SUSTAINABLE FINANCE PROGRAMME

UNIVERSITY OF OXFORD

Summary of Proceedings

Impact and ultra-transparency: measuring and managing the impacts of investments and investee companies on climate change and the SDGs

7th Sustainable Finance Forum & 2nd ADI Annual Meeting

Waddesdon Manor, 7-8th June 2018

In Partnership with:

ROTHSCHILD FOUNDATION

KR foundation

Author: Elizabeth Harnett | Conor Hickey | Lucas Kruitwagen | Matthew McCarten | Xiao Zhou

Table of Contents

About the Oxford Sustainable Finance Programme

The Oxford Sustainable Finance Programme at the University of Oxford Smith School of Enterprise and the Environment is a multidisciplinary research centre working to be the world's best place for research and teaching on sustainable finance and investment. We were established in 2012 to align the theory and practice of finance and investment with global environmental sustainability.

We research environment-related risks, impacts, and opportunities across different sectors, geographies, and asset classes; how such factors are emerging and how they positively or negatively affect asset values; how they might be interrelated or correlated; their materiality (in terms of scale, impact, timing, and likelihood); who will be affected; and what affected groups can do to pre-emptively manage risk. Since our inception we have conducted pioneering research on stranded assets and continue to undertake significant research on the topic.

The production of high-quality research on the materiality of environment-related factors is a necessary, though insufficient, condition for these factors to be successfully integrated into decision-making. Consequently, we develop the data, analytics, frameworks, and models required to enable the integration of this information.

We are pioneers and advocates of 'spatial finance', a term we have coined that refers to efforts to bring geo-spatial capabilities into financial analysis. As such we are developing new asset-level datasets through data science and combining these with new approaches to spatial analysis, scenarios, and stress tests.

We also research barriers to the adoption of practices related to sustainable finance and investment. This includes the role of governance, norms, behaviour, and cognition, as well as policy and financial regulation in shaping investment decisions and capital allocation.

The Oxford Sustainable Finance Programme is based in a world leading university with a global reach and reputation. We work with leading practitioners from across the investment chain (including actuaries, asset owners, asset managers, accountants, banks, data providers, investment consultants, lawyers, ratings agencies, stock exchanges), with firms and their management, and with experts from a wide range of related subject areas (including finance, economics, management, geography, data science, anthropology, climate science, law, area studies, psychology) within the University of Oxford and beyond.

Acknowledgements

We would like to thank the participants and speakers, as well as forum partners: The Rothschild Foundation and the KR Foundation. This was the 7th Sustainable Finance Forum and it is part of a series that aims to bring together a select number of key people from across the financial system to better understand drivers and barriers to the development of a sustainable finance system in globally.

University of Oxford Disclaimer

Introduction

The University of Oxford's Smith School of Enterprise and the Environment and The Rothschild Foundation, together with the KR Foundation, organised the 7th Sustainable Finance Forum on the 7-8th June 2018. These forums are designed to break down barriers to sustainable finance and develop dialogue within and throughout the economic system.

This Forum followed six earlier forums: i) a general investigation of topics connected to stranded assets (March 2014); ii) a more focused event concentrating on divestment by endowments of their financial holdings in the fossil fuel industry (September 2014); iii) a forum to explore the role that investment consultants play in promoting action by asset owners on matters of environment, climate, and sustainability (March 2015); iv) a forum to examine how environment-related risks might materialise in ways that could impact financial stability (October 2015); v) a forum on the state of, and opportunities for, sustainable investment among ultra-high net-worth individuals (April 2016); and vi) an investigation of the opportunities to use asset-level data to measure environmental risk and opportunity (April 2017).

The 7th Forum in June 2018 was focused on monitoring and measuring the impacts of investments and investee companies on climate change and the SDGs. Accurate information on risk and impact is needed to inform decision-making throughout the socio-economic system. The Forum therefore examined the latest developments in impact measurement and tracking technologies, and explored how to reduce information asymmetries in impact investing. This included a focus on how new approaches might be applied in emerging and developing markets, as well as exploring how existing technologies could be better utilised in new and current contexts.

The second day of the Forum hosted the 2nd Annual Meeting of the Asset-level Data Initiative (ADI), which was inaugurated at the 6th Sustainable Finance Forum in April 2017. This consisted of presentations and roundtable discussions focused on exploring opportunities to realise the ambition of making accurate, comparable, and comprehensive asset-level data tied to ownership publicly available across key sectors and geographies. ADI was established in 2017 by five founding partners: University of Oxford, Stanford University, CDP, World Resources Institute, and 2° Investing Initiative.

Key Findings

Measuring greenhouse gas emissions and carbon lock-in

The first session examined the measurement of carbon emissions and carbon lock-in, exploring the use of earth observation techniques and asset-level data, opportunities for forward-looking climate risk assessments, and the measurement and management of carbon risk exposures in investor portfolios. Current earth observation technologies are too coarse to measure point source emissions, but this is expected to change in the next 5 years. With current methodologies, a combination of bottom and top down methods of assessing companies and assets is an imperative, coupled with third party verification.

Measuring Sustainable Development Goal impacts locally and globally

This session focused on Sustainable Development Goals (SDGs), exploring innovation related to the measurement of the SDGs and how SDGs translate into different investment strategies and portfolios. It is widely recognised that investors will be needed to fill the funding gap that exists towards achieving the goals, but that barriers remain, notably related to challenges surrounding the measurement and attribution of impact. There is a growing trend to map portfolios onto the SDGs. Investors want low-cost ways of investing in impact, and this places greater emphasis on the need for passive investment tools linked to the SDGs, such as the development of indices or benchmarks.

Supply chain transparency and network analysis

This session explored the need to increase the transparency of supply chain networks. There is enormous potential impact for investors through encouraging better management of supply chains; this could meaningfully reduce costs, improve capital and increase shareholder value. The opacity of global supply chains is a key barrier to corporates and investors meeting their sustainability targets and their capacity to adapt to climate. There is a need for new measurement of supply chains internationally, particularly shifting from a focus on carbon emissions towards broader climate and sustainability risks and opportunities. There is a growing trend towards the use of big data and sensory technologies to track supply chain impacts, which can drive transparency and catalyze improvements in production practices, policies and the governance of supply chains.

Originating impactful investments reliably and at low cost

This session explored key issues related to initiating more impact investments globally. The issues examined include: how to bridge the gap between investable capital and potential projects, and how to utilise the advancements in technology, processes and data availability to find more deals to make in the impact investing space. One of the key challenges is finding investable projects for clients across all asset classes that cover the spectrum of SDGs. Since most projects are small and long term in nature, new solutions are needed to aggregate these smaller projects or access more patient capital for these smaller projects. Potential solutions include blended finance tools, and improving evaluation of risk and value. There is also the potential for block chain to provide an alternative source of financing for natural asset investments.

Session I: Measuring greenhouse gas emissions and carbon lock-in

The first session explored the role for new forms of data capture and data processing in measuring greenhouse gases and carbon lock-in across different sectors. Panellists cited enhancing coverage, robust methodologies, transparency of both emissions and methods used to estimate emissions, and using relevant indicators as key factors.

Emissions estimations through earth observation and asset-level data

Generating synthetic datasets through earth observations, when coupled with parametric estimation for measuring emissions, could help with the completion of asset-level datasets. Panellists discussed how this could improve efforts towards assessing networked risk across sectors and carbon lock-in pathways. Upcoming data platforms for direct measurement of greenhouse gas emissions using earth observations can act as catalyst to achieving the completion of these datasets. For example, current earth observation technologies are too coarse to measure point source emissions to complete asset-level datasets but this is expected to change in the next 5 years with a 1km spatial resolution suitable for large capital assets. Currently, earth observation methods are useful for localising assets while the risks associated with these assets need to be assessed separately across networks and sectors.

Forward looking climate risk assessments on companies and transparency

Alternative datasets can also play a role in estimating emission levels and production capacity. One example given was interpreting the size of a facility based on the number of jobs they advertise on job websites and access to mapping APIs. Additionally, data on how much revenue a company is generating can be used to infer emissions levels, with panellists outlining a vision towards creating a huge matrix of understanding about locations, sectors, economic activity and emission levels. Once an understanding of sectoral emissions globally exists we can start to attribute emissions down from a sectoral level to a company level with a view to independent monitoring of emissions levels. It was discussed that both bottom and top down methods of assessing companies is imperative, and needs to be coupled with third party verification. There are limitations to these innovative ways of measuring emissions independently, notably the gap between emissions estimates using these methods and those being reported. It could be a multiyear or a decade learning process to achieve concrete estimations and transparency of how emissions are calculated. Panellists commented that it could be 10 to 15 years before we reach a very rich level of transparency, with a combination of bottom up and top down techniques required until then in developed countries. However, there are potential future cost reductions through shared knowledge and economies of scales, so we could expect to see other countries leap frogging on these methods and technologies.

What information can be extracted from asset-level data that can benefit a business?

Once relatively complete asset-level databases exists, they can be analysed for the risk exposure of financial portfolios to transition scenarios and used to understand the evolution of that exposure over time. An understanding as to the extent to which current and forward-looking predictions of assets compare across scenarios can then be estimated. Ownership analysis is likely to be a fundamental part of asset-level data, allowing investors to match their loan book to the companies that own the individual assets being analysed.

The assumptions around estimating emissions are crude and can lead to results which are difficult to rely on. For example, the asset's lifetime, the boundary of the analysis and the potential retrofit of the asset (and all of these factors in a policy landscape that is changing rapidly), can change the risk profile of an asset or portfolio of assets dramatically. It was also discussed that CEO/CIO capital allocation decisions may focus on the deployment of capital in different technologies and in different assets, rather than on any consideration of committed emissions. As such, it was argued that it is at this level that asset-level databases need to focus, in terms of having data points that inform that conversation and in creating indicators that are relevant.

Reducing Portfolio Footprints through Estimated and Disclosed Emissions

Portfolios can be optimised to reduce their respective carbon footprint if these footprints are known. A key challenge is that while emissions information is available for many large cap companies in developed markets, that may not be the case in other investment universes and that ties back into the importance of the asset-level data initiative. Coverage is very important even on a sector-by-sector level in some countries. Current emission estimation is largely focusing on the reserve side and the potential emissions associated with that. The next steps could be to add scope 3 emissions to estimates of climate risk for companies.

The final theme of this session therefore focused on estimating emissions based on the level of disclosure. In medium to large companies that are in developed countries, the level of emissions disclosure is about 67%. From developing companies, the level of disclosure is about 55%, but only 25% of small cap firms in emerging markets disclose their emissions. As such, it is clear that investors with different universe exposures will have different requirements in terms of relying on reported vs. estimated emissions. The most carbon intensive industries generally provide the greatest coverage on disclosed emissions.

The process of emission estimations requires a model based on reported data that is cleaned and checked for consistency. This can be based on estimates of production data and historic disclosures where available. Average intensities at the sector level or even the business level that can be applied to revenues are commonly used for prediction in these circumstances.

Session II: Measuring Sustainable Development Goal impacts locally and globally

This session focused on Sustainable Development Goals (SDGs) and addressed two related questions: 1) innovation related to the measurement of the SDGs and 2) how SDGs translate into different investment dimensions and portfolios.

The SDGs are government-led and agreed by 193 countries in 2015 through the UN. They set common goals for 2030, broadly replacing the Millennium Development Goals (MDGs). What is very different in relation to MDGs is that they are intended to be universal and have partnerships at the heart of the goals, recognising that all actors in society are needed to deliver progress. The 17 goals cover various dimensions from poverty, hunger, education, climate change, to clean water. There are 169 targets and even more indicators to measure the performance of the goals. Those indicators were geared toward government and policy-makers, not investors. However, many have begun identifying impact investment opportunities aligned with the SDGs. Furthermore, it is widely recognised that investors will be needed to fill the funding gap that exists towards achieving the goals. Recognition of SDGs is varied globally, with panellists discussing how awareness and interest in SDGs is a primarily Western focus, with little attention in China, for example. There is a need to align investment and NGO work on sustainability topics with the key themes in local policy/government discussion. SDGs can fit in this discussion in the UK and US, but not everywhere.

Data gaps are a massive challenge. Even developed countries have only 50-60% of required data to measure across the SDG goals and indicators. Criticism of how some actors have been using SDGs also exists: is simply mapping existing investment strategies onto the goals rather than analyzing future opportunities through the framework a form of green-washing?

The goals will not be achievable without common actions and without significant flows of finance toward those goals. One of the reasons for companies and investors to get involved in SDGs is that they see opportunities from the delivery of those goals.

Innovation in investments towards meeting the SDGs

Investors want low-cost ways of investing in impact. Active investment is costly, so passive investment tools are often viewed as preferable. Panellists emphasised that institutional investors need to make market returns, but increasingly also need to account for the impact of their investments. Questions around the definition of impact and additionality of investment remain, and there is a need to shift the focus of measuring impact and exposure to risks and opportunities away from just a focus on company operational systems to a focus on product services.

There is a growing trend around mapping portfolios to link investments to meeting the SDGs. The mapping part is the relatively easy stage of the process, with a wide range of capital allocation theoretically aligned with SDGs. However, alignment is seen as a low barrier to entry, with opportunities to green-wash without having real impact. An example of trying to move beyond this was given by PGGM who have a €20 billion programme 'Investments in Solutions (BiO)' program which contains 4 themes: climate, food, water, and health and are in line with 5 SDGs. There is, however, still a need for better definitions of 'impact' and taxonomies of how to measure alignment to SDGs, particularly as many companies can be aligned to a few SDGs whilst having a negative impact on others. There is also need for new measurement techniques to establish to what extent (as a % of shares and/or revenues) companies are contributing.

The panel also discussed the opinion that greater opportunities for SDG investment may exist in the secondary markets, as this market relies more on the impact of investee rather than the impact of investors. Institutional investors just align with good companies. But there is still a greater need for companies to measure their own impact, which can then be shared with investors.

Discussion also turned to the development of indices related to SDGs and the use of SDGs to direct corporate engagement on sustainability topics. Investor dialogues with companies on these topics is argued to be very important, as there are significant gaps in knowledge on SDGs and how to understand the risks and opportunities linked to them in both investor and corporate spheres. Need for investors to communicate their expectations of their investee companies with regards to SDGs, though this will vary from sector to sector and between individual investors.

Need to innovate towards an ability to measure each SDG against new benchmarks and compare them with each other. Sustainable Index initiatives exist, and lessons can be learnt from past efforts related to similar topics, e.g. Access to Medicine Index constructed such an index 15 years ago. The sixth Medicine Index was published last year. The companies in the index can learn from each other and best practices in different areas. Such efforts could be replicated for other SDGs. But this needs significant collaboration across the industry, including with data providers to ensure that reporting is robust and sufficient, with index providers, and with regulators/governments.

There was a discussion of implementation through the example of water, including how this can exemplify issues around measurement of impact. Lack of clean water is a key SDG, with World Bank estimating that it will cost $114billion per year to achieve the target. Need to focus on the quantity, quality and reliability of water. Trust funds could be established to allow investors and donors to allocate capital based on performance and different metrics linked through new technologies (e.g. smart handpumps, mobile data and real-time data analytics).

However, the greatest social needs are not always the greatest investment opportunities. Only if there is very good financial and commercial reason will investors invest in the riskier projects and markets. There is a need for markets to get smarter at understanding risk and measuring impact when facing sustainability challenges.

Session III: Supply chain transparency and network analysis

Businesses making and selling goods must maintain a high-functioning supply chain of input resources, commodities, services, and finance, and must ensure that this supply chain maintains its social license to operate. The environmental impact of the upstream companies that provide these to the businesses often far exceeds the environmental impact of the businesses themselves. This session explored the need to think about the transparency and inter-relationships of supply chain networks, as these shift asset impacts from local to global scales and alter both risks and opportunities from climate change and other sustainability issues. This third session also examined the insurgent technologies that are changing the type, quantity and quality of data available for supply chain analysis.

There is enormous potential impact through supply chain feedbacks, and these can be measured across the diversity of SDG issues. 90% of consumer goods environmental and social impacts come from supply chains. It was argued that better management of supply chains could meaningfully reduce costs, improve capital and improve shareholder value throughout the international financial system. The opacity of global supply chains has been argued to be a key barrier to corporates and investors meeting their sustainability targets and their capacity to adapt to climate and SDG targets. Efforts to improve supply chain transparency also have compounding network positive externalities – the more transparent a supply chain is, the less onerous it is for an additional company operating in that supply chain to adopt transparency standards.

Measurement of supply chain impact

Managing carbon emission risks in supply chains is becoming an accepted norm among businesses. However, efforts towards managing a broader suite of environmental risks are still emerging. Discussion focused on the need for new measurement and new management of supply chains internationally. In particular, it examined some of the existing gaps in methodologies, and provided examples of some of the many organizations now trying to help measurement of supply chain impact through various technologies, including mobile data and big data analytics. Questions were raised about supply chains in different sectors, but there was a broader call for more attention on financial supply chains, including exploring how we track money. It was argued that we are in a new paradigm of financial opacity, which will require new technologies to overcome this.

Drivers of change towards ultra-transparency

With increased transparency, companies are able to coordinate to solve social dilemmas like common resource and network risk problems without the need for an intervening regulator or other third party. Ultra-transparency is seen as a prerequisite for enabling the endogenous emergence of mixed competitive/collaborative production modes between corporations that could help solve sustainability challenges.

Panellists discussed the different actors involved in driving transparency and disclosure across supply chains. Legislation was argued to be an important factor that could create ultra-transparency across supply chains, including financial supply chains. However, more broadly it was suggested that companies learn and adapt due to pressure from investors, governments and civil society, so all of these groups could drive progress by asking more of the right questions of companies on topics of sustainable supply chains. There was also discussion around the need for tiered engagement to reach those suppliers on the edge of networks, whereby investors should be able to track *and engage with* suppliers they are exposed to through their portfolios.

Using technology to track supply chain impacts and opportunities

New technologies are increasingly being used to develop real-time and near real-time data on supply chains. This session discussed the application of new technologies but also innovative ways to use existing methodologies and technologies.

For example, new satellite instruments allow the measurement and reporting almost real-time of air pollution, including the use of apps to measure localised pollution. Data capture in the form of pervasive sensors (e.g. internet of things, earth observation, cheap smartphones) is being combined with new data science techniques (e.g. machine learning) and algorithms (e.g. distributed ledgers) which have the potential to create new synthetic datasets and make corporate supply chains much more transparent.

One particularly transformative technology which is having a large effect on asset localisation and environmental risk and impact assessment is earth observation sensors. The number of earth observation sensors is growing exponentially – with hundreds of sensors launched in 2017 compared to only several per year only a few years ago. The resolution of these instruments is rapidly improving and the diversity of sensor technology is increasing. There has been growth in the deployment and use of sensors across land, sea and sky (e.g. drones, satellites). Using remote sensing technology provides not only a new source of data for inventorying the real economy, but provides new high-resolution data for primary commodity analysis which is fundamental to understanding the environmental impacts of many supply chains. New methodologies are being developed which can use machine learning analysis of imaging and AIS data signals to collect data and pictures of shipping. Examples were given of how activists have been able to use such technologies to track illegal fishing activities and modern slavery vessels, with opportunity to track them back to port and inform local law enforcement to make arrests. However, discussion also turned to privacy issues, accountability, governance and unintended consequences of some of these developments.

There is now a plethora of data but gaps do remain, including a lack of ownership data and the inability to link data to causality of impacts. Challenges also remain around field verification, needed to support and corroborate satellite data and methods. Field surveys, for example, are difficult due to anonymity and privacy issues. Opportunities exist to greatly upscale this internationally through the use of local internet, apps and mobile data.

The opportunities for sensory data creating ultra-transparency in the future were argued to be potentially transformative for the sustainable finance system, with investors and activists able to use data to drive change in corporate practices, revolutionise corporate reporting, track natural capital and improve supply chain management.

Session IV: Originating Impactful Investments Reliably and at Low Cost

This session explored key issues related to how we can originate more impact investments globally. The issues examined include: how we can bridge the gap between the available capital and potential projects, and how can we use the advancements in technology, processes and data availability to locate and generate ventures in the impact investing space.

Finding investable projects for clients

From the perspective of investment banks there is more of a push to get investments in ESG, impact investment and green finance together in one group so that investments are more consolidated. These types of consolidated groups have a mandate to operate across the world and across divisions. In the asset management side there are ongoing efforts to make existing funds more ESG compliant and create new funds which can be invested in by those seeking sustainable investments. One of the key challenges highlighted by panellists is finding investable projects for clients across all asset classes that cover the spectrum of SDGs. There has also been a push to engage with foundations and development finance institutions (e.g. Multilateral Development Banks) to find projects that could offer investable opportunities. However, SDG-related investments are typically very long term in nature and aren't very liquid, reducing their applicability to many investment mandates. To solve some of the issues of impact investing there is a need to find some more patient sources of capital.

What relationships are needed to invest and deliver sustainable development?

It was discussed that a lot of the problem lies in not properly evaluating risk. Potential for greatest opportunities for attractive returns often exist where our ability to assess risk is not good enough, such as in innovative technologies and long-term projects. Since most projects are small and very long term in nature, we need to come up with an appropriate solution to aggregate these smaller projects or how access to capital can be provided. One of the keys to supporting these projects is in developing the right types of relationships. Regional development banks provide some support but the majority don't provide capital early and don't absorb enough risk for innovative projects. There is opportunity for market actors to step in to provide the right kind of capital and relationship building. There are relationships to draw upon but we as a sustainable finance industry need to do more to provide capital for small entrepreneurs. There is more and more domestic capital being made available but there is still a need to link these forms of capital to innovations and projects more effectively.

How we can make natural assets investable?

Natural assets generate multiple forms of value that are meaningful but don't easily generate financial returns. Most capital for natural assets has traditionally come from government and philanthropic sources, so there is a culture of spending rather than a culture of investment. Panellists discussed the potential for block chain to provide an alternative source of financing for natural asset investments. The first step in the development of a block chain contract would be to disaggregate the natural assets into different asset categories or investment packages. The next step would be to create an algorithmic contract consisting of three components: (1) the payment schedule, (2) sort of activities like to be done to acquire the asset (e.g. a SPV to purchase the land rights and manage the land), and (3) linked to digitally verifiable entities (to verify that the work has been done), which can be turned into a story. The delivery organisations would then bid to deliver that contract. Metrics would be provided about the efficiency and quality of the delivery to provide a scorecard for the delivery organisations. The value people capture from a natural asset is highly variable but value generating practices can be metricised (e.g. photos, data). The benefits of a smart contract include: reducing transaction costs, generate data on cost/risk profiles of different investments, serving as the inspiration for new ideas, and changing conservation finance from an ask to an offer. This contract could also be structured as a pay for performance style contract.

Framework for blending projects and finance together

Blending can be done on both the financing side as well as the project side. Blending on the financing side involves taking money from different sources at different costs of capital by effectively allowing investors to take different

levels of risk. To the extent that what they are investing in meets their objectives ranging from purely financial through to a blend of other types of returns. This would involve blending the spectrum of investors from highly risk tolerant to risk averse. Similarly, blending of different projects can also be organised so that there is a range of projects that can be invested in ranging from purely economically through to purely socially return driven. The range of projects can work together providing different attributes of return that can be disaggregated in various ways. The basket of projects in aggregate should have attributes that align with the basket of investor returns.

2nd Annual Meeting of the Asset-Level Data Initiative

ADI was launched in 2017 at the previous Sustainable Finance Forum, and the sessions on the second day of the 7th Sustainable Finance Forum examined how different stakeholders across the investment industry can work together to improve the quality, content, accessibility, coordination and use of asset-level data.

There are three objectives of the ADI:

- Drive the use of asset-level data, including: making the case through research, educating stakeholders, highlighting potential of asset-level data, capacity building, encouraging disclosure regimes to ask for asset-level data
- Improving access to asset-level data: how do we lower costs, ensure consistency and standardisation, how do we link to established data streams, licensing and IP issues, and how do we develop platforms for the data.
- Enhancing quality of asset-level data: asset-level data does exist in various places, but with varying quality and accessibility. How do we improve quality and consistency of data?

A panel discussed the role of ADI in the context of regulatory shifts. This focused on the Task Force on Climate-related Financial Disclosures (TCFD). The TCFD has developed voluntary disclosure recommendations using a four-pillar approach, positing that companies should report on climate-related governance, risk management, metrics and strategy. Key challenges remain for companies trying to disclose in line with the TCFD, however, especially in implementing scenario analysis, as the data availability and tools are not yet widely available for this kind of reporting. Broad implementation and consistency and quality of reporting along these lines will not happen overnight, but are expected to develop over time, linked to the adoption of the recommendations by key industry reporting bodies such as PRI and CDP. ADI has potential for filling some of these data gaps and tool development to facilitate corporate reporting and aid decision-makers where reporting is insufficient, especially in relation to linking asset-level data to ownership data. Whilst there is a broad-based support for TCFD, this is not universal – panellists acknowledged that TCFD is widely known in Western economies, but is not so visible in China, for example. There was also discussion of ADI in the context of the EU Action Plan, IOSCO, UK Green Finance Task Force, which broadly discussed how these changes demonstrated the importance of collaboration across the industry to improve data accessibility and quality, and opportunities for ADI to help facilitate these regulatory changes.

The afternoon session broke into small roundtable discussions around different themes and sectors. These discussed the potential for ADI to contribute to climate-related disclosure in each case, with a focus on identifying the state of the market information and highlighting opportunities for future research and collaborations.

Natural Capital Roundtable

The natural capital discussions focused on ADI in the insurance context. It touched upon how asset-level data could be used in informing government decision-making on the value that is being created/destroyed. They highlighted the need for a better theory for 'value', as price is often equated to value but that is not the case. Subsidies distort value, so we need to explore ways of reducing subsidies so that we get a more accurate sense of value, with incentives and subsidies often mispricing natural capital. An example was given of US Forestry concessions being incorrectly priced.

This roundtable also touched upon the importance of investing in 'resilience' e.g. insurance companies investing in wetlands areas and coral reefs to avoid losses through the protection of coastlines they are exposed to throughout their portfolios. To increase investment in natural capital, decision-makers need an inventory of assets, with ADI able to contribute to this.

Agriculture Roundtable

This roundtable explored the different types of data assets essential to addressing sustainable agricultural investment, as well as use case and barriers to asset-level data in the agricultural sector. Land use and land cover data sets are widely available, and interested in developing tools and techniques for assessing carbon stocks and carbon emissions, as well as other land-use changes which would affect sustainability (e.g. across different SDGs). A lot of discussion focused on the use of land registries as a key data source, but coverage is variable in different countries and is not universally transparent/available. Barriers to better information included obfuscation of land-holdings and variability of models (e.g. carbon stocks and emissions). The roundtable discussed whether ADI could help standardise and legitimise methodologies, and noted multiple use-cases for ADI in this sector across civil society, investment and policy makers.

Infrastructure and Buildings Roundtable

The discussion around infrastructure and buildings focused on identifying uses for and availability of asset-level data across a broad range of buildings and infrastructure, including public and private buildings, green infrastructure such as rivers, parks etc. Identified a range of sources of information which already exist; some are publicly available whilst some are commercial, governmental or proprietary. Large amounts of information are available from various direct and indirect sources, and data could be accelerated through use of existing technology. There was discussion of the variable quality and consistencies, also highlighting where information is simply not available, such as informal buildings (especially in developing countries, e.g. favelas) and underground infrastructure. Number of use cases and users were identified, so no shortage of potential projects and broad collaborations across multiple stakeholders are possible and could be beneficial. Minimum needs for a project: users, researchers, platform, funding.

Power Sector Roundtable

The power sector roundtable focused on the value of globally complete datasets for power generation assets. While high quality datasets are currently available the group discussed what other key attributes of this dataset would help better inform transition risk. Annual asset-level production data could act as an indicator of transition risk, as the proportion of a generators revenue from that asset may be inferred. This could expose the potential value at risk of a company's revenue under a certain carbon price or a further integration of renewables. The group concluded that there is a sufficient amount of asset-level data but uncertainty about future risk exposure metrics using a committed emissions approach.

Ownership Roundtable

This roundtable discussion focused on how to unlock transparency surrounding the ownership of real economy assets. In order to map environmental risk exposure and impact through to corporate entities, the corporate owners of real economy and financial assets must be known. There are several layers of ownership including: companies that own the physical assets; the ultimate parent company that own those companies; and the investors that own shares in the ultimate parent company. Therefore the definition of 'ownership' is not always clear – there are taxonomical differences between beneficial ownership, decision-making authority, provision of finance, and a wide array of other contractual relationships which may be of interest. Ownership is further complicated when assets can be rolled up to multiple entities (e.g. joint ventures) or when dealing with subsidiaries and multiple listings. Thus ownership information is unlikely to be unravelled by new emerging forms of sensing technology. However, other technologies, such as automated web-scraping and distributed ledger technologies, show promise and could be adopted through an ADI approach to the ownership question.

The discussion highlighted the need for a public goods initiative in the form of a database of beneficial ownership, with many participating organisations agreeing that they would use and contribute to such a database, and that it could be developed through crowdsourcing. On further discussion, there seemed to be a difference in use cases between public sector organisations with primarily social mandates, and private sector organisations with profit motives. The private sector organisations often already have or buy the ownership information which is relevant to them, and/or might be otherwise constrained by their governance structures in their ability to use an open data source. The development of an ownership data set is largely sector-dependent, based on the availability of data and the level of transparency.

Annex 1: Forum Agenda

Thursday, 7th June 2018

10:00 – 10:30 **Arrival at The Archive at Windmill Hill, Waddesdon Manor**

10:30 – 10:40 **Welcome and Opening Remarks**
Ben Caldecott, Founding Director, Oxford Sustainable Finance Programme, Smith School, University of Oxford

10:40 – 12:00 **Session I: Measuring greenhouse gas emissions and carbon lock-in**
Chair: **Simon Horner**, Head of Innovation, City of London Corporation
Panellists:
Lucas Kruitwagen, Data Lead, Oxford Sustainable Finance Programme, Smith School, University of Oxford
David Lunsford, Co-Founder and Head of Development, Carbon Delta
Jakob Thomä, Director, 2º Investing Initiative
Marion de Marcillac, Head of Carbon and Sustainable Impact Products, MSCI

12:00 – 13:20 **Session II: Measuring Sustainable Development Goal impacts locally and globally**
Chair: **Jessica Fries**, Executive Chairman, The Prince of Wales's Accounting for Sustainability Project
Panellists:
Rob Hope, Director, Water Programme, Smith School, University of Oxford
Piet Klop, Senior Advisor, Responsible Investment, PGGM Investments
Wim Leereveld, Chairman, Index Initiative & Founder Access to Medicine Index
Calvin Quek, Head of Sustainable Finance Program, Greenpeace East Asia

13:20 –14:20 **Lunch**

14:20 –15:40 **Session III: Supply chain transparency and network analysis**
Chair: **David Hoile**, Global Head of Asset Research, Willis Towers Watson
Panellists:
Tom Bregman, Senior Associate, Sustainable Finance, Global Canopy Programme
Pedro Faria, Strategic Advisor, CDP
Dave Jones, Carbon & Power Analyst, Sandbag
Joseph Mascaro, Director of Academic Programs, Planet

15:40 – 16:10 **Tea/Coffee**

16:10 – 17:30 **Session IV: Originating impactful investments reliably and at low cost**
Chair: **Catherine Bremner**, Transformation Director and Head of Science, Department for Business, Energy and Industrial Strategy
Panellists:
Dana Barsky, COO, Impact Advisory and Finance Department, Credit Suisse
James Cameron, Chair, Overseas Development Institute
Paul Jepson, Leader, Conservation Governance Lab, School of Geography and the Environment, University of Oxford and WildChain
Alex Money, Director, Innovative Infrastructure Investment Programme, Smith School, University of Oxford

17:30 – 17:40 **Closing Remarks**

18:00 – 19:00 **Drinks Reception**

19:00 – 21:00 **Dinner**

Friday, 8th June 2018 – 2nd ADI Annual Meeting

09:00 – 09:30 **Transfer to The Archive at Windmill Hill, Waddesdon Manor from Hartwell House** *(transport provided)*

09:30 – 10:00 **Arrival at The Archive at Windmill Hill, Waddesdon Manor**

10:00 – 10:10 **Welcome and Introduction**

10:10 – 11:00 **Progress since 1st Annual Meeting**
Panel discussion, particularly focused on policy processes that are directly relevant to ADI such as the Task Force on Climate-related Financial Disclosures (TCFD), European Commission High-Level Expert Group on Sustainable Finance (HLEG), and UK Green Finance Taskforce (GFT)

11:00 – 12:45 **Showcasing projects and innovation**
Series of 10 minutes presentations from different organisations highlighting what they are working on related to asset-level data

12:45 – 13:30 **Lunch**

13:30 –15:00 **Roundtables focused on key sectors**
Series of roundtables in parallel with the objective of identifying opportunities for collaboration and joined up work plans that could become funded projects

15:00 – 15.50 **Conclusions from Roundtables**
Share findings from roundtables

15:50 – 16:00 **Wrap up and next steps**

Annex 2: List of Participants

Edward Baker, Senior Policy Advisor, Climate and Energy Transition, Principles for Responsible Investment
Matthieu Bardout, Project Manager, 2° Investing Initiative
Dana Barksy, COO and Head of External Partnerships, Impact Advisory and Finance Department, Credit Suisse International
Seb Beloe, Partner, Head of Sustainability Research, Wheb Asset Management
Olivier Beroud, Director, Beroud Consulting
Murray Birt, Vice-President, DWS Group
Frank Blasio, Director of Thought Leadership, Coalition for Inclusive Capitalism
Kingsmill Bond, New Energy Strategist, Carbon Tracker Initiative
Simon Bond, Director of Responsible Investment Portfolio Management, Columbia Threadneedle Investments
Kevin Bourne, Managing Director, LCE Risk
Tom Bregman, Senior Associate, Sustainable Finance, Global Canopy Programme
Catherine Bremner, Transformation Director and Head of Science, Department for Business, Energy and Industrial Strategy
Chris Brown, Vice President - Corporate Responsibility & Sustainability, Olam International
Bob Buhr, Director, Green Planet Consulting Ltd
Ben Caldecott, Director, Oxford Sustainable Finance Programme, University of Oxford
Ian Callaghan, Principal, Ian Callaghan Associates
James Cameron, Chair, Overseas Development Institute
Dan Carson, Head of Green Solutions, Sustainable Investment, FTSE Russell
Ella Chalfon, Independent Sustainable Finance Consultant
Sarah Jane Chimbwandira, Director, Surrey Wildlife Trust
Kelly Clark, Director, Tellus Mater Foundation
Mike Clark, Founder & Director, Ario Advisory
John David, Head, Rathbone Greenbank Investments
Marion de Marcillac, Head of Carbon and Sustainable Impact Products, MSCI
Nikolaos Dimakis, Quantitative Analyst, Hermes Investment Management
John Ditchfield, Partner, Financial Advice, Castlefield
Stanislas Duprè, Founder and Global Director, 2° Investing Initiative
Jessica Duveen, Interim Head Impact Research & Innovation, Clearlyso
Joanne Etherton, Pensions Lawyer, Client Earth
Pedro Faria, Strategic Advisor, CDP
Jessica Fries, Executive Chairman, The Prince of Wales's Accounting for Sustainability Project
Simon Fourmy, Head of Grants, Rothschild Foundation
Bevis Gillet, Trustee, The Marmot Charitable Trust
Steven Gray, Climate Partnerships and Capability, International Climate Finance, Department for Business, Energy and Industrial Strategy
David Griffiths, Principal, Portfolio Design, BT Pension Scheme Management Limited
Elizabeth Harnett, Researcher, Oxford Sustainable Finance Programme, University of Oxford
Tom Harrison, Senior Project and Research Officer, The Sainsbury Family Charitable Trusts
Clarissa Hauptmann, Postdoctoral Researcher, University of Oxford
Conor Hickey, PhD Candidate, University College Cork
Clare Hierons, COO, ShareAction
David Hoile, Global Head of Asset Research, Willis Towers Watson
Rob Hope, Director, Water Programme, Smith School, University of Oxford
Simon Horner, Head of Innovation, City of London Corporation
Paul Jepson, Leader, Conservation Governance Lab, School of Geography and the Environment, University of Oxford

Dave Jones, Carbon & Power Analyst, Sandbag
Marcelo Jordan, Senior Portfolio Manager (ESG), Pension and Endowments Department, The World Bank Treasury
Sasha Jung, Senior Advisor - Financial Markets, right.based on science
Piet Klop, Senior Advisor, Responsible Investment, PGGM
Christopher Knowles, Head of the Climate Change & Environment, European Investment Bank
Lucas Kruitwagen, Data Lead, Oxford Sustainable Finance Programme, University of Oxford
Bonny Landers, CEO, Bay Street Consultants
George Latham, Managing Partner & CIO, Wheb Asset Management
Wim Leereveld, Chairman, Index Initiative & Founder, Access to Medicine Foundation
Sara Lovisolo, Group Sustainability Manager, London Stock Exchange Group
David Lunsford, Co-Founder and Head of Development, Carbon Delta
Dan Luong, Instinet
Joseph Mascaro, Director of Academic Programs, Planet Labs
Matthew McCarten, Postdoctoral Research Associate, Oxford Sustainable Finance Programme, University of Oxford
Dirk Meuleman, Managing Director, Phenix Capital
Sara Minchin, Sustainable Finance and Corporate Risk Specialist, WWF-UK
Alex Money, Director, Innovative Infrastructure Investment Programme, Smith School, University of Oxford
Peter Munro, Director, International Capital Market Association, ICMA (Paris)
Agnes Lucia Neher, Sustainability Manager, Bank J. Safra Sarasin Ltd
Thomas O'Neill, Research Director, Influence Map
Marie Owens-Thomsen, Global Head of Investment Intelligence, CA Indosuez Wealth Management
Miroslav Petkov, Director, S&P Global Ratings
Warren Pimm, Partner, SDCL UK
Alberto Pisanti, Founding Partner & CEO, Absolute Energy Capital
Calvin Quek, Head of Sustainable Finance Program, Greenpeace East Asia
Iona Richardson, Responsible Investments Associate, Deutsche Asset Management
Colin Shaw, COO, Four Twenty Seven
Brigitte Small, Managing Director, Engaged Tracking
Peter Spark, Principal, Eco Operative
Jakob Thomä, Director, 2° Investing Initiative
Owen Thorne, Portfolio Manager, Monitoring & Responsible Investment, Merseyside Pension Fund
Jenny Tozer, Partner, Vestra Wealth LLP
Rick van der Ploeg, Director, Centre for the Analysis of Resource Rich Economies, University of Oxford
Chris Varco, Managing Director, Cambridge Associates Ltd
Rick Watson, Managing Director, Head of Capital Markets, Association for Financial Markets in Europe (AFME)
Galina Wells, Advisor, Emurgo
Shelagh Whitley, Head of Programme - Climate and Energy Programme, Overseas Development Institute
Mike Wilkins, Managing Director, S&P Global
Cynthia Williams, Osler Chair in Business Law, York University
Jon David Willingham, Partner, Highmore
Daniel Wiseman, Lawyer, Company & Financial, Client Earth
Soh Young In, PhD Candidate, Standford University
Mario Zelenak, Sustainability and Corporate Governance, Deka Investment
Xiao Zhou, Postdoctoral Research Associate, Oxford Sustainable Finance Programme, University of Oxford

Oxford Sustainable Finance Programme
Smith School of Enterprise and the Environment
University of Oxford
South Parks Road
Oxford, OX1 3QY
United Kingdom

E enquiries@smithschool.ox.ac.uk
T +44 (0)1865 614942
F +44 (0)1865 614960
www.smithschool.ox.ac.uk/research/stranded-assets/

SUSTAINABLE FINANCE PROGRAMME
SSEE

UNIVERSITY OF OXFORD