

Mainstreaming Climate

Case studies on innovations to integrate climate into financial decision making

Convening Partner

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Contents

- Aligning Portfolios with Paris (APWP)..... 4
- Disclosure - A New Approach 6
- Climate Risk for Asset Managers (CRAMS)..... 8
- Financial Centres for Sustainability (FC4S) 10
- Asset Data Provider 12
- Sovereign Physical Climate Risk (SPCR)..... 14



Foreword

On behalf of EIT Climate-KIC, thank you for picking up this booklet and taking time to read more about our engagements in what we call 'Mission Finance'. But what do we mean by this?

For finance to enable the scale and pace of change needed to prevent catastrophic climate change and achieving the 'well below 2°C' Paris agreement target, we will need to completely rewire our financial system. This means integrating climate into mainstream financial markets so that the impacts and effects of climate change become a necessary and accounted cost in the economy; creating strong, financial incentives to do something to reduce emissions; and rethinking market design and value economics in terms of circularity and planetary boundaries.

But how can we do this? What are the key levers of change? How can we unlock the massive financial and economic opportunity that this change presents? This is 'Mission Finance', and the booklet in your hands contains some concrete examples of where we are supporting innovative climate action solutions.

EIT Climate-KIC is Europe's largest public-private partnership established to catalyse systemic change through innovation. Our Theory of Change is focused on creating human agency across our community to help change systems, through exploration, experimentation and demonstrations to enable viable alternatives at scale. We work across whole value chains, applying leverage through finance, skills, and technology to influence behaviour, policy, governance, and market structures to catalyse deep decarbonisation and climate resilience in European societies and beyond.

The knowledge, know-how and diversity within our community is at the core of our value proposition and delivery model. It is our belief that communities that succeed in bringing about systems innovation are the ones that excel at understanding in detail the specificity of different contexts, and so we convene coalitions of stakeholders, create platforms for knowledge exchange and learning, and engage with policymakers and business leaders like you.

The global financial system, awash with capital, represents the enabling mechanism to unlock the trillions in risk-informed finance required to accelerate progress towards a net-zero emissions economy in the coming decades. However, currently, both short-term financial return incentives and the exclusion of climate risks and opportunities from the information used for commercial and financial decision making are preventing the realisation of climate-aligned efforts at the required scale in real world implementation in cities, land use and industry.

Our aim is to mainstream climate in financial markets, democratise climate risk information, and foster bankable green assets, especially in cities, where the need for risk-informed, 1.5 C compatible finance is more than \$90 trillion globally over the next 15 years. The 'Decision Metrics and Finance' theme at EIT Climate-KIC works with our community of partners to develop the metrics and financial mechanisms to redirect and mobilise the finance at this scale to drive the necessary structural and behavioural changes.

In short, there is no lack of finance but there is a lack of access and understanding of climate risk information and bankable green assets. We encourage you to take action and engage with EIT Climate-KIC colleagues to share your opinions and insights. Now is the time, our mission is clear and we welcome you to join us on the journey ahead.



Scott Williams

Director, Decision Metrics and Finance,
EIT Climate-KIC

Aligning Portfolios with Paris

InfluenceMap: <https://influencemap.org/>
2° Investing Initiative: <https://2degrees-investing.org/>

The Problem

Meeting the goals of the Paris Agreement to limit global warming can only be achieved with the development of a zero-carbon economy. This requires rapid redirection of financial flows away from the assets that make up carbon-intensive industries and towards low-carbon and climate change-resilient goods and services.

Institutional owners such as pension funds and insurance companies are the effective custodians of around half of all global assets, both tangible physical assets such as land, property and commodities and financial assets such as stocks and bonds. They have a major part to play in the transition to a low-carbon economy and will benefit from reduced risk profiles and high growth investment opportunities as a result.

The EU commission, the G20 Task Force on Climate-related Financial Disclosures (TCFD) and the UNPRI are strongly recommending that asset owners prioritise climate-related risks and opportunities. New legal requirements, for example from the UK Pensions Regulator, means doing so is becoming just as much about compliance as intelligent decision making.

However, fully mobilising the collective power of asset owners is complicated. Between them and the real businesses and structures they own sits a layer of intermediaries (such as investment consultants and asset managers) that both directly own and advise on the assets. This means half of all shares or bonds in listed companies are owned indirectly, packaged into other financial products like listed funds and investment trusts.

Most existing climate-related risk data on financial products like these has not been verified, is incomplete and difficult to access. This means that asset owners can only address the climate risks and opportunities to their portfolio in a piecemeal manner. The absence of reliable data prevents detailed decision making and restricts investors into making blanket actions like divesting from coal or mining stocks in favour of new investments in solar businesses. A joined-up, holistic approach that gives asset owners the information and tools needed to better understand where their portfolio stands in relation to climate risk and opportunities is needed. It is only when they have easy access to this information that they will be able to choose how best to re-allocate capital and accelerate the low-carbon transition.

The Solution

Aligning Portfolios with Paris (APWP), a project involving EIT Climate-KIC partners InfluenceMap and 2° Investing Initiative (2dii), sets out to provide owners with direct information on the climate-related characteristics of their assets, enabling them to amend their portfolios to increase climate resilience and take part in the growth of the low-carbon economy.

APWP has its origins in a pilot project underway at lead partner InfluenceMap, a London based non-profit that is working with 2dii, a think tank for developing climate-related risk metrics.

Together, these partners are using mandatory disclosures (made as part of annual reporting or to regulatory bodies) on fossil fuel reserves and assets to develop a unique dataset. Next, they are matching up this dataset with further disclosed data from various mainstream financial databases on the portfolios of 50,000 listed funds, 3000 fund managers and 2000 asset owners to provide information on the extent to which each is exposed to the carbon-intensive coal, oil and gas industries.

This innovative approach of combining two complex datasets, that although publicly available, are dispersed among many unconnected databases. It provides a simple but comprehensive map of the links between finance and the fossil fuel economy.

APWP seeks to scale up the pilot project to add all other carbon-intensive industries, in particular utilities, manufacturing and automotives and to produce a comprehensive map of the links between these carbon-intensive industries and the global financial markets that finance them. APWP will estimate each individual stock's carbon intensity and extrapolate this through the financial system in order to understand climate exposures at the fund level.

Going forward, APWP intend to make this data widely available to asset owners through the distribution of a dashboard-style user interface that enables investors to explore the key climate risks within their portfolio. Project partners also plan to develop a series of tools which will allow any asset manager to interactively alter the composition their fund or portfolio to better align with meeting the goals of the Paris Agreement. Their ambition is to eventually be able to embed this functionality as a widget that

can be used on the platform of any financial data provider.

With this information readily to hand, asset owners will be able to engage with their fund managers and consultants and assess how best to re-orientate their asset selection to maximise low-carbon investment opportunities, protect against climate-related risks and support the transition to a zero-carbon economy.

The Impact

APWP has huge potential to accelerate flow of assets to the climate-resilient economy by enabling every asset owner worldwide to align their portfolio with the Paris targets. Given that these major financial players are in charge of around half of all global assets, it could drastically shift the make-up of the global economy to one with significantly lower emissions.

All the data behind the APWP project is public, so can be made available to anyone without the approval of asset managers. Once developed, project partners intend to make data on the extent to which each of the funds considered are aligned with meeting the goals of the Paris Agreement freely available, for example, by publishing an online score card. Providing access to this level of transparency should encourage the financial community at large to place even greater emphasis on climate issues.

What's more, the APWP data can be easily integrated with mainstream financial data systems from the likes of S&P and Bloomberg and specialist databases such as the Climate Action 100+ list of companies. This expands the depth and breadth of the analyses tasks to which it can be applied, increasing its potential to drive competitive improvement across the finance sector.

Project partners believe that APWP's data output is a strong candidate for one of the official core metrics to be recognised by the EU in its 2019 recommendations for climate-related financial analysis.

EIT Climate-KIC's role

EIT Climate-KIC is providing funding to InfluenceMap and 2° Investing Initiative (2dii) to scale up the existing pilot project. It is also helping project partners to connect with the wider financial industry.

APWP fulfils multiple EIT Climate-KIC objectives by enabling the type of collaboration that is crucial to delivering a net zero-carbon economy and supporting innovation that can transform financial practices where it is most needed for deep decarbonisation.



Disclosure - A New Approach

CDP: <https://www.cdp.net/>

The Problem

Rethinking business and investment strategies so they are aligned with a low-carbon economy is crucial to limiting global temperature rise in line with the Paris Agreement on climate change.

Doing so requires a solid understanding of the extent to which businesses, investors and asset owners are exposed to products and processes with high carbon intensity. This requires accurate disclosure of climate and environmental risks and impacts and is a crucial first step for action. As CDP CEO Paul Simpson says, "You can't act on what you can't measure."

Through disclosure, companies become more aware of their relationship with climate change and the environment and tend to develop more efficient and less wasteful operations, reducing their carbon emissions and saving substantial amounts of capital relative to their industry peers (see figure 1)¹.

Over the past 18 years, CDP (formerly the Carbon Disclosure Project) has been working to make disclosure of climate and environmental data a business norm. It has built a world-leading disclosure system that collects data from over 7,000 companies with some 55% of global market capitalisation as well as from over 750 cities, states and regions. All this work is on behalf of a growing group of over 650 investors with assets of \$87 trillion, and 115 big purchasers.

The data derived from CDP's disclosure platform now sits at the very heart of the climate business ecosystem and is shared across multiple platforms including Dow Jones Sustainability Indexes, Bloomberg, MSCI ESG Research, Thomson Reuters, Google Finance, FTSE 100 index and with 115 of the world's top buyers. Large institutions such as The California Public Employees' Retirement System (which manages assets of over \$300 billion for 1.9 million people²) say that they now use CDP's data to inform all their analysis.

Yet with the landmark Paris Agreement and the recommendations of the TCFD³ creating a seismic shift in attitudes to climate action (98% of companies now have their boards engaged on climate⁴) the disclosure platform that CDP has used over the past 18 years to record climate and environment data is in need of an upgrade.

Going forward, it is important that CDP's disclosure platform not only helps businesses to report on their climate-related impacts but ensures that they do so in a standardised way, in line with the TCFD recommendations. It also needs to drill-down to the nitty-gritty of how individual businesses can best play their part in making the emissions reductions needed to meet the Paris Agreement. At the same time, it needs to provide the growing body of investors that rely on CDP's data with the metrics they need to better integrate climate data in their analysis and decision making.

The Solution

EIT Climate-KIC is supporting CDP in the upgrade of its disclosure system to ensure it responds to new market needs and the rising urgency of global environmental challenges.

There are three pillars to this:

Firstly, a new sector-by-sector focus ensures that each area of the economy can be analysed in a way most pertinent to its particular relationship to climate change. For example, when it comes to electric utilities, CDP focuses on emissions from energy generation and use of low-carbon technologies, while when analysing auto manufacturers it looks more closely at carbon efficiency of vehicles produced and investment in low carbon technologies. This allows CDP to drill down to the performance metrics that highlight the greatest risks, opportunities and resilience issues and permits greater comparability between and within sectors.

Secondly, CDP's upgraded disclosure system is completely aligned with the requirements of the TCFD – the leading global voluntary framework, initiated by the G20 and led by influential business leaders Michael Bloomberg and Mark Carney. This enables companies to report using a leading global framework that is designed to help them develop a climate change strategy as well as provide useful information to their investor base.

Lastly, it assesses how companies are planning for the transition to a low-carbon world. It does this by using forward-looking metrics, such as 'scenario analysis', to help organisations understand how they might perform under a range of different future business and climate conditions. In doing so, it should encourage them to put the systems in place

to help drive down emissions to a level that will not only support their bottom line but have a meaningful impact at a global level.

Dr. Tony Rooke, Technical Director of CDP says, "We have come through the era of transparency, looking at more forward-looking metrics to determine how companies take climate risks and opportunities on board to deliver the low-carbon transition and be successful – it's a win for business and a win for the planet".

The Impact

The 2018 reporting season was the first time CDP put its new state of the art reporting system into action and are steadily rolling it out across sectors to ensure the industries most crucial to mobilising a low-carbon economy – energy, transport, materials, and agriculture are covered first.

Initial signs are positive; not only are a greater than ever number of companies using the new disclosure system, but preliminary analysis shows that the new TCFD questions have been well met by a large majority of respondents.

Looking forward, there are proposals to extend the system to include banks and insurers, highly complex entities with environmental impacts that spread far beyond their direct operations. It intends to do this in a way that complements the existing UNPRI analysis of asset managers and asset owners and altogether covers a much larger chunk of the economy, with greater climate impact.

EIT Climate-KIC's role

In addition to co-funding the upgraded disclosure platform, EIT Climate-KIC is organising workshops for CDP with other partners to help them understand how to best use their data. This is not only increasing overall EIT Climate-KIC partner expertise but providing partners with a unique dataset that can be used to support their own solutions for the transition to a low-carbon economy. This helps extend the use of the data above and beyond the immediate CDP network and allows it to make a far broader impact in the global effort to meet the Paris Agreement.

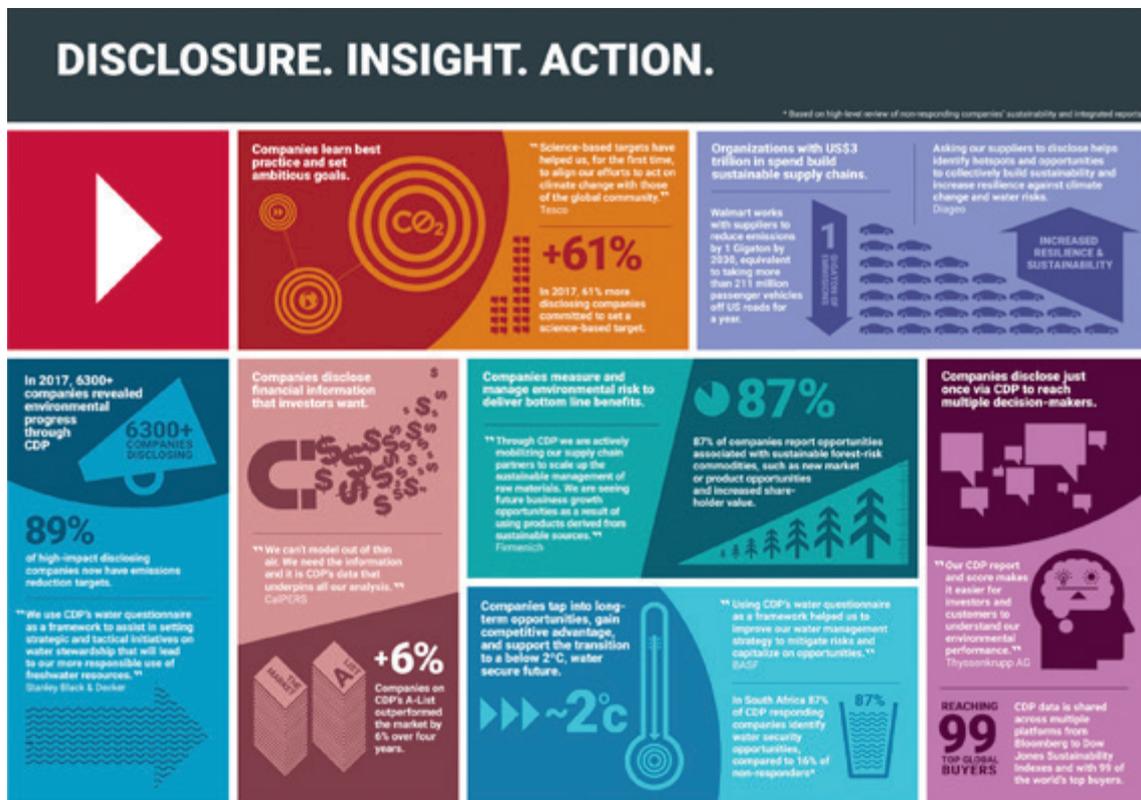


Figure 1: Benefits of Disclosure

¹ Maastricht University and Oxford University Smith School, 2018, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2719665

² CalPERS, 2018

³ The leading global voluntary framework, initiated by the G20 and led by influential business leaders Michael Bloomberg and Mark Carney

⁴ CDP 2017

Climate Risk for Asset Managers (CRAMS)

Carbon Delta: <https://www.carbon-delta.com/>

The Problem

Climate change is already affecting the economy and with it the financial sector. Extreme weather events are becoming increasingly frequent and severe under the influence of climate change and the new normal of heat waves, hurricanes and floods are damaging capital stock, reducing productivity, and impacting inflation across the complex global systems of food, energy production, transport and finance. It is estimated that the cumulative effects of climate change could lead to a 1% reduction in GDP growth per year¹; each and every year. Hurricane Florence alone caused up to \$50 billion economic losses in 2018.²

Yet, while climate change increases investment risk, it also produces new opportunities, for example through growing markets for cleaner energy production and sustainable food technologies.

Asset managers need to quickly get to grips with the impacts that climate change is having on their investment portfolios. They need to understand what the future impacts of a shifting physical environment, with more incidences of extreme weather, are likely to be, and start to analyse how climate-related regulation will affect their basket of assets. In doing so, they will not only safeguard against risk but can begin to take advantage of the huge opportunity they have to accelerate the growth of a low-carbon economy. It is clear that asset managers will play a key role in rewiring the financial system to address climate change.

The policy landscape increasingly favours investors that prioritise climate change. The coming into force of the Paris Agreement in November 2016 means that asset managers can be certain that nearly every country in the world (190 countries in total) is committed to supporting the development of business activity in line with a long-term goal of stabilising the climate. Since 2017, the recommendations of the G20 Financial Stability Board's Task Force on Climate-related Financial Disclosures (TCFD) has provided investors with a standardised framework designed to allow them to best assess climate related-risks and opportunities.

However, climate change is regulated by complex

interactions among components of the earth's systems, such as ocean currents, atmospheric circulation and different land surfaces. Although these earth systems are already impacting investment performance, many asset managers are only just beginning to understand the fundamental relevance of earth science to financial performance.

The CRAMS project aims to speed up the realisation, empowering financial institutions with the tools necessary to understand the likely impacts of climate change on their investments, protect their assets and also identify new low carbon investment opportunities.

The Solution

Before 2016, the only climate-related activity carried out by most investment houses was basic carbon foot printing – backward-looking analysis that provided little in the way of a useful tool for portfolio analysis and strategy. A forward-looking approach was needed to enable investors to reduce climate-related risks to their portfolios and capitalise on new low-carbon investment opportunities.

Over the past couple of years, a specialist team of software developers and climate change experts at Carbon Delta has been working on a Climate Value-at-Risk (Climate VaR™) model, a unique tool that takes climate change risk data, processes it and presents it to investment managers in an easy to understand format that can readily be used in portfolio analysis.

In a nutshell, Climate VaR™ takes 22,000 companies and models those firms' exposure to climate risk, including their listed equity and fixed income securities. It looks at both 'transition' risks, such as climate policy scenarios (like the probable costs for companies to comply with emissions limitations), and 'physical' risks which evaluate the impact of extreme weather hazards such as heat, cold, wind, wildfires and hurricanes. The model also incorporates opportunities, such as new low-carbon technologies, cleaner methods of energy production and new markets likely to open up as a result of changes in climate. It then combines each stock's exposure to both risks and opportunities and predicts the impact that these will have on a particular stock over the

next 15 years. Put differently, it looks at what a particular company might be worth today and compares it with likely value after the impact of climate-related costs, or indeed profits, incurred over time.

The result is that investors can assess future costs and revenues related to climate change impacts across their whole portfolio and understand what these might mean for the current valuation of each security. This enables them to take the necessary action for portfolio performance optimisation, risk management and regulatory reporting purposes.

The data that sits behind the Climate VaR™ model comes from some of the most reputable climate and economic research institutes in the world. Physical scenarios are based on methodologies developed in partnership with the renowned Potsdam Institute for Climate Impact Research (PIK). Other data comes from over 50 sources, including the European Patent Office and the International Renewable Energy Agency (IRENA).

The Impact

By providing climate data in a format that asset managers can easily utilise, the Climate VaR™ model immediately enables them to make the changes necessary to build climate resilience across their portfolios and realise the opportunities they have to redirect capital to low-carbon products and services.

For example, AXA, a group with over €750 billion assets under management, has been working with EIT Climate-KIC partner Carbon Delta to assess future portfolio level impacts from climate change. In April 2018, AXA released its first TCFD aligned report using Carbon Delta's Climate VaR analysis to help uncover climate risks and opportunities within their investment portfolios.

The recommendations of the TCFD have underpinned a surge in interest in the CRAMS project this year. David Lunsford, Head of Development at Carbon Delta emphasises "everything to do with our model is 100% in line with TCFD". In 2017, Carbon Delta was using its Climate VaR™ tool to support three asset managers on their TCFD report, in 2018, it is working with no less than twenty.

However, the only way Carbon Delta can ensure market adoption at the scale and within the timeframe to deliver the Paris Agreement is by developing an 'off the shelf' tool. To this end, it is working with thirteen leading asset owners,

insurers, and asset management firms to develop an online reporting tool that provides investors with direct access to climate scenario analysis.

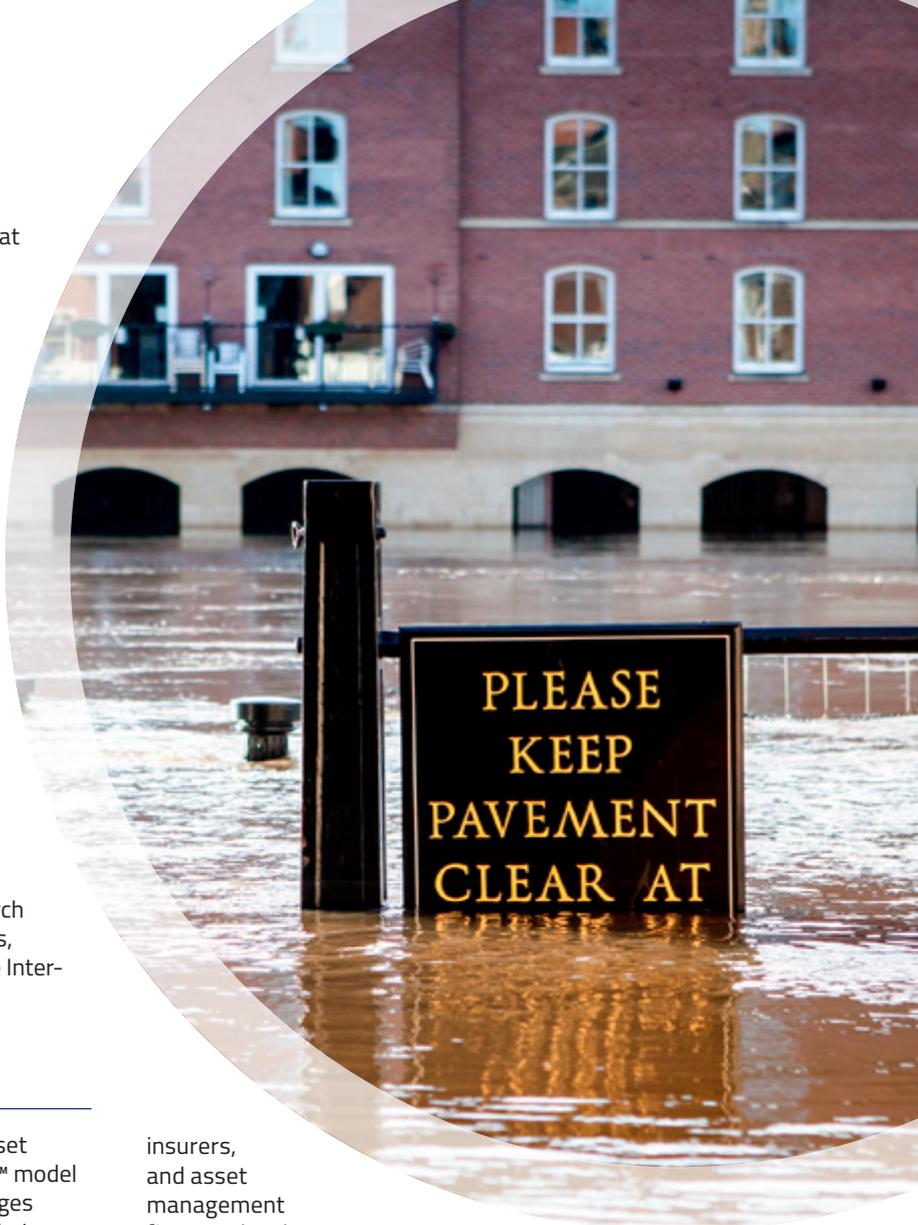
Carbon Delta expects the rate of uptake from asset managers to further accelerate through 2019, particularly if the TCFD releases even clearer recommendations so there is no excuse left for asset managers to side-line the climate issue. Lunsford emphasises that further development of industry standards is also needed for comprehensive integration of climate to become a portfolio must.

EIT Climate-KIC's role:

EIT Climate-KIC has worked with Carbon Delta to grow the CRAMS project from a collection of ideas to a solution that is transforming the asset management industry by mainstreaming climate analysis and democratising climate risk information. "We have had a very successful journey together," says David Lunsford pointing to EIT Climate-KIC's support in promoting the CRAMS project, arranging speaking opportunities and being a useful overseer in making sure deliverables are met on time.

¹ Schroders 2016 <https://www.schroders.com/nl/sysglobalassets/digital/us/pdfs/the-impact-of-climate-change.pdf>

² WSJ, September 2018 <https://www.wsj.com/articles/moodys-pegs-florences-economic-cost-at-38-billion-to-50-billion-1537572161>



Financial Centres for Sustainability (FC4S)

Sustainable Nation Ireland: <https://www.sustainablenation.ie/>
FC4S: www.fc4s.org

The Problem

Around €177 billion additional investment every year from 2021 to 2030 is required in Europe to deliver the emissions reductions needed to limit global temperature rise as set out in the Paris Agreement.

Achieving this requires a huge redirection of capital flows to low-carbon and climate-resilient goods and services. The EU Commission's High-Level Expert Group emphasises that financial centres, which have a powerful clustering effect across different market segments and sectors, are key to achieving this by using their influence to mobilise institutions and create networks of innovative products and services

In order to make this happen, the Commission has proposed a legislative package which recommends a unified EU classification system, clarification on investors' duties and disclosures, low-carbon benchmarks and better advice to clients on sustainability. It is important that financial centres take on this legislative package in a collaborative effort to mainstream low carbon finance and mobilise the flows needed to deliver the Paris Agreement.

A growing number of European financial centres, such as Dublin, London, Paris, Frankfurt, Milan, Stockholm and Luxembourg, are already stepping up to the challenge and taking strategic action to mobilise climate action. However, most European financial centres have yet to respond to the climate agenda, so scaling up efforts to include those not yet engaged is becoming increasingly urgent.

The Solution

In September 2017, the United Nations (UN) launched the Financial Centres for Sustainability (FC4S) initiative, which provides a network and framework for promoting green and sustainable finance. Under this umbrella, 16 member centres from across the world from Astana to Zurich have agreed a shared climate and sustainable development strategy. This involves stimulating strategic action, boosting market integrity, supporting implementation, fostering innovative solutions and exploring models to connect financial centres with real economy needs.

To this end, EIT Climate-KIC has assembled a consortium of partners to launch the FC4S Europe project. The European Hub of the FC4S is a part of EIT Climate-KIC's wider innovation ecosystems and systems innovation work and part of a joined-up 'portfolio' of finance interventions. FC4S Europe is led by Sustainable Nation Ireland and supported by the South Pole Group, I4CE, Imperial College Business School, the Carbon Bonds Initiative and the Frankfurt Green & Sustainable Finance Cluster. FC4S Europe will focus on supporting the development of financial innovation by applying the UN FC4S in practice with Europe's leading financial centres. Unlike other sustainable cities movements, FC4S has a unique focus on the local financial ecosystem and on linking up the private and public sectors to provide impact at the scale needed to enact real change (Figure 2).



Figure 2

FC4S Europe is launching a collaborative 'Open Innovation Platform' to serve as the foundation to accelerate green and sustainable finance across and between centres with efforts concentrated on five themes including strengthening Strategic Commitment: stimulating strategic action by financial centres through guidance, assessment tools and data systems; boosting Market Integrity: bringing clarity and convergence on key definitions, taxonomies and classifications, as well as endorsing international standards. 'Building Capacity' will strengthen the capacity of developing country financial centres, supporting implementation, and strengthening the skills base of financial practitioners.

'Fostering Innovation' pools experience on critical issues, such as how to leverage fintech and digital finance solutions for sustainable finance markets. 'Serving the Real Economy' explores models to connect financial centres with real economy needs, such as Green Finance Zones.

The platform will also provide European financial centres with a six-step process to support their transition to a state where they are aligned with the Paris Agreement (Figure 3).

The Impact

The long-term vision of the FC4S Network is rapid global growth of green and sustainable finance across the world's financial centres, supported by strengthened international connectivity and a framework for common approaches.

Most financial centres are still at early levels of adoption – somewhere between Level 1 and Level 3 of the assessment framework shown in Figure 2 above. work to date has focused on laying the foundations for the platform to provide the support needed to spur centres into action. Once a centre has achieved significant levels of awareness it is hoped that progression up the various levels will take place fairly rapidly, as is needed to deliver the Paris Agreement.

Momentum is building quickly, driven in part by the recommendations of the G20 taskforce on Climate-related Financial Disclosure (TCFD) and recent G7 pledges for continued action on the 2030 Agenda for Sustainable Development. Collaborative projects are rapidly materialising, for example, an executive education course to motivate senior financial leaders, held at Imperial College London.

Stephen Nolan, CEO of Sustainable Nation Ireland says "We have noticed a real uptick in interest in 2018 and are now talking to major institutions across financial centres which are deeply concerned about climate from a risk perspective". This is good news for FC4S Europe and should help to propel centres more quickly towards Level 5.

In the next year or so, FC4S will lay the foundation for a number of projects and collaborative initiatives. These should be similar in kind to the first Irish green bond, set to be issued during the final quarter of 2018 to raise money for projects with environmental benefits, and the Green and Sustainable Finance Cluster Germany which has analysed the current state of sustainable activities in Frankfurt and other European financial centres as a foundation for action.

EIT Climate-KIC's role

EIT Climate-KIC has been fundamental to the launch of the FC4S Europe project, both in terms of financial backing and also providing 'hands on' assistance, setting up collaborations, ensuring the centre makes substantial progress across the financial ecosystem and supporting other bodies, including the Climate Bonds Initiative, the Sustainable Digital Finance Alliance, the Sustainable Stock Exchange Initiative, the Principles for Responsible Investment and the UNEP Finance Initiative to act as a working group for FC4S Europe. This collaborative effort should help accelerate the rate at which FC4S Europe begins to make tangible, scalable impact and becomes a defining force in driving the zero-carbon economy.

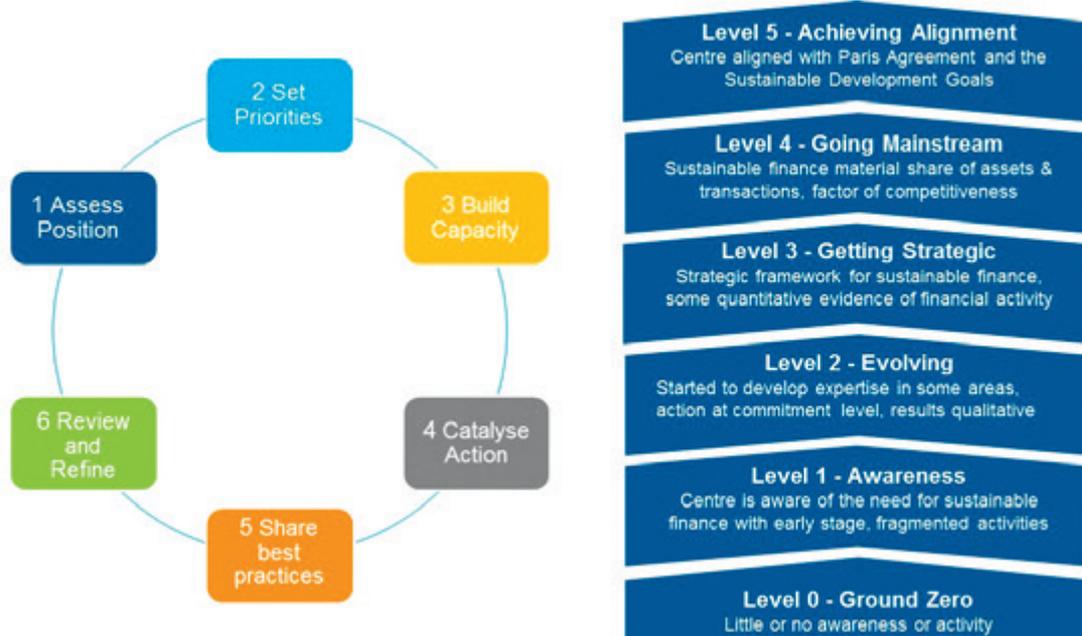


Figure 3

Asset Data Provider

2° Investing Initiative: <https://2degrees-investing.org/>

The Problem

Meeting the goals of the Paris Agreement to limit the detrimental impacts of climate change to the economy, society and the environment can only be achieved if the global financial sector is able to re-direct capital flows towards scaling low-carbon investments.

As it stands, there is a sizeable gap between supportive climate policies, such as those from the EU Commission¹ and the G20², and the availability of accurate, reliable data needed to provide financial actors with the metrics required to conduct the huge quantity of projects needed to grow the low-carbon economy.

To date, the bulk of climate-related financial analysis has relied on data and information disclosed by companies. This data is collected by a number of research organisations and housed in a variety of formats across different databases. As a result, investors looking to integrate climate change into their analysis have to go to a number of sources in order to gather the information needed to draw up a clear picture of the climate-related risks and opportunities for each stock. For example, information on emissions intensity might come from one data source and capital expenditure on low carbon technology from another. Even when investors have gathered all the information available it is often incomplete, inconsistent and insubstantial for informed decision making.

The Solution

It is vital that accurate, reliable and standardised data on the climate-related risks faced by the real economy are compiled and made accessible to enable climate considerations to form a substantial part of all financial analysis.

To meet this gap in the market, EIT Climate-KIC is supporting the 2° Investing Initiative (2dii), a non-profit think tank specialised in climate finance, in a project designed to improve the reliability and availability of asset-level climate data. This project, 'Asset Data Provider' builds on 2dii's research to date to provide verifiable asset-level data, for integration into climate-related financial analysis.

This kind of asset-level data is thought to provide a superior solution to disclosed data on a number of levels. Rather than relying on businesses self-reporting on climate-related metrics, it is sourced from leading business intelligence providers, which draw on certified records such as annual reports, to aggregate data on physical assets and related economic operations. This type of data is that it is geo-specific, highly granular (for example with information on productivity and ownership) and nearly universally available (see Figure 4).

The Asset Data Provider project's initial onus is to gather data on the physical assets most significant to the carbon-based economy such as coal mines, oil and gas fields and steel and cement plants. The



	Oil	11,900+ oil fields	1,600+ companies
	Gas	10,400+ gas fields	1,300+ companies
	Coal	3,200+ coal mines	1,000+ companies
	Power	114,800+ power plants	23,500+ companies
	Automotive	7,500+ production lines	1,600+ companies
	Aviation	32,000+ aircraft	1,300+ companies
	Shipping	44,400+ vessels	1,000+ companies
	Cement	2,900+ cement plants	1,600+ companies
	Steel	3,300+ steel plants	1,600+ companies

Figure 4: Example data coverage

Asset Data Provider team has already aggregated datasets estimated at covering at least 50% of scope 1 emissions and 70% of scope 2 emissions associated with investment portfolios, logging some 230,000 assets covering fossil fuel, power, transport and industrial sectors, including 10,900 oil fields, 10,400 gas fields and 2,900 steel plants. While data accuracy is a valid concern, early analyses of a sample of power assets shows average accuracy rates superior to 90% when cross-checked with other sources.

The depth, reliability and granularity of this data means it can stand up to the demands of detailed quantitative research carried out by investors. Metrics such as production numbers and development and expansion capital provide the kind of reliable data that is needed for incorporation into conventional financial analysis.

The Asset Data Provider project will be governed by a multi-stakeholder board with 100% of the profits reinvested or re-granted to 3rd parties. This will enable the huge uptick in interest in this kind of data from large financial players to be met in a commercial way, but at the same time will ensure the data remains independent and keeps pace with market developments.

The Impact

High-quality datasets like these can be used to inform the climate change research of any entity interested in the carbon-based economy and should form a stronger, more resilient backbone to the financial analysis that is driving the low carbon market. End-users will be armed with the data they need to properly analyse portfolio risk and develop financial products, such as low-carbon indexes, and services, such as scenario analysis.

Additionally, the data will enable more accurate climate-related reporting by the entities that directly own and/or run the assets themselves, enabling superior risk analysis and target setting.

The datasets have already been successfully road tested with over 1000 investors. This included using conducting climate risk scenario analysis, particularly focusing on thermal coal investments, for over 650 insurance companies in California. It also involved

quantifying the extent to which 79 investors, representing around two-thirds of the Swiss insurance and pension fund market, are aligned with the Paris Agreement.

Going forward, the intention is to expand its coverage to include sectors such as petrochemicals, real estate and agriculture, and other asset classes such as private equity and project finance.

EIT Climate-KIC's role

EIT Climate-KIC is part-funding the development of the the Asset Data Provider project. In addition, it is working to help refine the business plan and the governance model to ensure the data and research remains fully objective. EIT Climate-KIC is also involved with developing materials to help raise awareness of the Asset Data Provider project and assist with speedy adoption of the new data.

¹ The EU High-Level Expert Group on Sustainable Finance

² Task Force on Climate Related Financial Disclosures (TCFD)



Sovereign Physical Climate Risk (SPCR)

Beyond Ratings: <https://beyond-ratings.com/>

The Problem

After the financial crises of 2008, when credit ratings agencies were criticised for giving unwarranted high ratings to risky securities, it became clear that the standard risk analysis used by the likes of Standard & Poor's, Moody's and Fitch was no longer adequate.

At the same time, the need to integrate climate-related risks into financial decision making was becoming more apparent. Ten years later, the major credit risk agencies still do not give full consideration to these risks within their analysis.

In 2018, climate is of paramount importance to the financial industry. The cost of not considering climate risk is becoming steep, with extreme weather, made worse by climate change, costing around € 12.8 billion a year for EEA member states¹. Increased incidences of extreme weather are also starting to significantly impact the value and insurance premiums of physical assets. As a result, there is a growing urgency to limit the extent to which climate change is detrimental to the wider economy.

The Solution

The Sovereign Physical Climate Risk (SPCR) project aims to integrate climate change issues into financial ratings of sovereign states.

EIT Climate-KIC is supporting Beyond Ratings, an independent financial services provider specialised in the macro-financial assessment of sovereign risks, to launch a new credit ratings agency that will incorporate physical climate change impacts into the financial ratings of 146 countries. By providing a clear assessment of climate change risks at a national level, the SPCR project should encourage capital flow to nations with lower levels of climate-related risk. In doing so, it will incentivise higher risk countries to speed up their transition to a higher level of resilience to climate change.

To this end, Beyond Ratings is developing an international network of experts composed of academics, research centres, foundations, and think tanks

to develop a new credit risk rating methodology. To ensure this is based on the most up to date and accurate collective intelligence, Beyond Ratings is working closely with Eidgenössische Technische Hochschule Zürich (ETH) and Association pour la Promotion de la Recherche sur l'Economie du Climat (I4CE) and several international Development Banks. ETH is responsible for providing data and models with regards to physical climate change risks and I4CE assisting with a regular external review of the credit risk methodologies developed.

The new credit rating agency will bring existing methodologies for calculating sovereign risk up to date by applying non-financial physical climate risk factors to distort more conventional metrics like GDP, inflation and debt.

To date, Beyond Ratings and partners have focused on identifying the key macro-economic variables likely to be impacted by physical climate risks. This includes direct damage to public assets, loss of revenue or use of emergency funds.

At the same time, project partners have undertaken extensive statistical work to create methodologies to include these impacts in a sovereign bond creditworthiness scoring model.

A variety of data sources will form the basis of the credit risk methodology, allowing the most appropriate coverage of industrial sectors key to national level physical climate risk. For example, a number of agriculture-related risks might be derived from detailed historical databases available from organisations such as the Food and Agriculture Organization of the United Nations (FAO), whereas data on the real estate sector might come from in-depth remote sensing.

Going forward, partners will work to aggregate data on physical climate risk exposure up to the national level and use the specialist methodologies devised to determine sovereign bond creditworthiness scores.

The final rating methodology will be transparent, regularly audited by an external scientific committee and continuously improved thanks to a network of partner organizations with recognized international expertise.

It is expected that the new credit rating agency will have gained compliance with the Financial Services and Markets Act 2000 by early 2019, with official launch within the next couple of months.

The Impact

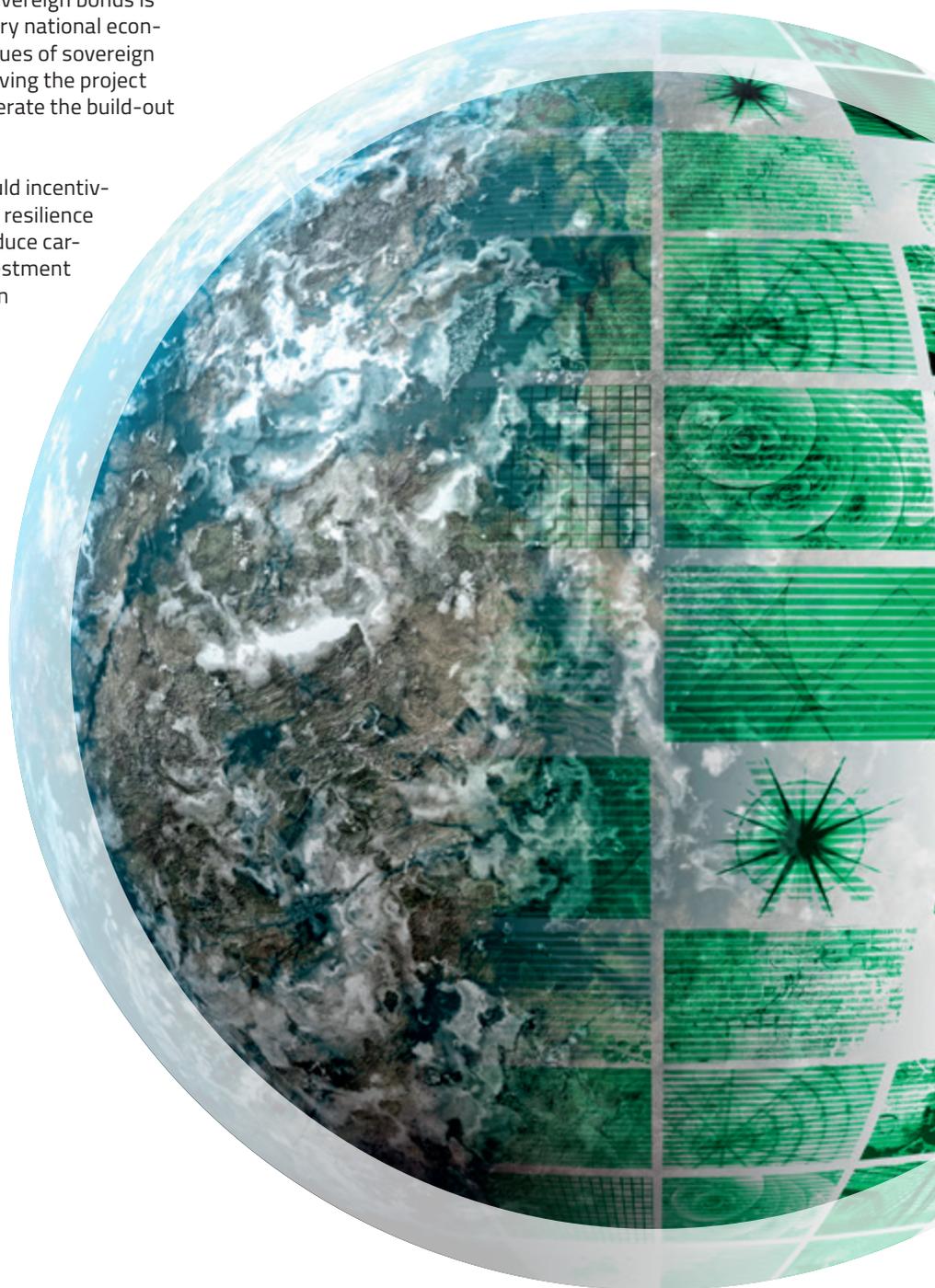
The Sovereign Physical Climate Risk project will create the ever first global ratings agency to explicitly integrate physical climate and energy-related risks into sovereign risk. The issue of sovereign bonds is crucial to the growth of nearly every national economy worldwide; in 2017, global issues of sovereign bonds totalled \$ 23,000 billion², giving the project the potential to significantly accelerate the build-out of the low-carbon economy.

If successful, the new ratings should incentivise states to improve their climate resilience through appropriate policies to reduce carbon emissions and encourage investment in climate-resilient and low-carbon infrastructure and services.

The new credit risk agency has the potential to be competitive as well as disruptive. Project partners expect the ratings to prove superior to those produced through conventional methodologies and capture market share from the incumbent ratings providers. They should also encourage other rating agencies to better integrate climate change impacts.

EIT Climate-KIC's role

In addition to co-funding the project, EIT Climate-KIC has worked with Beyond Ratings to find the most appropriate research partners at each stage. By linking up academics, research organisations and financial actors, EIT Climate-KIC has provided the SPCR project with the expertise needed to have a strong opportunity of disrupting conventional ratings and accelerate the low carbon transition at the global scale.



¹ Between 2010 and 2016, EEA, <https://www.eea.europa.eu/data-and-maps/indicators/direct-losses-from-weather-disasters-3/assessment-1>

² Thomson Reuters Eikon (provided by Beyond Ratings)



www.climate-kic.org