
ACCELERATING THE CAPITAL SOLUTION TO CLIMATE CHANGE

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The missing “I’s” of information and incentives have restrained the potential of the capital markets in previous decades to respond to the growing demand for climate solutions. Progress on both fronts in recent years, however, is moving us rapidly beyond an inflection point in climate investing to its turning point. In this article, the authors build upon previous work to examine this progress as well as analyse the potential for an enhanced return—a “greenium”—from investments in the transition to a low-carbon economy.



As the frequency and severity of extreme weather events continue to increase, many walks of society are demanding a solution to climate change which can meet a potent and complex mix of economic,

political, and social challenges. In terms of science and technology, we have clarity on what’s needed and what’s practical (Gates, 2021). This part, at least, is encouraging. Deploying these solutions, however, will require investors to bring the needed financial capital to the table—and here, the solution is more complex. In addition, this challenge is further complicated by concerns over national energy and food security that have contributed to a cost-of-living crisis for those most in need.

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The policy response has been to focus on creating the incentives for financial capital to do what it does best: price risk and allocate capital to the emerging opportunities. For that to succeed, however, we must encourage a partnership between the invisible hand of the market and the visible hand of public policy. Both are needed to realise the potential for sustainable and inclusive growth that can move us from the inflection point, to the

turning point, on climate change (Meng, 2021). Progress on aligning incentives and information flows has brought us within reach of meeting that challenge.

The sums that are necessary are significant. For example, for energy transition alone, it is estimated that trillions of dollars per year are required to achieve the goals in the Paris Agreement, agreed to by nearly 200 governments worldwide (IEA, 2021). There has been no shortage of efforts to find the financial capital needed, through the good work of philanthropic donations, foundations, family offices, multilateral development banks, government subsidies and tax incentives, and even some activist investors; however, they do not have the magnitude or scope of action required to provide capital at the necessary pace and scale.

How do we unlock the massive potential of the capital markets in the fight against climate change? In a previous JOIM article, we argued that, driven by the increasing demand for climate change solutions by all walks of society, we were approaching the inflection point of climate investing (Meng, 2021).

Although the demand for climate change solutions had continued to grow, we noted that the amount of capital required was much too large for the public sector to foot the bill alone. To close this gap between the demand for and supply of capital, it would be essential to encourage the capital markets to invest in climate solutions. We identified two critical missing pieces that have been preventing this: information (climate risk data) and incentives (carbon pricing). Since then, we have witnessed some significant—and accelerated—progress on both fronts, reflecting an increased awareness of the urgency of the climate crisis by regulators, policymakers, investors, companies, and the public, and lending us the confidence that the inflection point of climate investing is upon us.

A central tenet of modern finance pioneered by Dr. Harry Markowitz in 1952 defined risk as the volatility of expected financial returns (Markowitz, 1952). This framework was continually refined in the ensuing decades and, today, is fundamental to every investor's financial toolkit. It is now time for us to evolve conventional financial theories and frameworks again—this time, to incorporate emerging risks, such as climate change, that require the attention and action of the capital markets.

1 Missing: Information

Just as investors use disclosed financial data to perform financial risk–return tradeoff analyses, they also require reliable and comparable climate data to perform climate-related risk and return analyses. While we note that climate risk and return data from transition-focused investments have been growing and some countries/regions are mandating climate disclosure, there is not an international standard—requiring significant work to either normalize data or analyse a statistically significant sample. This lack of decision-useful climate data prevents: (1) investors from making sound capital allocation decisions; (2) consumers/customers from expressing their preferences and effecting changes; (3) regulators from monitoring systemic climate risks and enforcing climate polices; (4) companies from managing risks and capturing opportunities emerging from the transition to a low-carbon economy; and (5) the public from holding companies accountable for their actions, whether as employees, shareholders, or customers. This presents significant information asymmetry which thus impedes the ability of markets to price risk.¹

2 Missing: Incentives

The issue of skewed incentives has been equally vexing. This misalignment arises from two

sources. First, are legacy government subsidies to high-carbon energy sectors. The IMF counts these to be in the trillions of dollars (International Monetary Fund, 2021). This misalignment is then exacerbated by the lack of pricing of externalities, which has been understood since the 1920s to shift the costs of economic activity from the source of the problem to third parties (Pigou, 1920).² Where these externalities are negative, this can result in social and economic burdens that impact vulnerable communities. The example of carbon emissions illustrates the point well. The historic production of emissions has arisen from a relatively small number of entities but has global impact. Countries with populations most at risk have called for this to be recognised and addressed. The use of subsidies to foster a shift to renewables has historically had mixed investment results, but it is becoming an important part of the policy measures being introduced to create incentives for the energy transition to low carbon. The US Inflation Reduction Act (IRA) of 2022, for example, combines economic incentives and direct investment with disincentives (fees on emissions) to achieve climate goals while targeting economic growth.

3 Progress on the Missing I's

On the twin issues of information and incentives to drive the climate change transition, significant progress is being made. On March 21st, 2022, the US Securities and Exchange Commission (SEC) rolled out a proposal to mandate climate data disclosure and recommended the framework developed by the Task Force on Climate-related Financial Disclosure (TCFD) as the foundation (Task Force on Climate-related Financial Disclosures, 2017). The proposal has been the subject of broad consultation with market actors and was at the time of writing being finalised (Simpson, 2022). Despite the depth of support from investors, litigation may delay implementation.

Shortly after the SEC's rolling out of regulations proposing climate data disclosure, the China Securities Regulation Commission (CSRC), the SEC's counterpart in China, made similar policy moves in making climate data disclosure mandatory for certain industries and, equally importantly, adopting TCFD as the data standard.

The International Financial Reporting Standards (IFRS) Foundation has also made significant strides in climate risk reporting and will be the reference point for 144 countries globally. At COP 26 in Glasgow, the IFRS Foundation announced the launch of a new body, the International Sustainability Standards Board, which has issued its first proposals for reporting, similarly aligned to the TCFD framework. The IFRS reporting rules are followed by 144 markets worldwide so that the new S1 measures for general sustainability reporting and the S2 specifics on climate risk will have widespread influence.³ This has been followed by the State of California issuing its own requirements for climate risk reporting which will apply to both public and private companies doing business in the state, over a threshold of revenues. With California marking its position as the world's fourth-largest economy, this will propel the information flow for US and international companies even as the SEC continues to work through its own proposals.⁴

These reporting measures are being given additional force by regional initiatives such as the European 2030 Climate Target Plan which requires member states to reduce emissions by 55% by 2030⁵ with reporting on progress via the related directives on sustainability (European Union, 2021). These are intended to catalyse private finance and business action alongside the European Union's commitment to spend 30% of its budget on climate resilience.

With the largest economic blocs and greenhouse gas emitters globally (China, the US, and EU)

adopting similar measures, we have the critical mass to produce reliable, comprehensive, timely and consistent climate data and accelerate the development of global climate data disclosure standards. These policy measures are buttressed by investors focussing on climate reporting as part of their fiduciary duty to manage risks in client portfolios. Climate Action 100+ is one example, where the core goals of the initiative focus on governance, targets and disclosure, including integrating climate transition goals into executive performance targets,⁶ with a signatory base responsible for \$68 trillion in assets.⁷ This work is now coordinated through the umbrella organisation founded by UN climate envoy and former Bank of England Governor, Mark Carney, the Glasgow Finance Alliance for Net Zero (GFANZ), which has developed a protocol for a wide range of financial market initiatives such as the UN Net Zero Asset Owner Alliance, the Net Zero Asset Managers Initiative and parallel groups for the insurance and banking industries.⁸

There are also important initiatives in private markets which are critical to the transition. Economically these are of broader scale than public markets, with a vital role in the transition. Long-standing initiatives such as GRESB (formerly, the Global Real Estate and Infrastructure Sustainability Benchmarks),⁹ which offers a reporting platform that tracks climate change among other sustainability data points, is one example. Others include Novata (Novata, 2023)¹⁰ and the Institutional Limited Partners Association (ILPA),¹¹ both of which have developed new reporting platforms for private equity investors that include greenhouse gas emissions alongside other sustainability measures.

The recent initiatives by the SEC and European Parliament are making it possible for investors to play an active role in developing and assessing climate solutions. With decision-useful climate

data, investors will be able to make sound assessments from the climate risk–return analysis. Having investment-grade climate data will enable capital markets to develop climate risk–return tradeoff analytics—a Climate MVO.

But this is not enough, as evidenced by a recent report from TCFD that showed most companies were not reporting on all of the climate disclosures. Capital markets need the right economic incentives, such as carbon pricing, to bring private capital to the table. With the right price on carbon emissions, capital markets will be incentivized to invest in solutions that reduce emissions. Carbon pricing takes different shapes and forms with the most common and direct being emissions trading systems (ETS) and a carbon tax. Carbon credit is also used in many parts of the world, but the authentication of such credits has been called into question recently. As a result, some of the carbon credit and offset programs have been halted.

For economic incentives to work effectively and to avoid carbon leakage, there needs to be a global carbon market with one unified pricing scheme. Currently, about 25% of global emissions are covered by some form of regional carbon pricing schemes, which is far from ideal. In that aspect, we wholeheartedly welcomed the European Parliament’s adoption of the Carbon Package, one piece of which is the Carbon Border Adjustment Mechanism (CBAM), essentially a carbon border tax. Although it only applies to Europe, given the region’s economic integration with the rest of the world, this policy is expected to have a ripple effect on carbon pricing globally. More and more companies will come to realize that, instead of paying a hefty fee to the EU, it is in their best economic interest to adopt measures that reduce the carbon footprint of its products and services, such as by establishing regional carbon pricing schemes. By establishing a carbon market and investing in emission-reduction technologies,

these countries can keep the economic as well as environmental and technological benefits. CBAM could well be the last missing piece in establishing a global carbon market.

A carbon market would allow investors to monetize carbon emission reductions brought about by climate investing and thus present an additional source of financial return for investors. Carbon taxes such as the CBAM would also generate revenue that can be used not just in support of climate investing, but of a just transition. Carbon revenue can be reinvested in climate technologies and redirected to the parts of society that are most vulnerable to climate change, thus creating a benign cycle of climate investing. Ultimately, the correct assessment of climate risk would change the beta of the market.

There are significant social elements to climate solutions. Climate change has more adverse effects on women than on men and on the poor than on the rich, to name just a few. How do we ensure that we do not create climate inequality in our global fight against climate change, and ensure the transition to a low-carbon economy is just? This is the spirit of Europe's Social Climate Fund, a part of the European Parliament's recently established Carbon Package, as well as the US government's Justice40 initiative, established with a goal to deliver 40% of the benefits from federal investments in climate change and clean energy to disadvantaged communities. Evidently, carbon pricing and environmental incentives can achieve not only climate goals but also social and economic objectives.

4 In Search of a Greenium

With the passage of these regulations in 2022, we are encouraged by the significant progress on both missing I's. That being said, multiple parts of the energy transition ecosystem across both public and private markets are investable

and have been profitable. In addition to carbon pricing as an explicit source of return premium from investing in climate solutions, an even more important development is the awakening of the capital markets to the other sources of return premia that can be earned by providing capital to climate solutions (the "greenium"). Some have long suspected a return premium by investing in the environmental transition, but currently, most of this proof sits at the individual deal or company level. The trends which brought us to the inflection point are leading us to the turning point in financial markets—and ultimately to a "greenium". As we are in the very early stages of that potential being realised, this in turn poses several intriguing questions for the research agenda on climate finance.

We see multiple layers of the potential "greenium" that can entice capital markets to provide capital solutions to climate change. We start with the bottom-up perspective, the financial health of an investee company from which investors derive financial returns.

4.1 A bottom-up greenium

The most basic source of the greenium comes from a structural change that has been enabled by technological advances—the lowering cost of alternative energy sources and the effect on the bottom line. While traditional fossil fuels will continue to be a significant input to many industries and companies, the significant decrease in the cost of alternative energies such as solar and wind is driving companies to make transition investments to protect their competitive positions. Recent studies have found that companies with low carbon emissions exhibit excess returns (Kazdin *et al.*, 2021).

On top line revenue, there is emerging evidence that customers and consumers are asking companies to take actions to respond to climate

change, especially the younger generation—and they vote with their wallets (FCLTGlobal and University of Pennsylvania, Wharton School, 2022). In addition, a company's climate actions also impact its talent acquisition and retention costs. Studies show that when today's talent, especially young talent, look for a company to work for, in addition to compensation, they care about what the company stands for—and they vote with their feet.

Similarly, investors, public and private, are also increasingly demanding that investee companies take actions to mitigate the adverse impact that climate change poses to the company, in addition to positioning themselves to capture new business opportunities emerging from the transition to a low-carbon economy. Companies which are tackling sustainability challenges like climate change are being rewarded by investors with a lower cost of capital (MSCI, 2020) and the voting support (and otherwise) of their shareholders (Morningstar, 2023).

The growth of the green bond market and significant increase in the number of investment solutions that focus on energy efficiency, companies in the energy transition ecosystem and even the voluntary carbon offset market show both the increasing supply and demand of public markets solutions across varied risk and return profiles. However, a key source of the greenium is the investment opportunity in the private markets.

There are public companies that either demonstrate awareness of climate change or are already industry leaders in addressing the impacts of climate change. But public companies tend to be more established businesses investing in more mature technologies. Addressing climate change requires innovation and the development of new technologies, which tend to be riskier and require a longer runway. Public companies are typically under the pressures of quarterly earnings and even

executive rewards which are notoriously short-term. By contrast, private markets can offer the long-term financing and close governance alignment between investors and company boards to foster the commitment to innovation and scale. Because of these considerations, private markets will play a significant role in developing the necessary technologies thanks to their longer investment horizon and ability to effect material changes due to their control of the business.

Additionally, valuations of clean public companies are generally high, indicating a climate-compliance premium for investors. With the increased regulatory scrutiny globally, the public markets will start paying a premium when privately held climate-compliant companies go public. The long horizon in private market investing allows the time needed to prepare a portfolio company to be climate-compliant, and its private nature also shields it from the short-term noise often seen in public markets in the interim. The direction of travel in the public markets is clear—the timing is now for private companies to prepare.¹²

4.2 *The top-down greenium*

There is also the question of top-down (system-wide) sources of the greenium: the market premium (via carbon pricing), commitment premium (i.e., net-zero commitments by companies) and national security premium. We have discussed the market premium and the commitment premium; the last, however, will be addressed in further detail.

Market Premium: With a global carbon market being developed, investors will be able to capitalize on the carbon emission reductions from their investments. This presents an additional source of return for climate investing.

Commitment Premium: As more and more organizations and countries are making net-zero commitments along a specific timeline, the demand for climate solutions will continue to increase, which will in turn drive the premium that climate-solution investors can command.

Security Premium: Russia's ongoing war with Ukraine is a humanitarian crisis that has revived national security concerns for many countries, in particular energy security and food security. Solutions to these two national security concerns are aligned with climate solutions. For example, utility and transportation combined contribute more than 1/3 of GHG emissions, but in addition to reducing emissions, renewable energy also provides energy security. Adversaries generally cannot stop the sun from shining or the wind from blowing on your land.

Renewable energy generation technology is rather mature and renewable energy is economical in many parts of the world. However, the challenge lies with its intermittent nature. Thus, a key component of energy security is energy storage. Investments in energy storage will achieve dual goals: climate solutions and energy security. New developments in hydrogen technology also bring tremendous new potential to this arena.

Similarly, investing in food and agriculture can achieve the same dual goals. Food and agriculture contribute another third of GHG emissions globally. Even before the pandemic and the war in Ukraine, the world was on a path to massive food shortages due to population increase (and production inefficiencies like water and food waste). There are two main ways to increase food output: increase the size of arable land and/or increase crop yield. Deforestation is one of the main contributors to climate change so we are left with increasing crop yield as the only viable option. Investing in food and agriculture technologies (such as alternative meat, precision farming, and

vertical farming) can increase crop yield without using more land, fresh water or harmful chemicals, and allow countries to achieve food security by producing enough food within their national borders. Only a few countries are as fortunate as the US in having both food and energy security. Europe has food security but not energy. China is almost independent on food but not on energy. The Middle East is secure on energy but not on food. Singapore has neither. The heightened awareness of national security concerns provides an additional source of demand and return premium potential for climate solutions.

4.3 Averting the tragedy of the commons

To bring capital to climate solutions at the required pace and scale, investing in climate solutions must be an attractive commercial case that offers an opportunity for commercial success. For example, the adoption of renewable energy is accelerated by the fact that it is more economical than fossil fuels in many parts of the world. However, it is important to note that this was not the case at the beginning of renewable energy development. It got to where it is today with significant assistance. Technological innovations are rarely economical immediately. They need external assistance to reach economies of scale and become commercially viable on their own. This is especially true with respect to the development of renewable energy, since market-oriented mechanisms such as pricing of externalities are largely missing. The development of renewable energy, especially in the earlier days, benefited greatly from government policy support. In many cases, it was government incentives (e.g., carrots as subsidies and sticks as carbon pricing) that led to economies of scale and commercial viability—allowing the market (capitalism) to finally take over. We expect a similar trajectory for the development of a broader climate solution—a handshake between the visible hand

of the government in creating the market structure and providing the initial funding to innovation and the invisible hand of capitalism in directing the needed capital to climate solutions.

In addition to the war and the politicization of climate change, the concept of the tragedy of the commons is often cited as another reason for pessimism in our fight against climate change. Capitalism as we know it operates on Adam Smith's theory of the "invisible hand": that each individual looking after the best economic interest of himself/herself leads to the best result for the whole. However, invisible hands cannot save us from this tragedy of the commons. In fact, in his seminal paper "The Tragedy of Commons" (Hardin, 1968), Garrett Hardin proposed that when every person pursues his/her own best interests concerning the world's limited common resources, many of which are vital to our survival, he/she would deplete these resources, leading to an end result that is bad for everyone. The tragedy of the commons applies when the supply of the common good is not unlimited and the maintenance of the good is vital to our survival, such as the ability of our atmosphere to absorb GHGs without overheating the planet. Initiatives such as Climate Action 100+ provide a means through which diversified investors can manage their exposure to systemic risk through focusing on their common interest in managing market risks (Simpson, 2022).

Beyond national borders, climate change poses an existential threat to all of us and on a global scale. GHGs and climate change do not respect national borders or politics/geopolitics. Scientists predict that by 2050, global temperatures will rise 1.5 degrees Celsius, bringing sea levels higher by an average of 10–12 inches and leaving numerous coastal cities such as Mumbai, New York, Shanghai, and Miami at risk of being flooded. More than 1 billion people will be displaced as a

result of climate change. Already in 2022, the US had 18 separate disasters with damages exceeding \$1 billion, amounting to a total of \$165 billion for the year, according to the National Oceanic and Atmospheric Administration (Rott, 2023). As such, the common desire shared by all of us (regardless of race, religion, political party, and nationality) to survive should drive demand for climate solutions. If the function of the capital markets is to price in the future, this systemic risk needs to be understood in order to price that risk.

We know that the task of overcoming the tragedy of the commons, such as climate change, is daunting but possible. We have done so previously by granting property rights to common goods (e.g., by creating and granting fishing permits to fishermen in the management of fishery stock in New Zealand) and by establishing social contracts to save the atmospheric ozone layer. In 1978, four years after the scientific discovery of the damaging impact of chlorofluorocarbons on the ozone layer, the US became the first country to ban the use of such chemicals, an action quickly followed by other countries such as Canada and Sweden. In 1987, 26 nations and the European Union signed the Montreal Protocol to eliminate the use of chemicals that caused the depletion of the atmosphere's ozone layer. Today, all members of the United Nations have signed the Montreal Protocol and the atmospheric ozone layer is being restored.

We are pleased to note that the progress we have witnessed on climate change runs parallel with the solution proposed by Hardin and how we overcame the tragedy of the commons in the past. With the new regulations on climate data disclosure and carbon taxes, companies will be encouraged to adopt new technologies to reduce emissions and the capital markets will do what they do best—allocate capital. The capital markets will allocate the needed capital to climate solutions because it makes economic sense—and climate

investing generates good financial returns. It is an investment decision by investors.

5 Conclusion

In 2021, we argued in this publication that we were approaching the inflection point of climate investing. With developments in the past year that have filled in the gaps of the two missing critical components, information and incentives, we believe that we have now reached that inflection point to enter the third era of climate investing: enhanced return.¹³

Reaching an inflection point signifies that we can no longer extrapolate from the past to guide the future—we must think outside of the box. The energy transition can only be achieved with the combination of policy measures, enhanced information and continued technological innovation. The capital markets are at an inflection point that could bring rapid, transformative, and potentially disruptive changes in climate solutions, and investors must be ready to capture these investment opportunities. Said another way, not considering both climate risk and the investment opportunity created by the energy transition, which is already in progress, creates significant investment risk.

Some may question whether we can still win the war against climate change. Historical examples give an affirmative answer, as the climate crisis is not the first systemic challenge we have faced. Recent history has demonstrated that we can overcome the tragedy of the commons through the potential of human ingenuity, driven by a need to survive.

Endnotes

¹ American economist George Arthur Akerlof, Professor at the McCourt School of Public Policy, Georgetown University and Koshland Professor of Economics Emeritus, University of California, Berkeley, were awarded

the Nobel Memorial Prize in Economic Sciences in 2001 for analyses of markets with asymmetric information, along with Michael Spence and Joseph Stiglitz.

- ² Arthur Pigou argued that a tax equal to the marginal damage or external cost would reduce incentives.
- ³ In March 2022, the ISSB published Exposure Draft IFRS S1 General Requirements for Disclosure of Sustainability-related Financial Information and S2 Climate-related Disclosures, building on the recommendations of the TCFD and incorporating industry-based disclosure requirements derived from SASB Standards. The ISSB redeliberated the proposals after considering the feedback and in June 2023 issued IFRS S1 General Requirements for Disclosure of Sustainability-related Financial Information and S2 Climate-related Disclosures. Available at: <https://www.ifrs.org/issued-standards/ifrs-sustainability-standards-navigator/>.
- ⁴ California Senate Bill 253 and Senate Bill 261 were signed into law on October 7, 2023 and will be known as the Climate Corporate Data Accountability Act and Climate-related Financial Risk Act, respectively. Co-author Anne Simpson served on the California Governor's task force which led to the recommendation for both Senate Bills. Available at: Senate Bill 253 and Senate Bill 261.
- ⁵ European Climate Law, known as the European Clean Deal 28 June 2021.
- ⁶ Climate Action 100+ includes a compensation/remuneration policy in its benchmark. Available at: www.climateaction100.org.
- ⁷ Climate Action 100+. Available at: <https://www.climateaction100.org>. Co-author Anne Simpson is a co-founder and member of the Steering Committee.
- ⁸ The Glasgow Financial Alliance for Net Zero. Available at: <https://gfanzero.com>.
- ⁹ GRESB. Available at: <https://gresb.com/nl-en/>.
- ¹⁰ CEO Alex Friedman is a member of the board of Franklin Resources, Inc.; co-author Ben Meng is a member of Novata's ESG Advisory Council.
- ¹¹ Institutional Limited Partners Association. Available at: <https://ilpa.org>.
- ¹² In *Dissecting Green Returns* (November 2022), Lobos Pastor, Robert Stambaugh and Lucian Taylor highlight the recent outperformance of US green stocks and German green bonds but argue that their outperformance derives from climate risk aversion rather than expected future return. They forecast lower future returns of publicly traded green assets due to outperformance in the recent past. Available at Journal of Financial Economics Volume 146 Issue 2.

¹³ The first era was pure impact investing by philanthropic foundations; the second era was mitigating the risk of climate change. See S. Bose, D. Guo, A. Simpson (2019) *The Financial Ecosystem: The Role of Finance in Achieving Sustainability*. Palgrave Macmillan.

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What Are the Risks?

All investments involve risks, including possible loss of principal. Investors considering a strategy which focuses on investments related to reducing carbon emissions, should consider that changes to the regulatory landscape, physical climate related events, and market perceptions could have material adverse effect on such investments. Potential challenges to investments in renewable energy assets include cost-effectiveness, performance and reliability of renewable energy technology, changes in weather and climate and availability of government subsidies and incentives, as well as the potential for unforeseeable disruptive technology and innovations. Regulatory controls currently exist on investments in the energy, carbon dioxide and equivalent reduction emissions industries at the national, local, and international levels. Adherence to such controls, as well as unforeseen changes to regulation on such industries, due to shifting political landscapes or resulting from environmental events, will likely have impacts on climate related investments. Currently, there is not a universally accepted Environmental, Social,

and Governance standard, as such the manager may apply (or not apply) standards and considerations in their sole discretion. In the future, the various regulators may choose to implement more universal standards which could have an impact on climate related investments.

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