



AFRY  
AF PÖRY

# AFRY Insights

Energy transition



Summer 2023

## Interviews

Odile Renaud-Basso (EBRD)  
Guillaume Lucci (Prime Infrastructure)

## Topics

Australia's energy transition  
Green ammonia: one-size-fits-all solution?  
Green innovation driven by EUTaxonomy and IRA

# Imprint

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# Editorial

Dear reader,

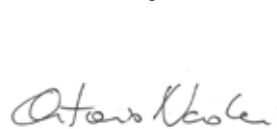
In the sprint to address the consequences of the pandemic and the ongoing effects of the Russian war on Ukraine, mastering the climate crisis -the pressing issue of our time- has been pushed to the side in the collective consciousness time and again. Neither a vaccine can help to overcome it, nor a bilateral peace agreement, and the consequences of climate change cannot simply be washed away or cleaned like the polluted Trevi Fountain. What remains painfully clear is the simple realisation that there is no easy solution to the climate crisis. We at AFRY are constantly tracking the sustainable transition and believe that one of the critical balances to strike, as we build a way forward and address the climate crisis, is that of energy security and decarbonisation. These pages are dedicated to examining that intricate balancing act, from various angles.

The climate crisis is a global phenomenon, which affects everyone and all business sectors. This is why we spoke to two international leaders who see the challenges of overcoming the crisis from different perspectives in our interviews with Guillaume Lucci, President and CEO of Prime Infrastructure, energy, water distribution and waste management, and Odile Renaud-Basso, President of the European Bank for Reconstruction and Development (EBRD).

In this edition of AFRY Insights, our colleagues reflect on the latest energy sector topics along the challenge of striking the right balance between energy security and decarbonisation, asking questions such as: "Can green ammonia be the solution to food scarcity and decarbonisation?", "Is now the right moment to invest in the electrolysis market?" and "How do the EU Taxonomy and the Inflation Reduction Act affect green innovation?" - to name just a few.

With an open invitation to exchange ideas and welcoming your feedback, we wish you an exciting and enriching read, promising that we will remain curious and true to our mission of providing you with new ideas and perspectives in order to support you for what is coming next.

AFRY Management Consulting

  
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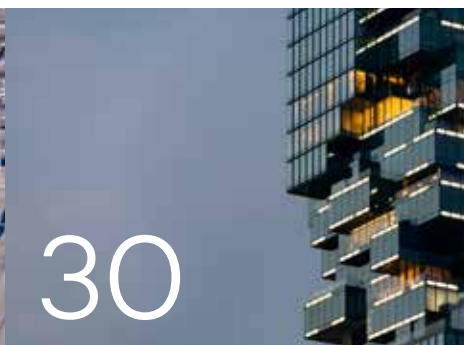
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# Going green down under

Australia has favourable natural conditions, abundant renewable energy resources (wind and sun) and an extensive land area. All of these green resources are currently limiting factors for some other major economic regions.



When Australia leverages all its geographic advantages, it could install plenty of renewable energy capacity and deliver power for the transition to net-zero by 2050.

Australia could take a global leadership role in transitioning from fossil-fuels to renewables while creating competitive advantages for the Australian economy, industry and investors alike.

#### **Momentum for renewables – here we go**

In 2022, Australia raised the bar by pledging to cut carbon emissions to 43% below 2005 levels by 2030, and to net-zero by 2050.

Up until now, Australia has been somewhat more moderate in its investments in renewables when compared to some other countries. Now it will increase the speed of installation of renewable capacities: the recent 2050 net-zero pledge has unleashed a wave of enthusiasm for the energy transition. The new target will provide opportunity for very large investments in renewables at pace - a once in a lifetime opportunity for an entire continent.

The net-zero pledge is strongly supported by the recent October 2022 federal budget commitments to renewable energy projects. This includes critical infrastructure projects, for example, transmission projects, which will enable the expansion of renewable energy generation and energy storage.

Already, the current willingness and excitement, both among the federal government and the state governments, among industry, investors and developers alike, is swiftly increasing the drive towards net-zero – now is the time for investors and developers to invest into a bright Australian future.

#### **From coal to green**

There is a non-negotiable mandate to maintain a secure and reliable energy supply at an acceptable and affordable cost for consumers during the energy transition and beyond.

However, energy-transition challenges are repeatedly getting a lot of public attention: ageing coal-fired power plants with an increasing reliability risk (recent unplanned outages in 2022 have proven that there is a severe risk of a disruption of the power supply) and recent increases in power bills for consumers.

The ageing coal-fired power plants continue to operate based on investments which were made decades ago, allowing them, at present, to remain somewhat competitive. Yet when renewable generation is high during sunny and windy days, coal-fired powered plants may still come under cost pressure in the market. Thus, there is an increasing risk of an early phasing out of ageing coal plants – so, now there is a need and the opportunity to act by installing renewable energy systems at a very fast and accelerated speed.

#### **All together - but all at once, please**

The success of the energy transition hinges on the involvement and management by all stakeholders of a meticulously orchestrated, planned and executed transition to renewables.

The energy transition is not only a technical challenge but also an enormous investment opportunity for governments, investors, developers, and the wider industry - AEMO's publication of the "singular scenario" in the Integrated System Plan (ISP) has already indicated a need for acceleration of investment and development activities in order to stay on target.

We can already foresee that there will be renewable energy generation and storage solutions deployed on an unseen GW-scale, including large investments into pumped-storage hydropower projects. Storage solutions need to be accelerated especially, as they are the least advanced in the renewable energy transition to date.

In addition, the hydrogen economy is gaining momentum faster than ever seen before. All the while, consumers increase their uptake on small-scale power generation, storage and e-mobility, which need to be integrated into the power grid.

### **The grid is key**

The current grid was designed and built prior the 1970s around large, centralised coal-fired baseload power plants and hydropower generation. The grid is now ageing, facing connection and congestion challenges with renewable energy generation coming online fast.

More than ever before, the electrification of Australia's renewable energy economy depends on the grid. When deploying new, decentralised large-scale renewable energy generation and storage at GW-scale, the current grid may soon reach capacity and transmission limits.

Grid upgrades will be key to connecting consumers with renewable energy generation and storage locations as preferred renewable energy generation and storage locations may not be situated in places with existing high-capacity transmission lines.

New transmission lines or upgrades require major investments to mitigate congestion and economic risks to both owners and operators. Historically, transmission

upgrade projects are complex and need to comply with countless regulatory requirements, with long lead times. Yet, Australia needs to act fast now to get renewables online, at the required speed.

The electricity markets, including Australia's largest National Electricity Market (NEM), now need to address the future grid requirement in real time to keep the grid resilient and stable, now and in the future, and to keep energy prices low for consumers. The regulatory re-design is a work in progress for the NEM2025 – while the debate is ongoing, fast decision making is required to remove investment barriers and not stifle the energy transition momentum. On the flipside, progress is emerging, creating a pathway to more investment certainty, such as the introduction and planning of Renewable Energy Zones (REZ), which are the renewable electron highways, connecting new, decentralised renewable supply to consumers.

### **Green rush**

The opportunities for Australia's economy, investors and developers are enormous, and are growing by the minute. The pathway towards becoming a global energy transition leader is real and Australia could make a significant contribution to reducing emissions and to limiting the global temperature rise.



In the long term, the net-zero economy has the potential to offer low-cost electricity from the large-scale, GW-scale renewable generation, with the load-balancing benefits from energy storage solutions, including expansions and new developments of pumped-hydro and battery storage.

The ability to leverage low-cost green energy at GW-scale could make the growing export businesses globally competitive and meet the increasing demand for global decarbonised products. The global demand for green hydrogen and green iron ore / green steel is growing fast. Australia can build the foundations for a local green society to reach the 2050 net-zero target and become a globally competitive green export economy. Australia can once again be the lucky and green resource rich country, with the ability to make a globally relevant contribution to limiting temperature increases.

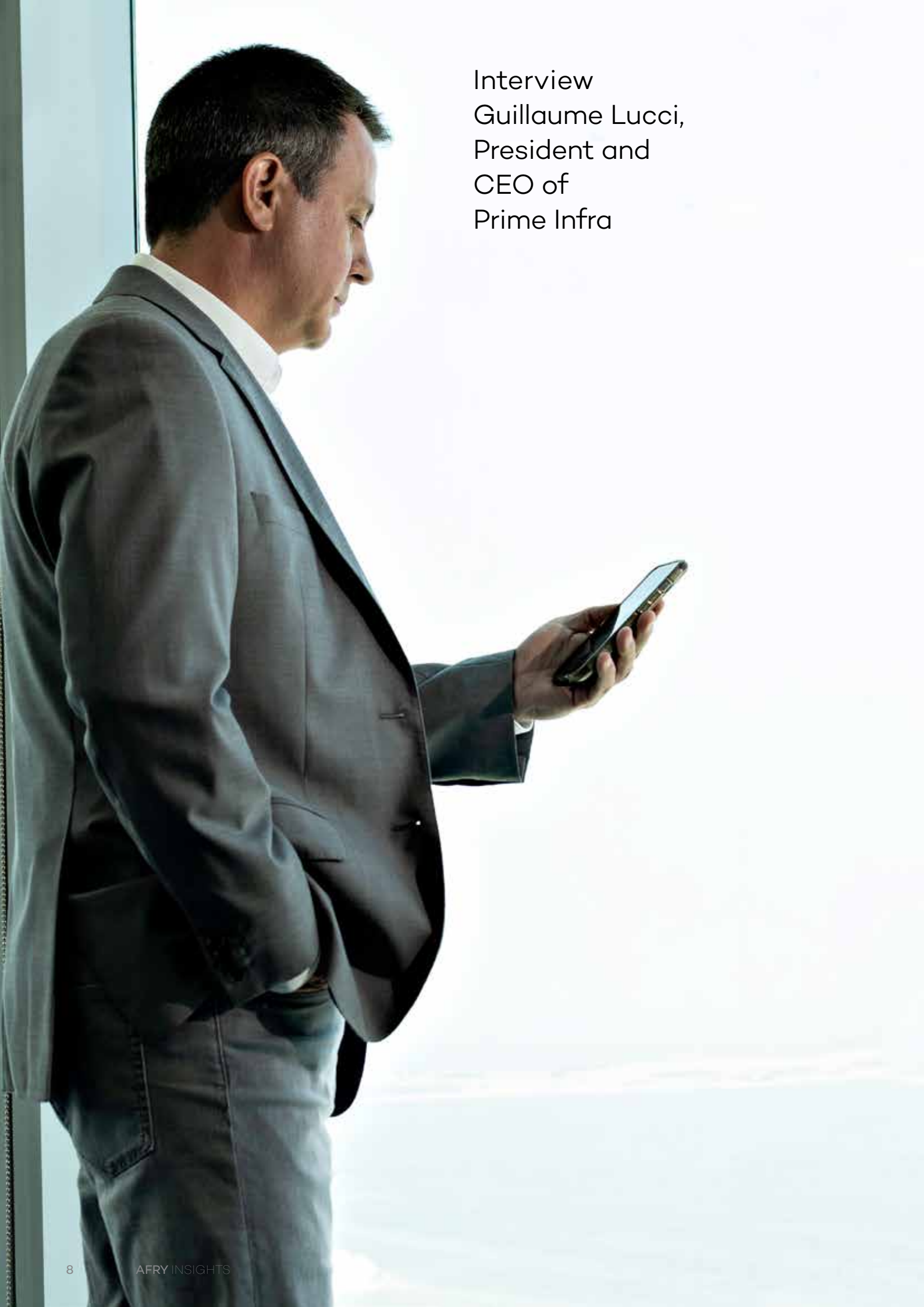
With Australia's 2050 net-zero target, its budget funding commitments, policy and regulatory changes being reviewed, alongside increasing public support and growing recognition of the need to address climate change, a strong need for advisory services is emerging, as Australian companies adapt their strategies. ☺

AFRY Management Consulting is expanding its physical presence with the establishment of a new office location in Australia, allowing us to deliver our expertise and experience to a broader set of clients and partners in Australia. We are committed to accelerating the energy transition and are passionate about creating value for clients and society. AFRY Management Consulting has experienced Australia's energy transition challenges on a global scale – AFRY Management Consulting has developed and delivered proven solutions and value to clients, and can deploy solutions to Australia fast – at a speed required by all stakeholders.

AFRY Management Consulting has a dedicated team of over 600 management consultants and energy experts, across over 20 offices on five continents, supported by 19,000 experts at AFRY in design, engineering and digitalisation. AFRY Management Consulting has to date advised more than 1000 clients across all areas of the energy transition from thermal generation, pumped hydro to offshore wind, from trading to customer solutions and from corporate strategy to operational efficiency.

For more information about AFRY Management Consulting in Australia, please contact our Head of Energy Management Consulting, Joern Schwinge (Joern.Schwinge@afry.com).





Interview  
Guillaume Lucci,  
President and  
CEO of  
Prime Infra



# Towards a sustainable future

With plans to develop one of South East Asia's largest solar-plus-storage facilities and expand the Philippines' only commercial natural gas field to date, Guillaume Lucci, President and CEO of Prime Infrastructure, currently has many exciting topics to talk about. For over 20 years, he has been spearheading the development of some of the most vital infrastructure projects in various industries in emerging markets across the globe, which makes him the perfect interview partner to discuss the core topic of our magazine: the balance between decarbonisation and energy security.

**You are developing four utility-scale energy projects and recently acquired a licence extension for the only commercial natural gas plant in the Philippines: If you have ever been bored, now cannot be one of those times, can it?**

Guillaume Lucci: You can say as much! While I am never bored, it is certainly a very active and engaging time for Prime Infra. Six years ago, we could see a massive gap in critical infrastructure, not only at home but also around the world. Emerging markets, the engine of our global economy, are suffering from an endemic gap in infrastructure that will undoubtedly slow down economic growth. Quality infrastructure development and investments can transform a country like the Philippines in terms of security (energy, water, etc.), stability, inclusive economic growth, and improving the quality of life across the board.

I've seen first hand how infrastructure promotes economic development, having worked most of my career in emerging markets and more recently for over half a decade as head of the Global Engineering division at one of the world's biggest port operators, ICTSI. And so, we decided to build a company that can deliver essential services through critical infrastructure. Six years later, Prime Infra has now become a leading and fast-growing infrastructure company that builds dams and provides reliable water services, develops renewable energy projects for energy security and reliability, and puts up modern materials recovery facilities for much-needed proper waste management, all of which are pursued with underlying decarbonisation strategies. The more essential or critical the services our projects extend are, the more resilient and enduring our business model will be.

We will continue to be relentless in identifying market needs and gaps and in pursuing opportunities not just for growth but, true to our commitment, also to build better lives and more resilient economies. We never stop—never stop moving, never stop expanding, and never stop looking for growth opportunities. It is still a long way to go and as our track record shows, we do not have time to be bored.

**As a utility provider, Prime Infra lives the balance between the need for energy supply and decarbonisation on a daily basis. How does Prime Infra solve this balancing act?**

All our projects have underlying decarbonisation strategies that are in line with our group-wide ESG approach. Especially regarding our energy assets, we intend to cater to the demand for energy while supporting the transition to a low-carbon economy. Addressing decarbonisation objectives while meeting the energy needs of fast-growing economies is challenging, particularly in terms of base load.

We therefore took a different approach to service the base, mid-merit and peaking needs. In the case of mid-merit, our Terra Solar project, eyed to be one of the largest hybrid projects in South East Asia, has a unique feature of integrating a large ESS with solar power generation at scale in order to ensure offtake requirements will be satisfied on a daily basis. It will also leverage on the "must" dispatch status of solar energy over conventional energy sources, such as coal, and is expected to power over 2.1 million households and to displace approximately 2.8 million tonnes of coal per year. This feature allows a fully renewable utility scale mid-merit power supply that can be handled by our transmission grid. Similarly, one of our

If we can help improve the quality of life and create a more sustainable and resilient environment, then I think we will make an incredible and lasting impact to benefit future generations.

pumped storages is designed to use energy that would have otherwise been wasted at night in order to reproduce it under the form of renewable energy during the day. It recycles excess power to service mid-merit demand. Our energy assets allow our offtakers and partners to adapt to sustainable energy initiatives and to transition to cleaner energy resources.

On the peaking side, while we are developing a few solar plants, we are really turning our attention to pumped storage projects to support the needs to the grid as the supply of renewable variable generation increases. Without proper ancillary services, there is really no way our existing grid will be able to cope with wind, solar and other seasonal hydro power projects.

When it comes to base load, we turned our attention to the only viable transition fuel the world currently has, natural gas. That is what drove our acquisition of the Malampaya gas-to-power asset. Prime Infra, through our subsidiary Prime Energy, took over Malampaya because we believe that natural gas is the only transition fuel in the near-term, reducing the need for baseload fossil fuels and allowing for the phased decommissioning of our coal plants. Of course, in the long term, we are bullish on small modular reactors (SMRs) among other technologies. We feel that SMRs will be the only reliable way to dispatch low emission base load. Over time, baskets of renewable projects properly combined with utility scale storage such as pumped storage will also address this need, but the overall system still needs to be upgraded to be able to cope with a combination of renewable energy to service base load demand.

**With their urgent need for energy, the Philippines, where growth in power demand has outpaced new capacity, is faced with a real challenge. How do you see Prime Infra's role in meeting this challenge?**

As the government's partner of choice, Prime Infra invests in and develops critical infrastructure aligned with the country's urgent needs. This includes ensuring both energy security and reliability because of the ever-increasing demand for power. Meeting this demand requires innovative solutions and I think this is where Prime Infra comes in. As our track record shows, Prime Infra's energy projects are complex by nature; they are very unique and game changing. We acted in the same way when the country faced a major water shortage and stepped up to supply bulk water, currently building a dam that will be able to supply over 700 million litres per day of water starting in 2025.

Prime Infra, as you know, has taken over the operations of the Malampaya gas field, a critical energy asset in the Philippines which has been operational since 2001. Now, the challenge is to extend the production life of the project through gas exploration. Prime Infra is also looking at other tie-back opportunities to capitalise on the natural gas processing and transportation infrastructure of the Malampaya asset.

In the renewables side, Prime Infra will be developing, together with our partner, the Terra Solar power plant that is unique both in the Philippines and on a global scale, integrating solar power generation of 2,500 to 3,500MW with an energy storage system of 4,000MWh (min). Upon completion, the Terra Solar project will be one of the biggest solar hybrid projects in the world. We will also be developing two pumped storage (hydropower) projects, again innovative projects that are game-changing in scale and energy efficiency. These PS plants will recycle power that is underutilised at night and reproduce it under the form of RE during peak demand.

Prime Infra responds quickly to market needs. As I've said, we get things done. That is the track record of the Razon Group when it comes to project delivery in complex situations and environments.

**When we think about the effects of climate change, they are perhaps even more directly felt by an island nation like the Philippines than on the mainland. What are the current impacts of climate change on Prime Infra's business, how do you face them now and what are your plans for the future?**

Definitely, climate change poses significant risks to an island nation like the Philippines, hence the need to integrate adaptation and mitigation measures into the development of critical infrastructure. Its impact is immediately felt in the fields of agriculture, power, water, among others.

For Prime Infra, our water infrastructure projects are more likely to experience the physical effects of climate change i.e. extreme weather events and reliability of water sources, but climate change is a phenomenon that we have accounted for by ensuring that our infrastructure assets—and our businesses—are resilient. Take note that Prime Infra's first water project – the Wawa Bulk Water Supply Project – was precisely devised to avoid a repetition of the 2019 water crisis. The said project also comprises a reservoir design that considers the impact of climate change with regards to the availability of raw water, including and especially during the hot months of summer. Furthermore, we are also undertaking

reforestation activities around the site. Combining water projects with extensive reforestation work on the watershed is critical to ensure the long-term sustainability of the project.

Our subsidiary Manila Water, which serves 7.3 million consumers, is eyeing new medium- and long-term water sources and intensifying watershed rehabilitation and reforestation work, among others, to ensure that our customer's demand for safe and reliable water supply is met. Manila Water is also actually the first company in the Philippines to have a Climate Change Policy predating even the national climate change policy. While there can be no guaranteed assurance that we can eliminate the negative impacts of climate change, we have put the necessary measures in place to ensure the continued project development and operations.

All the modelling takes climate risks into account, and this is very important for our businesses, because we enter into long term projects and offtake agreements. This approach also applies to our sustainable energy (natural gas, solar and hydropower) and waste management projects. In the case of waste management, our existing facility, and the upcoming ones currently under construction will capture methane emissions, recycle and treat organics. As you know, capturing methane plays a critical role in slowing down climate change. The risks are so diverse for these sectors, but so are the actions that can be implemented to address these risks, as well as reduce vulnerability to the impact and consequences of climate change.

**At AFRY, our vision is “Making Future”. Do you have any specific dreams about your own impact on a better future for the next generations?**

There is always uncertainty when talking about the future, but I like to consider it from a perspective of seizing opportunities – the opportunity to develop strategies that would address the market's needs and gaps, and the opportunity to lift communities up. Our goal is to build today's critical infrastructure for a sustainable future. All our investments are significantly influenced by our vision and as such, you will see us pushing in that direction, continuously developing infrastructure that enables our stakeholders to achieve decarbonisation goals, multiply social benefits, and promote inclusive economic growth.

The sectors we operate in provide essential services— access to clean water, reliable and sustainable energy, and proper waste management. If we can help improve the quality of life and create a more sustainable and resilient environment, then I think we will make an incredible and lasting impact to benefit future generations. ☺





# Dual benefit

Is green ammonia a silver bullet for food security and decarbonisation?

Russia's war against the Ukraine is reshaping not only energy markets, but also food markets. The war has led to widespread disruptions of food and fertiliser supplies, threatening global food security. The development of green ammonia production presents the opportunity for countries to reduce fertiliser import dependence whilst also tackling the climate crisis, but it may not be a suitable solution for all countries.

### **Russia's weaponisation of food threatens to bring about global food shortages**

International leaders, including Biden, Modi and Von der Leyen, have all condemned Russia's weaponisation of food since its invasion of Ukraine, which has taken the form of restricted Ukrainian and Russian exports of fertiliser and agricultural products. In particular, Russia is the world's largest exporter of nitrogen fertilisers, and its producers benefit from access to competitively priced gas, which is the key feedstock for most of the world's production of ammonia, the raw material for nitrogen fertilisers. Russia's suspension of gas supplies to Europe compounded the fertiliser shortage, leading to the closure of up to 70% of European ammonia capacity at its worst, and fertiliser prices reaching record highs in 2022. Such is nitrogen fertiliser's importance to overall food security that the United Nations forecasts that 2022's shortages of nitrogen fertiliser may result in a massive loss of 66 million tonnes of staple crops in 2023, enough to feed almost half the world's population for a month.

### **Balancing food security and decarbonisation**

Whilst nitrogen fertiliser plays a crucial role boosting worldwide crop yields, its synthetic production and use also accounts for around 2% of global emissions, meaning that finding the optimal balance between global food security and decarbonisation is difficult. It is consequently perhaps unsurprising that governments and companies are seizing upon the opportunity to develop green ammonia, utilising local renewable energy supply (RES) and electrolysis to produce domestically low-carbon fertilisers, as a means by which to address fertiliser availability and affordability, and food security, whilst also decarbonising.

According to the International Energy Agency, production of conventional gas-based ammonia ("grey ammonia") generates direct or scope 1 emissions of 2.4 tonnes CO<sub>2</sub>/tonne of product, far in excess of commodities such as steel and cement with direct emissions of 1.4 t and 0.6 t CO<sub>2</sub>/t respectively. The prospect of zero direct emissions with green ammonia production is therefore especially attractive to governments targeting meaningful emissions reductions.

### **Green ammonia not a one-size-fits all solution**

Green ammonia production is most likely to be attractive as a means to improve food security to those countries currently either a) heavily reliant on imported nitrogen fertilisers, for example, Brazil, India, and the EU, the world's largest importers, and/or; b) those countries where food scarcity is a major issue, for example, in sub-Saharan Africa where fertiliser application rates (and in turn imports) are low, resulting in sub-optimal crop yields.

Many of these countries also show some potential for competitively priced RES, suggesting in principle the suitability of domestic green ammonia production to improve national food supply, although in reality its appropriateness will vary by country. There are a number of challenges facing green ammonia projects aimed at alleviating food security, some of which are outlined below, including potential mitigating actions from government actors.

### **Fertiliser affordability and willingness to pay**

Increasing domestic ammonia supply via green ammonia will not guarantee an improvement in domestic fertiliser affordability, in fact in the medium-term quite the opposite may occur. One of the most significant challenges facing green ammonia production presently is its high costs relative to grey ammonia. For example, AFRY estimates a Levelised Cost of Ammonia (LCOA) for a representative European green ammonia project of €1,000/tonne. Whilst this was below European ammonia price levels for much of 2022, it is well in excess of more typical prices, for example over 2012-2020 prices were more in the range of €250-550/tonne.

The exact costs of green ammonia projects will be location and project specific, but important cost drivers will be the cost and variability of RES, and how the project is optimised and sized with storage options to manage the RES variability versus the flat demand profile of an ammonia plant. Other key drivers will be capex, especially for the electrolyser, and financing costs.

There are a number of factors that could serve to bridge the gap between the LCOA and farmers' Willingness to Pay (WTP), including penalties for grey ammonia production, most notably carbon pricing, development of a "green premium" reflecting the additional value perceived by consumers for the low emissions profile of green ammonia, or alternatively government support.

However, in lower income countries facing more severe issues with food security, there is limited carbon pricing to date, and the ability to pass through a green premium will be constrained by higher elasticity of fertiliser demand to price changes, owing to the larger share of fertiliser costs relative to farmer income. Moreover, fertiliser price increases can also impact food supply through demand destruction and the resulting reduction in crop yields.

As a result, whilst green ammonia costs reduce, government support will most likely be required to bridge the gap with grey ammonia. This could take the form of: a) increased subsidisation of farmers' fertiliser purchases, or of project developers, most notably seen currently in

the US Inflation Reduction Act (IRA) which is providing aggressive production and investment incentives; or b) via contracts for difference, as currently seen in the H<sub>2</sub>Global tender for ammonia where the German government is set to pay the difference between the supply and offtake tender prices. This platform is set to be used EU-wide for fixed premium auctions planned under the European Hydrogen Bank.

**Fertiliser demand and the loss of CO<sub>2</sub> production for urea**

Green ammonia is often sold as bringing fertiliser self-sufficiency, ignoring the fact that only 3% of ammonia is directly applied as a fertiliser globally. In reality, most ammonia in fertiliser production is used as an input into urea, nitrate, and other fertilisers. Additional processing capacity will be required for full fertiliser import substitution.

The shift to green ammonia production removes the CO<sub>2</sub> generation that many grey ammonia producers use in the integrated production of urea, the world's most heavily consumed nitrogen fertiliser, accounting for nearly half of the global market, with India and Brazil both major urea markets. Moving to green ammonia therefore alters the economics of integrated urea producers, leaving them seeking alternative CO<sub>2</sub> sources.

It is hoped that this issue can be overcome by a shift to nitrate fertilisers, given their production does not consume CO<sub>2</sub> and their overall carbon footprint including scope 3 emissions is lower. Whilst this may be possible in some markets, it is worth remembering that ammonium nitrate use requires higher regulatory costs and compliance in order to avoid accidents such as the Beirut 2020 explosion or use by terrorists.

**Fertiliser availability**

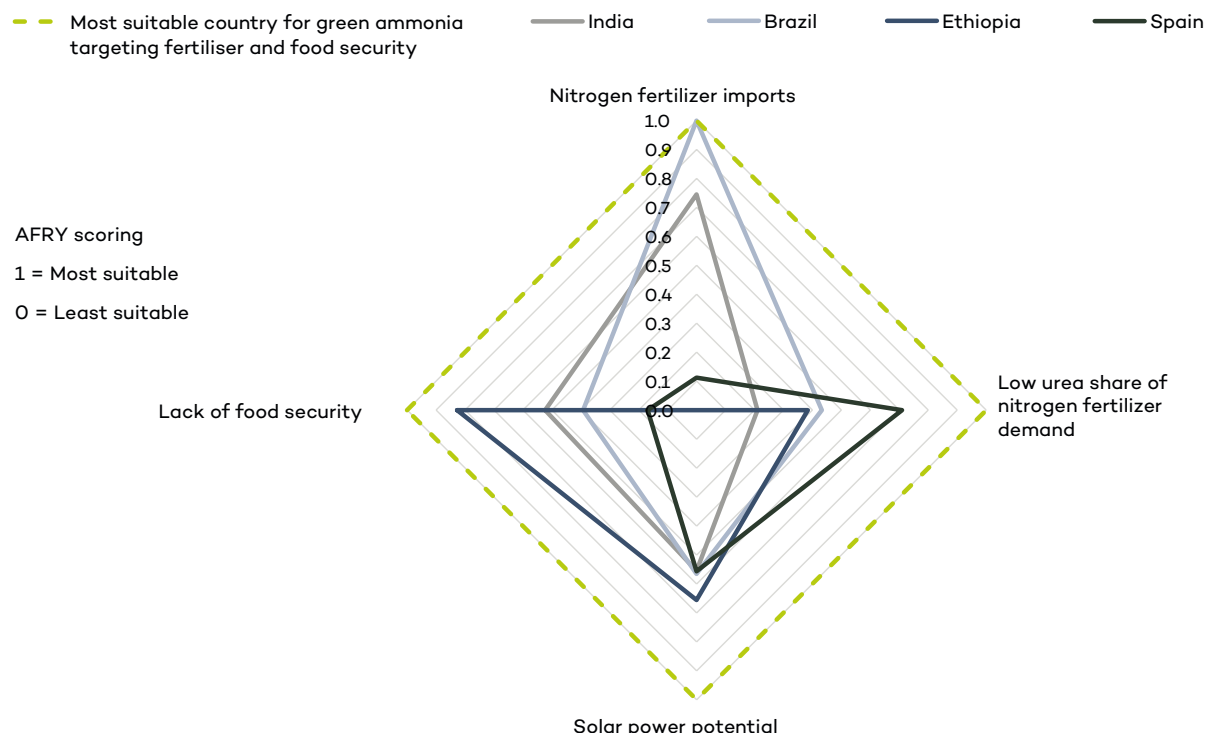
Currently, fertiliser accounts for 85% of global ammonia demand. As ammonia's value as an energy vector grows, the market could grow nearly x3-5 times by the middle of the century, depending on its uptake as a mobility fuel, most likely in maritime applications, as well as in power generation and storage, and as a carrier of hydrogen. This means green ammonia produced for fertiliser use will face increasing competition from other markets, as well as competing for RES. Over time these markets should delineate more with product differentiation and standards, and different WTPs and infrastructure, but especially in the interim, there could be increased competition for ammonia typically destined for fertiliser production, as opportunistic traders take advantage of arbitrage opportunities.

Governments will need to consider other options for low-carbon ammonia, including developing other production pathways, such as blue ammonia using carbon capture and storage (CCS) or waste-to-ammonia. Alternatively, in offering support to plug project funding gaps, governments may need to lock in green ammonia volumes for use solely in fertiliser production.

Overall, it is evident that whilst green ammonia offers much potential for increasing domestic fertiliser supply, and in turn food security in different geographies, it does not offer this immediately, and to what degree will depend on the features of each country's market and governmental support. 🌐

**Green ammonia rarely one-size-fits-all solution**

Suitability ranking of selected countries for green ammonia production as a solution for food and fertiliser security



Notes: Scoring based on country's values within global range for each metric (e.g. 1 for nitrogen fertilizer imports equivalent to world's largest importer), except urea share which is based on 0-100% of fertilizer demand. Sources: FAO, IFA, Global Solar Atlas, Economist, AFRY

# AFRY Management Consulting

We at AFRY Management Consulting are committed to accelerating change towards a sustainable world in the interest of future generations. We are passionate about transforming industries and creating value for clients and society.

We strongly believe that change happens when exceptional people with brave ideas come together.

AFRY Management Consulting works globally to address challenges and opportunities in the energy, bioindustry, infrastructure, industrial and future mobility sectors through:

- Forward looking market analysis
- Strategic advice
- Operational and digital transformation
- M&A and transaction services
- Sustainability consulting

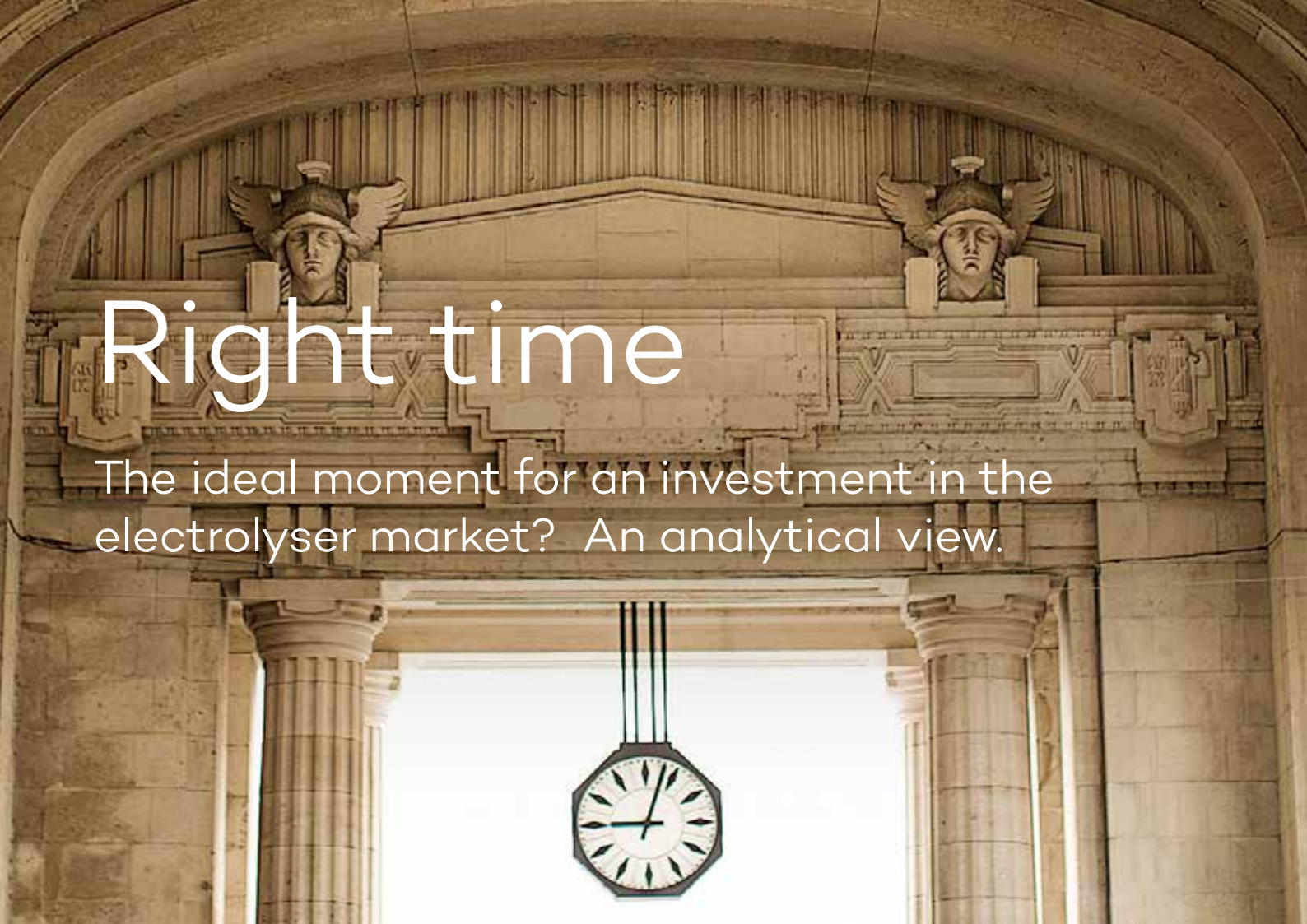
With more than 600 consultants across over 20 offices on 5 continents, and supported by 19,000 experts at AFRY in engineering, design and digitalisation, we are driven by the idea of helping our clients find solutions to business-critical questions.

We don't care much about making history.  
We care about making future.



For more information visit  
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# Right time

The ideal moment for an investment in the electrolyser market? An analytical view.

Current global hydrogen market demand amounts to 90 million tonnes (Mt). This is mainly produced from fossil fuels, resulting in 900 Mt CO<sub>2</sub>, and is concentrated in traditional industry sectors such as refining and chemicals. Over the next decades, total hydrogen demand is expected to increase two to five-fold, reaching between 225 and 450 Mt by 2050. Over 70% of this demand is projected to be met by renewable hydrogen, requiring an electrolyser capacity of 2000-3900 GW and a renewables capacity in excess of 3500 GW.

The immediate opportunity for investors and project developers lies in the substitution of unabated hydrogen with renewable hydrogen in these industry sectors. Further end-use applications (for example in steel production and transportation) continue to be developed, which could allow hydrogen demand to grow beyond these traditional uses. However, deploying the necessary renewable hydrogen value chains and ecosystems will be challenging owing to the scale, complexity, and maturity of the sector and this may make this opportunity less attractive for investors.

## Hydrogen for large-scale use

Nowadays, captive projects – where hydrogen production is co-located with demand – are the most common form of hydrogen supply. This mainly applies to refineries, ammonia, and methanol plants, where large volumes of hydrogen are consumed, justifying the investment in a dedicated on-site production unit. The first barrier to

switching to renewable hydrogen for these plants is the scope of the hydrogen demand that needs to be met. The average size of renewable hydrogen projects has been increasing from a couple of MW to hundreds of MW in recent years, however many large-scale projects are still in the development or demonstration stage and are still to be tested at the GW scale required. Secondly, industry processes often need to run continuously, implying that hydrogen plants that are dependent on intermittent renewable generation, may not be able to meet customer requirements without additional sources of hydrogen or battery storage or additional electricity input from the grid. Importantly, the configuration and economics of these plants are dependent on the availability of renewable resources which can vary greatly by location.

Wherever renewable hydrogen production is located close to renewable generation, rather than close to the demand, there is the additional complexity of requiring a hydrogen distribution infrastructure. There are currently some pipelines that link users of hydrogen with production centres, but significant new and dedicated infrastructure will need to be developed to link production and demand centres. Infrastructure projects require large upfront costs and can have long lead times, which further add to the costs of the delivered hydrogen. Commitments are being made by players: Among them is, for instance, a letter signed in May 2023 by the energy ministries of Italy, Germany, and Austria to support the development of the South H<sub>2</sub> Corridor – but details about this and other



national and international transport projects still need to emerge, adding some degree of uncertainty and risk to the projects.

The challenges outlined above translate into cost factors that can have a significant impact on the risk profile and on the costs of the delivered renewable hydrogen. As a result, installing renewable hydrogen plants requires the identification of offtakers that are willing to pay a 'green premium' for hydrogen. Incentives are being made available at present, for example through the Inflation Reduction Act in the US, which improves the economics of renewable hydrogen plants and covers, at least partially, the additional costs of investment compared to unabated hydrogen. However, finding offtakers willing to sign long-term contracts is currently a significant issue affecting the 'bankability' of projects.

### Scaling up the production

The challenge for the supply chain is to deliver larger and more standardised hydrogen systems that can be 'plugged and played' at more competitive prices. There are positive signals from the industry regarding electrolyser and the balance of plant manufacturers' scaling-up the production, innovating and exploring different business models to meet customer needs:

- Electrolyser production volumes are expected to increase and production lines to be automated. The increase in factory size itself can lead to the standardisation of products and economies of scale. This manufacturing scale-up does not only apply to electrolysers but also to the balance of plant components, e.g. compressors, water cooling, storage, etc., which account for over 70% of the costs. Assuming production volumes can scale up at the pace required, lower costs should be passed on to the customers, although in the short-to-medium-term we may see a tight supply situation that may offset lower production costs.
- Technology has been improving, with modern electrolysers being able to deliver 5 to 10 times more hydrogen than older models, with the same amount of surface area. According to manufacturers, technology lifetimes and efficiencies can be improved further, for

both established and new products. Alkaline (ALK) and proton exchange membrane (PEM) electrolysers still present some technological challenges but they are being heavily researched and increasingly larger products are coming to market. There are also novel emerging solutions such as solid-oxide electrolysers (SOE) which are currently only available in smaller scales and are still at the pilot stage, but appear to be promising, especially if coupled with high-temperature processes that are typical in the industry. New innovative technologies are also emerging promising significant efficiency improvements without higher costs. The race and competition among technologies is on, which is a positive sign for investors.

- Technology manufacturers are exploring different business models and global multinationals are entering the market, bringing their supply chain management capabilities to the table. Customers need turn-key solutions and operational support, and many suppliers are now offering system integration as well as the stack equipment and maintenance.

### Let's make it happen

Stakeholder platforms and ecosystems that bring together technology suppliers, infrastructure developers and customers are critical to ramping up and delivering the advancements outlined above. This is because the renewable hydrogen production technology itself can now be considered established and many of the challenges are now linked to the integration of large-scale renewable hydrogen systems into end-user processes and in meeting customer requirements.

With unabated hydrogen demand to be replaced and commitments from technology suppliers to produce larger and better products to meet customer needs, there should be little doubt regarding the potential attractiveness of the opportunity. Replacing the existing unabated hydrogen demand with renewable hydrogen could grow investment from a handful of MW installed today, to roughly 1000 GW. Although there are challenges, the conditions for this to be a success story are being established. So...let's work together and make this happen! 🌍

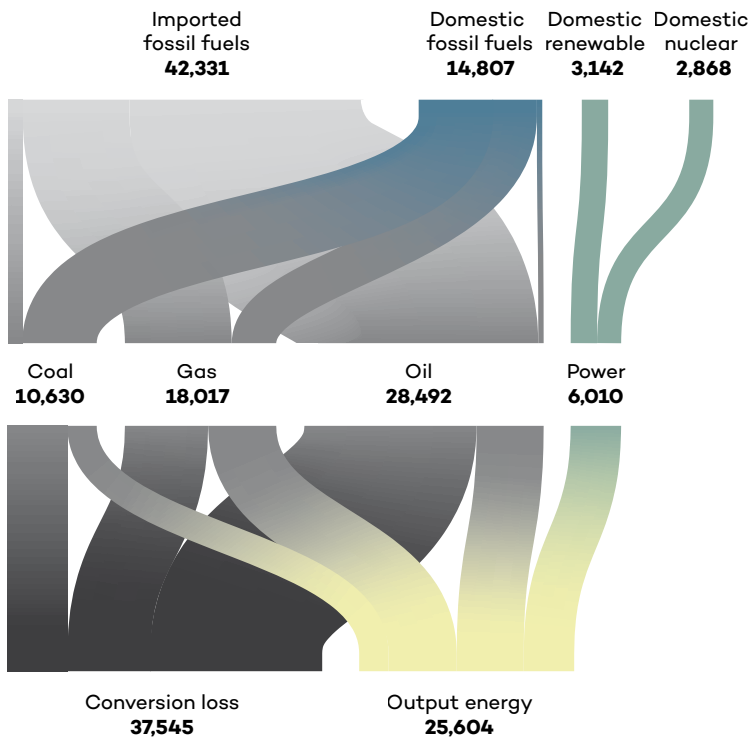


# EU's energy transition journey

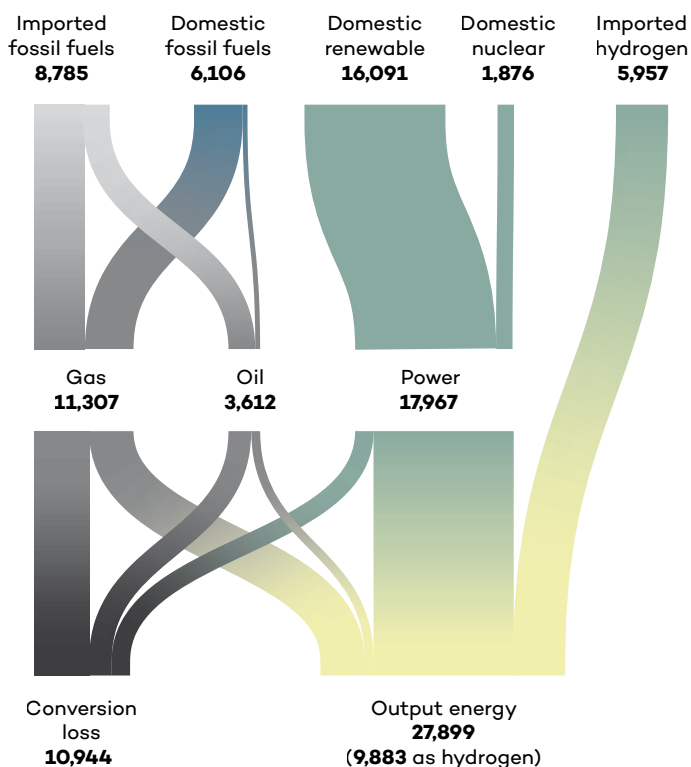
By replacing inefficient fossil fuels with highly efficient renewable power generation, the green energy transition will significantly reduce the need for energy imports.

Energy consumed in the EU showing imports and domestic production vs output energy and conversion loss in petajoules\*

2021



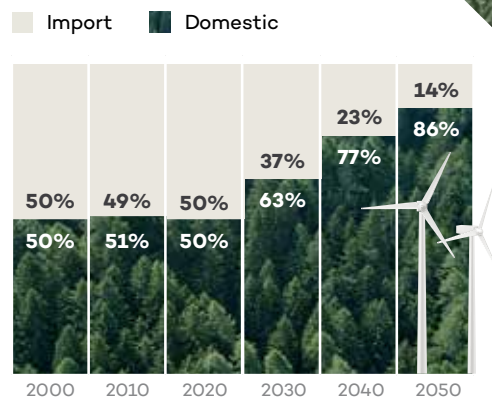
2050



To achieve its net-zero targets, the EU is increasing renewable energy production and reducing dependence on fossil fuel imports.



Percentage of output energy from domestic sources and imports in the EU, excluding hydrogen



In 2021, it was reported that the EU relied on imports for **55%** of its output energy. However, with the rise in domestic renewable energy generation, **Europe has the potential to decrease this to only 14% dependency for output energy by 2050**, excluding hydrogen. Conversely, as the demand for hydrogen in the EU increases (e.g. for power generation, industrial processes, and ammonia production), there may be a growing reliance on foreign imports of green and blue hydrogen.

\* 2050 shows projected data. Imported power is negligible in 2021 and 2050, and imported and domestic hydrogen production for output energy is negligible in 2021. As such, these have been excluded.

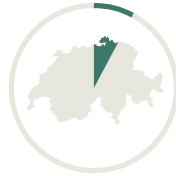
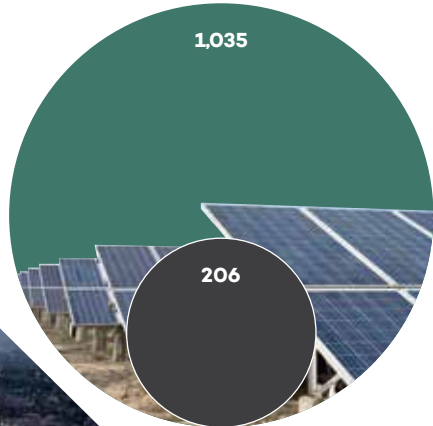
\*\* Due to rounding, numbers presented throughout this infographic may not add up precisely to the totals provided.

# EU net-zero: AFRY's roadmap to powering a greener future

To achieve the goal of net-zero by 2050, the EU must quickly increase investments in the clean energy transition despite challenges.

## Capacity by technology in Europe in gigawatts

● 2022 ● 2050\*



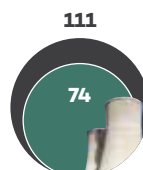
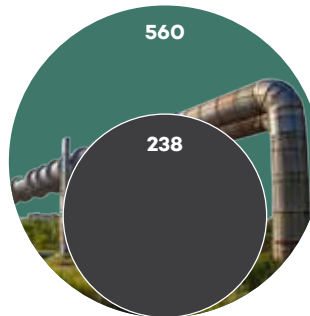
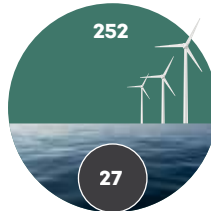
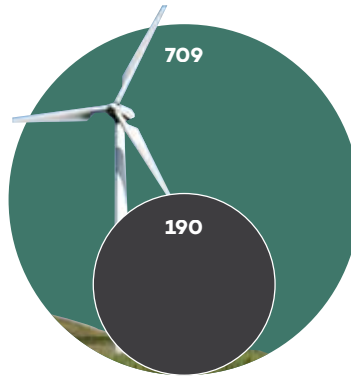
European land use for comparison:



4,000 km<sup>2</sup>  
for golf courses



100,000 km<sup>2</sup>  
for roads



# a Balance

Through investments in energy-efficient technologies, renewables, and hydrogen, AFRY predicts that by 2050, the EU will attain significantly increased energy independence.



# When lack threatens

## A balance between decarbonisation and the security of wood supply

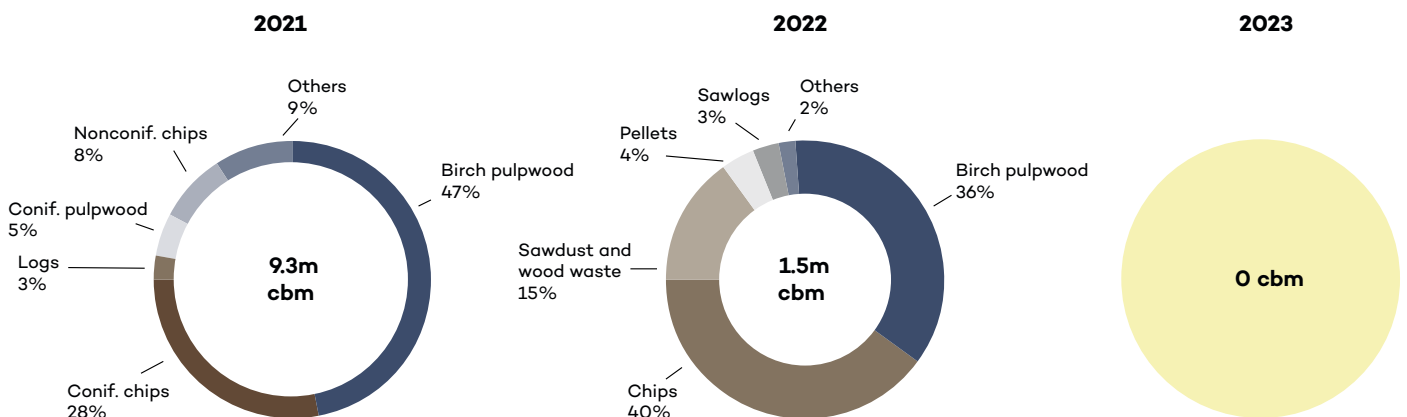
The ongoing green-energy transition involves shifting towards an ecologically sustainable economy as well as growth that is not based on the overconsumption of natural resources and fossil fuels. Although the background of the transition is therefore a need to mitigate both climate change and the unsustainable consumption of resources, even more momentum has been given by efforts to break away from energy imported from Russia. When looking for low-carbon solutions, all eyes have increasingly focused on wood raw material and bioeconomy. At the same time, however, the latest research results show that the carbon sinks provided by our forests have collapsed, endangering the achievement of national carbon neutrality goals. As a result, the use of forests will probably be more regulated in the future, which will mean that logging will hardly increase. Along with these prospects, the flow of imported wood from Russia has also stopped for a very long time. We are therefore on the verge of a difficult equation where on one hand, both the need for bio raw material and its potential uses are increasing, and on the other hand, its availability is decreasing while the important role of forests in the carbon balance must be taken care of. In this article, I set out to discover from the experts what kind of opportunities and challenges we have at hand.

### A sudden change on the market

If we look at Finland's imports of wood raw material from Russia against the backdrop of the Russian war against Ukraine, we see a striking change. While imports in 2021 still amounted to 9.3 million cubic metres, they shrank to 1.5 million cubic metres in 2022 and came to a complete standstill in 2023.

"Imports of wood raw material from Russia accounted for 10% of all wood raw material used in the Finnish forest industry in 2021," explains Timo Tolonen, Trade Policy Specialist at Finnish Forest Industries. "Among these, the most important wood grades were birch pulpwood and coniferous chips, which accounted for 75% of total imports. Their shortage is a challenge for the Finnish forestry and energy industries." Currently, this shortage is compensated primarily from domestic sources and commercial thinning and, in addition, through purchases from the Baltic region, such as Latvia and Estonia, as well as Sweden and Germany, Tolonen says. "But since there is fierce competition for the raw material, especially in the Baltic countries, this leads to sharply rising prices."

### Import of wood raw material from Russia



Source: Finnish Customs and Natural Resources Institute Finland

Although it is possible to import eucalyptus species from remote regions, Tolonen adds, the problem is the transport distance and the high associated costs. In some domestic factories, therefore, attempts are being made to replace birch pulp with coniferous wood, as far as the processes allow.

### Challenges are still to come

However, the real challenges of the wood shortage will not become apparent until the end of 2023. At the same time, the European Climate Law includes provisions to allow the EU to become climate net neutral by 2050. To achieve this objective, both natural ecosystems and industrial activities should contribute to removing several hundred million tonnes of CO<sub>2</sub> per year from the atmosphere. To support the integration of carbon removals into the EU climate policies, the EU has proposed a regulation of the carbon-removal certification. Malgosia Rybak, Climate Change & Energy Director at Cepi (Confederation of European Paper Industries), coordinates the pulp and paper industry's position on the initiative that will develop the necessary rules to monitor, report and verify the authenticity of these removals. The aim is to expand biogenic carbon removals and encourage the use of innovative solutions to capture, recycle and store CO<sub>2</sub> by farmers, foresters and industries.

Discussions on a carbon removal certificates have only just started and nothing is set in stone yet. According to Rybak, the establishment of a certification system for forest removals must be accompanied by a thorough impact assessment detailing the potential impact on

raw materials availability and, consequently, the effects on the development of the EU forest-based circular bioeconomy. Cepi has proposed clarifications for the current proposal, for example, regarding the storage effect beyond the forest cycle. "As certificates could be attached to products storing carbon, their ownership should be given to the actor enabling the storage", Rybak proposes. "This would be a way to acknowledge the benefit of prolonging the storage effect beyond the forest cycle and thus maximising the climate benefit". The approach is based on the thinking that mature forests are more prone to decay and disturbances that may cause the carbon to be released again. It is also known that the carbon sequestration capacity of a growing stock decreases over time.

Changes in forest-management systems could be a part of the solution, as studies show that EU forests could store more carbon through sustainable forest management. "If we get the carbon-removal certification right, forest management may become a revenue stream per se, in addition to products certified for their carbon storage capacity", says Rybak.

However, these changes may not be sufficient to balance the demand of wood and carbon sinks. It is clear that in addition to radical GHG emission cuts the level of carbon removals must be expanded, in order to reach the Paris Agreement goals. Rybak shares the view that increasing the forest area in Europe would be a win-win solution, enabling the highest potential for enhancing removals and securing wood availability in the long term. 🌱



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Interview  
Odile Renaud-Basso,  
President of the  
European Bank for  
Reconstruction and  
Development.



# Catalysing systematic change

Stopping climate change is one, if not the one, prerequisite for future life on this Earth of ours. An unsolvable task for just one nation or organisation alone, thinks Odile Renaud-Basso. In her interview with AFRY Insights, the President of the European Bank for Reconstruction and Development (EBRD) talks about strategies and approaches to tackle this future task of humanity and how her organisation can be part of the solution.



## Multilateral development banks, like the EBRD, have a key role to play, because we catalyse systematic change.

**Your actions show you are a tireless fighter against global climate change, calling for strategies, funding and partnerships. How specifically are you working with the EBRD towards this goal?**

At the EBRD we recognise that the climate crisis is the challenge of our time. The transition to a zero-carbon world requires trillions in investment, the bulk of which needs to come from the private sector, as public funds are insufficient.

Multilateral development banks, like the EBRD, have a key role to play, because we catalyse systemic change. We support countries where we operate, enabling regulatory environments for climate-friendly investments, for instance by structuring renewable energy auction mechanisms, seeking to promote carbon market schemes and developing low-carbon pathways that signal to project developers and investors new climate investment opportunities. We also channel funding from the developed world to developing countries and emerging markets – for example, donor funding from bilateral donors and global climate funds. We believe in private sector-driven growth; hence we work to incentivise private sector action. We also make major investments – for instance, financing the first wind farms in Kazakhstan or the first competitively tendered utility scale solar plant in Albania.

Last year, 50% of our total business volume (more than €6 billion) was invested in the green economy – the largest ever amount of green financing by the EBRD. This is part of our commitment to ensuring that at least half of our annual business volume is green by 2025.

We have also aligned all our activities with the objectives of the Paris agreement. This means that all EBRD investments are screened for their alignment with the mitigation and adaptation goals of the Paris Agreement. Beyond investments, the EBRD's Paris alignment approach covers all internal operations – ranging from treasury to mobility.

To support our clients in their Paris alignment efforts, we launched the Corporate Climate Governance Facility. With the EBRD's support, our clients develop transition plans to address governance gaps, identify priority green investments, and raise capital for green investments. The Facility engages with clients in agribusiness, manufacturing and services, and the financial sector.

We recognise that climate solutions are dispersed, diverse and intertwined across the whole economy. No single organisation on its own can deliver the full suite of climate investments. By co-financing with other multilateral development banks and investors, and by working with policy makers, donors, and technology providers, we

leverage our capital and deliver climate solutions that are greater than the sum of the parts.

**Looking forward, the range of new, climate-friendly solutions is wide – across hydrogen, renewable power, biomass, energy efficiency to name a few. Where do you see the most promising investment areas, and why?**

There is not just one promising investment area. We need to transition the entire economy – from our energy systems to industry and the agribusiness sector – and this requires climate investments and changes in business practices across all sectors. In fact, the transition to a zero-carbon world entails enormous business opportunities.

For example, we need to electrify whenever and wherever we can to drive our cars, heat our homes and run our industries. This electricity must come from renewable energy sources. Keeping the world on track towards an energy transition in line with the 1.5-degree goal requires annual renewable energy investments of USD 5 trillion between 2023 and 2030.

Since 2006, we invested close to EUR 11 billion in renewable energy and provided technical and policy support to mobilise billions more. In some of our countries, we are the largest financier of renewable energy and oftentimes we are one of the first as well. For example, we financed the first utility scale solar power plant in Albania last year with co-financing from private banks and other MDBs. We also supported the government with setting up the first competitive auction for solar power. Such investments and policy engagements build a replicable model for other countries in the region.

That said, certain activities – mainly in heavy industry – cannot be electrified. In such cases low-carbon fuels, like renewable hydrogen, can be the solution. We need to bring the regulators and the private sector together to build hydrogen strategies, regulations and market frameworks that provide long-term clarity to investors because the technology is still in its early stages. For example, in Egypt, we supported the development of the National Hydrogen Strategy and signed an investment for the first green ammonia production plant in 2022. Laying the regulatory groundwork and providing financing for the early investments, we are confident that we will create the right conditions to crowd in the private sector.

We should not forget about the low-hanging fruits. For example, energy efficiency projects in the SME sector. We support such investments through our Green Economy Financing Facilities, which channel funding to small and medium sized businesses and households via more than 180 partner financial institutions. Since 2006, we have committed €6 billion to investments under GEFFs,

avoiding almost 10 million tonnes of CO<sub>2</sub> emissions per year. This model increases access to climate finance at the local level and enhances the competitiveness of small and medium sized businesses.

In addition to decarbonising the whole economy, we need to invest in adaptation and climate resilience. Unfortunately, adaptation finance has historically lagged behind mitigation finance. The best way to scale adaptation investments is to structure all investments to support the climate resilience of our clients. For

There is a growing realisation that decarbonisation is key to energy security. An energy system powered by domestically generated clean energy sources is less dependent on fossil fuels, and thus less vulnerable to external pressures.

example, we are providing a EUR 210 million loan for the construction of a new section of the Corridor Vc Motorway in Bosnia and Herzegovina. While the primary focus is road construction, the project will actively incorporate adaptation elements to improve the resilience against physical impacts of climate change – such as strengthening embankments.

I brought forward these sectors as examples. We can also talk about buildings, manufacturing, the financial sector, the list goes on. The transition to net-zero is an economy-wide effort.

**How do you evaluate potential green energy investments, and what criteria do you use to determine whether an investment or project is a good fit for EBRD?**

Similar to any commercial financial institution, we apply sound banking principles, consider environmental and social safeguards, and evaluate climate-related financial risks.

In addition to these industry standards, all our activities – including our investments – are aligned with the objectives of the Paris agreement. This means every EBRD transaction must be consistent with a 1.5-degree pathway and support the climate resiliency of our partners. We developed the methodology for this jointly with the other MDBs and are already seeing other banks working to implement it.

While all our investments are aligned with the objectives of the Paris agreement, not all of them will necessarily be classified as green or climate projects. You will find that some projects, for example in the healthcare sector, are consistent with a 1.5-degree pathway, yet they do not show any significant climate benefits – hence, they are not considered as green or climate investments. We use the MDB climate finance tracking methodology to assess

whether an investment is a climate or green investment and we report our green finance in the annual Joint Report on MDB Climate Finance.

Standards and methodologies to track climate finance and Paris aligned financial flows are important for consistency, comparability, and transparency. We developed these methodologies jointly with the other MDBs as we could not rely on existing standards and methodologies. Having said that, we appreciate seeing that they are being picked up and adjusted by other institutions.

**Both the EU, the US and other regions are strengthening their policy frameworks and instruments to drive green transition. How do you assess the impact of government policies and regulations on the green energy sector?**

In our countries of operation, as in many others, the absence of a carbon price is a fundamental market failure. The introduction of a carbon price reduces externalities and makes many green projects economically viable. In Kazakhstan we supported the authorities in establishing an emissions trading scheme. This will take time to generate a strong economic signal, but we have seen with the EU Emissions Trading Scheme how once established this can prompt significant private investment throughout an economy.

In the absence of a carbon price, political commitments at the national level and sectoral regulations that create a climate-friendly market environment are ever so important. At the national level, we work with our countries to develop ambitious nationally determined contributions and long-term strategies. At the sectoral level, we bring together regulatory and industry stakeholders to design low-carbon pathways in sectors such as power, fertiliser, cement, steel, and transport. This policy work provides strong signals to project developers and investors on sectoral investment needs and the timeline to deploy new technologies.

The bottom line is that the right regulations attract private sector investments. That is why we place such an emphasis on our policy dialogue. In many of our countries the market for green energy is still nascent and we continue to work hard to bring the regulators and the private sector together.

**With war in Europe, a more accentuated geopolitical situation and disrupted supply chains post the pandemic, the path towards more climate-friendly solutions seems even more challenging. What implications does this development have on EBRD's strategic thinking and your investments?**

If anything, Russia's war on Ukraine has highlighted the urgent need to diversify gas supply and transition away from fossil fuels and coal. Green and renewable energy have become recognised as key to achieving this. We see

this not only through new policies, which aim to support clean energy and low-carbon technologies (such as the EU's Green Deal Industrial Plan and the US's Inflation Reduction Act), but in our countries of operations as well.

For example, Egypt has launched a groundbreaking Nexus on Water, Food and Energy (NWFE), part of the country's national climate change strategy.

The EBRD is the lead development partner on NWFE's energy pillar, which should unlock \$10 billion in private investment to install 10 GW of solar and wind energy and double Egypt's share of renewable energy by 2028.

Uzbekistan is another example of a country where EBRD is supporting the government's ambitious objectives to develop 12 GW of renewables by 2030 through policy work and investments. In the last twelve months, the EBRD financed 2.4 GW of new renewables capacity to be developed in Uzbekistan and continues to support the country on auctioning of 2 GW of renewables capacity.

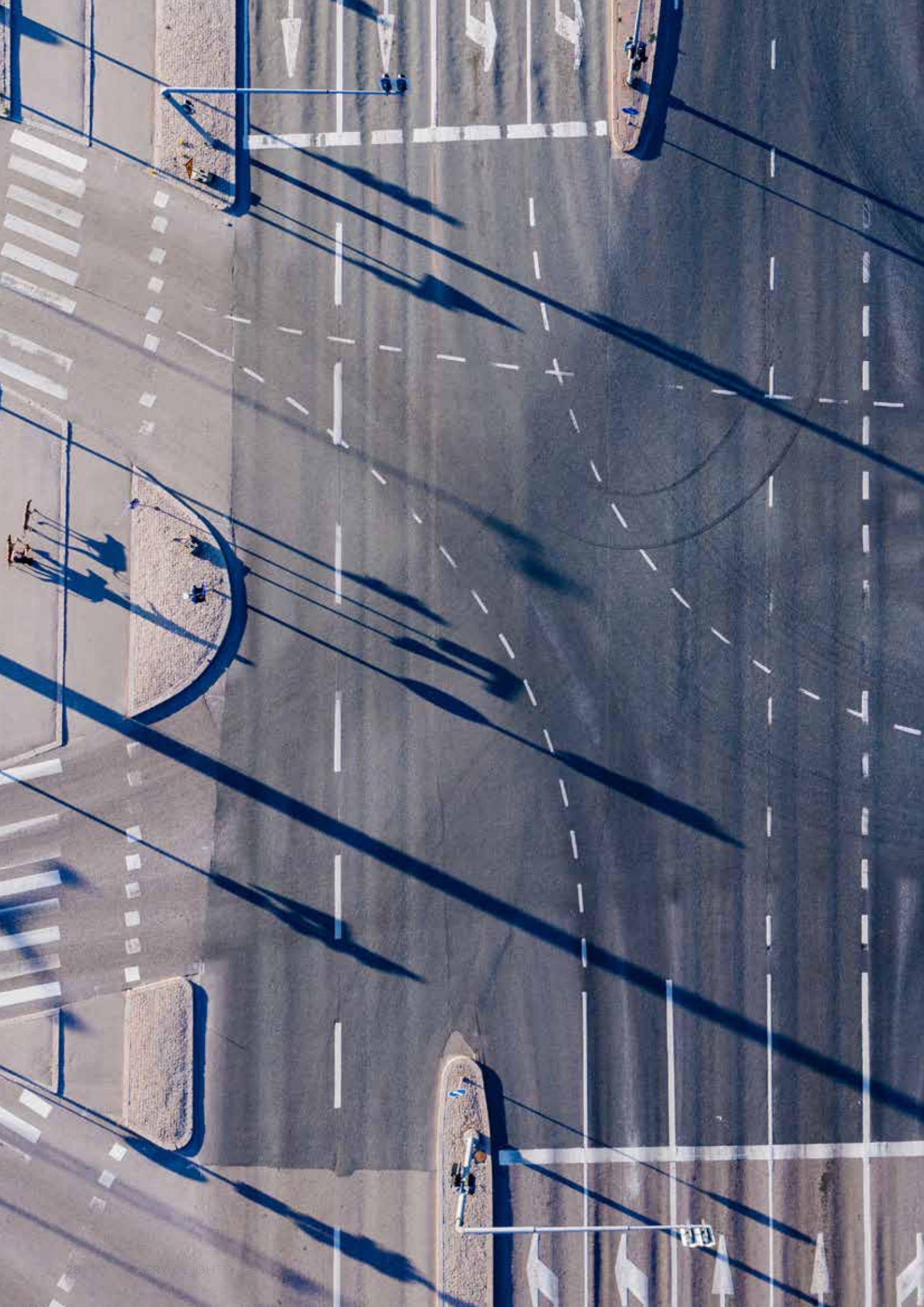
**What advice would you give to someone looking to invest in green energy, and what resources or strategies do you recommend for those who are just getting started in this field?**

I recommend being well versed in the various standards and regulations around green products. For example, when it comes to green bonds, an understanding of the Green Bond Principles will allow one to invest in financial products more confidently with green benefits. Similarly, for those looking to get involved with carbon markets, understanding how carbon credits are issued and standards like the Gold Standard will help make more informed decisions. For those investing in the European markets, the EU Taxonomy for Sustainable Activities is crucial.

**This issue of AFRY Insights magazine revolves around the challenging dual objective of balancing between decarbonisation and security of energy supply. What does this bring to mind for you, within the context of your expertise?**

I believe there is no longer any tension between these two. There is a growing realisation that decarbonisation is key to energy security. An energy system powered by domestically generated clean energy sources is less dependent on fossil fuels, and thus less vulnerable to external pressures. ☺





# Striking the right balance

## From a rule-based international trade to a subsidy race and protectionism?

After a couple of decades of strong globalisation and trade liberalisation we have experienced a global shift of attention towards ESG and climate abatement measures. The Covid-19 pandemic and Europe's gas crisis have also given additional impetus to enhancing resilience in supply chains and to limiting dependence on foreign markets and technology. However transparent and predictable mechanisms, mindfully drafted, should bring comfort regarding security issues without hampering trade.

Global CO<sub>2</sub> emissions are still on the rise. Both the investment rate and the deployment rate of renewable sources must be increased substantially to meet the Paris Agreement targets. The policy reaction is more subsidies and more lenient state aid regimes nationally. These trends coincide in the respect that they will lead to a more regionalised trade pattern.

### Under pressure

The philosophers Montesquieu and Kant were strong in their belief that dependencies in trade will contribute to peace. The trust in this philosophy has been strong among many policymakers over centuries. With the establishment of international economic institutions like the World Bank, the International Monetary Fund, The General Agreement on Tariffs and Trade (GATT) and the OECD, international rules for international trade and financial movements followed suit. The intention was to create level playing field among countries and promote international trade. The objective was capital flow liberalisation, and offering protection of foreign investment, among others. President Clinton's speech welcoming China to the WTO and the awarding of the Nobel Peace prize to the EU are examples of the standing of this policy.

However, the fundament of the international economic system is under pressure. The development and maintenance of the international ruleset slowed down

forcibly 15 years ago coinciding with the aftermath of the global financial crises. After a couple of decades of strong globalisation and trade liberalisation, we have experienced a global shift towards more attention to ESG and climate abatement measures. More attention is drawn to human rights issues, security concerns and increased dependencies. The Covid pandemic has added concern over long supply chains and fuelled the introduction of more restrictive trade policy measures.

### Wind of change

This spirit has brought about a change in the policymaking in the last decade, not least regarding tackling security issues. These concerns are met with mainly two types of measures:

- **Economic tools and restrictions like screening mechanisms of single investments in highly sensitive sectors**
- **Measures to limit the dependencies of single countries**

Over the past few years, most OECD countries have put in place an investment screening mechanism. And both the EU and the OECD established a ruleset and guiding principles to harmonise national screening regulations. The Covid-19 pandemic has also given additional impetus to enhance resilience in supply chains and to limit dependence on foreign markets and technology.

Concern over increased dependencies in critical and growing sectors like "green" technologies, artificial intelligence, semiconductors etc., is partly met with economic tools, such as subsidies and tax breaks.

The US Inflation Reduction Act (IRA) and the EU response are both clear indications of the effort to reduce dependencies and also have to be seen as an effort to meet the climate mitigation needs and domestic expectations.

The IRA was passed in an effort to reduce greenhouse gas emissions, the public deficit and inflation.

It included massive tax breaks and subsidies amounting to USD 367 billion to boost US domestic production of, among other things, electric vehicles, solar panels and batteries. A legitimate question is whether these subsidies are contrary to fair competition. For example, most electric vehicle manufacturers could relocate their production to the US. Today, more than 25% of electric cars are produced in Europe, while only about 10% are produced in the US.

The US legislation foresees tax credits of USD 7,500 per vehicle for US consumers who purchase electric cars, provided they meet two conditions: One is that at least 40% of the raw materials used in the electric battery are extracted in the US or in a country with which the US has a trade agreement. The EU and the US are major trading partners, but have no such deal. By 2026, the threshold for the tax credits will be raised to 80% of raw materials.

The other condition is that at least 50% of the battery components are made or assembled in the US, Canada or Mexico, and, by 2029, that threshold will be raised to 100%.

The US Inflation Reduction Act foresees a generous incentive programme for other areas as well, such as new tax credits to promote carbon capture, clean hydrogen and investments in green energy technologies and the mitigation of greenhouse gas emissions. In these areas, Europe is currently the world market leader.

### **The EU's new industrial policy will be prominent on the 2023 agenda**

“We need to come up with an answer of our own, our European IRA,” European Commission President Ursula von der Leyen said to the European Parliament.

On 1 February 2023, the EU launched the European Green Deal Industrial Plan, seeking to enhance the competitiveness of the European net-zero industry. The plan foresees more relaxed rules for the EU-member states to use subsidies and tax breaks.

The EU and the US policy changes are not the only examples. China announced plans to invest USD 280 billion in clean technologies. Japan, Canada, India and United Kingdom also belong to the group that recently announced similar plans.

The energy crisis that the world has been facing lately, as well as the policy responses to that crisis, can have a significant impact on the transition towards climate neutrality. The energy crisis was caused by an imbalance of energy supply and demand, with high prices as result. This means there is a need to reduce energy demand and increase the supply of secure, domestic and low-carbon energy. However, the bottom line is that the investment rate and the deployment rate of renewable sources has to be substantially increased to meet the Paris Agreement targets.

Policy coherence is an important factor to promote sound public policies. In the case of investment and competition and trade, the stated objectives of these policies are similar: to improve economic efficiency and promote sustainable economic growth. However, governments also need to manage competing public policy objectives such as the protection of essential security interests. The main objective of the investment policy is to attract and manage international investments.

### **Time to wonder**

Traditional tools to achieve this objective are capital flow liberalisation, incentives, and offering protection of foreign investment, among others. From a public policy perspective, a favourable investment climate can improve economic efficiency and promote growth and sustainable development; it can increase domestic welfare and facilitate the integration of the domestic economy into global markets. For a successful investment policy, the creation of a sound investment environment is crucial – in this respect, the 2022 developments are a concern.

Nobody should welcome an increasing worldwide subsidy race, even if they target important climate mitigation sectors. The subsidies will increase the inefficiencies in the allocation of capital, and the capital will not necessarily flow to the most efficient climate mitigation projects. The effects of climate gas emissions are independent of country and continent. 🌐

# New rules

How the EU Taxonomy and the US Inflation Reduction Act are driving green innovation by challenging the risk-return dichotomy

Investors and manufacturers must expand their views on the concepts of risk and return when looking at business operations and opportunities. New ways of identifying and measuring risks, including climate risks, are increasingly challenging our held assumptions – from the board room down to the shop floor. The types and quantities of data collected and reported are evolving, and our definition of returns on investment must change with it. The EU Taxonomy and the Inflation Reduction Act in the US are, in part, driving these changes, leading decision-makers away from a simplified financial view of the risk-return dichotomy, and towards a keen awareness of the rapidly evolving landscape of the sustainable economy.

The traditional role of a fund manager, acting on behalf of investors, is twofold:

- to ensure that risks are adequately assessed and match the investors' appetite for uncertainty, and
- to ensure that the financial reward will be according to or above investors' expectations.

Until recently, this was more of a numbers game, involving highly sophisticated and proprietary software. Investors chose what level of risk and reward they were comfortable with and could expect to earn higher financial returns in exchange for less risk aversion. However, investors are increasingly shifting their focus away from this traditional worldview, towards a model of return that encapsulates a more holistic and



long-term view of risks. This revolution is being driven by a growing recognition among investors that a company's success is not solely determined by its financial performance, but also by its impact on society and the environment, throwing sustainable innovation into the spotlight.

### Moving the dial

Smart investments in sustainable technologies already have inherent benefits that are moving the dial for decision makers. Sustainability factors are increasingly being used to assess and manage risks that will affect a company's financial performance, such as climate/environmental disasters, social unrest, or governance failures. Thus investors can identify potential risks and opportunities that may not be captured by traditional financial metrics. Furthermore, companies that prioritise non-financial factors tend to have a more sustainable business model and actively build trust and relationships with stakeholders such as customers and employees, leading to long-term value creation. Beyond these advantages, investors are now being driven away from the outdated risk-return dichotomy through

developments in the regulatory and legislative landscape, with a growing trend towards frameworks that require companies to disclose sustainability-related information, with those engaging in sustainable innovation being rewarded by markets and governments alike.

One such regulatory enabler is the EU Taxonomy for sustainable activities, an effort to create a framework for sustainable finance. It aims to construct a common language and understanding of what activities can be considered sustainable and to, therefore, encourage investment in activities that make a substantial contribution to one or more of six environmental objectives without significantly harming any of the others.

### The six objectives of the EU Taxonomy are:

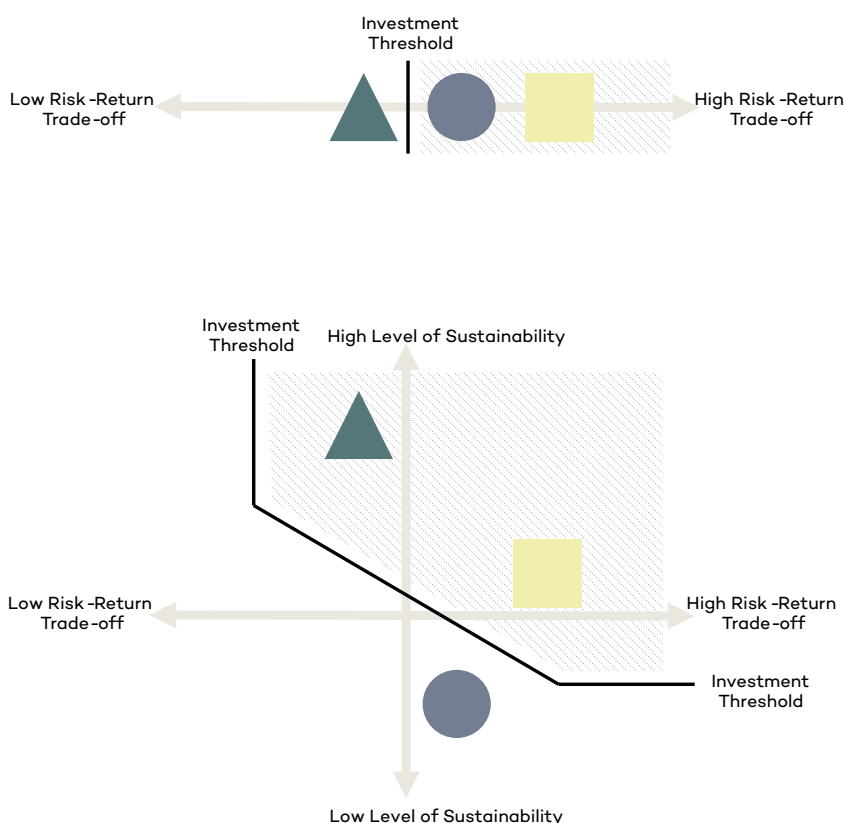
- climate change mitigation
- climate change adaptation
- sustainable use and protection of water and marine resources
- transition to a circular economy
- pollution prevention and control
- protection and restoration of biodiversity and ecosystems

The EU Taxonomy establishes criteria, based on regularly updated scientific and technical knowledge, for activities that can be considered sustainable by meeting these objectives. It is intended to be used by financial institutions, investors, and companies to guide their investment decisions towards sustainable activities.

To better understand the ambition level of the EU Taxonomy it is worth looking at the numbers. EU economists have made the rough estimate that to make the EU climate neutral by 2050, Europe needs between EUR 175 and EUR 290 billion in additional annual investment in the next decades. Yet, public funds will not be enough. This is also why the EU has proposed hard law to incentivise private capital to flow to sustainable projects.

### Two rules, two approaches

The EU Taxonomy can be contrasted with the US Inflation Reduction Act's sustainability incentives. The Inflation Reduction Act, passed in 2022, aims to encourage companies to reduce their greenhouse gas emissions by providing financial incentives for sustainable practices.



**“Net Zero Impact Investment Strategy”** ■

Purpose: Decreasing negative impact, e.g., reducing/avoiding GHG emissions by ensuring that sector pathways to net-zero are developed including effective measures. Applying strong governance on assets setting measurable targets with KPIs working towards net-zero with off-setting/carbon capture options for hard to abate emissions. Divestment might also have to be considered.

**“Net Positive Impact Investment Strategy”** ▲

Purpose: Creating positive impact, e.g., removing GHGs through Carbon Capture Solutions (CCS) and/or Nature-based Solutions (NbS) that confer financial benefits to investors as legislation and behaviour changes.

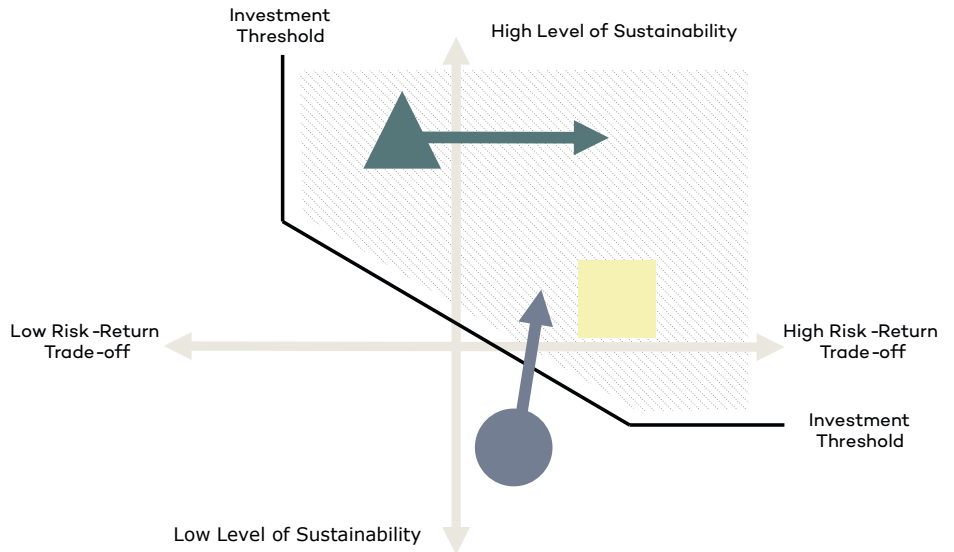
**“Activist Impact Investment Strategy”** ●

Purpose: Slowing down/stopping negative impact direction and utilising an “impact turnaround”. Transforming companies and assets to become part of the solution rather than worsening/continuing to be the problem.



Specifically, the Act provides a tax credit to companies that reduce their emissions below a certain level, with the credit increasing as emissions decrease, providing a generous financial incentive for companies to reduce their emissions. Of the estimated USD 391 billion in provisions relating to energy security and climate change, USD 270 billion will be assigned in new or increased tax incentives, as well as significant funds allocated towards loans and loan guarantees. The purposes of these funds are wide-ranging, from renewable and nuclear energy generation to home energy upgrades and an electrified postal service fleet.

Though the Inflation Reduction Act's sustainability incentives are primarily aimed at reducing greenhouse gas emissions, it does, in effect, communicate what the US government deems a sustainable industry or product, much like the EU taxonomy. Whilst the EU Taxonomy covers a broader range of environmental objectives, it does not confer financial incentives. Instead, the EU Taxonomy lays the groundwork for private investors to use this framework in guiding their decision making, and for companies, increasingly mandatorily, to disclose their environmental impacts to stakeholders. In short, the EU Taxonomy aims to guide investment decisions towards sustainable



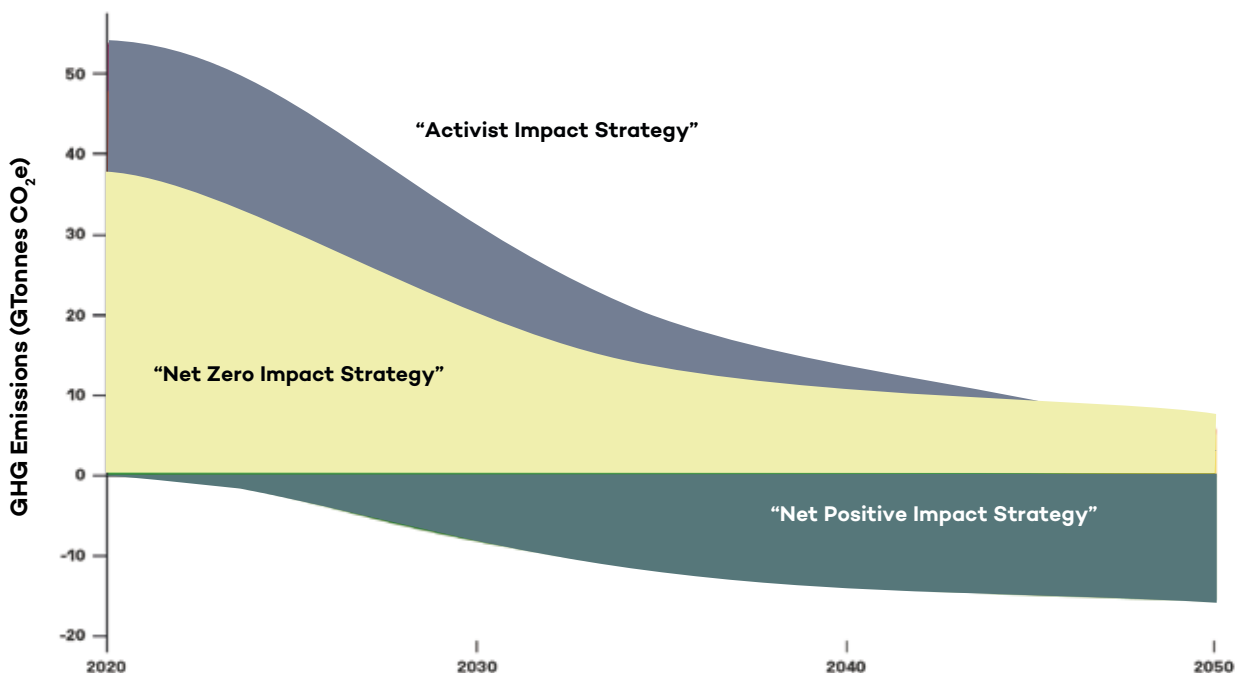
activities, while the Inflation Reduction Act provides direct tax reliefs and financing to encourage sustainable practices.

**Ways to sustainable financing**

As the EU prepares their response to the Inflation Reduction Act, the "Net Zero Industrial Act", other hubs of sustainable innovation, such as the UK and South Korea, will be forced to follow suit and directly incentivise sustainable activities and investments. The result will be a competitive global landscape of subsidies, regulations, and sustainability frameworks, all working to support a worldwide move towards green innovation. Despite their differences, both the EU Taxonomy and the Inflation Reduction Act are

addressing the risk-return dichotomy that exists in traditional financial models by creating a sustainable financial model that more broadly serves the needs of the future.

This revised model will require organisations to embrace new strategies that reverse unsustainable ventures, further follow their commitment to decarbonisation pathways, and begin to grow investment in projects with net positive sustainability impacts. Below, we outline and illustrate these strategies, the positive effect they will have on a company's market position, and the cumulative impact of this vital action on the journey towards net -zero. 🌱



# Next gen

Balancing education and experience on the path to shaping a better world



In the pursuit of sustainable development and the energy transition, finding the right combination of professional experience and academia is an important enabler for the next generation of change-makers. This delicate balance is precisely what AFRY fosters through its internship programme with the Social Mobility Foundation in the UK. The Social Mobility Foundation is a national charity whose vision is for a society where talent from all backgrounds is nurtured, harnessed and rewarded. Through the programme, AFRY has the opportunity to welcome fresh ideas, challenge conventional thinking, and bring together a unique blend of talents that can lead to transformative outcomes.

AFRY Insights spoke with Anna Lappin, Josh McKenna and Neha Yasin, interns at AFRY Management Consulting in the UK, who joined in 2022 and are returning in 2023. Read on to find out more about the connection between AFRY's vision of Making Future, the quest for balancing global energy security with decarbonisation, and the hopes and concerns of aspiring professionals who are striving to shape a better world.

## What does AFRY's vision, 'Making Future', mean to you?

Josh: "To me, AFRY's vision of 'Making Future' is a testament to the enthusiastic and knowledgeable individuals who make this company what it is. Based on my experience working at the Oxford office, whether devising new modelling approaches, providing policy

insights, or implementing new social programs, it is inspiring to work with people who are always striving forward together. AFRY's commitment to innovation and progress is truly inspiring and makes me proud to play my part"

Anna: "Handling the energy transition is one of the biggest challenges that our society, and our planet, are facing. 'Making Future' reminds us to keep focusing on the long-term, collective effort to steer humanity towards a sustainable future."

Neha: "As a young person in today's society, I am often left worrying about what the future may look like for my generation, especially as climate change and global warming are becoming increasingly apparent. There are no doubt going to have to be huge changes in global energy usage within my own lifetime and AFRY's vision will hopefully help make sure the right decisions are made for our future."

## The theme of balancing global energy security with decarbonisation lies at the heart of this edition of AFRY Insights magazine. What are your thoughts along that theme?

Anna: "Working at AFRY during such a turbulent time in terms of the supply of natural gas really highlighted to me the link between improving energy security and handling the energy transition."

Neha: "I think this idea of balance is important, especially for areas of the world that are still developing their energy and electricity market. It would not be fair to hinder the process of development in these countries by implementing limited options from the get-go. While their energy security should be improved or maintained with future sustainability ("futureproofing") in mind, decarbonisation would be most successfully done in areas that have the infrastructure to maintain satisfactory energy security alongside the changes."

Josh: "The challenges of energy security and decarbonisation are complex but they are more often aligned than not. I believe recent crises have only highlighted the necessity for policies that enable a decentralised, renewable energy system while addressing an increasingly inflexible supply and peak-prone demand. By optimising our installed capacity through smart grids and enhancing energy efficiency, we can reduce and distribute system demand, reducing the pressure on generation and thereby supporting both goals. Here in the UK, this could involve a more aggressive deployment of heat pumps in homes and the promotion and electrification of mass transportation."

### **What are your hopes and concerns in relation to the energy transition?**

Anna: "I hope that a successful handling of the energy transition will create a framework for truly global collaboration, not just across borders but across industries and communities. The costs and challenges associated with a transitional period could then be spread equitably, whilst developing a framework that would put us in a much better position to tackle future global challenges. My main concern is that the energy transition may not happen until it is too late to prevent the devastating effects of climate change, perhaps due to some people in positions of power prioritising their own short-term interests over long-term sustainable change."

Neha: "I just hope that we, as a civilisation, are able to turn our climate situation back around and prevent a disastrous outcome for our entire globe. However, I am concerned that we have waited too long already to implement some changes and that the changes we are making just aren't happening fast enough amongst the biggest players."

Josh: "As we navigate the energy transition, it's crucial that we take a step back and reflect on our resource consumption and our connection with the environment and its inhabitants. While the pursuit of greater sustainability is essential, we cannot overlook the opportunity to tackle other ethical and societal issues that intersect with the climate crisis. It's essential to ensure that the energy transition is a just transition that benefits everyone."

### **How would you describe your idea of a great place to work?**

Josh has a physics background that has equipped him with a mathematical and physical intuition that has been essential to his work at AFRY, enabling him to analyse data critically, understand its limitations, and draw meaningful conclusions.

Anna chose climate science as her optional module this year and the atmospheric science fits really well with the rest of her physics degree, while relating back to her work at AFRY on decarbonising European industry.

Neha found her time at AFRY allowed her to explore how her physics expertise could be applied in real life problem solving, such as quantifying the physical impact of our energy use and the mechanisms of sustainable technologies.

Neha: "A friendly and supportive work environment in which your ideas and contributions are recognised and allowed to thrive. A company whose goals align with your own ideals and morals."

Josh: "For me, a truly fulfilling workplace is one where everyone feels appreciated and respected, as well as one with sense of camaraderie between folks both in our work together and as individuals. I value a workplace that promotes personal growth and development, and where our interests are encouraged and supported."

Anna: "I really like the idea of a 'psychologically safe' environment. This covers many of the aspects that I would value in an office culture: clear and

honest communication, a robust code of ethical practice, encouraging a sustainable work-life balance, and so on. Combining this with rewarding, varied work and good training opportunities makes a great place to work!"

The Social Mobility Foundation unlocks potential, broadens horizons and creates opportunities with and for ambitious young people from lower socioeconomic backgrounds. It also influences employers to act on social mobility and campaigns on social mobility issues. By actively supporting the inclusion of individuals from diverse backgrounds, organisations like AFRY gain access to a range of perspectives that can drive innovation, enhance problem-solving capabilities, and foster a more inclusive corporate culture. 🌍



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# Making Future

