The Green Bond

Your insight into sustainable finance

18 April 2024

Fast, furious, and fair transition?

SEB

In this issue

Fast, furious, and fair transition?

Letter to the reader

Dear reader,

I am writing from a country that used to be associated with peace and mitigation but is now challenged with lack of integration, gang violence, and geopolitical uncertainty that forced it to enter a military alliance. Alongside these considerations, we (like many others) are trying to find priorities under the weight of holding on to mandates - where did visions and idealism go?

While the global awareness and dialogue on decarbonization and the consequences of delays are fully underway, one thing that is missing is the consensus around when, where and how we do it. From the perspectives of optimizing returns (just ask the CFO) critical questions are what the costs are and why and when do we make transition investments, what does it takes to be compliant whilst also staying competitive. Other dialogues, like the ones on water, biodiversity, migration (integration), diversity and health, are still mostly absent in the fiduciary front office discussions.

At the same time, we are witnessing massive shocks: storms, droughts, like the one ongoing for several years now in the Horn of Africa (and having already led to over 5 million children being acutely malnourished), pollution created from industrial production, and others require rapid change and coordination.

It is my expectation, based on our work, that these events will appear more broadly, more often, and with more force than we have seen in the past. We know that a minority is pushing to delay decarbonization action because – in their eyes – climate change will only affect business in the future. While it is true that there is a time delay between increasing emissions and balance sheet impacts, businesses are already suffering from the tangible impacts of climate change. Recent storms, water shortages or flooding events are being made worse by climate change and the economic costs are being felt at C-level and by investors today.

Now, this letter is obviously not nice – and the expected events won't be either. When we look into water, we realize that the legacy debt (under-investment) has led to a lack of educational supply (salaries will rise in this sector), a lack of firms (limited investment budgets) and a lack of awareness. This considered, it becomes difficult to point towards a more appealing investment case – it is just a matter of where.

In this edition of The Green Bond, we have the privilege of presenting contributions from Brookfield on how an asset manager can take the lead in the energy transition; Coolbrook showcases its novel solution to decarbonize industrial heat; and the International Labour Organization presents ideas how to finance a just transition. Thank you all for sharing these important insights!

Enjoy your reading,

Christopher Flensborg

Head of Climate and Sustainable Finance
christopher.flensborg@seb.se

Transition update

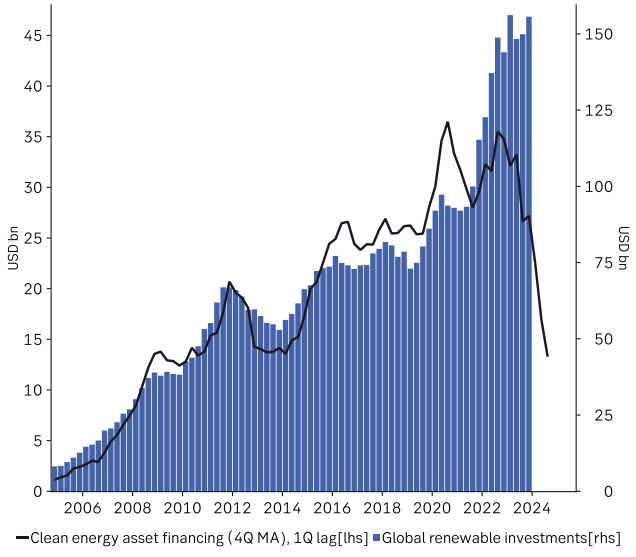
Still stalling – can industrial policy help?

The clean energy transition is still stalling. China's industrial policy has allowed it to dominate transition supply chains, and the US and the EU must emulate it to catch up. The US IRA is a clear step in this direction, but Europe is hampered by the lack of EU-wide funding.

Clean energy investments still stalling

While we have seen a boost to clean energy investments over the past 5 years, realized investment levels are stalling. The latest clean energy asset financing data does not show any signs of a pick-up in investments, rather the contrary. Although the asset financing data is not perfectly correlated with the actual capex that takes place, it does suggest that global investments in clean energy will drop over the coming quarters (Figure 1).

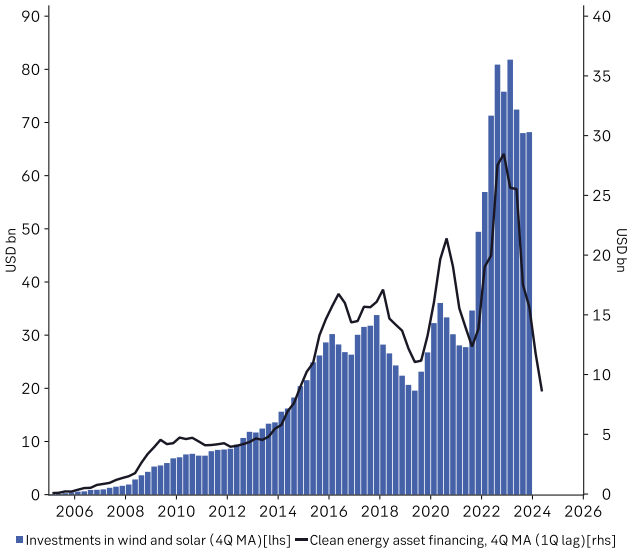
Figure 1 Clean energy asset financing and investment



Source: BloombergNEF

Two factors have been holding global investments up over the past 2-3 years: large investments in China, and investments in solar as opposed to wind. In terms of dollars placed in clean energy asset financing, China peaked in Q3 2022. Since then, clean energy asset financing has fallen back to 2015 levels (Figure 2). Splitting the clean asset financing into solar and wind, the latter has come back down to earth after a strong 5-6 years. The stock market also indicates that investments in clean energy are stalling.

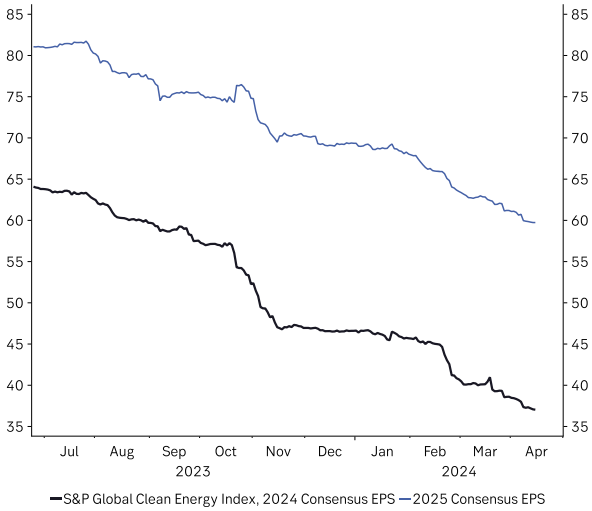
Figure 2 China clean energy asset financing & investment



Source: BloombergNEF

We had expected a pickup in investment could start lifting the earnings across the supply chain, but consensus estimates for 2024 and 2025 are still falling (Figure 3).

Figure 3 S&P Clean Energy 2024, 2025 consensus EPS



Source: Bloomberg, Macrobond

Thomas Thygesen
thomas.thygesen@seb.dk

Elizabeth Mathiesen
elizabeth.mathiesen@seb.dk

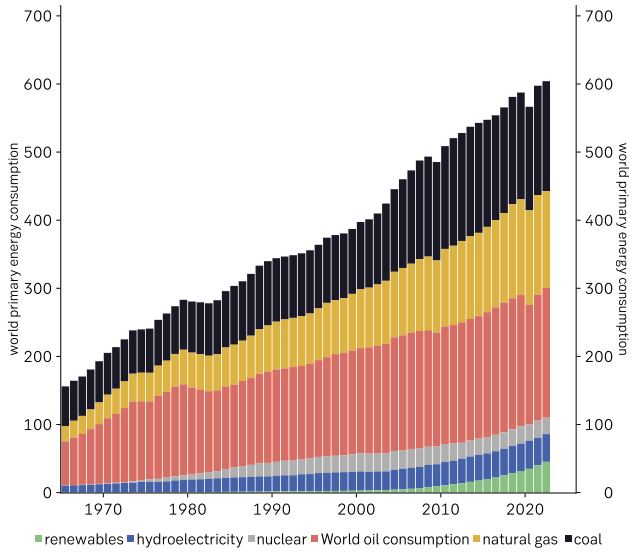
Mads Bossen
mads.bossen@seb.dk

Gregor Vulturius, PhD
Gregor.vulturius@seb.se

Still far away from the end goal

Energy remains crucial for economic growth and following the slump in 2020, due to the pandemic, global energy consumption has picked up. It is far too soon to stop increasing investments in clean energy. The stalling trend previously described will make it more difficult to change the current composition of energy consumption. There is still a long way to go in terms of creating a global clean energy economy. According to data from the Energy Institute, less than 10% of the world primary energy consumption is from renewables, albeit on an exponential trend.

Figure 4 World primary energy consumption

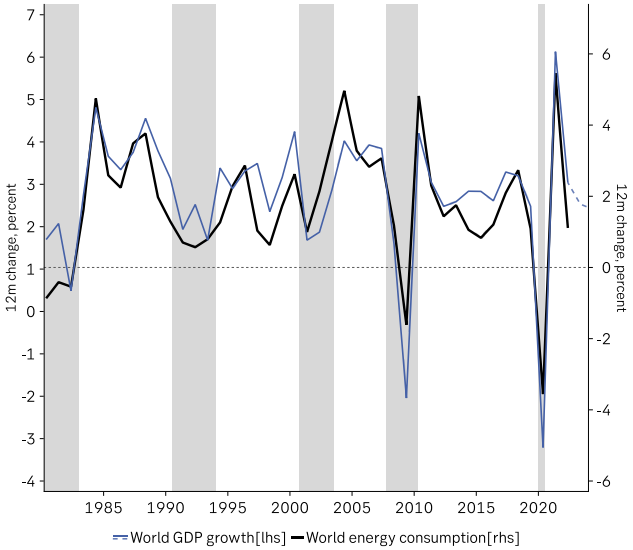


Source: Energy Institute

It should be noted that primary energy measures the energy consumed by those who produce energy. Renewable energy has a higher efficiency when converted to energy use and thus the actual share is probably somewhat higher than the 7%. Nonetheless, the low starting point and the significant additional capex required for grids and storage still means that a significant increase in investment is needed to make a dent in fossil energy consumption. Looking at the overall energy mix, oil, coal and natural gas still make up more than 80% of world primary energy consumption measured in Exajoules.

There is a close relationship between energy and GDP growth (Figure 5). The challenge we face is that if we want to raise investment not only for the clean energy transition, but also for energy-intensive AI investment, increased defence spending and re-shoring of key sectors, we will need to increase GDP growth – or accept a less equitable transition where some parts of society will have to reduce their standard of living to pay for it, which a political no-go. So, we must ramp up and increase the pace of renewable investment or invest more in oil & gas during the transition.

Figure 5 World GDP growth and energy consumption



Source: IMF, Macrobond, SEB

At the current level of investments in renewables, oil and gas will continue to be used (at least) until the second half of the 2030s. As the Kaya identity highlights, the only tangible way to bring emissions down by the amount needed to reach the global ambitions without driving world GDP lower is by reducing emission per unit of energy i.e. ramping up the share of renewable energy used. However, this has so far not happened, even though the climate risks are well understood by policymakers and business leaders. How can we speed up the process?

Figure 6 Kaya identity

Source: Kaya, Yoichi; Yokoburi, Keiichi (1997), SEB

Could industrial policy be the solution?

After 40 years where the consensus policy doctrine was 'minimal government interference', industrial policy is back on the agenda. The aftermath of the pandemic combined with the new geopolitical regime means that the global economy is now in a position where a large amount needs to be invested not only in the energy transition but also directed towards other structural drivers.

Energy independence, national security and securing essential technologies are now at the centre of (primarily Western) government discussions. For example, European governments need to find at least 1-2% of GDP for military spending to build the capacity needed to meet the demand for military equipment. Reduced globalization and near-shoring has become a priority, and the US are in the process of bringing high-tech areas such as chip production closer to home.

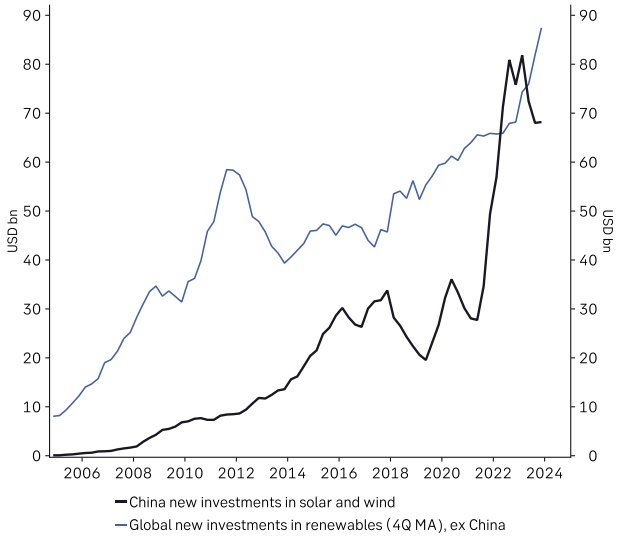
In a recent study, the IMF has tried to define and measure the surge in industrial policy plans[1]. Most of these policies are seen as likely to have a distorting effect and are centred around generating local investments. Climate mitigation is just one of the goals that governments have when implementing policies. But there is no doubt that policy will play a pivotal role in speeding up investment processes through incentive schemes and alike.

China was first out of the starting blocks

From a regional perspective, China has been dominant in deploying policy to direct investments towards clean energy technologies. With its Made in China 2025 policy, the country has had a comprehensive industrial policy long before Western Countries. Industrial companies in China may receive almost nine times more government support (relative to company sales) than comparable companies in the OECD. Subsidies for e.g. EVs, batteries or wind power – in combination with other protective measures like joint-venture obligations – have allowed Chinese companies to become global leaders. This has put China way ahead of both the US and Europe in the global race to transform to a clean energy system.

China's geopolitical position explains why they were the first movers. Unlike the US, which is now self-sufficient when it comes to energy and a net oil exporter, China is deeply dependent on energy imports from abroad. And the Chinese authorities understood early on that true energy independence not only requires controlling the last step of the supply chain, but all parts of it.

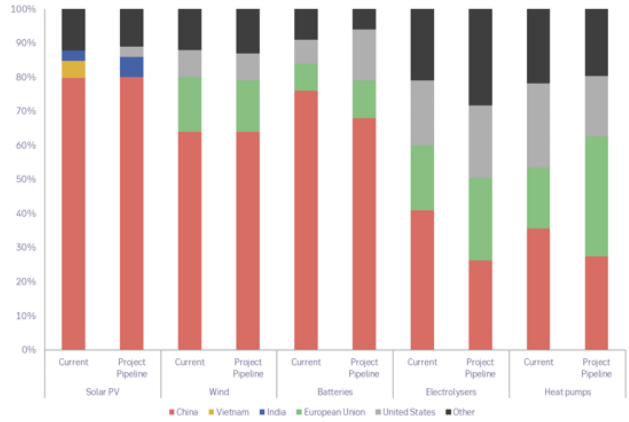
Figure 7 China vs. World investments in solar and wind



Source: BNEF, Macrobond, SEB

As a result, China not only quadrupled their direct investment in clean energy production to the point where they exceeded the sum of all investments in the rest of the world. They also invested aggressively in battery production, solar panel production, EV production and key minerals to the extent that they now dominate them globally. As Figure 8 shows China is by far the biggest producer of the manufacturing capacity that underpins the clean energy transition.

Figure 8 Clean tech manufacturing by region



Source: International Energy Agency, 2023

And this is starting to show up in global trade flows. According to Center for Strategic and International studies (CSIS)[2], climate technology exports (Lithium batteries, PV panels, EVs and wind) have increased by 274% from 2019 to 2023. The value of these exports has increased from 1.5% of total exports in 2019 to more than 4% in 2023.

Naturally, this has triggered an (indirect) response from the US in the shape of the Inflation Reduction Act (IRA) to ensure that they remain competitive. In turn this has forced Europe to react with their own policy measures in the shape of the Green Deal, which encompasses many intentions, goals and initiatives but has had no funding behind it so far.

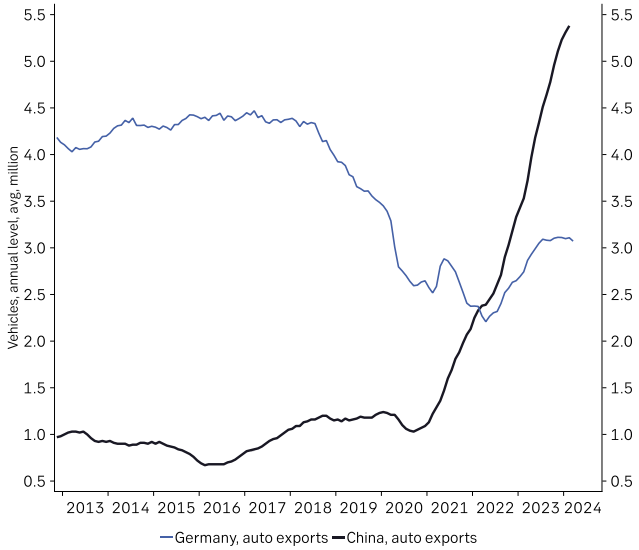
The US response: IRA targets more than climate risks

China's subsides for clean energy-related products, increasingly seen as a threat in Europe and the US and this may trigger other actions than industrial policy. As seen in figure 8, China's EV exports have supplanted Germany's, because the quality-adjusted price of Chinese vehicles has collapsed. It is unclear whether this is directly linked to subsidies, or it just reflects superior technology. In the US, Chinese solar panels are subject to a 25% tariff.

[1] The Return of Industrial Policy in Data in: IMF Working Papers Volume 2024 Issue 001 (2024)

[2] Green Industrial Policy: A Holistic Approach (csis.org)

Figure 9 Auto exports Germany vs China



Source: BNEF, Macrobond, SEB

The EU has begun an investigation into Chinese EVs that could trigger tariffs, though Germany seems to be against it. US Treasury Secretary Yellen also mentioned the possibility of imposing further tariffs when she recently visited China. However, shutting out the best technology is not going to help Europe, or the US compete when it comes to developing their own technological strength. As a result, at least the US has launched industrial policies that in some way emulate China's strategy.

The IRA, which was signed into federal law by President Biden in August 2022, is the most prominent example. The core elements of the IRA as presented when it was passed were USD 500 bn in new spending and tax breaks, with USD 394 bn in federal funding directed at clean energy using tax incentives, grants and loan guarantees, most of which will be in the shape of tax credits to corporates. The total effect is likely to be larger than these numbers indicate as the IRA is intended to leverage private investment, especially when it comes to loans and grants.

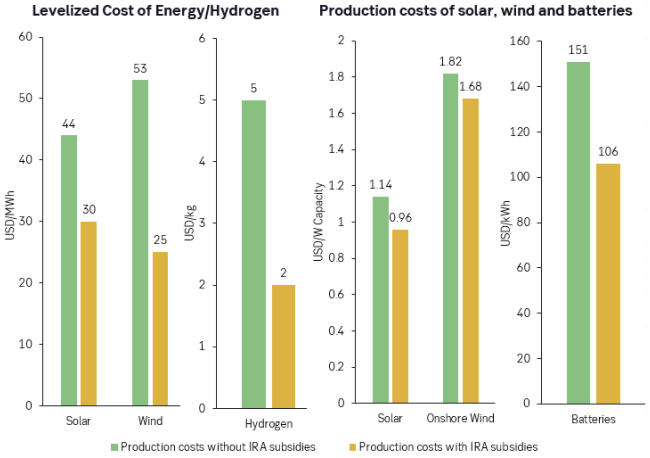
While initial estimates from the Congressional Budget Office (CBO) pointed to a reduction in the budget deficit, revised cost estimates now point to the IRA increasing the deficit by USD 786 bn from 2024-2033.[3] However, that is likely also too conservative in terms of estimating the costs. There are several open-ended elements in the IRA where the ultimate cost is determined by the take-up. There is for instance no upper limit on the subsidies for EV purchases, so the total cost depends on how popular the subsidies are for car buyers. The latest estimates indicate the cost over 10 years could be more than USD 1tn.

The IRA is also a good example of a piece of legislation where climate policy is interlinked with broader industrial policy, not only focusing on greening the economy but also on bringing jobs and factories back to the US and regaining control over the supply chain. For instance, the IRA includes tax credits for advanced manufacturing (which includes e.g. semiconductors) as these are seen is key inputs for the electrification. These measures complement other elements of industrial policy like the CHIPS act, which also aims to increase domestic production of semiconductors in the US. Other policy initiatives like the bipartisan Infrastructure Investment and Jobs Act (IIJA) also include clean energy spending.

This is aligned with our analysis of the energy transition, where the whole supply chain has to accelerate in a coordinated way for the transition to work. However, the IRA is not just about promoting clean energy adoption. Subsidies are only available for products that are produced in North America. From this perspective, it also has a clear element of trade policy.

This is not what economic theory generally says you should do, but in practice this could also help attract support from voter segments that might otherwise not be supportive of policies only focusing on climate risks. This plan is designed to create jobs and growth also in areas where fossil energy has been an important driver of these things in the past.

Figure 10 Effect of IRA subsidies on production costs



Source: Deloitte 2023 "IRA and the net-zero race – How EU industrial policy should respond"

The IRA continues to be perceived as the most significant piece of legislation in terms of climate action. In broader terms the purpose was to combat inflation, increase cleaner domestic energy production and reduce carbon emissions by roughly 40% by 2030.

[3] [3] US Deficit: CBO Budget & Economic Outlook: 2024 to 2034 (taxfoundation.org)

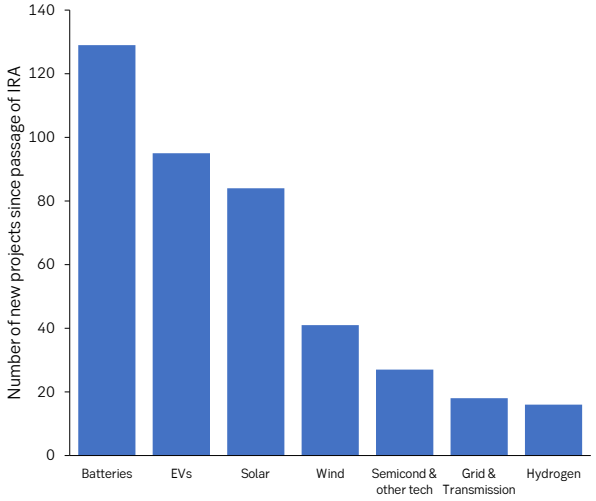
IRA investments largely in batteries, EVs so far

The IRA 's impact is starting to appear, not only in terms of investment but also job creation: more than 210.000 jobs had been created in the clean energy space by the end of Q3 2023. According to the Rhodium Group and MIT's Climate Investment monitor, companies have announced more than USD 242 bn in new investments across an array of clean technologies to contribute towards building a clean energy economy. 70% of the investments are expected to be directed towards solar, energy storage and batteries, while less than 5% is dedicated to carbon management.

A report by Climate Power titled the "Clean Energy Boom", provides further insights and details on the number of new projects and investments in these projects since the IRA was passed. Most of the new projects are centred within the field of batteries, EVs and solar (Figure 11). and are spread around the country with Michigan, Georgia, California, Texas and South Carolina as the top 5 states.

Looking at investments in new projects, batteries, EVs and solar remain at the top but are beaten by semiconductors with close to USD140 bn in investments (Figure 12).

Figure 11 Number of new projects since passage of IRA

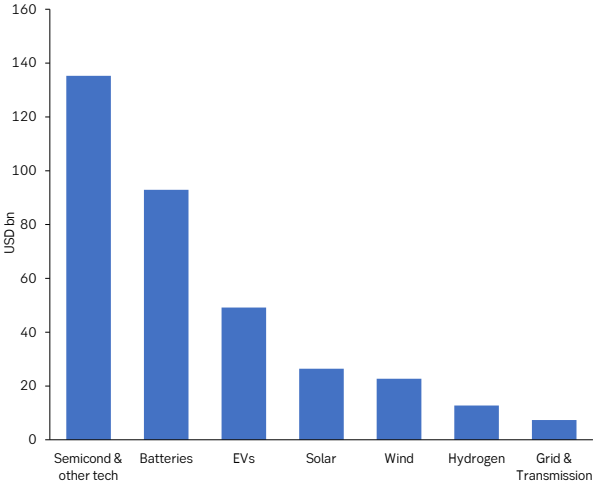


Source: Climatepower.us

Semiconductors benefit from the CHIPS and Science act but also from expanded IRA credits that are pushing investments in advanced clean energy. Semiconductors are an integral part of the overall industrial policy, to shore up the entire supply chain and bring it back to the US as well as providing key inputs to renewable energy.

Areas like grid & transmission investments are likely to take longer to unfold as they typically involve large infrastructure projects, so we may not have the full picture of the effect yet.

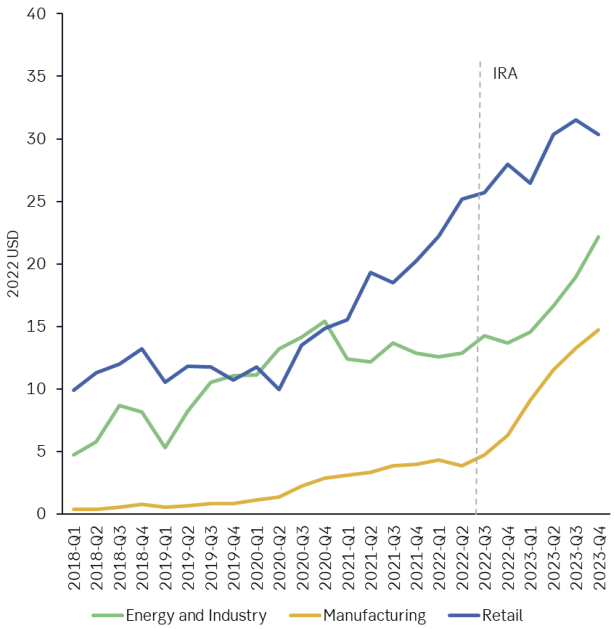
Figure 12 Investments in projects since passage of IRA



Source: Climatepower.us

The Climate Investment monitor slice the data by segment to understand where the investments end up as investment in the manufacturing of GHG reducing technology (Manufacturing), investment in the deployment of that technology to produce clean energy or decarbonize industrial production (Energy and Industry) or the purchase and installation of that technology by households and businesses (Retail).

Figure 13 Actual clean investments across segments US



Source: Clean Investment Monitor

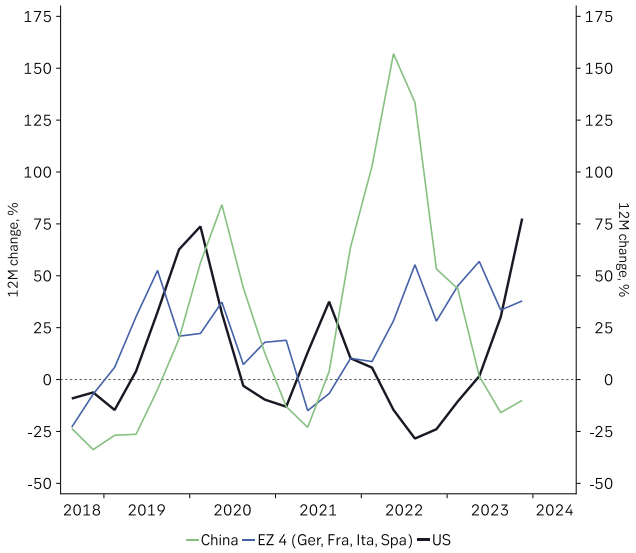
Investments in all three segments accelerated after the IRA was passed, but the increase was more rapid in manufacturing (especially the EV supply chain) and the energy industry. In the retail space, purchases of EVs have been the main driver while distributed electricity/storage

and heat pumps have moved sideways. Finally, utility-scale solar and storage investment has driven the uptick in energy and industry (Figure 13).

How about Europe?

The EU has similar ambitions to accelerate the transition, but unlike the US, the EU faces some serious constraints when it comes to industrial policy[4]. According to a CEPS study, *"the EU's policy response to the IRA is inevitably shaped by its own institutional constraints, namely in terms of available financial resources and legal competence.* The EU does not have authority to raise taxes to fund spending, which also makes it exceedingly difficult to use tax credits as incentives in any EU-wide policies. As a result, the EU as a starting point cannot emulate the US IRA strategy.

Figure 14 Y/Y change in renewable investment, regions



Source: BloombergNEF, Macrobond

The EU Green Deal is the EU's flagship climate, energy, and green industrial policy framework. Adopted in 2020, it aims for the EU to become climate-neutral by 2050 and reduce emission by 55% already by 2030. Since March 2020, various parts of the plan have gradually been adopted. However, as a response to the passing of the IRA in the US, the European Commission realized that more had to be done on the industrial policy to ensure domestic production of clean energy technologies remained competitive, which led to the Net Zero Industry Act (NZIA).

This opens for an increase in subsidies for transition investment in the EU but leaves the responsibility for designing such policies to the individual countries in the EU. This is problematic from a single market perspective and misses the opportunities offered by having a single economy with large scale.

The European Green Deal has a strong overall regulatory framework but with public financing being dispersed by nature with multiple countries trying to push industrial policy initiatives, the path is not as straightforward and transparent as with the IRA in the US.

Figure 15 Selected EU Green Industrial Policy tools

EU policy tool	Policy (year of adoption, where relevant)
Framework condition	• Net-zero industry act (NZIA) (2024) • Green Deal Industrial Plan (2023) • Temporary Crisis and Transition Framework (TCTF) (2023) • Carbon Boarder Adjustment (CBAM) (2022) • Revision of EU Emission Trading System (EU ETS) (2022) • Critical raw materials act (CRMA) (2022) • Fit for 55 (2021) • EU Green Deal (2020)
Deployment	• European Hydrogen Bank (2023) • EU Innovation Fund • European Investment Bank (EIB) • REPowerEU (2022) • NextGenerationEU (2020) • Important Projects of Common European Interest(IPCEIs)
Innovation	• Horizon Europe • European Institute of Innovation and Technology

Source: Journal of Industry, Competition and Trade 2024, SEB

Where is the money?

Expectations are that the European Green Deal Investment Plan will see (at least) EUR 1 tn mobilized in sustainable investments over the next decade[5]. However, funding remains the biggest shortcoming of EU Green Industrial Policy. A third of the EUR 750 billion NextGenerationEU Covid-19 recovery instrument were earmarked for climate action. However, the EU has to date only issued EUR 55.9 billion in green bonds. Of the EUR 225 billion in RRF funding dispersed by 2023, only EUR 28.5 billion have been used for energy transition. The RFF is also set to expire in 2026.

No extra EU funds are included in the NZIA which aims to increase domestic manufacturing of clean technologies to meet the EU 2030 targets. Instead, the EU has deferred this to the to be set up European Sovereignty fund. But the proposed fund has been met with muted interest from Member states has now been downgraded to a EUR 10 billion addition to existing programs.

In the absence of US-style climate policy, the EU has introduced other measures. The Climate Border Adjustment Mechanism (CBAM) is part of a larger overhaul of the EU ETS system including the phase-out of free allowances which SEB expects to raise EUA prices to above EUR 130 by 2030. The CBAM is designed to prevent carbon leakage i.e. relocation of energy-intensive industries to countries with lower carbon costs.

[4] IXo0BcFr-CEPS-Explainer-2023-16_Different-roads-aligned-goals.pdf

[5] The European Green Deal Investment Plan and JTM explained (europa.eu)

It will level the playing field between European producers and carbon-intensive importers inside Europe – essentially in the same way as tariffs do. However, the result will be more expensive products for European consumers. Furthermore, for products sold by EU producers outside of the EU, the current formulation of CBAM does not (yet) have mechanisms to restore a level carbon playing field.

The Critical Raw Materials Act (CRMA) is an attempt to respond to the supply disruption risk in critical raw materials, by boosting their domestic production, refining, and recycling. The proposed Act finds a list of strategic raw materials that are considered crucial for the manufacturing of green, digital, and defence technologies and sets precise domestic targets to be achieved by 2030. The CRMA aims to make the issuing of permits to relevant industrial projects subject to a common EU deadline. It does not provide any finding for this, though.

Europe must raise its game

Despite these efforts, the EU is still far from having a full-fledged green industrial policy. The various initiatives outlined above based on a mix of a horizontal approach of creating general framework conditions (e.g. CBAM or the CRMA) for green industrial developments and a vertical approach allowing for a more specific targeting of certain green technologies (e.g. EIB or the EU Innovation Fund) and innovation (e.g. Horizon 2030).

The focus on regulation and increased costs of emissions in the EU's transition strategy is also problematic from a political perspective. Right-wing parties have made progress in EU elections, in part by targeting climate policies.

Several flare-ups of public protests in recent years have come out of the agricultural sector, where farmers are faced with increasing costs even though there is currently no alternative emission-free technology they can deploy. Higher food and energy prices also hit the lower part of the income range hardest. Subsidies for EVs have so far gone mainly to the affluent, because there are no small, cheap EVs on the market yet.

One of the lessons from the US and the IRA is in our view, that by linking the efforts to accelerate the transition to investment and job creation, instead of tying it to higher prices and more regulation, there is a better chance of anchoring support for the fast transition in the electorate and reduce the odds of the policies being removed again in the case of a change in political leadership.

Plans that could facilitate a more ambitious industrial policy are being drawn up. According to media reports, former Italian PM Enrico Letta will tell the 27 EU leaders in a special report published this April that Europe must urgently enact measures to push a "competitive industrial strategy" rivalling the US Inflation Reduction Act (IRA), including through an EU-wide state aid contribution mechanism.

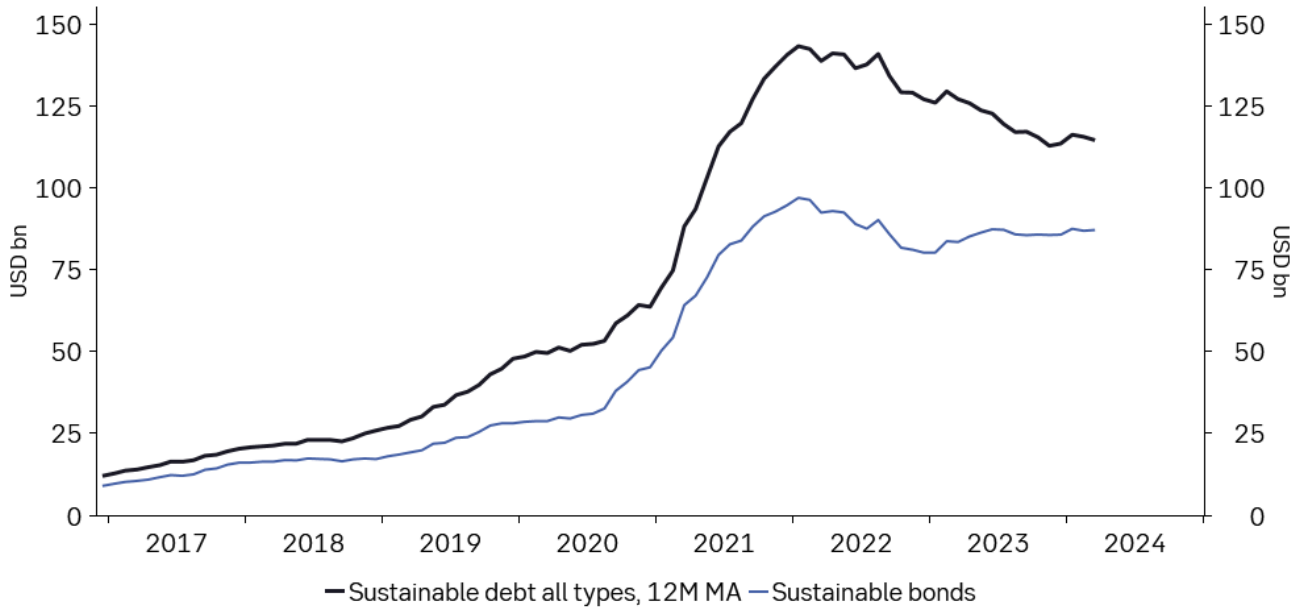
"Supporting jobs and industries in Europe, rather than financing our partners or rivals' industrial development, must be a primary objective when spending public money," Letta notes in his report according to Euractiv. *"In addition, never before has there been such an urgency to develop our own industrial capabilities in order to be autonomous in the strategic domain. Europe cannot, and should not, cede its role as a manufacturing leader to others. At the turn of the century and for much of the subsequent decade, the shift was widely regarded as a feasible and even beneficial option. However, it is now evident that this is no longer the case."*

Sustainable finance market update

Stagnating market in need of new growth incentives

The first three months of 2024 saw timid growth in use-of-proceeds bonds which was almost erased by Y/Y halving of sustainability-linked bond issuances. However, cover ratios for sustainable bonds are still above market average showing lasting investor interest in sustainable finance.

Figure 16 Rolling 12M sustainable debt transactions



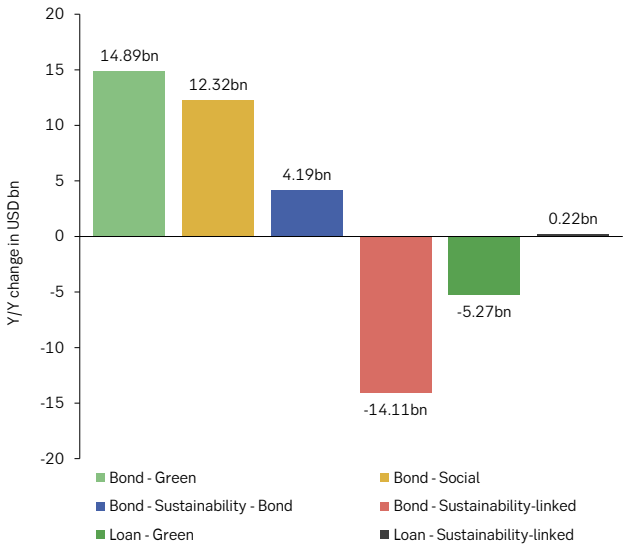
Source: BloombergNEF 31 March 2024, Macrobond, SEB

Sustainable debt continues to stagnate

The market for sustainable bonds and loans saw timid growth of 3% in the first quarter of 2024 compared to the same period last year. Green, sustainable and social bonds were responsible for the growth, increasing 8% to USD 207bn, 31% to USD 52bn and 7% to USD 62bn, respectively in the first three months of 2024. Growth in use-of-proceeds bonds compensated for the decline in new sustainability-linked bond issuance by 55% to USD 14bn and the drop of green bank lending by 20% to USD 21bn in Q1 2024. The first three months of 2024 saw a stagnating market for performance-based loans, growing by USD 0.2bn or 0.4% and reaching a total of USD 55bn in new transactions.

Overall, the impression is that the sustainable debt market is in dire need of a second push for growth. This will have to come from policy makers and regulators and needs to strengthen the economics case of sustainable borrowing by reducing risk for borrowers and lenders.

Figure 17 Y/Y change in sustainable debt transactions, Q1 2024



Source: BloombergNEF 31 March 2024, SEB

Gregor Vulturius, PhD
gregor.vulturius@seb.se

Thomas Thygesen
thomas.thygesen@seb.dk

Ben Powell
ben.powell@seb.no

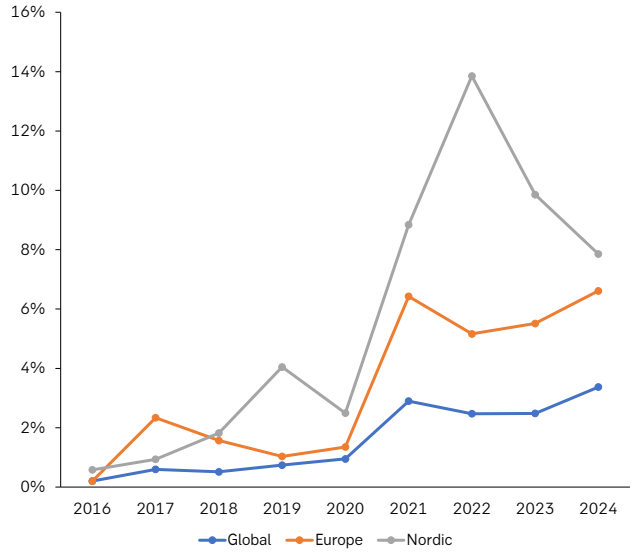
Filip Carlsson
filip.carlsson@seb.se

Alison Mariko Rhatigan
alison.rhatigan@seb.no

Sustainable bond market in timid recovery globally and in Europe

Sustainable bonds – including green, social, sustainability and sustainability-linked – increased by just over 4% in Q1 2024. In comparison, total new bond issuance has fallen by 23% globally, 4% in Europe (excluding the Nordics) and 7% in the Nordics. Looking at Q1 figures only, the share of sustainable bonds of the global and European (excluding the Nordics) bond market reached its highest value ever of 3.5% and 6.6%, respectively.

Figure 18 Share of sustainable bonds by region, Q1 only

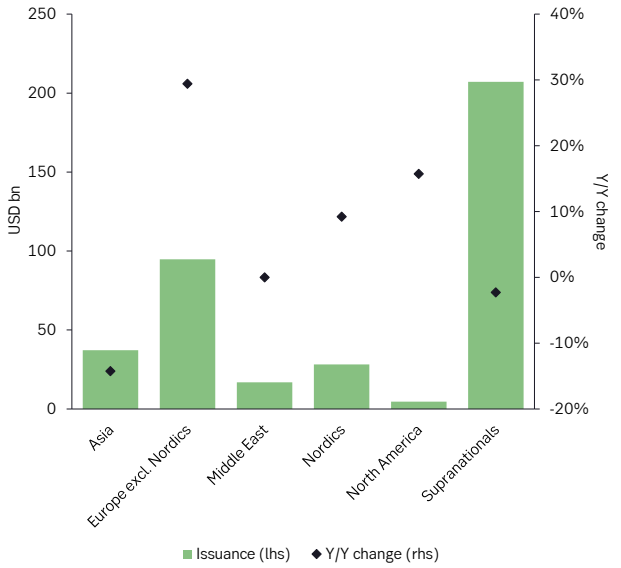


Source: Bloomberg 31 March 2024, SEB

Sustainable bonds' share of the Nordic bond market continued to decline to 7.9% in the first quarter of 2024. Unlike in the two other markets, new issuance of sustainable bonds has fallen by USD 2bn Y/Y in Nordics. The loss of market share could be explained by an exceptionally high level of sustainable debt issuance in Q1 of 2022 when conventional bond market declined by USD 27bn amid uncertainty caused by Russia's invasion of Ukraine while sustainable bond issuance increased by USD 2bn in the same period of time. Another reason is that sustainable debt issued during Q1 in 2024 is still behind previous years' first quarter results.

Green bonds saw the strongest ever Q1 with USD 207bn in new issuance. Among leading markets, green bonds in Europe (excluding the Nordics) grew by 29% Y/Y, reaching USD 94bn in new issuance. North America was the second strongest green bond market, increasing by 16% to USD 28bn. The Nordics lagged behind, growing only 9%, while new green bond issuance by Supranationals and in Asia fell by 2% to USD 22bn and by 14% to USD 37bn, respectively.

Figure 19 Green bond issuance by region, Q1 2024

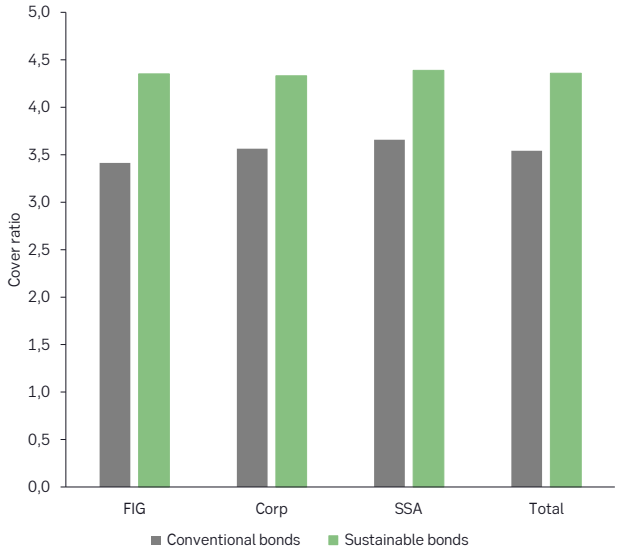


Source: BloombergNEF 31 March 2024, SEB

Sustainable bonds achieve higher cover ratio than conventional bonds

Sustainable bonds continue to attract greater investor interest than conventional bonds. Sustainable labelled IG bonds issued in the first three months of 2024 had an average cover ratio of 0.8 higher than conventional bonds. Sustainable bonds issued by financial institutions had the largest difference with an average cover ratio of 4.4 for labelled bonds versus 3.4 for conventional bonds. Real estate was the only sector where conventional bonds had a higher average cover ratio than labelled bonds.

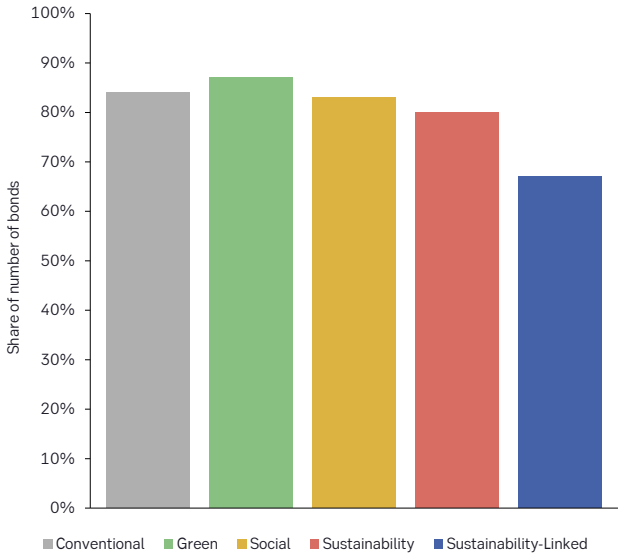
Figure 20 Average cover ratios, IG bonds issued in Q1 2024



Source: Bloomberg 2 April 2024, SEB. Sample excludes secured bonds. Analysis covers 384 conventional bonds and 72 sustainable bonds

Data also shows that more than 80% of IG bonds issued during Q1 was trading tighter than issuance launch spread. It is also showing that demand and liquidity is similar between conventional and sustainable bond market. While 84% of conventional and 87% of green bonds traded tighter, one third of Sustainability-linked bonds were traded at a higher yield and lower price than at issuance. However, results for SLBs are only anecdotal since there were only seven in our sample.

Figure 21 Share of bonds issued in Q1 2024 trading tighter by product

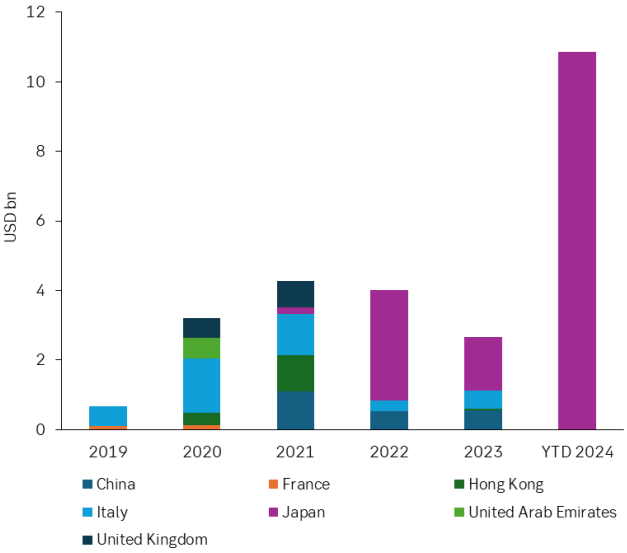


Source: Bloomberg 2 April 2024, SEB. Sample excludes secured bonds. Analysis covers 384 conventional bonds and 72 sustainable bonds

The "just" in the transition bond market

The transition bond market experienced a surge in issuance in 2024, led by the government of Japan and followed by three Japanese issuers. While many international issuers refer to ICMA's Climate Transition Finance Handbook for guidance on transition financing frameworks, Japanese issuers have the added benefit of national guidelines from the Ministry of Economy, Trade and Industry (METI). Japan's Basic Guidelines on Climate Transition Finance were published in May 2021, followed by the Transition Finance Follow-up Guidance in June 2023, as well as sector-specific roadmaps for the iron and steel, chemical, power, gas, oil, pulp and paper, cement, and automobile sectors.

Figure 22 Transition bond issuance by region



Source: Bloomberg 2 April 2024, SEB

The Government of Japan's Climate Transition Bond Framework addresses just transition via reference to the country's Green Transformation (GX) Promotion Act, which aims to support smooth labour migration from fossil fuel-related industries to low-carbon industries, and stipulates establishment of collaboration between government and business, taking the perspective of just transition into account. Similarly, ICMA's guidance on transition finance defines a just transition as one which "seeks to ensure that the substantial benefits of a green economy transition are shared widely, while also supporting those who stand to lose economically – be they countries, regions, industries, communities, workers or consumers."

Although both ICMA's Climate Transition Finance Handbook and Japan's Basic Guidelines on Transition Finance recommend that issuers disclose on how just transition is incorporated into their transition strategies, as well as relevant social expenditures where appropriate, few issuers address this concept in their transition financing frameworks. Where there is mention of just transition, it is typically considered from a passive "do no harm" perspective.

Equities: still no sign of growth

On the equity front, there is still no sign of a rebound for the stocks in the S&P Clean Energy index, which covers the whole supply chain. Earnings have been stagnant for a decade and there are no indications that this trend is about to be broken to the upside. At the same time, the large inflow into ESG/sustainability funds that had been the main

driver of clean energy stocks from 2020-2022 has now turned into direct outflows, putting pressure on valuations.

Figure 23 S&P Clean Energy Index and ESG fund flows

Source: EPFR, Bloomberg, SEB

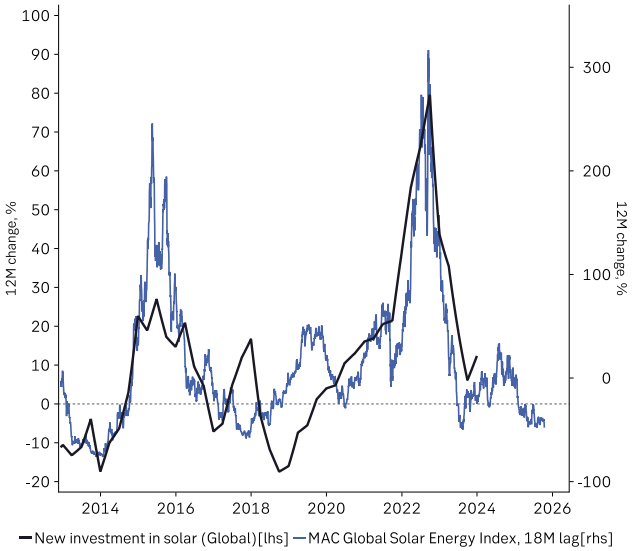
Ultimately the case for clean energy stocks comes down to the potential re-boot and lift capex into the clean energy space and trigger some kind of sustained earnings growth - without that it becomes increasingly difficult to see upside for clean energy stocks in the near-term.

Figure 24 S&P Global Clean Energy Index, 12m fwd EPS

Source: Bloomberg, SEB

Looking more specifically at solar energy, Figure 25 shows the historical correlation between stock prices and new solar energy investment. Based on the historical relationship, recent performance appears to be consistent with a continued decline in capex over the course of 2024. If we see the start of a new upswing in solar energy investment, then we are likely to see it first in the stock prices of companies in the solar energy supply chain, but there are no such indications so far.

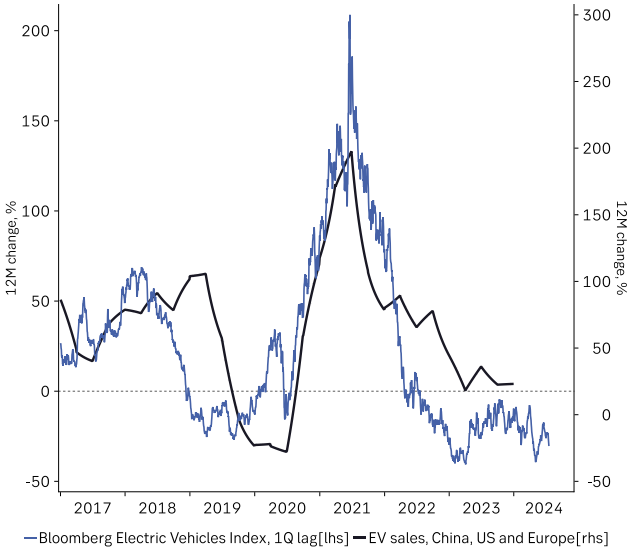
Figure 25 Global solar energy index and new investment in solar



Source: Bloomberg, SEB

Turning to energy users, the picture is similar when we look at the EV sector. As with solar energy, the historical evidence suggests that a pickup in EV sales would be reflected first in rising stock prices (and then in rising earnings). Right now, the stock market development points to a continuation of the double pressure from weaker sales growth and intensifying margin pressure.

Figure 26 Bloomberg EV index and EV sales (China, US and Europe)



Source: Bloomberg, SEB

Solving unpleasant climate math

The requirement for asset managers to step up

Simon Maine
Managing Director- Renewable Power & Transition, Brookfield Asset Management
simon.maine@brookfield.com

Meeting climate targets call for action by asset managers

The World Meteorological Organization stunned the scientific community recently with its prediction that average global warming could breach 1.5°C in the next five years.

The recurrence of the El Niño weather pattern in the Pacific is contributing to this threat. But so too is the fact that we are rapidly exhausting our carbon budget. At the current rate, we have less than 10 years before the world's emissions surpass the minimum threshold required to maintain the 1.5°C benchmark.

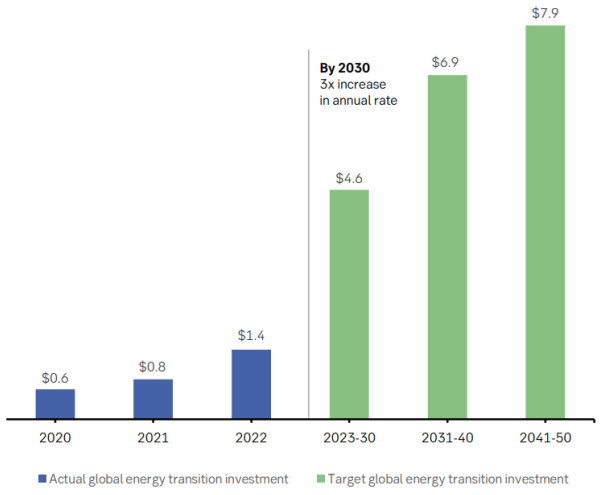
This climate math is now driving the investment math. Leading asset managers are stepping up with new strategies that offer positive environmental impact with no discount to expected returns.

Rapid scaling of transition investment required

According to BloombergNEF, more than $200 trillion needs to be invested in clean energy supply and associated infrastructure between now and 2050 Annual investment rates must triple during this decade and increase fivefold by mid-century. The good news is that progress is happening very fast. The International Energy Agency recently reported that there is sufficient manufacturing capacity for solar panels and batteries to meet the needs of its 2030 Net Zero scenario.

But the investment math continues to be a challenge in other ways. For every dollar spent on traditional energy, we need four dollars deployed in clean energy and its associated infrastructure. Today, we are spending just $1.80 on clean energy for every dollar spent on traditional fossil fuels.

Figure 27 Actual and target global energy transition investment



Source: BloombergNEF Energy Transition Investment Trends 2023

Transition finance to meet science-based emission reduction pathways

As with any ratio, only two actions can change the equation: both investing more in clean energy and also reducing the use of existing fossil fuels in our economy.

Or in the words of UN Climate Finance Envoy and Brookfield Asset Management's Head of Transition Investing Mark Carney, "we must go where the emissions are."

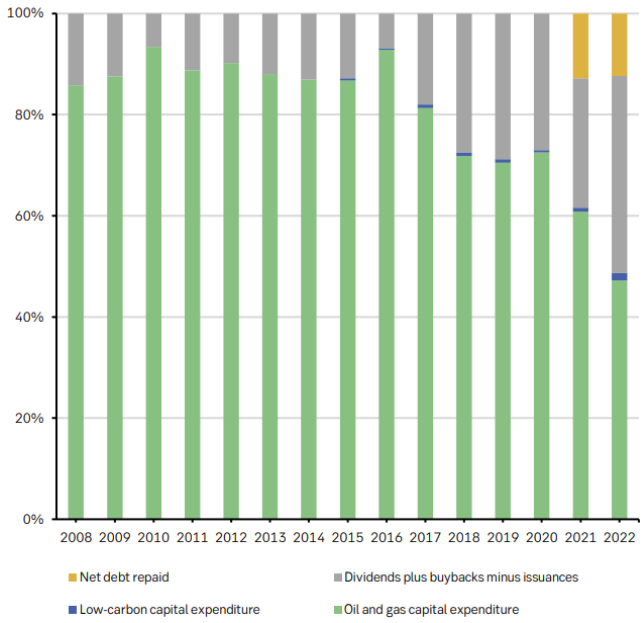
In practice, this means investors must be willing to work with and partner with carbon-intensive businesses to transition to more sustainable business models and help radically reduce their emissions.

Not every business can reduce its emissions overnight, nor is it always desirable to do so – sometimes the economic or security cost is too great. And such a transition can only be achieved when those businesses have a clear and committed pathway toward reducing emissions in line with global climate goals.

Oil and Gas not shifting their investment fast enough

There have been some important steps forward in the oil and gas sector. International majors have increased clean energy investment to as much as a third of their overall capex.

Figure 28 Declining reinvestment from energy companies



Source: IEA World Energy Investments 2023

But in ratio terms, this still represents just one dollar in clean energy for every two dollars they spend in fossil fuels. That is far too little to meet the goal. And the sector is reinvesting less, putting just 50% of its available cash into new projects in recent years, down from above 80% historically.

The excess cash is being returned to shareholders in record amounts, leaving investors the task of reallocating that capital into transition-friendly investments.

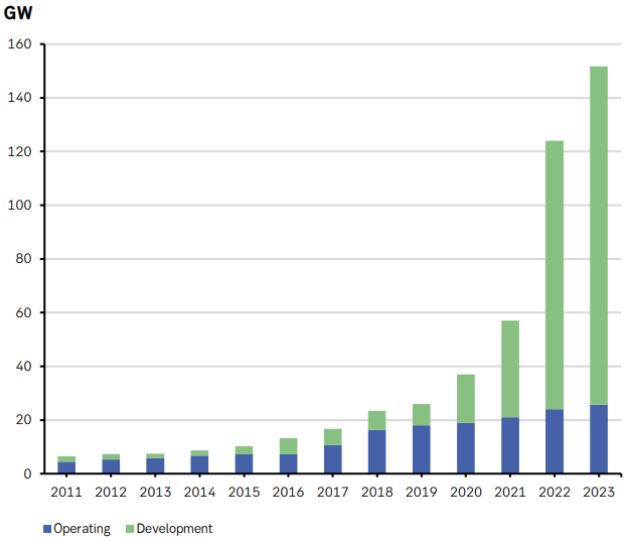
Investment firms drive the energy transition

In place of the traditional energy companies, investors can now turn to specialist fund managers with both a track record of successful investing in renewables and the capability of investing where the emissions are.

Mark Carney sums up the challenge: "We need an industrial revolution at the pace of the digital revolution, and that means transition investment must accelerate in every sector of the economy. Investment firms will increasingly take up the gap left by traditional energy companies, and that creates a wall of opportunity for smart money."

This includes firms such as Brookfield Asset Management—recently named the world's largest impact fund manager and a leading private capital investor in the energy transition by New Private Markets.

Figure 29 Brookfield becoming a clean energy supermajor



The firm is already a global leader in renewable energy deployment, building on over 30 years of specialist investing in the asset class. Since 2020, however, Brookfield has witnessed exponential growth in its Renewable Power and Transition investing strategy, cementing its role as one of the leading global players in the transition.

In the last two years, Brookfield has deployed or committed the entirety of its record-breaking $15 billion transition fund across a range of critical technologies including wind, solar, batteries, nuclear, carbon capture, waste recycling, distributed generation, and renewable natural gas.

Brookfield provides capital to scale-up clean energy infrastructure

Where technologies are already mature, such as wind and solar, Brookfield is investing in platforms that can build efficiently at scale. Where technologies are ready to go but not yet at global scale, such as carbon capture and renewable natural gas, Brookfield can invest in project development and then offer much larger quantities to construct facilities when they are ready.

For example, Brookfield's investment in carbon recycling business, LanzaTech, committed $500 million to construct facilities that can produce zero carbon aviation fuels and

basic chemicals used in everyday products. Up to $500 million has been committed to CalBio to expand the company's footprint of renewable natural gas and waste-to-energy facilities that capture methane emissions from dairy farms.

In another example, Brookfield committed C$300 million to construct a pipeline of projects alongside Entropy, a Canadian carbon capture and storage (CCS) technology business that can retrofit onto existing industrial facilities. Wherever you find existing heavy industry, the role of carbon capture will be critical to protecting jobs and economic strength while also meeting Net Zero goals.

One perceived barrier to greater deployment of CCS in Canada is the variable carbon price created by the country's carbon market policy. The company found an innovative way to address that challenge recently, signing a carbon 'contract for difference' with the Canada Growth Fund which provides a long-term fixed price for carbon credits.

As these examples show, there will be a strong role for private capital in driving transition investment, particularly when it comes to scaling new technologies. It is good for progress in this area that more asset managers are stepping up.

Decarbonizing heavy industry at gigaton scale

Joonas Rauramo
CEO, Coolbrook

Mikko Jaatinen
CFO, Coolbrook
info@coolbrook.com

A need for a Clean New Industrial Era

Hard-to-abate industries, such as steel, iron, cement, petrochemicals and chemicals, are responsible for over 60% of the total CO2 emissions from industry. Industrial processes require high temperatures, which are almost exclusively achieved by burning fossil fuels.

Reaching the climate targets requires significant measures to curb emissions from heavy industries, such as steel and iron, cement, chemicals and petrochemicals. However, the global industrial emissions have continued to increase – a trend that urgently needs to be turned.

Electrification of industrial processes across industry sectors – including the ones considered almost impossible to electrify – is key to achieving the required emission reductions and to speed up the transition. Clean electricity provides a clear pathway towards zero carbon industrial production in an energy and cost-efficient manner, and new electrification technology makes hard-to-abate industries possible-to-abate.

Electrification and decarbonization of high-temperature processes

Coolbrook is a transformational technology and engineering company on a mission to decarbonize major industrial sectors. Coolbrook's proprietary, revolutionary rotating technology combines space science, turbomachinery and chemical engineering to electrify and replace burning of fossil fuels in high temperature processes across all major industrial sectors.

While the supply of green electricity is abundant, existing electrical heating technologies have trouble achieving very high temperatures, especially in use cases and applications that require high mass flows. Coolbrook's RotoDynamic technology is currently the only electric heating technology with the potential to reach 1,700 °C without the use of fossil fuels. Reaching those temperatures would enable it to replace fossil-fired furnaces and kilns in industrial processes.

While the supply of green electricity is abundant, existing electrical heating technologies have trouble achieving very high temperatures, especially in use cases and applications that require high mass flows. Coolbrook's RotoDynamic technology is currently the only electric heating technology with the potential to reach 1,700 °C without the use of fossil fuels. Reaching those temperatures would enable it to replace fossil-fired furnaces and kilns in industrial processes.

The electric RotoDynamic Technology has two main applications:

- RotoDynamic HeaterTM (RDHTM) to electrify and provide carbon-free high-temperature process heating to e.g. iron and steel, cement and chemicals production
- RotoDynamic ReactorTM (RDRTM) to replace fossil-fuel fired steam crackers to reach 100% CO2 free olefin production in petrochemical industry.

Through electrification of the steam cracking process, petrochemical actors are able to stop burning of fossil fuels to produce ethylene, propylene and high-value chemicals that are the most essential building blocks for various plastics, rubbers and other materials utilized to produce and manufacture everyday essential materials, products and goods. Steam cracking furnaces emit approximately 300 million tons of CO2 each year and electrification, combined with renewable electricity can reduce these emissions to zero.

On track to seize the global EUR 1 trillion global industrial heating market

The RotoDynamic Technology is on track for commercial launch starting in 2024 with first demonstration projects starting at customer sites and followed by full commercial deployment is expected to start around 2025. There have been over 40 use cases for the technology identified, especially in high temperature carbon intensive industries like cement, steel and petrochemicals. The market size for industrial heat – temperatures up to 1700°C – is estimated to be EUR 1 trillion.

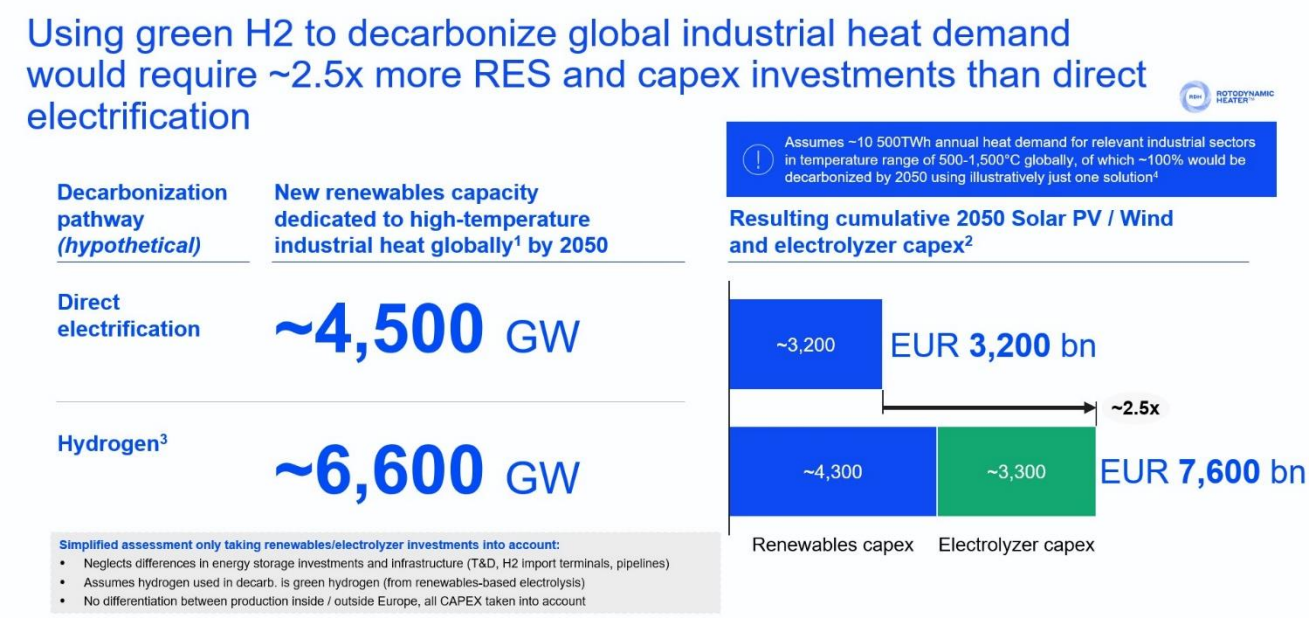
Coolbrook is conducting research and development activities in Finland, the Netherlands and the UK. The technology has been undergoing a large-scale pilot phase at the Brightlands Chemelot Campus in the Netherlands since 2022, demonstrating its performance across various industrial sectors.

In 2023 Coolbrook successfully completed a test program to demonstrate the RotoDynamic Heater technology for electrification and decarbonization of high-temperature industrial processes. The tests validated Coolbrook's technical pathway up to 1700°C, capturing 95% of the EUR 1 trillion market.

The RotoDynamic Heater test program demonstrated RDH technology's capabilities for industrial use in high-temperature process heating, enabling the technology to move forward to industrial scale projects at customer sites. The pilot testing exceeded the level of 1000°C, which is already several hundred degrees above the temperature range of conventional resistive heaters.

In 2023, the tests for the RotoDynamic Reactor succeeded in cracking naphtha, leading the way towards zero-carbon steam cracking. The tests validated the potential of the technology to replace traditional fossil fuel-based cracker furnaces with Coolbrook's electric RDR units in the petrochemical industry. The Pilot testing achievements reinforce Coolbrook's position as the leader in electric steam cracking enabling CO2 emission reductions of 300 million tons per annum. Coolbrook will continue the performance testing and optimization of the RotoDynamic Reactor Technology in 2024 and thereafter. Coolbrook will first test various traditional feedstocks and later also recycled and renewable feedstocks to enable circular and bio-based materials manufacturing at industrial scale.

Figure 30 Investment comparison of electrification and hydrogen



Source: IEA Hydrogen Supply (September 2022); Global Cement Directory; International Cement Review; US Geological Survey

Decarbonization with improved energy and production efficiencies

Coolbrook's RotoDynamic Technology is the only electric technology that can transform heavy industries to net zero.

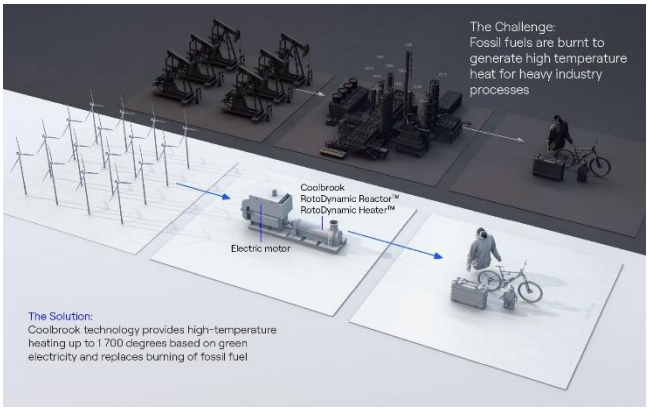
For an industry customer in e.g. cement, steel & iron, or chemicals industry, Coolbrook's RotoDynamic Heater brings several benefits:

- Scalability to high temperatures (up to 1700 °C degrees) and to size categories (50+ MW equipment size)
- Elimination of fossil fuel derived CO2, NOx and SOx emissions by replacing fossil fuels with electrification
- High energy efficiency of 92 - 95% for the conversion of electricity to heat
- Compact equipment size and possibility to retrofit into existing industrial facilities
- Competitive CAPEX and OPEX

In addition to decarbonization of petrochemical processes, the RotoDynamic Reactor significantly improves process efficiency of petrochemical plants thereby reducing the demand for feedstocks and enabling higher circularity in plastics and other materials. Key benefits of RDR compared to traditional process are:

- Free of direct CO2, NOx and particle emissions from steam cracking
- Higher product yield and uptime
- Lower CAPEX and OPEX
- Reduced coking
- Compact equipment size suitable for new and retrofitted sites

Figure 31 Coolbrook's RotoDynamic Technology



Source: Coolbrook

Committed, comprehensive partner ecosystem to roll out the technology

Coolbrook has built a comprehensive partnership ecosystem consisting of leading technology and industrial partners, as well as academic institutions, to develop and launch the technology.

The company has for long collaborated with Oxford, Cambridge and Ghent Universities on the research and development of the technology, and its technology partners include e.g. ABB, Linde Engineering and Schmidtsche Schack. Coolbrook's industry partners include Shell, Braskem, SABIC in the petrochemicals industry, CEMEX and UltraTech Cement in cement industry, JSW Group in both cement and steel, and Arcelor Mittal in steel industry.

Electrify everything

With the new technology for industrial electrification available already now and the share of green electricity growing in the energy mix, the focus on decarbonization efforts should be on electrification. As the IPCC report from 2022 states, achieving swift and broad decarbonization through electrification is critical.

Solutions such as hydrogen and carbon capture and storage (CCS) both will be needed in the full mix of solutions to battle the climate crisis, but transforming heavy industries with electrified processes is clearly superior alternative in all cases where it can be applied due to higher energy efficiency and lower cost.

Ready to scale-up

Based on hundreds of engagements with different stakeholders, it is very clear that the technology has a huge interest and demand around the World. For a company that is still in early phase of the journey, is heartwarming to realize that many of the forces that shape and define our society, are on the same journey.

Politicians see the necessity to tackle the toughest climate challenges in the hard-to-abate sectors. Also, financiers are equipped, and sometimes even eager, to facilitate the transition among Coolbrook's customer industries. In addition, the amount of specialized green transition investor funds has grown enormously during the past few years: VCs, growth funds and private equity funds. This is crucial for a company that is commercializing a disruptive technology.

Financing comes in many forms and sources. It is though crucial that it is there on every step of the journey; from idea to decarbonizing heavy industry in gigaton scale.

From climate transition to a just transition

The need to take socio-economic implications into consideration

Ekaterina Chubarova
Technical Officer- Just Transition and Sustainable Finance,
International Labour Organization
chubarova@ilo.org

The climate transition needs to take a holistic approach considering socio-economic impacts

As the global community intensifies its efforts towards climate action, it is encouraging to witness the rising emphasis on comprehensive management of climate transition and its social implications—factors that were initially overshadowed by the immediate urgency to reduce emissions.

The concept of a just transition, outlined in the International Labour Organization (ILO) Just Transition Guidelines, originated in the trade union movement and was later incorporated into the 2015 Paris Agreement. It is based on the conviction that addressing climate change involves more than reducing carbon emissions. It demands a holistic approach that recognizes and carefully manages the socio-economic impacts of this major transformation while considering the voices of stakeholders and vulnerable populations. Both are central to the climate transition's ambition, speed and success.

For corporate actors and investors, embracing a just transition is not only a matter of social responsibility but also a strategic imperative that can help mitigate risks, open new business opportunities and enhance long-term shareholder value.

The just transition sustains the speed of climate action while providing business opportunities

Promoting a just transition is a means of sustaining the necessary ambition and the speed of climate action, reducing the physical and financial risks of the climate change. Social unrest, triggered by ignoring social dimensions of climate strategies, can also disrupt business operations with additional financial implications for both corporate actors and investors. The "gilets jaunes" protests in France and agricultural protests across Europe were important markers of the necessity of making any transition inclusive and fair; the climate transition is no exception. Other social factors, such as skills development, are simply essential for making the transition happen: skilled workforce shortages are a significant barrier for businesses to put in place more sustainable technologies and processes. Embracing a just transition also presents business opportunities in the inclusive green shift. This includes supporting economic growth through diversification, for example into green and clean technology activities, as well as investing in companies that provide solutions to address emerging social challenges.

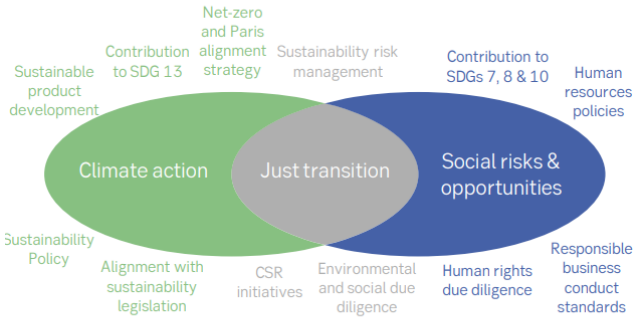
Bias towards climate targets clouds the holistic investment approach

While the need for a holistic approach is increasingly recognized across international forums, the investment landscape and community are still heavily biased towards climate targets, as illustrated by the sustainable debt universe.

While we have seen Green, Social, Sustainability, and Sustainability-linked bonds rapidly gaining traction as a tool to finance sustainable development, the issuance of instruments allowing to target both environmental and social objectives remains relatively modest. Social, Sustainability, and Sustainability-linked bonds still represent a relatively small fraction of the sustainable debt universe. Sustainability bonds issuance is dominated by international public finance issuers, while Sustainability-linked bond issuance declined for a second consecutive year, due to ongoing questions around their credibility and efficiency to incentivize issuers to reach targets.

The traction created by the implementation of corporate and investor climate strategies creates opportunities to fill the void by developing comprehensive investment processes and approaches that allow to tackle environmental and social objectives in a holistic manner.

Figure 32 Factors of consideration in a just transition



Source: ILO LSE Just Transition Finance Tool

Adopting a just transition lens relies on a thorough understanding of what a just transition means and what it implies for different economic sectors and countries, investment ideas and portfolio holdings.

"Phasing down" and "business transformation" is about more than just energy

While we talk a lot about changing energy sources, addressing climate change affects more than just energy. Both green and brown sectors, developed and emerging economies alike are impacted by climate transition. Each face a unique combination of potential social impacts and challenges driven by "transition in", "phasing down" and "business transformation" dynamics that affect them.

Considering the massive shift towards low-carbon practices happening globally, it is crucial to map out and be aware of the relevant and salient social factors like employment impacts, human rights, skills mismatches, specific needs of for example indigenous peoples, and the affordability of green technology solutions. These social elements can be integrated into various levels of macroeconomic, sector, and investment analysis as a critical first step.

The insights gained can lead to uncovering higher-quality and socially conscious investment opportunities among green or businesses in transition as well as among the providers of solutions that address emerging social challenges.

Tauron, a Polish energy utility company, issued in 2020 a transition bond to finance its decarbonisation strategy. In addition to emission reduction, achieved via decommissioning of coal-fired units, expanding renewable (solar photovoltaic and onshore wind) capacity, and improving the distribution grid, Tauron has committed to develop a programme to address the social impacts of closing its coal-powered plants in Silesia, one of Poland's most carbon-dependent regions[6].

Addressing the social implications of the energy transition can also help to avoid high risk investments prone to business interruption or sustainability-related litigation and inform stewardship and engagement activities. Encouraging the investees to strategize around efficient mitigation of social impacts of the climate transition is another lever to reduce portfolio risks as well as influence real economy change.

An example of a fruitful investee engagement approach is the initiative of Royal London Asset Management and Friends Provident Foundation to engage with utility providers. It resulted in SSE, a UK-based company, publishing the world-first dedicated just transition strategy from a utility company[7].

Overall, investment products and accompanying investment and sustainability processes can be shaped to minimize the negative externalities of the green transition and to target positive social impact and inclusivity.

As just transition is getting increasing prominence in international climate processes and international forums, such as those by the United Nations Framework Convention on Climate Change and the G20 Sustainable Finance Working Group, considering social aspects of climate strategies is no longer a nice-to-have but a necessity for the financial and corporate sectors to effectively navigate the challenges of climate transition

[6] https://www.ebrd.com/work-with-us/projects/psd/51855.html

[7] https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2021/10/Just-Zero_2021-Report-of-the-UK-Financing-a-Just-Transition-Alliance.pdf

The Green Bond Editorial Team

Gregor Vulturius, PhD
Advisor
Climate & Sustainable Finance
gregor.vulturius@seb.se

Thomas Thygesen
Head of Strategy & Equities and a transition specialist,
Sustainable Banking
thomas.thygesen@seb.dk

Elizabeth Mathiesen
Senior Strategist
Equity Strategy Research
elizabeth.mathiesen@seb.dk

Ben Powell
Head of Sustainability Fixed Income
DCM/Bond Origination
ben.powell@seb.no

Karl-Oskar Olming
Head of Sustainability Strategy and Policy
Sustainable Banking
karl-oskar.olming@seb.se

Lina Apsheva
Sustainable Finance Specialist
Climate & Sustainable Finance
lina.apsheva@seb.se

Tine Vist
Senior Quantitative Strategist
Equity Strategy Research
tine.vist@seb.dk

Mads Skak Bossen
Quantitative Strategist
Equity Strategy Research
mads.bossen@seb.dk

Lina Norder
Sustainability Business Developer
Sustainable Banking
Lina.norder@seb.se

Alison Mariko Rhatigan
Sustainable Finance Analyst
DCM/Bond Origination
alison.rhatigan@seb.no

Filip Carlsson
Junior Quantitative Strategist
Macro & FICC Research
filip.carlsson@seb.se

Contacts at SEB

Hans Beyer
Chief Sustainability Officer of SEB
hans.beyer@seb.se

Christopher Flensborg
Head Climate & Sustainable Finance
christopher.flensborg@seb.se

The Climate & Sustainable Finance Team
greenbonds@seb.se

SEB Norway:
Øystein Stephansen
Head Climate & Sustainable Finance in Norway
oystein.stephansen@seb.no

SEB Finland:
Anssi Kiviniemi
Head of Sustainability in Finland
anssi.kiviniemi@seb.fi

SEB Germany:
Alexandra Themistocli
Head of Sustainable Banking in Germany
alexandra.themistocli@seb.de

SEB UK:
Renato Beltran
Client Executive, LC&FI
renato.beltran@seb.co.uk

SEB Denmark:
Lars Eibeholm
Head of Sustainable Banking in Denmark
lars.eibeholm@seb.dk

SEB USA:
John Arne Wang
General Manager
john.wang@sebny.com

SEB Baltics:
Anders Larsson
Head of Sustainable Banking, Baltics
anders.larsson@seb.se

SEB Singapore:
Eng Kiat Ong
Financial Institution Coverage Singapore
eng-kiat.ong@seb.se

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