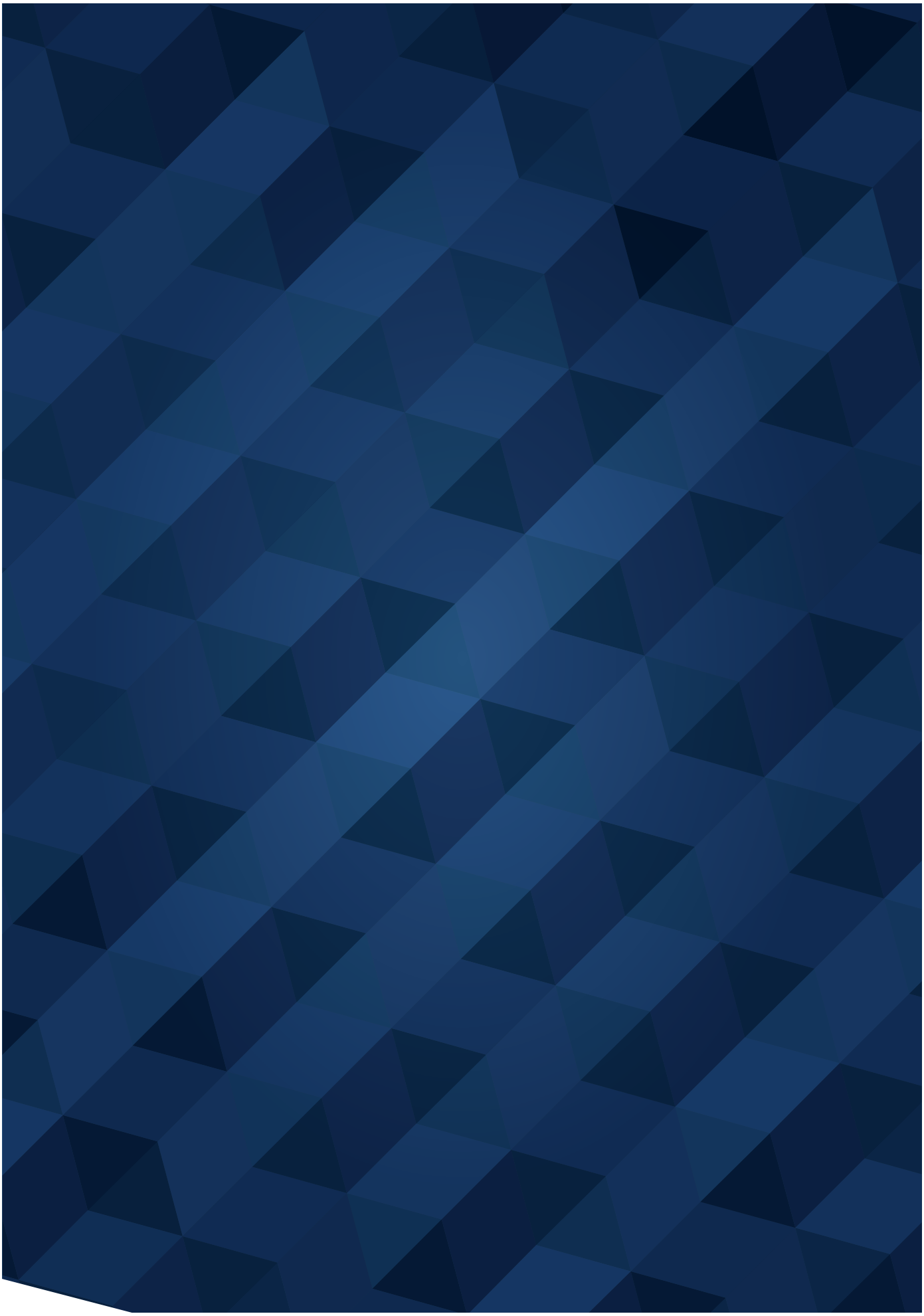
COLUMBIA THREADNEEDLE INVESTMENTS

Responsible Investment Quarterly

Q3 2022



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Foreword: energy crisis remains top of the agenda

Roger Wilkinson
Head of EMEA Equity and Responsible Investment Research

The third quarter of this year continues to be dominated by the implications of the energy crisis, but there was also a significant new development in the US, with Congress passing the Inflation Reduction Act (IRA). We believe both these events will accelerate the uptake of renewables and accelerate decarbonisation over the next decade.

The IRA is arguably the most ambitious and comprehensive climate legislation the US has ever seen. As analysed by Natalia Luna in one of this quarter's articles, the Act is a very important catalyst for increased investments in clean energy such as renewables, hydrogen and carbon capture and storage (CCS). Within the US it has the potential to double the speed of decarbonisation over the next decade while leapfrogging the US to become one of the global leaders in green technology.

The energy crisis remains top of the agenda in the European Union and countries accelerated their responses to prepare for a winter without reliance on Russian gas, after the suspension of Nord Stream 1 in September.[1] The EU announced a set of emergency measures to cut power use and redirect windfall profits of energy companies to households and businesses to shield them from power prices that are multiples of long-term averages. Against this backdrop we believe energy efficiency investments will become a much more visible part of the solution for consumers and industrial energy users, so companies in this space will benefit from increased demand.

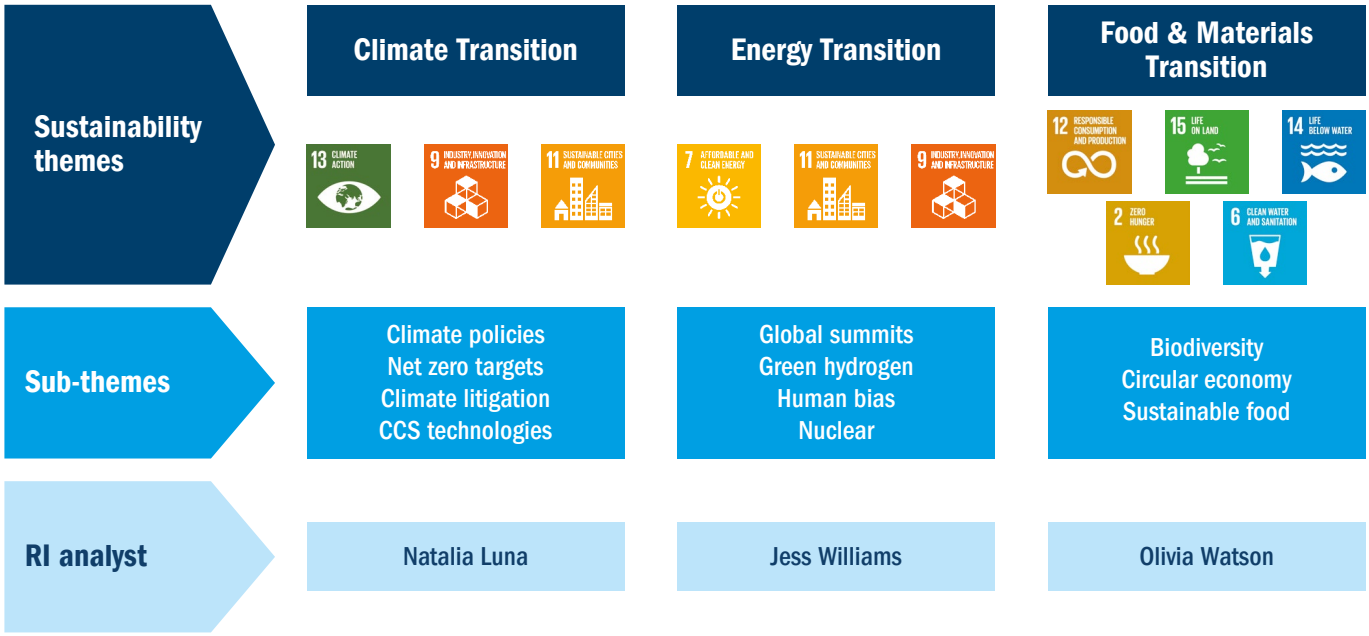
RI research team philosophy

We believe responsible investment (RI) research is fundamental research, so our RI analysts are embedded within the global research team. The team's philosophy reflects this integration with its mantra: "Educate, Collaborate, Engage".

Our RI analysts educate portfolio managers and fundamental industry analysts on RI themes and developments based on our intense research in three overarching sustainability themes: climate transition, energy transition, and food and materials transition. We then collaborate with our portfolio managers and industry specialists to highlight risks and opportunities within industries and sectors. Through this collaboration we pinpoint companies we want to engage with on the risks and opportunities we have identified linked to that particular RI theme. Finally, we integrate these learnings into our investment selections and decisions.

This approach allows us to support and provide actionable investment insights. Our overarching sustainability themes are linked to the UN Sustainable Development Goals, which we believe increasingly shape the economic and investment landscape, and our RI thematic research focuses on investment-relevant sub-themes within these.

Our RI themes and sub-themes



In response to gas shortages we have seen coal usage spike in the short term, however the use of renewables is also accelerating. In a recent report BloombergNEF highlighted the record increase in renewables additions, with 75% of the power capacity added in 2021 being renewables, and of this 50% was solar,[2] which is a trend that we expect to continue. This increasing future supply of clean renewable energy and very high gas prices improve the relative attraction of green hydrogen. Jess Williams and Natalia give an update on the progress and catalysts for the development of green hydrogen in this edition.

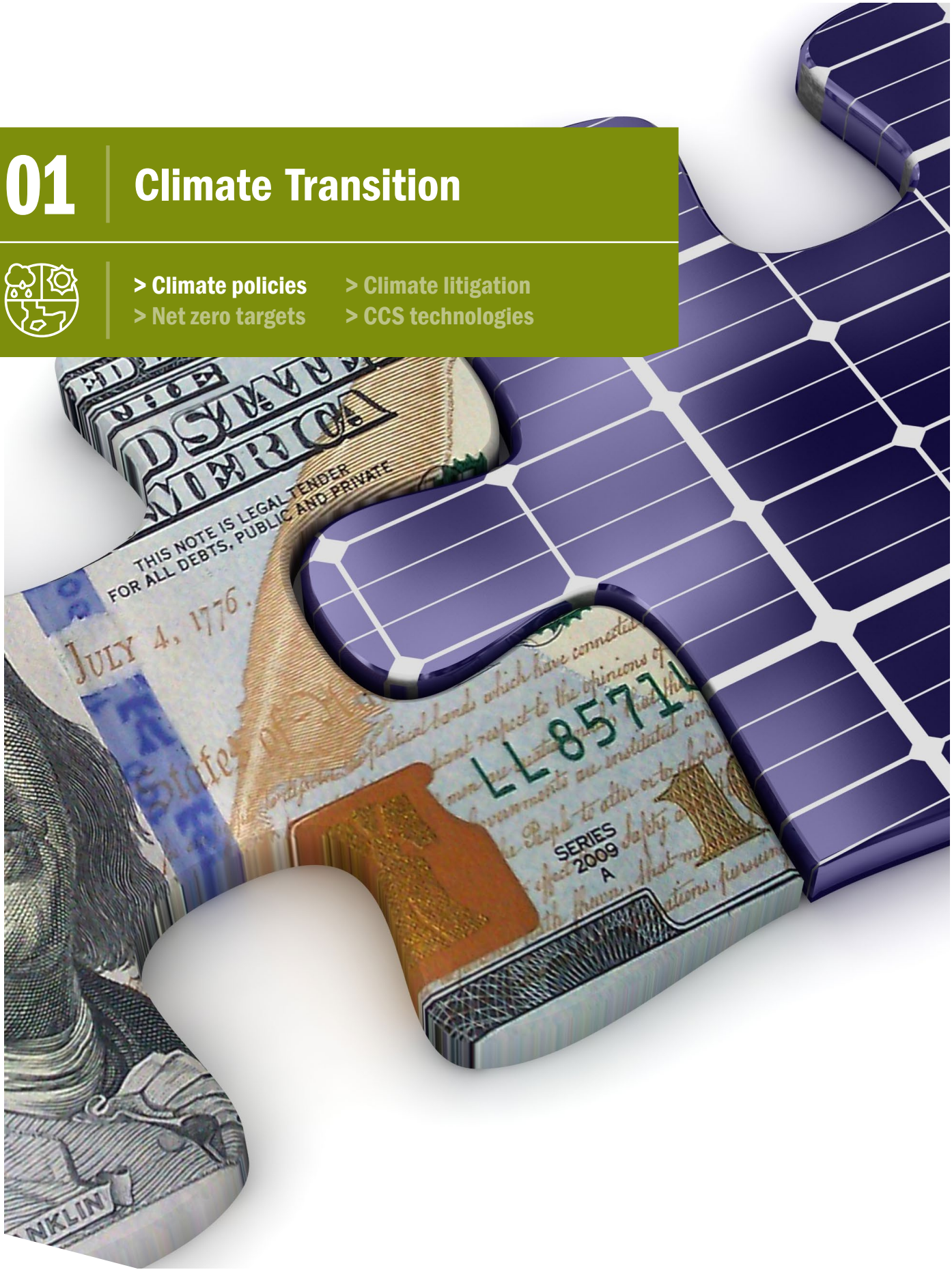
Finally, an area that doesn't get as much attention as we think it should is the sustainable food transition. Previously, food prices were increasing due to conflict, climate change and Covid. This has now been exacerbated by war, trade disruption and energy prices, increasing the risks of social and political disruption in countries dependent on food and fertiliser imports, and worsening inequality in developed markets. This issue, Olivia Watson writes about the importance of a sustainable food transition and the investment risks and opportunities this brings, with a particular focus on food waste, one of the biggest levers to improve the efficiency of the global food system and an area that is sure to get more attention in view of rising food prices.

We hope you enjoy reading our analysts' viewpoints.

1 FT.com, Russia indefinitely suspends Nord Stream gas pipeline to Europe, 2 September 2022.
2 BNEF, Energy Transition Investment Trends 2022.

01 Climate Transition

> Climate policies
> Net zero targets
> Climate litigation
> CCS technologies



US Inflation Reduction Act: a strong force to accelerate energy transition technologies

Natalia Luna
Senior Thematic Investment Analyst, Responsible Investment

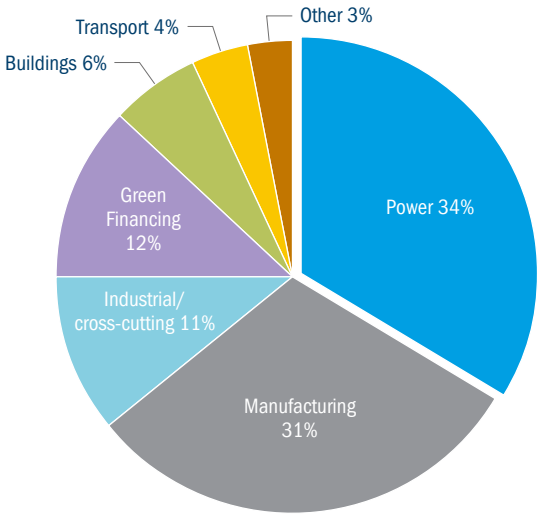
In August, the US passed a major milestone in climate policy with the introduction of the Inflation Reduction Act (IRA).[1] As the largest piece of federal legislation ever to address climate change, we believe it will have a profound effect across industries for decades to come.

The act deploys sizeable tax credits for every major economic sector key to achieving wholesale decarbonisation: energy, transport, buildings and agriculture. Within each transition sector, the legislation aims to offer support across the whole value chain, from end consumers up to suppliers, with a clear intent to subsidise domestic manufacturing of these technologies.

The act primarily aims to support US manufacturers and will subsidise US-made components of renewables, batteries and electric vehicles (EVs) to reduce reliance on China. It proposes allocating more than $60 billion to onshore manufacturing across the supply chain of clean energy and transportation technologies. We think this push for supply chain localisation and the re-shoring of US manufacturing will have substantial macro and strategic implications over the next decade. Tax support to develop domestic industries, alongside an increased focus on carbon emissions and the need for more transparent/ less complex supply chains, could incentivise sectors to re-shore more rapidly as a strategy to reach net zero. We view this as potentially transformative across industries, particularly for renewables and EVs.

The IRA will provide at least $369 billion to support clean technologies across multiple sectors (Figure 1) such as renewable energy, hydrogen, nuclear, carbon capture and storage (CCS) and EVs. The vast majority of the tax credits are available for around 10 years, therefore companies will have visibility

Figure 1: IRA allocation across industries



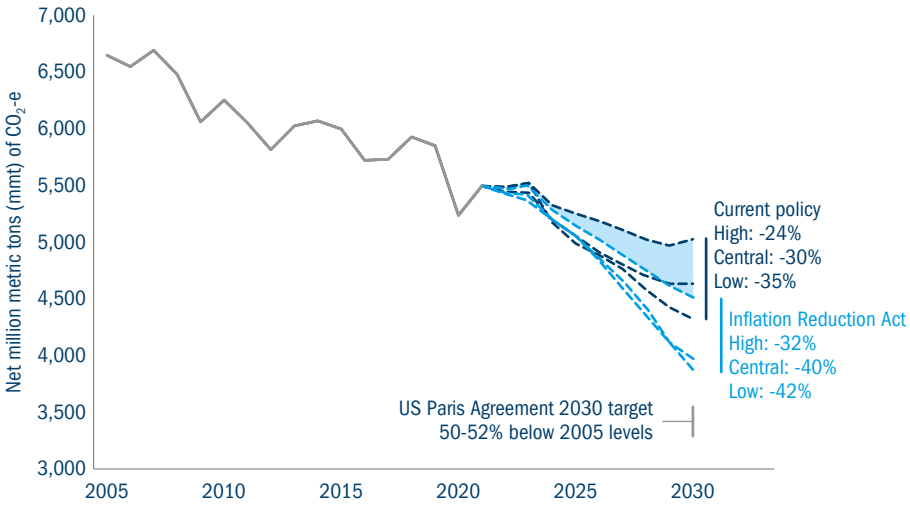
Source: Credit Suisse, September 2022.

over the next decade of the tax credits, which will favor the deployment of investments and projects. Credit Suisse estimates that with subsidised green financing and the multiplier effect on federal grants/loans, the total public plus private financing in that period could even reach around $1.7 trillion.[2]

This large stimulus package represents a major milestone in strengthening the climate goals and policies of the US. The package is also expected to contribute to accelerating decarbonisation in the US and reduce emissions by around 40% by 2030[3] – close to the 50% target set by President Biden (Figure 2). We see most of the upside coming from solar, clean hydrogen, CCS and EVs.

The meaningful extension of tax credits for renewables will provide a major boost to solar energy adoption particularly. IRA support coupled with continuing better economics could double the expansion of solar energy in the US in the next decade. However, a dependence on Asia for components, and human rights issues associated with Chinese labor, are hurdles to overcome. The growth of renewables will also contribute to the development of green hydrogen as a key power source.

Figure 2: US greenhouse gas emissions and projections



Source: Rhodium Group. The range reflects uncertainty around future fossil fuel prices, economic growth and clean technology costs. It corresponds with high, central and low emissions scenarios detailed in Taking Stock 2022: https://rhg.com/research/taking-stock-2022/

In fact, we believe the IRA will be a game-changer for hydrogen (see the article "Tailwinds hasten hydrogen's cost-competitiveness, but demand is lagging" elsewhere in this report), and for the development of CCS. We also view the sizeable extension of the 45Q tax credits for CCS projects as an important catalyst in accelerating investments in this space. These investments and incentives will benefit energy majors as key enablers of this technology given their expertise, skills and access to the required infrastructure.

Finally, the significant expansion within the IRA of EV tax credits for consumers will further support the already rapid adoption in the US. The extension of the $7,500 credit for new EV purchases and the introduction of a $4,000 credit for used EV purchases are vital in accelerating the supply and demand over the next couple of years. In addition, narrowing the subsidy to vehicles that met certain domestic requirements will be very beneficial for US automakers.

Climate transition engagement:[4] Climate policies

Company

NEXTera ENERGY

Sector and country

Utilities, US

Why we engaged

We wanted more insight regarding the impact of the US Inflation Reduction Act (IRA), as well as the implementation of forced labour rules on the solar supply chain in the US.

How we engaged

Our utilities industry equity analyst organised a series of calls with US solar companies on this topic. The call with NextEra was joined by the RI analyst as well as portfolio managers.

What we learnt

The company sees the potential for a US supply chain to form in next two to four years given manufacturing incentives from the IRA. In particular, community solar is likely to play a more significant role than rooftop solar in the evolution of the electric grid given its scale advantages and increasing popularity.

The company also sees bright prospects for the adoption of renewables in the US with tax incentives facilitating the addition of significant extra renewable capacity. NextEra expects that as a result of IRA the energy transition could happen twice as fast over the next decade.

Outcome

The call provided valuable insight on the broader developments impacting the US solar industry and NextEra's position within this. We concluded that the company is relatively insulated from the forced labour rules and very well positioned to seize the expansion and growth within solar energy in the US.

1 https://www.energy.gov/lpo/inflation-reduction-act-2022.
2 Credit Suisse, US Inflation Act, a tipping point in climate action, 2022.
3 Summary of the Energy Security and Climate Change Investments in the Inflation Reduction Act of 2022.
4 Although not all stewardship activities are successful in driving change, engagement helps us learn more about – and in some cases influence – issuer practices. The case studies in this document describe select company engagements over the past quarter.

02 Energy Transition

> Global summits
> Green hydrogen
> Human bias in forecasting
> Nuclear

Tailwinds hasten hydrogen's cost-competitiveness, but demand is lagging

Jess Williams
Senior Thematic Investment Analyst, Responsible Investment

Natalia Luna
Senior Thematic Investment Analyst, Responsible Investment

Our original research review of the hydrogen economy a few years ago led us to conclude that hydrogen would play a key role in decarbonisation. A key conclusion for us was that where electrification is possible it will be the dominant technology, and that hydrogen will help fill some of the carbon-intensive gaps that electrification cannot reach. Key areas of opportunity in our view are fertilisers, steel production, aviation, long-term seasonal energy storage and heavy-duty trucks.

To continue to effectively monitor the progress and potential of the hydrogen economy in the future, we think there are three main catalysts to look out for: policy, cost declines and infrastructure development (Figure 1), which we will now address.

Policy

More and more countries are adopting hydrogen strategies, with recent examples being the EU, the US and China. The global energy crisis has further bolstered momentum for the fuel because, apart from the decarbonisation angle, energy security has brought an exponential boost to hydrogen due to a desire to reduce dependence on gas.

The US has the most aggressive long-term target to reduce hydrogen cost production down to $2/kg by 2025 and $1/kg by 2030.[1] This commitment has been demonstrated by the introduction of the Inflation Reduction Act (IRA), which we think represents a game-changer for the development of green hydrogen (see the article "US Inflation Reduction Act: a strong force to accelerate energy

Figure 1: catalysts for conversion to hydrogen

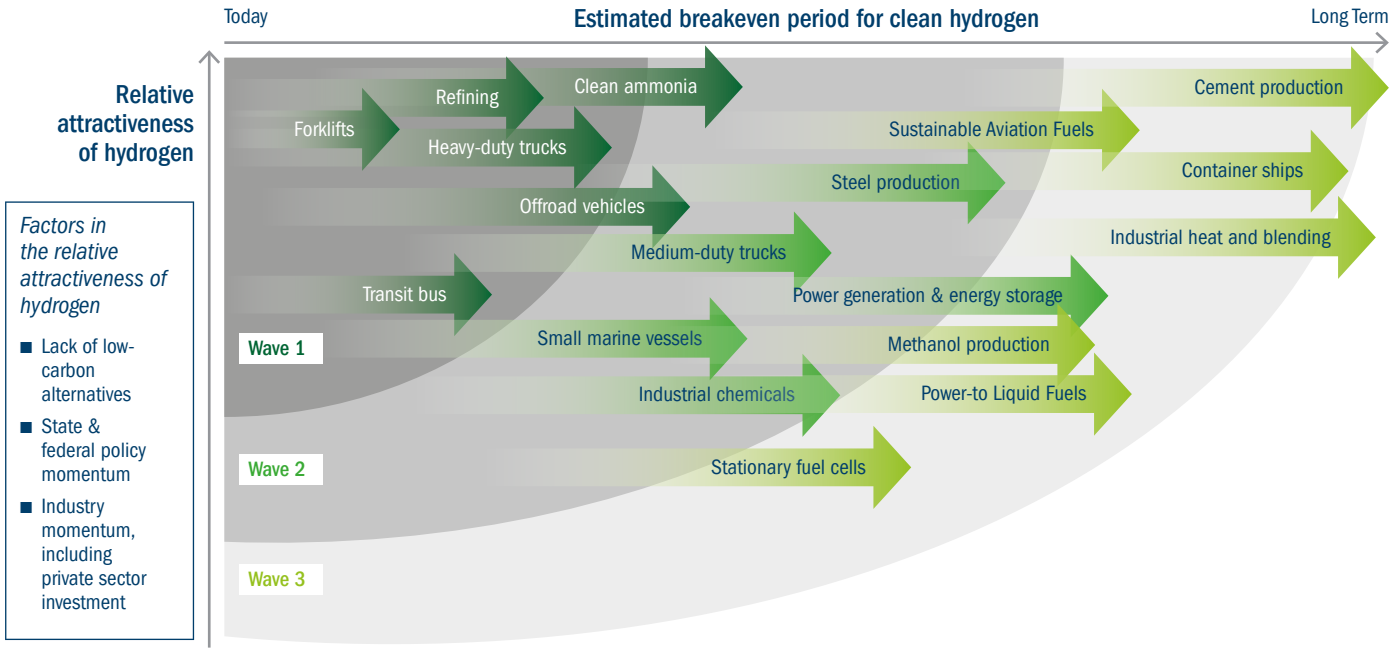
Policy	■ Continued policy development in alignment with Net zero ■ Hydrogen specific policies at national/regional level ■ Higher carbon prices to make hydrogen more cost competitive
Cost Declines	■ Technology advances to increase efficiency and bring costs down ■ Renewables scale up and cost declines
Infrastructure Development	■ On both the demand and supply side

transition technologies" elsewhere in this report). The IRA,[2] passed in August, includes a $3/kg tax credit for green hydrogen, which could effectively bring the cost down to the target and make it cost-competitive with grey (hydrogen produced with natural gas) and blue (grey with carbon capture) earlier than expected. In addition, a hydrogen project can benefit from tax credits applicable to renewables – investment tax credits and production tax credits for solar and wind – thus potentially resulting in a meaningful total tax support for a full hydrogen project.

In September, the US Department of Energy (DOE) released a draft of its Hydrogen Strategy and Roadmap[3] under which $9.5 billion will be deployed, mostly to develop hydrogen hubs and regional networks. The strategy also reflects the adoption of hydrogen by different industrial segments in waves over the next few decades: the first by 2030 will include oil refining and ammonia production where hydrogen is already being used as a feedstock, and heavy transport with the scale of fuel cells; the second will be applications such as steel making, sustainable aviation and shipping, which we view as sensible given the different level of complexity required to make hydrogen scalable and commercially available across sectors; and finally the third wave which will include container ships and cement production (Figure 2).

In the EU, the European Commission presented its Repower Package[4] in March, designed to ensure energy independence and security from Russia. The plan also includes substantial support for green hydrogen and an increase in its

Figure 2: hydrogen adoption projections



Source: US Department of Energy, Draft Hydrogen Strategy, 2022.

hydrogen capacity targets by four times. The most important element is the proposal of hydrogen-specific contracts for difference (CfD), which will provide subsidies worth 100% of the additional cost of using green hydrogen over fossil fuel alternatives. This should enable more hydrogen producers to make a final investment decision by 2023 when the next round of contracts are available.

Furthermore, the EU announced funding amounting to €5.2 billion for an array of hydrogen infrastructure projects which will involve the construction of large-scale electrolysers and production, storage and transport infrastructure, as well as plans for a €3 billion Hydrogen Bank[5] intended to "guarantee" purchases of hydrogen to create certainty of demand.

All these policies represent a major support for the development of hydrogen. We think the key milestone to look out for is rules for faster permitting for renewables, because in order to scale hydrogen a major increase and acceleration in renewable capacity will be needed.

Nonetheless, we note that policies in the EU and the US are focusing mainly on the supply side, and there is still not enough policy for creating hydrogen demand which is critical for project developers to secure financing.

We think more regulatory initiatives such as creating mandates, imposing quotas and proposing incentives for end-use sectors are needed to bolster the adoption of green hydrogen.

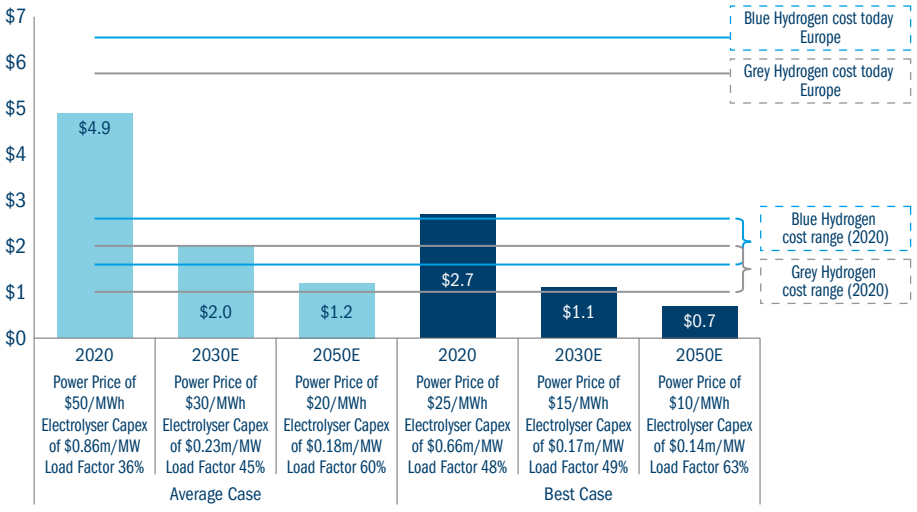
China also released its Hydrogen Industry Development Plan this year. The country represents 30% of global hydrogen demand[6] and as such could have a powerful impact on the development of hydrogen projects in the coming decade, particularly in electrolysers and fuel cells given its current domination of those sectors.

Cost declines

The cost of producing green hydrogen is mainly driven by the cost of electricity (accounting for around 70% of the total cost) and of electrolysers (around 30%).[7] Both these inputs are on a downward trend: the cost of renewable energy has declined substantially, with solar down 80% and wind down 60% versus 2010,[8] which has lowered operating expenses; and electrolysers continue to become cheaper, lowering the capital expenditure needs for green hydrogen.

Data from BNEF (Bloomberg New Energy Finance), a strategic research provider on the future of the energy

Figure 3: levelised cost of hydrogen ($/kg hydrogen) – average and best-case scenario



Source: Bernstein, Hydrogen Highway 2022.

economy, shows that unsubsidised green hydrogen costs declined from $4.5/kg in 2019 to $3.81/kg in 2022, and predicted further declines to $1.15/kg in 2030.[9]

The International Energy Agency (IEA) estimates that costs for electrolysers could fall substantially, achieving learning rates between 7% and 18%. Given the current pipeline of projects, this could reduce the capital cost of electrolysers by around 70% by 2030. Combined with the expected drop in the cost of renewable energy, this could bring the cost of hydrogen to around $1.3-$4.5/kg, with regions with good access to renewable energy – for example, southern Europe, the Middle East and Australia – at the lower end of this estimate.[10]

Where does this leave blue and grey hydrogen? Low emission hydrogen production coupled with carbon capture usage and storage (CCUS) is increasing in Europe, particularly in the UK and the Netherlands. However, the competitiveness of blue hydrogen hinges on the availability of relatively low-cost gas, which is currently challenged by high prices in the EU. We think the current energy crisis could lead to structurally higher gas prices while at the same time lower the cost of renewables, which could question the future of blue hydrogen (Figure 3).

In terms of grey hydrogen, those same abnormally high gas prices are making grey around three times as expensive as it was in 2020.[11] As a result, green hydrogen is today the cheapest option in many countries, particularly in Europe. If we had the required electrolysers and renewables capacity to produce it now, green would be the most competitive form of hydrogen. We think this is a major development that could incentivise end-users to start considering using green hydrogen earlier than envisaged.

Infrastructure

The pipeline of hydrogen projects continues to grow, but actual deployment is lagging. So far, 680 large-scale project proposals worth $240 billion have been put forward, but only about 10% have reached a final investment decision, according to the Hydrogen Council[12] (Figure 4).

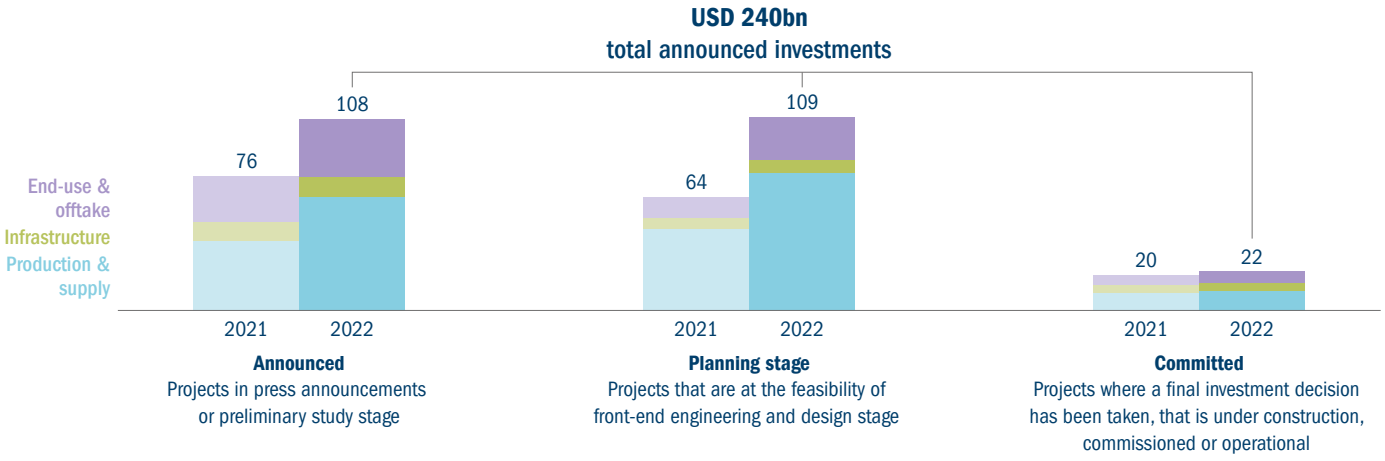
Most announced end-use investments target traditional applications such as oil refining and ammonia where hydrogen is already used. The number of announced industrial projects, such as steel making and mobility, continues to grow, most of which are supported by high carbon prices and strong decarbonisation policies.

For the transport sector, the main feasible application is heavy-duty vehicles. The largest market for fuel cell trucks and buses is currently China,[13] which accounts for most of the sales in this area, though the market remains very small.

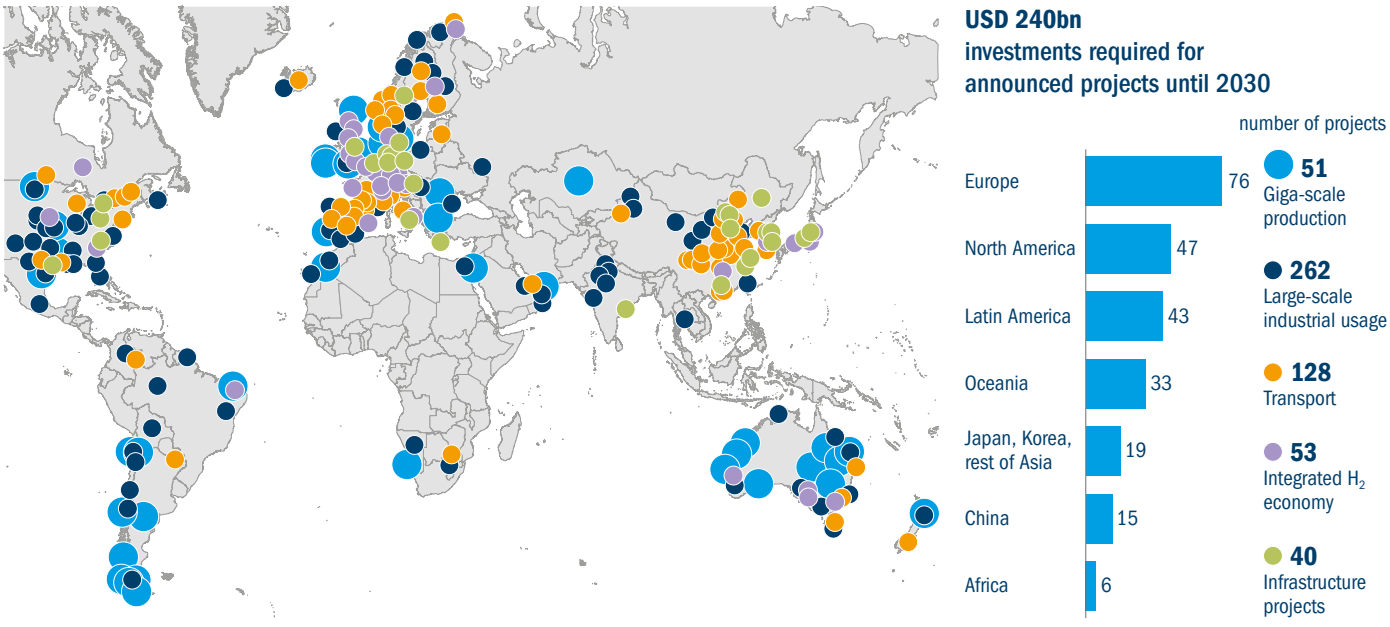
On the other hand, we think fertilisers could become a sector adding demand for hydrogen in the future. With the price of fertilisers heavily influenced by the price of gas, and with Ukraine and Russia being key producers,[14] the cost of these inputs has rocketed this year, highlighting the need for more diversified production.

An illustration of this potential trend is a recently announced partnership between Total Energies and Adani who will manufacture green hydrogen in India for use in fertilisers,[15] among other things. With India being one of the top fertiliser importers, this partnership takes advantage of a clear opportunity for green hydrogen.

Figure 4: hydrogen pipeline projects



Source: Hydrogen Council, 2022.



Source: Hydrogen Council.

Conclusion

Since last year there have been material policies implemented to accelerate the development of green hydrogen, and we see this regulatory support as the most important catalyst to accelerate this market over the coming years.

In addition, the energy crisis has made green hydrogen the cheapest option versus fossil fuel alternatives in many places. This, coupled with expected rapid cost declines fueled by innovation and scale coming from electrolysers and renewables, have improved the cost competitiveness of green hydrogen hugely. The expectation of lower costs might reduce demand for hydrogen as end-users could decide to wait a few years until prices become more competitive. This could be offset by the need to deliver on companies' net zero targets, particularly in the EU where there is higher scrutiny by investors and consumers on this front. Nevertheless, this lack of demand visibility is often mentioned as a key barrier that project developers face in unlocking the long-term funding for long-term hydrogen projects.

Despite this positive progress and strong momentum there remain challenges and hurdles to overcome. We see the lack of policies that encourage demand, particularly in key industrial sectors, as a weakness that must be overcome if we are to stimulate the necessary investments in infrastructure and innovation to scale and make green hydrogen commercially available.

With many projects not coming into fruition until 2025/30 or so, we believe more near-term investment opportunities can be found in renewable energy developers, integrated players along the clean hydrogen supply chain, and in leading electrolyser suppliers.

1 Senate.gov, Summary of the Energy Security and Climate Change Investments in the Inflation Reduction Act of 2022, August 2022.
2 https://www.energy.gov/lpo/inflation-reduction-act-2022
3 Bloomberg Law, White House Launches 'Generational' $7 Billion Hydrogen Plan (1), 2022.
4 European Commission, REPowerEU: affordable, secure and sustainable energy for Europe, 2022.
5 European Commission, State Aid: Commission approves up to €5.2 billion of public support by thirteen Member States for the second Important Project of Common European Interest in the hydrogen value chain, 21 September 2022.
6 IEA, Hydrogen Global Review, 2022.
7 Bernstein, Hydrogen Highway 2022.
8 IEA, World Energy Investment, 2022.
9 BloombergNEF, 1H2022 Hydrogen Levelized cost update, 2022.
10 IEA, Hydrogen Global Review, 2022.
11 BloombergNEF, 1H2022 Hydrogen Levelised cost update, July 2022.
12 Hydrogen Council, Hydrogen Insights 2022.
13 BNEF, Hydrogen Market Outlook.
14 Russia exports 11% of the world's urea, and 48% of the ammonium nitrate. Russia and Ukraine together export 28% of fertilisers made from nitrogen and phosphorous, as well as potassium, according to Morgan Stanley.
15 Energy Voice, TotalEnergies, Adani team up for multi-billion dollar Indian hydrogen plans, 15 June 2022.

Energy transition engagement: Green hydrogen

Company

Air Liquide

Sector and country

Industrial Gas, France

Why we engaged

We wanted to get better insight on the investment and growth plans around hydrogen and, more broadly, energy transition technologies. We also sought an update on progress towards net zero targets.

How we engaged

A call with the CEO was organised by a portfolio manager and the RI analyst. This was attended by other portfolio managers.

What we learnt

The company continues to make improvement in its climate targets without having any negative impact on their financials. It is well positioned to increase its exposure on hydrogen and is part of numerous hydrogen projects in the EU. The company is focused on providing a full range of products to its customers that add value across the value chain of the energy transition, from carbon capture projects and uses of carbon capture, to green hydrogen production etc.

Outcome

The call provided valuable insight on how the company is enabling different energy transition technologies and maximising the growing opportunities.

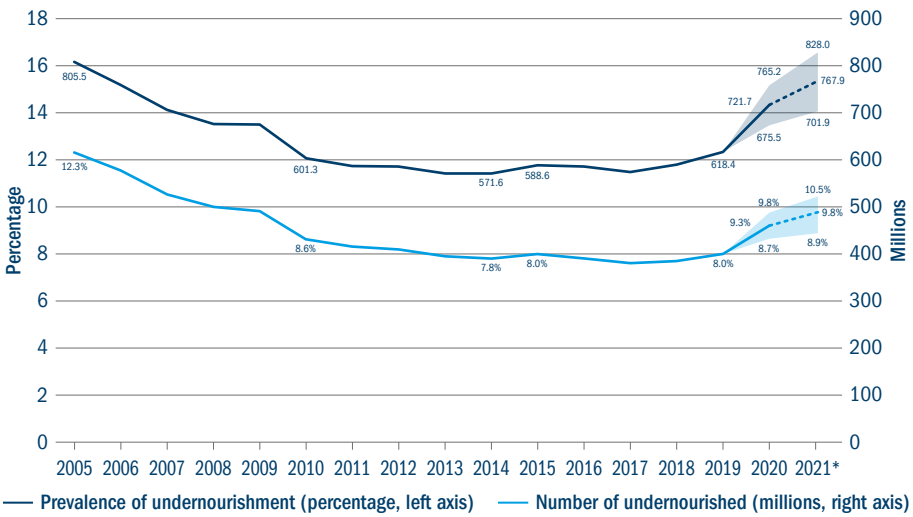
03 Food & Materials Transition

> Biodiversity
> Sustainable food
> Circular economy

Food security challenges put spotlight on sustainable transition

Olivia Watson
Senior Thematic Investment Analyst, Responsible Investment

Figure 1: number and percentage of population that is undernourished



Source: FAO, IFAD, UNICEF, WFP and WHO, The State of Food Security and Nutrition in the World 2022, 6 July 2022.

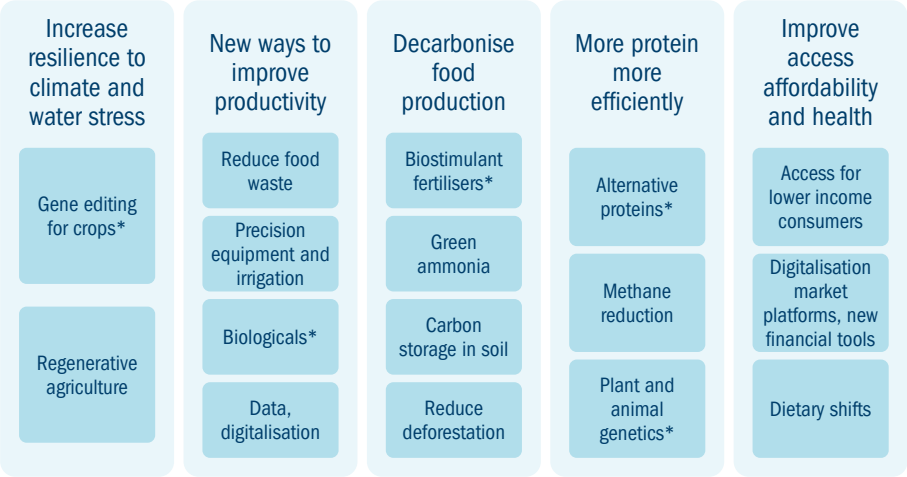
For many around the world, 2022 has seen a dramatic rise in food prices. This has been caused by the compounding effects of climate change, supply chain interruptions linked to the Covid-19 pandemic, trade disruptions and rising energy prices resulting from the war in Ukraine. While prices have come down from the highs seen earlier this year, the global food situation may remain tight until 2023 or beyond due to declines in grain stores, low/ending commodity stocks, high fertiliser and energy prices and the impact the conflict in Ukraine is also having on agricultural production.

Unfortunately, this risks a continuation of the upward trend seen in global food insecurity since 2019 (Figure 1). It also increases the risks of social and political disruption, particularly in countries most dependent on food and fertiliser imports, while increasing inequality in developed countries.

The convergence of events affecting the food system between 2020 and 2022 has been remarkable, but it may not be a rarity in the future. The physical impacts of climate change, volatility in energy pricing along with the energy transition, increasing water stress and the degradation of biodiversity will only further increase pressures on the food system over the coming years and decades. As we have seen this year, such pressures and shocks can lead to protectionism and disruption to trade and have an impact on food security.

In our view, the increased awareness of these pressures will accelerate the shift toward a more resilient and sustainable food system. Recent policy developments have begun to highlight this, drawing connections between food security issues and sustainability. For instance, the US Inflation Reduction

Figure 2: mapping the elements of the sustainable food transition



*Gene editing as an enabling tech

Source: Columbia Threadneedle Investments, 2022.

Act (IRA) passed in August includes funding for "climate smart agriculture", while the recent White House summit on biotechnology highlighted the role of innovations such as synthetic biology in achieving food security and environmental objectives.

The transition towards a more sustainable food system will be wide-ranging and multi-faceted. To identify the investment implications of this shift we have developed a framework of five cross-cutting themes that will underpin and shape the transition: increasing resilience to climate and water stress; finding new ways to improve productivity; decarbonising food production; producing more protein, more efficiently; and improving access, affordability and health outcomes.

Ultimately, each of these five themes will need to be pursued concurrently and in ways that are complementary and mutually reinforce one another. As highlighted in Figure 2, each theme will require the adoption of policy measures and a scale-up of related technologies, bringing risks and opportunities for the food sector.

Looking ahead we plan to use this framework to explore the sub-themes, supporting technologies and implications for both incumbent food and agricultural companies and potential disruptors.

A wasted opportunity?

Taking the theme of "new ways to improve productivity" as an example, a major area of focus is food waste. With a third of food estimated to be lost or wasted across the value chain, reducing waste is arguably among the most critical drivers needed to improve productivity in the food system. Reducing food waste could also mitigate around 8%-10% of global greenhouse gas emissions and lessen environmental pressures through reducing the water, land and agricultural inputs required to produce the food which is currently wasted. In addition, there are social benefits that will come from improving efficiency and availability of food.

Food waste is a well-known problem but, due to its complexity, the historically low price of food and misaligned incentives, addressing it has generally not been a high priority. However, with global food price inflation

Continued on page 22.

Figure 3: opportunities in the food chain

Stage of production	Food production lost/wasted (%)[1]	Risks and costs	Opportunities	Company examples
Pre-harvest Key drivers of food loss: ■ Pests and disease ■ Drought and extreme weather ■ Inadequate harvesting techniques, lack of adequate or economic labour	8%[2]	Increased costs and volatility within food supply chain Lost revenues for producers	Biocontrol (enzymes and microbes) Early pathogen detection and biopesticides Predictive pest analytics Machine learning for rapid molecule development for pests	Novozymes Greenlight Biosciences FMC Enko
Harvest to processing Key drivers of food waste: ■ Lack of infrastructure and energy for crop drying and refrigeration ■ Lack of storage and transport infrastructure	13%[3]	Increased costs and volatility within food supply chain Lost revenues for producers	Digital marketplaces and logistics Clean label packaging or coatings	Innoterra Indigo Apeel Greenlight Biosciences
Retail, food service and consumer Key drivers of food waste: ■ Inaccurate demand forecasts ■ Lack of consumer awareness, overbuying due to grocery promotions	17%[4]	Lost revenues through wastage Costs to consumers through food waste at home Lost value from food by-products	Sensors and AI to optimise inventory Supply chain innovation and collaboration; engaging customers through food waste awareness Food retail business models that capture value of surplus food Direct to consumer models with ingredient sizing Upcycling of food by-products	Afresh Tesco Grocery Outlet, Misfits Market Hello Fresh

and increased awareness of food insecurity we believe this will change with the introduction of more incentives for consumers, companies and governments to reduce food waste.

As this unfolds, companies will increasingly need to account for, and take action to reduce, food waste within their operations and supply chains. This must become an integral component of relevant companies' routes to meeting both net zero and biodiversity goals.

Despite the challenges that reducing food waste brings, it also provides opportunities (Figure 3). At each stage of the food value chain, reducing food waste can create markets for new technologies, products and business models; help companies to engage customers; spark innovations in supply chains; and reduce costs.

Continued research and collaboration across our fundamental and responsible investment teams will help us identify implications that will arise as this theme evolves and enable us to advise our portfolio companies on how they can reduce costs and capture the opportunities coming from food waste strategies.

1 Columbia Threadneedle analysis, figures are estimates and cannot be summed due to denominators using different methodologies, September 2022.
2 WWF, Driven to waste: the global impact of food loss and waste on farms, 2021.
3 FAOSTAT, Food Loss Index, 2020.
4 UNEP, Food Waste Index, 2021.

Food & Materials transition engagement: Food security and biodiversity

Company

Sector and country

Chemicals, USA

Why we engaged

We wanted to better understand the integration of sustainability considerations within FMC's research and development (R&D) efforts and product portfolio, as well as the company's plan to reduce crop loss and enhance productivity using biologicals.

How we engaged

Video call with Chief Sustainability Officer and Investor Relations, analysts, and portfolio managers.

What we learnt

With regards to agricultural productivity, FMC reported that physical impacts from climate change such as shifting pest populations have already become a material factor for crop health in some instances. This will increasingly influence product development and demand levels. In FMC's next long-term plan, it will have more to share on how it is integrating this into strategy.

The company believes it is well positioned for the shift to more precision-targeted approaches to agriculture, with products becoming less harmful as they become more targeted. All products are assessed against sustainability parameters as part of the R&D process, and development is not pursued unless a product performs better in at least one area when compared with a primary alternative product on the market.

The company's Arc tool provides analytics and field monitoring to assess and predict pest presence, and more precisely determine where and when treatment may be needed, helping reduce crop losses as well as the overuse of insecticides. This builds engagement and customer loyalty. So far, Arc is available to 60%-70% of customers with a focus on Latin America. Roll out will continue.

Biologicals appear a promising route to growth, with FMC focused on products based on pheromones and peptides. Biologicals account for only $200 million of revenue but have grown at two to three times the rate of chemicals. This growth could be further heightened by EU regulatory changes in late 2022 that will reduce the regulatory requirements for biologicals, which until now have been regulated as chemicals. FMC believes it is well positioned to bring scale and access to growers and that there are opportunities for biologicals to grow and develop, even though this will take time given how fragmented the market is.

Outcome

We took a positive view of the company's integration of sustainability factors into its R&D and mergers and acquisitions activity. We encouraged the company to continue to take steps to reduce the toxicity of its product portfolio over time, particularly in view of potential regulatory changes. We will follow up in due course on FMC's forthcoming nature strategy and disclosure.

Stewardship in action

Our stewardship activities are integral to our investment process, helping us to detect inflection points and long-term trends, and influence companies' standards around ESG risk management and sustainable outcomes. A key focus our investment research so that we can make informed capital allocation decisions as active investors.

The ultimate goal of our stewardship approach is to enhance our understanding of risks and opportunities, strengthening our ability to deliver sustainable long-term value for clients. In approaching these responsibilities we are mindful of market trends; company, local market and industry-specific issues; and relevant best-practice standards – but we will ultimately be guided by what we consider is in the best long-term economic interests of our clients.

The research and analysis emerging from this, and the ongoing engagement with companies, is disseminated globally throughout the firm as part of our culture of research intensity and helps us identify potential issues at an early stage. In prioritising our engagement work, we focus our efforts on the more financially material or contentious issues and themes, and the issuers in which we have large holdings. There are many companies with which we have ongoing engagements, as well as a number that we speak to on a more ad hoc basis, as concerns or issues arise. We vote actively at company meetings.

We view this as one of the most effective ways to signal approval (or otherwise) of a company's governance, management, board and strategy, or standards of operating practice. While analysing meeting agendas and is making voting decisions, we use a range of research sources and consider various ESG issues, including companies' risk management practices and evidence of any controversies.

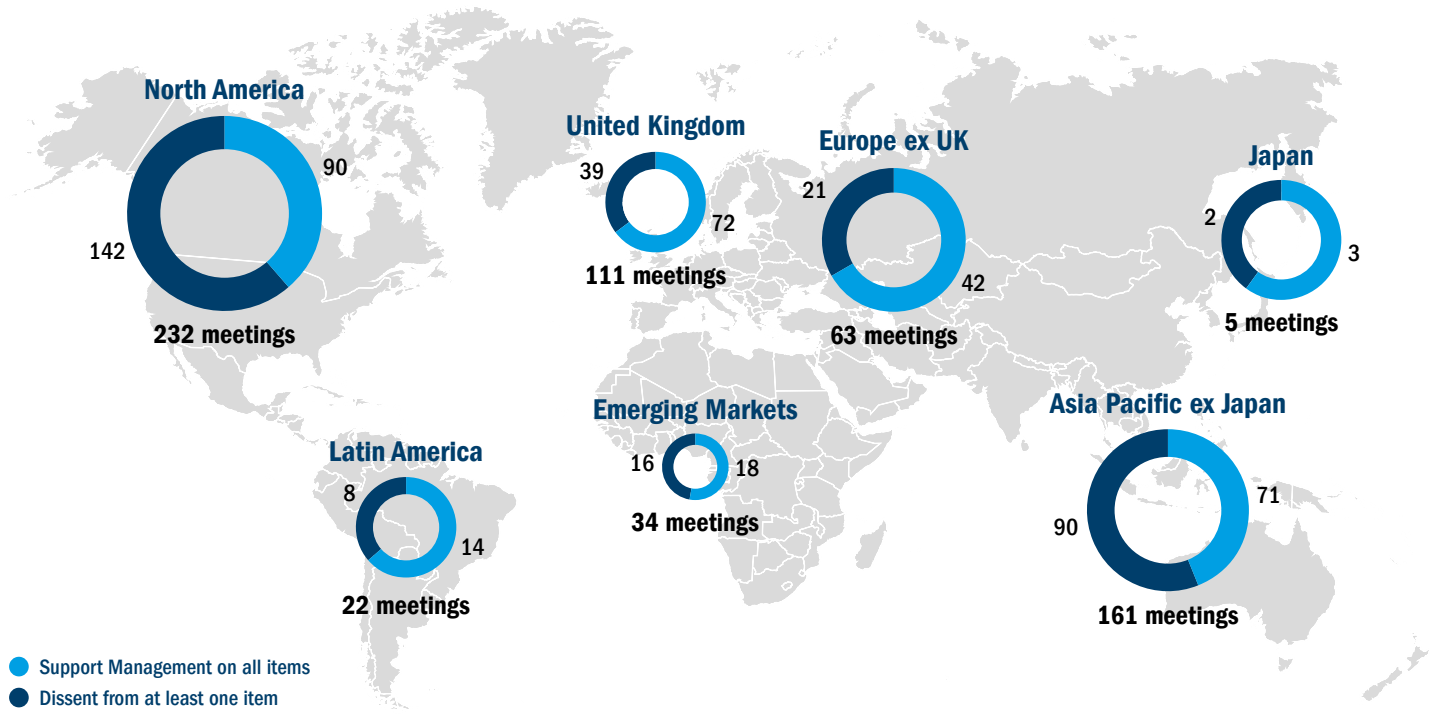
Our final voting decisions take account of research issued by proxy advisory organisations such as ISS, IVIS and Glass Lewis, as well as MSCI ESG Research. Although we subscribe to proxy advisors' research, votes are determined under our own custom voting policy. Within this, material or controversial proposals receive enhanced due diligence and are voted on by the investment team, with support from the RI team. Votes are cast identically across all mandates for which we have voting authority. All our voting decisions are available for inspection on our website seven days after each company meeting in EMEA/APAC, and are updated annually in September in the US.

Voting Q3

Between July and September 2022 we voted at 628 meetings across 46 global markets. This compares to 4,378 meetings voted across 60 markets in the previous quarter. Of the 628 meetings, 442 were annual general meetings, 155 special, 14 combined annual/special, 12 court and five bondholder. We cast at least one dissenting vote in 325 meetings (52%).

We voted in 46 separate markets in the third quarter. Most meetings were voted in the United States (232), followed by the United Kingdom (111) and India (89). The majority of the voting items that we did not support throughout the quarter continue to be related to directors (63%), followed by remuneration (23%), capitalisation (5%) and other business and social-related proposals (3%).

Figure 1: Meetings voted by region



Source: Columbia Threadneedle Investments, ISS ProxyExchange, 31 July 2022.

Engagement highlights

Between July and September 2022 we conducted ESG-focused engagements with 22 issuers, some on multiple occasions. Meetings with a sustainability focus concern the impact of a company's products and services, while meetings with an ESG focus concern how well companies manage their internal non-financial risks.

ESG

Adani Ports & SEZ
Baycurrent Consulting
Chesnara PLC
DFI Retail
Paprec
Shift4 Payments, Inc
Tech Mahindra
Tencent
Electronic Arts Inc

Environment

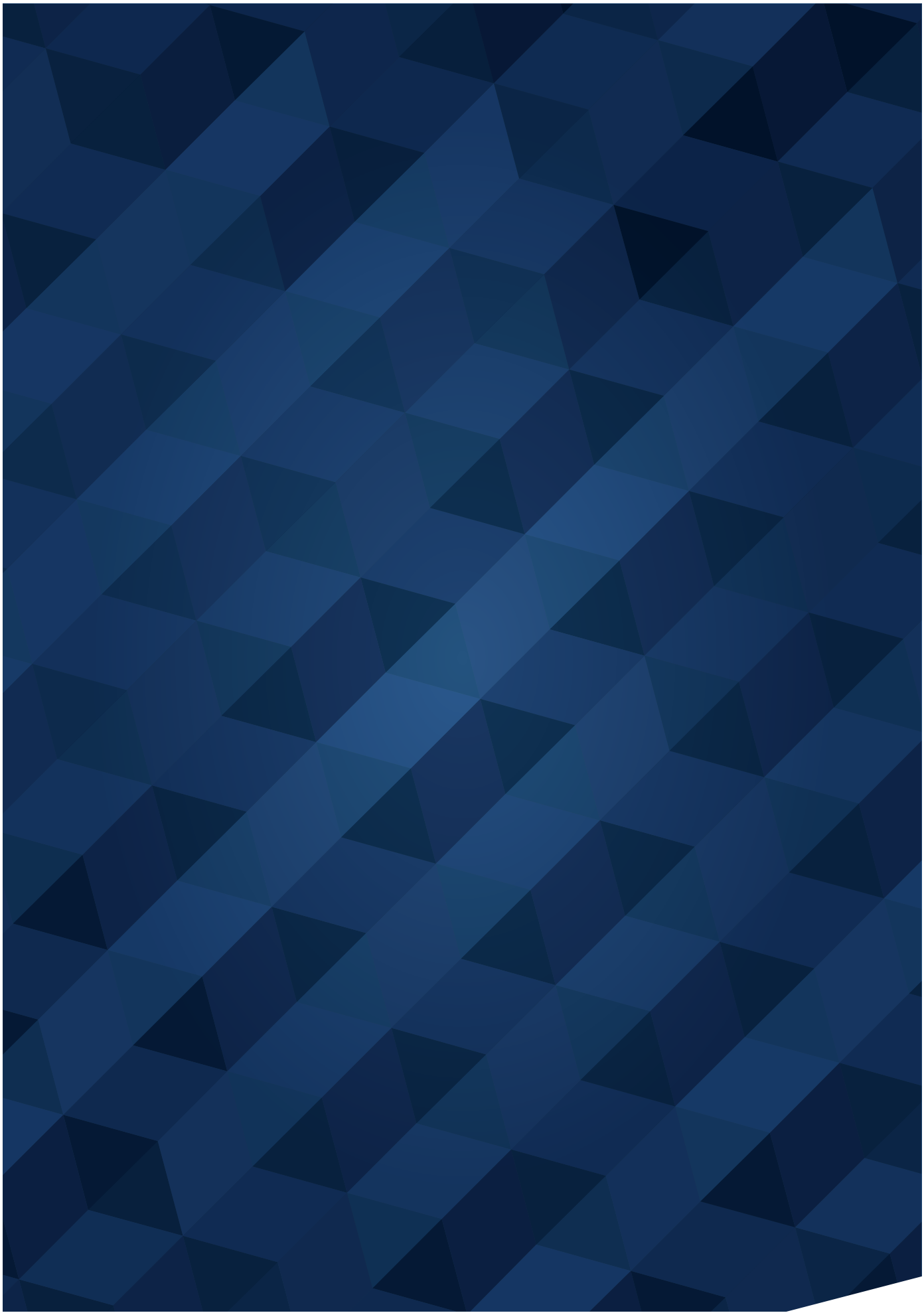
Bank Rakyat Indonesia
FMC Corporation
Reckitt
Richemont

Governance

Berkeley Group Holdings PLC
Castings PLC
Future PLC
Morgan Sindall Group
Netapp Inc
Pearson PLC
Richemont
Rotork PLC
Trifast PLC

Other

Air Liquide



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