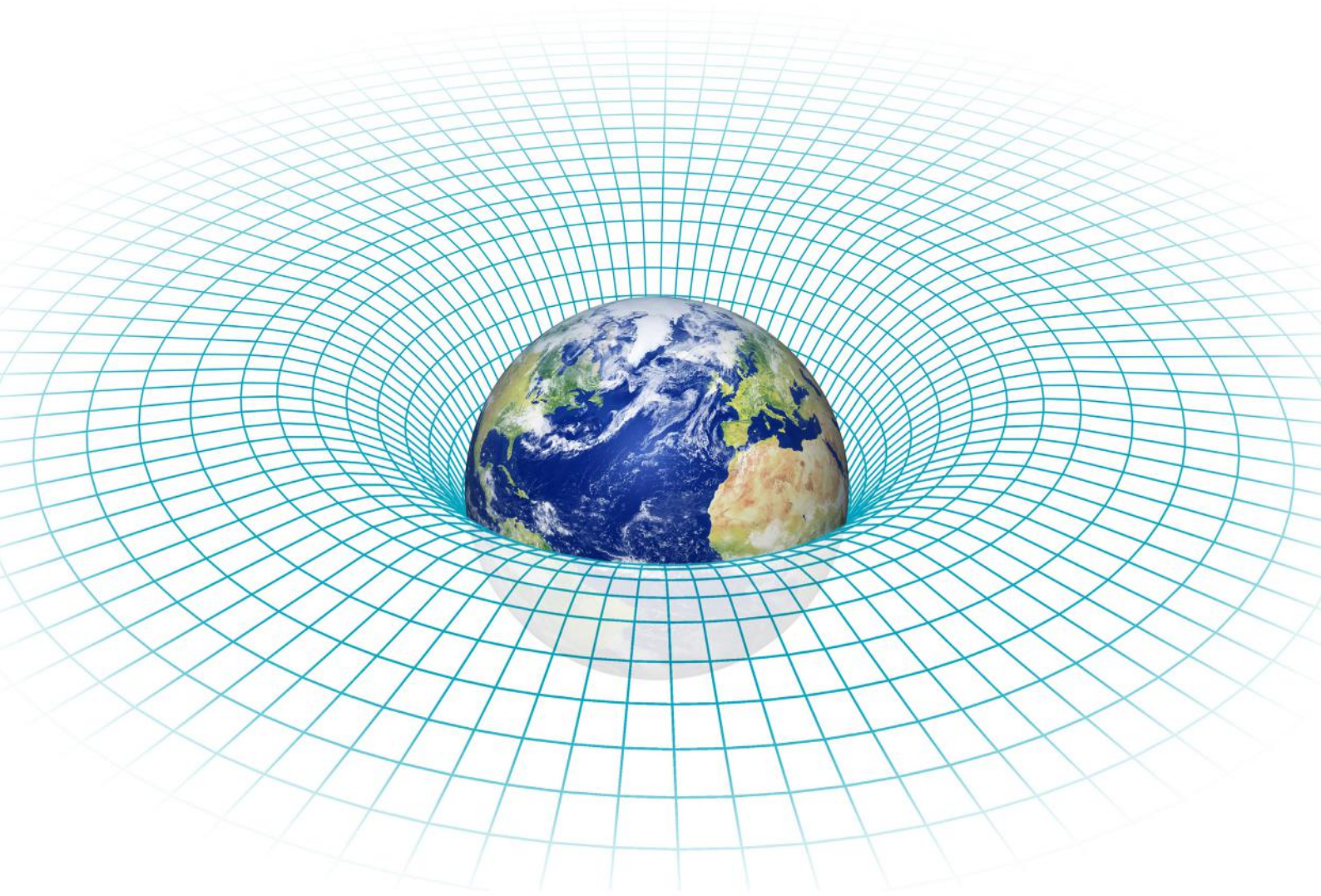
THE BIG BOOK OF

CLIMATE INVESTING

From urgency to proposed solutions



Sustainable Investing Expertise by
ROBECOSAM

ROBECO
The Investment Engineers

THE BIG BOOK OF

CLIMATE INVESTING

From urgency to proposed solutions

The content in this publication is taken from Robeco's online climate hub. This PDF is created in September 2021. The climate hub will regularly be updated with new articles.
For the latest version, please visit
https://www.robeco.com/us/sustainability/climate-investing/

For professional investors

September 2021

Contents

Urgency

We believe climate change is the biggest challenge facing humanity. Rising sea levels will displace millions of people, and the economic consequences will be catastrophic unless something is done. We can't leave saving the planet to future generations: we must act now.

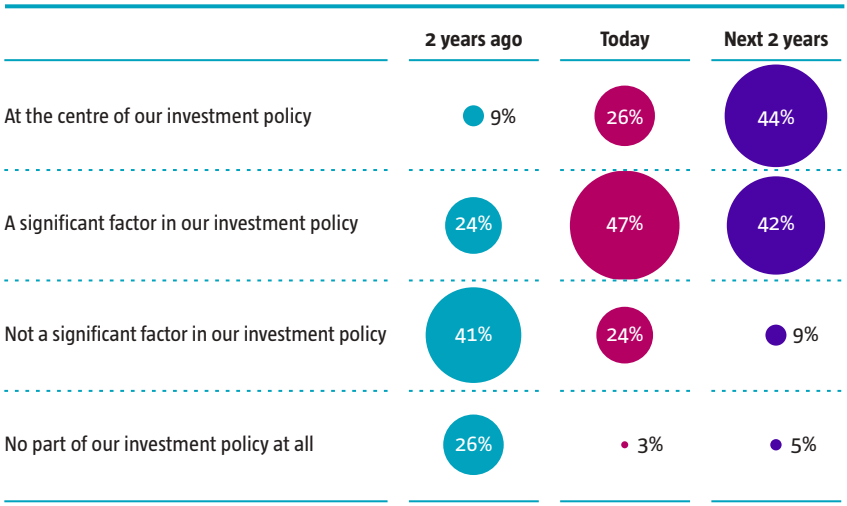
86% of investors see climate change as a key theme in their portfolios by 2023

In the last two years climate change has become increasingly important to investors' investment policies and this is set to continue.

This represents a huge increase from only two years ago, when only a third of investors put climate change at the centre, or as a significant factor in their investment policies.

This major shift shows how investors now accept the case for co-ordinated, global action to stop a catastrophic rise in global warming.

Figure 1: Climate change is rapidly becoming central or significant to investment policy



Source: 2021 Robeco Global Climate Survey

The future of humanity and indeed, all life on earth, now depends on us

Climate change is an increasingly emotional subject, not least if you are living at the sharp end of it. In the past few years alone we've seen uncontrollable wildfires in Australia, severe hurricanes in the US, and flooding all over the world. Thousands have died, seen their homes destroyed, or been displaced.

The issue has brought some memorable quotes from people who in some cases have dedicated their life or work to try to combat it. While it is the politicians that hold the real power in being able to enact measures that can tackle global warming, others can be just as influential.

Take Sir David Attenborough, for example. The 94-year-old naturalist and broadcaster had dedicated a seven-decade working career to highlighting 'Life on Earth' (as his seminal work suggests) and the fragility of it. His moving documentary, 'A Life on our Planet', outlines how humans have caused immense destruction to the planet. It produced a memorable warning shot to mankind:

"Never before have we had such an awareness of what we are doing to the planet, and never before have we had the power to do something about that... The future of humanity and indeed, all life on earth, now depends on us."

With nine of the ten hottest years on record occurring in the last decade, the effects of climate change are now impossible for anyone to ignore. As former US President Barack Obama said:

"We are the first generation to feel the effect of climate change and the last generation who can do something about it."

This is both a challenge and an opportunity, as new President Joe Biden said when taking the US back into the Paris Agreement in January 2021. His policies if enacted by Congress would invest USD 2.2 trillion in combatting global warming, saying:

"Climate change is the existential threat to humanity. Unchecked, it is going to actually bake this planet. This is not hyperbole. It's real. And we have a moral obligation."

"It's also going to create millions of jobs. We can't be cavalier about the impact it's going to have on how we're going to transition to do all this. But I just think it's a gigantic opportunity; a gigantic opportunity to create really good jobs."

There is broad consensus that the action needed to stop greenhouse gases from entering the atmosphere is decarbonization. This requires international cooperation and treaties to universally – rather than unilaterally – agree to decarbonizing the industries we take for granted, such as fossil fuel. German Chancellor Angela Merkel's clarion call reflected the urgent need to move beyond words alone:

"We must now agree on a binding review mechanism under international law so that this century can credibly be called a century of decarbonization."

At Robeco, we believe we are also part of the solution by investing in companies that make a difference. And as our CEO Gilbert Van Hassel makes clear, this is our top priority:

"It is clear from scientific reports about climate change and carbon emissions that society has to act now. We cannot solve big problems such as climate change and the rapid decline of biodiversity on our own."

"But what we can do is set a clear example for the broader industry, work together and encourage other financial institutions such as asset managers to follow suit. We have set this ambition with the conviction that investing is not only about creating wealth but also about contributing to well-being."

WATCH THE
FULL VIDEO

WHY IS CLIMATE INVESTING SO URGENT?

Gilbert Van Hassel
CEO

"The funny thing is that we all say that climate is urgent, but we don't act as if it is urgent. And so, I would like to paraphrase Sir David Attenborough, who basically says that it is frightening, but the climate evidence and science is telling us that if we don't act vigorously within the next decade, that we will see a loss of the natural world and even a loss of our societies as we know them today. So indeed, very, very urgent."

Masja Zandbergen
Head of Sustainability Integration

"Do we still need to talk about the urgency of climate change? I think we're all experiencing extreme droughts, extreme temperatures in the summer in Siberia (38 degrees), bushfires, flooding. I think it's pretty clear that the climate is changing. Yet, we are still hooked on fossil fuels and fossil fuels emit CO_2 emissions. CO_2 that has been captured by fossil fuels over millions and millions of years is now being released into the atmosphere in a few hundred years. The atmospheric CO_2 amounts are now as high as they were three million years ago. And then the temperatures were about 2-3 degrees higher pre-industrial era and the sea levels were 15-25 metres higher. I would like to rest my case by that."

Victor Verberk
CIO Fixed Income and Sustainability

"If you talk about urgency, you need to understand the trajectories we are facing. So, either we decarbonize slower in the world and then later we do it faster, or we decarbonize very fast now, and then slower later. You get different trajectories and that means different cumulative emissions of carbon. It's a bit of a complex story, but it depends on the path we take. And in the end, technology is important. So, if we get advanced technologies, we will decarbonize faster and vice versa. So, the urgency is one. The importance is two. But the trajectory we take is even more important."

Lucian Peppelenbos
Climate Strategist

"The urgency is really to act now. Business as usual will lead to a world that is unliveable for our children. So, we need to act. We need to change. We have less than one generation to decarbonize our economy. That's a complete overhaul of the way we live, the way we eat, the way we travel. And we need to do that within one generation. Every year counts. Every year we delay, the costs increase. So, the urgency is really to act now."

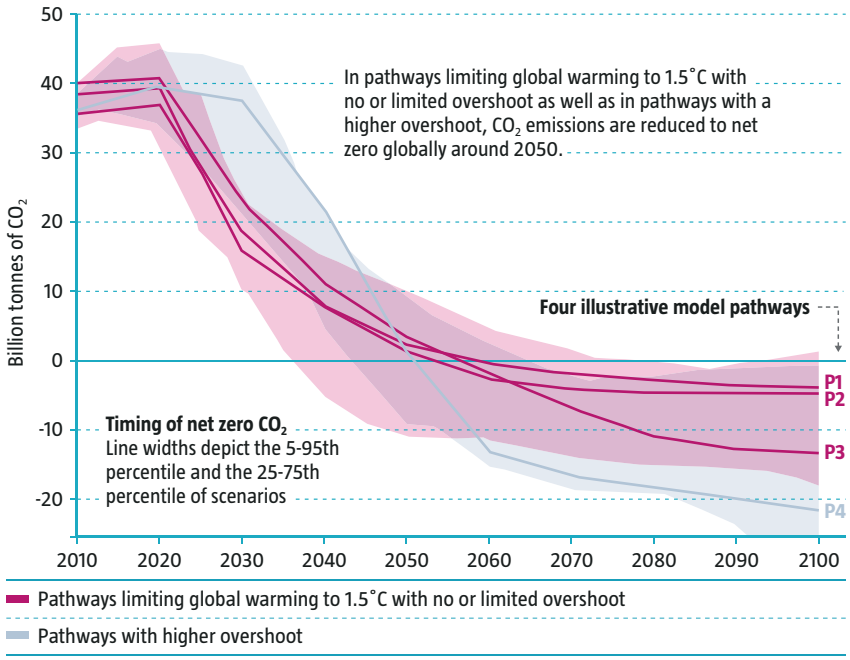
Carola van Lamoen
Head of Sustainable Investing

"The climate crisis is basically the biggest crisis that we currently face as humanity. If we look back, the last 5 years have been the hottest on record. And if we want to keep a world that is also attractive to live in for our kids and their kids, I think it's very clear that the sooner we act, the less costly it will be to solve this crisis. So that should all bring us into a clear action mode."

The chart that tells it all

This chart from the Intergovernmental Panel on Climate Change (IPCC) reflects the 90 scenarios in which CO_2 emission pathways meet the goal of limiting the increase in global warming to less than 1.5°C in the coming decades. Each incorporates different assumptions about mitigation measures, technological advancements, political priorities, societal preferences and economic development. Scenarios that fall within the pink-shaded area fall within the 1.5°C limit by around 2050 with little or no overshoot; the scenarios in grey have a high overshoot, and fall back within the 1.5°C limit before 2100.

Figure 2: Global total net CO_2 emissions



Source: IPCC, October 2018, Special Report no. 15

The 1.5°C pathways all have in common a reduction of CO_2 emissions to net zero, the phasing out of unabated coal use by 2050, and a reliance on renewables for most of the energy supply.

Four archetypal model pathways are highlighted in the chart: P1 is the most disruptive, with a rapid reduction in emissions towards net zero based on a fast reduction in demand for carbon-intensive products.

P2 meets the emissions target in a way that maximizes the contribution to the SDGs; like P1, it is ambitious in terms of changing consumer patterns.

The P3 pathway is a sort of middle-of-the-road scenario, with limited change in social and economic trends and a high reliance on carbon-reduction techniques such as bioenergy with carbon capture and storage.

The riskiest of the four archetypes is P4: it delays the most and results in overshoot, and therefore requires aggressive compensatory action to bring emissions within target.

Are we on track? Moving from red to amber

Lucian Peppelenbos
Climate Strategist

Governments have woken up to the urgency of tackling climate change. But we do not believe we are yet on track to meet the Paris Agreement unless more urgent action is taken – and that is where investor initiatives can help.

The Paris Agreement is the only truly global accord that all nations have committed to tackling climate change. Its core aim is to limit the rise in global average temperatures to below 2°C above pre-industrial levels by 2100. This means the world must become carbon neutral by 2050 at the latest.

The agreement was ratified on 22 April 2016, which the UN designated as Earth Day, and signed by 196 countries. Since then, many have committed to becoming carbon neutral by 2050. Some have made more ambitious plans – Austria and Uruguay have pledged to do so by 2040. China, which has the world's largest carbon footprint, has set a longer-term target of 2060.

Turning yellow

So, are we on track to meet the Paris Agreement? "No, we're not," says Lucian Peppelenbos, climate change strategist at Robeco. "If we use the traffic light system of red, yellow, and green, I would now give it an yellow light, although a year ago, I would have given it a red."

"The step-up to amber is due to the recent policy commitments in Asia, China, Japan and South Korea, but also because everybody knows now what the US will do, now that it has rejoined the Paris Agreement."

"With all this in place, the countries responsible for 63% of global emissions will be in line with the net zero ambition."

"If we can actually deliver on our promises by 2050, the world will be on track to limit global warming to 2.1 degrees Celsius; previously we were heading for 3 degrees. This recent wave of commitments is now more ambitious than ever."

Distributed leadership

Moving from yellow to green is going to take much more collaboration, Peppelenbos says. "I like the term 'distributed leadership' that was coined by the architect of the Paris Agreement, Christiana Figueres," he says

"In the real economy, you need policy frameworks, and you need the consumers and technology to be onside. All of these pieces need to come together. As investors, we can redirect capital towards the green, circular, low-carbon economy... and that's vital. But we critically depend on other pieces of the puzzle to move as well."

Some of these pieces are embodied in various initiatives that investors including Robeco have joined to try to move the world from yellow to green. The top 10 of these initiatives regarding their importance for investors are listed below.

EU Action Plan on Sustainable Finance
A major policy objective by the European Union which aims to promote sustainable investment across the 27-nation bloc. (Brussels, 2018)

The Institutional Investors Group on Climate Change
A collaboration of 270 investors taking action to decarbonize their EUR 35 trillion of assets under management. (London, 2012)

Net Zero Asset Managers initiative
A group of global asset managers including the IIGCC committed to net zero carbon emissions in their investment portfolios by 2050. (London, 2020)

Climate Action 100+
An investor engagement group that targets the 100+ companies that have the highest greenhouse gas emissions. (Paris, 2017)

Partnership for Carbon Accounting Financials
A global partnership founded by a group of Dutch banks to standardize carbon accounting for the financial sector. (Amsterdam, 2015)

Task Force for Climate-Related Financial Disclosures
An organization launched by the Financial Stability Board to improve and increase reporting of climate-related financial information. (London, 2015))

Transition Pathway Initiative
A global asset-owner led initiative that assesses companies' preparedness for the transition to a low-carbon economy. (London, 2017)

Dutch Climate Accord
A set of measures by the Dutch government to reduce the country's CO_2 emissions by 49% by 2030 compared to 1990 levels. (The Hague, 2019)

Finance for Biodiversity Pledge
A group of 37 financial institutions calling for governments to protect threatened biodiversity. (Brussels, 2020)

Powering Past Coal Alliance
A coalition of 104 countries, cities, businesses and organizations working to accelerate the transition from coal power generation to clean energy. (Ottawa, 2017)

Tracking our climate action progress

Are we on track to meet the goals of the Paris Agreement? It can be hard to keep up with events, particularly given the disruption caused by Covid-19. Two German organizations have come up with a more visual way of measuring progress using a climate action tracker and a carbon countdown clock.

The Climate Action Tracker monitors governments' efforts to reduce their emissions and measures them against the Paris Agreement goal of limiting global warming to below 2°C by 2100, and to pursue efforts to keep the temperature rise to 1.5°C.

The tracker is a collaboration between the climate science and policy institute Climate Analytics and the research group New Climate Institute. It quantifies and evaluates climate change mitigation commitments, and then assesses whether countries are on track to meet them.

It then aggregates country action to the global level, determining the likely temperature increase by the end of the century. A thermometer is used to make visualization easier. Users can see how their own country is doing on a number of metrics on the interactive parts of the tracker's website.

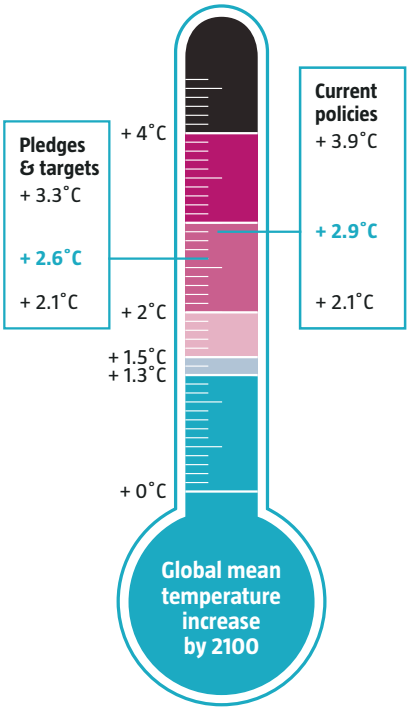
The Carbon Clock shows how much carbon dioxide can still be released into the atmosphere if global warming is to be limited to the Paris Agreement goals. With just a few clicks, you can compare the estimates for the temperature targets and see how much time is left in each scenario. Currently, there is only six years and 10 months left for the 1.5°C scenario, and 24 years and 8 months for the 2°C scenario.

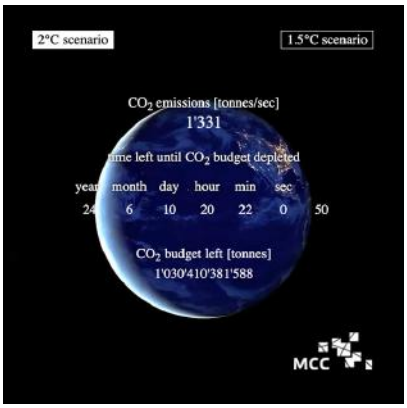
The Carbon Clock

The clock is run by the Mercator Research Institute on Global Commons and Climate Change, a scientific thinktank founded by the scientific foundation Stiftung Mercator and the Potsdam Institute for Climate Impact Research.

The data for the clock is supplied by the Intergovernmental Panel on Climate Change (IPCC) and is based on the fact that around 42 gigatons of CO_2 is emitted globally every year, or 1,332 tons per second. The estimates of the remaining carbon budget are based on the IPCCC's autumn 2018 'Global Warming of 1.5°C' report. The next update of the Carbon Clock is set to come from the IPCC's Sixth Assessment Report, due in 2022. ■

Figure 3: The Climate Action Tracker





Challenge

Tackling climate change is not easy. It means upending the status quo, inventing new technologies, and reducing the emissions causing global warming. In short, it means working together, for the same vital cause.

58%

of the European investors see the lack of data as the biggest obstacle for implementing decarbonization.

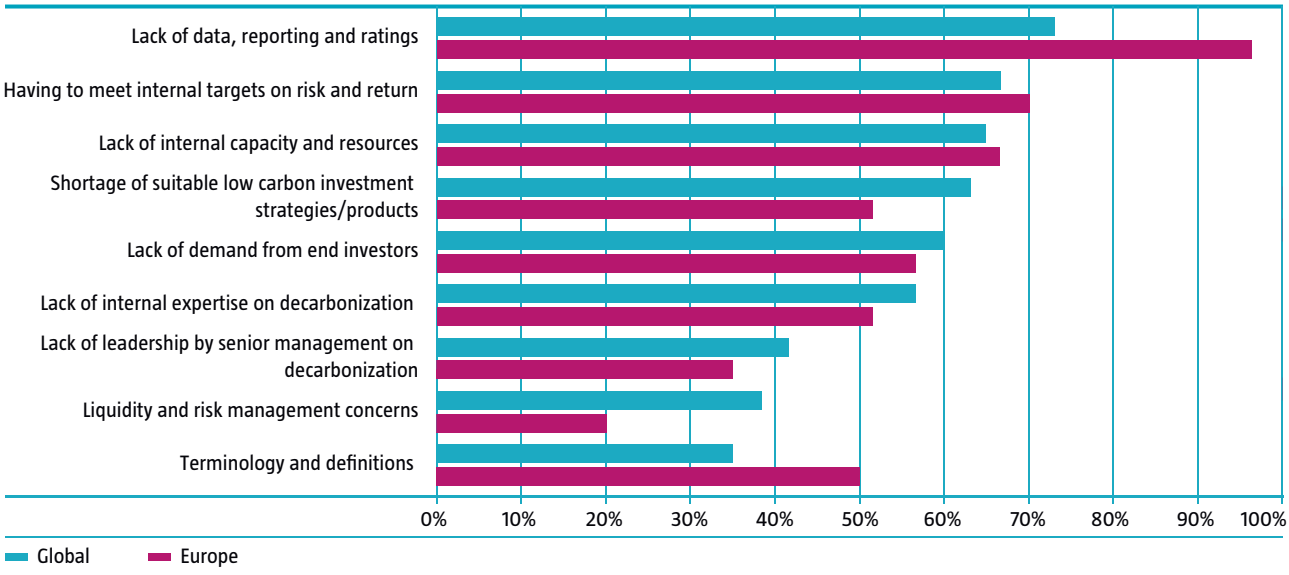
54%

of Asian investors consider a shortage of suitable strategies and products as a key obstacle.

45%

of North American investors point to the lack of internal expertise and of demand from end investors.

Figure 4: Investors face a range of obstacles to implementing decarbonization



Source: 2021 Robeco Global Climate Survey

The real challenge is ensuring we're all moving in the right direction

Finding common ground on how to act is one of the biggest challenges in tackling climate change. Acknowledging that we all have a role to play and then agreeing to act collectively are critical to creating real-world impact. Robeco's climate strategist, Lucian Peppelenbos, argues that investment capital is absolutely critical in this, but that the real economy needs to be guided by the right incentives for finance to be able to move too.

- **Incentives are essential in getting all stakeholders moving towards positive change**
- **It's time to stop pointing the finger and to start taking individual and collective responsibility**
- **We can't build a net zero portfolio without the real economy moving in the same direction**

These incentives need to be far-reaching. "For the real economy to decarbonize, you need policy frameworks, and you need consumers and technology to be onside. All of these pieces have to come together. It's crucial for us as investors to reallocate capital towards the green, circular, low-carbon economy. But we depend critically on other pieces of the puzzle falling into place as well. I think that's the real challenge."

Governments have a critical role in putting effective incentives in place. This begins with establishing appropriate carbon pricing schemes and ensuring they are incorporated into economic decisions, so that investors and consumers can factor in the true cost of their actions.

There's still a long way to go in getting the incentives right. At present, only around a fifth of global emissions are priced, through a variety of carbon schemes. And most of these schemes are underpricing emissions – which means the incentives are not effective in changing behavior. Across various carbon pricing schemes, the weighted average price of carbon emissions per ton is an estimated USD 2 (World Bank data). Calculations show that pricing needs to reach USD 50 by the end of 2021 and USD 100 by 2030 to get us on the 1.5°C trajectory.

In regions where pricing does appear to be more realistic, it has clearly changed behavior. Take Europe, where carbon is now priced at around EUR 30 to 35. "This is really accelerating the phase-out of coal. It's driving innovation in industry, because low-carbon options begin to make business sense," Peppelenbos says.

Lighting the path towards change

He believes that the other crucial role for governments is to create long-term clarity. "They need to set clear boundaries, whether for emissions or technical standards, at a certain point in the future so that the market can do its job".

He cites the example of the Dutch government signaling years in advance that, as of January 2023, all commercial real estate must have an energy label of at least 'C' if the owners wish to let or sell the property. "As a result, all property is now being refurbished or taken off the market. The industry has had years to adapt itself, and the process has worked well."

Another example is the decision by multiple European countries to ban the sale of non-electric vehicles by 2030, a move that is driving huge innovation in the automobile industry. "So, the incentives combined with clarity on the long-term timeline force a phase-out

and a transition in industry. There is time to adapt, and the requirements are reasonable and aligned with where we need to go. They also help people focus and spur innovation."

Changing our thinking – and our consumption

A vital aspect of ensuring we're all moving towards transition is to recognize how our individual choices and actions shape global outcomes. While it's easy to point the finger at companies that produce carbon-emitting products, we need to think about the role of consumer behavior, too.

"We've focused for a long time on the oil and gas industry, blaming it for climate issues. And, while it does have a huge role as well as a responsibility, what we often forget is that the industry looks for oil on our behalf. As long as we think it's normal to fly five times a year for a holiday trip, to eat large quantities of meat, and to discard clothes after a few months on wear, our behavior will be a big part of the problem."

For all of this to change, both supply and demand must change. "But I don't buy into the narrative that consumers alone determine their behavior. It takes two to tango. Companies play a big role in determining what consumers want as well."

Legal drivers of change

Developments in the judicial system are helping to accelerate this process. There are a growing number of cases of governments and companies being taken to court and challenged on the impact of their actions on the climate. Successful lawsuits have already been brought against the Dutch and French governments, for instance, for failing to fulfil their duty of care towards citizens to act on climate change. "As these cases build up, it creates jurisprudence that will support and accelerate the transition to a low-carbon economy."

Investment opportunities move in step with progress in the real economy

The extent and pace of progress in the real economy will determine the investment opportunities and risks. "Although as investors we are future oriented and take a leadership role by signaling to the market which direction it needs to go, the real economy does set limits as to where these investment opportunities develop. We can't work on a net zero portfolio without the real economy moving in the same direction," Peppelenbos says.

Meeting the challenge of getting all the elements lined up requires everybody to take responsibility. "While attributing blame to the oil industry, governments or the financial system may be justified, it is entirely the wrong approach right now – because we are all facing the same challenge and responsibility."

What's more, we can't wait for all the elements to come together before we step up to the plate. "Right now, each and every one of us must assume that role. What the world needs right now is distributed leadership."

WATCH THE FULL VIDEO

WHAT CHALLENGES DO INVESTORS FACE IN TACKLING CLIMATE CHANGE?

Gilbert Van Hassel
CEO

"It's of course, a very difficult thing to translate long-term ambition into short-term portfolios. But I think what we should really do, just like national governments and government policies are doing, is to get five-year time spans and making sure that we are in line with what the UN climate policies are doing with their ratchet mechanism. And so, indeed, yes, it is a challenge, but it's doable. Is it going to make an impact? If I look at ourselves as an asset manager, of course, it will indirectly have an impact if we decarbonize our portfolios. But if enough asset managers are starting to do it and the world is following, it will be noticed by companies and indeed it will have a major impact."

Carola van Lamoen
Head of Sustainable Investing

"If you look at the challenge of decarbonizing portfolios, sometimes it seems the most easy to basically just sell those stocks with the highest carbon emissions. But if then someone else buys the same stock, then from a real-world perspective, nothing will change. So, that doesn't help the real world. So, in addition, it is good to also engage with companies on the transition to a low-carbon economy. And that is really a way to solve this challenge."

Victor Verberk
CIO Fixed Income and Sustainability

"If you talk about decarbonization, you talk about data, to start with. You need to purchase data. The data is captured by three vendors, so it's expensive by definition. You need an IT system to store the data in the cloud. So, SI is IT to me. I sleep very well, but if you ask me what bothers you, then it is: SI is IT. There is so much IT investments needed."

Masja Zandbergen
Head of Sustainability Integration

"We focus on the large carbon emitters. We focus on the energy sector, the utility sector, cement, mining, heavy industries, all high-carbon emitters. And if we sell them, our portfolios are decarbonized. But then again, nothing has really happened in the real world. These companies also need to have capital to innovate, to develop new products. They have clients that need their products, that buy them and that need to also maybe even pay a little bit more for those products. So, it's the whole chain that needs to help in decarbonizing the economy. And we as an investor are only at the beginning of that whole chain."

Lucian Peppelenbos
Climate Strategist

"Carbon pricing has been identified by economists for many decades as the key solution. However, delivering on it has proven to be a real challenge. There are around 60 carbon pricing schemes in the world, but together they cover only 20% of global emissions and the average price is 2 dollars per ton. Whereas scientists agree that currently carbon pricing should be between 40 and 80 dollars, and it should grow to 100 dollars in 2030. So, there's a long way to go. Now there where we do see serious carbon pricing, for example, in Europe this year, prices are at 40 euros, we do see the clear benefits."

The data dilemma

Thijs Markwat
Climate data scientist

Curbing global warming means cutting greenhouse gas emissions – this is a simple fact. However, investors face a challenge in acquiring the data needed to track the levels of emissions that are causing global warming and the rate at which they are being reduced.

The scale of the problem of data collection becomes clear when trying to establish where emissions come from in the first place. To give a clearer idea of their source, they are classified as either Scope 1, 2 or 3 emissions. In short, Scope 1 emissions are those directly generated by a company; Scope 2 are created by the generation of the electricity or heat needed to make a product; and Scope 3 are caused by the entire value chain, including the end user of the product over its life cycle.

But it's not simply a case of adding up tons of cubic meters of greenhouse gases – assuming that you could even access that information. There are three principal problems, stemming from the fact that by definition, any data acquired about anything is always historical.

"A fundamental problem of carbon footprint data is that it is backward looking, with an average time lapse of around two years. So, if we're staring down the barrel of carbon, then we're currently looking at the reality of 2019," says Robeco's climate data scientist Thijs Markwat.

"This means the data won't tell you about the transition readiness of a company. What we really need is more forward-looking metrics. A carbon footprint as it is now doesn't tell me about whether the company is going to decarbonize in the future."

Competing providers

The second problem is not that there isn't enough data, but that it comes from multiple and overlapping sources that are often contradictory. "Scope 1 and 2 data is relatively easy to obtain, but there's hardly any correlation on the scale of it from the different data providers," says Markwat. "The real problem is that it's not measured, it's modelled. That means it's estimated."

Furthermore, the scopes themselves do not tell us the whole story. For example, while a carmaker will produce relatively low Scope 1 and 2 emissions in making a petrol-driven car, the user of the vehicle would burn petrol over many years, causing very high Scope 3 emissions in exhaust fumes.

But the data challenges should not keep us from acting. "The lack of data is being used as an excuse by some to avoid tackling the issue head on," says Markwat. "We need to be careful not to frame the entire issue as a data challenge; it's more of an analytical challenge caused by the data itself. We know what the carbon-intensive sectors are, so we can act on that."

Numerators versus denominators

The third issue is what metrics to use, as the current approach is largely quantitative when it needs to be qualitative as well. "The carbon footprint is the numerator, but then there's also the denominator," says Markwat.

"So, do you look at companies in terms of their carbon footprint per sales, or per enterprise value? These factors make huge differences when EU law requires one thing and laws in other regions and countries require something different. There needs to be a more focused approach."

Carbon pricing is too small scale to make a difference

Carbon pricing is often seen as a solution to curbing emissions, since it is a direct cost on the higher emitters. However, it is far from being adopted on the global scale needed to make a difference, and current carbon prices are much too low.

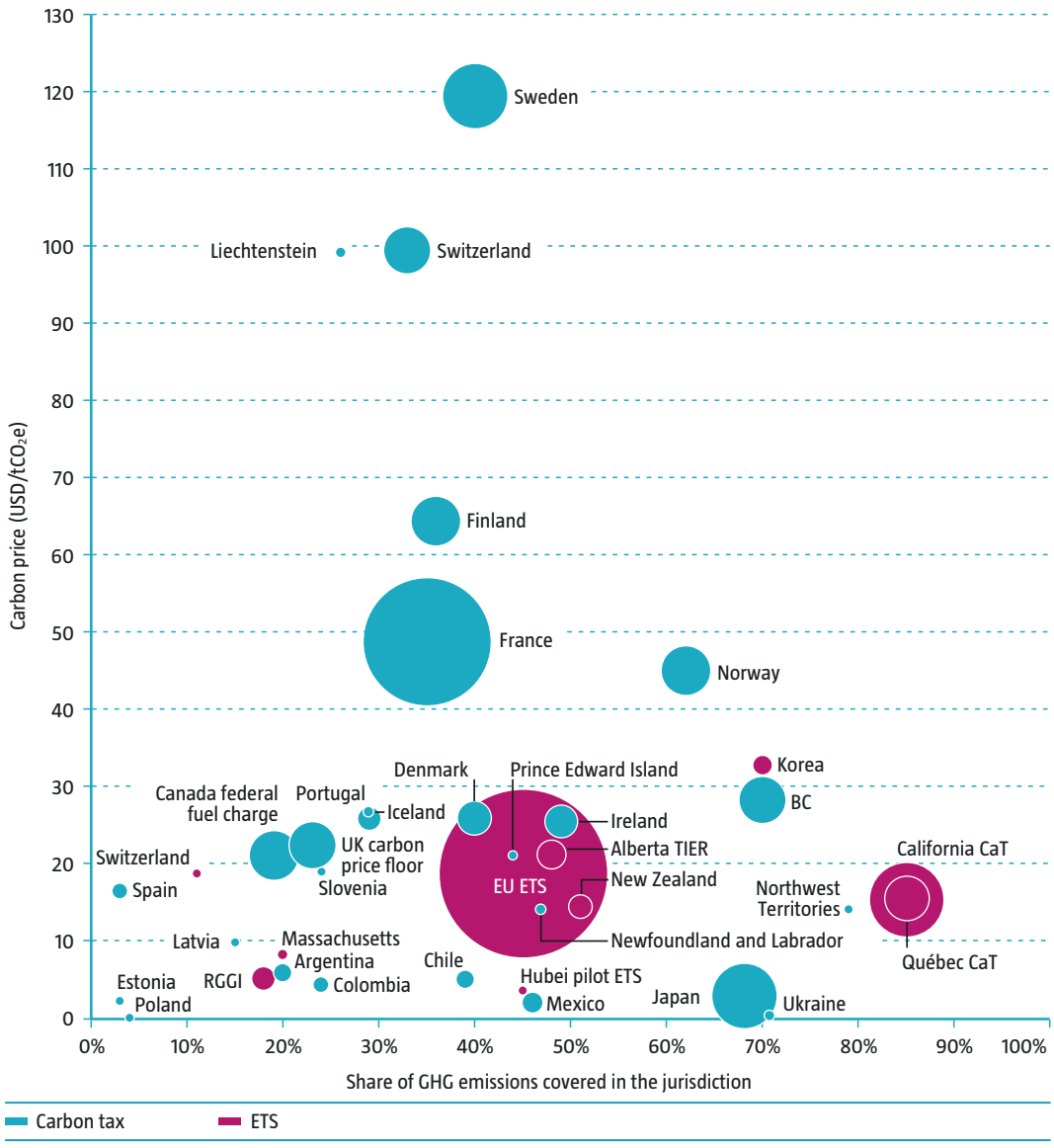
In its simplest form, carbon pricing is a tax per ton on the amount of carbon emitted, and is typically levied by a government. Sweden has the highest carbon taxes in the world, charging about USD 120 per ton of CO_2e, according to the World Bank Group's 'State and Trends of Carbon Pricing 2020' report.

Another means of dealing with emissions is through 'cap and trade' schemes, in which carbon allowances can be traded with other emitters subject to thresholds set by the governing authority. One of the most extensive of these is the European Union's Emissions Trading Scheme (ETS).

In such schemes, the carbon price fluctuates according to the supply and demand of the allowances. The current price in the EU ETS is around EUR 33/tCO_2e.

Most countries, however, do not have either a carbon tax or a trading scheme, or operate them at such a low level that it doesn't act as a deterrent to emissions. At the end of 2020, there were only 61 carbon pricing initiatives in place or planned in the world, consisting of 31 ETSs and 30 carbon taxes, the World Bank Group says. These cover 12 gigatons of carbon dioxide equivalent or only about 22% of global greenhouse emissions, up from 20% in 2019.

Figure 5: State and trends of carbon pricing



Source: Worldbank, 2019

Prices are too low

Meanwhile, carbon prices remain substantially lower than needed to act as an incentive to meet the goals of the Paris Agreement. In 2017, the High-Level Commission on Carbon Prices estimated that a global carbon price of USD 40-80/tCO2e by 2020 and USD 500-100/tCO_2e by 2030 would be needed to limit the increase in global warming to 2°C. The current global average price is about USD 2/tCO_2e, according to the IMF.

"At the global level, currently only 22% of carbon is being priced, which is really insufficient," says climate change strategist Lucian Peppelenbos.

"And the average global price of about USD 2/tCO_2e is nowhere close to being serious."

"But there are some signs now that it is finally being taken more seriously. The price of carbon in Europe is now EUR 33/tCO_2e, and that's really the price at which it starts to impact economic behavior. We're already seeing the shift from coal-fired to gas-fired power production taking place at these price levels, and it is stimulating low-carbon innovation in industries."

Being taken more seriously

The issue is clearly being taken more seriously within the EU, which has committed to becoming carbon neutral by 2050 in the European Green Deal. Its first target is to achieve a 55% reduction in greenhouse gas emissions compared to 1990s levels by 2030. As part of this ambition, a Carbon Border Adjustment agreement is being drawn up to create a level playing field and protect European industries against cheaper, high-carbon products from outside the EU.

"The ETS is the cornerstone of EU climate policy," says Peppelenbos. "To achieve its objective of a 55% reduction by 2030, the EU understands that the carbon allowances will need to become scarcer, which will push up the price per ton of CO_2. The carbon border tax would be a game changer globally."

Higher carbon prices and border taxes may be good for the climate, but won't they harm the economy? One way of making it more palatable to those actually paying the taxes is to compare it with existing taxes on fuel. "If you take the average amount of taxes on gasoline in Europe, this would equate to a carbon price of around USD 300 per ton," Peppelenbos says.

"This taxation has not stopped the European car industry from being competitive, and it hasn't stopped consumers from buying or driving cars. But it did help to produce much more efficient cars in Europe versus the world average." "This shows that it's possible to introduce higher prices without killing the car industry or consumer purchasing power. You just need to do it in a clever way; none of this needs to be a threat."

Challenges of decarbonizing investment portfolios

Climate change is the problem, net zero is the goal, and decarbonization is the means. But are there obstacles blocking the road ahead? Masja Zandbergen, Robeco's Head of Sustainability Integration, explains the caveats and challenges that may trip up investors in their quest to decarbonize portfolios and contribute to the net zero transition.

What exactly does it mean to decarbonize a portfolio?

"Put simply, it is reducing the carbon intensity of the portfolio by including companies with low emissions or which have made credible commitments to reduce their emissions. Similar to a portfolio's financial performance, progress in this area requires continuous measurement against a reference point."

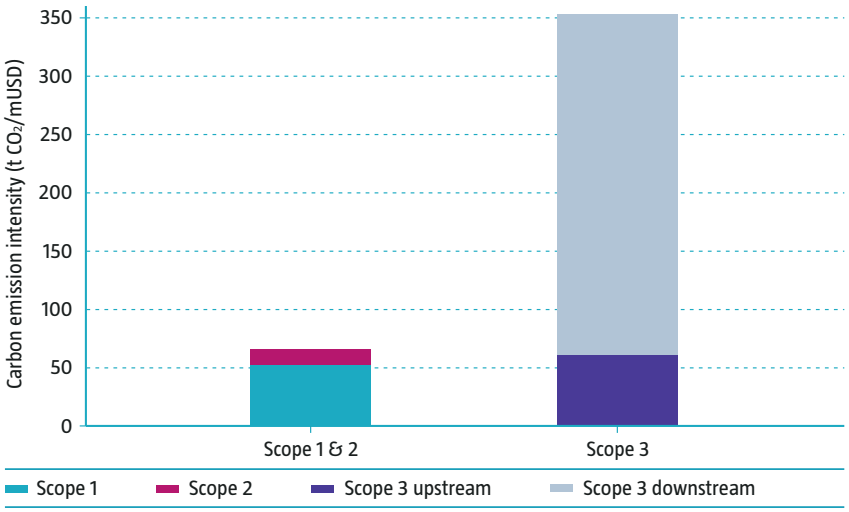
"Otherwise, the informational value of reported emissions is low. That reference could be the overall market, such as the emissions performance of a global index, or an internal standard such as a point in time from which a portfolio's year-on-year progress is measured. The emissions amount is irrelevant; what matters is that you start to measure."

Wouldn't it be easier to simply divest from heavy emitters?

"It would be if company-reported data were complete, but the bulk of emissions generated is excluded from this, so true emissions performance is underestimated. Currently, companies report and investors measure emissions from production processes (Scope 1) and the electricity used to power those processes (Scope 2). But they don't report emissions generated further along in the supply chain by a product's consumers. Oil and gas producers have a high carbon footprint in the production phase, but that's still only 20% of total emissions. The other 80% is generated when the oil is burned by customers (Scope 3)."

"Oil and gas companies aren't alone; economy-wide scope 3 emissions are underestimated. Many food companies, for example, have comparatively low operational footprints upstream, yet hefty unaccounted emissions from things such as deforestation and fertilizers in other parts of their supply chains. Comprehensive supply chain data is not yet calculated, publicly disclosed or considered by most investors (see Figure 6)."

Figure 6: Scope 3 emissions are under-reported yet dominate total emissions of publicly listed companies



Source: Robeco, Trucost. The graphic shows the annual weighted average carbon intensity (WACI) of constituents of the MSCI All World AC. Constituent emissions data are based on average annual emissions reported by companies for 2019. WACI measures the carbon intensity (Scope 1 + 2 + 3 emissions / enterprise value including cash in millions USD) for each portfolio company multiplied by its portfolio weight.

How is this affecting efforts to decarbonize investor portfolios?

"It can lead to the emissions of some companies and sectors being underestimated or overestimated. Many 'green and clean' solution providers have paradoxically high carbon emissions if you only take backward-looking emissions into account. For example, wind turbine operators, electric vehicle makers and hydrogen producers, are all clean technologies but their carbon-reducing benefits lie in the consumer use phase further down the supply chain."

"Given they may need steel for parts or use electricity from a carbon-intensive regional power grid, their Scope 1 and 2 emissions may still be high. That means their decarbonization potential is not being fully realized in portfolios. Predictive power is needed to combat this effect."

What is Robeco doing to address this dilemma?

"Our most advanced decarbonization strategies take Scope 3 emissions into account. For other strategies, we use proprietary estimation techniques and third-party modelling to derive best case estimates of future emissions. This involves mapping out net zero transition pathways for sectors based on available or near-term technologies. Besides Scope 3 emissions, we incorporate other types of forward-looking data to help predict companies' climate preparedness and future climate-adjusted performance. Which companies have strategic plans that incentivize a shift to low-carbon technologies and business models? How are they expected to benefit and profit from the net zero transition? Which are financially strong enough to make the capital investments needed to transition?"

"The ultimate goal is to ensure client portfolios are climate proof by reducing their exposure to carbon risk and ensuring they are climate-ready. This is a much more complex responsibility, involving many more considerations than how a portfolio measures up against a benchmark in terms of emission reductions."

How is decarbonizing a portfolio different from ESG integration?

"ESG integration brings more information across a wide range of risk factors; social, economic, governance and environmental. This can be combined with financial analysis to more accurately assess future risks, evaluate financial performance and make better-informed investment decisions."

"Decarbonization, on the other hand, is often done to reduce climate risks as well as to combat climate change. An investor's decision to decarbonize their portfolio is not always based on purely financial objectives. Often, it is motivated by a desire to invest in companies that are making positive impact by not contributing to climate change and environmental damage."

How does decarbonizing a portfolio fit into the bigger context of decarbonizing economies?

"The economy grows where capital flows, so channeling capital towards companies with strong carbon reduction momentum and away from laggers accelerates the transition to a carbon-free global economy. That said, selling the securities of a high carbon emitting company has no immediate effect on the real economy. Real world impact requires large pools of investors to 'vote with their feet' by refusing to own securities of heavy polluters. This will ultimately raise their financing costs and expedite change."

"However, there are caveats to this approach. For one, denying financing will hurt many companies that want to transition but need capital to do it. In addition, some heavy polluters are so cash-flow rich, they don't need new capital. In the latter case, financing boycotts may have little effect. But even cash-rich companies care about their reputations, so if investors position their portfolios away from these companies, it sends an amplified, high-alert message to company management."

How does decarbonizing a portfolio fit into the bigger context of decarbonizing economies?

"Investors must also use active engagement and voting as a tool to exert their influence over company management. Given that carbon emissions are spread across entire economies and require major structural changes, engagement needs to take place not just with the company but also at the country level."

"Robeco has recently started engaging with country leaders to help them understand the aggregate effects of conflicting carbon policies at the national level. It is counterproductive to force some industries to decarbonize while allowing others to cut down forests or to offer protective subsidies to heavy carbon polluters. Country leaders must also understand that national decarbonization policies will impact their ability to attract global businesses, foreign investments and financing via sovereign bonds." ■

Responsibility

No one can ignore climate change, least of all investors, as we have the means to put money to work where it can make a difference. Active ownership can also help transform companies. With great power comes great responsibility.

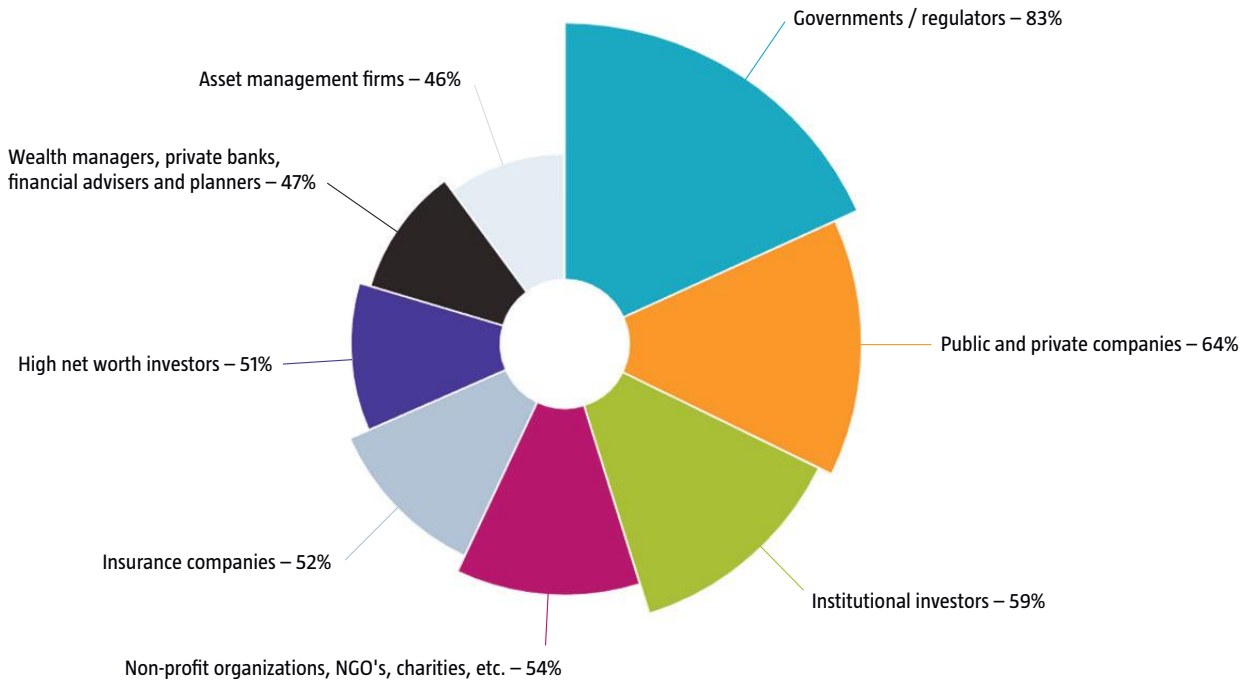
83%

of global investors identify governments and regulators as bearing the most responsibility for reducing carbon emissions to meet the Paris Agreement targets.

64%

of public and private companies follow in the list, and then institutional investors (59%). Investors put NGOs (54%) ahead of most types of investors in bearing responsibility, while retail investors are seen as having the least responsibility.

Figure 7: Who do investors see as bearing the most responsibility for reducing carbon emissions?



Source: 2021 Robeco Global Climate Survey

Innovating for sustainability

AN URGENT CALL TO ACTION FOR INVESTORS, BY ROBECO CEO GILBERT VAN HASSEL

Gilbert Van Hassel
CEO

Our planet is in trouble. We can no longer ignore the reality that our climate is changing and that biodiversity is collapsing. On top of that, we have yet to adequately manage the pandemic that has been afflicting us since early 2020. It's vital to act now: the longer we wait, the bigger the trouble ahead.

I believe that investors need to lead in this crisis. In fact, one of the biggest risks for asset owners and managers is not seeing the opportunity to transform towards a more sustainable planet. Sustainability is now a key driver of innovation: the search for solutions to climate change, in particular, is driving technological innovation at an unprecedented rate. If investors don't seize such opportunities by investing in sustainable innovations, they will not only hurt their own bottom line. They will also fail to support the solutions that can reverse the tide and get our planet out of trouble.

A climate roadmap

The single most important issue for investors should be how we can have real-world, sustainable impact. I believe there are three priorities in this regard.

First, it's critical that we scale sustainable investing. Sustainable investing must become mainstream in order to be a force that helps drive the transformation towards more sustainable and resilient societies.

Despite the surge in the number of ESG and impact funds on the market, our work is not yet done. For every fund that integrates sustainability criteria, there are many more that don't. This presents a challenge: although investors are increasingly steering capital towards sustainable firms, plenty of financing is still going to companies that have an adverse environmental and social impact. It means that, rather than treating sustainable investing as niche, we must go all in and make it the standard way of doing business.

Our second priority is to innovate. If we are to achieve the goal of making sustainable investing mainstream, we must come up with innovative ways to integrate sustainability into different asset classes. Today, the main focus remains on listed equity. Fixed income, particularly credits, is following, but surveys show that sustainability integration in this asset class is at an early stage.

That means that there is a world to gain for sustainable investing. If we succeed in creating innovative ways for integrating sustainability across different types of asset classes – particularly sovereign debt – then we will see many more opportunities to make a positive impact.

The third priority is impact. Here, we still see many unknowns: how can we measure the impact of companies on societies and the environment? Is ESG a good indicator of impact or do we need better metrics that focus more on the goods and services that companies deliver rather than focusing on their operations? And which metrics can indicate whether companies will successfully increase their impact in the future?

We are tackling these challenges through research and by creating new products. We have, for example, created a proprietary SDG Framework that enables us to assess what impact companies have on each of the SDGs – and with this framework we create investment strategies that invest in companies that have a positive impact. We have also launched two innovative climate-focused fixed income strategies, which are fully compliant with the EU benchmark regulation for Paris-aligned investments. As such benchmarks are not yet readily available to the market, we innovated – and developed these indices by working with a specialist in this area.

Ultimately, sustainable investing must be about impact – and there is a great deal more good work to be done here.

Overcoming the obstacles to ensure we have impact

These are very complex challenges and this complexity is to be embraced rather than avoided. This requires us to have a much better understanding of what we are dealing with and what the consequences are. There is much work to be done to understand how investments influence climate change and especially biodiversity loss, and vice versa.

It also requires us to act together as an industry. No sustainability challenge will be solved if we do not act collectively. A planet that is safe and healthy can only exist if sustainable investing becomes run of the mill rather than the exception.

We need to just do it. Yes, it is complex and will take time. But we no longer have the luxury of waiting until all the unknowns are known and we have mastered all the complexity. We understand more than enough today to roll up our sleeves and get moving. Now.

Steering the money towards sustainable companies

Investors can play a major role in directing how money is channeled towards those companies making a different to climate change. For listed companies, the threat of divestment combined with engagement is particularly effective. And the planned EU Taxonomy will give investors clarity on what constitutes an environmentally sustainable activity and under which circumstances.

Apart from the fiduciary duty to maximize returns for their clients, particularly when it involves ERISA assets, there is a global, increasing focus on the sustainability aspect. Asset managers decide what equities and bonds to buy for portfolios, which means they can target companies working towards decarbonization. This is primarily done through negative screening (typically exclusions) and positive screening, which uses models to find companies with higher ESG profiles.

Engagement is also used to persuade companies to do better. Robeco has two engagement themes in 2021, targeting financial institutions that fund higher-carbon companies, and those companies that have been slow or reluctant to move to lower-carbon business models.

Meanwhile, a swathe of new strategies are being launched that invest in companies making a direct contribution to combating global warming. In December 2020, Robeco launched two fixed income climate strategies that have benchmarks aligned with the Paris Agreement – the first time this has been done in this space.

Other climate-related investment products include those involved in carbon capture technology, the circular economy, and reforestation. Other forms of impact investing target the UN's Sustainable Development Goals (SDGs) – particularly SDG 13: climate action – along with green bonds. So, is it just a case of channeling all the money into these kinds of strategies?

Thinking laterally

No, because investors need to think laterally too: it's not enough to just avoid the bad guys and buy into greener securities, says climate change specialist Lucian Peppelenbos. "The irony is that we currently need to use fossil fuels in order to abolish them," he says. "Take the oil and gas industry, an everyday necessity that is both at the heart of the problem and part of the solution. Oil and gas will be needed for transport and heating right up until 2050, though to a declining extent each year. And we still need fossil fuels and chemicals to build wind farms."

"Oil majors need to transform into renewable energy companies, and we need to help them to do that. Just divesting from them and only investing in renewables won't get us there. For example, we know of one company that has a large carbon footprint because of its mines, but it also has the largest renewable energy power generation capacity in Europe. So, you want to be invested in that company to help achieve the transition and gain exposure to the renewables. That's the balance you need to strike."

Not everything is investible

The investible oil and gas companies still need shareholder money to survive – and that's where investors can wield their power. "The threat of exclusions or divestment is particularly effective when combined with engagement," Peppelenbos says.

"I have engaged with oil companies for many years and for them, the threat of their leading investors divesting them is very real for them – they genuinely fear it. So, they're very willing to listen to what we want from them to avoid this happening, because they know that we're under pressure too. We saw that with Shell. So, I think it works."

Unfortunately, not everything is within investors' reach. "We can only invest in listed securities; most of the world's coal reserves are owned by governments, so we can't threaten to exclude them," Peppelenbos says. "At Robeco, we also don't buy real assets such as wind farms, which are a critical part of the equation. What we can do though is invest in the companies developing the technologies behind the wind farms and other renewables instead."

"It is our responsibility to maximize investor's returns, but we also need to keep an eye on offering investment opportunities in any of these areas while remembering that we can't just dump all the fossil fuel producers and users overnight."

EU Taxonomy can help

One thing that will help in steering money towards the more sustainable companies is the EU's new Taxonomy. This will establish for the first time a unified classification system for 'green' and 'sustainable' economic activities under the EU's sustainable finance regulations.

Under the Taxonomy, environmentally sustainable activities must make a substantial contribution to one or more of six environmental objectives. These are climate change mitigation, climate change adaption, the sustainable use and protection of water and marine resources, the transition to a circular economy, pollution prevention and control, and the protection and restoration of biodiversity and ecosystems.

Only activities that contribute to the first two environmental objectives – climate change mitigation and adaptation – have so far been defined. The first disclosures to meet for these objectives are due to be filed in January 2022. Technical screening criteria for activities that make a substantial contribution to the other four criteria will be released by the end of 2021, with disclosures due in the course of 2023.

WATCH THE FULL VIDEO

WHAT RESPONSIBILITY DO ASSET MANAGERS HAVE IN COMBATING CLIMATE CHANGE?

Carola van Lamoen
Head of Sustainable Investing

"If you look at climate change, it is clear that if everyone looks at his or her neighbor, it will not change. So, there is a responsibility for everyone. Countries have to act. Companies have to act. And also investors have to act. And I think specifically for investors, there is a special responsibility, because they can decide where to invest their money. And that is a very powerful tool."

Victor Verberk
CIO Fixed Income and Sustainability

"The responsibility is huge, of course, and we have signed the UN PRI Global Compact, we have signed all kinds of stewardship codes and the Paris Agreement. So, our responsibility is there and we need to get this private capital behind those goals, the Sustainable Development Goals, for example. That responsibility is there; we signed up for it. We're working very hard to do so. Next to that, we also have our normal voting and engagement procedures, of course. So, we vote where our view is. We vote down the wrong CEO compensations, like we do in shareholders meetings. We do engage with companies to improve their behavior. So, voting and engagement in the background is also constantly pushing the private sector into the right direction."

Gilbert Van Hassel
CEO

"Money speaks. And we as asset managers control an enormous amount of money and we need to put that to work. We as Robeco firmly believe that as an asset manager, it's not only your task and your responsibility to maximize wealth, but also to maximize well-being. Not only are we doing that by reflecting that in our portfolios, but also we can do it through engagement. Engagement you cannot do by yourself; you have to work together. And being a member, for instance, of the Climate Action 100+ group is one of these examples on how the asset management industry can work to get a real impact."

Masja Zandbergen
Head of Sustainability Integration

"I think as an asset management industry, we're at the beginning of the whole chain. We are providing capital to these companies. Companies deploy that capital, to making products or delivering services. So, we have clearly a responsibility there. Having said that, everyone has a responsibility in the whole chain and also, for example, policymakers and governments, to set the right level of regulation that is fair and that people can trust. If you, on the one hand, are subsidizing fossil fuels and on the other hand, subsidizing renewable energy, what are you going to achieve? So I think the asset management industry has a clear responsibility, companies have a clear responsibility and regulators have a clear responsibility."

Lucian Peppelenbos
Climate Strategist

"For investors to address climate change is part of our fiduciary responsibility, because climate change is investment risk and also investment opportunity. It's a key determinant for determining winners and losers in tomorrow's market. Climate change is essentially a market failure. It's emissions that are not being priced as part of economic decision making. That puts a key responsibility for governments to put the right incentives in place and give a price, put a price to carbon."

Our six climate change engagement themes

Robeco has long believed in using engagement with companies as a means of pursuing positive change. This can be seen in six engagement programs that are directly related to climate change, with an increasing focus on decarbonization. Every year the Active Ownership team chooses four or five new themes that it will pursue through engagement. As each theme typically runs for three years, those chosen since 2018 are still active. They are summarized here:

1. Financing the transition

Regulators are increasingly looking at the financing of climate change and how the financial sector can support rather than undermine the low-carbon transition. An example of this is to make sure that banks align their lending policies with the carbon reduction targets being set by governments to meet the Paris Agreement.

"We know that many banks are still lending to high-carbon emitters without gaining any commitment from them to change to lower-carbon business models," says Peter van der Werf, senior engagement specialist in the Active Ownership team.

"In this way, they are not aligning their lending activities with the Paris Agreement commitments. We expect the financial sector to gain much more insight into the climate risks and opportunities that are increasingly falling within their purview."

2. Targeting high emitters

The other side of the coin is targeting the high-carbon emitters themselves. This engagement program is aimed at companies that are falling behind in the transition. "In the past, we have engaged with a large number of companies on the need to transition to lower-carbon business models – but some are still not making sufficient progress in that process," says Van der Werf.

"So, for this program, we wanted to further shift gears and focus on the 'worst of the worst'. These are the ones that won't be pushed with a little nudge: they really need fundamental change to transition towards lower-carbon business models."

Active ownership is a key tenet of sustainable investing, which has been part of Robeco's DNA for decades.

3. Combatting biodiversity loss

A theme of combatting diversity loss began in 2020, and was boosted in September of that year when Robeco was one of 26 financial institutions to sign the Finance for Biodiversity Pledge. "Investors are exposed to biodiversity loss predominantly through land use change as a result of deforestation through clearing land for expansion of agricultural production," says Van Der Werf.

"We want companies that produce soy, cocoa or palm oil, or companies that manufacture food to conduct a biodiversity impact assessment of their operations and/or supply chains. We also want them to develop plans to achieve net zero deforestation by 2023."

4. Net Zero Carbon

A second theme for 2020 focused on the increasingly urgent need to achieve net zero carbon emissions by 2050. This was followed later in the year by Robeco's pledge to achieve net zero greenhouse gas emissions across all its assets under management by 2050.

"As climate change represents a significant threat to investments, investors should align their portfolios with the goals of the Paris Agreement," says Van der Werf. "Key industries need be decarbonized. The energy industry accounts for more than half of global emissions. The steel and cement industries are also significant emitters."

5. Deforestation at palm oil plantations

In 2019, an engagement program was launched to tackle challenges in the palm oil industry such as deforestation, which adds to climate change by removing important carbon sinks and destroying biodiversity. "We've actively engaged with palm oil companies in the past, but we wanted to step up our efforts and make sure that palm oil-producing companies commit to producing palm oil sustainably," says Van der Werf.

"We will focus on producers and traders in Malaysia and Indonesia, to bring them in line with the standards of the Roundtable for Sustainable Palm Oil."

6. Collaborating on climate change

Going full circle, our global focus on collaborative engagement on climate change began in 2018, when we joined other members of the Climate Action 100+ initiative to target the world's largest corporate greenhouse gas emitters. As a joint leading investor, Robeco achieved an important breakthrough in December 2018 when Shell agreed to set short-term targets for decarbonizing its main oil and gas business, and link executive pay to these targets for the first time.

"This shows that engaging with the companies we invest in is a powerful mechanism and key differentiator in bringing change to help combat major challenges such as climate change," says Van der Werf. "The Shell case shows just how well this approach can work."

Exclusions – our last resort

Carola van Lamoen
Head of Sustainable Investing

Exclusions have long been used by Robeco for companies whose products or practices do not meet acceptable standards. A new policy in 2020 went much further by barring fossil fuels from all portfolios, subject to certain thresholds.

Robeco operates three kinds of portfolios. 'Sustainability Inside' strategies have ESG integrated as standard, and form the majority of Robeco's offerings. 'Sustainability Focused' strategies go a step further, with specific ESG targets such as achieving a better carbon footprint than the benchmark. Impact Investing strategies go further still, typically targeting a theme in which a real, impact can be made on the ground, such as through SDGs.

In the past, companies excluded from any of these portfolios included those making controversial weapons such as cluster bombs, firms embroiled in corruption or other unethical practices, and tobacco. Climate change had not been widely seen as excludable – indeed, fossil fuels were often viewed as a necessary element of the current economy pending the transition to cleaner energy sources in the future.

Widening the scope

But under the policy announced in September 2020, companies that derive 25% or more of their revenues from thermal coal or oil sands, or 10% from Arctic drilling, have been barred from Sustainability Inside portfolios. This expands the thermal coal

exclusion policy that previously only applied to the more bespoke Sustainability Focused and Impact Investing strategies.

Investments in companies actively engaged in oil sands and Arctic drilling were also barred for the first time. This means that 242 fossil fuel companies in the energy, mining and utilities sectors joined the exclusions list.

Stricter thresholds have been applied to Sustainability Focused and Impact Investing portfolios, excluding companies with just 10% of their activities in thermal coal and oil sands, or 5% in Arctic drilling.

"Although the preferred approach is to engage with companies, we believe it is very difficult to drive significant change at companies whose portfolios are skewed to coal or oil sands," says Carola van Lamoen, Head of Sustainable Investing at Robeco. "Therefore, we prefer to focus our efforts on the companies and sectors where we are more confident that our engagements will be effective."

Practicing what we preach – a net zero carbon ambition

At Robeco, we like to practice what we preach. In December 2020, we committed to achieving net zero greenhouse gas emissions across all our assets under management by 2050. In this Q&A, we explain the rationale behind the move.

What has Robeco committed to doing?

Meeting the Paris Agreement's goal to limit global warming to below 2°C by the end of this century means the world needs to become carbon neutral by 2050. Many nations along with the EU have since pledged to become net zero carbon by this deadline. As a leader in sustainable investing, we felt that we had a fundamental duty to do the same.

What does this mean in practice?

All Robeco's assets under management must become carbon neutral, which means that all the companies held as stocks or bonds in our portfolios must meet this goal by 2050. As such, they will have to cut their greenhouse gas emissions and engage in carbon offsetting. To achieve that, they will need to make major changes to their economic models, including such as the long-term transition away from fossil fuels into renewables.

Doesn't this just mean divesting problem companies?

It's not just a matter of decarbonizing portfolios by throwing out high-carbon companies – this kind of divestment doesn't solve the underlying problem. We need to work with the more carbon-intensive companies, including the use of engagement, to help them move their business models towards lower-carbon solutions.

How will Robeco achieve this?

A roadmap will be used by all our investment teams to map out how we can gradually decarbonize all our billions of euros of investments. The targets set in the road map include the reduction of portfolio emissions using our data models that can calculate how much greenhouse gas emissions companies are producing.

Are we doing this unilaterally, or with others?

It was a decision taken by us as something we should do anyway, but we've always believed in the power of collaboration to work together and achieve a wider goal. So we've done this as part of an international effort by the Net Zero Asset Managers Commitment, launched by the Institutional Investors Group on Climate Change (IIGCC), of which Robeco is a member.

What about any new products?

In December 2020, we became the first asset manager in the world to launch fixed income climate strategies targeting companies that are making a direct contribution to combating global warming. We also have products targeting the Sustainable Development Goals, including SDG 13: climate action. And we have investments in solutions such as green bonds, smart energy and the circular economy.

What steps have been taken so far?

We think fossil fuels are the 'low-hanging fruit' in that they are an obvious issue on which to take a stand. In September 2020, we extended our fossil fuel exclusion policy to include all UCITS-registered funds (not just the bespoke ones), subject to certain thresholds. We combine this with extensive engagement to target not just the high-carbon companies, but also the financial institutions funding them.

Has Robeco boosted its resources to help with this?

Yes. We wanted to add some extra expertise in this arena. So in 2020, we hired a climate strategist and a climate data scientist to work exclusively on this project. They work within our news SI Center of Expertise, which we also created in 2020, partly to intensify our efforts on climate-related investment issues. They advise investment teams across the company.

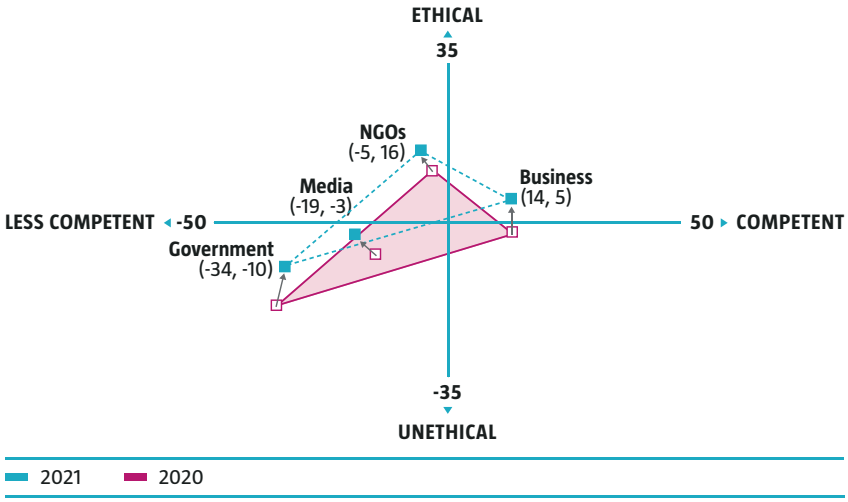
Does Robeco publish all its findings?

Yes. We believe strongly that full transparency is an important part of sustainability. So, we publish all our sustainability policies on our website, including a climate change policy which was updated in September 2020. We also produce regular updates on how sustainability is translating into fund performance and showcase our engagement work in quarterly reports.

2021 Edelman Trust Barometer: winners and losers

The Covid-19 pandemic has brought to the fore the importance of good leadership; or, put differently, how a lack thereof can prove costly in the event of a crisis.

Figure 8: Business now only institution seen as both competent and ethical



Source: 2021 Edelman Trust Barometer. The ethical scores are averages of nets based on INS_PER_DIM/1-4. Question asked of half of the sample. The competence score is a net based on TRU_3D_INS/1. Depending on the question, it was either asked of the full or half the sample. General population, 24-mkt avg. Data not collected in China, Russia and Thailand.

Indeed, the various degrees of success – or, rather, failure – in combating the outbreak across the globe have led to a loss of public trust in government, as shown in the 2021 Edelman Trust Barometer. As can also be seen in the barometer, survey respondents continue to view government as the least competent and ethical institution. In fact, business is the only institution seen as both competent and ethical.

That said, respondents in our global client survey said that government should play the biggest role in reducing carbon emissions, followed by business. While there might be a lack of consensus on which institution should take the mantle of leadership, what is clear is the increasing urgency to address the underlying reality of climate change.

In this context, all pillars of society have to play a role in moving towards a more sustainable world. Change should not only be determined by government regulation, but also by the proactive efforts of other institutions. Closer to home, the responsibility also lies with the asset management industry as well as the companies we invest in and engage with. ■

Opportunity

From bushfires to retreating glaciers – climate change sometimes feels overwhelming. But out of adversity opportunity sometimes emerges. We can invest in the companies that are part of the solution, from renewables to smart technology.

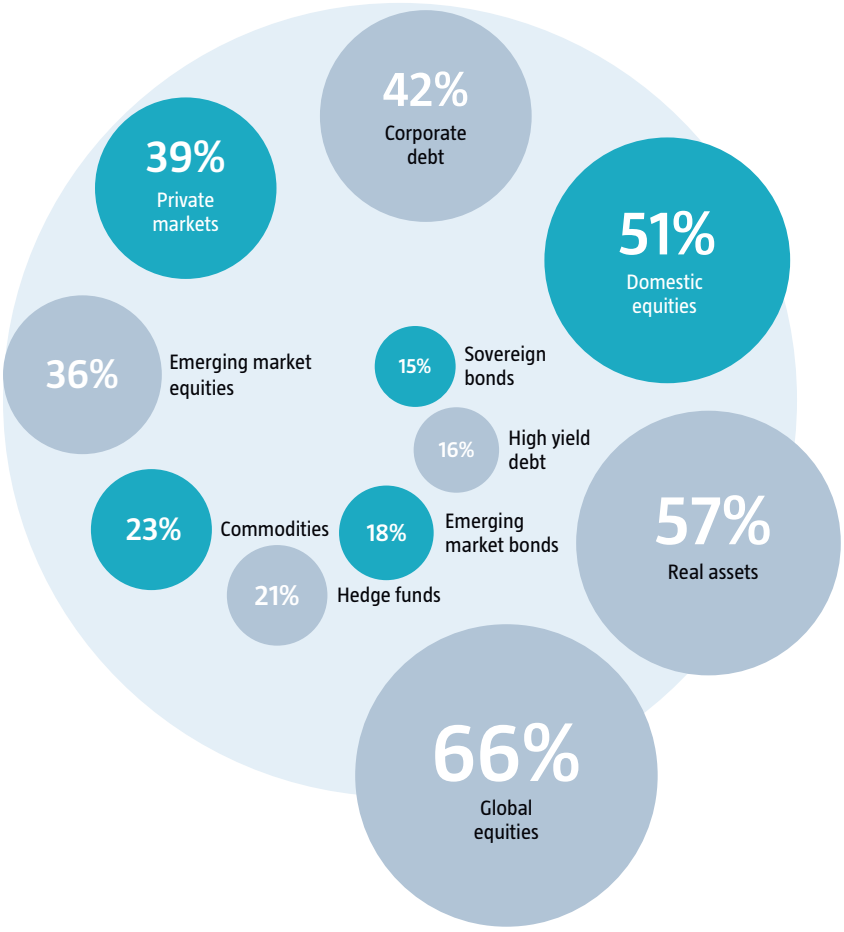
66%

of investors globally say they will focus their decarbonization process on global equities. Domestic equities, corporate debt and private markets are also expected to be a focus for decarbonization in the next one to two years.

57%

of investors see real assets as a focus for decarbonization. This makes sense, as the generation of energy to power lighting, heating and cooling for buildings in the latter sector (in)directly produces carbon emissions.

Figure 9: Equities and real assets to be the focus for decarbonization in the next 1-2 years



Source: 2021 Robeco Global Climate Survey

The gainers and losers in the low-carbon transition

Few things are more disruptive than losing your business. Just as trains replaced horses and digital photos replaced film, those companies not taking climate change seriously are unlikely to survive.

Meeting net zero carbon goals by 2050 requires decarbonization on a global scale. Its scope will range from switching from coal-fired power stations to wind farms, to electrifying vehicles, insulating every building and making agriculture more efficient. Many will benefit, particularly among those companies that form part of the many technological solutions to climate change. These can be found in arenas such as renewable energy infrastructure, carbon capture systems and recycling techniques.

'There will be clear winners and losers, which is good for active managers'

Ultimately it means moving to a circular economy to reduce the manufacturing processes that generate carbon in the first place. And there will also be losers – those companies that are too slow to adapt to the need to move to lower-carbon business models over the coming decade. As regulation gets tougher and consumer tastes change in favor of more climate-friendly products, these companies will eventually be the ones still selling horses when the railroad has arrived.

Decarbonizing as the yardstick

Separating the wheat from the chaff is the job of any asset manager who is serious about performance. One way in which this is done is by measuring how well a company is doing in decarbonizing its business model, using metrics that measure greenhouse gas emissions, energy used for heating and waste produced during the production process.

For example, many car manufacturers have already announced plans to have an all-electric model range by 2030, to avoid their businesses becoming obsolete when governments eventually ban petrol and diesel vehicles from the roads. These manufactures will likely benefit, while auto makers still offering internal combustion engines in a decade's time are likely to be shunned by investors.

Airlines offer a different example. Battery-powered aircraft are currently not possible, since the weight of the battery needed to generate the power for take-off would be three times the weight of a modern jetliner. Instead, they are switching from four-engine aircraft to more fuel-efficient twin-engine planes, and many have announced plans to ditch their fleets of the iconic four-engine Boeing 747 jumbo jets.

For energy companies, it is a different story again, since the world will remain reliant on oil and gas for many years to come. This means the winners in this industry are increasingly viewed as those whose business models are transitioning towards wind and solar power, for when the oil and gas either runs out, or can no longer be sold.

China: charting the course to carbon neutrality

Jie Lu
Head of Investments China

China's pledge to become carbon neutral by 2060 has left many observers both excited and perplexed. Making the world's largest CO_2 emitter carbon neutral within the next 40 years is no mean feat, and will have far-reaching consequences. But the formidable challenges associated with the transition also come with many investment opportunities.

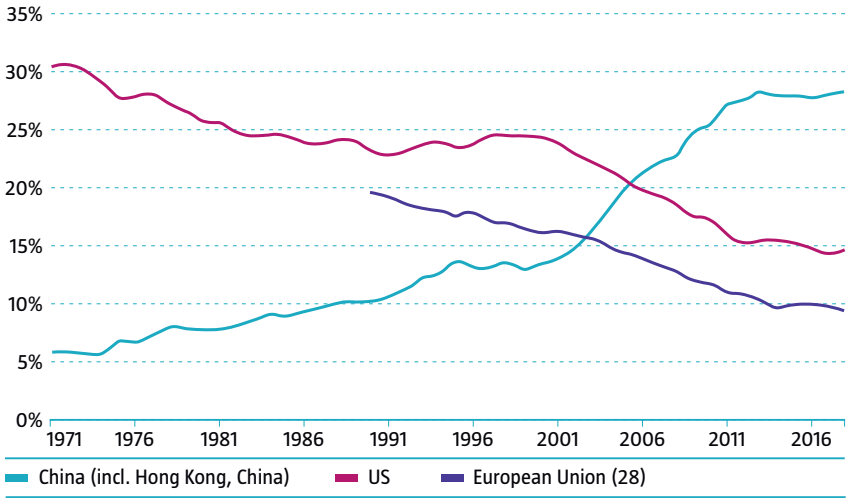
China is by far the largest carbon emitter in the world. The country currently accounts for close to 30% of global CO_2 emissions, according to the International Energy Agency (IEA), versus 15% for the US and 9% for the European Union.[1]

Colossal investments will be required to help the transition, especially in areas such as renewables, the electrification of transport and nuclear power generation.

1. Source: IEA. Based on CO_2 emissions from fuel combustion for 2019.

The rapid pace at which CO_2 emissions re-embarked on their upward path last year, in spite of all the havoc caused by the Covid-19 pandemic, is a testament to the disruption needed only to put our economies on the necessary trajectory. So, while current trends in CO_2 emissions may not be comforting, the recent change of tune at the highest level clearly warrants close attention.

Figure 10: China's rising share of global CO_2 emissions



Source: IEA. CO_2 emissions from fuel combustion in metric tons.

Net zero carbon emissions will require combined efforts in three directions. Firstly, a shift in the country's gross domestic product (GDP) mix, away from carbon-intensive industries such as manufacturing and construction, towards more carbon-light activities such as services. In fact, China's gradual move away from industrial activities started over a decade ago.

Secondly, a change in the country's energy mix, away from coal and oil towards renewables. Despite sizable investments in areas such as hydro, wind and solar power over the past decade, China's economy remains heavily dependent on fossil fuels. In particular, China is extremely reliant on coal, which is arguably the most problematic energy source in terms of carbon emissions.

Finally, carbon compensation plans will also play a key role. Even with the most radical measures, full decarbonization is unlikely to be achieved without compensation initiatives. From this perspective, carbon capture, utilization and storage (CCUS) techniques, as well as forestation and reforestation, will likely become an indispensable part of the government's toolbox.

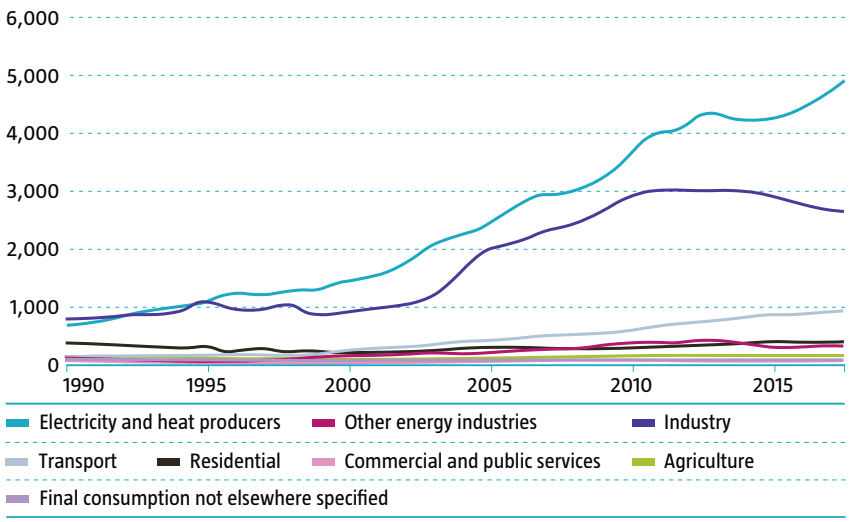
Implications by sector

Around 90% of China's CO_2 emissions come from electricity and heat production, industry, and transport, with electricity and heat production representing half of all emissions.[2]

2. Source: IEA. Based on CO_2 emissions from fuel combustion for 2019.

Logically, these three areas will be affected most by the transition, with electricity and heat production at the forefront.

Figure 11: China's historical carbon emissions



Source: IEA. CO_2 emissions from fuel combustion, in million metric tons.

Yet there are also important differences across sectors. For instance, while industry emissions already peaked almost a decade ago, emissions from electricity and heat production, as well as from transport sectors, have yet to. But there are signs that the tide is slowly turning. For one, investments in coal-fired power generation have been slowing sharply over the past few years.

Meanwhile, moving towards a more sustainable transport sector will also require drastic changes, as well as sizable investments. These include a greater use of public transport infrastructures, an accelerated increase in the use of electric vehicles, and a further improvement in the efficiency of conventional oil-powered vehicles.

Seizing investment opportunities

Given the changes needed in most sectors to achieve carbon neutrality, the key issue for investors is to identify any major risks they might be exposed to, and to find the most attractive opportunities. Arguably, the most exposed companies are fossil fuel producers and in particular oil majors. Their core business is fundamentally at odds with decarbonization. But many other industries also stand to suffer from a badly-handled transition, including petrochemicals, steel and cement. Conversely, companies able to support the transition are poised to benefit from the decarbonization trend. In some cases, the likely impact of decarbonization is already well known, but in others, the consequences remain difficult to fully grasp.

For now, we see opportunities in three major areas. Renewables are expected to retain the lion's share of investments. But electric vehicles are also expected to be among the big winners. Finally, upgrades in power networks and energy storage technologies, as well as the hydrogen industry are likely to capture a significant portion of total investments too.

Recent official announcements suggest there will be an ambitious ramping up of clean power over the coming decade, with the share of non-fossil fuels in primary energy now expected to reach 25% by 2030, compared to an earlier target of 20%.[3] Given the gradual exhaustion of hydropower potential and slowing nuclear power additions, this targets implies a rapid step-up of wind and solar.

3. Myllyvirta, L., 15 December 2020, "Analysis: China's new 2030 targets promise more low-carbon power than meets the eye", Carbon Brief article.

China is leading the NEV pack

Beijing has also made it clear that it wants to continue leading the way in new energy vehicles (NEVs), with a recently approved plan for the industry. According to the plan, NEV sales are expected to reach 20% of overall new car sales by 2025, up from 5.4% last year.[4] This target for 2025 is lower than the previously stated target of 25%, as it takes into account the rough patch of 2019 and 2020.

4. Yu, C., 4 November 2020, "High-quality growth of new energy vehicle sector prioritized", China Daily article.

Finally, while renewables will play the most critical role in the transition toward carbon neutrality, additional storage technologies will be also needed to address intraday and seasonal variability issues inherent to wind and solar energy, and to decarbonize all parts of the economy – including the most carbon intensive ones, such as steel and cement production.

From this perspective, two complementary technologies – batteries and hydrogen – are likely to play a key role given their ability to convert electricity into chemical energy and vice versa. China is already the world leader in terms of battery manufacturing, accounting for around 70% of global capacity.[5] Despite the air pocket experienced early in 2020, production recovered rather quickly.

5. Gül, T., Fernandez Pales, A. and Paoli L., May 2020, "Batteries and hydrogen technology: keys for a clean energy future", IEA.

Meanwhile, developments in hydrogen are also set to accelerate over the coming decades. The China Hydrogen Alliance, a trade group representing the sector at large, estimates hydrogen could account for up to 10% of China's total energy mix in 2050, compared with less than 1% today.[6]

6. China Hydrogen Alliance, 2018, 'White Paper on China Hydrogen and Fuel Cell Industry', white paper.

WATCH THE FULL VIDEO

THERE ARE MANY CLIMATE RISKS, BUT WHAT ARE THE OPPORTUNITIES?

Gilbert Van Hassel
CEO

"Personally, I think that risk is a very bad motivator. So, I rather think of opportunities. People like positive thinking and therefore that's the proper way of thinking about it. If you look at this, we're sitting in a climate emergency. Emergencies, strangely enough, motivate people to think about innovative solutions. A lot of innovative solutions are going to come to the forefront in the next couple of years. Innovation also can lead to efficiency. We've seen that efficiency in the economy over the last 10-20 years hasn't made a lot of progress. I would suspect that we will see efficiency coming out of those innovations. And finally, you see that new ideas, new technologies lead to increases in the labor market and more jobs for people. So overall, I think that this is something that, if we do it right, can be a lot more positive than just thinking about risk."

Masja Zandbergen
Head of Sustainability Integration

"There are so many opportunities. There are too many to even discuss now in this interview. I would like to mention the Trias Energetica rules. It's about, first of all, saving energy. Second, it's about using renewable energy. And then thirdly, it's about if you really, really have to use fossil fuels, for example, aviation, we still need fossil fuels, then please make it as efficient as possible. So, all these three areas are investment opportunities."

Lucian Peppelenbos
Climate Strategist

"In my view, the risks and opportunities of climate change are highly correlated. They are two sides of the same coin. Now, the effects of climate change, how it exactly plays out across countries, sectors and companies – that's uncertain and uneven. It's going to be disparate. Picking the right companies, being in the right countries, is where opportunities are."

Victor Verberk
CIO Fixed Income and Sustainability

"People always talk about the threats and the downsides. But actually for investors and for clients, there's a huge opportunity here. Because, yes, there are companies that get stuck with stranded assets and they might underperform. But against the underperformers there are outperformers, of course. And if you look at the TCFD framework, the Task Force on Climate-related Financial Disclosures, there are threats and opportunities. And the opportunities are the companies that have the right product mix, low-carbon products or access to clean energy, clean water and get a competitive advantage, of course. Stranded assets, winners, losers. Good for stock picking, very good for active management. It's bad news for the passive investment industry that got very big in the last few years. Because if you have a passive product, you are invested in the wrong stuff, also. Clients don't accept it anymore. So, you need active management. You need to create new universes, aligned with the Sustainable Development Goals."

Carola van Lamoen
Head of Sustainable Investing

"Well, there are many opportunities for investors, and I think one of the nice areas that didn't get a lot of attention yet is to not only focus on decarbonizing, but also on carbon offsetting. So, how can we invest as investors in nature-based solutions, for example, related to planting trees, where you basically offset carbon. I expect a lot of traction on that topic at the upcoming climate conference in Glasgow. I think in the next years, this will rapidly develop and gives us as investors additional tools to accelerate that transition to a low-carbon economy."

Hydrogen – an element loaded with hope, hues, and hurdles

The urgency of climate change has brought hydrogen back into the spotlight. Hopes are high, investments are growing, and technology is advancing. Here we take a closer look at the hope, the hues and the hurdles surrounding hydrogen and its potential for decarbonizing industry.

Great expectations

After promising starts and prolonged stalls spanning at least a century, hydrogen's star is once more on the rise. Hydrogen holds the promise to fuel the energy needs of the global economy without generating excess pollution in the process.

Along with renewable energy production and electrification trends, clean (green) hydrogen will be part of an essential strategy for decarbonizing energy markets and industrial sectors, reducing global warming and combatting climate change.

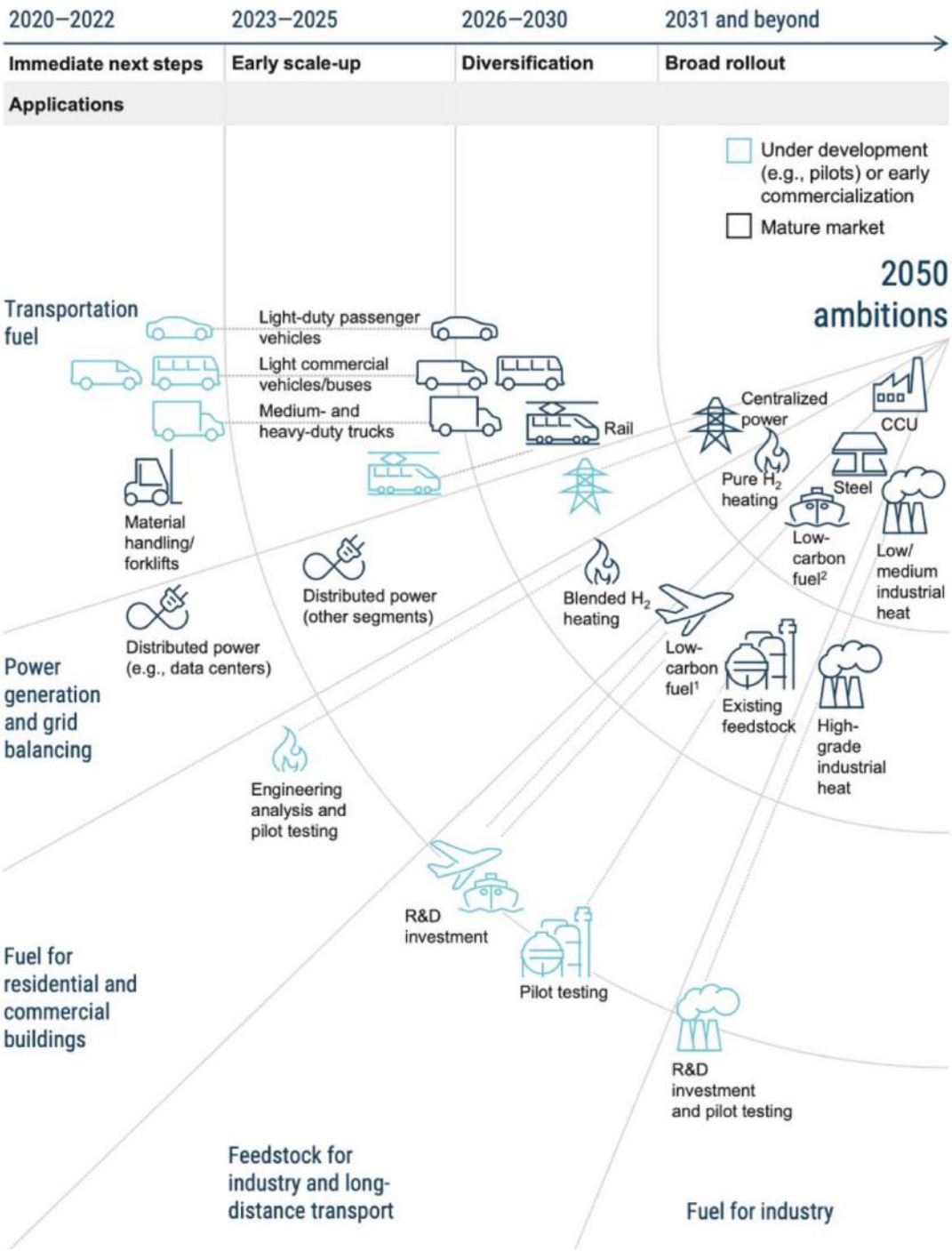
Investments made now into hydrogen technologies and infrastructure are critical for accelerating the energy transition to reach net zero targets by 2050. Attractive opportunities exist along the entire hydrogen supply chain that will reduce production costs, increase production scales, and accelerate hydrogen's deployment and adoption within sectors and across the wider economy.

Industry applications

Though it is still niche, hydrogen production is expected to grow and will be a game changer, especially for lowering the carbon footprints of many heavy-carbon emitting industries (e.g. steel, glass, fertilizers and semiconductors) where electrification is not feasible. Moreover, its capacity as an energy carrier means it can store and deliver surplus renewable energy for later use on the electrical grid or to any number of energy-hungry sectors. It can be used for building heat (to replace natural gas for heating residential and commercial buildings) or as a building block (to replace fossil fuels as feedstock in industrial productions of chemicals and biofuels).

Within transportation, hydrogen fuel cell technologies are seen as an effective means of decarbonizing long-haul freight fleets including heavy-duty trucks, trains, container shipping, and even some types of aviation.

Figure 12: Hydrogen applications across the economy



1. Carbon capture and utilization (for chemicals production)
2. Biofuel, synfuel, ammonia

Source: The Fuel Cell and Hydrogen Energy Association (FCHEA), Roadmap to a US Hydrogen Economy (October 2020)

Accelerating investments

Hydrogen's versatility explains why enthusiasm from the public and private sectors has reached fever pitch. Worldwide big industrialized economies like Japan, South Korea, China, the EU, and Australia, have outlined hydrogen strategies as part of their decarbonization agendas. Meanwhile, eager to seize early mover advantages, giga-scale production projects have even been announced in less industrialized regions like Chile and the Middle East.

Along with big government, big industry is also putting skin in the game, launching more than 200 pilot projects that span the entire hydrogen supply chain. All totaled, announced private investments stand at USD 300 billion by 2030 and that figure excludes public financing and incentives to further catalyze development.[7] As part of its Green Deal and Covid recovery plans, the EU is set to spend around USD 560 billion on transitioning its economies to hydrogen energy through 2050.

Energy incumbents are also joining the fray. Big oil is hedging bets on the peak of big oil in part by bankrolling hydrogen projects. Saudi Arabia recently announced its intention to build a USD 5 billion hydrogen plant powered by plentiful desert sun and desert winds.[8] Other petrol producers like Royal Dutch Shell, Equinor and PetroChina are also shifting future strategies and investments on the assumption that a hydrogen-based economy will shortly materialize.[9] This comes as no surprise, given the addressable market globally could reach in the trillions by 2050.[10]

Hydrogen hues

Hydrogen is the most abundant element in the universe, and so supply is virtually endless. It is a molecule found in water as well as fossil fuels. Although hydrogen is abundant in nature, that does not make it easily available.

In the environment, it is usually combined with another compound from which it must be extracted. If extracted from a fossil fuel, it is called grey hydrogen. The process is cheap and efficient (partly due to historically low natural gas prices) but also emits CO_2 as a by-product. Grey hydrogen is by far the most common form of hydrogen currently produced.

Blue hydrogen is produced in the same way as grey varieties. However, the CO_2 emissions are captured and sequestered. As a result, overall emissions are reduced.

Green hydrogen, in contrast, is produced without fossil fuels as input and without emissions as output. Instead, hydrogen is extracted from water (H_2O) within an electrolyzer that uses an electrical current to split hydrogen (H_2) from oxygen (O) molecules. If the current is from renewable sources like wind and solar, then the hydrogen created is entirely carbon free.

7. "Hydrogen Insights: a perspective on hydrogen investment, market development, and cost competitiveness." (February 2021). Hydrogen Council and McKinsey & Company.

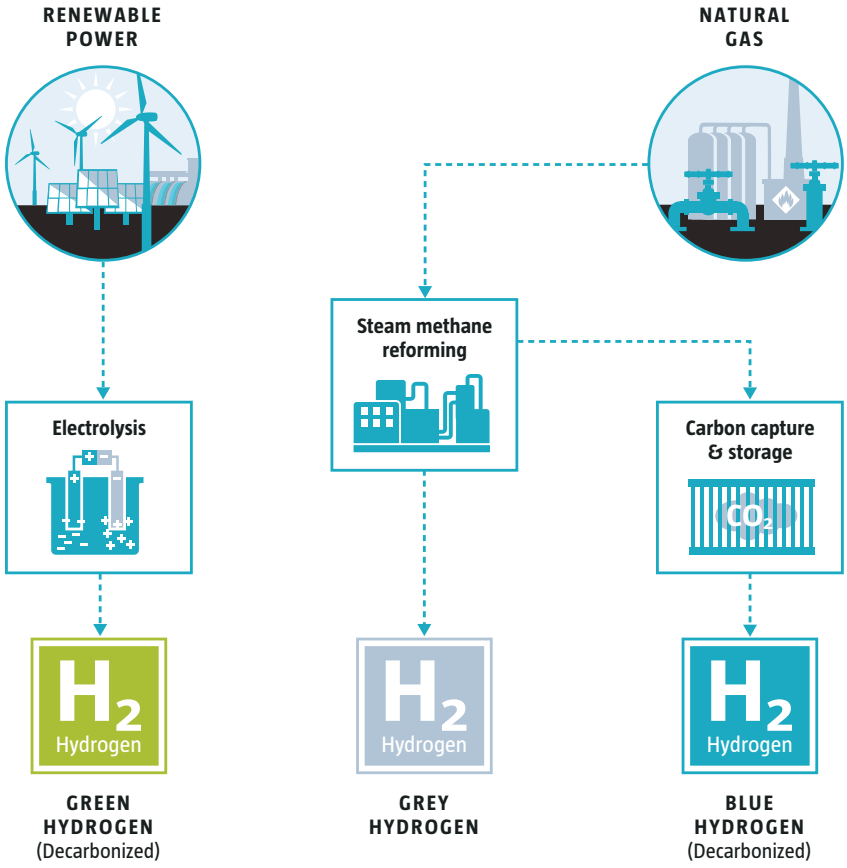
8. Ratcliffe. V. "Saudi Arabia's Bold Plan to Rule the USD 700 billion Hydrogen Market." Bloomberg News. (7 March 2021).

9. Fickling, D. "Big oil seeks redemption in the hydrogen revolution." Bloomberg News. (4 December 2020).

10. Goldman Sachs Equity Research Report. (September 2020). "Green Hydrogen: The next transformational driver of the Utilities industry."

Figure 13: Important hues of hydrogen

Hydrogen (H_2) can be extracted from water (H_2O) via electrolysis to make carbon-free, green hydrogen. The most dominant form in industry at present is grey, made from extracting it from natural gases like methane (CH_4).



Source: Resources for the Future Report, December 2020

Hurdles

Green hydrogen is a beautiful concept but its production is expensive. Production volumes have therefore remained low – less than 4% of all hydrogen produced is green. More renewable energy and more electrolyzers are needed to increase green hydrogen's supply and bring down its price. Conservative estimates suggest it will take another five to ten years before green hydrogen reaches cost parity with grey. In some regions where renewables are cheap, parity could be reached in just two to three years.

In recent decades, hydrogen fuel cell vehicles have been widely publicized as a cleaner alternative to fossil fuels in passenger and freight transportation. Japan and South Korea's governments and auto manufacturers in particular have invested heavily in fuel cell R&D and infrastructure. But for fuel cells to truly be a zero carbon mode of transport, green hydrogen must replace grey on the grid as well as in the gas tank. Otherwise, lifetime emissions from hydrogen fuel cell vehicles are not much better (and sometimes worse) than petrol-powered cars.

Hydrogen also poses other challenges. It is complicated to store, transport and distribute both as a gas and as a liquid. Current gas pipelines could be used but require heavy modifications to accommodate hydrogen's unique properties. Concentration to a liquid is also a possibility but this too is energy intensive, inefficient and costly.

Certain future, uncertain timeframes

Technical challenges, high production costs and economic uncertainties currently obstruct green hydrogen's supply and uptake. Given these aspects, there is still considerable variations in timelines for hydrogen's deployment. For some applications where infrastructure already partially exists, adoption may take just a few years. For others, it might take more than a decade.

Current estimates are predicated on fixed assumptions. But as is common to many technologies, breakthroughs can dramatically alter variables and development trajectories. Moreover, with hydrogen, it is much less a story of technological breakthroughs as political will and investment momentum. As regulatory pressures increase, market incentives intensify, and economies of scale expand, hydrogen's development and predicted timelines will accelerate.

Hydrogen will ultimately reveal another feature common to many technologies – challenges are overcome and development timelines reduced when innovation and ingenuity meet the right incentives.

Pioneers: from green certificates to climate bonds

In times of great change, you need to be able to rely on people who not only have the passion for sustainability, but also a long track record of implementing it.

As a pioneer of sustainable investing, Robeco has been at the forefront of providing sustainability-focused investment solutions since the mid-1990s, when the environmental movement first started to gain ground. Our dedication to creating investment products that can bring about change continues to this day.

Here we take a trip down memory lane to highlight the many firsts that Robeco has notched up:

- In 1994, Robeco launched the world's first sustainable investment product, the 'Groencertificaten' (Green Certificates), for Dutch retail investors.
- Five years later, we launched Europe's first dedicated SI equity strategy, in 1999.
- The use of engagement began in 2005 with the creation of a bespoke Active Ownership team dedicated to voting at shareholder meetings and talking to companies about improving their ESG credentials.
- Routinely integrating ESG factors into the investment decision-making process started in 2010; we are now the only mainstream asset manager in the world to use sustainability principles across the entire range of fundamental equity, fixed income and quant strategies.
- Further innovation with the launch of impact investing strategies came along in the 2010s, targeting, among other things, renewable energy and the Sustainable Development Goals, including SDG 13 on climate action.
- In 2020, Robeco launched the world's first climate change fixed income strategies, investing in companies that make a direct contribution to tackling global warming. Our Climate Global Credits strategy invests in corporate bonds, while the Climate Global Bonds strategy invests in both credits and government bonds.

All of these developments have been backed by firm policies that are based on a commitment to help combat climate change. In line with the launch of the climate strategies, Robeco also committed to achieving net zero greenhouse gas emissions across all its assets under management by 2050.

As for the future, we will continue to innovate, particularly in the areas of climate change, green bonds and the SDGs. ■

Proposed Solutions

Robeco started offering clients sustainable investments long before climate change became a global concern. Today, Robeco offers thematic strategies targeting the long-term effects of global warming, we are still climate solutions obsessed.

71%

of investors rate energy storage systems as very attractive.

During the recent lockdowns, there was a mismatch between energy supply and demand (i.e., lower demand for power and high renewables supply), leading to an increased interest in energy storage systems.

67%

of investors consider forestry as a relevant opportunity.

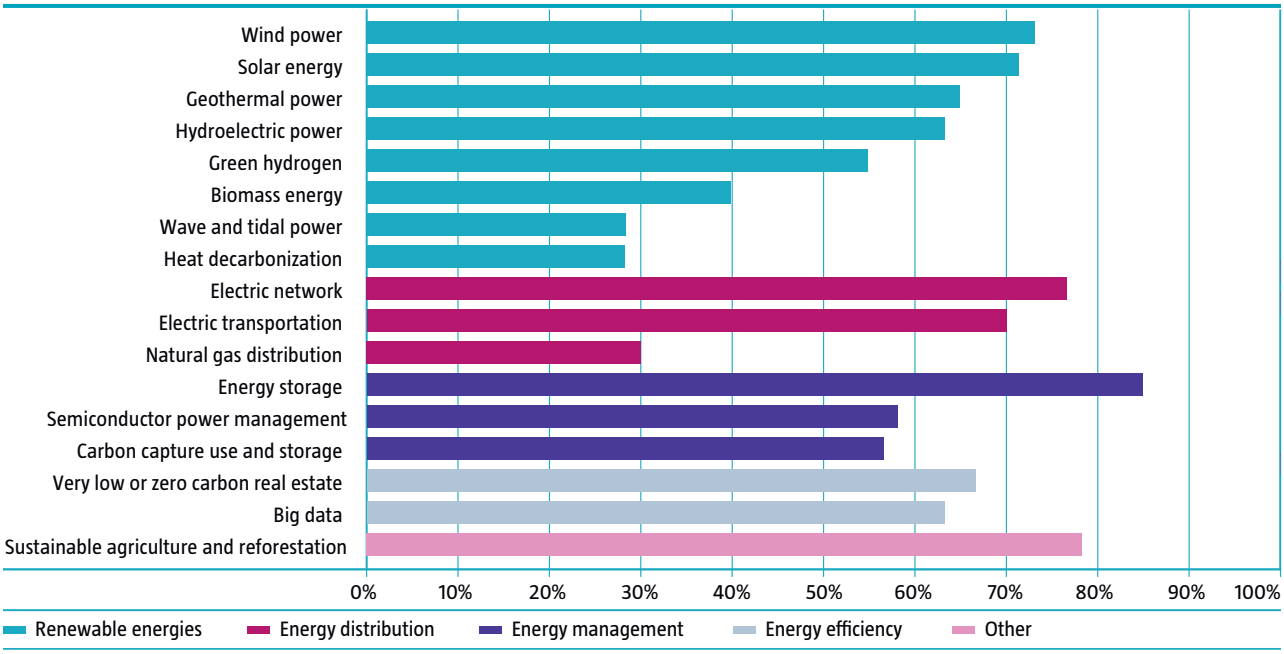
Forestry, recognized in the Paris Agreement as a key part of the solution to climate change, is increasingly relevant for investors looking for sustainable long-term returns and environmental and social benefits.

64%

of investors are interested in wind power opportunities.

Renewable energy sources and energy networks and distribution are also seen as attractive investment opportunities by many investors, along with energy efficiency. Wind power and solar energy score the highest.

Figure 14: Investor interest in investment opportunities



Source: 2021 Robeco Global Climate Survey

Divestment – the quick fix that isn't a solution

Masja Zandbergen
Head of Sustainability Integration

Investors need to decarbonize their portfolios to meet net zero commitments, and many have begun by removing thermal coal producers. But it's not the answer to climate change.

Divestment offers a quick fix, since selling a holding in a high-carbon company instantly removes its carbon footprint from the portfolio. However, it is not the answer to the wider challenge of decarbonizing the underlying economic activity the company is engaged in. Divesting also simply transfers a problem from one investor to another. Many fossil fuel assets that are removed or excluded are bought by another investor, often taking them into private hands and outside public scrutiny. "We can decarbonize a financial portfolio, but that's not the same as decarbonizing the real world. And in the end, what counts is the real world," says Masja Zandbergen, Head of ESG Integration.

"Lowering the carbon footprints of our portfolios by divesting simply means that carbon ends up in the portfolio of another investor, and the world stays the same. That's why it's important that we also engage with those companies, so that decarbonization really becomes part of their business strategy."

"Decarbonization has to be part of the way that companies think about long-term value creation. That's the true essence of decarbonization – that there is a new business model based on the low-carbon economy."

The world is drowning in waste – circular solutions provide a lifeline

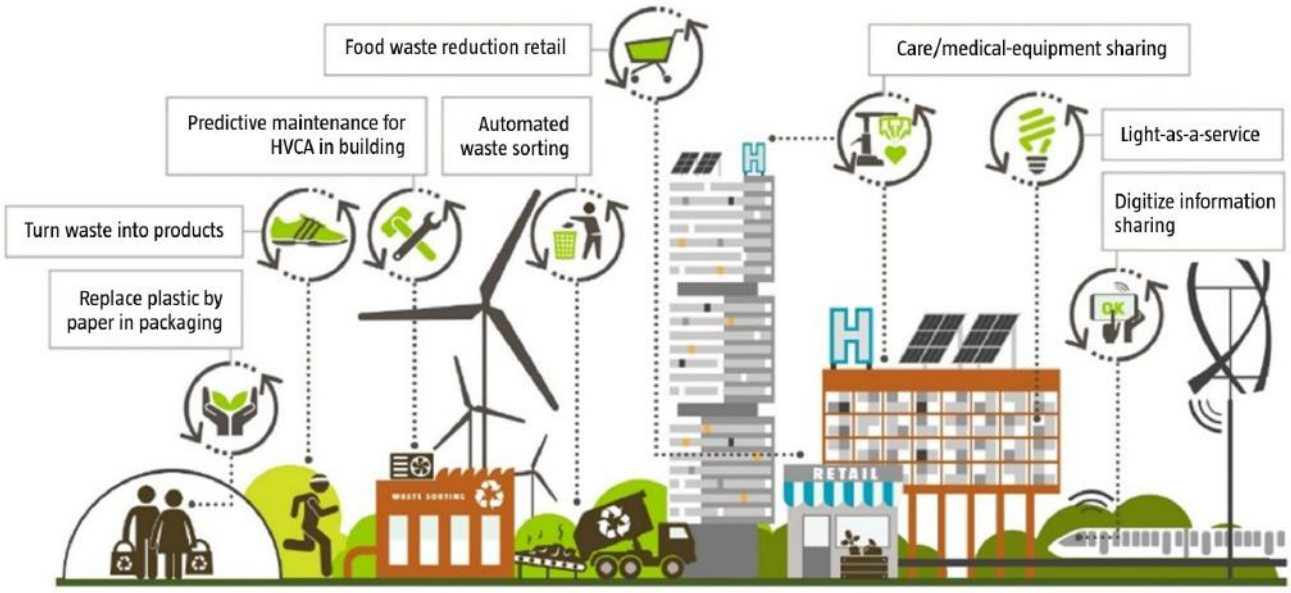
The linear model of 'take, make and dispose' is destroying the planet.

The circular economy begins where linear models end by looping discarded output back into the production cycle. Instead of extracting more resources to use as input for production, circular solutions focus on recycling, repairing, and reusing existing materials. In the circular economy, value is rescued and redeployed rather than destroyed.

The damaging effects of linear supply chains within the global economy are hard to escape. Excess waste piled in landfills, littered along coastlines, and trapped in polluted air are all visible vestiges of a 'take, make, use, and dispose' paradigm fueled by business and devoured by consumers.

But excessive outputs are only one part of the problem, endless extraction of natural resources to use as input for production is also a serious environmental threat. Circular economy principles help by leveraging every part of the supply chain in order to reduce resource use and maximize input to its fullest potential.

Figure 15: The infinite scope of circular opportunities



Source: Robeco

Designing eco-friendly input

Redesigning input focuses on reducing waste in the early stages of the supply chain by substituting scarce resources with renewable ones and polluting input with cleaner alternatives. The use of virgin plastics in product packaging is an illustrative example. Plastic feedstock is cheap to source and manufacture but devastatingly costly for the environment. Billions of metric tons have been created in the last few decades, most of which (91%) was quickly used before being discarded.

Each year millions of tons are burned in waste plants or dumped in landfill and oceans, with devastating environmental consequences. Plastic incineration contributes significantly to greenhouse gas emissions, and plastic litter in oceans entangles aquatic wildlife, damages aquatic habitats and threatens biodiversity.
But circular solutions are available. Renewable inputs incorporate bio-based materials like plant fibers, algae oils, and complex proteins into packaging, that reduce the need for plastic feedstock.

Renewable alternatives and more energy-efficient substitutes are being applied not just to plastic consumer packaging but to other products within other industrial sectors. For example, in the industrial sector, lightweight carbon fibers can replace heavy steel in vehicles and machinery to reduce fuel consumption. Moreover, in construction, bio-plastics are being used to improve the durability of building materials while still remaining eco-friendly. In farming, agri-biologicals are replacing chemical-based fertilizers to protect and nourish plants naturally instead of synthetically.

Repair and reuse

Extending a product's useful life is another key aspect of the circular economy. Here, applying concepts of modular design can help. Modular-designed products can be easily disassembled so that worn-out parts can be replaced or refurbished. In addition, full-service repair and maintenance services that keep products fit and optimally functioning are also important for reducing physical waste.

Inevitably, products do wear out, which, in the linear model, landed them in the trash heap. However, circular economy solutions use ingenuity and technology to loop expired products back into the production cycle. Companies focused on recycling and end-of-life management systems recover embedded value from disposed products for re-use as inputs in the production cycles of new products or services.

Leveraging the digital economy

Transforming conventional supply chains is a herculean hurdle and wouldn't be possible without a major thrust from technology. But the scope, speed and scale of digital platforms for commerce are opening up new possibilities to apply circular economy principles to later stages of the supply chain. The success of the "sharing economy" that allows consumers and suppliers to collaborate and collectively consume existing assets (e.g. cars, drivers, rooms and offices) demonstrates the combined power of circular principles and technology.

But sharing principles are also happening upstream in the value chain, helping to increase collaboration and reduce inefficiencies in the design, production, use, and recycling phases. Manufacturing and production are currently dominated by inflexible, mechanical and physical processes. Robotics, automation and software are modular and highly adaptable so they can be reprogrammed to respond to changing business needs.

Moreover, augmented reality (AR), the Internet of Things (IoT) and cloud-based technologies connect sensors in factories with interfaces on remote devices that provide valuable information and a seamless connection between designers, manufacturers, suppliers and even customers. The result is improved product design, enhanced quality, reduced costs, accelerated production, and facilitated waste capture, recycling, and end-of-life management.

The planet's growing but resources are shrinking

From field to fork, smart farming uses technology to optimize resources, improve yields, reduce waste, conserve biodiversity and increase food security across the food value chain.

More people, less land, less water

The UN estimates that by 2050 human populations will grow to 9.7 billion. That means more than 65 million additional mouths need feeding every year, adding pressure on food and agricultural sectors to produce more to keep pace. Moreover, land is getting even scarcer as populations and cities expand exponentially. The number of megacities – defined as having more than 10 million inhabitants – is increasing worldwide, particularly in developing markets.

Land is not the only critical resource in short supply. As populations boom, so does their water consumption. Global water demand already exceeds supply, with two billion people currently living in areas of acute water stress.

Moreover, water withdrawals are dominated by the agricultural sector, as the water used to produce food is exponentially more than what is used for personal consumption. To illustrate, just one apple requires more than 70 liters of water to produce.

Worldwide, dietary habits are shifting from staples such as roots, tubers and cereal grains towards animal proteins like meat and dairy that demand exponentially greater inputs of water and other resources. Though some of these shifts are healthy and desirable, they are also resource-intensive and costly and intensify pressure on water supplies. For example, producing one kilogram of beef requires 15,000 liters of water.

Figure 16: Liters of water used per kilogram of food produced

Source: www.waterfootprint.org

Environmental challenges

To super-charge crop yields, industrial agriculture has turned to synthetic fertilizers, herbicides and pesticides to stimulate and protect plant growth. However, while effective at improving yields in the short-term, they have also had disastrous long-term effects on the surrounding land and ecosystems. Excess chemicals seep down into natural aquifers and flow into streams, rivers, lakes and ponds, killing native plant species and wildlife.

Moreover, farming and agriculture is acutely vulnerable to the damaging effects of global warming. In some regions, crops are lost to over-precipitation and flooding, whereas in other areas crops suffer due to heat waves and drought. Farmers need to adapt at an accelerated pace to avert crop damage and lost harvests. At the same time, to feed the world without damaging the planet, farmers need to optimize resources and develop climate-smart agricultural practices so that productive and resilient agriculture can be achieved.

Increasing supply, protecting quality

Robust water supplies are essential for agricultural productivity. Many land-locked countries are investing in technologies to capture and clean rainwater. At the other extreme, arid countries with access to ocean waters are investing in desalination plants. Wastewater purification via microfiltration membranes and ultraviolet light are also effective technologies helping regions to counter chronic water shortages.

Furthermore, to transport water to fields and farms, efficient networks of pumps, pipes valves and irrigation systems are needed. Thanks to digitalization, these networks and systems are being equipped with sensors that rapidly detect leaks and breaks, monitor soil moisture levels, and customize water doses according to soil need. In addition, advances in water treatment and analytics are helping identify and extract chemicals, fertilizers, and contaminants from waste and run-off water so that it can be safely returned to the environment or recycled back into the system.

Finally, the importance of water extends beyond hydrating and nourishing crops. Improving soil's water retention helps restore organic matter and reduce erosion. This leads to more nutritious crops and healthier livestock.

From plants to plates

Ensuring safe water supplies isn't the only approach to sustainable agriculture. Smart farming's focus on reducing inputs and protecting soils and vegetation makes it an area ripe for application of circularity principles. GPS technology is already widely used to navigate tractors and harvesters, reducing costs and CO2 emissions associated with operating farming machinery.

Moreover, AI and machine learning can teach agricultural equipment to detect weeds in fields and to automatically apply crop protection chemicals with unprecedented precision and accuracy.

As a result, the volume of chemicals required can be reduced by up to 90%, significantly protecting biodiversity without compromising crop yields.

Population growth, scarce resources and climate change are straining the agricultural sector as well as the environment.

WATCH THE FULL VIDEO

WHAT SOLUTIONS DOES ROBECO OFFER?

Masja Zandbergen
Head of Sustainability Integration

"Let me talk about the RobecoSAM thematic strategies. They go way back, some of them. The water strategy started in 2000. And they also play into these themes that I just mentioned, of decarbonizing the whole economy and saving energy. Smart energy, smart materials, circular economy, all of these strategies are really playing into those themes. So, they're excellent investment opportunities for our clients."

Gilbert Van Hassel
CEO

"At the end of last year, we started to offer two climate strategies in fixed income. And if I'm not mistaken, these were amongst the first in the world. We, of course, have a green bond capability that we've been offering for quite some time now. And in terms of engagement and working with our clients, we're very active, engaging with companies that are lagging behind on their climate action and make sure that they pick up the pace."

Carola van Lamoen
Head of Sustainable Investing

"I think it is, first of all, clear to say that there is not one single solution to combat climate change. So, we need many solutions as a world and also as investors. And the good news is that we do have many solutions in place. So, we have our thematic strategies. We can offer screening. We can engage with companies. But next to that, we also have our climate strategies that focus on those companies that are at the forefront of the transition and also our green bond strategies that focus on basically financing the transition."

Victor Verberk
CIO Fixed Income and Sustainability

"We have three categories. But most important is you have the regular funds which are light green, the normal funds; where we do ESG integration, we make ourselves better informed. We create better risk-adjusted returns. And then you have the impact range. That is what we call dark green under the SFDR regulation. And there you really have positive impact, real positive, real-world impact, and then you really reduce the amount of water consumed or the casualties in production processes are reduced or carbon emitted is lowered."

Lucian Peppelenbos
Climate Strategist

"It not only generates good return, but it is actually by investing in solutions that we mitigate climate change, because that means investing in renewables and regenerative agriculture in low-carbon technologies. And that's how we help avoid catastrophic warming."

Clean electrification to drive the global economy to net zero

Getting to net zero in the 21st century and mitigating climate disaster require industry to shift gears, switch fuels and change course.

The expansion of renewables is a powerful catalyst that is enabling the development of clean technologies and solutions across the energy value chain. Mass deployment of solar and wind- power is helping decarbonize electricity generation, and intelligent electrical grids ensure energy demand always matches supply. Grid-connected batteries and green hydrogen will ensure surplus electricity is stored for later use. Moreover, the clean electrification of heavy-carbon emitting areas like passenger mobility, transport logistics and building heat are already underway and gaining momentum.

As electrification spreads and demand for electricity increases, the energy generated will need to be consumed efficiently. Next-generation technologies are helping to reduce energy consumption in power-hungry applications and end-user devices in buildings, industrials, transportation and IT sectors.

Energy meets urgency

Populations and economies need energy. Unfortunately, primary energy supplies are still dominated by hydrocarbons, and global carbon emissions continue to rise. The urgency of climate change has propelled efforts to "green" the global economy, triggering disruptive innovation that is rapidly altering the energy landscape.

Governments worldwide have announced massive new initiatives aimed at decarbonizing entire economies. Prominent among them are strong commitments from the US and China, which are finally aligned with global ambitions to tackle climate change.

Front and center in the race to decarbonize is the carbon-free electricity provided by renewables. Internal projections show that by 2050, solar power generation is likely to increase by a factor of 20, while wind power generation from on and off-shore sources will increase by a factor of 10. This will allow the share of electricity as a percent of global energy consumption to grow from 20% today to 50% by 2050. In parallel, renewables' share of the electricity mix will nearly triple.

Electrification of transport

The electrification of the transport sector has already developed considerable momentum in recent years and will continue to be an important theme for energy-related investments. Electric vehicle (EV) sales have risen sharply in key markets like Europe and China and should remain strong. Again, internal estimates show global EV sales in 2021 nearly

doubling from 2020 which was already an extraordinary year marked by 130% year-on-year growth in Europe and a significant rebound in China towards year end.

Electrification of the built environment

Transport is not the only high-emission sector being transformed by electrification; the built environment is also in transition. According to the International Energy Agency, buildings and building construction combined are responsible for over a third of final energy consumption globally and nearly 40% of direct and indirect carbon emissions.

Driven by stricter emission standards and the prospect of lower energy costs, commercial buildings are turning to clean electrification to power and regulate everything from heat pumps and cooling to energy-efficient lighting and building management systems.

Green hydrogen – the missing link

The trend towards electrification is also driving other essential parts of the energy equation. Solar and wind power are clean but also weather dependent and intermittent. Cheap solutions must be created to temporarily store any surplus energy generated. Within passenger transport, lithium ion batteries within electric vehicles are providing cost-effective energy storage solutions; and further improvements are on the horizon.

Larger-scale industries are more energy intensive and difficult to electrify, but even here clean solutions are emerging. Green hydrogen is created by splitting water into hydrogen fuel and oxygen using carbon-free electricity from renewables. As it scales and becomes more cost-competitive, it will provide a critical link in decarbonizing high-carbon emitting industries like long-haul transportation (e.g. trucks, trains, ships and aircraft) and industrial sectors (e.g. semiconductors, fertilizers, and steel production).

Powering up an investment portfolio

Decarbonization of energy goes well beyond the production of solar panels and wind turbines. Reaching net zero in this century will require transformation across the entire energy value chain.

‘We can build Paris-aligned portfolios that still enable strong factor exposures’

Robeco recently announced its ambition to achieve net zero greenhouse gas (GHG) emissions by 2050 across all its assets under management. We will set decarbonization targets for all our strategies, in line with global efforts to limit global warming to 1.5°C, as agreed in the 2015 Paris Climate Accord. But what does that mean in practice for investors? We discussed this with Arnoud Klep, from our quantitative equity team.

How will Robeco’s recent announcements translate for quantitative equity strategies in the short term?

“We now plan to bring several of our ‘sustainability-focused’ strategies in line with the Paris Climate Accord in the coming months. Robeco has a broad range of quant equity strategies, that all integrate sustainability aspects to some degree. Within that subset, we have a ‘sustainability-focused’ range, intended for investors who have preferences that go beyond basic sustainability integration.”

“These quant equity strategies have a dual objective: performance and a strong sustainability profile. Their purpose has always been to lead the way in terms of sustainability integration. So, given the increasing emphasis put by the asset management industry on sustainability and climate risk, we consider it a natural step to bring these in line with the Paris agreement.”

When you say ‘now’, you mean ‘now’, right?

“Yes. We have actually already started. The first quant equity strategy to become ‘Paris-aligned’ is one of our Global Sustainable Conservative Equity strategies, for which we have already completed the client consultation process and received the greenlight from existing clients.”

“The most important change is a much stricter carbon footprint reduction objective. Our entire sustainable quant equity range already had a reduction objective of 20% relative to its reference index. For the Paris-aligned strategy, we implement a 50% reduction as a starting point. In addition, we target a 7% footprint reduction every year thereafter.”

This sounds like a very fast transition. How is that possible?

“We do not start from scratch. Our ‘sustainability-focused’ strategies already feature a carbon footprint reduction close to the 50% level we set as a starting point. Obviously, the 7% reduction will become an additional constraint in the future. But we think we can make this migration while keeping turnover at reasonable levels.”

Actually, how do you reduce the carbon footprint of these strategies in practice?

"So, to give you an example, while our sustainable quant equity portfolios already have a low exposure to the energy sector, restrictions will become even stricter once they are Paris-aligned. Companies involved with thermal coal will naturally be excluded, and so will most oil & gas companies, especially the oil majors. Restrictions on electric utilities will also be much tighter."

"Apart from these stricter exclusions, the carbon intensity of companies will be a key component in portfolio construction. Stocks with relatively low carbon footprints will have a higher probability of being selected in the portfolio compared to stocks with high carbon footprints."

OK. But would these kind of restrictions be realistic for a broader set of strategies, especially the ever stricter target of 7% year-on-year decarbonization?

"That will depend on how our economies evolve. If we, as a global community, do manage to decrease our GHG emissions over time, then the 7% annual decrease target may never become a very restrictive constraint for stock selection. But if companies do not succeed, then asset managers will have to compensate by additional carbon divestments from the portfolio, and the 7% reduction target may become more difficult to achieve."

Decarbonizing portfolios will necessarily have an impact on their risk/return profile. What consequences should investors expect?

"We have thoroughly researched this aspect. Our simulations show that we can build Paris-aligned portfolios that still enable strong factor exposures. In theory, limiting the opportunity set should bear some cost in terms of performance."

"And this is what we actually find, although in a global investment universe with ample investment opportunities the impact is limited: Paris-aligned quant equity strategies would be able to capture about 90% to 95% of the risk-return potential compared to the standard quant equity strategies."

"But these simulations are based on past prices and therefore assume that there is no alpha potential from getting a strategy Paris-aligned. If climate change-related risks, like stranded assets or transition risks, rise and materialize, then we will not be discussing the negative impact of getting Paris-aligned but rather its positive effect. So, it is also a matter of perspective."

Introducing Robeco's climate investing strategies

We believe our climate fixed income capability puts us at the forefront of the transition to a low-carbon economy.

There's been much talk about the need to decarbonize investments, in order to meet targets that mitigate climate change. What does this require of investors? Is a simple tweaking of existing portfolios, to improve their sustainability criteria, enough, or do asset managers need to make more fundamental changes?

Our view is that asset managers have a responsibility to identify and manage climate change risks through the investment decisions they make and the contact they have with investee companies and other institutions. Making superficial changes to existing investment processes is not enough.

Instead, a bold new approach is needed, based on a credible and well-founded understanding of sustainable investing, that is embedded in all aspects of the investment approach.

Robeco is able to harness its extensive know-how and proprietary processes to invest in line with the targets of the Paris Agreement. Specifically, we have pioneered a new investment solution for climate and decarbonization, by launching the world's first global fixed income strategies that are fully aligned with the Paris Agreement: the Climate Global Bonds and Climate Global Credit strategies.

The Robeco Climate Global Fixed Income capability is a unique solution that reflects the decarbonization plan set out by the Intergovernmental Panel on Climate Change. The Climate Global Bonds and Climate Global Credits strategies invest in global fixed income assets in a way that strives to keep the rise in global temperatures well below 2°C above pre-industrial levels, and aims to limit it even further to 1.5°C.

These two strategies provide for a 7% year-on-year decline in the portfolios' overall emission intensity. This is measured per capita for sovereigns and per unit of total capital for corporates. The Climate Global Credit strategy goes even further, by starting with a 50% lower emission intensity than the investment universe at inception, and excluding fossil fuel production. The two strategies are managed against new indices that are aligned with the terms of the Paris Agreement. What's more, Climate Global Bonds is the world's first global fixed income strategy to be fully aligned with Paris.

Favoring the players of tomorrow's economy today

Importantly, the regulatory requirements for a Paris-aligned Benchmark exceed the requirements of the Paris commitment. It is therefore appropriate that the EU Technical Group on Sustainable Finance describes Paris-aligned Benchmarks as "tools for investors with the willingness to be at the forefront of the transition, favoring today the players of tomorrow's economy".[1]

The high standards Robeco pursues in following a demanding carbon-reduction trajectory for our investment portfolios reflect our commitment to combating climate change.

An active, contrarian approach to climate change considerations

Robeco Climate Global Bonds and Robeco Climate Global Credits are active investment strategies that build on our established global fixed income capability. They combine our top-down perspective on the macroeconomic and credit cycles with bottom-up issuer selection, to navigate market cycles, exploit market inefficiencies, and contribute positively to sustainable activity. Climate change considerations are fully integrated in the investment process and portfolio construction, across multiple components.

The investment approach is contrarian, value focused and research driven – backed by a highly experienced team of nearly 30 macro and credit analysts, who are able to identify the best opportunities in global fixed income markets. The Robeco Sustainable Investing Center of Expertise shares its input with the investment teams and our data scientist team provides insight into greenhouse gas emissions and their varying intensities.

Bottom-up issuer selection that is in line with the Paris Agreement
The top-down view is combined with bottom-up issuer selection that is grounded in rigorous fundamental research and contributes positively to sustainable economic activity. Robeco's team of seasoned fixed income professionals filter down the available investment universe to a select list of issuers. This incorporates sector, country as well as environmental, social and governance (ESG) considerations.

We select issuers by factoring in the CO2 emission intensity of governments, sectors and companies. This ensures that the strategy follows a decarbonization trajectory that reduces the portfolio's overall emission intensity by 7% on a year-on-year basis.

Furthermore, our forward-looking approach is to invest in countries and companies that allocate capital towards activities that are in line with the EU Taxonomy, and that are efficient in reducing their carbon emissions. Importantly, this may include issuers whose emissions are currently high, as our criterion for allocating capital is that sovereigns and companies must be serious about making the transition to sustainable energy, and that they play an important role in facilitating such a shift.

Continuous innovation in our sustainable investing capabilities

Robeco acknowledges that urgent and bold action is needed to mitigate climate change. We also recognize the responsibility and stewardship required of the asset management industry in working towards the goals of the Paris Agreement. Our commitment is to contribute to decarbonization through our investment activities, in line with the ambitious target of limiting the temperature rise to 1.5°C. We will do so by managing climate risks as well as seeking out opportunities to bring about innovative, positive change through our investment and engagement activities.

Robeco's Climate Global Fixed Income strategies are the most recent innovation in our sustainable investing capabilities, and are specifically focused on climate impact. We view these strategies as an opportunity for investors wanting to be at the forefront of the transition to a low-carbon economy.

1. The EU Technical Expert Group on Sustainable Finance, "Report on Benchmarks", September 2019.

The new Paris-aligned Benchmark sets the bar

Until 2020, no benchmark existed for measuring the performance of investment funds against the goals of the Paris Agreement. The EU Benchmarks Regulation responds to this need by defining the 'Paris-aligned Benchmark'. This, however, does not cover corporates or incorporate guidelines and requirements for governments.

Robeco innovated in this area by working with Solactive to create Paris-aligned Benchmarks for fixed income investing – for corporate credits and aggregate bonds. These are the indices against which the performance of the Robeco Climate Global Fixed Income strategies is measured.

The benchmarks start with a lower CO2 emission intensity than the global market universe as a reference intensity, and will decarbonize at a rate of 7% per annum relative to the starting point. In the case of the Paris-aligned index for credits, the starting point will be 50% below the broader market, in line with the EU Benchmark Regulation for Paris-aligned Benchmarks.

The indices are structured on the following principles

For corporate bonds:

- A process of year-on-year decarbonization is reflected, equaling at least 7% on average per annum, based on the Scope 1, 2 and 3 emissions.
- All industries except fossil fuels are included, and sector weights are kept close to the broader market index.
- Emissions are normalized by the total capital of issuers, measured in terms of book values.

For sovereign bonds:

- A process of year-on-year decarbonization is reflected, equaling at least 7% on average per annum.
- Decarbonization of the index will be achieved through decarbonization at country level, as well as by adjusting the weights of individual sovereigns to establish a -7% annual trajectory at index level.
- Country emissions will be normalized by the population size, measured in terms of CO2 emissions per capita.

Despite these carbon-related constraints, we find that the index characteristics mimic those of the general market over time. Specifically, back-testing of the Solactive Paris-aligned Benchmark Indices for credits and bonds against the Solactive Global indices for credits and bonds gives favorable results: the behavior and yield characteristics of the Paris-aligned indices are very similar to those of their equivalent generic indices, with the important difference being that the Paris-aligned indices have a much lower carbon footprint. ■

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Robeco publishes 2021 Global Climate Survey

Tackling climate change has become the number one priority for investors. But how is the asset management industry dealing with an issue that is both a threat and an opportunity? Are we ready for the biggest challenge facing humanity?

To find out, Robeco commissioned a survey that asked probing questions to more than 300 institutional, wholesale and insurance investors accounting for about 20% of global assets. The results have been both encouraging and an indication that much still needs to be done.

Perhaps the biggest signal from those surveyed is that half of all assets under management will be committed to net zero in the coming years. Some 86% of investors saw climate change as a significant factor in their investment policy over the next two years, sending a massive message that decarbonization is well under way.

Most believe that renewable energy forms part of the solution: 81% said solar, wind and hydrogen power would lead the way in switching from fossil fuels. And 66% said they would focus portfolio decarbonization efforts on global equities as their preferred asset class for achieving this over the next one to two years.

Mind the gap

But the results showed there is also a substantial knowledge gap when it comes to fully understanding the major issues, and many investors simply don't knowing where to start with this, or how to make a difference.

The overall purpose of this survey is to show where we are as an industry and help investors understand the urgency of dealing with this. We hope it presents interesting insights into the current status of climate investing, as well as the challenges and opportunities that climate change presents.

DOWNLOAD
your copy of the survey

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