allocations. We are seeing increasing demand and opportunities for investing in climate change, renewable energy/energy efficiency and clean technology.

Early-stage investments

With competition for assets intensifying and with most targeted projects developed to some extent, there are early signs of discussions among some funds of going after energy transition opportunities at an earlier stage in the development cycle and setting up funds to invest in early-stage assets. This could include setting up a single asset funded around one renewable or green project, and maybe at a future date transferring that asset, once it is developed, into an infrastructure fund.

Rise of debt financing

Private debt has taken off since the 2008 financial crisis, although private debt fundraising slowed down in 2022. Most of the transaction activity in energy transition in the Middle East tends to be equity co-financed, involving sovereigns and private funds. Our sense of the market is that we could see interest in infrastructure debt funds that provide financing for renewable energy projects, as has happened in the U.S. and Europe.

Changing behaviours by sovereign investors

We see the potential for increased allocation into infrastructure joint ventures directly, and possibly alongside other co-investors that may not be funds, so that participation is across the whole lifecycle of an asset. This means sovereigns would have exposure to specific assets in addition to the fund exposure they have.

Africa

Decarbonisation in Africa

Tim Scales
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Africa faces a challenge: how to meet its soaring energy and infrastructure needs while reducing its carbon footprint and adapting to the severe realities of climate change

As the world focuses on energy transition and decarbonisation, there is clearly no shortage of bold ambition on the part of many African governments to play a key role in global efforts to tackle climate change. Meanwhile, the debate about the role of fossil fuels in Africa's development is as lively as it is nuanced. Tim Scales and Urvi Gudka assess why a pragmatic approach is needed because, vital though energy transition is, it will not happen overnight.

Striking a balance

Africa faces a challenge: how to meet its soaring energy and infrastructure needs while reducing its carbon footprint and adapting to the severe realities of climate change. The continent contributes only 2-3% of global greenhouse gas emissions from energy and industrial sources and uses less than 6% of global energy, yet the international community demands rapid decarbonisation. Africa is not blind to the urgency of the transition, as it suffers more than most regions from the devastating effects of a warming planet, with some suggesting that approximately seven of the ten countries most at risk from climate change are located here.

As the continent continues to grapple with the huge gap between demand and supply in the energy and infrastructure sectors (which is only set to widen with continued population growth and accelerating urbanisation), the long-standing challenge facing African governments looking to bridge the gap is more complex than ever with climate politics thrown into the mix. Policymakers in several African countries are having to strike a balance between utilising and/or monetising their abundant hydrocarbon resources and responding to the mounting pressure to embrace renewable technologies and decarbonisation.

Hydrocarbons remain important to many African countries and, according to modelling by McKinsey, will continue to be a key source of revenue over the next 10-15 years. However, attracting investment for new developments – even in Africa, where the economic and developmental case for it is strong – is becoming much harder. While oil companies and national governments remain eager to capitalise on recent discoveries, international banks have seemingly closed their books to new oil and gas projects.

This has inevitably led to claims of environmental colonialism from some on the continent, pointing to the fact that most developing countries that decrease their poverty rates also have increased rates of per capita carbon emissions – in this context, asking African nations, where roughly one in three people still live in extreme poverty, to freeze or reduce their carbon emissions seems clearly unjust. This injustice has been thrown into sharper contrast in the aftermath of the Ukraine war, given the reopening of coal-fired power stations in Europe and the renewed European interest in African oil and gas projects – projects that, in some cases, had been actively discouraged by Europe and its institutions prior to the war.

Nonetheless, with mounting domestic and international pressure for African nations to embrace decarbonisation, and the vulnerability of many of these countries to the effects of climate change, it is clear that energy transition is, and will continue to be, a clear objective across the continent going forward.

The role of renewables

Renewable technology is fast becoming more available, reliable and affordable across the globe. Africa holds enormous potential and opportunity across the whole range of renewable resources, most notably hydropower and wind and solar power, giving rise to much optimism about the potential for African nations to "leapfrog" fossil fuels and power their development through green energy. Africa also has a strong track record of embracing and developing breakthrough technologies, as its leading role in the mobile communications revolution shows.

The proliferation of solar energy has been particularly notable, helped by the falling cost of key components like PV panels and new, more efficient technologies (including storage solutions). Although there is strong international support for African solar projects, there is still capacity for much more. The International Energy Agency (IEA) states that Africa has 60% of the world's best solar resources, but currently only accounts for 1% of installed capacity.

Renewable technology is being deployed increasingly both on a utility scale, feeding into national grids, and for private as well as commercial and industrial (C&I) consumption. Smaller-scale renewable generation is also being developed in more remote areas, with investment in "mini-grids", avoiding the need for (and associated cost of) connecting to national transmission infrastructure.

Across the continent there are many examples of the growing role of renewables:

– Some 77% of Mozambique's power is currently produced by hydro projects and we are seeing continued investment in this technology. Although Mozambique remains highly climate challenged and susceptible to drought, making this heavy dependence on hydro potentially problematic. For that reason, there is growing interest in developing solar projects, both large-scale (including the proposed 300MW solar PV and battery energy storage system project in the Tete Province) and relatively small off-grid solutions in rural areas to power schools, public buildings and homes.

– In Angola, we are seeing a big push to invest in renewables, with the government targeting 80% renewable power by 2025. Renewables currently account for 56% of the energy mix, with a number of big hydro projects either recently developed or under construction, boosting capacity. There is also a push to invest much more in solar under a national development plan that also includes wind, biomass and mini-hydro schemes.

– In South Africa, renewable energy and market reforms are helping to take the pressure off South Africa's broken electricity system that is struggling to meet demand, with rolling blackouts now an uncomfortable norm.

However, in all this, it is important to maintain perspective. Comparatively speaking, Climate Analytics affirms that the value of renewables investment on the continent remains a fraction of the amount being spent on fossil fuels – the latter being estimated at six to seven times greater than the former in recent years. Furthermore, as the world seems to have reached a tipping point in clean energy spending, with the IEA having announced earlier this year that for the first time, more than half of global energy investment is now going into clean and renewable technologies. However, Africa's share of the global green energy investment remains at only 2%, despite accounting for one fifth of the world's population. Much more needs to be done to ensure that Africa is not left behind in the clean energy revolution.

Africa's green hydrogen potential

The recent advances in hydrogen and green fuels technologies have also led to a significant interest in Africa's potential to be a key player in the green hydrogen revolution, but this must be balanced with its own energy needs. Providing reliable power for all is the first and foremost priority for African governments and people. Exporting green hydrogen should not come at the expense of this goal. However, there may be a way to achieve both, by developing a green hydrogen industry that can also deliver significant domestic benefits through employment growth, transfer of renewable energy skills and expertise (which are essential for green hydrogen production) and providing a valuable alternative revenue stream as oil and gas demand falls.

Some North African countries that are already very well electrified, like Morocco and Egypt, are undertaking some ambitious hydrogen projects and the case for it in these countries is clear. But for other countries, this will only be feasible when they have enough reliable renewable capacity, which may take several years to build.

The race for hydrogen will be intense, with many countries globally competing to be front-runners. Some Western nations have launched generous subsidy schemes, with countries in the Middle East also investing heavily in first-of-a-kind mega-projects. African countries' governments may not be able to provide the sort of support that other governments can offer. It will come to sub-Saharan Africa, but it may be more mid-to-long term, once the technology has matured and the cost of production decreases.

Africa's initial role in the hydrogen economy could be rooted in the supply chain, particularly with regard to mineral resources such as cobalt, nickel and lithium, which are abundant in Africa and vital for key clean technologies. The race for these minerals will be intense and African countries need to prepare frameworks and regimes to allow and encourage investment in their mining industries and supporting infrastructure. The balance required to manage these resources is not unknown to African nations – but it will be important to apply the lessons learnt in the past from the extraction of precious metals, minerals, and oil and gas.

The ideal scenario for African countries endowed with these resources would be to look further along the supply chain rather than focusing on mining, including refining minerals and indeed manufacturing clean-tech components. This would allow them to capture the maximum value from their natural resources. But of course, these industrial processes would require large amounts of constant and reliable electricity – highlighting how vital mass electrification of the continent is to all aspects of its development.

Ambitious targets

So far, countries accounting for 70% of global CO2 emissions have pledged to reach Net Zero emissions by 2050. This includes 12 African countries that account for 40% of the continent's total emissions, while nearly all African countries are signatories to the 2015 Paris Climate Accord and its overriding goal to limit global warming to 2°C above pre-industrial levels, or preferably 1.5°C.

However, the majority of African Nationally Determined Contribution (NDC) targets are conditional on receiving support from developed countries, most notably in the form of financial support but also technical assistance and transfer of technology. The total funding cost required between 2020 and 2030 to achieve Africa's NDCs is estimated by Climate Policy Initiative to be USD2.8tn, representing more than 93% of Africa's GDP. National governments have committed to contribute approximately 10% of this cost from domestic public resources, leaving a USD2.5tn funding gap to be filled by international sources or the private sector. As this number far exceeds the funding pledges of developed economies under the Paris Accord, it will be imperative to leverage private sector investment towards climate finance.

Financing challenges

The challenge of financing Africa's climate investment is heightened by the deterioration of the macroeconomic climate of many of its economies in recent years. Recent economic crises, including the Covid-19 pandemic and the spike in food and fuel prices following the Ukraine war have driven up the debt costs of most African governments and their public institutions. This means that the public capital available to fund the energy transition in Africa is more limited than ever.

In the meantime, the scale of private investment required on the continent continues to elude it. Despite having an abundance of resources, proven technologies and fundamentally positive project economics, private investment levels remain low. Investors are deterred by the perceived and actual risks, including lack of regulatory clarity, political risks and reputational concerns, and foreign exchange fluctuations. As a result, the cost of capital for clean energy projects in Africa is estimated by the IEA to be at least two to three times higher than advanced economies and China, which hinders investment by raising project costs.

In this respect, multilateral and development finance institutions continue to perform a vital role in helping to unlock the potential. Through a combination of capacity building (helping to build-up regulatory, technical and commercial understanding and encouraging sector reform), financial support, including direct lending to governments, public utilities and private investors and through offering partial risk guarantees and other credit enhancement structures, these institutions can address key risks and bring down the cost of, and barriers to, investment, and thereby drive further private sector investment.

The growing use of carbon credits for clean energy projects

Since the inauguration of the Africa Carbon Markets Initiative at COP27, there has been significant interest in the potential to unlock billions through the carbon markets – while also expanding energy access, protecting biodiversity and promoting sustainability and climate action. Carbon credits could form an important second source of revenue for clean energy projects alongside what the developers make from producing and supplying power, and, if adopted at scale, could transform the energy investment model for Africa.

Reason for optimism

We can be hopeful about energy transition in Africa by looking at the achievements so far and setting pragmatic goals about what can feasibly be achieved in the short, medium and long term.

Renewables will play an increasingly important role on the continent. We call it energy transition for a reason: it's not something that will happen overnight. Renewables alone cannot meet Africa's urgent power needs in the short term.

However, with the right support and investment, all the evidence, we believe, indicates that energy transition on the continent will inevitably accelerate, given time.

Just transition through climate finance: a matter of priority

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As the world increasingly puts a price on environmental and climate impacts, it is evident that the climate transition will be costly – but the cost should be apportioned fairly

The just transition ambition is grounded in a desire to meet global climate targets, while ensuring improved social and economic outcomes. Global cooperation will be necessary to deliver a just transition but, as acknowledged in the UNFCCC, the cooperation must be in accordance with countries' common but differentiated responsibilities and respective capabilities and their social and economic conditions. Ahead of COP 28, where a just energy transition is firmly on the agenda, Matthew Townsend, Alexandra Clüver and Ying-Peng Chin discuss a number of the key measures that have been proposed to facilitate a just transition.

Climate and socioeconomics: two mutually exacerbating problems

Socioeconomic challenges and the climate crisis are mutually exacerbating. It is apt that, at a key conference in July 2023, ministers and high-level representatives from government, business and civil societies from 140 countries pushed for "integrated and accelerated action on climate and the Sustainable Development Goals"[ii].

On the one hand, climate change impacts on a nation's socioeconomic wellbeing in significant ways. Most evidently, climate disasters inflict developmental setbacks and have the potential to significantly impact a nation's GDP, and this will continue for as long as adequate steps are not taken for climate mitigation and adaptation. The move away from fossil fuels threatens to disrupt the livelihoods of workers and communities if the transition is not properly managed and can result in greater debt burdens for countries.

On the other hand, the prevailing socioeconomic conditions of a nation, particularly its ability to fund necessary actions for adaptation and mitigation, directly impacts on its vulnerability to climate change. Global South nations are struggling to finance big ticket items in climate adaptation, such as defences against rising sea levels, salinity intrusion and floods, more resilient road and bridge infrastructure, and water conservation[i].

Where is the justice?

As the world increasingly puts a price on environmental and climate impacts, it is evident that the climate transition will be costly – but the cost should be apportioned fairly. In the process of arriving at a point of wealthy post-industrialisation, over 270 years, North America and Europe have contributed 70% of the stock of GHG emitted from fossil fuels and industry[iii]. By contrast, developing countries continue to struggle with energy poverty – strikingly, 13% of the global population (in developing countries) still do not have access to electricity, according to UNCTAD. The per capita emissions of developed countries remain much higher than developing countries.

Unlike the Global North, the Global South's quest for socioeconomic progress is now encumbered by climate considerations: earlier industrialisation, which generally took place without due regard for climate considerations, is said to have used up 86% of the planet's carbon budget[iv], leaving little scope for further emissions by socioeconomic development in the Global South. Although Africa has contributed negligibly to the changing climate, it stands out disproportionately as the most vulnerable region in the world largely due to prevailing low levels of socioeconomic growth in the continent[v]. It would be unjust to expect the Global South to sacrifice socioeconomic progress to tackle the climate problem that was primarily the Global North's doing.

Is there a way out?

The high cost of capital is arguably the most fundamental issue standing in the way of the Global South's ability to tackle the twin challenges of climate change and socioeconomic development. The numbers speak for themselves: across developing countries, the cost of capital for energy projects in 2022 was almost three times higher than that in developed countries[vi]. If this persists or worsens, the gulf between developed and developing countries will continue to widen, in terms of withstanding climate challenges and making socioeconomic progress. The just transition will simply be a pipedream.

High borrowing costs are an impediment to the deployment of both public and private capital. Thirty of the largest global banks have committed USD870bn annually to finance climate solutions, and venture capital investment in businesses providing climate solutions reached USD70.1bn in 2022[vii]. However, it remains to be seen how much of the committed private climate finance will flow to developing countries. To scale private finance globally, public finance should also be deployed to lower the cost of capital for private investors who, due to risk perceptions, require a rate of return that is three to ten times higher in developing economies than in the EU or the U.S.[viii]

Climate finance to the rescue?

Unlocking finance is at the heart of a just transition. This is a mammoth task, not only because of the amount of finance required[ix]. New research published by Allen & Overy and the Climate Policy Initiative (CPI) in September 2023, which tracks climate finance to projects in the real economy that have mitigation or adaptation benefits, indicates that:

– USD6.2tn of climate finance is required annually between now and 2030, and USD7.3tn by 2050, to deliver Net Zero – a total of almost USD200tn. However, tracked global climate finance is only expected to pass USD1tn for the first time in 2022.

– Africa is severely lacking in climate finance, especially private climate finance. Research published by CPI and A&O indicates that public funding (which is generally scarce) comprised 86% of total climate finance in Africa over the past decade but just 4% in North America.

Equally (if not more) dauntingly, the task of unlocking finance for a just transition is challenging because, according to UN Secretary-General António Guterres, "the international financial architecture is short-sighted, crisis-prone, and bears no relation to the economic reality of today". The brokenness of the system is evidenced by developing countries facing debt overhangs, significantly higher borrowing costs and limited access to liquidity in times of crisis[x]. Achieving a just transition will therefore require no less than breaking out of the traditional financing mold, to bring about a revamp of the international financial system.

The Bridgetown Initiative

At the UN 2023 SDG Summit in April 2023, the Bridgetown Initiative 2.0 called for six actions to build a more equitable development finance architecture: (i) provide immediate liquidity support, including rechannelling at least USD100bn of unused Special Drawing Rights through the IMF and multilateral development banks; (ii) restore debt sustainability today and in the long-term and support countries in restructuring their debt with long-term low interest rates; (iii) dramatically increase official sector development lending to reach USD500bn annual stimulus for investment in the SDGs (SDG Stimulus); (iv) mobilize more than USD1.5tn per year of private sector investment in the green transformation; (v) transform the governance of international financial institutions to make them more representative, equitable and inclusive; and (vi) create an international trade system that supports global green and just transformations[xi].

Several of these are discussed below, along with other measures and proposals for facilitating a just transition.

(a) Rethinking public and private debt servicing

Developing economies are weighed down by debt and rising interest rates: 52 low- and middle-income developing economies are either in debt distress or at high risk of debt distress, accounting for more than 40% of the world's poorest people[xii]. According to Avinash Persaud, Member of the High Level Expert Group on Climate Finance, "over fifty per cent of the increased debt of many climate-vulnerable countries is a result of the loss and damage associated with natural disasters. If this goes unaddressed, it will sink them before they can adapt".

Bold actions are needed to create fiscal space for developing countries to plan beyond their immediate financing needs and to build climate resilience. Positively, in June 2023, the UK, France, the U.S., Spain Barbados, the World Bank Group and the Inter-American Development Bank launched a call to action to bilateral, multilateral and private sector creditors to offer climate-resilient debt clauses by the end of 2025, with a group of early movers offering the clauses by COP28. In the October 2023 Nairobi Declaration, African leaders called for a 10-year grace period on interest payments and new debt relief measures. Continued consideration should be given to designing debt instruments that allow for flexibility in debt servicing, particularly in times of crisis when liquidity is most needed.

(b) Leveraging carbon markets for a just transition

There continues to be interest in the use of carbon credits markets to further the aims of a just transition. Despite the perception that carbon credits are a "financialisation of African nature and the climate crisis", actual and proposed initiatives indicate that carbon markets have the potential to bring down the cost of capital for developing countries, generate new finance for adaptation efforts in developing countries, and advance sustainable development goals.

Efforts to leverage carbon credits markets for just transition purposes include: (i) a Harvard proposal which suggested that investors can invest in green projects at concessional rates, and in return receive credit towards their own targets to the extent their investment reduces the cost of capital[xiii]; and (ii) the Energy Transition Accelerator, which is a joint initiative between the U.S. Department of State and private partners aiming to "support country-driven energy transition strategies through a high-integrity voluntary carbon market framework that will generate carbon credits representing verified greenhouse gas emissions reductions and make them available to qualified private sector and sovereign government buyers"[xiv].Looking ahead to COP28, details of the UN-backed mechanism under Article 6.4 of the Paris Agreement are expected to be hammered out. If so, it may pave the way for increased use of carbon credits for just transition purposes, subject to usual concerns such as ensuring the integrity of carbon credits.

(c) Increasing concessional finance

Concessional finance is an important source of funding for climate resilience and adaptation projects that are unattractive to private investors. However, concessional finance is not growing fast enough – research by A&O and CPI indicate that multilateral development banks (MDBs) have publicly committed to increase their annual climate finance by just 32% annually through 2030, and only six of the 27 largest national and bilateral development institutions have set climate investment targets.

In addition, the eligibility criteria for concessional funding is arguably overly restrictive: MDBs offer very concessional funds only to the poorest countries with a GDP per capita of less than USD1253 per year – this has already provoked calls for the eligibility criteria to be broadened so that concessional finance can be made available to more climate-vulnerable countries and on a pre-emptive basis (instead of after a climate disaster)[xv].

(d) Just Energy Transition Partnerships (JETPs)

JETPs are country-led partnerships and financing mechanisms aimed at helping certain high-emitting developing countries pursue an accelerated just energy transition away from fossil fuels and towards renewable sources. Developing countries that have been announced as partners include South Africa, India, Indonesia, Vietnam, and Senegal. The donor pool has been expanded from countries in the global north to include multilateral development banks, national development banks, and development finance agencies.

However, there are questions around the effectiveness and inclusiveness of this mechanism, as the packages comprise few grants and mostly loans which add to the debt burden of the developing countries. There have also been reports of poor transparency and delays in delivery of finance in the South African JETP.[xvi] It remains to be seen how JETPs will be refined over the duration of their lifetimes to be implemented in line with just transition principles.

(e) Loss and damage financing

Loss and damage financing is particularly important for developing countries that are most vulnerable to the adverse effects of climate change. COP28 is expected to deliver the operationalisation of the loss and damage fund. If the Transitional Committee's recommendations are adopted at COP 28, the fund will provide financing in the form of grants and highly concessional lending, and may deploy additional financial instruments that take into consideration debt sustainability (eg direct budget support and risk sharing mechanisms). The fund is expected to tap on a range of sources, including private, public, and innovative sources.

Closing thoughts

Achieving a just transition requires a global commitment in devising and implementing novel climate finance solutions. In the context of the Bridgetown Initiative, Prime Minister Mottley of Barbados noted, "too many countries are being prevented from fighting the climate crisis and from creating decent opportunities for… their citizens. If countries cannot access the finance they need at rates they can afford, the world will lose the battle[xvii]". Urgent and effective action, particularly in climate finance, is required to win this battle. In the lead up to COP28 and beyond, ensuring a just transition should be a consistent theme throughout the negotiations.

i https://unfccc.int/news/a-strong-outcome-at-cop28-is-crucial-for-climate-action-and-the-sdgs
ii https://geopolitique.eu/en/articles/breaking-the-deadlock-on-climate-the-bridgetown-initiative/
iii https://www.climatepolicyinitiative.org/wp-content/uploads/2023/06/An-FX-Guarantee-Mechanism-for-the-Green-Transformation-in-Developing-Countries.pdf
iv https://www.climatepolicyinitiative.org/wp-content/uploads/2023/06/An-FX-Guarantee-Mechanism-for-the-Green-Transformation-in-Developing-Countries.pdf
v https://www.unep.org/regions/africa/regional-initiatives/responding-climate-change
vi https://unctad.org/system/files/official-document/wir2023_en.pdf, page 155.
vii Research by Allen & Overy and Climate Policy Initiative, September 2023.
viii Research by Allen & Overy and Climate Policy Initiative, September 2023.
ix According to the UNFCCC Global Stocktake Synthesis Report in September 2023, access to climate finance in developing countries need to be enhanced; assessments found that shifting finance flows to support a pathway towards low GHG emissions and climate-resilient development stood at an annual average of USD 803 billion in 2019-2020, which is only 31-32 per cent of the annual investment needed to meet temperature increase targets under the Paris Agreement.
x https://www.un.org/sustainabledevelopment/blog/2023/04/press-release-with-clock-ticking-for-the-sdgs-un-chief-and-barbados-prime-minister-call-for-urgent-action-to-transform-broken-global-financial-system/ (26 April 2023).
xi https://www.un.org/sustainabledevelopment/blog/2023/04/press-release-with-clock-ticking-for-the-sdgs-un-chief-and-barbados-prime-minister-call-for-urgent-action-to-transform-broken-global-financial-system/ 26 April 2023
xii https://www.un.org/sustainabledevelopment/blog/2023/04/press-release-with-clock-ticking-for-the-sdgs-un-chief-and-barbados-prime-minister-call-for-urgent-action-to-transform-broken-global-financial-system/ 26 April 2023
xiii https://www.lse.ac.uk/granthaminstitute/news/cross-border-investment-is-crucial-to-achieving-a-just-transition/#:~:text=Article%206%20of%20the%20Paris%20Agreement%20allows%20the%20government%20or,their%20own%20Paris%20Agreement%20goals.
xiv https://www.lse.ac.uk/granthaminstitute/news/cross-border-investment-is-crucial-to-achieving-a-just-transition/#:~:text=Article%206%20of%20the%20Paris%20Agreement%20allows%20the%20government%20or,their%20own%20Paris%20Agreement%20goals. And https://www.rockefellerfoundation.org/news/u-s-state-department-bezos-earth-fund-and-rockefeller-foundation-announce-next-steps-on-energy-transition-accelerator/
xv https://geopolitique.eu/en/articles/breaking-the-deadlock-on-climate-the-bridgetown-initiative/
xvi https://www.lse.ac.uk/granthaminstitute/news/cross-border-investment-is-crucial-to-achieving-a-just-transition/#:~:text=Article%206%20of%20the%20Paris%20Agreement%20allows%20the%20government%20or,their%20own%20Paris%20Agreement%20goals.
xvii https://www.un.org/sustainabledevelopment/blog/2023/04/press-release-with-clock-ticking-for-the-sdgs-un-chief-and-barbados-prime-minister-call-for-urgent-action-to-transform-broken-global-financial-system/ 26 April 2023

Seven thoughts on kickstarting offshore wind in South Africa

Alessandra Pardini
Partner – Johannesburg

Offshore wind projects are still novel in South Africa – First-movers will need to navigate complex regulations and bureaucratic regulators to get projects off the ground

Alessandra Pardini explores the potential for offshore wind in South Africa and the possibility of kickstarting this nascent industry, as well as some of the legal and environmental hurdles the industry will need to overcome.

South Africa has big potential for offshore wind

South Africa could produce up to 901GW of power from both floating and fixed seabed-mounted offshore wind, according to a report from the World Bank[1]. Much of this opportunity is centred around the Western Cape, with areas like Saldanha, Cape Town, Hermanus and Mossel Bay all highlighted as having some of the highest potential.

This could help diversify South Africa's energy mix away from coal, alleviate grid constraints and help boost energy security in Africa's most industrialised nation.

The geography of the coastline is a challenge

But getting anywhere near that potential will be a massive task as there are real technical challenges to overcome.

South Africa has a relatively deep coastline and some of the strongest ocean currents in the world. That deep coastline means that the vast majority of South Africa's potential offshore wind production would need to be provided by floating turbines, where huge turbines are constructed on land, towed to site and tethered to the seabed. The World Bank estimates that floating turbines could produce up to 852GW of South Africa's 901GW of potential wind power.

Yet floating turbine technology is still in its infancy, with only a handful of pilot projects in operation across the world. Floating turbines require infrastructure including floating substations, ports that are large enough to handle the huge turbines, as well as greater use of deep sea cabling. All of this adds expense and complexity to projects.

There are regulatory hurdles to overcome, but the industry can rely on know-how from the oil and gas sector

Offshore wind projects may be relatively common in Europe and China, but they are still novel in South Africa.

This means that first-movers will need to navigate complex regulations and bureaucratic regulators in order to get projects off the ground. This will include, amongst others: obtaining marine leases permits through the Integrated Coastal Management Act; dealing with civil aviation concerns; as well as taking account of Marine Special Planning considerations.

But all of this is not without precedent. Developers can leverage considerable experience from South Africa's offshore oil and gas sector, as well as companies that have been involved in large under-sea cabling and green hydrogen projects to inform how they structure project companies, reduce risk and tackle regulation.

[1] https://documents1.worldbank.org/curated/en/337531586894229468/pdf/Technical-Potential-for-Offshore-Wind-in-South-Africa-Map.pdf africa

Collecting high quality data will be critical

Offshore wind projects typically cost at least double the price of onshore wind projects to construct with prices for floating turbines projects even higher. But offshore turbines have larger blades than onshore turbines, meaning they have a higher generating capacity.

Given the challenges of South Africa's coastline, collecting good quality data on seismic conditions, wind and wave speeds will be crucial in deciding what offshore projects are financially (and technically) viable.

Aside from this sort of technical data, developers will also need to collect a wide array of environmental and socioeconomic information in order to submit environmental impact assessments needed by regulators to sign off on such projects.

This could include collating several years' worth of data on the impact of turbines on marine birds, bats and other mammals, as well as on how systems would affect ecosystems, tourism and fishing in the longer term. All of this will take time and money; it is not uncommon for impact assessments to take up to three years to produce.

It is worth investing considerable resources in the data gathering exercise. International investors who may provide project financing are often worried about the environmental, social and governance (ESG) impacts of offshore projects, so high quality impact assessments that adhere to globally recognised best practices can go some way to alleviating these concerns and securing investment.

Question marks remain over who will buy the energy

A big unknown remains who the offtaker for these projects will be.

The most obvious solution would be for the South African government to purchase the power and feed it directly into the national grid. Unfortunately, the current Integrated Resource Plan for New Generation Capacity does not recognise procurement from offshore wind. The Department of Energy's much anticipated (and delayed) Integrated Resource Plan 2023 may change this, though developers are not holding their breath.

The second and more feasible option is for the private sector to purchase this potential off take. But who?

Hydrogen, green ammonia and Sustainable Aviation Fuel producers are likely to be particularly interested in purchasing electricity made from renewables (even at significant cost) and where these producers are located in ports, which is often the case, this makes a lot of sense. It also solves the current transmission constraints that are preventing many of these producers from securing renewable energy off take.

Engagement with stakeholders will be needed at every stage

Last year's decision by a South African court to halt Shell's exploration of the Wild Coast still looms large in the public consciousness. The court sided with residents who said they had not been properly consulted about Shell's exploration of the seabed, with many concerned about the impact the company would have on marine life.

Developers will need to spend significant time engaging with various groups, including indigenous peoples and small-scale fisheries, to address concerns that offshore wind can be built without causing significant harm to the environment and local industries.

Offshore wind has a lot of promise, but is not a silver bullet

While there is considerable opportunity for offshore wind in South Africa, our panellists agreed that the technology would not be a quick fix or 'silver bullet' for South Africa's energy crisis.

Instead, over the longer term, offshore wind has the potential to be a highly useful tool to further diversify the country's energy mix and boost the country's energy security.

The contributors include Stuart Heather-Clark, Africa Power Sector lead from sustainability consultancy SLR Consulting; James Larmuth, a renewable energy specialist from engineering and advisory firm Zutari, and Gillian Niven at Niven Attorneys.

Tax incentives are crucial to South Africa's energy transition

Benjamin Mbana
Director – London

Changes to South Africa's tax system encourage small and medium sized businesses to invest in renewables

South Africa urgently needs to upgrade its energy systems and transition to renewable energy. Benjamin Mbana highlights how the country's tax system could play a crucial role in this transition.

South Africa has been in the grip of an energy crisis since so-called "load shedding" started in 2007, with the situation worsening over the past three years, with blackouts of up to 12 hours a day now a regular occurrence. Load shedding has a huge impact on business; when the power is switched off companies are forced to rely on alternative energy which, until recently, has been expensive diesel-run generators to keep the lights on, or cease trading altogether.

Businesses now want new ways of generating their own cheap and reliable renewable electricity, yet for many years these types of small scale generation projects were simply too expensive to invest in. Through our work with clients, we are seeing that newly introduced tax incentives as well as tax structuring for larger projects are playing a critical role in getting these much needed projects off the ground

Broken system

South Africa is still predominantly fuelled by an ageing fleet of coal fired power stations which produce around 70% of the country's power generation capacity, and despite the country's abundance of sunshine and wind, renewables made up just 1% of total power generation capacity in 2020.

The country's energy crisis has largely been blamed on the state monopoly power provider Eskom, which has been labeled as "broken" by media outlets and criticised for high levels of corruption and underinvestment. The country's central bank estimates that blackouts could cost the economy up to R899m (USD47m) a day in 2023, so it is perhaps no wonder that President Cyril Ramaphosa declared South Africa's energy crisis a "national disaster" earlier this year.

New renewables incentive

The government is now looking at ways that it can diversify the country's energy mix and move away from coal. As such it introduced changes to the tax system which became effective earlier this year to encourage small and medium sized businesses to invest in renewables.

Finance Minister Enoch Godongwana announced that the South African National Treasury was expanding section 12B of the Income Tax Act No 58 of 1991 (the **Tax Act**), originally introduced in 2016, to encourage rapid private investment to alleviate the energy crisis. Prior to this amendment, section 12B allowed businesses to deduct the costs of qualifying investments in wind, concentrated solar, hydropower biomass and photovoltaic (PV) projects over a one- or three-year period, depending on the energy generation capacity. This created a cash flow benefit in the early years of a project.

[12] https://www.iea.org/countries/south-africa
[13] https://www.iea.org/countries/south-africa
[14] https://www.ft.com/content/ed8887a4-21b2-44db-9a67-bc6801c06a70
[15] https://businesstech.co.za/news/energy/662515/stage-6-load-shedding-costs-south-africa-r900-million-a-day-sarb/

Tax breaks to encourage businesses to invest in renewables have been in place since 2016. But this extended scheme is considerably more generous and as such we have seen many more businesses become interested in how they can use the scheme to invest in small scale solar facilities or inverters.

The renewables incentive scheme allows businesses to deduct 125% of the costs of qualifying investments in the first year of the project with no threshold on generation capacity, which means they can get money back on their investment.

For instance, a company that buys solar panels worth R1m will qualify for a tax deduction of up to R1.25m during its first year of operation. The adjusted incentive is currently a temporary measure and only available for investments brought into use for the first time between 1 March 2023 and 28 February 2025. It is expected to cost the government around R5bn (USD266m) in 2023 to 2024.

We believe the scheme is a promising start in encouraging small and medium sized businesses to ramp up their renewables investments. We have seen considerable interest from clients, but the biggest hurdle remains financing. At present, this is mostly through bank loans but there are structuring opportunities in terms of which private capital funds can benefit from financing these projects, particularly if the scheme becomes a longer term policy.

Larger projects

It is not just small and medium sized companies that are increasingly interested in investing in their own renewable generation. Large industrial companies typically have energy intensive operations that make big demands on the grid, and the majority of these companies are desperate to avoid costly shutdowns caused by blackouts.

These larger industrial companies are reliant on financing from banks and international investors to invest in solar panels, wind turbines, inverters or battery storage systems. But tax structuring is still a crucial part of making these deals financially viable.

We have seen considerable interest from mining companies in such projects, recently advising Rio Tinto on the installation of a 148MW Solar PV project for Richards Bay Minerals, as well as Tronox on a 200MW Solar PV project for Tronox Mineral Sands.

Many of the financing structures require a mix of equity, debt or similar instruments, that take the form of hybrid instruments such as preference shares. These instruments must comply with anti-avoidance rules contained in various sections of the Tax Act. If companies do not think about the tax implications of these structures at an early stage it can scupper an entire deal; we have seen several examples of banks, investors and target companies being forced back to the drawing board to restructure their transactions because large tax liabilities made these deals unworkable. As such, tax structuring always needs to be at the forefront of the discussions.

Change needed

It remains to be seen how effective the government's new tax policies will be in boosting South Africa's private investment in renewable energy. But we believe that tax incentives and tax structuring will remain crucial to the private sector's attempts to create its own new sources of clean power. What is clear is that the economy desperately needs change. Companies want reliable and cheap sources of power because without it, they and the economy simply cannot grow.

Asia

Asia carbon market implementation can drive united transition

Scott Neilson
Partner – Tokyo

Goran Galic
Partner – Perth

Carbon pricing has been a heavily politicised issue across emerging markets in Asia. This is unsurprising, given the tension that stems from the region being particularly susceptible to the impacts of a warming climate, while also being home to many young carbon-intensive assets and heavy emitting industries. Scott Neilson and Goran Galic explore the approach being taken by emerging Asian jurisdictions to the development of carbon markets.

Currently, carbon pricing regulation is inconsistent and fragmented across the region. It includes both carbon taxes and emissions trading schemes (ETS), although the latter is more common in Asia. In addition to domestically mandated trading and crediting mechanisms across several Asian jurisdictions, we observe a notable uptick in demand for credits being generated from voluntary carbon markets in the region.

In September 2023, **Indonesia** launched the country's first carbon emissions credit trading system. Trading will be voluntary in its initial stage, and the system will aim to adopt international standards to make the credits available to foreign buyers. The government also plans to launch its twice-delayed carbon tax in 2025.

China has had a national market for emissions since February 2021. It is the world's largest carbon market by emissions; however currently the carbon price is too low to be effective, and only covered entities are allowed to make trades.

Malaysia and **Thailand** are both considering the implementation of a carbon tax and ETSs. Malaysia recently launched a domestic emissions trading market, beginning with voluntary offset trade before rolling out an ETS at a later date. Thailand is considering establishing a national ETS, having already launched a voluntary scheme in 2015.

India is seeking to establish a domestic carbon market, which is to be implemented in three phases: increasing demand for voluntary carbon credits; enhancing supply of voluntary carbon credits; and introducing a mandatory system for certain sectors, modelled on the EU's cap-and-trade system. The push for a national carbon market has sparked debate about whether the export of carbon credits to international markets should be banned until India's climate goals are met. Similar arguments were raised in Indonesia, however the government ultimately decided that its carbon market would be open to foreign buyers.

Japan is currently in the early stages of developing a national ETS, which is slated for 2026. From 2033, auctioning is set to be introduced for large emitters in the power sector. In the meantime, a voluntary ETS (called the GX-ETS) is being run as a testing ground.

Similarly, **Vietnam** anticipates launching a pilot voluntary ETS in 2026, before launching a full ETS in 2028. There are also suggestions that a carbon tax could be developed under the revised Law on Environmental Protection, which took effect on 1 January 2022 and allowed the establishment of a carbon market.

In the **Philippines**, a bill was introduced in 2023 in relation to a Low Carbon Economy Act. It aims to establish a domestic cap-and-trade system, however no timeline has been specified.

Overall, many economies in emerging Asia are actively developing and implementing carbon pricing mechanisms to help them meet national mitigation targets. Momentum is growing across countries to make national policies more effective, consistent and harmonised in light of international commitments.

The greatest demand for credits in the region is being generated from voluntary carbon markets, consisting of mostly private entities purchasing carbon credits (under voluntary crediting mechanisms, such as Verra) for the purpose of complying with voluntary mitigation commitments. In terms of value in these markets, turnover hit an all-time high annual value of USD2 billion in November 2021, four times its value in 2020. After two years of rapid growth, carbon credit markets slowed in 2022 owing to challenging macroeconomic conditions and debates around mandatory carbon markets. Unclear plans to implement an ETS in a country in the future may dampen the voluntary market. The current value of these voluntary carbon markets is a small fraction of the global carbon pricing revenue generated by compliance-based regimes. Notwithstanding this, we expect that in the long term, growth in the voluntary markets linked to emerging economies will continue as the approach to carbon pricing and trading continues to develop and mature.

Many economies in emerging Asia are actively developing and implementing carbon pricing mechanisms to help them meet national mitigation targets

Hydrogen and ammonia key elements of Asia's transition strategy

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Much of the focus on hydrogen and ammonia (and other related energy vectors, such as MCH) in Asia has been on Japan and South Korea (and, to a lesser extent, Singapore) as importers and Australia's aspirations to be their leading supplier. But hydrogen development is gaining momentum across other emerging markets in Asia due to its potential to help achieve decarbonisation goals in a variety of domestic use-cases, particularly in relation to transport. Matthias Voss, Xue Wang, Goran Galic, Hitomi Komachi and Jackson Allen share insights on the potential for significant developments across a range of emerging Asian jurisdictions.

China is the world's largest producer and consumer of hydrogen, but less than 0.1% of its production is green hydrogen. But the government has committed to change this, with the introduction of the Hydrogen Industry Medium and Long-Term Development Plan (2021–2035) which aims to produce 100,000 to 200,000 tonnes of green hydrogen a year and have 50,000 hydrogen-fuelled vehicles by 2025.

By 2050, it is expected that about 70% of China's hydrogen will be green. To that end, several projects are currently being developed by major Chinese SOEs such as Sinopec, which has recently started production at the 260MW Kuqa project in Xinjiang, which is currently the world's largest operating green hydrogen project (though a number of larger projects in China will soon surpass it). China is quickly becoming a world leader, going from 10% of the world's installed capacity of electrolysers in 2020 to 50% by the end of 2023.

India has a formal hydrogen strategy – the National Green Hydrogen Mission, which was published in 2023 and aims to continue the success that India has had in relation to installing renewable energy capacity. India's goal is to develop green hydrogen production capacity of at least 5 million metric tonnes per year and add renewable energy capacity of about 125 gigawatts by 2030. In the past two years, multiple green hydrogen pilot projects have been commissioned. The government has also announced its intention to extend incentives to green hydrogen producers for 10% of their costs.

Malaysia is set to launch its Hydrogen Economy and Technology Roadmap, aiming to become a green hydrogen export hub by 2027. Malaysia has already begun hydrogen production for domestic purposes – in 2019, Malaysia built Southeast Asia's first integrated hydrogen production plant, refuelling station, and hydrogen fuel cell-powered buses. Investors are looking at green hydrogen export projects using Malaysia's ample hydropower supply, as for example in the Sarawak region. Malaysia also looks set to become one of the biggest hubs for CCS projects in Asia, with multiple international treaties signed, paving the way for blue hydrogen projects. So far, public tender is not required or contemplated for export projects. It is expected that local investors will take at least minority ownership in the projects. It is expected that the Gas Sales Act will be revised to address handling and safety regulations on hydrogen.

> China is the world's largest producer and consumer of hydrogen, but less than 0.1% of its production is green hydrogen

In the **Philippines** and **Thailand**, green hydrogen and fuel cell technology are still in the pre-commercial phase, however both countries have recently signed memorandums of understanding with international companies to advance hydrogen projects and research. Thailand also plans to replace 20% of gas and LNG with hydrogen (blue and green) between 2023 and 2027, as part of a proposed new national power development plan (which is currently awaiting approval).

Planning and construction of hydrogen production facilities has commenced across **Indonesia** and **Vietnam**. Construction started this year on Vietnam's first green hydrogen plant (24,000 tonnes of green hydrogen a year), while Pertamina recently announced plans for a pilot project in Indonesia to produce 100kg of green hydrogen a day. While small-scale, this pilot project is significant for Indonesia, as the hydrogen production is linked to geothermal energy and Indonesia has unmatched potential in relation to geothermal resources. Indonesia is second only to the U.S. in current geothermal power production and is set to surpass it as early as 2025.

Unsurprisingly, given the very different contexts, key industries and available resources of the different countries, emerging Asian markets have taken very different approaches to the development of hydrogen and ammonia markets. However, there are some common threads emerging, and we may see regional approaches and markets start to appear as this decade progresses.

The use of ammonia in coal-fired power stations to reduce carbon emissions is a strategy which is being strongly pursued in **Japan** but is starting to spread regionally as Japanese companies (which are heavily invested in Asian power generation outside of Japan) have started research and feasibility studies for co-firing of ammonia and coal in Malaysia, Indonesia, the Philippines and Thailand. This example also helps to show that the scale of development in relation to hydrogen in emerging markets will be strongly impacted by take-up in, and appetite for investment from, the developed markets that are leading in this industry.

There is positive momentum growing in all of the emerging Asian markets discussed above. However, with the exception of China and India, scaling up production and domestic demand will arguably be an even greater challenge for emerging markets than markets such as Australia, Japan and South Korea (where it is recognised as a key issue to overcome), as the need to meet quickly and economically the energy demand of the high growth ASEAN countries trumps the ability to invest in new and expensive energy sources.

Existing conventional energy sources will remain a key staple in emerging markets in the near term. This may be addressed by direct renewable electrification (where possible and commercial) but we expect there will need to be a growing focus on availability of offset options. For this reason, and due to current constraints on renewable power and CCS in Japan and South Korea, these North Asian countries will be key destination markets for scaling up green and blue hydrogen production in Asian countries. Japan and South Korea look to finalise subsidy schemes for hydrogen and ammonia international supply chain projects towards the end of this year or the first half of next year. Projects globally, with no exception in Asia, are lining up their final investment decision and scale-up schedule with that of the Japanese and South Korean subsidy timelines.

Japanese subsidy scheme for hydrogen and ammonia gaining new power

Hitomi Komachi
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Scott Neilson
Partner – Tokyo

> Two of the biggest challenges with low carbon hydrogen and ammonia are the energy losses in their conversion and use cases and the staggering price gap with fossil fuel energy sources

We have been covering the developments in Japan's subsidy regime for the use of low carbon hydrogen and ammonia over the past few years. Hitomi Komachi and Scott Neilson offer the latest update and insights.

Two of the biggest challenges with low carbon hydrogen and ammonia are the energy losses in their conversion and use cases and the staggering price gap with fossil fuel energy sources. The energy losses in using them as a carrier of energy suggest that the most compelling use case is where direct electrification is not feasible – like industrial processes that require a chemical reaction. The other challenge with low carbon hydrogen and ammonia (in part due to the energy losses) is their staggering cost – one calculation suggests that for every MWh of green hydrogen a USD12 per MWh subsidy on average is required; translates to every kilogramme of green hydrogen requiring USD396 of subsidy on average.

Japan's subsidy regime faces two tides against it. A large part of the subsidy regime targets the power generation using hydrogen and ammonia, not the hard-to-abate chemical industry like shipping fuel or fertilisers. This is due to the sheer electricity demand that is not being met or cannot be met by renewable power sources today in Japan. Another tide against it is that the regime aims to address the large price gap between fossil fuel energy source and low carbon hydrogen and ammonia.

There are broadly speaking three categories of direct Japanese government subsidies aimed at supporting low carbon hydrogen and ammonia projects:

1. **NEDO Fund**: The NEDO fund for research, development and pilot projects, on which please see our previous article here.
2. **Price gap support for international supply chain and support for domestic storage and transport**: The price gap support (or the Contract for Difference scheme) for international supply chain projects and clusters support scheme for domestic storage and transport projects, on which please see our previous article here.
3. **Long-term Decarbonised Power Source Auction**: The new long-term decarbonised power sources auction, which includes hydrogen and ammonia co-fired power, is a new auction which will start in January 2024.

Alongside this, government agencies and institutions like JBIC, JOGMEC and NEXI have been strengthening their investment and financing frameworks to accommodate and support investments in first-of-kind hydrogen and ammonia projects. Such projects face new bankability challenges, such as little to no track record on electrolyzer technology or CCS performance, new technology risk, ramp-up risk, volume risk and project-on-project risk within a complex array of infrastructure interfaces along the supply chain producing, transporting and distributing hydrogen. These issues are magnified in the case of Japan, as it looks to overseas projects for the long-term commercial scale supply of hydrogen and ammonia, and every risk will need to be examined in the context of the jurisdiction where the particular infrastructure in the supply chain is situated, the green transformation journey of such host country and its legislative framework, and the geopolitical risks associated with cross-border supply chain projects.

Long-term Decarbonised Power Source Auction

The long-term decarbonised power source auction is the newest addition to the subsidy schemes developed by the Japanese government, and is set to further accelerate the demand for low carbon hydrogen and ammonia in Japan, amongst other sources of decarbonised power supply.

The auction is for the sale and purchase contracts of a variety of low carbon power sources, run on an auction basis, for 20 years, and to be run by and to be entered into with the Organization for Cross-regional Coordination of Transmission Operators, Japan. Electricity operators in Japan are eligible to apply for the auction. There is a range of eligible clean power sources (such as renewable power, nuclear and biomass) in the aggregate of 4000MW to be tendered out, out of which 1000MW is for refurbishing existing power plants (including for hydrogen and ammonia co-firing).

In particular, the following co-firing hydrogen and ammonia power sources will be included:

(a) the construction or replacement of power plants with hydrogen co-firing with LNG of 10% or more; or

(b) the retrofitting of existing power plants with hydrogen co-firing of 10% or more, or ammonia co-firing of 20% or more, provided that the capacity of the new co-firing facility exceeds stable supply of 50MW.

The bid price is subject to a different cap for each power source. In the case of the above:

(a) the greenfield or replacement hydrogen co-firing with LNG is subject to a cap on the bid price of JPY48,662 / kilo-watt per year; and

(b) the retrofitting hydrogen co-firing with LNG is subject to a cap of JPY100,000 / kilo-watt per year, and the retrofitting ammonia co-firing is subject to JPY74,446 / kilo-watt per year.

To translate these caps into USD MWh based figures (all USD figures in this section are based on the U.S./JPY foreign exchange rate as of 5 November), the subsidies range from USD37.19 per MWh to USD76.42 per MWh. These very high ceiling figures suggest that the government will be relying on the participants to determine the actual cost of production, rather than legislating it at this stage, which spurs healthy competition and is positive news for the private sector participants.

The current auction does not include CCS supplemented power plants, ammonia co-firing in LNG fired power plants construction or replacement, or e-methanol fired power plants, albeit it is noted that they will be eligible for later rounds.

To the extent a project takes advantage of the decarbonised power source auction, and seeks to also benefit from the price gap support for international supply chain projects, there are requirements to prevent double-recovery of costs through multiple subsidy schemes. Although the details remain to be seen, this is likely to be implemented through discounting the costs that benefit from one subsidy scheme, to the extent it is accounted for in another subsidy scheme.

METI Budget

A tentative budget breakdown requested by METI for the implementation of various hydrogen and ammonia subsidies, including those listed in 1-3 above, for the coming financial year is as follows (all USD figures in this section are based on the U.S./JPY foreign exchange rate as of 5 November):

	Budget for Hydrogen and Ammonia supply chain and infrastructure	Budget requested for approval FY2024 (JPY Million) (USD Million)
1	International hydrogen and ammonia supply chain price gap support	JPY117,100 / USD783.96 *National Treasury Debt Burden (5 years): JPY578,500 / USD3,872.92
2	Domestic hydrogen and ammonia supply infrastructure development project	JPY3000 / USD20.08
3	Investment in hydrogen, ammonia, etc. production, asset acquisition, etc. business	JPY10,000 / USD66.95
4	Technology development project for building a competitive hydrogen supply chain	JPY8,600 / USD57.58
5	Green Innovation Fund Project	JPY2,756,400 / USD18,453.50

The first item and a part of the last item above form part of the GX budget within METI's requested budget for the next fiscal year, being in the aggregate JPY1 trillion 98.5 billion yen (USD7bn 354m). A majority of this GX budget is requested through government "GX bond" issuance. Items two to three above form part of the Energy Special Account budget within METI's requested budget for the next fiscal year, being in the aggregate JPY782bn yen (USD5bn 232m).

The above allocation shows that Japan continues to focus its budget on R&D and pilot projects through its original Green Innovation Fund established by NEDO a few years ago, whilst it is clearly gearing up for initiatives under the GX Act, including the JPY5tn (at the moment, around USD33bn 473m) price gap support programme, the JPY1tn (at the moment, around USD6bn 694m) infrastructure and retrofitting projects, and another JPY1tn (at the moment, around USD6bn 694m) R&D programme.

GX and New Auction Timelines

The overall timeline for the green transformation (GX) Act measures, with respect to hydrogen and ammonia, is as follows:

Hydrogen/ammonia roadmap

Support system for the next 10 years to adopt 3 mil tons of hydrogen and 3 mil of ammonia in 2030, and 20 mil tons of hydrogen and 30 mil tons of ammonia in 2050. A large-scale and resilient supply chain (manufacturing, transportation, and utilization) to be established through the support systems.

Objectives/ Strategies

2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2030's | 2040's

Building a large -scale and resilient supply chain

Establishment of "S+3E" in hydrogen/ammonia

S: Safe business operations

E: Stable supply through procurement diversification etc

E: Gray → Blue/Green

E: Improvement of efficiency

GX Investment

Intensive system period (~2025)
– Revision of **basic strategy and roadmap**
– Formulation of **industrial strategies** to capture the global market
– Developing a **security strategy**

Period to achieve the objectives of cost and implementation (~2030)
– Large-scale public and private investment
– Technology development to reduce supply costs
– Demand creation through market and environmental improvement

Demand expansion and stable supply

Targeted cost: Hydrogen JPY30/Mm3 (CIF) → Hydrogen JPY20/Mm3
Ammonia JPY15~19 /Mm3- H2

* Hydrogen supply cost: more than twice the cost of LNG
Ammonia supply cost: Approx. triple of the cost of coal

Domestic usage amount: 3 mil ton (Hydrogen +ammonia) → Hydrogen 20 mil ton
Ammonia supply cost: Approx. triple of the cost of coal → Ammonia 30 mil ton

1% for power generation

Infrastructure development / renovation of existing equipment JPY 1 tri ~

Building a large -scale and resilient supply chain JPY 5 tri ~ (cod 27)

Infrastructure development / renovation of existing equipment JPY 1 tri ~

R&D to ensure Japan's tech superiority, establish advanced domestic research stations JPY 1 tri ~

20% ammonia mixed combustion demonstration (~ FY 2024)

Tech development for larger -scale transportation and power generation (single fuel combustion)

→ Investment of approximately 7 tril yen ~ over the next 10 years

Source:
https://www.cas.go.jp/jp/seisaku/gx_jikkou_kaigi/dai6/siryou1.pdf

Long-Term Decarbonisation Power Source Auction timeline

The timeline for the first round of the long-term decarbonised power source auction starting in January 2024 is as follows:

			FY 2023						FY 2024
			Oct	Nov	Dec	Jan	Feb	Mar	
Bid Register	Submission period of operator info.	16-20 Oct 2023							
	Assessment period of operator info.	16-26 Oct 2023							
	Submission perod of power supply info.	24 Oct- 8 Nov 2023							
	Assessment period of power supply info.	24 Oct- 30 Nov 2023							
	Submission period of expected capacity	1-12 Dec 2023							
	Assessment period of expected capacity	1-27 Dec 2023							
Auction	Registration of bidders	23-30 Jan 2024							
	Registration of spec list eg expected capacity used for bidding calculation	31 Jan- 7 Feb 2024							
	Execution process / monitoring period	About 3 months							

Source: https://www.occto.or.jp/market-board/market/oshirase/2023/files/202309_youryou_jitsumusetsumei_long.pdf

The building blocks for Japan's subsidy scheme for low carbon hydrogen and ammonia are stacking up steadily. The key ingredients for the price gap support for the international supply chain, including the criteria for low carbon hydrogen and ammonia (and others flagged in our previous article), will be the next key items to be finalised, as the CfD scheme is finalised in the coming months. We are working with a number of international developers and investors who are lining up their hydrogen and ammonia projects to fit with the timeline indicated above. We look forward to seeing the first-mover hydrogen and ammonia projects being structured, thanks to the robust, bespoke and multi-layered Japanese subsidy regimes, in the coming years.

The growth of the electric vehicle battery industry in Asia

Xue Wang
Partner – Tokyo

Xue Wang highlights some findings based on our expertise advising on nickel smelter projects in Indonesia, giga-factory projects and wider battery value chain experience.

Electric vehicles (EVs) form an essential part of the green transition, as they offer a cleaner and more efficient alternative to fossil fuel-based transportation. However, the rapid growth of the EV market in recent years also poses significant challenges for the supply chain of high performance batteries and the critical minerals that go into their production, such as lithium, cobalt, nickel, and manganese.

Asia is a key region for the EV battery supply chain, as it hosts some of the largest and most advanced battery manufacturers, such as CATL, LG Chem, Samsung SDI, and Panasonic (according to data from SNE research the top three battery makers – CATL, LG and Panasonic – together make up nearly 70% of the EV battery manufacturing market), as well as some of the largest and fastest-growing EV markets, such as China, Japan, South Korea, and India, and critical mineral resources. An International Energy Agency publication provides the following statistics.

China produces three-quarters of all lithium-ion batteries and is home to 70% of the production capacity for cathodes and 85% for anodes (both are key components of batteries). Over half of lithium, cobalt and graphite processing and refining capacity is located in China. In comparison to Europe, which is responsible for over one-quarter of global EV assembly, it is home to very little of the supply chain apart from cobalt processing at 20%. South Korea and Japan also have considerable shares of the supply chain downstream of raw material processing, particularly in the highly technical production of cathode and anode material. South Korea is responsible for 15% of global cathode material production capacity, while Japan accounts for 14% of cathode and 11% of anode material production. South Korean and Japanese companies are also involved in the production of other battery components such as separators.

The unprecedented demand for batteries and minerals has led to the implementation of various policies and subsidies to encourage the development of the domestic EV supply chain industry, such as tax incentives, consumer rebates, charging infrastructure, and research and development support, but also restrictions on the export of raw materials (such as nickel from Indonesia) as well as increased scrutiny of ESG diligence along the supply chain.

However, scaling up the battery production and securing the mineral supply also requires massive amounts of capital and coordination up and down the supply chain, from mining and refining to manufacturing and recycling. This creates opportunities and challenges for investors, developers, and financiers who are looking to tap into this lucrative and strategic sector and compete for security of supply of battery minerals and production facility.

We have seen the emergence of limited recourse project financing being used to raise capital for upstream mineral extraction and processing facilities, as well as battery giga factories around the world, including in APAC, allowing sponsors and projects to raise large amounts of capital to fund further build out of battery supply chain projects and mitigate the risks among the various stakeholders. These projects illustrate the growing investment appetite and innovation in the electric vehicle battery supply chain in Asia, which is crucial for the green transition and the competitiveness of the EV industry.

Electric vehicles form an essential part of the green transition, as they offer a cleaner alternative to fossil fuel-based transportation

Ready for take-off: Sustainable aviation fuel in APAC

Hitomi Komachi
Partner – Tokyo

Most investments in sustainable aviation fuel have taken place outside of the Asia Pacific (APAC) to date, but activities in APAC are rising. How will APAC, comprising a collection of countries with widely diverse and disperse needs and regulatory landscapes, tackle the next big bang of energy transition in the aviation sector? Hitomi Komachi offers a brief commentary.

Sustainable aviation fuel (SAF), also known as aviation fuel derived from biomass, waste or carbon captured from gas emissions, is making headways in the APAC aviation industry.

Already, SAF is set to be the main tool by which the aviation industry globally will achieve their Net Zero emission targets by 2050. The International Air Transport Association (IATA) is counting on SAF to carry the aviation industry 65% of the way to its goal, with other pathways to decarbonise including fleet renewal, electric and hydrogen aircraft propulsion and air traffic management. A number of countries and major airlines around the world have introduced targets to replace 10% of aviation fuel with SAF by 2030 or earlier. Most SAF investments have, up until 2023, taken place in Europe and the U.S., driven by comprehensive EU policy drivers including blending mandates and increasing the cost of using fossil fuel, and the U.S. IRA credit for the production of SAF.

2023 marks a new era for SAF in APAC, triggered in part by the introduction of blending mandates by a number of countries in APAC like Japan and South Korea. Taking a whistlestop tour around the APAC countries, we consider what role this region may play in the emerging SAF industry.

Singapore: In May 2023, Neste announced the opening of its expanded refinery for SAF in Singapore, increasing its production of SAF from 100,000 tonnes to 1 million tonnes of SAF per year, derived from waste oils, fats and other residues. Once SAF is produced in the Tuas region, it is sent to a blending facility to be combined with conventional fuel and certified to meet jet fuel standards, before delivery to airlines at the Changi Airport. The Civil Aviation Authority of Singapore, Singapore Airlines, and Temasek launched the sale of SAF credits in July 2022, as part of a pilot project which involved 1,000 tonnes of neat SAF being supplied by Neste and blended with refined jet fuel at ExxonMobil's facilities in Singapore. It remains to be seen whether a transparent and trusted market for the trading of SAF credits will emerge as a result of recent activities, but as a regional hub, Singapore is certainly set to be a promising ground for SAF investments.

Japan: Japan established its SAF roadmap and announced that the government will mandate, in 2030, 10% SAF use for international flights at Japanese airports, and oil wholesalers will be accountable for this measure. Japan's transport department also announced the goal of replacing 10% of domestic airlines' fuel use with SAF by 2030. In April 2023, locally blended SAF was produced in Japan for the first time. Neste is supplying SAF to Japan airlines and All Nippon Airlines through its partnership with Itochu Corporation. In addition to its use case, Japan may also become a major producer of SAF in the long-term. Research by the Japan Transport and Tourism Research Institute (JTTRI) estimates Japan could, theoretically, produce between 7.06 million kl and 13.13 million kl of SAFs per year by 2030, comprising a 40% blend of carbon dioxide and hydrogen and 32% municipal and industrial waste. JTTRI expects the actual SAF supply to reach up to 1.34m kl per year by 2030, sufficient to provide 10% of the fuel consumption in the country.

South Korea: Korean Air signed a memorandum of understanding with Shell to purchase and supply SAF at major airports in APAC and the Middle East for five years, beginning in 2026. As in the case of Japan, Korean Air is also currently sourcing SAF from Neste, albeit currently there is no domestic producer of SAF. South Korea announced plans to expand biofuel blending mandates but only set a target of 2026 for the introduction of SAF. The Ministry of Land, Infrastructure and Transport and the Ministry of Trade, Industry and Energy have responded by stating they will revise the Oil and Alternative Fuels Business Act by 2026, fostering the production of biofuels from sources like corn, sugarcane, and waste cooking oil. GS Caltex and HD Hyundai Oilbank have announced plans for SAF production, and they have the advantage of existing refineries located along coastlines to facilitate imports and exports, as well as existing transport and pipeline infrastructure which could be used for SAF.

India: The Indian government committed to putting in place a policy framework to move towards a blending mandate for SAF. India is the third-largest domestic aviation market in the world with forecasted yearly growth of around 9% going forward. Some airlines have tested blends in India already, and Vistara has piloted a long-haul flight using SAF. Airport operators Groupe ADP and GMR Airports, together with Airbus, Axens and Safran have signed a MoU to conduct a joint study on SAF and their potential in India.

China: The 14th Five-Year Plan for the Green Development of Civil Aviation, issued by the Civil Aviation Administration of China, focuses on promoting breakthroughs in the commercial application of SAF and sets a target of achieving consumption of over 50,000 tonnes of SAF by 2025. However, compared to other energy transition technologies, China has been slow in its uptake of SAF, and until early 2023, Sinopec's facility outside of Shanghai was the sole SAF production facility in China. In April 2023, Cathay Pacific committed to developing four power-to-liquid production facilities in China with State Power Investment Corporation. If these facilities become operational between 2024 and 2026, as planned, then SAF production in China could start before those in Europe, and China could, again, quickly rise to the top in terms of market share in the production of SAF, as it has become in other new technology low carbon energy sources, like green hydrogen, renewable power and batteries.

Australia: The Australian government is accelerating its plans to decarbonise the aviation sector, having formerly launched the Australian Jet Zero Council focused on end-to-end SAF production and announcing a funding programme for local production of SAF to be coordinated by the Australian Renewable Energy Agency (ARENA). In order to benefit from funding, SAF will need to be derived from locally sourced renewable feedstocks, and power-to-liquids and e-fuels are excluded from the programme. Separately, Qantas Group established an AUD400 million climate fund as part of its broader emissions reduction policy. Qantas already has an AUD290 million partnership with Airbus to help deliver commercial-scale SAF production in Australia and a commitment of AUD110 million for other SAF projects overseas. Currently Qantas relies on around 10 million litres of SAF supply per year from Heathrow and 20 million litres per year from California. The Queensland government is supportive of onshoring production, and has announced an investment in a new alcohol-to-jet production facility producing SAF from sugar cane, along with other investors Jet Zero Australia and LanzaJet.

There are several themes coming out of this overview.

Firstly, while policy focus is growing, there is little formal regulation in APAC. Japan and South Korea have the firmest demand side targets and policies. Interestingly, Indonesia had the earliest blending mandate but did not succeed in meeting it, partly as a result of the global move away from palm-derived energy sources. Encouragingly, both Singapore and India have stated their intentions and are now moving forward with policy formulation. A significant laggard to date was China, but it is showing signs that it may be on the way to a quick catch-up and acceleration in SAF production.

Secondly, some parts of APAC show promising signs of becoming some of the biggest feeders of waste feedstock for SAF, such as China, India and Japan, due to the waste by-product of the biggest economic and industrial centres being in these locations. The landscape of possible feedstock providers is different to the usual energy and natural resource landscape where, for example, Japan is heavily dependent on importing natural resources. Many of the SAF projects in Europe, and early stage SAF projects in the APAC region, are dependent on the import of waste from China. Such projects could become victims of "waste nationalism" if China accelerates production of SAF domestically. So far, such trend hasn't been seen but this risk is under discussion in many projects, particularly given the wider geopolitical dynamics. There is ample feedstock for certain technology pathways for sustainable aviation fuel in APAC, given this is a region which is home to the biggest population and demand centres in the world.

Parts of APAC show promising signs of becoming some of the biggest feeders of waste feedstock for SAF

Thirdly, whilst there are many pilot projects, the difficulty lies in scaling and the cost of scaling in particular. According to the IATA, global SAF production in 2022 was slightly above 300 million litres, which accounts for around 0.1% to 0.15% of total jet fuel demand. Only a handful of suppliers can produce SAF at scale.

SAF projects are complex, deploying new processing pathways to convert the relevant feedstock into jet fuel, and feedstock production often is a (start-up) project on its own. Production of ethanol from sugar bagasse, for instance, is a semi-agricultural, semi-refinery business, requiring the right environment, season, and technology to extract ethanol from bagasse. Weather and environmental impacts of upstream agricultural waste feedstock have a direct impact on feedstock supply, and there are questions of prioritisation – given that feedstock in many cases is the byproduct of a primary product, such as sugar. This also goes towards qualifying SAF for the end-customers' compliance requirements or eligibility for subsidies. Project-on-project structuring challenges are everywhere, upstream, midstream and downstream (eg blending facilities). Competition for good-quality and certifiable feedstock is high and there is a drive to secure partnerships and joint venturing early with potential high quality feedstock suppliers and offtakers.

APAC in particular offers high quality feedstock for SAF, and some of the biggest potential SAF demand centres across the region with high growth potential, which are relative advantages of APAC compared to other regions. With APAC governments' commitments and support, including blending mandates, many investors are coming to invest in SAF in the APAC region. With the right level of support from the APAC governments, production and investments in SAF in APAC are set to grow significantly in the coming years.

The offshore wind opportunity in Asia gains strength

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While there have been significant increases in renewable energy capacity in recent years driven by commitments to Net Zero, there is still a long road ahead in emerging markets in Asia, where coal and natural gas still account for a significant proportion of the total energy mix. Recognising this, ambitious goals for the increase of renewable energy have made their way into national power development plans for many countries and it is clear offshore wind has a key role to play in the energy transition agenda in emerging Asia. Xue Wang, Adam Moncrieff, Sarah Wilson, Michael Tardif and Jessica Lee offer observations on this proven but currently underutilised energy source.

Offshore wind – a promising option

Offshore wind is a promising cost-competitive and reliable option where land availability is limited and strong and consistent wind resources are available, for example in China, Taiwan, Vietnam, Japan, India, South Korea and the Philippines. The offshore wind market in Asia is set for rapid growth in the coming years, driven by the increasing demand for renewable energy, a supportive policy environment, strong investor appetite and ambitious targets in key markets.

According to the International Renewable Energy Agency, Asia could account for more than half of the global offshore wind capacity by 2050.

However, the development of the offshore wind industry in Asia has faced many head winds; affected by the challenges of cost inflation, supply chain tightening and vessel availability which also affect other offshore wind markets globally, as well as jurisdiction specific challenges.

Big plans in emerging markets

China remains the global leader in the offshore wind market, with more than 30 GW of installed capacity and ambitious plans to expand further in the coming years.

Taiwan completed the first phase of it's Round 3 offshore wind auctions at the end of 2022. Taiwan continues to be a focus for many investors, despite recent challenges and delays faced by some of its offshore wind projects. However, with the most recently awarded projects increasingly being dependent on corporate PPA offtake as the main revenue source, this will present additional challenges for their bankability.

A strong pipeline of large-scale projects, especially floating wind projects, are on the horizon in **South Korea**. South Korea has set a target of 14.3 GW of offshore wind capacity by 2030 (reportedly set to increase) and announced several mega projects, such as the 8.2 GW Sinan project and the 6 GW Ulsan floating wind project, which are expected to attract significant investment and create thousands of jobs.

With a 3,000-km coastline and strong wind speeds, **Vietnam** has the natural conditions required to develop a strong offshore wind market. The Vietnam government released the Power Development Plan 8 that sets an offshore wind target of 6 GW by 2030 and 70–91 GW by 2050, signalling the government's commitment to the industry.

India has committed at COP26 to install 30 GW of offshore wind by 2030 and this year shared a strategy paper detailing the offshore wind auction trajectory for 2023 to 2030, pinpointing regions such as Gujarat and Tamil Nadu as having the highest potential for offshore wind energy.

Developers in **Japan** are eagerly awaiting the outcome of the Round 2 offshore wind auctions, which are expected to be announced in March 2024. Japan has set a target of 10 MW by 2030 and 30-45 GW by 2040 and huge potential for offshore wind capacity (of which a significant proportion is floating wind, due to its deep coastal waters). However, the development of the offshore wind market has been slower than expected due to uncertainty around the auction process, limited scale of the projects, supply chain constraints and port availability, and extensive environmental assessment and stakeholder engagement processes.

The **Philippines** is making plans to conduct its first green energy auction for offshore wind and, this year, the Executive Order No. 21 was issued mandating the preparation of a policy and administrative framework for offshore wind in order to accelerate development of the offshore wind market in the Philippines (though there remains no specific target for offshore wind at present).

New frontiers – floating offshore wind

On the horizon is floating offshore wind, where a handful of smaller projects around the world have provided valuable learning for the development of larger scale GW projects, starting in China where the PFS-1 Southeast Wanning project will be among the largest floating offshore wind projects globally (if not the largest). However, higher costs and technical and logistical challenges as compared to its fixed-bottom counterpart, as well as supply chain issues, likely mean that widespread installation of large floating offshore wind is still some way off.

Challenges and head winds

Like many global markets, the development of the offshore wind market in Asia is currently facing significant challenges in terms of managing project economics due to cost inflation, declining subsidies and price competition (where governments have largely moved away from feed in tariffs), as well as supply chain constraints. Analysis from the Global Energy Wind Council shows that by the mid-2020s supply chain bottlenecks may become an issue in all regions, except China. Substantial investment in the offshore wind supply chain will be needed to facilitate the growth of the offshore wind market at the pace currently targeted.

In addition, many jurisdictions, especially emerging economies in Asia, face additional challenges such as grid limitations, port availability, restrictive local content requirements, PPA bankability and the need for regional cooperation to avoid supply chain challenges and ensure availability of the vessels and skilled workforce needed for installation. Stability and certainty in the regulatory, permitting and seabed leasing regimes and auction rules is also lacking in emerging Asia and will need to be addressed.

A positive outlook

Notwithstanding the challenges, the offshore wind market in emerging Asia remains attractive and has huge potential. However, given global competition for supply chains and resources among the immense pipeline of offshore wind projects worldwide, it remains to be seen to what extent developers will prioritise and devote resources to projects in emerging markets in Asia. This will depend in part on whether and how well the challenges outlined above are tackled in emerging Asia though regulatory and framework development, incentives and regional collaboration.

> The offshore wind market in Asia is currently facing significant challenges due to cost inflation, declining subsidies and price competition, as well as supply chain constraints

Understanding the energy transition in Central Asia and Caucasus

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Uzbekistan, Kazakhstan, Azerbaijan and Georgia are pursuing different strategies, not just in terms of the technologies they deploy, and at what speed, but also in respect of following different paths to attract international investment as they look to reduce, although not cut, their historic reliance on Russia

Uzbekistan, Kazakhstan, Azerbaijan and Georgia have all set off on a journey of energy transition, but each of these countries is taking a path of its own, as Anton Konnov, Alexey Mareev and Arthur Minosyan explain.

Common ground

Two main factors unite Uzbekistan, Kazakhstan, Azerbaijan and Georgia as they set out on separate energy transition journeys.

First, as former Soviet Union countries, they have traditionally relied almost exclusively on Russian technology to power their energy systems, which have recently lacked investment and need modernisation as well as decarbonisation.

In the case of Uzbekistan, Kazakhstan and Azerbaijan, this has left each of them heavily dependent on fossil fuels of which they have plentiful reserves, whether that is oil, gas or coal.

Where Georgia is concerned, the reliance is on hydroelectric power plants, thanks to its abundant supplies of water and its lack of domestic fossil fuel reserves. But many of its hydro plants also date back to the Soviet era and it still imports some natural gas from Russia, even though, as long ago as in 2009, Georgia disassociated itself from the Commonwealth of Independent States (CIS) of which the other three are still a part.

The second factor uniting the four countries is that they have all signed up to the Paris Climate accord, committing themselves to cutting greenhouse gas emissions sharply by 2030. Uzbekistan, Azerbaijan and Georgia have committed to a 35% cut in emissions, while Kazakhstan is aiming for a 15-25% reduction in that time.

Each of the countries has now announced nationally determined contributions (NDCs) to meet the Paris targets, and they are pinning their hopes, to varying degrees, on a widescale rollout of renewable energy, whether that is solar, wind, hydro or biomass. Uzbekistan and Kazakhstan also have long-held ambitions to add nuclear power to the mix. But there the similarities end.

Diverging paths

Uzbekistan, Kazakhstan, Azerbaijan and Georgia are pursuing different strategies, not just in terms of the technologies they deploy, and at what speed, but also in respect of following different paths to attract international investment as they look to reduce, although not cut, their historic reliance on Russia.

As energy transition gathers pace across this vast and disparate region, stretching from central Asia to the Caucasus, there is already growing evidence of activity and interest from international investors, particularly from Europe, the Middle East and Asia. Often this is being led by the big development banks, providing both direct financing and advice and guidance on market and regulatory reform. But big specialist infrastructure funds, especially those with a dedicated green focus, and industrial players are also increasingly showing interest.

We expect this trend to accelerate. Despite significant hurdles that must be negotiated, the potential for further investment in renewable energy is huge and it urgently needs to be fulfilled if these countries are to meet their ambitious climate commitments and increase their energy independence.

Uzbekistan looks to wind and solar

Uzbekistan has massive potential to develop wind and solar facilities on a large scale thanks to ideal natural conditions. Indeed, where solar is concerned, the country is said to have greater natural potential in terms of consistent sunshine than either Spain or Italy, where solar power is being widely adopted.

Currently, natural gas is the predominant electricity generation fuel, with renewable accounting for just 8% of the energy mix. Almost all of this comes from hydroelectric stations built in the Soviet era, and there is limited scope to develop hydro further given the high demand for water from the farming sector. Biomass also plays a part currently, but mostly as a fuel for domestic heating and cooking in rural areas. Against this background, the government is pushing ahead with an ambitious strategy to increase solar and wind, with the aim of building 12GW of capacity by 2030, in addition to a further 1.5GWs of hydro – a plan set out in its Paris Accord NDC.

Although Uzbekistan has not gone as far as other countries in the region in terms of liberalising its economy and energy market, it is widely seen as a stable and attractive destination for international investment. That perception has been helped by the government's decision to set out its energy policy goals up to 2030 in a Green Economy Transition Strategy and an Electricity Supply Security Concept. With the help of international partners, it has also developed a roadmap for a carbon neutral electricity sector by 2050.

The government has also launched a competitive bidding process to attract foreign investment in large-scale solar projects, helped by development institutions. In July 2022, the Ministry of Energy announced that 11 groups from the Middle East, Turkey, China, India, Spain and France had prequalified to tender for three major solar projects.

The process attracted far more competitive pricing than had previously been achieved, meaning that renewable investments could more readily compete with highly subsidised prices in the electricity market.

This year, Masdar, the increasingly active global green energy company based in the UAE, announced it had raised funds for three solar farms in Uzbekistan to produce some 900MW of power. Funds were raised from a wide variety of development organisations. Masdar is also developing a large-scale wind farm, while another Middle East green energy giant which is also increasingly active on the global stage is involved in developing four large wind projects in the Karakalpakstan, Bukhara and Navoi regions.

These are promising developments, but major challenges remain, not least the need for further action to bring down the cost of renewables compared with the artificially low price of traditional energy sources and the need to stimulate development through financial support mechanisms.

The country also needs to build skills and research capacity around renewable energy and, although the government has clear ambitions to build out its industry, it has yet to really convince the wider public of the need for energy transition.

All that will need to change in a country experiencing rapid population growth, which will inevitably put further strain on its electricity supply industry. Widespread adoption of renewables will not only help Uzbekistan to achieve its climate goals but will also increase energy security.

Nuclear power remains an option for a country with significant reserves of uranium. But development of nuclear power plants takes a long time and is highly capital intensive. Renewables can more rapidly meet the rising demand for electricity.

Kazakhstan weighs up decarbonisation options (including nuclear)

The urgency for Kazakhstan to make a success of energy transition is clear for a country that still relies on coal-fired power stations for 70% of its electricity generation. This is not surprising given its massive reserves of coal, the majority of which go to domestic consumption.

Renewable energy is limited in scope currently, with most of it coming from Soviet-era hydroelectric plants. But the government is actively looking to develop renewable and low carbon energy sources, and its National Concept for Transition to a Green Economy, a strategy adopted as early as 2013, includes a target to raise alternative energy sources (including nuclear power) from 3% in 2020 to 50% in 2050, and to cut greenhouse gas emissions by 40% in that time.

The potential for wind power is huge and we have already seen some significant projects developed. The potential for solar is more limited, however, given the country's susceptibility to powerful winter storms and blizzards.

Kazakhstan, with the world's second largest reserves of uranium, has long been debating whether to build a new nuclear power plant to increase its energy security. Traditionally that would almost certainly have been in collaboration with Russia's nuclear power giant, Rosatom, and with Russian financing. But the country is currently assessing rival designs and this year has announced it is considering proposals from China, Korea and France as well as from Russia.

Whatever solution is chosen will lock Kazakhstan into a long-term dependence on the selected partner for maintenance and operation, given that technologies and fuel types differ from one to the other. Given the geopolitical tensions created since Russia's invasion of Ukraine, the decision has become a great deal more complex.

Kazakhstan has gone further than many countries in the region in liberalising its electricity market, which is now largely privatised, with most power plants in private hands and wholesale prices determined by the market. This makes the country attractive to international investors, from major international institutions, and is driving development working with the state sovereign wealth fund.

But energy remains a vexed issue, as was demonstrated in the civil unrest that exploded in January 2022, after the government lifted a cap on liquid gas prices, with the riots eventually being quelled after an international force, involving troops from Russia and other neighbouring CIS countries, intervened to support the government. Some observers believe that Kazakhstan will be hard pressed to meet both the climate targets it has set and its ambitions for developing renewable energy more widely, not least as support for the coal industry remains strong and the transmission network needed to carry renewable power to consumers requires massive investment. It also remains unclear whether the government can garner public support for its energy transition plans. However, the commitment of the government is clear.

Azerbaijan continues efforts to diversify

Azerbaijan remains heavily dependent on oil and gas revenues, which account for some 90% of its exports. Although this has brought great wealth to the nation, there has been a growing realisation since the financial crisis of 2008 and the oil price shock ten years ago that it needs to diversify its economy. The government's "Azerbaijan 2020 – Look into the Future" strategy specifically targets faster development of renewable energy, and a 2021 renewable energy law provides for the use of renewable energy in the electricity supply industry. Such moves recognise that this is a country with huge potential to develop renewable energy and the significant task involved in doing that if Azerbaijan is to meet its Paris commitments.

Today, fossil fuels make up more than 98% of the total energy supply, with renewables accounting for just 1.5%. Natural gas is the primary energy source for electricity production, accounting for 90% of the market, while hydro power accounts for a mere 4%.

Quite apart from helping to meet its climate goals, there is also a growing recognition that developing a sizeable renewables sector would help to preserve gas for export markets. To that end, the government has set a target for 30% of electricity to come from renewable sources by 2030, a clearly stated goal of achieving energy independence and an ambition to export not just oil and gas but electricity too.

The country has excellent solar power potential due to generally sunny conditions, but wind generation, both onshore and offshore in the Caspian Sea, could eventually make the biggest contribution. Although the dominant renewable energy source to date, hydropower remains relatively under-developed, but we are seeing small-scale hydro schemes get underway.

In addition, a number of international companies have begun exploring the development of green hydrogen capacity, often harnessing offshore wind to provide the renewable energy input. A Japanese engineering company has worked with the government to establish a green energy zone in the Karabakh region to explore a wide range of renewable energy developments.

Development banks have also been active in backing important projects. These include a wind power plant and a solar facility. Generous tax and tariff exemptions are also on offer to encourage investment.

The country is widely seen as a stable investment environment, but energy transition legislation requires further development. The government is simplifying the process of getting permits, thus making it easier for international investors to take part in pilot projects to test the potential for renewable energy. In an economy that has seen plenty of privatisation, the energy sector remains largely state controlled, but this is beginning to change. In addition, the government is working with international development banks to create a regulatory framework that will support energy transition.

Georgia takes a very different path

Georgia stands as a true outlier in this group of four countries, for many reasons. The share of renewables in Georgia's electricity generation mix, at 81%, is one of the highest in the world, thanks to its dominant hydroelectric power industry and its abundance of rivers to feed that industry. Most of the remainder of electricity generation is fired by natural gas, all of which is imported from various sources, including Russia.

So great are the water resources that this still has further potential. It's estimated that only about one-fifth of rivers are currently being used for hydropower and a total potential capacity of 15,000MWs is available, capable of producing 50TWh of electricity, according to figures quoted by the International Energy Agency.

Other renewable sources remain untapped too. Wind power potential is estimated to be around 4TWh and solar potential is also high.

The country is determined to meet most of its energy needs through hydro and the government is trying to incentivise foreign investment into developing new small and medium-sized hydro plants, for instance, by offering free access to the network and fixed tariffs for small and micro schemes. There's also a focus on small solar schemes and regulations offering free access to the network and fixed tariffs for micro schemes.

We are seeing progress. In 2022, feasibility studies for 100 hydro schemes were underway, according to the IEA, with 56 at the licensing or construction stage. However, hydro remains controversial, especially where big new schemes are being proposed. These attract frequent opposition from environmental and community groups which argue that Georgia has huge untapped wind and solar potential as an alternative to hydro and that this could be harnessed without the need to modify the transmission system.

The government is indeed pushing the development of wind and solar, both of which have good potential given the country's climate, but no full assessment of the potential for these two renewable technologies has been carried out to date. The 21MW Qartli wind farm has been in operation since 2016 and has now been privatised, while the government has signed MoUs for the development of 31 solar plants and another 13 wind farms.

Although seen as a good investment destination, Georgia's political system is prone to frequent policy changes which can delay investment decisions. However, its ambition to join the EU, having disassociated itself from the CIS, and its clear belief that renewable energy is key to its decarbonisation and energy security strategy, are welcomed by investors.

It has now reached an accession agreement with Brussels, and as part of that has already begun to implement some EU regulation into domestic law, including around energy and water supply and the adoption of renewables.

Clearer targets for renewable energy and more transparent price signals would, it is widely believed, increase investor confidence and this is something we expect to see developed.

A range of opportunities

Uzbekistan, Kazakhstan, Azerbaijan and Georgia are clearly the most developed of the former Soviet Union countries in terms of energy transition, from an investment, market, policy and regulatory point of view.

They have set themselves very ambitious climate goals which will be very challenging to meet, but the direction of travel is clear even if the precise route map is yet to be developed in some of these economies.

International investors are increasingly seeing the huge potential of energy transition in these markets and are voting with their feet. This is a strong trend and one which we fully expect to intensify.

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