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ACCOUNTING AND CLIMATE CHANGE:

THE TWO DEGREES TARGET AND FINANCING THE TRANSITION TO A LOW-CARBON ECONOMY

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Declaration

I certify that the thesis I have presented for examination for the MPhil/PhD degree of the London School of Economics and Political Science is solely my own work other than where I have clearly indicated that it is the work of others (in which case the extent of any work carried out jointly by me and any other person is clearly identified in it).

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ABSTRACT

This thesis investigates the emergence of the long-term climate target to hold the increase in global average temperature below two degrees Celsius above pre-industrial levels. This 'two degrees target' is shown to be the product of efforts to embed climate science, 'cost-effective' GHG control, and national sovereignty in a long-term climate goal, and that it became a foundation for work to align the financial sector with the transition to a low-carbon economy. This thesis investigates how this target envisages an apparently simple and manageable future for addressing climate change, and comes to orient the strategies of diverse and distributed actors towards a common vision. The empirical core of this thesis is a participant observation of a United Nations and Greenhouse Gas Protocol standard-setting project, which is supplemented by semi-structured interviews and documentary analysis. This thesis studies four interrelated instruments, the two degrees target, the carbon budget, investment roadmaps and an emergent carbon accounting standard. It focuses on the work involved in assembling and adjusting these instruments, attending to the efforts to produce coherent and stable linkages between ideas of climate governance and the local specifics of the financial sector. This thesis shows how a carbon-constrained future with financial sector implications was envisaged. It also traces how ideas stemming from the two degrees target shifted the development of finance-specific carbon accounting practices away from greenhouse gas data and towards metrics for managing risk and monitoring alignment with investment roadmaps. This thesis, as a whole, contributes to our understanding of carbon accounting as a practice that embeds diverse modes of climate governance and coordinates action across multiple entities. It shows the processes through which an apparently simple vision for addressing climate change began to orient diverse and distributed efforts towards financing the transition to a low-carbon economy.

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LIST OF ABBREVIATIONS

ADP	Ad Hoc Working Group on the Durban Platform for Enhanced Action
AGGG	Advisory Group on Greenhouse Gases
AODP	Asset Owners Disclosure Project
BSR	Business for Social Responsibility
BUR	Biennial Update Reports
CCS	Carbon Capture and Storage
CDP	Formerly known as the Carbon Disclosure Project
Ceres	The Coalition for Environmentally Responsible Economies
CO_2e	Carbon dioxide equivalent
COP	Conference of the Parties to the United Nations Framework Convention on Climate Change
DEFRA	Department for the Environment, Food and Rural Affairs
ESG	Environment, Social and Governance
EU ETS	European Union Emissions Trading Scheme
GCM	General circulation models
GHG	Greenhouse gas
GRI	Global Reporting Initiative
ICSU	International Council of Scientific Unions
IEA	International Energy Agency
IIASA	International Institute for Applied Systems Analysis
INCR	Investor Network on Climate Risk
INDC	Intended nationally determined contributions
IPCC	Intergovernmental Panel on Climate Change
MCP	Montréal Carbon Pledge
MIT	Massachusetts Institute of Technology

MRV	Measurement, Reporting and Verification (UNFCCC)
Nazca	Non-State Actor Zone for Climate Action
NGO	Non-governmental organisation
NOAA	National Oceanic and Atmospheric Administration
NPO	Non-profit organisation
PDC	Portfolio Decarbonization Coalition
PRI	Principles for Responsible Investment
RAN	Rainforest Action Network
RCEP	Royal Commission on Environmental Pollution
SEI	Sustainable Energy Investment
TCFD	Task Force on Climate-related Financial Disclosures
TWG	Technical Working Group
UN	United Nations
UNEP	United Nations Environment Programme
UNEP FI	United Nations Environment Programme Finance Initiative
UNFCCC	United Nations Framework Convention on Climate Change
UNGC	United Nations Global Compact
VCLT	Vienna Convention on the Law of Treaties
WBCSD	World Business Council for Sustainable Development
WBGU	Scientific Advisory Council on Global Change (Wissenschaftlicher Beirat der Bundesregierung Globale Umweltveränderungen)
WMO	World Meteorological Organisation
WRI	World Resources Institute
WWF	Worldwide Fund for Nature

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CHAPTER 1 – ACCOUNTING AND CLIMATE CHANGE: AN INTRODUCTION

1.0. CLIMATE CHANGE, FINANCE AND ALIGNING ACTION ACROSS MULTIPLE ENTITIES

On the 12th December 2015 196 nations and the European Union adopted the Paris Agreement on climate change, an international framework to guide post-2020 reductions in global greenhouse gas (GHG) emissions. As international talks continue to develop mechanisms to implement the Paris Agreement, much attention has turned to the supporting role of the financial sector in tackling climate change. Indeed, 2016 has been hailed as the "year of green finance" (Robins 2016) by the former Executive Director of the United Nations Environment Programme (UNEP), Achim Steiner, as countries around the world work to align "their financial systems with the sustainability imperative" (Ibid.). Efforts have ranged from China's Green Finance Task Force changing the accounting treatment of environmental costs to improve estimates of investment and commercial risks (Green Finance Task Force 2015) to the publication of the UNEP *Inquiry into the Design of a Sustainable Financial System* calling on central banks to stimulate the creation and provision of 'green finance' (UNEP 2015). In the United Kingdom, climate change is becoming seen as a threat to financial stability (Carney 2015) with the Governor of the Bank of England, Mark Carney, forming the Task Force on Climate-related Financial Disclosures (TCFD) to report on improved reporting requirements that would prompt capital markets to respond to climate risk.

This thesis investigates the emergence of the 'two degrees target', the long-term climate objective of holding the increase in global average temperature below two degrees Celsius above pre-industrial levels. It further attends to the instruments that refine this target to the local specifics of the financial sector, focussing on the coordination of efforts to address climate change across diverse and distributed entities. This responds to Bebbington and Larrinaga (2014b) who argue that "no one single entity creates and sustains" sustainable development issues (Bebbington and Larrinaga 2014b,

p.401) and who call for "a sustained examination of the setting within which organisations operate" (Ibid.) to study the "combination of institutions" that frame the activities of multiple entities. To provide this response, this thesis investigates two interrelated questions. First, it focuses on the practices that frame financial sector investment and lending decisions, which have the potential to influence decision making across economies towards developing and implementing low-carbon modes of production (Coulson and Dixon 1995; Richardson 2009). In this regard, thesis addresses the question, *how are the financial sector discourse on climate change and the development of new carbon accounting tools interrelated?* Second, to study the coordination of investment and lending activities across multiple entities, this thesis focuses on the instruments that link global climate objectives to the specifics of the financial sector, and their role in aligning action across financial organisations. As such, it addresses the question, *how do the complexities of climate change become embedded in multiple instruments that shape how the underlying issues are managed?* The thesis pays particular attention to the objective of limiting the increase in global average temperatures to two degrees Celsius above pre-industrial levels (the two degrees target). It argues that the two degrees target rendered climate change into an apparently simple and manageable form. This enabled work to construct and mobilise instruments that refine the issue to specifics of multiple entities, and began to align diverse and distributed actions towards a common vision for addressing climate change. The next section (Section 1.1) provides background to the research project, followed by a detailed overview of the thesis structure and chapter-specific contributions (Section 1.2).

1.1. The Research Project

A participant observation of the UNEP Finance Initiative (UNEP FI)[1] and GHG Protocol[2] multi-stakeholder standard-setting project, initially known as the Financed Emissions Initiative, forms the empirical core of this thesis.

[1] UNEP FI was established in 1992 as a partnership between UNEP, the United

[2] The GHG Protocol is a standard-setting organisation established by the think tank, the World Resources Institute, and the World Business Council for sustainable development. Its carbon accounting standards are the most widely used basis for mandatory GHG reporting requirements as well as for voluntary disclosure mechanisms (J. F. Green 2010).

The Financed Emissions Initiative set out to create guidance specifically for financial organisations, which would detail the requirements for complying with the GHG Protocol's core accounting standards. The GHG Protocol published *A Corporate Accounting and Reporting Standard* in 2004, setting out measurement and reporting requirements for the emissions of an organisation (GHG Protocol 2004). Its 2011 *Corporate Value Chain Accounting and Reporting Standard* (GHG Protocol 2011) set out related requirements for GHG emissions within the supply chain. The Financed Emissions Initiative was launched to create guidance tailored to the financial sector regarding compliance with this 'supply chain standard'. That is, it set out to produce measurement and reporting requirements for reporting the GHG emissions enabled by a financial organisation's investment and lending activities, referred to as the their *financed emissions*. Over 120 hours of meeting observations were conducted between January 2014 and February 2016, including attendance of in-person workshops in London, Milan and New York, conferences in Paris as well as numerous online webinars. The engagement was conducted as a "moderate participant" (Spradley 1980, p.60), initially observing webinars and gradually making some contributions to discussions. This enabled the researcher to "gain some degree of acceptance from [other participants]" (Jorgensen 1989, p.73), and also to take steps to limit influence over the purpose and content of the documents (Section 3.1.1).

Eighteen semi-structured interviews were conducted across 2014 and 2015 to supplement, check and refute observations made during the Financed Emissions Initiative engagement (Becker and Geer 2003, pp.250–251). Interviewees included individuals from NGOs, think tanks, financial organisations and governments, providing a range of perspectives on the intersection of climate change and finance (Horton, Macve, and Struyen 2004, p.344). Combining insights from the interviews with those from the participant observation, it became apparent that the two degrees target underpinned shifting notions of climate risk and the financial sector's role in supporting efforts to tackle climate change. Interviewees provided some insight into the emergence of this two degrees target, which guided the preliminary collection of documentary evidence for charting the emergence of the target from a range of other climate metrics. Where this initial data collection centred on texts relating to long-term climate targets (Prior 2011,

pp.94–96), this developed into a more 'archaeological' approach (Ibid.) to gathering materials pertaining to how the documents came into being. Over 60 reports and proceedings – from conferences, research centres, international bodies, NGOs and governments – as well as more than 55 academic texts – from climatologists and meteorologists to economists and lawyers – were analysed to document the controversies surrounding the emergence of the two degrees target since the mid-20th century.

Through the iterative process of data collection and analysis across the three methods (*cf.* Marginson 2004, p.332; Dey 2007, pp.431–432), four interconnected instruments – the two degrees target, the carbon budget, investment roadmaps, and the emergent carbon accounting standard – emerged as creating the linkages through which an apparently simple climate objective came to frame: national-level policy making; the future constraints facing the financial sector; and the climate impact of a financial organisation's investment and lending activities. In this regard, the thesis maps an emerging calculative infrastructure[3] that connects "local issues to larger questions, and vice versa" (Miller and Napier 1993, p.634) through the interconnecting of "practices together into a complex web" where the two degrees target "emerge[d] as central to a certain way of calculating" (Ibid.). Moreover, this informed the positioning of the data to examine the specific characteristics of these devices as *mediating instruments* (Miller and O'Leary 2007), the interconnections between which demonstrate how the apparently simple two degrees target came to stimulate and orient action towards a common vision across multiple entities.

Indeed, Miller and O'Leary demonstrate the linking of science and the economy through the "performing and connecting up a whole series of calculations based on Moore's Law, technology roadmaps, and cost-of-ownership models" that "link formally separate actors and arenas, and in such a way as to adhere to the apparently beneficent imperatives of Moore's Law" (Miller and O'Leary 2007, p.729). However where Miller and O'Leary focus on how these mediating instruments aligned action to enable the "making of

[3] The term 'calculative infrastructure' is used to refer to "the relatively stabilised chain of accounting calculations and associated narratives, the ensemble of calculative technologies and rationales that has come to appear necessary for the assessment of", in this thesis, the contributions of different entities to the international efforts to address climate change (Kurunmäki and Miller 2013, p.1101).

markets" (Ibid.), this thesis specifically investigates the dynamics of constructing a calculative infrastructure, attending to the work of linking scientific, economic and political concerns on climate change to the diverse and distributed actions of multiple entities. However it has been argued "[s]cholars working within this [mediating instruments] framework [...] have only begun to specify the process by which we might study and theorise interactions between material objects and wider calculative conceptions" (Pollock and D'Adderio 2012, p.567). Indeed, this thesis offers a partial response to this argument by studying the processes of 'co-production' (Hacking 1992) through which "diverse components and practices" are assembled and adjusted "so that they might operate as a more or less stable and coherent working ensemble" (Miller and O'Leary 2007, p.708). Specifically, it draws on Gooding (1992) to frame the work of constructing and interconnecting instruments as processes of 'experimenting' and 'tinkering' through which ideas and instruments are "mutually adjusted" (Hacking 1992, p.30).[4]

1.2. THESIS STRUCTURE

After situating the thesis within the carbon accounting, sustainable finance and mediating instruments literatures in Chapter 2 and detailing the rationale and methods for data collection and analysis in Chapter 3, Chapter 4 charts the emergence of the two degrees target from a range of other climate metrics since the mid-20th century. In particular, it investigates how the two degrees target became seen as the long-term objective for controlling GHG emissions and how it "fram[ed] a manageable future" (Jordan, Jørgensen, and Mitterhofer 2013, p.159) for climate change that became a common basis for work to reshape the conditions that orient action across multiple entities of different scales and scopes (Bebbington and Larrinaga 2014b). Overall, Chapter 4 demonstrates that the construction of a long-term target for climate change elicited and embedded multiple concerns: a scientific basis for defining 'dangerous anthropogenic interference' with the climate system,[5] a level and

[4] Also see Wise on "mutual adaptation" (Wise 1988, p.79) and Mennicken on "how audit and market ideals mutually shape and condition one another" (Mennicken 2010, p.354).

[5] This pertains to the overarching objective of the UNFCCC, which states that Parties will work towards "[...] stabilization of greenhouse gas concentrations in the

trajectory of GHG control that did not jeopardise economic growth, and a degree of flexibility that avoided encroaching on developing nations' national sovereignty (See first row of Figure 1.1).

Chapter 4 specifically argues that the two degrees target is unsuited to the 'boundary object' framing (Star and Griesemer 1989) that some have applied as an analytical lens (Randalls 2010; Cointe, Ravon, and Guérin 2011). Where a boundary object is "weakly structured in common use, and become strongly structured in local site use" (Star and Griesemer 1989, p.393), the two degrees target maintains an apparently simple and manageable vision (Jørgensen, Jordan, and Mitterhofer 2012) in common use and is flexible regarding the actions that work towards that vision in local site use. Furthermore, as efforts to establish a target-based mode of formulating GHG control policies travelled into different domains, responses were provoked that elicited the ideas to be embedded in such a target. In this regard, the two degrees target is analysed as a mediating instrument (Miller and O'Leary 2007) that renders climate change into a highly abstract and simplified form amenable to *disaggregation*, the separation of a problem into component parts by different actors.[6] To reiterate, it provides a common basis for diverse and distributed actors to analyse the implications of climate change to the conditions in which they operate. This enables them to identify and plan the steps that their nation, sector, organisation or portfolio need to take to align with the global response to climate change.

Chapter 5 focuses on the financial sector discourse on climate change, attending to how the two degrees target gained traction as it became the basis for envisaging a carbon-constrained future posing new risks to capital markets. Combining interview and observational materials, the chapter details how civil society actors – such as think tanks, campaigning-NGOs, standard-setters and disclosure groups – created and mobilised 'the carbon budget', which sets out the maximum level of cumulative GHG emissions to achieve the two degrees target. The chapter specifically responds to O'Sullivan and O'Dwyer's (2015) call for research into "the role of the EP [Equator Principles]

atmosphere at a level that would *prevent dangerous anthropogenic interference with the climate system*" (UNFCCC 1992, p.4, *emphasis* added).

[6] Professor Morgan presented her work on *aggregation* and *disaggregation* at an LSE400 lecture on 20th February 2015, which was subsequently discussed in follow-up conversation. Morgan's research on the matter is ongoing and unpublished.

issue-based field, in 'facilitating' the development of […] a climate change issue-based field" (O'Sullivan and O'Dwyer 2015, p.51). On the one hand the chapter supports their argument that campaigning-NGOs, over time, achieved deeper concessions on social responsibility from commercial banks. It shows that this influence extended beyond project finance to a wider range of lending activities by pressuring commercial banks to engage in developing and implementing new carbon accounting practices. On the other hand, Chapter 5 highlights an emerging strategy employed by civil society actors to establish a vision of a carbon-constrained future that poses implications to the regulatory agenda of financial stability authorities and risk management strategies of financial organisations (*cf.* Bebbington and Larrinaga-González 2008, p.707). That is, rather than directly campaigning against particular organisations, the two degrees target was mobilised to envisage a carbon-constrained future that diverse and distributed financial sector actors should seek to understand and manage.

As a more concrete rendering of the two degrees target, the carbon budget is analysed as a mediating instrument (Miller and O'Leary 2007) that 'bridges' (Morgan and Morrison 1999, p.30) between a global objective for climate change and the implications of that target for the financial sector as a whole. Where Miller and O'Leary's analysis of technology roadmaps focuses on their 'concretion' of Moore's Law into "key, generic aspects of product development" (Miller and O'Leary 2007, p.719), the carbon budget translates the two degrees target into ideas of climate risk and threats to financial stability for the financial sector (See 'carbon budget' in Figure 1.1). Put simply, the carbon budget presents one component of achieving the global two degrees target and enables work to orient the financial sector towards that objective. Chapter 5 further demonstrates that it was through the mobilisation of the carbon budget by civil society actors that concerns of investment risk and financial stability were produced and mediated by the instrument.

Chapter 6 brings the reader inside the meeting rooms and webinars of the UNEP FI and GHG Protocol's Financed Emissions Initiative, demonstrating how the shifting financial sector discourse on climate change gradually permeated and reoriented the standard-setting project. This, in particular, highlights that the formation of a standard is only partly connected to enhancing *input legitimacy* (by showing potential stakeholders of the standard

were involved in its creation). Standard formation is simultaneously a process of eliciting and embedding shifting concerns into the standard to enhance perceived *output legitimacy*, which results from its "effectiveness and coordinative capacity" in responding to collective problems (Botzem and

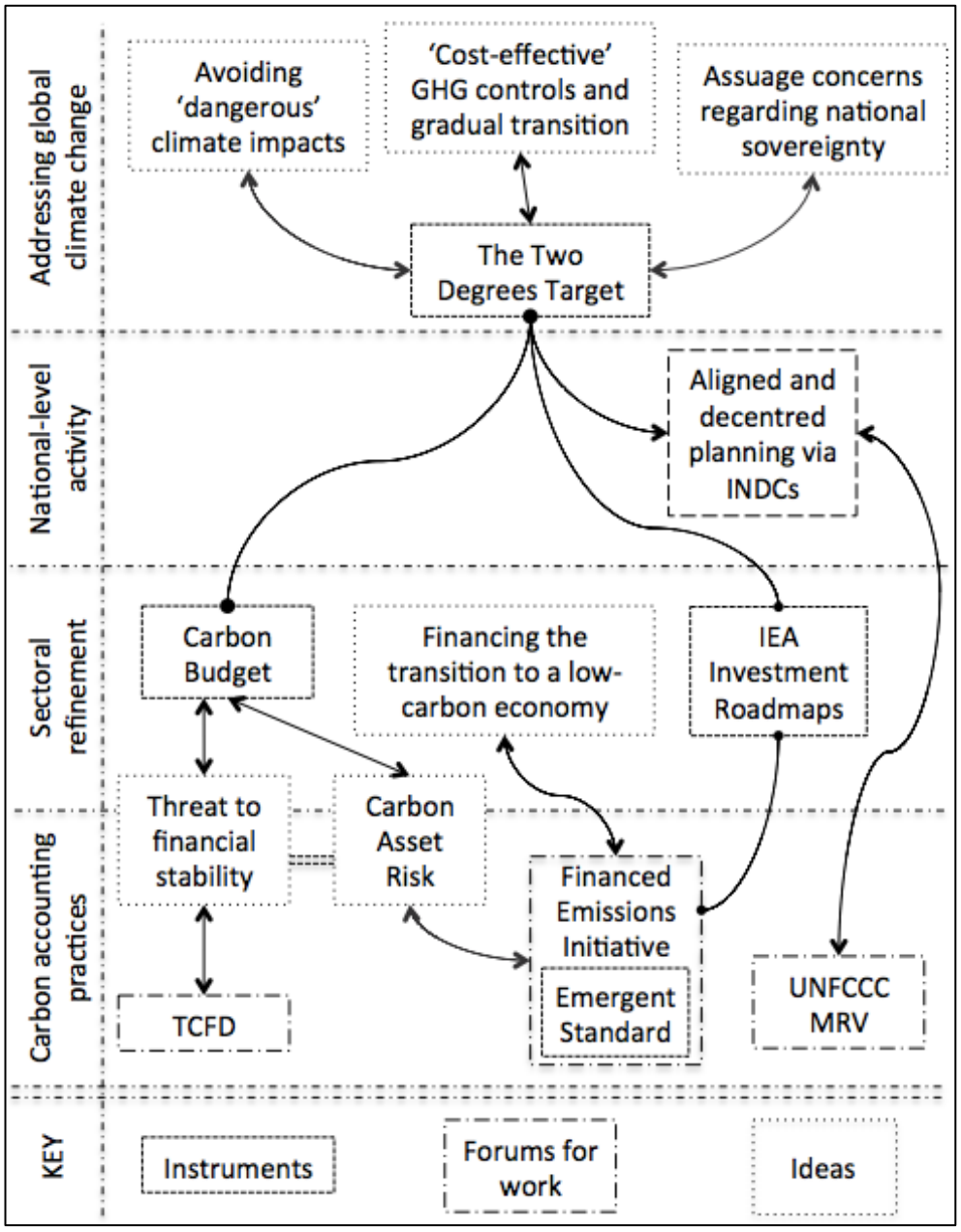


Figure 1.1: Diagram of the relationships between ideas, instruments and forums for work studied in this thesis.

Dobusch 2012, p.741). In this regard it nuances Botzem and Dobusch's argument that output legitimacy is "predominantly related to standard diffusion" (Ibid.), which the authors argue is because "high adoption contributes to output legitimacy [...] due to network or crowd effects" (Ibid., p.743). The thesis argues that stakeholder participation should not only be

viewed as generating input legitimacy by identifying "what the preferences of people are" (Boedeltje and Cornips 2004, p.7); rather, standard formation draws on the expertise of diverse actors in shaping and embedding those preferences in an 'effective' standard. Specifically, the chapter shows that the idea of monitoring the alignment of investment and lending activities with the two degrees target came to replace an initial objective of rendering financial organisations' climate impact visible by measuring and reporting the GHG emissions they finance. Indeed, this brought the Financed Emissions Initiative to the brink of collapse, leading to its relaunch as the Portfolio Carbon Initiative. In particular, this entailed a shift away from applying carbon accounting to produce 'carbon footprints' and towards metrics for the extent to which investment and lending activities support the transition to a low-carbon economy.

It is in this regard that Chapter 6 demonstrates the co-production between financial sector discourses on climate change and the accounting tools called upon to render the climate impact of investment and lending activities visible (*cf.* Pollock and D'Adderio 2012). That is, the ideas of managing 'carbon risk' and monitoring alignment with the two degrees scenario emerged interactively with the development of carbon accounting practices (See 'Financed Emissions Initiative' in Figure 1.1). In this light, the standard-setting process is framed as the one of constructing a mediating instrument (Miller and O'Leary 2007) and a "situated form of learning in which the manipulation of conceptual objects is often inseparable from the manipulation of material ones, and vice versa" (Gooding 1992, p.66). Furthermore, this co-production was interrelated with two other mediating instruments, the carbon budget and investment roadmaps. The carbon-constrained future envisaged by the carbon budget was to be made compatible with risk management practices, and investment roadmaps had to be refined to become a basis for indicators of 'climate performance'. The linking of these instruments through the Financed Emissions Initiative highlights the emerging calculative infrastructure built upon the two degrees target, and the embedding of that target in carbon accounting practices that frame investment and lending activities in terms of a global vision for addressing climate change.

Cutting across these three core chapters, Chapter 7 discusses the overarching contributions of the thesis. First, it draws together the components of the thesis pertaining to the production of sustainable development issues across multiple entities (Bebbington and Larrinaga 2014b, p.401). It argues that, in the case of climate change, activity across multiple entities is being reframed in terms of a common global vision for addressing the problem. Specifically, it is through multiple "practices or instruments [that] help link the actions and expectations of actors across formally separate and diverse domains" (Miller and O'Leary 2007, p.711) that efforts are coordinated towards achieving that vision. Second, the chapter further contends that mediating instruments offers a useful analytical lens for studying the global and complex issues on the sustainable development agenda (Unerman and Chapman 2014; O'Dwyer and Unerman 2016). On the one hand, the concept focuses the researcher on the instruments through which the diversity of concerns on a particular issue are rendered into a 'manageable' form that enables and coordinates work across multiple entities on specific component parts of the problem. On the other hand, the interconnections between mediating instruments provide a focus for studying the linking of "local issues to larger questions, and vice versa" (Miller and Napier 1993, p.634), directing attention to the emergent modes of governance across the sustainable development agenda. Third, processes of co-production (*cf.* Hacking 1992) are studied across the three core chapters, offering a response to the argument that '"[s]cholars working within this [mediating instruments] framework [...] have only begun to specify the process by which we might study and theorise interactions between material objects and wider calculative conceptions" (Pollock and D'Adderio 2012, p.567). Specifically, the processes of constructing and mobilising an instrument entail work that 'experiments' and 'tinkers' (Gooding 1992) with ideas and instruments and through which each is adjusted to the other.

Chapter 7 also identifies limits to the thesis and potential avenues for further research. In particular, the thesis has focussed on studying an emerging calculative infrastructure for enacting the two degrees target. Its conclusions are therefore limited to the processes through which a complex global problem is made 'manageable' at various different levels, and not the local acts of strategic planning and policy formulation. As such, this thesis

supports O'Sullivan and O'Dwyer's call for research into "institutionalization processes at the organizational level" (O'Sullivan and O'Dwyer 2015, p.51) of such social and environmental accounting practices. In addition, the majority of data collection pre-dates the December 2015 adoption of the Paris Agreement. As such, the thesis provides limited insight into the influence of its adoption on the development of carbon accounting as it "unfolds" (Bebbington and Larrinaga-González 2008, p.711). The thesis also pertains to the instruments that begin to coordinate action across multiple entities specifically in the financial sector on climate change. While this responds to O'Sullivan and O'Dwyer's call for studies of NGO movements around investment and lending activities on the issue of climate change (O'Sullivan and O'Dwyer 2015, p.51), it also narrows the scope of the contribution to regarding the conditions that influence actions across multiple entities on sustainable development issues (*cf.* Bebbington and Larrinaga 2014b). Further research could pursue a comparative study across multiple sustainable development issues by attending to, as examples, the Millennium Development Goals and Sustainable Development Goals, as initiatives that address multiple issues through the application of accounting, indicators and targets (as noted by Chenhall, Hall, and Smith 2013).

Chapter 7 also identifies three avenues for further research. First, the Paris Agreement enshrines a post-Copenhagen mode of climate governance that allows flexibility in designing decentred responses that work towards common objectives (see Falkner, Stephan, and Vogler 2010; Falkner 2016). However, as Chapter 4 highlights, this presents new challenges of hybridisation (Kurunmäki and Miller 2011) and commensuration (MacKenzie 2009) to national-level carbon accounting. These challenges are central to the Measurement, Reporting and Verification (MRV) UNFCCC work stream as well as the Capacity-building Initiative for Transparency established under the Paris Agreement (see 'UNFCCC MRV' in Figure 1.1). This provides an opportunity to study the "dynamics of accounting systems of governance as they emerge" with regards to "non-organisational entities" (Bebbington and Larrinaga 2014a, p.207), and which are central to the mechanisms being developed to enact the Paris Agreement. Second, further research into the carbon accounting practices that render visible deviations from the two degrees scenario at the organisational-level are required to study the

pressures on organisations to act on those deviations. This relates to the call for studies of the "institutionalization processes at the organizational level" (O'Sullivan and O'Dwyer 2015, p.51), however is not restricted to the financial sector. The Science Based Targets initiative, for example, provides a site for studies of the influence of the two degrees target in coordinating organization-level action across sectors. Finally, civil society actors have been studied regarding the influence of their interactions with corporations on enhancing corporate accountability (Cooper and Owen 2007; Archel, Husillos, and Spence 2011; O'Sullivan and O'Dwyer 2015). This thesis argues that civil society actors should be further studied as part of a regulatory dynamic between state and market. Chapter 6, for example, analyses their work as being interwoven with the regulatory agenda of the state as well as the strategies of the organisations they seek to influence (Chandhoke 2002). This appears particularly important to studying the regulatory dynamic in a post-Copenhagen climate regime, where the interrelation and mutual reinforcement of state and market action - referred to more generally as 'policy feedbacks' (Jänicke 2012; Jänicke 2014) – are seen as central to strengthening efforts to address climate change (Falkner 2016). Chapter 7 elaborates on these avenues for further research, while the next chapter (Chapter 2) turns its attention to situating the thesis within the carbon accounting, sustainable finance and mediating instruments literatures.

CHAPTER 2 – COORDINATION ON CLIMATE CHANGE: SITUATING THE THESIS

2.0. INTRODUCTION

As a key issue on the sustainable development agenda, climate change has been described as a complex problem[7] that is not created by "one single entity", but results instead from the "combination of institutions" that frame the activities of multiple entities (Bebbington and Larrinaga 2014b, p.401). This thesis responds to Bebbington and Larrinaga's call for studies of the "setting within which organisations operate" (Ibid.) by examining how the two degrees target envisaged a future that began to reframe ideas about how the financial sector influences and is influenced by climate change. It specifically focuses on the reshaping of concerns at the intersection of climate change and finance and how the target led to a reconfiguration of an emerging carbon accounting standard. In particular, this attends to the coordination of investment decisions across capital markets through their reframing in terms of a common long-term vision of addressing climate change. The investigation traces the linkages between the objective of the two degrees target and entities of different scales and scopes (from nations and sectors to organisations and investment portfolios), studying how the accountability of multiple entities is framed in terms of a common vision. The practices of carbon accounting are central to this study, as the tools through which the climate impacts of those entities are rendered visible. Moreover, the thesis focuses on four interconnected instruments – the two degrees target, the carbon budget, industry roadmaps, and the emergent carbon accounting standard – that link an abstract and simplified vision to multiple entities. These are examined as *mediating instruments* (Miller and O'Leary 2007) that simultaneously embed multiple potentially conflicting concerns and that orient action towards a common vision for tackling climate change.

[7] The term 'complex' refers to the view that climate change is a 'wicked' or 'super-wicked' problem (Milne and Grubnic 2011, p.949), with the former defying "resolution because of the enormous interdependencies, uncertainties, circularities, and conflicting stakeholders implicated by any effort to develop a solution" (Lazarus 2008, p.1159) and with the latter adding that "time is not costless, so the longer it takes to address the problem, the harder it will be to do so" (Ibid., p.1160).

This literature review provides a foundation for this study as well as situating the thesis within ongoing debates regarding carbon accounting, sustainable finance and mediating instruments. Section 2.1 explores the rapidly emerging field of carbon accounting and its multiple meanings across different disciplines. While it focuses on accounting scholarship, the section also highlights the debates in scholarship on national inventories of GHG emissions. Section 2.2 presents literature focussed on integrating the sustainability agenda into the financial sector. Section 2.3 turns its attention to the theoretical framing of the thesis, attending to the specific aspects of the notion of *mediating instruments* that inform its analytical framing. Section 2.4 offers brief concluding remarks. It should be noted that the research presented in this thesis holds relevance to literatures beyond those detailed in this literature review. Indeed the contributions of Chapters 4, 5 and 6 to specific debates in different literatures are highlighted within those chapters. The scope of this literature review, however, is to situate the thesis within the three bodies of scholarship that are connected to its overarching research programme.

2.1. WHAT IS CARBON ACCOUNTING?

Prior to 1992 carbon accounting had provided the natural sciences with measurement, calculation and attribution tools for analysing GHG dynamics in the biophysical environment (Ascui and Lovell 2011, p.983). However after the United Nations Framework Convention on Climate Change (UNFCCC) [8] was established in 1992 carbon accounting practices were developed for conducting 'GHG Inventories', accounts detailing a nation's GHG emissions as well as the removals of GHGs from the atmosphere (see IPCC 1996). Implementing such national-level accounting has proved challenging particularly in developing nations, where a lack of financial resources and expertise have hampered even the data collection stage of producing a national GHG inventory (Fransen 2009). Moreover, and as will be seen in Chapter 4, the Measurement, Reporting and Verification (MRV) requirements

[8] The UNFCCC was established as the framework to guide international negotiations on addressing the problem of global warming. The 1992 agreement on UNFCCC stated its overarching objective as preventing 'dangerous anthropogenic interference' with the climate system. Subsequent international climate talks held under the UNFCCC have formed mechanisms for setting GHG reduction targets and guiding policy implementation at the national-level (discussed further in Chapter 4).

that underpin the production of national GHG inventories in the UNFCCC process have been perceived as a threat to developing nations' national sovereignty. As such, the evolution of national-level carbon accounting practices has sought to improve the accuracy of national GHG inventories while ensuring their requirements are sensitive to the concerns of developing nations.

Carbon accounting is not, however, restricted to the measuring the GHG dynamics of the biosphere or the GHG inventory of one nation. As market-based solutions became the focus of debates on optimal solutions for emissions reductions in the mid-1990s, development of practices for producing organisational-level carbon accounts was stimulated. Ascui and Lovell refer to this form of carbon accounting as *market-enabling* (Ascui and Lovell 2011, p.986), emphasising that corporate-level data was produced to facilitate efforts to make carbon costly. In other words, as states pursued their national-level GHG reduction targets by curbing GHG emissions from emissions intensive sectors, corporate-level GHG disclosures were required to inform the number of emissions 'permits' an organisation needed to purchase or the allocated permits it could sell. Indeed, this raised financial accounting challenges regarding the treatment of emissions permits (Cook 2009; also see Section 2.1.3). However the idea of carbon being 'costly' is central to the forms of interconnected carbon accounting detailed above. This view takes carbon accounting as practices the enable mechanisms for creating a carbon price to integrate the need to curb global GHG emissions into profitability objectives at the corporate-level. That is, where the entity is "the matter or activity for which an accounting is to occur" (Meyer 1973, p.116), monetization through a price on carbon was seen as underpinning "the relationship assumed to exist between the entity and external parties" (Ibid.). Yet the monetization of GHG emissions remains a core challenge to the carbon accounting practices detailed above, even if the application of carbon pricing mechanisms is increasing and covers approximately 13% of global GHG emissions (World Bank 2016).

However carbon accounting is far from being exclusively tied to enabling market-based mechanisms for curbing GHG emissions. As early as the first Global Reporting Initiative (GRI) 'G1' sustainability reporting guidelines, published in 2000, environmental indicators included measures of

GHG emissions (Brown, de Jong, and Lessidrenska 2009a). However it was the launch of the GHG Protocol in 2001,[9] a carbon accounting standard-setting organisation, that would see a proliferation of carbon accounting practices (Ascui and Lovell 2011). The GHG Protocol developed corporate- and project-level carbon accounting practices through multi-stakeholder development projects that produced standards for organisations' (GHG Protocol 2004) and supply chain emissions (GHG Protocol 2011) as well as industry-specific guidelines for compliance with the core standards. Furthermore, these are the most widely-adopted carbon accounting standards, providing the basis for numerous voluntary and mandatory disclosure regimes (J. F. Green 2010). Yet, in the absence of a carbon price, carbon accounting provides practices that "pronounce on" and "evaluate the performance of individuals and organizations" (Miller and Power 2013, p.562) for different ideas and aspirations for addressing climate change. This thesis argues that the two degrees target is becoming one such focal point for addressing climate change, enabling the linking of numerous entities, of various scales and scopes, to a single figure that represents the long-term objective for addressing climate change.

It is in this regard that the thesis takes 'carbon accounting' to refer to those practices that use GHG emissions as their basis for measuring, estimating, recognising, disclosing and verifying the climate impact of an entity's activity. Indeed this definition mostly fits within Ascui and Lovell's (2011) frame regarding the scope of carbon accounting. Their definition is presented in Figure 2.1, and as the authors explain, "[b]y selecting and combining different terms within this figure, a multitude of more specific interpretations of carbon accounting may be derived" (Ascui and Lovell 2011,

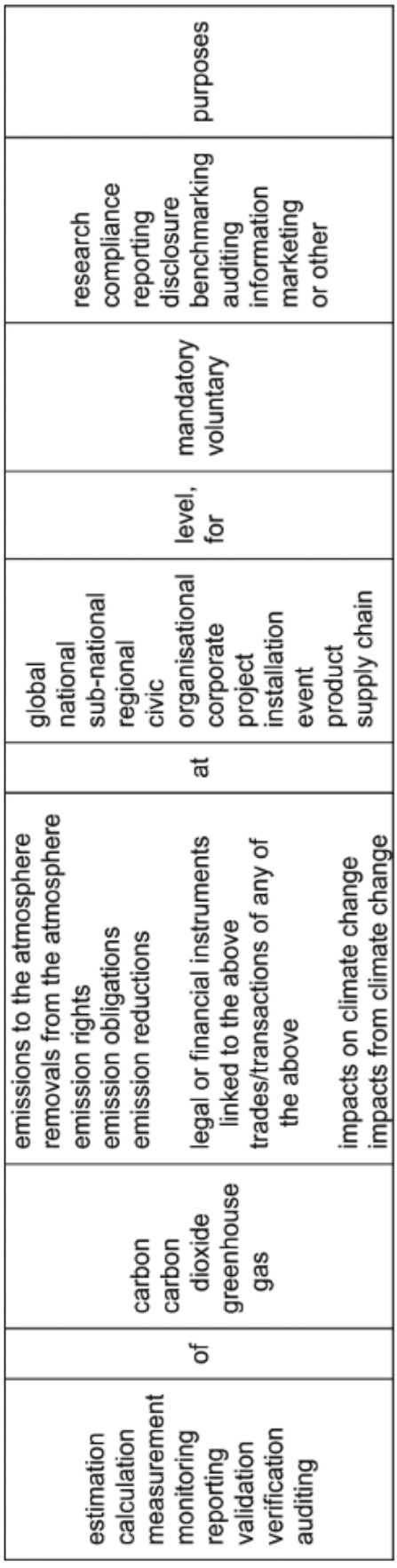
[9] The Greenhouse Gas Protocol was founded in 2001 by the World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD).
WRI is a global think tank, headquartered in Washington D.C., that seeks to shift societal behaviour towards protecting the Earth's environment so that is can provide for future generations (WRI 2016b). Since its founding in 1982 it has avoided what it terms the 'prevailing activist model' (WRI 2016a) in favour of work that advances an evidence-based understanding of sustainable development issues and works to bring this to the attention of decision-makers across the public and private sectors.
WBCSD was founded shortly before the Rio Earth Summit in 1992 in an effort to ensure the business voice was present (WBCSD 2016), and based its work on the belief that business had an inescapable role to play in sustainable development (Schmidheiny 1992). It is a CEO-led organization that works to influence the business community towards creating a "sustainable future for business, society and the environment" (WBCSD 2016).

p.980). However, this thesis highlights that carbon accounting practices are being combined with economic and physical measurements to provide the basis for national-, sectoral and organisational-level planning and target setting. As such, the definition of carbon adopted pertains to those practices that fit within Ascui and Lovell's definition, as well as such practices that have been hybridised with other forms of measurement expertise (*cf.* Kurunmäki and Miller 2011).

2.1.1. Carbon Accounting and Climate Governance

In their chapter, *Accounting and global climate change issues*, in *Sustainability Accounting and Accountability*, Bebbington and Larrinaga argue carbon accounting has not become 'black boxed' as it is still evolving through the plethora of reporting requirements and the development of interlocking standards (Bebbington and Larrinaga 2014a, p.207). This, they claim, provides accounting researchers with an opportunity to study a "process that is in play" (Ibid.), through which the range of efforts to integrate carbon accounting in a particular mode of climate governance may be explored. This thesis provides one such study, demonstrating how the two degrees target provided the foundation for civil society actors – such as think tanks, standard-setters, campaigning-NGOs and disclosure groups – to enact a mode of climate governance that pursues the alignment of capital markets with the transition to a two degrees world. Bebbington and Larrinaga further highlight the numerous contexts in which the role and nature of accounting for carbon may be examined, and the potential significance of such studies to mainstream accounting and interdisciplinary research. "[Global climate change] governance regimes create contexts in which issues of commensuration, marketization, economic consequences and risk analysis come to the fore" (Bebbington and Larrinaga 2014a, p.206). Indeed, in this thesis Chapter 4 demonstrates that the historical emergence of the two degrees target, and the idea of a target-based mode of policy planning, was wrought with issues regarding the coordination of action across multiple entities – from the commensuration of GHGs to setting 'interim' targets to guide a gradual transition towards alignment with a long-term climate goal. Larrinaga, introducing the 2014 carbon accounting special issue of *Social and Environmental Accountability Journal*, further remarks on the role of carbon accounting in enabling both 'soft forms of carbon governance' as well as 'hard

Figure 2.2: Definition of Carbon Accounting (Ascui and Lovell 2011, p.980)



law' on the issue (Larrinaga 2014, pp.2–3), yet how carbon accounting "remains contested in every scenario" (Ibid., p.4). Indeed, whereas Chapter 5 shows how the two degrees target provides a basis for civil society actors to engage in 'soft forms of carbon governance', Chapter 6 documents the contests over carbon accounting that led to the reconfiguring of a standard towards a mode of climate governance based on aligning investment and lending activities with the transition to a two degrees scenario.

On standards development, Bebbington and Larrinaga note that carbon accounting "offers the opportunity to investigate the dynamics of accounting systems of governance as they emerge" (Bebbington and Larrinaga 2014a, p.207). The authors point to the involvement of state and non-state actors in producing norms around carbon accounting (*cf.* Braun 2009) and an emerging infrastructure that will become linked to new regimes for acting on climate change (*cf.* Bowen and Wittneben 2011). Chapter 6, in particular, demonstrates how carbon accounting was called upon to facilitate efforts to manage the potential risks of a two degrees scenario and the extent to which investment and lending activities support to transition to a low-carbon economy. That is, the project shifted from producing an accounting focus on carbon footprints of investment and lending activities, to indicators for managing and monitoring alignment with a two degrees scenario. In this regard, the thesis demonstrates how an emerging mode of climate governance – based on holding financial organisations accountable for supporting the transition to a low-carbon economy and managing the risks it presents – emerged (Chapter 5) and became embedded in carbon accounting practices (Chapter 6). Moreover, it does so by demonstrating a specific instance in which carbon accounting became linked to an emerging calculative infrastructure that refined the two degrees target to sectoral-, corporate- and portfolio-level entities. To reiterate, this thesis demonstrates how a specific carbon accounting standard was reconfigured to enact a mode of climate governance based on aligning action with a two degrees scenario.

This focus on the reconfiguration of an accounting standard away from calculating 'carbon footprints' is, however, a contrast to calls for a closer technical analysis of carbon accounting. For example Lohmann calls for reflection on the "erasures, conflicts and exaggerated claims" (Lohmann 2009, p.530) of environmental accounting techniques and "carbon accounting's

indifference to where or how emissions cuts are made […]; its conflation of reductions and offsets […]; and its focus on means of achieving short-term efficiency" (Ibid.). Published as part of the *Accounting, Organizations and Society* special issue on carbon markets, his paper prioritises the study of carbon accounting as a 'market-enabling' practice. Similarly, MacKenzie draws attention to the commensuration of GHGs as a technical definition that underpins carbon markets, arguing that it "precisely issues of this detailed kind that an effective, inter-disciplinary analysis of carbon markets will need to address" (MacKenzie 2009, p.442). As such, the representational accuracy of carbon accounting, regarding both its scientific basis and the emissions of the entity in question, is central to studying the practices in relation to carbon markets. Yet these studies also privilege the view that carbon accounting is a set of practices for facilitating emissions trading schemes or other market-based mechanisms for GHG control. Rather, this thesis demonstrates how carbon accounting becomes connected to a new mode of climate governance. Specifically, one where civil society actors coordinate a range of pressures on financial organisations, pursuing the envisaged alignment of capital markets with a two degrees scenario. This thesis does, however, still demonstrate the influence of technical definitions on the visibilities created by carbon accounting – for example in Chapter 6 financial organisations' scenario planning is influenced by their choice of emissions trajectory, and several initiatives exist to facilitate the translation of industry roadmaps into portfolio-level metrics.

This chapter now proceeds to consider the challenges of defining and linking multiple scales and scopes of entity through the practices of carbon accounting. This is to inform the focus of this thesis on the emergence of the two degrees target and its subsequent linking to national-, sectoral-, corporate-, and portfolio-level entities.

2.1.2. The Nation as a Carbon Entity

As Gillenwater explains, "[a] GHG inventory is an accounting of anthropogenically produced GHG emissions from sources (e.g., fossil fuel combustion) and removals through sinks (e.g., managed forest growth or carbon sequestration) based on rigorous technical methodologies and detailed data collection on relevant activities (e.g., fuel consumption)" (Gillenwater 2008, p.195). Called upon by the UNFCCC, one duty of the

Intergovernmental Panel on Climate Change (IPCC)[10] is to provide guidance on methodologies for calculating GHG inventories, which has been adopted as the best practice guidelines by Parties to the UNFCCC. The IPCC guidelines were first approved in 1994 and published in 1995 (IPCC 1995a), being updated in 1997, 2000, 2006 and 2014 (IPCC 1997; 2000; 2006; 2014) through the IPCC Task Force on National Greenhouse Gas Inventories.

Scholars have directed much attention at examining the accuracy of IPCC methods, comparing results from the published guidance with a range of other models for estimating specific aspects of national GHG inventories. La Motta *et al.* (2005), for example, find that while the main aspects of the IPCC method appear reliable, the emissions from non-energy use of fossil fuels are currently underestimated (La Motta et al. 2005). These results have been built upon in appeals for the IPCC standards to consider incorporating a wider range of emissions as well as adopting adjustments to enhance the accuracy of the calculations (Stechemesser and Guenther 2012). Stechemesser and Guenther argue that indirect emissions should be included to produce a more complete understanding of the drivers of emissions, and that enhanced "regulations at all scales" (Ibid., p.356) are necessary to improve the precision of GHG inventories. Through these measures, the authors claim, "national mitigation strategies and international agreements can be improved and projects can be better assessed" (Ibid.). Yet Chapter 4 highlights that following the collapse of the UNFCCC Copenhagen climate talks in 2009, the UNFCCC mechanism for national-level contributions to GHG mitigation has been based on a wider set of metrics than CO_2, or GHG, data alone. While, for example, contributions based on reductions in emissions intensity of GDP may appear a small change from reductions in total GHG emissions, it requires standardised approaches to forecasting GDP growth. Furthermore, with China basing much of its proposed contribution to tackling climate change under the UNFCCC on a range of 'policy targets' (such as, among others, renewable energy, energy efficiency, and forestry) a focus on the accuracy of GHG data alone risks overlooking how carbon accounting at the national-level is becoming interconnected with a range of other strategies for mitigating climate change. Indeed, Chapter 4 shows that after the 2009 Copenhagen climate talks the

[10] The IPCC is an intergovernmental scientific body that is tasked, by member nations of the United Nations, with assessing the latest scientific view of climate change along with its economic and political impacts (see Agrawala 1998).

UNFCCC adopted a more flexible approach to national-level target setting to assuage concerns regarding encroachment on developing nations' sovereignty. This raises new concerns on measuring and monitoring the nation as a climate entity – from the comparability of domestic data sources with other nations' contributions, to MRV requirements for monitoring national progress – on which carbon accounting scholars can provide valuable insight. This also provides opportunities for accounting scholars explore the application of carbon accounting to enact a post-Copenhagen climate regime.

However one of the most active debates in the literature regarding the relevant entity to be made accountable for GHG emissions is the question of whether a nation's GHG inventory should reflect the emissions arising from *producing* goods and services or their *consumption*. While IPCC methods follow a production-based approach to calculate GHG inventories, there is a growing literature examining the feasibility and advantages of consumption-based carbon footprints. In a world where trade is growing faster than population and GDP, Andrew *et al*. argue, the emissions embedded in imports (i.e. a consumption-based approach) are increasingly important in designing effective national policies for the reduction of GHG emissions (R. Andrew, Peters, and Lennox 2009). Take, for example, UK emissions between 1992 and 2004. While the UK achieved a 10% reduction in its production-based emissions in this period, surpassing its Kyoto Protocol target ahead of time, a consumption-based approach demonstrates that, when imports are included in the calculation, emissions rose by 8% over the same period (Minx et al. 2009; Wiedmann et al. 2010). Challenges facing the consumption-based approach, however, stem from the increased data and computational requirements. Andrew *et al.* explore this challenge in the Australian context, investigating the trade-off between simplifying assumptions and the cost, timeliness and robustness of the approach (R. Andrew, Peters, and Lennox 2009), highlighting the assumptions with potential to make the models more "accessible" (Ibid., p.312; pp.325-6). This debate attends to the question of which entities, in principle, should be made responsible for controlling GHG emissions; those that produce emissions, or those whose consumption drives the production.

Yet literature on the consumption-based approach sets aside the question of the conditions in which carbon accounting is configured, instead

taking a more ideological approach to the potential benefits it presents. For example Peters and Hertwich (2007) argue that it would reduce the importance of emission reduction commitments for developing countries and ease their integration into international talks because developed nations would take a greater burden of the emissions reductions (Peters and Hertwich 2007). However developing nations, as Chapter 4 will show, were not alone in their recalcitrance during the UNFCCC process. Indeed, the United States of America did not ratify the Kyoto Protocol, and its approach to the 2009 Copenhagen talks was seen as contributing the collapse of the negotiations (Christoff 2010). As such, there appears little reason for Peters and Hertwich (2007) to expect developed nations to willingly accept a larger share of global emissions. This is not to set aside debates regarding a consumption-based approach. Liu *et al*., for example, highlight its relevance to balancing the regional emissions targets in China, where the current shift of carbon-intensive producers to poorer regions is allowing wealthy regions to achieve their production-based GHG reduction targets without implementing GHG control measures (Liu et al. 2015). The point is that national-level carbon accounting practices are configured through the negotiation of concerns in international climate talks. Whereas the Kyoto Protocol was rigidly based on targets for reducing GHG emissions, the flexibility of the post-Copenhagen climate regime enshrined in the 2015 Paris Agreement calls upon carbon accounting to reveal the contribution of a range of metrics to global reductions in GHG emissions.

2.1.3. Accounting and Emissions Trading Schemes

Bebbington and Larrinaga (2014b) argue that carbon accounting has "captured researchers' attention" because markets have emerged to "translate these concerns to the entity level" (Bebbington and Larrinaga 2014b, p.401). Indeed, this reinforces Hopwood's observation that "the creation of a market in carbon emissions is one arena in which accounting and the environment have become intertwined – for better or for worse" (Hopwood 2009, p.434). While this thesis examines climate change through the efforts to assign responsibility for achieving the two degrees target to a various entities of different scales and scopes, the accounting literature on emissions trading schemes provides insight into the challenges of rendering GHG emissions into

a form where accounting can coordinate activity across organisations and regions.

The *Accounting, Organizations and Society* 2009 special issue, *Accounting and Carbon Markets*, provided useful insights into making an organisation or facility the responsible entity for national-level GHG reduction targets and, in doing so, the translation of GHG emissions into measurement and reporting practices for GHG accountability more broadly. MacKenzie (2009) focussed on identifying and examining the specific technical details of accounting for carbon that have significant consequences for economic action. For example, his analysis of Global Warming Potentials (GWPs) examines the "exchange rate" (Ibid., p.446) that translates a GHG into its 'carbon dioxide equivalent' (CO_2e), providing policy-makers with a form of GHG information that enables work on emissions with little input from scientists (Ibid.). Yet the "exchange rate" established for GWPs also determines the relative value of GHGs in terms of the number of emissions permits required or the number of carbon credits that can be generated through their sequestration or removal from the atmosphere. In particular, Chapter 4 highlights that a pair of workshops, held in Bellagio and Villach 1987, proposed CO_2e to enable the commensuration of GHGs and the aggregation of GHG emissions at, in particular, the national level.

Furthermore, while there have been numerous studies of factors influencing the treatment of emissions permits (Zhang-Debreceny, Kaidonis, and Moerman 2009; McNicholas and Windsor 2011; Gallego-Alvarez, Martínez-Ferrero, and Cuadrado-Ballesteros 2016), Mete *et al.* (2010) set out to examine the "creation of an economic phenomenon, a carbon permit, provides a unique opportunity to explore the construction of institutional meaning and the role of institutional members in creating meaning" (Mete, Dick, and Moerman 2010, p.620). In particular this demonstrates how carbon accounting embeds the concerns of the conditions in which the entities being made responsible operate. While this thesis focuses on the embedding of concerns beyond the monetization of carbon emissions, these studies still demonstrate how carbon accounting is configured to establish a responsibility that is compatible with particular concerns. Mete *et al.*, basing their study on the Australian tax system, show the contrast between an 'accounting treatment', which "demonstrates support for a market imperative" (Ibid.,

p.628) by centring on the tradable nature of the permits, and the 'taxation treatment', which places "reliance on the notion of regulation and compliance" (Ibid.). The institutional meaning created through the different treatments, the authors argue, "contributes to the hybrid mix of *laissez-faire* and regulation evidenced in the Australian context" (Ibid.). In this thesis, on the other hand, Chapter 6 demonstrates how the shifting concerns regarding the way the financial sector influences and is influenced by climate change came to reconfigure carbon accounting practices. The standard setting project was not simply a case of pursuing an accurate and comprehensive representation of the emissions financed by investment and lending activities; rather, it was creating the practices that could simultaneously appeal to ideas of risk management and monitoring alignment with the two degrees target.

Yet it should also be noted that others have argued the monetization of emissions is unethical and fails to challenge the institutional arrangements that caused – or at least enabled activity that caused – issues such as climate change. Zhang-Debrency *et al.* argue that treating emission permits as an asset creates a right to emit (treatment as a liability similarly faces this inconsistency, as firms are effectively 'entitled' to emit), which is inconsistent with the responsibility humans have to reduce emissions (Zhang-Debreceny, Kaidonis, and Moerman 2009). McNicholas and Windsor approach the question of financial and reporting regulation in emissions trading schemes from a somewhat different perspective, arguing that a system that failed to prevent a global financial crisis will do little to address GHG emissions as "the real problem that underlies global warming" (McNicholas and Windsor 2011, p.1074). Arguing that "value should not be reductively monetised for the sake of market participants" (Ibid., 1089) the authors warn that "no amount of taxpayer funded bailouts will be able to rescue life on Earth" (Ibid., p.1090) from the failures of "[n]ational and international public policy [that] is now largely focused on a risky experiment of emissions trading as a market solution to global warming" (Ibid.). However it is also important to note that while emissions trading schemes have attracted much scholarly and public attention in recent decades, they are far from the only mechanism for enacting national and international ideas of GHG control. In this regard McNicholas and Windsor (2011) overstate the extent to which market-based mechanisms are being applied to curb GHG emissions, privileging a view of carbon accounting

as practices for the monetization of the Earth's atmosphere. This thesis, on the other hand, demonstrates how carbon accounting is called upon to facilitate an array of regulatory efforts, from the international UNFCCC protocols to the campaigning efforts of NGOs. To reiterate, this thesis demonstrates that carbon accounting is being called upon to "enable the diverse forms of carbon governance" (Larrinaga 2014, p.2), presenting new challenges for carbon accounting in its hybridisation (Kurunmäki and Miller 2011) with other forms of measurement expertise.

2.1.4. Carbon Accounting Disclosures

To examine the ideas that carbon accounting comes to embed it is necessary to study the range of pressures that drive its implementation, which extend beyond legal requirements. Indeed, while the disclosure of corporate-level GHG emissions information has been mandated for certain organisations by some nations (DEFRA 2012; Assemblée Nationale 2015), the drivers of voluntary reporting of carbon information has attracted much attention, especially from social and environmental accounting scholars. This attention extends beyond carbon accounting to the drivers of social and environmental reporting requirements. For example, O'Sullivan and O'Dwyer (2015) demonstrating how a global network of campaigning-NGOs, BankTrack, worked to enhance commercial banks' compliance, over time, with the Equator Principles, a set of environmental and social risk management guidelines for project finance (O'Sullivan and O'Dwyer 2015). For carbon accounting scholars, CDP (formerly, the Carbon Disclosure Project) has been particularly central to such studies. CDP, as Kolk *et al*. explain, leverages the influence of institutional investors to gain insight into the climate risk profiles of the world's largest firms (Kolk, Levy, and Pinkse 2008, p.724). That is, the authors show that CDP appears to promote widespread disclosure of corporate-level climate-related impacts, based on which institutional investors may analyse and manage the long-term risks that climate change presents.

However this reported GHG emissions information has proved difficult to link to the risk agendas of investors. Indeed, Kolk *et al*. highlight that GHG emissions lack compatibility with the day-to-day work of investors and they find no evidence to suggest that such information is being used by investors in their decisions (Ibid., p.741). Kolk *et al.*'s findings are supported by more

recent accounting literature examining CDP's influence on disclosure practices. Sullivan and Gouldson, for example, highlight that reported data is difficult to integrate in investment risk analysis and, also, that investors have paid little attention to the quality of the data (Sullivan and Gouldson 2012. See also J. Andrew and Cortese, 2011; Dragomir, 2012).[11] Indeed Chapter 6 shows that this 'disconnect' between GHG emissions and risk management appeared to stem from the absence of a price on carbon that would enable the monetization of the risks presented by GHG emissions. This became central to the tensions between financial organisations and the Secretariat of the Financed Emissions Initiative on the extent to which the resulting standard would be adopted. What Chapter 6 documents is how the carbon accounting practices shifted towards metrics for analysing industrial transitions under a two degrees scenario.

These observations further develop Haigh and Shapiro's insights into investors' motivations for environmental investing, which highlight how investors prepare for the future they imagine while being unable to connect corporate carbon disclosures to their own commercial exigencies. Investors, the authors argue, prepare their systems for the potential asset allocations in their imagined futures, with the predominant use of carbon disclosures in decision-making being limited to assessments of corporate governance (Haigh and Shapiro 2011). This offers a partial response to Kolk *et al.*'s (2008) call on accounting researchers to examine the relationship between the 'incomplete' information being generated through CDP with the financial performance of the reporting firms. Indeed, this thesis develops these insights by documenting how the carbon accounting standard was reoriented away from a focus on GHG emissions, partly due to the lack of risk-relevance, and towards a set of measurements and indicators tailored towards emerging notions of risk and accountability. This further highlights that the implementation of carbon accounting is not solely a matter of responding to pressures to disclosure, but also as a means for managing emerging concerns that stem from climate change. As such, this chapter turns to consider the application of carbon accounting as a management tool.

[11] Elsewhere this incompleteness of emissions disclosures has been framed as the result of carbon accounting being a symbolic act to address legitimacy concerns (Liesen et al. 2015, Hrasky 2011).

2.1.5. Carbon Management Accounting

While much carbon accounting literature focuses on the disclosure of GHG information, the application of carbon accounting as a management tool demonstrates how the practices become refined to the operations and strategies within and across organisations. Moreover, the standard-setting project studied in Chapter 6 sought to simultaneously standardise the disclosure of GHG information on investment and lending activities as well as provide methods for analysing the risks and opportunities that climate change posed to financial organisations. In their overview of carbon management accounting techniques and scholarship, Schaltegger and Csutora describe it as "that part of carbon accounting, which supports companies in the successful operationalization and implementation of their carbon management" (Schaltegger and Csutora 2012, p.7). In particular, the authors highlight that beyond calculating carbon footprints, indicators such as CO_2 emissions per Euro of sales enables the comparison of performance across organisations and products (Ibid., pp.7-10). Furthermore, and as Tsai *et al.* (2012) argue, this refinement of carbon accounting to the level of an individual product or portfolio exposes the most environmentally damaging elements of the production process on a more granular level, enabling targeted managerial interventions.

Of particular relevance to Chapter 6, Schaltegger and Csutora highlight that organisations may set goals based on benchmarks of their own carbon management accounting data against "the company's historical carbon emissions, specific corporate functions (functional benchmarking), industry average (industry benchmarking), leading competitors (leadership benchmarking) or the goal of carbon neutrality" (Ibid., p.9; also see Rietbergen, van Rheede, and Blok 2015). However Chapter 6 focuses specifically on the value chain of a financial organisation. That is, the carbon accounting standard did not focus on the emissions originating from the 'direct' operation of a bank's office block, for example; rather, the standard initially sought to measure the emissions enabled by investment and lending activities. Supply-chain benchmarking is detailed by Acquaye *et al.*, who develop carbon maps at the industry-level, providing benchmarks against which the environmental sustainability of supply chains can be measured (Acquaye et al. 2014). The authors demonstrate the value of their benchmarks

in rendering visible the deviations of their supply chain from the industry map. This highlights 'hot spots' that managerial attention can be directed toward. Chapter 6 expands on this form of benchmarking, highlighting the application of carbon accounting indicators for comparing corporate- or portfolio-level performance against emissions trajectories and roadmaps for industrial transition towards the two degrees target. In other words, the transformation of the two degrees target into industry roadmaps makes it possible to assess the alignment of an individual investment portfolio with the long-term global climate objective.

2.2. Finance and the Sustainability Agenda

In their chapter in *Sustainability Accounting and Accountability*, Coulson and O'Sullivan highlight the blurred margins between niche financial products that cater to demand for sustainable investment, and the mainstream products that have come to include social and environmental risk considerations in routine assessments (Coulson and O'Sullivan 2014). A parallel shift is occurring in how financial organisations are being held accountable for the impact of their investment and lending activities on climate change. On the one hand, NGOs – such as the members of the global NGO network, BankTrack – have directly campaigned against and engaged with commercial banks regarding their lending to projects deemed to have a significant contribution to global GHG emissions (e.g. mountaintop removal of coal, a form of mining). On the other hand, this thesis (Chapter 5 in particular) shows how a range of civil society actors sought to influence investment and lending activities beyond the project finance operations of commercial banks, seeking to align capital markets with the two degrees target. Specifically, this distinguishes between a mode of direct intervention in a particular and tangible form of lending, and the emerging strategy of fostering expectations of a two degrees world and embedding a two degrees scenario in the accounting practices that frame investment and lending decisions. This section situates the thesis within studies of sustainable finance, focussing on financial organisations' engagement with ideas of environmental and social risk as well as on the dynamic between civil society actors and financial organisations.

2.2.1. Sustainable Finance, Risk, and Envisaging Carbon Constraints

A central strand in the sustainable finance literature pertains to the potential risks that climate change, along with a number of social and environmental issues, may pose to financial organisations. Indeed this thesis demonstrates how the two degrees target was mobilised by civil society actors as a basis for new ideas of climate risk (Chapter 5), ideas that permeated into the standard-setting project and reconfigured carbon accounting to render it compatible with financial organisations risk management systems (Chapter 6). Focussing on the integration of environmental concerns into corporate financial strategy, Coulson and Dixon (1995) offer an early study of financial organisations' reactions to the environmental concerns raised through disasters such as the disastrous Union Carbide gas leak in Bhopal and the Exxon Valdez oil spill in Alaska (Coulson and Dixon 1995, p.22). The authors emphasise the legislative response to these disasters as the link between environmental issues and the risks they pose to the financial sector. The authors argue that "companies and financial institutions have little excuse for ignoring environmental considerations within project appraisal" (Ibid., p.28) considering this rapid increase in legislation. Indeed Coulson and Monks (1999) offer concrete examples of the "unforeseen costs" that "companies who fail to consider their environmental performance could face" before finance is made available to them, including "specialist environmental assessment or pollution abatement and clean-up" (Coulson and Monks 1999, p.9). In this regard it has been argued that the legal system's response to environmental issues creates a 'business case' for financial organisations to analyse potential risks from climate change, with Richardson basing his argument on the increasing regulation of GHG emissions (Richardson 2009). However this thesis highlights, in Chapter 5 in particular, that financial organisations initially saw flaws in this 'business case', doubting that strong GHG regulations would enter into force and believing they could adjust their investment and lending strategy relatively swiftly if and when such regulations arose.

On the other hand this thesis demonstrates that the two degrees target provided the foundation for civil society actors to create a vision of a carbon-constrained future. Their argument is that to remain within a two degrees scenario there is a 'finite carbon budget' – a maximum level of cumulative

emissions – and transformations of carbon-intensive sectors will be required to remain within that budget (Chapter 5). It is precisely this carbon constrained future that Bebbington and Larrinaga-González (2008) – in their introduction to the 2008 *European Accounting Review* special section on *Accounting and the Market of Emissions* – argue creates risks for investors that could lead them to require further information to inform their risk management practices (Bebbington and Larrinaga-González 2008, p.707). The authors, citing Kolk and Levy, (2001), present the example that "competitive risks arise from the likelihood that carbon-intensive products and services become obsolete compared with low emission products and technologies."[12] It is this perception of carbon constraints, and their asymmetrical distribution across sectors (*cf.* Busch and Hoffmann 2007), that is central to the 'climate risk' concerns examined in Chapter 5. In particular, this demonstrates how the two degrees target provided an apparently simple vision for the future of efforts to address climate change upon which ideas and analyses of carbon constraints could be based. In other words, it is through the gradual reorientation of financial sector expectations towards a two degrees future that the idea of legal requirements to curb GHGs became perceived as a potential risk to investment and lending activities.

2.2.2. NGO Influence and Engagement on Sustainable Finance Practices

Chapter 5 also demonstrates the reputational risk stemming from the efforts of campaigning-NGOs. Such reputational risk has become a central theme in the sustainable finance literature, which has attended to the strategies of campaigning-NGOs to leverage the influence that financial organisations have across industries around the world. This has been noted since 1995, with Coulson and Dixon remarking "Financial institutions are key stakeholders in a company and their influence on decision making should not be underestimated" (Coulson and Dixon 1995, p.28). More recently, Richardson has argued that the financial sector has potential beyond mobilising finance for clean energy due to its influence for more sweeping changes across the economy (Richardson 2009). This is a central theme in

[12] Similarly, Busch and Hoffman suggest that as financial organisations come to recognise fossil fuel substitution as a long-term trend it will come to constitute a risk factor to be integrated into their established environmental risk assessments (Busch and Hoffmann 2007).

Chapter 6, which documents how the standard was reconfigured to produce metrics to render visible the extent to which investment and lending activities were supporting the transition to a low-carbon economy. In Chapter 6, this reconfiguration is driven by think tanks working to align capital markets with the two degrees target by rendering visible the deviations of investment and lending activities from roadmaps to a low-carbon economy. This, however, presents a different strategy for creating reputational risk than that shown in the sustainable finance literature. Wilson, for example, details how, since 2000, Friends of the Earth and Rainforest Action Network (RAN) have challenged the financial industry with high-profile campaigns exposing cases where financial organisations had 'bankrolled disasters' (Wilson 2010, p.268). Similarly, Petherick (2012) examines RAN's *Bankrolling Climate Change* report (Schücking et al. 2011) that 'named-and-shamed' the 'climate killer' banks that had contributed most to the doubling of investments into coal between 2005 and 2010 (see Figure 2.2).[13]

These campaigning efforts had taken a case-by-case approach that targeted banks' financing of specific carbon-intensive projects. Chapter 6, on the other hand, demonstrates a new strategy to benchmark investment and lending activities against a trajectory towards the two degrees target. This draws a parallel to Coulson and O'Sullivan's view that margins between niche 'sustainable' financial products and mainstream products integrating routine social and environmental risk assessments are blurring (Coulson and O'Sullivan 2014). Compared to NGO campaigns that target specific problem projects, this thesis highlights the combined strategies of multiple civil society actors behind efforts to render deviations from a particular industry roadmap visible. In doing so, deviations from that trajectory become visible, providing information to inform efforts to pressure financial organisations to align with a particular vision for addressing climate change. In other words, the adjudication of the climate impact of investment and lending decisions is becoming based on the transition to a low-carbon economy, rather than the objectives of particular campaigning-NGOs.

[13] Also see Waygood (2006) for an overview of the different campaigning strategies of NGOs in capital markets and a historical perspective on their emergence and evolution (Waygood 2006).

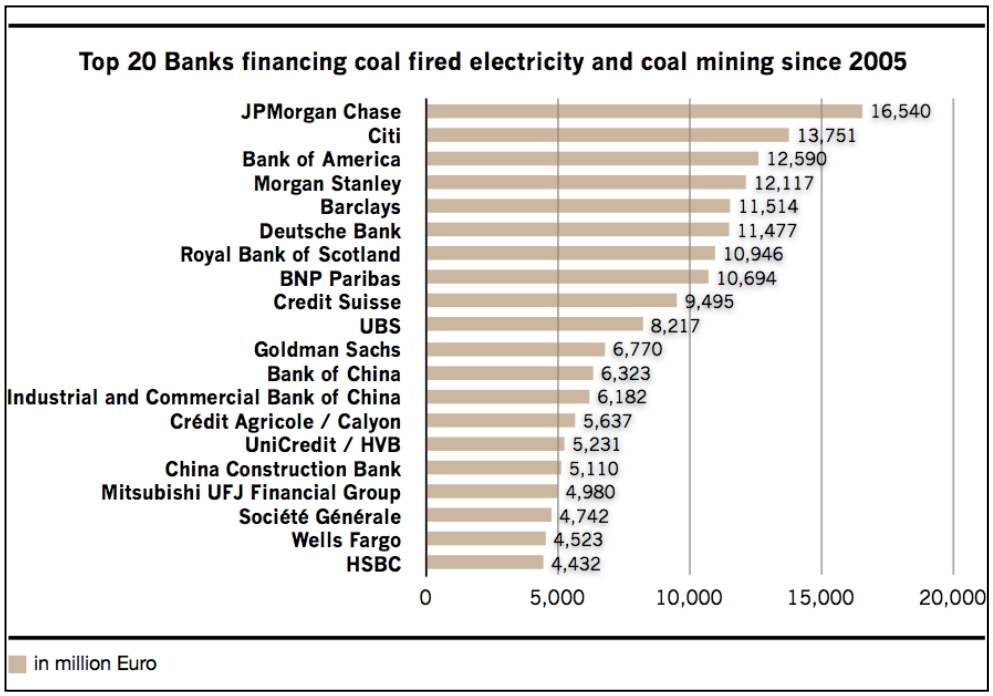


Figure 2.2: BankTrack's Climate Killer Banks (Heffa Schücking et al. 2011, .p15).

Scholarly attention has not been restricted to the reputational risks posed by NGOs' campaigns. It has also revealed the dialogue between NGOs and financial organisations, with Coulson (2009), for example, examining the tensions that arise from the different ideas of environmental governance held by each group (Coulson 2009). Similarly, in their study of the Equator Principles O'Sullivan and O'Dwyer (2009) highlight how NGOs shifted from a strategy of "hard line advocacy to one of engagement" (O'Sullivan and O'Dwyer 2009, pp.555–6). While Wright notes that the support of commercial banks in committing to and endorsing the Equator Principles played a key role in their materialisation (Wright 2009), the dialogue between NGOs and financial organisations is central to studies of the initiative. For example O'Sullivan and O'Dwyer highlight that the campaigning and engagement efforts of BankTrack – a global network of NGOs – has gradually enhanced reporting on social and environmental risks through closer adherence to the Equator Principles (O'Sullivan and O'Dwyer 2015). Furthermore, the Equator Principles have been framed as a form of 'soft law', encouraging companies to adopt codes in order to avoid the pitfalls of both individual voluntary actions and legal requirements (Macve and Chen 2010). Indeed, as Gough and Shackeley note:

> "Compared to the single-issue campaigning style generally associated with the approach of NGOs to environmental and public risk issues, climate change ushers in a new era of engagement and empowers NGOs by giving them a place at the negotiating table" (Gough and Shackley 2001, 329)

It is in this regard that Gond and Piani (2013) draw attention to the dialogue between investors and managers. The authors base their argument on a study of the Principles for Responsible Investment (PRI)[14] initiative, framing it as an 'enabling organisation' that facilitates collective action (Gond and Piani 2013, p.66). In particular, they highlight how the initiative acts as a mobilizing structure that creates a hybrid organisational space (Ibid., p.97) to enable a lasting dialogue between investors and managers. Indeed Chapter 6 demonstrates that the dialogue between financial organisations and civil society actors destabilised the Financed Emissions Initiative, with both groups perceiving deficiencies in a sole focus on GHG emissions information. This led to the reconfiguration of the project to embed the emerging concerns of carbon risk and alignment of investment and lending decisions with the transition to a low-carbon economy. In this regard, the dialogue facilitated collective action, with the emerging concerns of each group stemming from the two degrees target and the standard embedding those concerns in the carbon accounting standard. In other words, the carbon accounting standard became based on creating a way of framing diverse and distributed decision making across the financial sector in terms of the two degrees target.

As well as embedding the shifting concerns at the intersection of finance and climate change, this dialogue enabled the standard setting project to enhance the compatibility of carbon accounting practices with financial organisations' decision-making processes. Bebbington and Larrinaga, in their chapter in *Sustainability Accounting and Accountability*, write "[i]t is testament to the ubiquity and importance of [global climate change] that financial market investors are championing reporting", (Bebbington and Larrinaga 2014a, p.206), while noting the difficulty of linking entity level data with investors' needs. The authors' argument – that carbon accounting practices lack sophistication to meet the needs of investors – resonates with observations that there is limited integration of GHG information into investors' decision-making process (Kolk, Levy, and Pinkse 2008; Sullivan and

[14] PRI promotes the integration of environmental, social and governance (ESG) issues into institutional investors' decision making.

Gouldson 2012). In the Japanese context, for example, Mizuguchi examines two reports from the Japanese Institute of Certified Public Accountants (JIPCA) on climate risk disclosures in companies' environmental and financial reports. He finds that disclosures are inadequate for investment decision making due to the variation in scope of emissions reported across companies (Mizuguchi 2008). These concerns arose early in the standard-setting project, and were partially resolved through the dialogue between financial organisations and civil society actors, combining multiple sets of expertise. Specifically, the carbon accounting practices were refined to simultaneously address the concerns of 'carbon risk' and 'climate performance' as well as being compatible with decision-making processes for investment and lending.

2.3. Mediating Instruments

This thesis studies how the two degrees target enabled work that reconfigured how investment and lending activities were framed regarding their impact on climate change. It examines this linking of science and the economy by focussing on four instruments: the two degrees target, the carbon budget, industry roadmaps, and an emerging carbon accounting standard. It is through the interconnections between the four instruments that the two degrees target became linked to the day-to-day activities of the financial sector. By analysing the interconnections between these *mediating instruments* (Miller and O'Leary 2007), the thesis demonstrates how a particular future for addressing climate change was envisaged, providing a foundation for work that linked a global objective with decision making at an organisational- and portfolio-level. In doing so, it demonstrates how the "combination of institutions" that produces 'unsustainable' activity across multiple entities is reconfigured towards a common, and less 'unsustainable', vision for addressing climate change (Bebbington and Larrinaga 2014b, p.401). In particular, it highlights that it is through the different characteristics of each of the four mediating instrument that they interconnect to link climate science to investment and lending decisions, and it is to those characteristics that this section attends.

Mediating Instruments and Global Climate Change

In their study of the microprocessor industry, Miller and O'Leary emphasise that Moore's Law "modelled a strikingly beneficent relation

between science and the economy at a highly abstract and simplified level" (Miller and O'Leary 2007, p.716), making "the case that improvements in the science of integrated circuits could be crucial to the future of the semiconductor industry and to economic growth" (Ibid., p.712). Moore's Law envisaged the rates of increase in the power of semiconductor devices and the timing of those increases, envisaging the restoration of American pre-eminence in the industry that would bolster the wealth and security of the nation. Moreover, this vision shaped expectations across sets of industries regarding the targets for technological advancement, linking diverse and distributed actors to a "common narrative" (Miller and Power 2013, p.579). Yet that common narrative is not a mirroring of wealth and security concerns in a technology trajectory. Rather it stems from an instrument that mediates those concerns with the specifics of the semiconductor industry. Indeed, as Latour writes, mediators "transform, translate, distort and modify the meaning or the elements they are supposed to carry" (Latour 2005, p.39). It was by embedding economic and scientific concerns in its predictions that Moore's Law rendered this complexity into a form that "frame[d] a manageable future" (Jordan, Jørgensen, and Mitterhofer 2013, p.159). Chapter 4 highlights how the idea of a long-term target for climate change emerged as a means to make the future 'manageable' by creating a basis for analysing possible policy responses. Furthermore, it demonstrates that the two degrees target emerged from numerous alternatives as a metric that could mediate between the definition of 'dangerous' climate change, ideas of ensuring a 'cost-effective' response to climate change and, crucially, national sovereignty concerns. That is, the two degrees target rendered the complexities climate change into a 'manageable' form that could mediate between the scientific, economic and political concerns at the centre of the international discourse on climate change.

Chapter 4 also emphasises the point that the two degrees target provided a vision that made climate change appear manageable, while not specifying how adjustments towards alignment with the target were to be made. In this regard the target provides an apparently simple focal point on climate change, while providing flexibility in how it is interpreted by the diverse and distributed actors whose expectations it aligns. On the one hand, in the future envisaged by the two degrees target, "complex and potentially

not well understood processes come to appear simple, imaginable and 'manageable'" (Jordan, Mitterhofer, and Jørgensen 2016, p.1). On the other hand, there is flexibility to its interpretation because it does not prescribe how it is to be achieved. Instead, it embeds the scientific, economic and political concerns at the centre of climate debates into a target that can inform the planning and strategizing of diverse and distributed actors who come to imagine the future in terms of the two degrees target. Indeed it is on this point that Chapter 4 contrasts its analysis with prior studies of the two degrees target that adopt a 'boundary objects' framing (Randalls 2010; Cointe, Ravon, and Guérin 2011). Star and Griesemer define boundary objects as enabling communication and cooperation across different domains by being "weakly structured in common use, and become strongly structured in local site use" (Star and Griesemer 1989, p.393). That is, when considered at a general level rather than their use in a specific context, boundary objects do not set out a particular imperative or vision of what is to be achieved; they remain ambiguous. On the other hand, boundary objects prescribe how they are to be used in specific situations. Star and Griesemer emphasise that this creates a common structure across multiple sites for the gathering of information. In turn, this enables different worlds to operate autonomously while structuring the production and circulation of information to enable communication between them (Ibid., p.404). To reiterate, boundary objects facilitate cooperation by prescribing how they are to be used in order to structure communication. However they neither envisage a particular future nor reorient actors' expectations and objectives towards that vision. In contrast, the two degrees target establishes an apparently simple vision for efforts to address climate change, while not prescribing how that vision is to be achieved. Furthermore, it envisions a future that addresses the scientific, economic and political concerns at the centre of the climate debate. Yet its flexibility in how it is to be achieved provides autonomy across diverse and distributed actors to decide how to bring their particular activities into alignment with that vision.

Sectoral-Implications of the Two Degrees Target

While Chapter 4 argues that the two degrees target rendered climate change into a 'manageable' form (Jørgensen, Jordan, and Mitterhofer 2012, p.112), it also recognises that the envisaged future was a highly abstract and

simplified global goal. Chapter 5 analyses the carbon budget – the maximum level of cumulative emissions to remain within a two degrees scenario – as the 'bridge' between the global representation of climate change as the two degrees target and the implications of that target for the financial sector as a whole. Indeed, Morgan and Morrison's (1999) notion of mediating instruments focuses on models that bridge between theory and data. These 'mediating models' simultaneously embody the higher-level structure of a theory and produce concrete-level data through simulations (Morgan and Morrison 1999, p.31). In terms of the carbon budget, it forms a bridge between the "abstract and idealised" (Ibid., p.30) two degrees target and a "level of concrete detail" (Ibid.) such as the carbon emissions potential of fossil fuel reserves. Yet this is unlike the industry roadmaps studied by Miller and O'Leary, which codified Moore's Law into "key, generic aspects of product development" such as "to at least double product functionality every three years" and "seek manufacturing cost reductions per three year period of roughly 65% (Miller and O'Leary 2007, p.719). Rather, the carbon budget provided a more concrete rendering of the two degrees target that could be enrolled in arguments that tailored the implications of a two degrees scenario to the risk concerns of financial organisations and the capital market stability concerns of financial regulators. In other words, the carbon budget refines the two degrees target from a global vision for tackling climate change into a vision of the vulnerability of the financial sector to a carbon-constrained future.

The two degrees target further enabled the construction of roadmaps for industrial transitions under different warming scenarios. These roadmaps set out the shifting investment landscape that facilitates a particular emissions trajectory; detailing the financing needs of regions, technologies and asset type to support a low-carbon transition. In this regard, and borrowing from Jørgensen *et al.*, the roadmaps "convey an ideal picture of a collaboration […] and focus attention on particular areas of coordination" (Jørgensen, Jordan, and Mitterhofer 2012, p.112). Yet, as Chapter 6 highlights, these roadmaps were in development during the standard-setting project, with the most developed roadmap being for the energy sector. The point, however, is that the roadmaps refined the carbon budget into the adjustments needed to align investment and lending activities with achieving the two degrees target. That

is not to say it prescribes the necessary methods and responsibilities. Rather it envisages a sectoral-alignment with the two degrees target. This is consistent with Revellino and Mouritsen's study of the management of innovation surrounding the Italian automated toll collection device, Telepass, where the authors argue "the technologies of managing […] never told and specified what the innovation's technology was to be but they stipulated the types of alignments that had to be managed to make the innovation productive" (Revellino and Mouritsen 2009, p.356). Indeed, the energy sector investment roadmap detailed the timings and scales of shifts for a low-carbon finance transition, setting out a vision for alignment with the two degrees target while not prescribing necessary actions.

A Two Degrees Framing of Investment and Lending Activities

It is in the refinement of the carbon budget and roadmaps through carbon accounting tools that the two degrees target came to reconfigure the climate change framing of portfolio-level activity. That is, the reconfiguration of the standard-setting project focussed it on creating carbon accounting practices to render visible deviations from a portfolio allocation consistent with the two degrees target. In Miller and O'Leary's study, cost-of-ownership calculations provided a target for bringing the development of individual technologies in line with the envisaged markets for semiconductors. These calculations were to "affirm the viability of an extreme-ultraviolet lithography, but also to shape expectations regarding cost and price in markets for the various components comprising the system" (Miller and O'Leary 2007, p.728). Seen in this light, the new carbon accounting tools provided the calculative infrastructure for evaluating 'climate performance' at the organisational- and portfolio-level in terms of the two degrees target. They did not assign responsibility for specific adjustments; rather, they have the potential to create a portfolio-level visibility based on which financial organisations can be held accountable for their influence on climate change.

Yet Chapter 6 also demonstrates that creating accounting practices to render alignment with an abstract target visible at the level of a single portfolio is wrought with difficulty. Indeed during the multi-stakeholder standard-setting process discussions centred on identifying the concerns to be addressed by the new carbon accounting tools. Forming the linkages between the carbon accounting practices, the carbon budget and the finance roadmaps

entailed "various detours and experiments" before the project identified ways to connect to multiple concerns that "could finally stabilise its connections – at least for a while" (Mennicken 2008, p.409). To reiterate, the interconnections between the mediating instruments studied in this thesis arose through discussions over the vision of the future that was to be embedded in carbon accounting practices, as well as the indicators that could render it visible.

Co-production and Coordinating Action Across Multiple Entities

By tracing the interconnecting of four mediating instruments that link an envisaged future for addressing climate change to investment and lending decisions, this thesis examines efforts to orient the activities of multiple entities towards a common objective on climate change, as called for by Bebbington and Larrinaga (2014b, p.401). This thesis highlights how the notion of mediating instruments (Miller and O'Leary 2007) may be applied as an analytical lens for such studies (*cf.* Unerman and Chapman 2014; O'Dwyer and Unerman 2016). As detailed earlier in this section, the mediating instruments framework places emphasis on the rendering of sustainable development issues into apparently simple and manageable visions of what is to be achieved, while allowing flexibility in how actors develop strategies for achieving that vision. Central to such an application of the mediating instruments framework are the processes of "assembling and adjusting diverse components and practices so that they might operate as a more or less stable and coherent working ensemble" (Miller and O'Leary 2007, p.708). However, as Pollock and D'Adderio (2012) argue, applications of the framework "have only begun to specify the process by which we might study and theorise interactions between material objects and wider calculative conceptions" (Pollock and D'Adderio 2012, p.567).

The interactions that Pollock and D'Adderio refer to are central to the processes of 'co-production' through which "a body of types of theory and types of apparatus and types of analysis that are mutually adjusted to each other" (Hacking 1992, p.30). Writing on the maturation and stability of the laboratory sciences, Hacking argues "[o]ur preserved theories and the world fit so snugly less because we have found out how the world is than because we have tailored each to the other" (Ibid., p.31). Yet Pollock and D'Adderio's (2012) concern is that applications of the mediating instruments framework have shed little light on the processes of co-production through which a

"working ensemble" may become "more or less stable and coherent" (Miller and O'Leary 2007, p.708). This thesis offers a partial response to these concerns, one that focuses on the work of constructing and mobilising instruments to simultaneously embed a range of potentially conflicting concerns and the local specifics with which they link. To do so it frames this work as that of 'experimentation', gradually exploring the interactions between ideas and instruments and adjusting each to the other (Gooding 1992, pp.65–66). Hacking refers to 'ideas' as the "theories, questions, hypotheses, [and] intellectual models of apparatus" (Hacking 1992, p.32) that are embedded in or created by "instruments we have engineered" (Ibid., p.32). Miller and O'Leary equate this to the notion of 'programmes' (Miller and Rose 1990; Rose and Miller 1992), the realm of which "was extensive, and could include dreams and schemes for enhancing output, analysing and encouraging modes of consumption, envisaging and designing audit, or inventing new forms of personal transport" (Miller and O'Leary 2007, 707–708). By drawing on Gooding (1992), this thesis foregrounds processes of tinkering and experimenting with instruments and ideas in its discussion of co-production (Chapter 7). Furthermore, this tinkering and experimenting configures instruments to local specifics as it draws on the diverse and distributed expertise of actors in linking the 'working ensemble' to the activities of multiple entities.

2.4. Concluding Remarks

Carbon accounting has been argued to provide the practices that "enable the diverse forms of carbon governance" (Larrinaga 2014, p.2), and its development "offers the opportunity to investigate the dynamics of accounting systems of governance as they emerge" (Bebbington and Larrinaga 2014a, p.207). Indeed, for its role in enabling the measurement and monitoring of national-level emissions and mitigation efforts, the accuracy of carbon accounting has been a core line of inquiry in studies of national-level carbon accounting (see La Motta et al. 2005; Stechemesser and Guenther 2012). However such studies appear to be tailored to the primacy of GHG emissions targets in the mode of climate governance under the Kyoto Protocol, while providing little insight into the challenges that the flexibility of the post-Copenhagen climate regime enshrined in the Paris Agreement poses

for national-level carbon accounting. Indeed, Chapter 4 highlights these challenges and calls for further research into the hybridising (Kurunmäki and Miller 2011) of national-level carbon accounting with other forms of measurement expertise.

However a key focal point in studying the role of carbon accounting in enabling different modes of governance has been the carbon markets that "translate" the programme of GHG mitigation "to the entity level" (Bebbington and Larrinaga 2014b, p.401). Yet the sustainable finance literature demonstrates that GHG emissions information appears to have little relevance to investors (Kolk, Levy, and Pinkse 2008) in the absence of a more widespread carbon price. Rather, it has been argued that it is the perception of carbon constraints, and the regulatory and competitive risks this raises, that leads investors to require further information on climate change (Busch and Hoffmann 2007; Bebbington and Larrinaga-González 2008, p.707). While these studies highlight the risks that would stem from a carbon-constrained future, little insight is offered into how financial organisations would come to perceive such a future beyond the introduction of carbon pricing or carbon markets. On the other hand, the dynamic between NGOs and financial organisations has been shown to drive the adoption of and compliance with mechanisms for social and environmental risk assessments on project finance activities (O'Sullivan and O'Dwyer 2009; O'Sullivan and O'Dwyer 2015). Yet O'Sullivan and O'Dwyer call for further studies of NGO movements around investment and lending activities specifically on the issues of climate change and human rights (O'Sullivan and O'Dwyer 2015, p.51), and note that project finance "represented less than 5 per cent of commercial bank activities" (Ibid., p.43).

This thesis responds to O'Sullivan and O'Dwyer's call by studying a particular set of interconnected instruments through which climate change is becoming linked to investment and lending activities across the financial sector. Specifically, by studying the mobilisation of the carbon budget as a more concrete representation of the two degrees target, Chapter 5 attends to the work of establishing a common vision of carbon constrained future and its implications for the financial sector. Furthermore, Chapter 6 studies the reconfiguration of a carbon accounting standard setting project to embed concerns stemming from the two degrees target as well as developing

indicators to inform assessments of climate risk. It adopts a mediating instruments framework (Miller and O'Leary 2007) to frame the analysis of four instruments – the two degrees target (Chapter 4), the carbon budget (Chapter 5), investment roadmaps and an emergent carbon accounting standard (Chapter 6). This analysis enables the thesis to respond to Bebbington and Larrinaga's call for studying sustainable development issues through the shifting conditions in which organisations operate and how this influences action across multiple entities (Bebbington and Larrinaga 2014b, p.401). In particular, this thesis maps the interconnections between the four instruments to analyse how the two degrees target provides a basis for efforts to orient the activities of multiple entities towards a common objective. In doing so, this thesis also provides a partial response to Pollock and D'Adderio's (2012, p.567) call for further insight into how processes of co-production may be studied in applying the mediating instruments framework (Chapter 7). In the next chapter, Chapter 3, this thesis directs its attention to the research strategy underpinning the empirical work on which the study of these four instruments is based.

CHAPTER 3 – STUDYING A CALCULABLE VISION: COMBINING OBSERVATIONS, INTERVIEWS AND DOCUMENTS

3.0. INTRODUCTION

The empirical core of this thesis is a participant observation of a UNEP FI and GHG Protocol standard-setting project, initially known as the Financed Emissions Initiative. This entailed observation of over 120 hours of meetings, workshops and conferences between January 2014 and February 2016,[15] ranging from 'Technical Working Group' webinars to in-person meetings in Milan, Washington D.C. and Paris, as well as workshops and conferences in London, New York and Paris. In addition, eighteen semi-structured interviews were conducted and designed to probe deeper into insights developed during the participant observation. Similarly, to chart the historical emergence of the two degrees target over 60 reports and proceedings – from conferences, research centres, international bodies, NGOs and governments – as well as more than 55 academic texts – from climatologists and meteorologists to economists and lawyers – were analysed to document the controversies surrounding its emergence since the mid-20th century.

The combination of participant observation, interview and documentary materials enabled the thesis to explore how carbon accounting tools are configured by the conditions surrounding their emergence, as well as how they embed ideas and concerns from those conditions to enact particular ideas of climate governance. In this regard the thesis takes carbon accounting to be constructed by judgments on the issues that should be measured and reported, while also creating the information through which climate impacts

[15] While February 2016 marked the publication of the third main document produced through the standard-setting project, UNEP FI and GHG Protocol are currently exploring additional work that could be conducted through the project. In that regard, engagement with the project as a participant observer will continue, however this thesis is based on the observations conducted between January 2014 and February 2016.

across entities are rendered visible (*cf.* Hines 1988). That is, "accounting information is not only socially constructed, it is also socially constructing" (Broadbent and Unerman 2011, p.8). Carbon accounting translates the subjective matters of what is to be measured and the rules that prescribe how to conduct those measurements into numbers that appear to present an objective view of a nation, organisation, project or investment portfolio as a carbon entity. Their apparent objectivity stems from an "intersubjective consensus" (Ibid., p.9) of their agreed meaning as interpretive schemes through which actors come to understand their own actions as well as those of others (Chua 1986, pp.613–4). Taking carbon accounting as a "subjectively created, emergent social reality" the methods employed in this thesis investigate the "deeply-embedded rules that structure the social world" and how "these typifications arise, and how [they are] sustained and modified" (Ibid. p.614). In other words, the thesis investigates the ideas and concerns that came to 'order' the standardisation project and traces their emergence and evolution. Based on this methodology, this chapter details the design, challenges and limits of combining participant observation, semi-structured interviews and documentary analysis into a research strategy.

3.1. Three Methods of Collection[16]

3.1.1. Being a Participant Observer of the Financed Emissions Initiative

Participant observation as an ethnographic method has become more commonplace in accounting scholarship since early recognition and application of the method (Tomkins and Groves 1983; Berry et al. 1985; Preston 1986) and Power's call for critical ethnographic studies as "a more radical break with the scientific paradigm of assessment towards one that is more literary in orientation" (Power 1991, p.338). It has been employed to investigate the creation and maintenance of a shared reality between actors through accounting practices, ranging from social accounting (Dey 2007) and fraud risk (Power 2013) to shop floor groups in a steel mill (Ahrens and Mollona 2007) and the translation of international auditing standards at a large post-Soviet audit firm (Mennicken 2008). As Ahrens and Mollona write,

[16] See Appendix 3A for a timeline presenting an overview of data collection activities.

participant observation immerses researchers within an organisation, enabling them to study "taken-for-granted aspects of organisational practices […] and to exploit the revealing tensions between what organisational members say and do" (Ahrens and Mollona 2007, p.310). It should be noted, however, that the participant observation at the core of this thesis should not be considered as an ethnographic study of standardisation in carbon accounting. Such a study would have focussed on providing a detailed and in-depth account of the "multiplicity of complex conceptual structures" (Geertz 1973, p.10) to produce a "think description" (Ibid., pp.6-7) of a particular action, process or setting. Rather, the participant observation sought to reveal potential conflicts between ideas guiding the work of creating a carbon accounting standard (*cf.* Chua 1986, p.614). This was to focus the thesis on investigating the influences beyond the standard-setting project that came to configure the carbon accounting standard, by tracing the conflicting ideas through semi-structured interviews and documentary analysis.

In November 2013 at the UNEP FI Global Roundtable, *Financing the Future We Want*, a conversation with the President of the World Resources Institute, Dr. Andrew Steer, led to access being secured for a participant observation of the Financed Emissions Initiative as a member of one of the five Technical Working Groups (TWGs). The participant observation was conducted as a member of TWG 4, which was tasked with discussing 'cross-cutting issues' that are relevant to the work of several TWGs. Covering a range of topics – accounting principles, boundary setting rules, target setting, performance metrics, and, among others, assurance – TWG 4 provided an ideal research site for investigating the issues that would underpin the standard. In contrast, TWGs 1, 2 and 3 worked on guidance for specific types of finance: company and project finance guidance were considered by TWG 1, government finance by TWG 2, and consumer finance by TWG 3. TWG 5, on the other hand, worked on a 'sister' guidance document dealing with measuring and understanding carbon asset risk,[17] the risk investors face as a result of new regulations, changing customer preferences, threats to reputation, and technological development.

[17] The World Resources Institute define carbon asset risk as a "type of financial risk is driven by non-physical factors during the transition to the low-carbon economy: changing public policy and private sector regulation, rapidly evolving technologies, unpredictable economic markets, and shifting public opinion" (WRI 2015).

Fieldwork was conducted as a "moderate participant" (Spradley 1980, p.60), seeking to "maintain a balance between being an insider and an outsider, between participation and observation". Initially the engagement focussed on observing the roles of individuals during webinars: the Secretariat leading and structuring the virtual discussion by presenting up to 20 PowerPoint slides over the course of 90 minutes, with certain participants interjecting frequently, others offering minor technical comments and many remaining silent throughout the webinar. As the TWG process progressed, the participant observation also extended to 'subgroup' meetings, conducted via webinar, where numerous aspects of the standard – from boundary setting to performance metrics – were discussed and participants assisted in and commented on the drafting of those standards.[18]

Researcher participation in TWG discussions balanced the expectation on all subgroup members to engage and contribute with caution to avoid influencing the purpose and content of the documents being drafted. Indeed, virtual attendance of subgroup meetings ranged from four to fifteen individuals and presenters would often speak to each individual by name to ask if there were any questions. In this regard maintaining an observer-only role would have breached the 'norms' of the meeting and hampered efforts to "gain some degree of acceptance from [other participants]" (Jorgensen 1989, p.73). As such, participation was restricted to clarification questions regarding, for example, what the 'roadtesting phase' of the Financed Emissions Initiative entailed (which had been remarked on without explanation during a subgroup meeting on boundary setting). While this approach was adopted to limit the influence of the research engagement on the project, it also restricted the roles that could be experienced first hand, such as leading a subgroup or presenting the work of a subgroup during a TWG 4 webinar or in-person meeting. However informal conversations during in-person meetings with a variety of participants provided opportunities to discuss their different views on such roles and the problems they faced.

A similar limitation is with regards to the work of TWG 5. While discussions in TWG 4 cut across the work of TWGs 1, 2 and 3 and addressed central aspects of the Accounting work stream, it had little overlap with the

[18] See Appendix 3B for details of meeting and conference observations as well as documentation from the project.

TWG 5 work stream on Carbon Asset Risk. As such, observations of their work were limited to: their presentations during the Advisory Committee and TWG in-person meetings; informal interactions with participants; as well as a draft document circulated in February 2015 to all TWG members for comment. While these events provided insights into stages of development for the 'sister' guidance, it was not possible become immersed in the discussions underpinning the emergence of that document. However, as noted, participation in TWG 4 provided access to the discussions that cut across the carbon accounting component of the Financed Emissions Initiative. This ensured that such immersion was possible in the TWG relating most closely to the configuration of emergent carbon accounting practices, which was the primary focus for the research.

However access was granted to the May 2014 Advisory Committee meeting, for which attendance was usually restricted to Advisory Committee members, the Secretariat and the head of each TWG. It was agreed with the Secretariat in advance of the meeting that access was only for an observation, and that participation in discussions during the meeting was prohibited. The Secretariat also requested that the purpose of the research should be briefly presented to attendees at the start of the two-day meeting, after which permissions to record was sought and agreed on the grounds that quotes would only be attributed to a general category of attendee, such as 'NGO and think tank community' or 'Commercial bank community'. The Advisory Committee appeared familiar with meetings being observed under this form of anonymity,[19] and the heated and open exchanges from that meeting suggest limited 'reactivity' among participants to the presence of an observer (Bryman 1988, p.112; Saunders, Lewis, and Thornhill 2009, p.195). Access to the meeting also provided an opportunity to observe tensions between Advisory Committee members, identifying contentious aspects of the project where different ideas came into conflict. It also allowed for an informal engagement with these individuals during breaks in the meeting and at the evening function on the first day. Furthermore, the researcher knew two Advisory Committee members from the UNEP FI Global Roundtable in November 2013,

[19] Indeed, the Secretariat remarked at both the Advisory Committee meeting in May 2014 and the in-person TWG meeting in June 2014 that any comments they used in their meeting summaries or later presentations would only be attributed to a general category that the individual belonged to.

whose introductions to other members assisted in 'normalizing' the presence of a researcher in this private meeting (Jorgensen 1989, pp.74–75). These informal interactions further assisted in clarifying and prompting reflection on particular discussions during the meeting, as well as serving as initial introduction to potential interviewees.

A challenge throughout the participant observation, however, and especially during this Advisory Committee meeting, was to achieve a level of immersion as an *insider*, while maintaining the perspective of an *outsider* to enable independent analysis of the project. This challenge was addressed in two ways. *First*, the scheduling of field visits and webinars created 'breaks' between observations, which were used to focus on developing an *outsiders'* perspective by reviewing fieldnotes and reflecting on potential alternative explanations and frameworks (*cf.* Dey 2007, pp.431–432). *Second*, and aimed at fostering reflection while 'in the field', fieldnotes were kept as a 'condensed account' during observations and time was scheduled after the meeting to develop this into an 'expanded account' (Spradley 1980, pp.69–70). For example, while producing the expanded account of observations from the first day of the May 2014 Advisory Committee meeting (held in Milan, Italy) it became apparent that a 'regulatory capture' (Carpenter and Moss 2013) perspective was guiding observations in the 'condensed account'. Yet in reflecting on the comments from different participants, it appeared that NGOs shared the concerns of financial organisations yet couched these in terms of 'accountability' rather than 'workload'. As a result, the observation during the second day of the meeting sought to identify commonalities between arguments from different actors. Indeed it was through this investigation that the two degrees target, and particular instruments based on that target, appeared as a common feature across the tensions emerging within the Financed Emissions Initiative. Specifically, the two degrees target was central to ideas of 'carbon risk' and aligning capital markets with the transition to a low-carbon economy. While informal interactions with participants offered some insight and reflection on the these ideas, semi-structured interviews and documentary analysis provided a systematic approach to exploring their emergence and to checking or refuting observations of the standard-setting project.

3.1.2. Reconstructing Events and Prompting Reflection Through Interviews

As noted, one limit of using participant observation was that it restricted research primarily to the standard-setting project, with informal interactions offering some initial insight into the intersection of climate change and finance outside the Financed Emissions Initiative. For example, some participants argued that the growing concerns regarding 'carbon risk' stemmed from Carbon Tracker's 2011 work on the carbon budget, while others pointed to debates in the early-2000s that stemmed from Ceres' reports that developed a risk framing of climate change. However, as noted, there are limits to the situations and events that can be accessed through a participant observation (Becker and Geer 2003, pp.250–251), while interviews enable the researcher to access the 'lived world' of individuals (Kvale and Brinkmann 2008) working at the intersection of climate change and finance. On the one hand these one-on-one interviews created a space for a more in-depth inquiry into apparently taken-for-granted concepts in the standard-setting project. For example, in tailoring questions to foster interviewee reflection on the carbon budget, the research was able to access the points of view across interviewees and to unfold the meanings and experiences of 'carbon risk' (Ibid., pp.1-3). On the other hand, the interviews were also used to reconstruct events that preceded the participant observation (e.g. the scoping phase of the *Financed Emissions* Initiative) and to explore the evolution of particular actions and instruments (e.g. NGO strategies for applying pressure to commercial banks and institutional investors, and the creation and articulation of the carbon budget). For such lines of inquiry the interviews served to trace the 'facts' (Ahrens and Chapman 2006, pp.832–833. Also see Miller and O'Leary 1994) of the standard-setting project before the TWG phase – as perceived by different Advisory Committee members – and the emergence and development of initiatives at the intersection of climate change and finance. Yet, as a method, interviewing presents its own challenges and limits, which are discussed and addressed in this section that provides an account of how the method was applied.

Eighteen semi-structured interviews were conducted and designed to probe deeper into insights developed during the participant observation of

the Financed Emissions Initiative.[20] The majority of these interviewees were either members of the Advisory Committee or the Secretariat (five from each), along with three TWG participants (note that, in addition to these, three of the interviewed Advisory Committee members also engaged as TWG participants and that Secretariat members engaged in and coordinated the TWG meetings and webinars) and five individuals who did not participate in the Financed Emissions Initiative but worked in organisations and initiatives at the intersection of climate change and finance (see Appendix 3C). This cross-section of individuals enabled the interviews to probe, confirm and refute observations through the perspectives of individuals at different levels of the standard setting project (*cf.* Horton, Macve, and Struyen 2004, p.344). In addition, the Advisory Committee and Secretariat members were engaged with the project during its scoping phase in 2012, providing a range of opinions with which events prior to the TWG phase could be reconstructed. Moreover, perspectives on the evolution of ideas that had become central to tensions within the project – such as 'carbon risk' and aligning capital markets with the transition to a low-carbon economy – could be contrasted between individuals that had and had not participated in the Financed Emissions Initiative.

However questioning interviewees on the restructuring of the Financed Emissions Initiative into the Portfolio Carbon Initiative (a process which began in June 2014) presented a particular challenge. This was partly because interviews in 2014 – that were conducted on either side of the two-day June in-person TWG meeting where a 'landscape review' of the project was initiated – provided some insight into the emerging tensions within the project, while preceding the restructuring of the project. During interviews in 2015, on the other hand, interviewees struggled to recollect specific discussions prior to the 'landscape review' and, conversely, appeared to conceptualise the project in terms of its new 'risk' and 'alignment' objectives resulting in rather 'clear' accounts of the restructuring process. Following-up, probing and adopting different modes of questioning provided insights into the 'mess' of the restructuring process. However the point is that the participant observation provided an account of "changes in behaviour over a period of time and […] the events which precede and follow them" (Becker

[20] See Appendix 3C for details of the interviews.

and Geer 2003, p.249) whereas interviewees found it difficult to articulate their "former actions, outlook, or feelings" (Ibid.). In this regard, the limits of interviewing – in terms of recollection, bias and apparent clarity – are mitigated through the combination and comparison of different sources of data to expose gaps, inconsistencies and differing perspectives (*cf.* Ahrens and Chapman 2006, p.834, on *triangulation*).

The reason the interviews were conducted in a 'semi-structured' manner was to explore these lines of inquiry in more detail, enabling the data collection to probe into interviewees' understandings of the two degrees target and in what ways, if any, they made sense of it (Kvale and Brinkmann 2008, pp.133–134). Furthermore, the participant observation provided a valuable foundation for this style of interview. The language and concepts of the broader climate finance debate had become familiar, helping to tailor the questions and approach to conversation in a manner that could overcome any initial interviewee resistance (Wengraf 2009, pp.64–5). Similarly, the participant observation highlighted that interviewees working for investment banks and corporate banks could be particularly cautious in discussing their organisation's impacts on GHG emissions. However the relationships and rapport developed through the participant observation (Jorgensen 1989, pp.69–78) provided an existing network of individuals who could be interviewed as well as provide introductions to potential interviewees. Furthermore the semi-structured approach also helped to overcome this problem as it allowed the interviewer to create a relationship of trust in the early stages of the interview, through a flexible questioning approach, which could be followed by more probing questions (Flick 2014, pp.208–9). Similarly, several interviewees from the finance community appeared to relax when, at the start of the interview, it was explained that comments would remain anonymous (Marginson 2004, p.342). As such, the write-up of interview materials contextualises insights from interviewees, while ensuring specific insights cannot be traced to the specific individual or organisation.

In preparation for the interviews, background research on each interviewee was conducted and an interview protocol was drafted detailing the themes to be explored during each interview. This protocol was modified following interviews that either highlighted areas where the protocol needed to be improved or certain lines of inquiry that were potentially worth

exploring (Marginson 2004, p.333; Horton, Macve, and Struyen 2004, p.341). These were used as a guide for the interview, and were comprised of a variety of introductory questions with potential questions for following-up or probing on interviewees response, as well as theory-driven, comparative and more confrontational questions (Kvale and Brinkmann 2008, pp.134–138). Taken together, the document provided prompts for how to raise a new topic for discussion, the specific areas of that topic to discuss, and how to encourage interviewees to reflect on specific topics (Flick 2014, pp.218–9). However the interview protocol was not followed bureaucratically (Flick 2014, p.209). For instance, if a topic towards the end of the interview protocol was raised in the first minutes of an interview, questioning around this topic was pursued. This both fostered a more natural flow to the conversation and allowed questions to be tailored to the topic that was on the interviewees mind during that part of the interview. This interview protocol also helped manage the challenge of being the sole interviewer (Marginson 2004, p.343). Specifically, it was possible to focus on understanding and clarifying interviewee responses while using prompts from the interview protocol as a basis for formulating questions.

The challenge of being the sole interviewer was further managed by recording interviews. All except one interview were recorded[21] and, at the start of the interview, interviewees were informed of the rationale for recording the conversation and how the recording would be used, and were also asked for permission to record. This limited the amount of note taking required during the interview, allowing a greater focus on the formation and improvisation of questions based on interviewee responses. This 'active listening' (Wengraf 2009, p.132) is of particular importance in semi-structured interviews as it helps the researcher to probe into specific topics and allows room for creativity (Ibid., p.5) in tailoring questions to prompt reflection. Furthermore, the two to three hours following the interview were scheduled as a period for "self-debriefing" (Ibid., pp.142–4). This allowed time for written descriptions of the interview setting as well as observations from the interview. As with note taking for observations, a condensed account was kept during interviews that was developed into an expanded account (*cf.*

[21] One interview was not recorded due to stringent confidentiality requirements at the financial organisation the interviewee worked at. This was agreed in advance of the interview date.

Spradley 1980, pp.69–70) during this 'self-debriefing'. Recordings were subsequently transcribed by the researcher or by a transcription service – those from latter were checked for accuracy and consistency – with audio and text files being stored chronologically.

3.1.3. Tracing Two Degrees Through Documents

To chart the emergence of the two degrees target from a range of other metrics – as well as to supplement and check interview and observation insights – the thesis gathered a variety of reports, draft documents, climate literature, press releases and media coverage. For Chapter 6 this centred on UNEP FI and GHG Protocol materials regarding the Financed Emissions Initiative that pre-dated the participant observation, such as Advisory Committee meeting summaries, scoping workshop results, draft sections of the standard, correspondence, templates and presentation slides (See Appendix 3B). It also included numerous draft documents and materials pertaining to the TWG process. In Chapter 5, by contrast, this focussed on the documents that were enrolled in developing a 'climate risk' argument based on the carbon budget, as well as how documents presenting that argument (in particular, Carbon Tracker's *Unburnable Carbon* report) appeared in the financial sector discourse on climate change (e.g. in speeches, reports, and calls for divestment). However it was in Chapter 4 that the gathering and analysis of documentation formed the empirical core. Over 60 reports and proceedings – from conferences, research centres, international bodies, NGOs and governments – as well as more than 55 academic texts – from climatologists and meteorologists to economists and lawyers – were gathered as the basis for charting the emergence of the two degrees target from a range of other metrics (see Appendix 3D).

This collection of documentation was initially guided by a skeleton timeline, constructed from the events identified by interviewees as part of the emergence of the two degrees target as well as a reading of numerous accounts from climate historians. Some of these accounts pertained to the two degrees target (Tol 2007; Randalls 2010) and others related to intergovernmental bodies such as the United Nations Framework Convention on Climate Change (Bodansky 2001; Bodansky 2010; Christoff 2010) and the Intergovernmental Panel on Climate Change (Agrawala 1998). A combination of online digital archives and physical resources were drawn on for this

collection. Furthermore, initial data collection centred on what was 'in' the texts (Prior 2011, pp.94–96), which provided the basis for a more 'archaeological' approach (Ibid.) to gathering materials pertaining to how the account came into being. Through this, additional organisations, individuals and targets were identified, which added to the timeline and extended the scope of data collection. However, one of the main challenges with analysing documents is that they do not provide "transparent representations of organisational routines, decision-making processes, or professional practices" (Atkinson and Coffey 2011, p.79). Yet rather than using these texts merely to gather 'content' on long-term climate targets, this challenge was mitigated by viewing the documents as 'receptacles' of instructions, objectives, and concerns that provided insights into both the conditions in which they were produced as well as their wider mobilisation as an 'ally' or 'enemy' (Prior 2003, p.3).

In this regard, data collection expanded from the skeleton timeline to gathering materials to contextualise the documents. These related to, among others, the authors of reports, the remits of the committees that convened particular conferences and workshops, as well as particular movements that appeared influential over documents pertaining to the two degrees target. For example, the first appearance of two degrees Celsius as a target from which an economic analysis of policy responses to climate change could be based appeared in a pair of papers by the economist William Nordhaus (Nordhaus 1975b; Nordhaus 1977b). These stemmed from research he began during his time as a Research Scholar at the International Institute for Applied Systems Analysis (IIASA), an institute whose formation was shaped by influential members of the Club of Rome.[22] The documentation regarding the formation of IIASA enabled Chapter 4 (Section 4.1.2) to analyse this instance of economics and climate change becoming connected in the idea of a target-based mode of policy formation and intervention.

Taken together this collection of documentary evidence provided the foundation for analysing the shifting ideas within the climate debate and how these shaped efforts to set a long-term target for climate change. It further

[22] The Club of Rome was founded in 1968 by Aurelio Peccei (with a background in the Italian automobile industry) and Alexander King (then head of science at the Organization for Economic Cooperation and Development) as an informal association addressing long-term, global and intertwined problems (Masood 2016, pp.72–75).

shows how the two degrees target emerged as a central target by mediating between scientific, economic and political concerns. In this regard the gathering of documentation enabled an analysis of the historical contingencies of the two degrees target, and how the target tied "local issues to larger questions, and vice versa" (Miller and Napier 1993, p.634) in a manner that linked "practices together into a complex web" where the two degrees target "emerge[d] as central to a certain way of calculating" (Ibid.).

3.2. Iterating and Combining: Analysing materials

While at times the analysis centred on materials gathered through one particular method, it most often moved across the different sources with observations, interviews and documentation being analysed together. Even in the first half of 2014 when materials had primarily been gathered through participant observation, reflection was based on fieldnotes and recordings as well as the documentation surrounding the formation of the Financed Emissions Initiative and the webinar-based and Advisory Committee meetings. Moreover, the periods in between field visits as well as between the participant observation and interviews enabled data collection and analysis to be an iterative process (*cf.* Dey 2007, pp.431–432) through which "collection and analysis [were] inexorably intertwined" (Marginson 2004, p.332). Analysis of collected materials was central to fostering reflection and regaining an *outsiders'* perspective during these periods. While the 'expanded accounts' produced immediately after observations and interviews provided structure to immediate reflection, the initial analysis conducted during periods away from data collection was to revisit both condensed and expanded accounts. Similarly, documentation and materials relating to their production and subsequent impact were analysed "as 'topic'" (Prior 2011, p.101), to explore the shifting ideas and concerns surrounding an emerging target-based mode of formulating policy response. Specifically, this re-reading of fieldnotes, transcripts and documentation focussed either on themes that had emerged during data collection or on identifying themes across the different materials. To organise this process, separate documents were created, populated and maintained for each theme, enabling a form of 'data reduction' (O'Dwyer 2004, p.393) and for excerpts on a particular theme from a variety of materials to be read and reread to explore different potential

framings. These documents also indicated the particular meeting or interview that an excerpt was taken from as well as the category of participant – such as 'NGO and think tank community' or 'ratings agency' – that the individual fit within (Dent 1991, p.712).

These themes subsequently informed the inclusion of "focussed" and, eventually, "selective observations" (Spradley 1980, pp.107–111) conducted during the engagement with the Financed Emissions Initiative. It similarly enabled the formulation of deductive and theory-driven questions for inclusion in the interview protocol (*cf.* Ahrens and Chapman 2006). Through this process the initial themes, over time, evolved. Some were set aside as different themes and explanations became the focus of inquiry, and some themes developed interconnections with others, prompting further investigation and analysis of those interconnections. For example, following the May 2015 Advisory Committee meeting, the theme of 'regulatory capture' was temporarily set aside to analyse the potential 'common basis of concerns' of the NGO and think tank community and commercial banks. Relatedly, the theme of 'NGO pressures for adoption' of carbon accounting tools developed a focus on pressures for 'realignment' of investment and lending activities, which appeared interconnected with the two degrees target as a 'common basis of concerns'. That is not, however, to say that this iteration between collection and analysis, as well as the evolution of themes, was a smooth process. The above, for example, highlights that the 'regulatory capture' theme was 'temporarily' set aside. That is, the analysis did not immediately commit to a new theme. Rather different themes would frame particular return visits to the materials in an effort to develop alternative explanations and to evaluate which theme was, as some phrase it, "best-fitting" (Klag and Langley 2013, p.151). Indeed, It was only as observations continued (with the Financed Emissions Initiative being relaunched as the Portfolio Carbon Initiative) and compared with transcripts of the interviews conducted in 2015 (Becker and Geer 2003, p.256) that the two degrees target continued to appear as a 'common basis of concerns' that cut across many different groups within the project. Moreover, the theme appeared to simultaneously shed light on the shifting concerns within the project as well as the shift in focus from a more conventional form of carbon accounting (put simply, to calculate carbon

footprints) towards indicators that were based on or had relevance to two instruments, the carbon budget and investment roadmaps.

Alongside this analysis, the empirical material and themes were brought together in writing exercises. These ranged from short reflective pieces to papers that were subsequently presented at seminars and conferences. Taken together, these exercises aided in exposing, at a more refined level, where the theoretical framing of the empirical material required further consideration by returning to the theoretical literature for further reflection on particular aspects of a theme. Moreover, this informed the positioning of the data with regards to the specific characteristics of the instruments and how their interconnections link an abstract climate objective to the framing of investment and lending decisions. This assisted in articulating the specific aspects of the *mediating instruments* (Miller and O'Leary 2007) framework that assisted in analysing how the two degrees target 'infused action' (Ahrens and Chapman 2006, p.830) across multiple entities.

This analysis formed the basis for the following three chapters, which each emerged from themes cutting across the forms of data collected. Each of the three chapters does, however, place emphasis on a different empirical core. Chapter 4 draws primarily on documentary evidence in detailing the development of a target-based mode of formulating climate policy and charting the emergence of the two degrees target and its mediation between particular political, economic and scientific concerns. It further highlights that the two degrees target provided a common vision for addressing climate change that was mobilised in efforts to connect that target to the national-, sectoral- and organisational-level. Indeed, Chapter 5, which is based primarily on interview materials that are supplemented by the participant observation, examines how the carbon budget was created as a 'bridge' between the two degrees target and the carbon constraints facing the financial sector. As well as framing the carbon budget as an instrument that 'bridges', the chapter also shows how it was mobilised to mediate between the concerns of financial organisations, regulatory authorities, and a divestment movement. In particular it attends to how the carbon budget was enrolled in arguments on the vulnerability of the financial sector under a two degrees scenario. Chapter 6 brings the reader inside the meeting rooms and webinars of the UNEP FI

and GHG Protocol's Financed Emissions Initiative by drawing primarily on the participant observation and supplementing this with interview materials. It demonstrates how emerging concerns stemming from the two degrees target came to permeate meetings and, as they came into conflict with the objectives set during the scoping phase, brought the project to the brink of collapse. Yet, relaunched as the Portfolio Carbon Initiative, the project came to connect the carbon accounting practices to a calculative infrastructure for aligning actions at the sector-, organisation- and portfolio-level with the two degrees target.

CHAPTER 4 – TWO DEGREES CELSIUS: REPRESENTING CLIMATE CHANGE, MEDIATION AND DISAGGREGATION

4.0. INTRODUCTION

As the collapsing 2009 Copenhagen climate negotiations neared the end of its penultimate day on the 18th December, negotiators attempted to salvage the talks and present a new vision for international action on climate change by presenting a three-page text. Known as the Copenhagen Accord, a key feature of the text was the long-term objective of limiting the increase in global average temperatures to two degrees Celsius (UNFCCC 2009, p.2). While the 2009 talks had only gone as far as 'noting' this two degrees target, the 2010 Cancun Agreements saw 196 nations commit to it (UNFCCC 2010, p.3); and in the 2015 Paris Agreement it became the central long-term climate target in the international response to climate change (UNFCCC 2015f, p.22). The two degrees target, however, had been used as early as the 1970s to analyse optimal policy responses to global warming (Nordhaus 1975a; Nordhaus 1977b), and throughout the following decades it garnered support from the European Union as the policy objective for efforts to curb greenhouse gas (GHG) emissions (European Environment Agency 1996).[23]

Based on the document analysis detailed in Chapter 3, this chapter charts the emergence of the two degrees target from a range of climate metrics to become the internationally recognised long-term objective for efforts to address climate change. In particular, it emphasises that, as a single figure representing the climate problem, the two degrees target provides a common basis for analysing and planning the regional-, sectoral- and corporate-level implications of climate change. This chapter argues the target simultaneously envisions the prevention of 'dangerous anthropogenic interference' in the climate system as well as enabling the construction of mechanisms that orient actions towards that vision. Yet this single figure should not be taken for granted. Some argue that 2°C of warming permits

[23] See Appendix 4A for a timeline of events in the emergence of the two degrees target.

severe global and local impacts especially when regional variation in warming is considered (Hansen 2005; Hansen and Sato 2012), and others point to the inherent uncertainties in translating warming targets into GHG emission targets (Hulme 2012). It is also claimed that by committing to the target governments are merely masking their inaction on climate change (Victor and Kennel 2014). Yet this chapter highlights that the flexibility of the two degrees target enabled it to simultaneously connect the science of climatic impacts, with a level of GHG control that did not jeopardise economic growth and in a manner that did not encroach on national sovereignty. The chapter argues that the 'boundary object' framing (Star and Griesemer 1989) adopted in earlier studies of the two degrees target (Randalls 2010; Cointe, Ravon, and Guérin 2011) is an inappropriate analytical lens. Rather, this chapter analyses the target as a mediating instrument (Miller and O'Leary 2007) that envisages an apparently "simple, imaginable and 'manageable'" future (Jordan, Mitterhofer, and Jørgensen 2016, p.1), while being "flexible enough to be associated to local concerns and activities" (Jørgensen, Jordan, and Mitterhofer 2012, p.112).

In Miller and O'Leary's study of the microprocessor industry, Moore's Law was framed as a mediating instrument that shapes "the fundamental expectations of an entire set of industries about increases in the power and complexity of semiconductor devices, and the timing of these increases" (Miller and O'Leary 2007, p.703). Amidst the vast complexity of technological advances in the semiconductor industry, Moore's Law initially presented a apparently simple vision: "during the next decade there would be a thousandfold increase in the power of the most complex integrated circuit or semiconductor device available commercially" (Ibid. p.702). Revised in 1975 as "the number of electronic elements on a semiconductor could continue to be doubled approximately every two years" (Ibid.) Moore's Law "modelled a strikingly beneficent relation between science and the economy at a highly abstract and simplified level" (Ibid., p.716). The two degrees target, similarly, cuts through the complexities of climate change, rendering the problem into an apparently simple vision: "Holding the increase in the global average temperature to well below 2°C above pre-industrial levels" (UNFCCC 2015f, p.22). It is the apparent simplicity of the target that is central to its representation of climate change. Yet it became a common basis for diverse

action as it came to mediate between the scientific literature on severity of climatic impacts, national sovereignty concerns that hindered international climate negotiations, and 'cost-effective levels of control' for GHG emissions.

In examining the stability of the two degrees target through its mediation of diverse concerns, this chapter is a contrast to Randalls' (2010) and Cointe, Ravon and Guérin's (2011) 'boundary object' framing (Star and Griesemer 1989), which emphasises its ability to enable communication. Star and Griesemer define boundary objects as enabling communication and cooperation across different domains by being "weakly structured in common use, and become strongly structured in local site use" (Star and Griesemer 1989, p.393). In other words, there is an ambiguity to boundary objects until considered in terms of a specific situation, at which point they become prescriptive regarding the linkage or action. Randalls briefly remarks that the two degrees target "represented a useful 'boundary object' interfacing between science, social science, and policymakers" (Randalls 2010, p.602) in debates where the idea of "low-carbon societies was being actively debated" (Ibid.). Cointe *et al.*'s 2011 working paper, however, emphasises the 'weakly structured in common use' aspect of the boundary objects definition, seeing the two degrees target as being "[s]ufficiently vague to allow several interpretations" (Cointe, Ravon, and Guérin 2011, p.18).

Yet in 'common use' as a global objective, the two degrees target provides an apparently fixed objective. Far from being vague or ambiguous, it is presents a seemingly simple vision for addressing climate change. The two degrees target is, however, flexible. That is, it does not per se prescribe how it is to be implemented and the necessary actions. Cointe *et al.* appear to allude to this in stating that it 'allows several interpretations'. However these interpretations are part of the 'local site use' of the two degrees target. That is, rather than being 'strongly structured' in local site use (prescribing how it is to be implemented or used), the two degrees target is flexible (allowing "several interpretations"). Where the definition of a boundary object does not appear to fit the two degrees target's 'structure', the target may be seen as a mediating instrument: detailing an apparently simple and manageable vision in 'common use' while being flexible in its implementation in 'local site use'. In this regard, the two degrees target, viewed as a mediating instrument, provides a "stable frame of reference" while being "flexible enough to be

associated to local concerns and activities" (Jørgensen, Jordan, and Mitterhofer 2012, p.112).

The two degrees target may be seen as representing "complex and potentially not well understood processes" by envisioning a future that appears "simple, imaginable and 'manageable'", which can guide the efforts of diverse actors (Jordan, Mitterhofer, and Jørgensen 2016, p.1). However this chapter studies the role of two degrees target as a basis for developing instruments that link a climate change to concerns at the national-, sectoral, and organisational-level. In particular, it demonstrates how an apparently simple representation of a complex[24] issue provides the basis for efforts to create linkages between diverse and distributed entities.[25] In this regard, where Miller and O'Leary (2007) map the instruments – technology roadmaps and cost of ownership calculations – that linked Moore's Law to corporate investment decisions, this chapter attends to how the two degrees target provided a basis for assembling and adjusting instruments to refine its vision. To reiterate, this chapter first investigates how the two degrees target became a common objective that mediated between economic, political and scientific concerns on addressing climate change (Sections 4.1 and 4.2). It then considers how its apparently simplicity stimulates, enables and orients work to construct instruments that refine the vision of the target to local specifics (Section 4.3).

The work of constructing instruments that refine the two degrees target is analysed through Mary Morgan's notion of *disaggregation*;[26] the

[24] The term 'complex' refers to arguments that climate change is a 'wicked' or 'super-wicked' problem (Milne and Grubnic 2011, p.949). The former defy "resolution because of the enormous interdependencies, uncertainties, circularities, and conflicting stakeholders implicated by any effort to develop a solution" (Lazarus 2008, p.1159), with the latter adding that "time is not costless, so the longer it takes to address the problem, the harder it will be to do so" (Ibid., p.1160).

[25] It has been suggested that "the problems with defining a singular point of sustainable development" (Bebbington and Larrinaga 2014b, p.396) have led to the pursuit of sustainable development to focus on moving "away from being unsustainable" (Ibid.). This chapter illustrates the problems of 'defining' (or temporary stabilising) the two degrees target as a singular point for directing efforts to address climate change. Moreover the target is to move away from being unsustainable, aiming to lessen but not prevent any further climatic impacts.

[26] Professor Morgan presented this work during an LSE400 lecture on 20th February 2015. Morgan's research on the matter is yet to be written up, and thanks are owed to her for a follow-up conversation regarding the concepts of *aggregation* and *disaggregation*.

separation of a problem into component parts. Disaggregation pertains to the way a common rendering of a problem (in this chapter the two degrees target as the long-term climate objective) enables actors to form linkages between their own specific circumstances – such as ongoing work, relationships and expertise – and the underlying issue. It is not that some central authority divides the rendering into components; rather, it is that the rendering becomes a basis to frame and configure the work of diverse and distributed actors. Indeed, it is this work that forms linkages between the underlying problem and entities of various scales and scopes. Climate change, this chapter argues, is made amenable to disaggregation through the two degrees target. For example, emissions trajectories may be calculated that are consistent with a two degrees target. These trajectories enable: the benchmarking of reductions in national GHG emissions, the analysis of the transition to low-carbon modes of production in specific sectors, and the setting of corporate targets that are consistent with the global vision for addressing climate change. Section 4.3 illustrates this disaggregation of the two degrees target to highlight the influence of a common vision in orienting diverse and distributed efforts to address climate change.

In particular, this disaggregation of the two degrees target highlights the new demands placed on carbon accounting as it is called upon to "enable the diverse forms of carbon governance" (Larrinaga 2014, p.2). At the national level, Parties to the UNFCCC may base their targets and policy strategies for working towards the two degrees target on a wider set of metrics than CO_2, or GHG, data alone. Emissions intensity targets, for example, require the combination of national GHG information with forecasts of GDP growth. On the other hand, 'policy targets' (such as, among others, renewable energy, energy efficiency, and forestry) present a commensuration challenge in arriving at estimates for GHG impact of those policies that can be combined with other Parties' contributions to provide an aggregate measure of global emissions reductions. These stem from the post-Copenhagen mode of climate governance that prioritises the flexibility with which Parties may contribute towards global climate objectives, shifting away from a the Kyoto Protocol's UNFCCC-determined GHG reduction targets (Falkner, Stephan, and Vogler

Morgan's work also attends to *aggregation*, where poorly visible or complex issues are brought together into an aggregate form that provides actors with a particular way of seeing the problem.

2010; Falkner 2016). That is, the two degrees target has become the common vision for Parties to work towards, yet the flexibility of approaches for that work present new challenges to national-level carbon accounting. This chapter highlights these challenges, and argues that the adoption of the 2015 Paris Agreement presents an opportunity to "investigate the dynamics of accounting systems of governance as they emerge" (Bebbington and Larrinaga 2014a, p.207).

The chapter is structured as follows. Section 4.1 explores the emerging debates on the costs of climate change and a variety of targets for guiding action between 1967 and 1992. In particular, this traces the idea of setting a long-term target for tackling climate change as a basis for economic analyses of cost-effective policy responses. Section 4.2 investigates efforts to define the United Nations Framework Convention on Climate Change's (UNFCCC) objective of preventing 'dangerous anthropogenic interference' with the climate system as well as the growing support for the two degrees target between 1992 and 2009. Specifically, the section highlights how the two degrees target became a central objective in international climate debates as its flexibility enabled it to mediate between science, politics and economics. Section 4.3 analyses actions surrounding the two degrees target after it was formally noted in the 2009 Copenhagen Accord. The section also illustrates several instances of disaggregation following the stabilisation of the two degrees target. Section 4.4 discusses the chapter's findings, and Section 4.5 offers concluding remarks.

4.1. 1967-1992: TARGET-BASED ASSESSMENTS OF 'COST-EFFECTIVE' GHG CONTROL STRATEGIES

4.1.1. CLIMATE SENSITIVITY: A LINK BETWEEN TEMPERATURE AND CO_2

The discovery of climate change dates back to 1859 when the Irish physicist John Tyndall demonstrated that several gases could block infrared radiation from leaving the planet (Weart 2008, p.3). However it was the Swedish scientist Svante Arrhenius who, in the late-19th century, investigated the impact of a doubling of atmospheric carbon dioxide (CO_2) concentrations on global mean temperatures (Arrhenius 1896). Such studies (also see

Chamberlin 1899) examined potential causes of the Prehistoric Ice Age, and were motivated by concerns of similar upcoming glacial shifts (Maslin 2014, p.15). In 1896 Arrhenius calculated the Earth's *climate sensitivity* – defined as the temperature responses to a doubling of CO_2 emissions – as 6°C. However his work received little attention in the first half of the 20th century, when the work of climatologists centred on producing data with which farmers could forecast crop yields and engineers could assess the flood risks over the lifetime of a bridge (Weart 2008, p.10). In 1938 Guy Callendar, a British steam engineer and amateur climatologist, presented the first evidence that the planet had warmed to the UK's Royal Meteorological Society (Callendar 1938). His paper, *The Artificial Production of Carbon Dioxide and its Influence on Temperature*, also calculated the Earth's climate sensitivity as 2°C (Ibid., p.231). As with Arrhenius and Chamberlin's studies, Callendar focussed on the causes and possible prevention of glacial shifts. Noting that "the combustion of fossil fuel […] is likely to prove beneficial to mankind in several ways", he concludes that there are sufficient fossil fuels to produce "at least ten times as much carbon dioxide as there is in the air at present" and that "the return of the deadly glaciers should be delayed indefinitely" (Ibid., p.236).

During the Second World War meteorology became seen as an important source of information, with military strategists seeking improved weather forecasting to factor into battle planning (Weart 2008, p.20). Following the war new courses in meteorology continued to be taught – for example at the University of Chicago and the Massachusetts Institute of Technology (MIT) – and the Office for Naval Research was established to fund small-scale projects (Ibid., p.21). It was based on research conducted shortly after the Second World War that Plass argued human actions would warm the planet by 1.1°C per century (Plass 1956). Research into the relationship between CO_2 and temperature change continued, with a meeting of ecologists, chemists, physicists and other experts[27] in 1963 suggesting that the current trends in CO_2 emissions could lead to warming of 3.8°F (2.1°C) (Eichhorn 1963, p.i). By the late-1960s, the meteorologists Syokuro Manabe and Richard Wetherald, working in the United States' National Oceanic and Atmospheric

[27] These other experts included an oceanographer from the US Fish and Wildlife Service, the aforementioned Gilbert Plass – then working in the Aeronautical Division of the Ford Motor Company – and a meteorologist from the International Meteorological Institute in Stockholm.

Administration (NOAA), similarly found that climate sensitivity was approximately 2°C (Manabe and Wetherald 1967). Their more sophisticated 1975 model refined this to 3°C (Manabe and Wetherald 1975). Numerous studies of climate sensitivity emerged across the 1960s and 1970s as the meteorological community worked to reinforce warnings of changes to the global climate that could result from burning fossil fuels (Schneider 1975, p.2060). In Schneider's summary of these studies, he suggests that "a state-of-the-art order-of-magnitude estimate is suggested between 1.5 and 3 K [Kelvin[28]], but that the combined effects of improperly modelled climatic feedback mechanisms could, roughly, enhance or reduce this estimate by as much as a factor of 4" (Schneider 1975, p.2061).

Despite the range of average temperature increases suggested by climate sensitivity models, the studies prompted the United States' Office of Science and Technology and Policy to request the National Academy of Sciences to undertake a critical assessment of the scientific basis of the results. The request was premised on the "incontrovertible evidence that the atmosphere is indeed changing and that we ourselves contribute to that change" (Charney 1979, p.vii) and sought to produce a foundation for assessing "the implications of this issue for national and international policy planning" (Ibid.). Chaired by the American meteorologist Jule Charney, the report adopted the climate sensitivity heuristic and found that if CO_2 concentration in the atmosphere doubled from current concentrations, and remained so until temperatures stabilised, then the best estimate is that "changes in global temperature of the order of 3°C will occur and that these will be accompanied by significant changes in regional climatic patterns" (Charney 1979, p.17), refined elsewhere in the report as having "a probable error of ± 1.5°C" (Charney 1979, p.2). Commenting on the findings in the Forward to the 1979 Charney Report the Chairman of the Climate Research Board of the National Research Council, Verner Suomi, stated "[i]f carbon dioxide continues to increase, the study group finds no reason to doubt that climate changes will result and no reason to believe that these changes will be negligible" (Charney 1979, p.viii).

[28] A temperature *interval* of one degree Celsius (°C) is equal to one Kelvin, with the range suggested in the quote therefore being equal to 1.5°C to 3°C. The conversion of *specific* temperatures can be made using the formula [K] = [°C] + 273.15.

However before considering how the scientific debates on climate sensitivity featured in global warming debates in the 1980s this chapter turns its attention to the emergence of economic analyses of climate policy, beginning with the American economist William Nordhaus' work in the mid-1970s.

4.1.2. Target-Setting as a Basis for Cost-Benefit Analysis

In 1974 the 33-year old American economist William Nordhaus became a Research Scholar at the International Institute for Applied Systems Analysis (IIASA) in Laxenburg, Austria. IIASA had been established in October 1972 as a centre for "liaison between the scientists of East and West" (IIASA 2013) with twelve member nations.[29] In negotiations over the IIASA's agenda, the Club of Rome founder and first president, Aurelio Peccei, had been a strong advocate for a focus on interdisciplinary research on global modelling (Ibid).[30] This also had the support of the founder of the Canadian Association for the Club of Rome, J. Rennie Whitehead, and the Deputy Chairman of the USSR's State Committee for Science and Technology, Jermen Gvishiani (also a member of the Club of Rome). However Lord Zuckerman, representing The Royal Society from the UK, was sceptical of application of global modelling in the Club of Rome's *The Limits to Growth* (Meadows et al. 1972), which had been published shortly before the IIASA was founded. Based on a computer simulation conducted by researchers at MIT, *The Limits to Growth* set out the argument that the exponential economic and population growth, paired with only linear technological advancement, could not be supported beyond 2100 (Ibid.). Yet Lord Zuckerman saw no value in applying a global modelling approach to what he saw as an argument dating back to the industrial revolution (Masood 2016, p.80). The USA's National Academy of Sciences "shared his dim view of global modelling" (Brooks and McDonald 1997, p.3), and Lord Zuckerman threatened to withdraw The Royal Society from the IIASA. This resulted in an agreement that the institute would only host conferences to review contributions to global modelling and not conduct work

[29] The 12 member nations, as listed in the IIASA's 1972 Charter, were the USSR, Canada, the Czechoslovak Socialist Republic, France, the German Democratic Republic, Japan, the Federal Republic of Germany, the People's Republic of Bulgaria, the USA, Italy, Poland and the UK (IIASA 1972).

[30] Global modelling entails the forecasting of current human activity on "overarching problems which confront humankind" (Peccei 1982, p.92), with the Club of Rome's *Limits to Growth* being identified as the first global model (Meadows et al. 1972).

on the topic (IIASA 2013). However while Lord Zuckerman dismissed pollution as a potential risk to mankind (Masood 2016, p.80), research into environmental issues were established as a core theme in IIASA projects from its outset (Boehmer-Christiansen 1994).

It was during his year at IIASA, conducting research into energy policies, that Nordhaus shared an office with a climatologist who first introduced him to the issue of global warming (Harris 2014). Nordhaus is quoted saying "'My own first serious research on global warming started when I spent a year in Vienna at IIASA'" (IIASA 2006, p.19), where he produced the first economic model of global warming as a working paper, titled *Can we Control Carbon Dioxide?*. Nordhaus thanks the physical chemist Cesare Marchetti and the meteorologist Allan Murphy in that working paper for helping him navigate the climatic literature (Nordhaus 1975b, p.1), which he used to provide an overview of the cycle through which CO_2 emissions have effects on agricultural production, on production or destruction of land and capital, and on amenity (Ibid., pp. 4-6). He frames these "as the effects of an uncontrolled development" where "the energy system and emissions of carbon dioxide evolve simply on the basis of economic forces" (Ibid., p.6). "Put differently," Nordhaus writes, "the externalities of carbon dioxide are ignored" (Ibid.). As such the problem studied in his working paper is not merely "how can we limit the concentration of atmospheric carbon dioxide to a reasonable level?" rather it is specifically addressing "how much would a control path cost if it were implemented on an efficient basis?" (Ibid., p.9). The question was not only one of controlling carbon dioxide emissions. It was focused on the cost of controls in order to 'efficiently' curb those emissions.

To formulate the control of CO_2 into a problem amenable to economic analysis, Nordhaus identified what he referred to as "arbitrarily given standards" (Ibid., p.22). By this he meant that he knew of "no attempts to suggest what might be reasonable standards, or *limits to set in a planning framework*" (Ibid., emphasis added) and so selected what appeared "reasonable" to him: "the climatic effects of carbon dioxide should be kept well within the normal range of long-term climatic variation" (Ibid.). Nordhaus argued that most sources take long-term variation to be ±5°C, and that the global climate was in the upper half of this range (Ibid., p.23). Based on this Nordhaus stated:

> "If there were global temperatures more than 2 or 3°C. above the current average temperature, this would take the climate outside of the range of observations which have been made over the last several hundred thousand years" (Ibid.).

Nordhaus was attempting to convert the climatic literature into a specific quantified limit. This was to provide the basis for his economic analysis of the efficient control of CO_2 emissions. In other words, the idea of a specified limit for controlling global warming was essential to an economic framing of the problem. Yet a temperature target could not be factored into his economic analysis. Rather, Nordhaus drew from the latest climate sensitivity literature, which estimated a temperature response of 0.6 to 2.4°C to a doubling of current atmospheric CO_2 levels, assuming "a doubling of atmospheric concentration of carbon dioxide is a reasonable upper limit" (Ibid., p.23). However it should be noted that this limit was issued with a strong caveat in the working paper:

> "The standards proposed here, as well as the reasoning behind it, are extremely tentative. It must be emphasized that the process of setting standards used in this section is deeply unsatisfactory, both from an empirical point of view and from a theoretical point of view. We can only justify the standards set here as rough guesses; we are not certain that we have even judged the direction of the desired movement in carbon dioxide correctly, to say nothing of the quantitative levels." (Ibid., p.24, emphasis in original)

The findings developed in the working paper were refined and in 1977 *The American Economic Review* published the paper, titled *Economic Growth and Climate: The Carbon Dioxide Problem*, in an issue containing 'the Papers and Proceedings of the Eighty-ninth Annual Meeting of the American Economic Association' (Nordhaus 1977b). Indeed, after returning to his Assistant Professorship at Yale University, Nordhaus presented his paper, *Long Run Impact of Energy Use on Climate*, in the 'Natural Resource and Environmental Constraints on Growth' session at the 1976 American Economic Association meeting in Atlantic City, New Jersey (Nordhaus 1976). The chairperson of this session was John Krutilla, a pioneer of conservation economics (the valuation of undisturbed natural environments. See Krutilla 1967) who was serving as a Senior Fellow at Resources for the Future, a non-profit organisation conducting economic analyses of natural resource and environmental issues. This exposed Nordhaus' work to the early environmental economics movement beyond the confines of IIASA. His 1977

paper argued that, out of the range "wolf-cries" (Nordhaus 1977b, p.1) from scientists on the potential harms of future economic growth, climate change was an issue that "should be taken very seriously" (Ibid.). Identifying Manabe and Wetherald (1975) as the most careful climate sensitivity study to date, Nordhaus highlighted that an increase in global mean temperatures of 3°C would "take the climate outside of any temperature pattern observed in the last 100,000 years" (Nordhaus 1977b, p.342).[31] Nordhaus summarises the potential future temperature increases using the graph reproduced in Figure 4.1, identifying 2°C as the estimated maximum warming over the past 100,000 years.

Having reviewed the latest climate sensitivity research and approximated that temperatures be held within the maximum temperature increase experienced over the last 100,000 years, Nordhaus (1997b) examines the costs of policy responses to control the level of warming. The paper states two key aspects of control strategies, the first being a feasibility at a scientific level and the second being "a way to decentralize the controls so that nations, producers, and consumers have proper incentives to implement the control strategy on an individual level" (Nordhaus 1977b, p.342). To address the second aspect, Nordhaus builds a 'carbon tax' into his mathematical programming problem. The first, he claims, is satisfied by the substitutability of non-fossil fuels for fossil fuel sources of energy. Nordhaus, solving what he defined as an optimisation problem, finds that the cost of limiting the increase in atmospheric CO_2 to 100% (i.e. a doubling) would be $87 billion in 1975 prices (Ibid., pp.345-6) and would only require a reduction in emissions after the year 2000. He concludes that an efficient programme for controlling carbon dioxide concentrations is feasible and "requires little change in the energy allocation for 20 to 40 years" (Ibid.). This, Nordhaus suggests, offers reasons for optimism on the potential of carbon dioxide controls, which should be guided by the question: "How costly are the projected changes in (or the uncertainties about) the climate likely to be, and therefore to what level of

[31] In 1977 Nordhaus also presented this work as a discussion paper at the Cowles Foundation for Research in Economics at Yale University. This discussion paper maintained that "[a]s a first approximation, it seems reasonable to argue that the climatic effects of carbon dioxide should be kept within the normal range of long-term climatic variation" (Nordhaus 1977a, p.39), and refined the limit as: "[w]ithin a stable climate regime, such as the current interglacial, a range of variation of 2°C is the normal variation" (Ibid. p.40).

control should we aspire?" (Ibid., p.346). In other words, he argued that the specification of a target for 'acceptable' climatic change was crucial to analysing an 'optimal' cost-effective response to the problem.

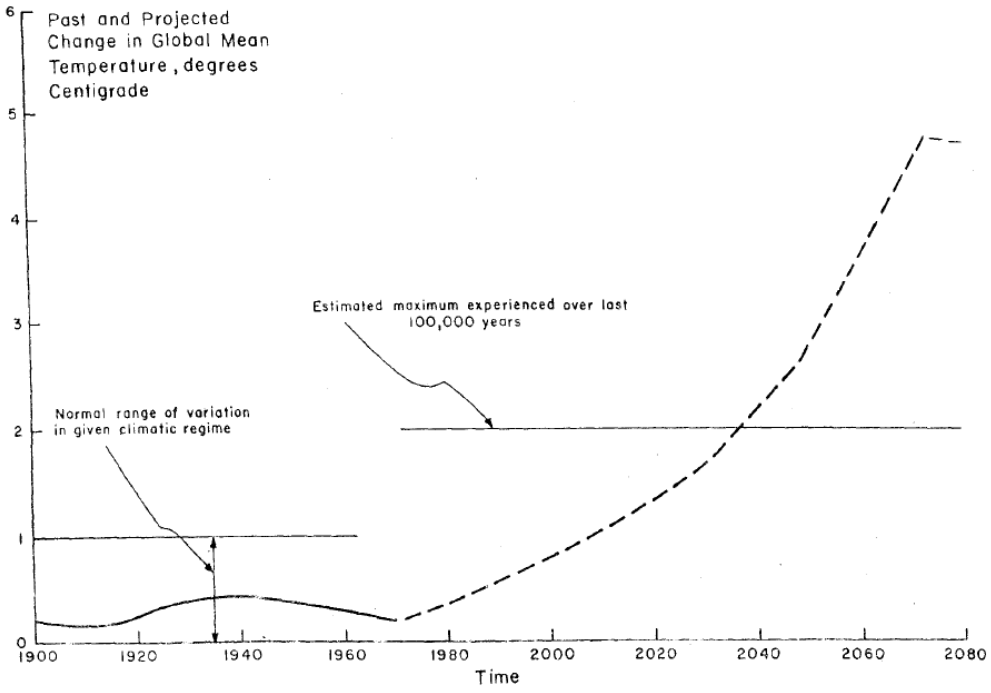


Figure 4.1: "Past and projected global mean temperature, relative to 1880-84 mean. Solid curve up to 1970 is actual temperature. Broken curve from 1970 on is projection using 1970 actual as a base and adding the estimated increase due to uncontrolled buildup of atmospheric carbon dioxide" (Nordhaus 1977a, p.3).

It was in the 1983 *Changing Climate* report produced by the National Research Council's Carbon Dioxide Assessment Committee – of which Nordhaus was one of nine members and lead author of one of the report's nine sections – that Nordhaus' work was consolidated with research into climate sensitivity. The Committee was formed under the National Research Council in response to mounting Congressional interest in the United States (National Research Council 1983, p.x). From 1980 to 1983, it worked to produce a comprehensive assessment of climate science and policy advice on climate change, which it presented in its 1983 report. It maintained that policymakers would be wise to be concerned about any "prospective change in some major index of climate, like the mean annual global atmospheric temperature, that goes beyond the boundary of values believed to have been experienced throughout the history of civilization" (National Research Council 1983, p.455).

Moreover, the report develops a framework for assessing and selecting policies, and was intended to "lend itself to different levels of universality" and "be susceptible of disaggregation" (National Research Council 1983, p.457). That is, it would set out the possible responses to climate change so as to render the problem into a form amenable to control by diverse and distributed actors. A similar 'disaggregation' was seen as desirable in models of the energy system, centring on the idea that "experts in individual areas (such as analysts specializing only in the U.S. economy or a particular fuel source) can evaluate the detailed forecasts and assumptions" (Ibid., p.161). In other words, the models referred to in the report went beyond overarching analyses of energy supply, demand and prices when facing CO_2 constraints. They also provided data on their component parts and were "flexibly designed" (Ibid.) to enable their application, evaluation and refinement across a diversity of distributed efforts to factor global warming into planning and policy-making. Borrowing from accounting terminology, the report similarly proposed that frameworks for evaluating policy choices should not stipulate "some 'bottom line.' There will be as many bottom lines as there are users of the framework, according to their interests and responsibilities over space, time, and people" (National Research Council 1983, p.463). As with Nordhaus' view of establishing a target as a common basis for economic analyses, the framework was to simultaneously enable and align efforts across various policy-making entities to develop local responses to the global problem.

In addition to identifying climatic impacts at different levels of warming – such as reduction in quality and quantity of water resources in western United States at 2°C (Ibid., pp.421-2) and sea level rise of about 70cm at 3°C to 4°C (Ibid., pp.435-6) – the report details the timing of necessary emissions limits to remain below certain concentrations of atmospheric CO_2. Nordhaus acts as the lead author in this section, synthesising recent research on the economy, energy and CO_2 emissions to further inform the "likely costs and benefits of alternative CO_2 control or adaptation strategies" (Ibid., p.181). In particular he draws together the research to construct "action initiation times" (Ibid., p.168), the years when reductions in the use of fossil fuels would need to begin in order to limit CO_2 in the atmosphere at different concentrations, depending on the initial growth rate of annual carbon

emissions. From his assessment he draws severe warnings regarding current efforts to understand the intersection of climate change, economics and energy policy:

> "There is not one U.S. long range global energy or economic model that is being developed and constantly maintained, updated with documentation, and usable by a wide variety of groups. […] Efforts to evaluate the effectiveness for CO_2 control of energy policies of particular nations or groups of nations in a globally consistent framework have been lacking" (National Research Council 1983, p.173).

Nordhaus hails the "considerable progress" (National Research Council 1983, p.181) made by the scholars whose research was synthesised in his contribution, calling for "a strong fundamental research program" in economic and energy modelling as a prerequisite for the international response to climate change. Defining a target concentration of atmospheric CO_2, according to the 1983 *Changing Climate* report, should be the basis for determining the most cost-effective energy policy to enable the transition away from fossil fuels (Ibid.). This section now turns to demonstrate how the target-based approach to policy appraisal of the *Changing Climate* report came to shape the idea of addressing climate change as it rose on political agendas.

4.1.3. A Target-Based Approach to Controlling Climate Change

Climate Science Conferences and the Concept of Target-Based Management

By the late-1970s and early-1980s, evidence on climate change, through the array of reports and conferences on the issue, had raised awareness at an international level (Agrawala 1998, p.614). The World Meteorological Organisation (WMO) – seeking to extend its expertise beyond forecasts of natural and man-made climatic changes and to include the formulation of policy responses – convened the First World Climate Conference in 1979 (Ibid.). Bringing together experts in science, economics, industry, agriculture and government, the WMO requested that the conference "review and approve an International Plan-of-Action for the study of the impacts of climate upon society" (Ibid., p.9). The conference, however, set aside the "interesting and important questions of goals" (WMO 1979, p.24), while noting that international co-operation on climate change must be developed as an essential element in addressing the issue. The conference

carved out four elements of a research agenda (Ibid., p.715) that would reinforce the evidence of climatic change and its relevance to policymakers: assessing relative roles of natural and anthropogenic influences on climate change; developing climatic data, including "climate-related geophysical, biological and socio-economic data." (Ibid., p.719); creating methods for applying knowledge of the climate system to planning, development and management in the food, water, energy and health sector; and the translation of climate variability and changes into their impacts on human activities. Taken together, this creation of data and methods sought to provide a framework for planning decisions that, the report stated, "are of great importance for economic development, particularly in the developing nations" (Ibid., p.728). Furthermore, "the basic objective" of applying this data was "to assist societies to improve their capabilities to carry out various activities, and *to obtain maximum economic and social benefit* under different climatic conditions while maintaining environmental integrity." (Ibid., p.729, emphasis added).

Building on the foundations created at the First World Climate Conference, the International Council of Scientific Unions (ICSU), United Nations Environment Programme (UNEP) and the WMO held a series of conferences in Villach, Austria, in 1980, 1983 and 1985. It is worth noting that 1981 marked the start of the Reagan Administration in the US, which deemed research into carbon dioxide as unnecessary and moved to cut related funding. In this regard, resistance to global warming as a political issue provided the backdrop to the Villach conferences, especially in the US (Weart 2008, pp.140–142). However understanding of potential climatic changes developed significantly through these conferences, with the 1985 conference statement reading: "in the first half of the next century a rise of global mean temperature would occur which is greater than any in man's history" (World Climate Programme et al. 1986, p.1). In that same year, and in an attempt to ensure follow-up on conclusions from the Villach 1985 conference, ICSU, UNEP and WMO created the Advisory Group on Greenhouse Gases (AGGG) to conduct biennial reviews of research on GHGs and to assess the rates and impacts of increases in concentrations of CO_2 (Potter 1986). While Agrawala documents the "crucial shortcomings" of the AGGG (Agrawala 1998, p.610), it was central to a pair of conferences in 1987 that began developing long-term

goals for tackling climate change and responded to conclusions reached at the 1985 Villach conference.

Funded in part by the Rockefeller Brothers Fund and the Rockefeller Foundation,[32] a two-stage workshop process was designed to provide a synthesis of the latest evidence of climatic change. The first workshop was based on the impact of increased concentrations of GHGs – discussed from 28th September to 2nd October 1987 in Villach – in order to inform the second workshop, which explored "policy steps that should be considered for implementation in the near term" (Jäger 1988, p.iii) – discussed from 9th to 11th November in Bellagio, Italy. Forty-eight scientists and technical experts – including two representatives from both IIASA and Resources for the Future – attended the October Villach workshop, while twenty-four participants attended the November Bellagio workshop and ranged from scientists and technical experts to representatives of government agencies, NGOs, and development funds from around the world (Ibid., pp.43-7). Discussions on long-term environmental targets were central to discussions, with the report from these workshops stated that "planning and decision-making could be facilitated by the use of long-term environmental targets" (Ibid., p.v) and that there was a need for "detailed comparisons of the costs of various strategies" (Ibid.). On the latter, the conference suggested a framework for assessing the relative costs of limiting and adapting to climatic changes as well as resulting externalities, and that these should be assessed across three policy scenarios: business as usual, moderate efforts, and concerted efforts (Jäger 1988, pp.28–9. Also see Appendix 4B). Furthermore, the report recommended that cost comparisons be made at the national- and local-levels. This reflected the view that limitation strategies would be negotiated at the international level and implemented at the national level, while adaptation strategies would be implemented at a local level due to the regional specificity of climate impacts (Ibid., p.30).

On long-term environmental targets, the Villach-Bellagio report (the summary of discussions and recommendations from the conferences written by Jill Jäger) can be thought of as identifying three interconnected

[32] Funding was also provided by the United Nations Environment Programme (UNEP), The German Marshall Fund of the US, The Austrian Ministry for Environment, Youth and Family, the Swedish Energy Research Commission, and the US-based W. Alton Jones Foundation.

coordination problems and suggesting avenues for further research to remedy these.[33] The first coordination issue was to develop "some procedural mechanism […] to guide planning and decision-making" (Ibid., p.21). Specifically relating to such a mechanism, the report states, "the use of long-term environmental targets, such as the rate of temperature change or sea-level change, would be extremely advantageous as a management tool" (Ibid.). In this regard, where the National Research Council's *Changing Climate* report concluded that a long-term target would provide the basis for planning and policy-making, the Villach-Bellagio workshops concluded that such a target could also guide planning across regulatory authorities.

A goal of limiting warming to 0.1°C per decade was proposed on the basis of observations that natural ecosystems and societies have limited capacity to successfully adapt to higher rates of warming (Ibid., p.25). While the 0.1°C per decade target was the focus of the Villach-Bellagio report, the conference also recognised historical experience of adaptation was in the range of 2cm to 3cm sea level rise per decade, although it noted that this occurred during periods of approximately 0.1°C warming per decade (Ibid., p.22). It further stated that these 'rate of change' targets "could be supplemented with absolute limits on temperature […] since unlimited warming at any rate much sooner or later become problematic" (Ibid., p.21). As such, establishing a long-term target would both enable analyses of policy responses to global warming and ensure that the basis for policy responses at the national- and local-levels were guided in a similar direction.

The second coordination issue was managing a period of adjustment to bring efforts into alignment with the long-term target, rather than calling for regulations that sought to immediately constrain activities and bring them in line with a rate of change target. In other words the delegates envisioned a more gradual alignment that avoided 'shocks' to the regulated industries. Interim targets were suggested as a way to guide this adjustment phase. These

[33] However it should be recognised that the Villach-Bellagio report primarily set out ideas for developing an international mechanism to guide efforts to limit GHG emissions and adapt to climatic impacts. For example, on the question of differentiated targets for developed and developing countries, while the report declared "It is obvious that the developed countries have greater possibilities for controlling emissions. […] It might be appropriate to set different emissions goals for the developed and developing countries" (Ibid., p.25), this remained a matter for future deliberation.

can be thought of as a constraint compared to the 'business as usual scenario', which would gradually be strengthened until regulations were aligned with the long-term environmental target. Moreover, the conference concluded that advances in scientific knowledge and economic analyses of policy options were likely. Interim targets were seen as a way to increase the pace of adjustment as such developments were made, being adjusted to reflect these advances where it was "justifiable in terms of the estimated costs of achieving the required emission goals" (Ibid., p.26). To reiterate, while a long-term climate target was viewed as essential for cost-effective control of climate change, economic shocks would be avoided by a gradual transition of economies towards alignment with the target. As such, economic feasibility was embedded in the target-based management of climate change in these early climate workshops, both in analysing the 'optimal' level of GHG control and in the timeline for adjustments.

The third challenge of coordination was that the warming effects of each GHG were different, increasing the complexity of assessments across GHGs. While it was possible to set a target based on an absolute or rate of change in temperature, an agreement was required on how to convert these temperature targets into a GHG target. The conference had concluded that the former could be based on observations of natural variations in the climate system and pace at which natural systems could adapt; however the conversion into GHG targets was necessary for analysing control strategies and implementing policies. The Villach-Bellagio report recommended that "all GHGs must be made intercompatible" (Ibid., p.33) through a concept such as 'CO_2 equivalent' (CO_2e)[34] to "allow a total emissions picture to be obtained in warming terms" (Ibid.).

The conference had identified potential coordination problems and concluded with avenues for research and negotiations to overcome these issues. In doing so the Villach-Bellagio workshops sought to enable the three management steps envisaged as the ideal process for guiding strategies to control climatic changes:

> "first, determine the target (e.g. rate of global surface temperature change) that should be reached if large-scale

[34] This is detailed in the report as "expressing the amount of each GHG in terms of the amount of CO_2 that would produce the same radiative effect" (Jäger 1988, p.33).

> environmental and social problems are to be avoided; second, specify the changes of rates of GHG emissions that would be needed to reach this target; third, regulate GHG emissions so that the environmental target can be reached" (Ibid., p.33).

It is necessary to note two observations regarding the Villach-Bellagio workshops. First, as with Nordhaus' work and the 1983 *Changing Climate* report, defining a long-term climate target was central to rendering the problem of global warming 'manageable'. Specifically, setting a target was seen as providing a basis for analyses of policy options, and in doing so could simultaneously guide national- and local-level policy towards a common global direction. Second, the conference mapped out three management steps to implementing regulations that would guide actions towards a long-term target, identifying coordination challenges and suggesting potential avenues for research to resolve these. As such, the conference not only established the idea of coordination towards a common long-term target, it also envisaged a decentred response to this target through national- and local-level planning. However, as noted, the Villach-Bellagio workshops set out ideas for responding to global warming. It was in the late-1980s, to which this section now turns, that questions of developing international treaties on climate change, deciding on the appropriate long-term environmental target, and creating mechanisms such as those proposed at the Villach-Bellagio conference would appear on the political agenda.

Climate Change on the International Political Agenda

The Toronto Conference, *The Changing Atmosphere: Implications for Global Security*, coincided with an intense heat wave in North America during the summer of 1988, capturing the attention of the media that had increasingly connected severe weather events to climate change during 1987 and early-1988 (Torrance 2006, pp.45–6).[35] Co-sponsored by UNEP and hosted by the Canadian Government, The Toronto conference "attracted so many reporters that extra press rooms had to be added to handle the hordes

[35] Agrawala (1998) notes "The years 1987 and 1988 were marked by severe heat waves in North America, Hurricane Gilbert struck the Caribbean and caused more than $1 billion in damage, there was a freak hurricane in the English Channel and a chunk of ice approximately 100 miles long and 25 miles wide broke off the coast of Antarctica. These events contributed to heightened public concern both on the possibility of warming trends and the possibility of increased risk to extreme climatic events" (Agrawala 1998, p.608).

of descending journalists" (Schneider 1989, p.194).[36] Moreover, Agrawala credits the former head of the Canadian Meteorological Service, Howard Ferguson, with generating "high level political participation including a few heads of state" (Agrawala 1998, p.610).[37] In its powerful framing of the problems facing the world, the conference statement begins: "Humanity is conducting an unintended, uncontrolled, globally pervasive experiment whose ultimate consequences could be second only to a global nuclear war" (F. K. Hare 1988, p.292). The conference also expressed support for the Intergovernmental Panel on Climate Change (IPCC) – which had been developed, following a 1987 WMO Executive Council resolution (Agrawala 1998, p.612), by the WMO and UNEP and set up with the mandate "to examine climate science, impacts, and response strategies" (Ibid., p.616) [38] – to continue assessments of scientific results and initiate discussions between governments on responses and strategies (F. K. Hare 1988, p.298).

The first highlight from the Toronto conference was the 'Toronto goal' to "[r]educe CO2 emissions by approximately 20% of 1988 levels by the year 2005 as an initial global goal" (Ibid., p.296). The final conference statement provided no supporting analysis for this goal, however Levy *et al.* (2001) claim that at the time "there was a crude notion that a 50 percent carbon dioxide reduction would have some effect in stabilising CO_2 concentrations in the atmosphere, but 50 percent was clearly too ambitious in political terms" (M. A. Levy et al. 2001, p.99). The authors go on to argue that instead of a 50% goal, "NGOs chose a pragmatic target for CO_2 reductions of 20 percent to be met by the year 2000" and that "[m]ost saw the 20 percent target only as an initial step" (Ibid.). Following the conference the Toronto goal primarily influenced target setting at the municipal level (Ibid., pp.99-101), having little impact on national-level GHG targets partly because several nations, including the United Kingdom, dismissed the goal as "arbitrary" and "formulated primarily by a group of NGOs" (Ibid., p.101). The authors argue, however, that the Toronto

[36] Levy *et al*. (2001) similarly note the media coverage of "the North American hot summer of 1988", while also highlighting that "400 members of the international press who had come to Toronto to cover the G7 meeting [in the week prior] stayed on to cover the Toronto Conference on Climate Change" (M. A. Levy et al. 2001, p.100).

[37] Two heads of state attended the 1988 Toronto conference (Krause, Bach, and Koomey 2013, p.6), the Prime Ministers of Norway (Gro Harlem Brundtland) and Canada (Martin Brian Mulroney).

[38] For a detailed account of the IPCC's emergence refer to the insightful work of Shardul Agrawala (1998).

goal broadened the climate debate. They attribute this, on the one hand, to the mobilisation of the Toronto goal by advocates at the domestic-level, who used it to initiate debates on measures for meeting the goal. The authors also argue, on the other hand, that the goal stimulated assessments of alternative measures for addressing global warming at the national level, such as reducing GHGs other than CO_2 and the potential to remove CO_2 from the atmosphere (Ibid.).

The second highlight from the conference was for governments to "[i]nitiate the development of a comprehensive global convention as a framework for protocols on the protection of the atmosphere" (F. K. Hare 1988, p.297). This 'global convention' would provide a regular meeting and guidelines for developing and negotiating an intergovernmental mechanism for addressing climate change. In other words, where earlier talks had developed the concept of a long-term target and the mechanisms for orienting policies towards that target, the global convention would provide a forum for states to negotiate the specifics of an international response to the problem. The conference statement recommended that this should be "vigorously pursued" at high-level conferences in 1989 and 1990 "with a view to having the principles and components of such a convention ready for consideration at the Intergovernmental Conference on Sustainable Development in 1992" (Ibid., pp.298).

4.1.4. Climate Change Thresholds and a Global Climate Convention

In 1989, building on the Toronto conference, the first high-level intergovernmental talks on climate change took place at the Noordwijk ministerial meeting (Bodansky 2001), organised by the Government of the Netherlands, UNEP and WMO. The Noordwijk Ministerial Declaration – that was adopted by 67 countries in November 1989 – stated, "[s]tabilizing the atmospheric concentrations of greenhouse gases is an imperative goal" (Noordwijk Declaration 1989, p.10). It emphasised that a stronger goal than the 20% by 2005 from 1988 levels proposed in Toronto was required for stabilization: "Some currently available estimates indicate that this could require a reduction of global anthropogenic greenhouse gas emissions by more than 50%" (Ibid.). The Declaration further called on the IPCC "to report the best scientific knowledge as to the options for containing climate change within tolerable limits" (Ibid.).

In its First Assessment Report, the IPCC synthesised the latest research into climatic changes, producing a foundation for policy discussions (IPCC 1990, p.vi) and centring on responses in the period up to 2010. Indeed this report focussed on assessing the latest climate science to provide an authoritative scientific basis for policy making. However work on long-term goals fell outside the IPCC's scope, leaving the calls from the Villach-Bellagio conference for research into target setting unanswered. The research of the second working group (WG2) of the AGGG, however, had "grown out of the results of the two-stage workshop process held in Villach and Bellagio in late 1987" (Rijsberman and Swart 1990, p.iii) and sought to drive this agenda. It attempted to do so by providing supporting material to the IPCC that was to be incorporated in its assessment of the latest research on climate change. To reiterate, the IPCC's initial work was a response to concerns regarding the scientific basis for climate change. As such, the focus of the climate debate was shifting away from target setting as a basis for guiding GHG limitation policies. This, however, was central to the work of AGGG's WG2. Stating their concern that the IPCC's work did not balance the need to simultaneously advance scientific knowledge and implement GHG control policies, the report reads:

> "Although important scientific uncertainties remain, they should not keep us from implementing policies that would help achieve the targets identified here. Rather, the uncertainties should be used as a reason to periodically review and adjust targets" (Ibid., p.iii)

AGGG's WG2 specifically investigated "the utility and feasibility of incorporating long-term objectives into national and international climate policy" (Ibid., p.iv), arguing "it is now time to define long-term environmental goals as a basis for short-term emission targets" (Ibid.). The authors stated that while the "underlying objective of all climate policies is to limit effects or impacts of climatic change on society to socially acceptable levels […] [s]uch general objectives […] are difficult to define clearly and provide no basis for implementation" (Ibid., p.vii). As such, the report – which AGGG presented as supporting material for the IPCC's assessments of latest research – details three sets of indicators based upon which targets could be set to guide planning and policy implementation.

The first indicators were aimed at protecting coral reefs and avoiding the complete submersion of island states such as the Maldives. The working

group recommended that sea-level rise should be held to between 20 and 50mm per decade as well as a target for absolute sea-level rise of between 0.2 and 0.5m above the 1990 global mean sea level (Ibid., pp.54-6). The second set of indicators was with regard to increases in mean global temperature. While the working group maintained the Villach-Bellagio conference decision that the maximum rate of change should be 0.1°C per decade, it also included two targets for total temperature change (Ibid., p.viii). "A maximum temperature increase of 1.0°C above pre-industrial global mean temperature" (Ibid., p.72) was recommended on the grounds that beyond this level "unpredictable and non-linear ecological responses may occur, leading to extensive ecosystem damage" (Ibid.). However should temperatures increase beyond this point, "[a]n absolute temperature limit of 2°C can be viewed as an upper limit beyond which the risks of grave damage to ecosystems, and of non-linear responses, are expected to increase rapidly" (Ibid.).

CO_2 concentration was recommended as a third indicator that could translate these two temperature limits, with a 330 to 400ppm (parts per million) maximum CO_2e for the 1°C target and 400 to 560ppm for the 2°C target. In this regard, CO_2 concentration targets primarily provided a means of converting temperature targets into GHG targets that could inform policy making, as per the outcome of the Villach-Bellagio conference. In particular, the report represented these temperature and CO_2 concentration targets through a 'traffic-light' system of their associated risks (see Figure 4.2), emphasising the risk levels associated with these different targets. This is noteworthy because prior studies had articulated 2°C of warming as a target that was within the natural variation of the climate system. In contrast, AGGG's WG2 report emphasised that warming beyond 2°C placed ecosystems at 'High Risk'. While this was still based on analysis of the vulnerability of ecosystems to historic temperature changes, it attempted to reframe the 2°C as a point beyond which the risk of damage to ecosystems is expected to rise rapidly and risked an increase in 'nonlinear' climatic change (i.e. 'chaotic' responses).

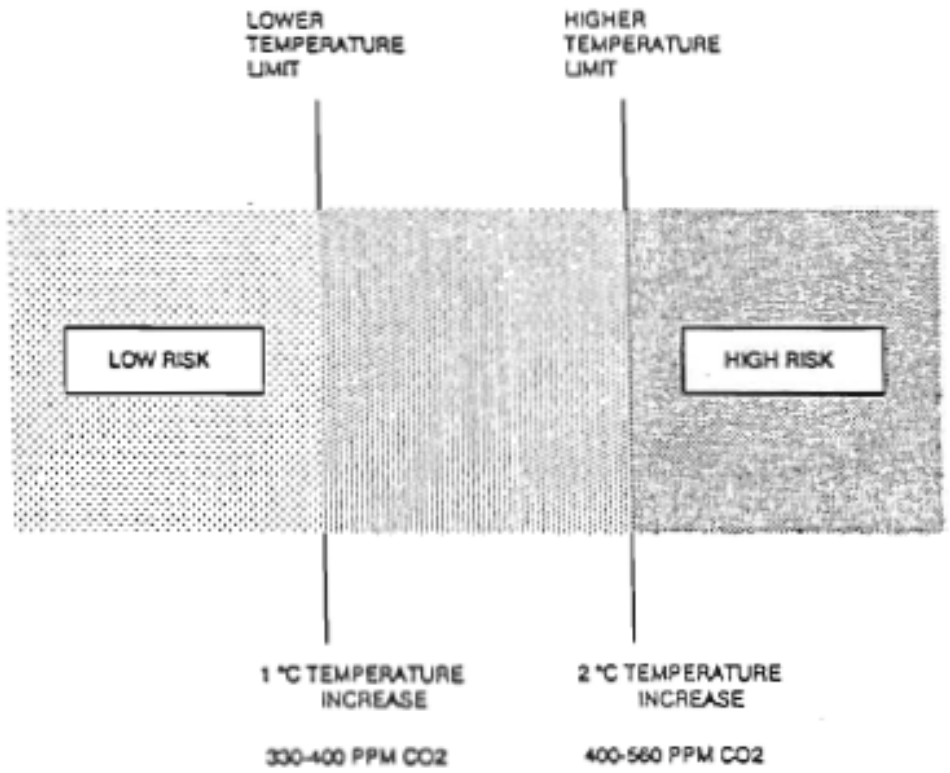


Figure 4.2: Proposed targets for absolute temperature change and CO_2-equivalent concentrations (Rijsberman and Swart 1990, p.ix)

The AGGG's submission of supporting materials to the IPCC claimed that the "underlying objective of all climate policies is to limit effects or impacts of climatic change on society to socially acceptable levels" (Ibid., p.vii). However negotiations to establish an overarching objective for addressing global warming were central to the formation of a global convention on climate change. This global convention was established at the 1992 United Nations Conference on Environment and Development 'Earth Summit' in Rio di Janeiro. Named the United Nations Framework Convention on Climate Change (UNFCCC), it was an international framework to guide negotiations on climate change treaties (Oppenheimer and Petsonk 2005). When opened for signature on the 4th of June 1992, 154 nations signed the UNFCCC, committing in principle to participate in efforts to reduce atmospheric concentrations of GHGs. The specifics of these efforts were to be negotiated at climate talks (known as 'Conferences of the Parties' (COPs), with a 'Party' being a signatory of the UNFCCC), with those negotiations being guided by the framework established in the UNFCCC. However an overarching objective was agreed in 1992, and efforts to reduce atmospheric concentrations of GHGs were to pursue this objective:

> "The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would *prevent dangerous anthropogenic interference with the climate system*. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner" (UNFCCC 1992, p.4, emphasis added).

However the interpretation of 'dangerous', the target concentration for stabilising atmospheric GHGs, and how to 'enable economic development in a sustainable manner' were not defined in 1992. Rather, these would become the focus of target-setting debates that sought to balance the various ideas and concerns. It is to the disagreements in the late-20th and early-21st century over the definition of 'dangerous anthropogenic interference' and GHG stabilisation targets that this chapter now turns.

4.2. 1992 – 2009: Mediating Between Science, Economics and Politics

4.2.1. Early Efforts to Interpret 'Dangerous' Climate Change

Sparked by the agreement of the UNFCCC in 1992, debates in the mid-1990s grappled with interpretations of 'dangerous anthropogenic interference'. Particularly prominent was the Second Assessment Report of the IPCC released in 1995, whose synthesis report (summarising the output across all three of its working groups) dedicated an 18-page section to the "Synthesis of Scientific-Technical Information Relevant to Interpreting Article 2 of the UN Framework Convention on Climate Change" (IPCC 1995b, pp.1–18). These 18 pages outline the likely impacts of climate change across ecosystems, society and economies. In particular, under the section heading 'Economic Development to Proceed in a Sustainable Manner' the report states: "The UNFCCC notes that responses to climate change should be coordinated with social and economic development in an integrated manner with a view to avoiding adverse impacts on the latter" (Ibid., p.15.). In other words, the IPCC sought to balance economic and climatic impact concerns in producing a

scientific basis for discussions on the level of anthropogenic interference in the climate system that would be 'dangerous'. In this section of the synthesis report, it is suggested that cost-effective policies will depend on economic instruments and incentives, paired with appropriate long-run signals to allow consumers and producers to adapt in a similarly 'cost-effective' manner (Ibid., p.17). Three different scenarios are presented in their summary, with warming of 1°C by 2100 in the lowest emission scenario with low climate sensitivity, 2°C in the mid-range emissions scenario with a best estimate value of climate sensitivity, and 3.5°C in a high emissions scenario with high climate sensitivity (Ibid., p.5). While the report makes no attempt to categorise damages at different levels of warming, it notes that beyond 3°C incidences of malaria would increase by 10-15% (Ibid., p.8) and that research quantifying damages between 2-3°C of warming "tend to be a few per cent of world GDP, with, in general, considerably higher estimates of damage to developing countries as a share of their GDP" (Ibid., p.15).

Specifically within the UNFCCC process, the German Government hosted the first Conference of the Parties to the UNFCCC[39] (COP1) in Berlin in 1995. In preparation for COP1, the German Government established the Scientific Advisory Council on Global Change (Wissenschaftlicher Beirat der Bundesregierung Globale Umweltveränderungen, or WBGU) in 1992. As with the Villach-Bellagio 1987 conference and the 1990 report of AGGG's WG2, WBGU's research adopted an "inverse scenario" or "backwards mode" (WBGU 1995, p.1) of deriving CO_2 reduction targets. This first identified a "tolerable window" (Ibid.) for the maximum ecologically and economically bearable stress levels of climate change and then determined emissions profiles that would keep the climate system within that window. The 1995 WBGU report reasoned that a tolerable temperature window could be defined by the variations observed during the geological epoch shaping the present-day environment (Ibid., p.7). This range was from a mean minimum of 10.4°C in the last ice age, to a mean maximum of 16.1°C during the last interglacial period (Ibid.). The report further stated, without offering its reasoning, that "*If we extend the tolerance range by a further 0.5°C at either end, then the tolerable temperature window extends from 9.9°C to 16.6°C*" (Ibid., emphasis in original).

[39] The Conference of the Parties to the UNFCCC (or COP) refers to the annual climate talks where representatives of each nation that has signed the UNFCCC meet to negotiate climate treaties.

With the 1995 mean global temperature at 15.3°C, this implied that the tolerable 16.6°C maximum was only 1.3°C higher (Ibid.). This was equivalent to 2°C above pre-industrial temperatures (as reiterated in WBGU 1997, pp.13–14).

The 1995 WBGU report also noted that warming should be limited to an increase of 0.2°C per decade in order to limit adaptation costs to 5% of Gross Global Product, which the authors took to be the maximum tolerable limit on global society based on economic analyses of the level at which severe social and economic disruptions would occur (Ibid., p.8). However this 'rate-of-increase' target made no appearance in the Council of the European Union's 1996 statement on the Community Strategy on Climate Change, which instead supported a long-term climate target of limiting warming to 2°C. [40] Recognising the Second Assessment Report of the IPCC as the principle reference document (Council of the European Union 1996, para.4), the Council noted that a doubling of CO_2 concentrations above pre-industrial levels was likely to result in a 2°C increase in global average temperatures above the pre-industrial level (Ibid., para.5). Its statement on the long-term climate target reads:

> "Given the serious risk of such an increase and particularly the very high rate of change, the Council believes that global average temperatures should not exceed 2 degrees above pre-industrial level and that therefore concentration levels lower than 550ppm CO_2 should guide global limitation and reduction efforts. This means that the concentrations of all greenhouse gases should also be stabilized." (Council of the European Union 1996, para.6)

However IPCC's Second Assessment Report faced criticism from climate campaigners as well as fossil fuel lobbies. Notably, the Global Commons Institute[41] and the World Energy Council[42] claimed that the IPCC

[40] While the 1987 Villach-Bellagio workshops had proposed the 0.1°C per decade objective, they made no reference to the study supporting this claim. Rather, it has been suggested that this was based on observations of plant life on a North American lake that were mentioned during the 1987 conference (see Tol 2007, p.424). Yet the European Council offered no explanation for the omission of a rate of change target.

[41] The Global Commons Institute is a London-based policy think tank, co-founded in 1990 by climate campaigners Aubrey Meyer and Penny Kemp. It worked to promote a 'contraction and convergence' approach to emissions reductions, entailing a reduction of emissions by bringing per capital emissions to the same level across all nations (http://www.gci.org.uk/Documents/OrigStatement2.pdf).

was "'yielding to pressure from industry to foresee yet higher atmospheric pollution as acceptable'" and called on governments "not to accept IPCC recommendations" on the grounds that it had been biased by "academics seeking to attract funding for their work" from fossil fuel lobbies (Newell 2006, p.112). Indeed, Newell highlights that fossil fuel lobbies, such as the Climate Council, Mobil Oil and the National Coal Association, were reviewers of the IPCC's Working Group 1 reports (Ibid., pp.111-112), while also noting procedural battles with these groups over their tactics to delay the IPCC's work. These lobbies similarly accused two lead authors of the Second Assessment Report of deleting passages pertaining to uncertainties regarding the climate threat, leading the *New York Times* and *Wall Street Journal* to report on impropriety in the IPCC process (Ibid., p.82).

While facing criticism, the Second Assessment report continued to feed into policy discussions, and was noted in a 1996 European Environment Agency thematic assessment of climate change that supported a two degrees target (European Environment Agency 1996, p.3). Indeed, from this point the two degrees target began to feature more prominently in the work of WBGU. As noted by Jaeger and Jaeger (2011) – based on their interactions with WBGU members – it was under the chairmanship of Professor Hans-Joachim Schellenhuber from 1996 that WBGU would begin to convince the German Minister for the Environment, Angela Merkel, of the two degrees target (Jaeger and Jaeger 2011, p.S17). WBGU's 1997 report emphasises that their interpretation of Article 2 of the UNFCCC is that warming of more than 2°C above the pre-industrial level would "constitute climate changes that are absolutely intolerable" (WBGU 1997, p.14). However in the mid-1990s the intergovernmental UNFCCC climate talks were focussed on developing "a protocol or another legal instrument" (UNFCCC 1995, p.4) to guide international efforts to prevent dangerous anthropogenic interference in the climate system. As such, the question of a long-term target was not on the agenda, with the UNFCCC focussing on developing a 'protocol or legal instrument' (terms used by the UNFCCC) that established mechanisms to

[42] The World Energy Council, founded in 1923, is a the largest global network of energy practitioners, working to advance the creation of a sustainable energy system through research into increasing social benefit and reducing the environmental impact of energy, holding international conferences and acting as a lobby group to represent its membership (Newell 2006, p.112).

coordinate international reductions in GHG emissions. This 'protocol or legal instrument' was to be created no later than the 1997 COP in Kyoto, to which this chapter now turns.

4.2.2. The Kyoto Protocol: Centrally-determined emissions targets

When the UNFCCC entered into force in 1994 it required Annex I[43] Parties to the UNFCCC to produce national inventories of GHG emissions – accounts of GHG emissions released into the atmosphere by sources and removed by 'sinks' – on an annual basis. As such, the measurement and reporting practices for GHGs at a national level were developed from the early stages of the UNFCCC, who also requested that the IPCC provide guidance (IPCC 1996). Prior to 1997, Parties had also been invited to submit plans and targets for emissions reductions, however this was not a UNFCCC requirement. Yet this invitation prompted little policy intervention directed at reducing GHG emissions (Oberthür and Ott 1999, p.123). Responding to this lack of action by Parties, the UNFCCC placed emissions reduction targets at the centre of negotiations for COP3 in Kyoto in 1997. These were to be made by Annex I nations that, under the UNFCCC's principle of common but differentiated responsibilities, had benefited from the industrialization that drove increasing concentrations of GHGs and would therefore take greater responsibility for reducing emissions (see Appendix 4C for targets). Under Article 3 of the Kyoto Protocol, Annex I nations would be required to reduce their overall emissions of GHGs "by at least 5 per cent bellow 1990 levels in the commitment period 2008 to 2012" (UNFCCC 1998, p.3). Each of the Annex I nations faced different emissions reductions (see Appendix 4B) that, taken together, would amount to an overall reduction of five per cent.

Yet such 'requirements' would only enter into force for Parties that had ratified the Kyoto Protocol *and* if the minimum ratification threshold of 55 countries accounting for 55 per cent of developed country emissions had been met (UNFCCC 1998, p.18). Customary international law, general principles of international law, and the 1969 Vienna Convention on the Law of Treaties

[43] It is important to note that at this time in the UNFCCC process industrialized nations were expected to lead in cutting emissions, as they were the primary historical source of GHG emissions. These nations were classified as Annex I Parties. Non-Annex I Parties refer to the developing nations that had signed the UNFCCC, and they faced different requirements under the agreements and protocols emerging from the series of COPs.

(VCLT) govern international treaties, such as the Kyoto Protocol and the UNFCCC. Ratification is central to this because by ratifying a treaty a Party consents to the requirements, which become domestic law[44] under the rule *pacta tertiis nec nocent nec prosunt*.[45] Under the rule *pacta sunt servanda,* a ratifying nation cannot use their domestic law to justify non-compliance with the treaty (Hyvarinen et al. 2012). In the case of UNFCCC 'legal instruments', COPs serve as the forum for monitoring compliance. For the Kyoto Protocol, a Compliance Committee was formed under the Marrakesh Accords of COP7, detailed later in this section.

The Kyoto Protocol was not without controversy. The Kyoto target of a 5.2% reduction in overall emissions (Oberthür and Ott 1999, p.273) fell far short of the Toronto goal of reducing CO_2 emissions to 20% below 1990 levels by 2005, which had been "adopted by almost all environmental NGOs" (Ibid., p.115) in the mid-1990s. Further criticism emerged as the United States' position broke from the agreement in the Berlin Mandate that emissions limits would only apply to Annex I nations. Instead, the United States entered negotiations with demands (under the US Senate's Byrd-Hagel Resolution) that 'meaningful participation' of key developing counties was required before the Senate would consider ratifying any agreement from the Kyoto COP (Gupta 2010, p.645). Indeed, while President Clinton signed the Kyoto Protocol, it was never ratified by the United States; and President Bush later withdrew US support of the agreement (Ibid., p.646). With the US contributing 36% of global GHG emissions in 1996 (Jamieson 2014, p.47), their withdrawal represented a major obstacle to ratifying the Kyoto Protocol that, under Article 25, required ratification from Annex I nations that account in total for "at least 55 per cent of the total carbon dioxide emissions for 1990 of the Parties included in Annex I" (UNFCCC 1998, p.18) before it enters into force.

As noted by Oberthür and Ott, however, the Kyoto Protocol represented a "watershed in international climate and environmental policy" (Oberthür and Ott 1999, p.136–7). Specifically, it designed mechanisms to

[44] The procedure for an international treaty to become part of domestic law differs between nations, and for an overview of the process see Hyvarinen *et al.* (2012).

[45] Article 34 of the VCLT pertains to the sovereignty and independence of states, with *pacta tertiis nec nocent nec prosunt* stating "treaties are binding only upon those who are Parties to them, and cannot impose obligations on third-party States" (Hyvarinen et al. 2012, CLIB 1).

support the 'binding' targets placed on Parties that ratified UNFCCC protocols and agreements. This represented the UNFCCC's vision of international action on climate change at the time: national-level targets that were determined at UNFCCC talks and imposed on Parties, and that these targets cumulatively aligned with a global emissions trajectory for avoiding 'dangerous' climate change. However the enforcement mechanism for these binding targets was to be shaped through subsequent COPs. It was through the 2001 Marrakesh Accords of COP7 that a Compliance Committee was established (Wang and Wiser 2002, p.189). It is important to note that this was split into two branches, "facilitative" and "enforcement'". The 'facilitative' branch emphasized the need to offer technical expertise and capacity building assistance to Parties in order to assist in their compliance efforts (Ibid., p.191). Such compliance entailed three steps: reporting, review and assessing compliance. The reporting rules developed in the Marrakesh Accords would continue to be developed on the principles of transparency, comparability, completeness and accuracy of information (Ibid. pp.188-9), while the review process provided a forum for Parties to seek assistance at an early stage and subsequently conducted a technical assessment of policy implementation against a Party's commitments (Ibid. pp.188-9). These assessments were to be conducted by 'expert review teams' operating under the UNFCCC.

The second, 'enforcement', branch would review compliance with the emissions targets. Where a Party was in excess of its target, its excess emissions would be deducted from subsequent commitment periods' emissions reductions targets (i.e. after the initial 2008-2012 commitment period) at a deduction rate of 1.3 to 1 (Ibid., p.196). In other words, for every ton of CO_2e in excess of an Annex I Party's 2008-2012 emissions target, its target in subsequent commitment periods will be reduced by 1.3 tons of CO_2e. However two shortcomings of this 'deduction' approach were widely recognized (Ibid.). The first shortcoming was that a Party could continue to miss its targets in subsequent periods unless an additional means of 'enforcement' ensured the Party complied with its reduced emissions target. The second was that Parties might negotiate less stringent emissions targets for subsequent periods to "accommodate for the deduction" (Ibid.). Despite recognition of these shortcomings, the compliance system was adopted because, while Annex I parties acknowledged the need for a compliance

system to support the binding emissions targets, they were unwilling to agree a system for punishing non-compliance that involved "financial penalties or trade measures" (Ibid.). In this regard the so-called 'enforcement' branch established under the Marrakesh Accords primarily monitored compliance with targets, while having a limited mandate and few mechanisms for punishing non-compliance.

On the other hand, in the late-1990s and early-2000s, the Kyoto protocol stimulated development of economic instruments, from emissions trading schemes to financial support for low-carbon development in non-Annex I countries (Gupta 2010). These were key features across numerous COPs as the details of the Kyoto Protocol continued to be negotiated. Indeed, the inclusion of Certified Emissions Reductions in the Kyoto Protocol had been central to the Clinton Administration's demands (MacKenzie 2009. pp.442-3), allowing carbon credits to be surrendered to gain emissions allowances. This increased the flexibility with which Parties could achieve their emissions targets, and emissions trading schemes were developed as a potential mechanism for trading carbon credits. Indeed, by proposing the European Union Emissions Trading Scheme (EU ETS) in 1998, the EU Commission added to the flurry of activity. This followed abandoned attempts to introduce a EU-wide tax on carbon emissions in 1992 and 1995, which did not achieve the unanimous approval from the Council of Finance Ministers required for fiscal policies (Braun 2009, p.473). However, outside the debates on shorter-term emissions reduction targets and their corresponding instruments, temperature thresholds and GHG concentration targets continued to be discussed by scientists, policymakers and economists in pursuit of a long-term limit to define 'dangerous anthropogenic interference'. It is to these discussions that the chapter now turns.

4.2.3. Temperature Change Becomes the Index for Climate Impacts

By 1998 economists had applied Nordhaus' cost-benefit analyses of policy choices – optimizing emissions control strategies based on climate thresholds – to the UNFCCC's core objective. Azar's (1998) assessment of this literature highlights that some economists, Nordhaus included, argued that the high costs of controlling GHG emissions meant that the 'optimal' would be to allow GHG emissions to increase. On the other hand, a "growing number of studies" (Azar 1998, p.302) argue such control measures are not as costly as

suggested and that reducing emissions to 30% below the current levels would be 'optimal'. Azar uses his assessment of the literature to argue such models should not be seen as "truth machines" because "cost-benefit analysis is *not* a value-free tool" (Ibid. p.311. Emphasis in original). Rather than trying to uncover some 'optimal' level of climate change, he argued that research should focus on analysing potential strategies "related to the realisation of the UNFCCC's main objective" (Ibid., p.312).

Elsewhere it was argued that when analysing the UNFCCC, a reasonable starting point is a threshold based on natural variations in the climate (Azar and Rodhe 1997, p.1818). While the analysis concurs with Nordhaus' earlier suggestions that to remain within such thresholds it is not necessary to cut emissions in the "next decade or so" (Ibid., p.1819), the authors rebutted the idea that no immediate action was required. They argued that the envisaged "rapid departure from business-as-usual emissions" (Ibid. p.1819) required the adoption of policies well in advance of the subsequent emissions reductions. Specifically, the authors noted that investments in "long-lived carbon-intensive technologies" should be discouraged to enable a sharp decrease in emissions at a future date. The authors also suggested that, until the definition of 'dangerous' is "settled in the political arena" (Ibid., p.1818), 2°C should be used as a maximum temperature increase, accompanied by 350 to 400ppmv[46] as the corresponding level at which GHG concentrations should be stabilized. These limits, the authors note, would provide a basis for cost-benefit analyses of 'dangerous' climate change.

This method of inferring concentration levels from temperature targets was not, however, a practice adopted by all groups considering long-term climate targets. In 2000 the Royal Commission on Environmental Pollution (RCEP) recommended that the UK should support an international agreement to prevent "carbon dioxide emissions in the atmosphere from exceeding 550ppmv" (RCEP 2000, p.2). Their decision was based on "[t]he principle that concentrations of greenhouse gases should be prevented from rising to a dangerously high level is enshrined in international law" (Ibid., p.52). Furthermore, the design of policy responses required a decision on

[46] The change in notation from earlier "ppm" or "parts per million" to "ppmv" or "parts per million volume" refer to the same levels of GHG concentration, however the latter is the more accurate description and became more common around this time.

what constitutes a dangerous GHG concentration and the design of actions for stabilization at that level (Ibid., p.52-3). In other words, RCEP saw the necessity of concentration targets for policy-making and also saw it as a metric that had been recognised by international law. Temperature targets, on the other hand, were neither directly relevant to policy making, as they had to first be converted into concentration targets, nor recognised by any UNFCCC agreements to date. While noting that 550ppmv as the 'dangerous' concentration level was disputed, the RCEP report writes that the "EU Council of Environment Ministers has proposed that stabilisation below 550 ppmv should guide global limitation and reduction efforts" and that "[o]n the basis of current scientific knowledge about human impact on climate, we support the proposal that an atmospheric concentration of 550 ppmv of carbon dioxide should be regarded as an upper limit that should not be exceeded" (Ibid., p.52). RCEP's support for the targeted was based on 550ppmv CO_2e having been recognised by international law and its compatibility with policy making.

However, in 2001, the Third Assessment Report of the IPCC turned its attention to temperature targets. They were to be used as a means of assessing climate impacts that would constitute 'dangerous anthropogenic interference'. While the report did not seek to define a single limit beyond which climate impacts became 'dangerous', it assessed "the state of knowledge concerning Article 2 of the United Nations Framework Convention on Climate Change (UNFCCC)" (Smith et al. 2001, p.915). In this regard the IPCC's Third Assessment Report was to provide the scientific basis for discussions regarding the definition of 'dangerous anthropogenic interference'. Five 'reasons for concern' were identified to "enable readers to evaluate the relationship between increases in global mean temperature and impacts" (Ibid.). These five categories of impacts were: damage to or irreparable loss of unique and threatened systems, the distribution of impacts, global aggregate damages (primarily measured in terms of impact on GDP), the probability of extreme weather events, and the probability of large-scale singular events such as the breakup of the West Antarctic Ice Sheet or the collapse of the North Atlantic thermohaline circulation (Ibid., p.917).

The authors considered five indicators as the basis for their analysis – GHG emission levels, atmospheric GHG concentration levels, changes in global

mean temperature and sea-level rise, changes in regional climate variables, and changes in the intensity or frequency of extreme events – and assessed the problems of adopting each. Using atmospheric GHG concentrations or emissions levels as the indicator was deemed inappropriate as "published estimates of time frames for stabilizing GHG atmospheric concentration levels tend to assume such levels will not be stabilized until after the end of the 21st century", while "most of the impact literature examines potential impacts only as far as 2100" (Ibid., p.918). The IPCC was assessing this impact literature and so needed to base its assessment on stabilisation within the 21st century. As a result, while GHG concentrations had been favoured for their relevance to policy-making, the indicator was incompatible with the IPCC's assessment. Conversely, most impact literature was "based on scenarios of specific changes in global mean or, more typically, regional climate variables such as temperature or precipitation" (Ibid.). Furthermore, 'changes in global mean temperature' was a useful index because general circulation models (GCMs) – the most common form of modelling used in climate research – provided estimates of change in terms of global mean temperatures (Ibid.).[47] In this regard, global mean temperature provided a suitable basis for the IPCC's assessment of the impact literature. However the problem with this indicator (as well as the regional climate variables and frequency of extreme events indicators) was that it was "more difficult to work back to defining atmospheric concentrations of GHGs, as required by Article 2 of the UNFCCC" (Ibid.). However, of the alternatives to GHG-based indicators, 'changes in global mean temperature' "can be used most readily to relate GHG emissions (and emissions control) to changes in climate and impacts" (Ibid.). Through this decision temperature thresholds became the indicator that would connect the objective of 'dangerous anthropogenic interference' with the climate system to a stabilization target for atmospheric concentrations of GHGs. To reiterate, temperature thresholds were to provide the link between the abstract UNFCCC objective and the emissions reductions required to achieve that objective. Moreover, the risks of climate change were to be assessed in the IPCC assessment reports of the latest climate science using changes in global mean temperature as its index.

[47] The report also highlighted that studies based on other forms of modelling could easily be related to global mean temperatures (Smith et al. 2001, p.918).

Summarising their 56-page synthesis of the latest research, the authors produced a heat map (see Figure 4.3) resembling the 'traffic light' system adopted by AGGG's WG2 in its 1990 report. Simplifying temperature increases into three levels – 'small' (as much as 2°C), 'medium' (2 to 3°C) and 'large' (more than 3°C) – the authors conclude:

> "Adverse impacts are estimated to occur in three reasons for concern even at a small increase in temperature: unique and threatened systems, extreme weather events, and distributional impacts. For the other two reasons for concern—adverse impacts and large-scale discontinuities—adverse impacts begin at the medium level of temperature increase for the former and a large temperature increase for the latter" (Ibid., p.959).

Following the IPCC's Third Assessment Report, a range of studies and reports emerged calling for the increase in global mean temperatures to be held to 2°C. A 2003 conference focussing on species loss, *Global Climate Change and Biodiversity*, held at the University of East Anglia concluded it is "imperative that global warming is contained to 2°C by the end of this century" (R. E. Green et al. 2003, p.34). Having commissioned a special report to summarise present knowledge on climate impacts and how these may constitute 'dangerous' anthropogenic interference with the climate system (W. Hare 2003), WBGU argued that an increase in global mean temperature above pre-industrial levels of more than 2°C would have serious impacts on ecosystems and biodiversity.

Further support for the two degrees target (outside of UNFCCC negotiations and IPCC assessments) came from the International Taskforce on Climate Change, a newly formed collaboration between the UK's Institute for Public Policy Research, the US Centre for American Progress, and The Australia Institute that was co-Chaired by the UK's Rt Hon. Stephen Bryers MP and US Senator Olympia Snowe (ICCF 2005, p.vii).[48] The Taskforce saw a long-term climate target as an essential component of upcoming negotiations under the UNFCCC. Based on submissions from the three founding think tanks, their report stated "[t]he Taskforce is agreed that establishing a long-term climate objective is necessary to ensure the adequacy of the next round of

[48] There were 15 members of this task force, ranging from MPs and a Harvard Professor of Environmental Policy to Programme Directors of prominent think tanks and senior figures in environmental NGOs. For details of each of the 15 taskforce members see ICCF (2005, pp.19-20).

commitments under the UN global climate negotiations, as well as that of domestic climate policies and the decisions of businesses and institutional investors" (Ibid., p.3). As well as guiding policy makers, a long-term target was seen as necessary for providing 'certainty' to businesses and institutional investors. Setting a target would, according to the Taskforce, enable corporate- as well as national-level planning for addressing climate change. It further recommended that emissions reductions "should aim to achieve greenhouse-gas concentration levels by the end of the century compatible with limiting global average temperature rise to 2°C" (Ibid., p.4). That same year, 2005, also saw the Council of the European Union reaffirm their support

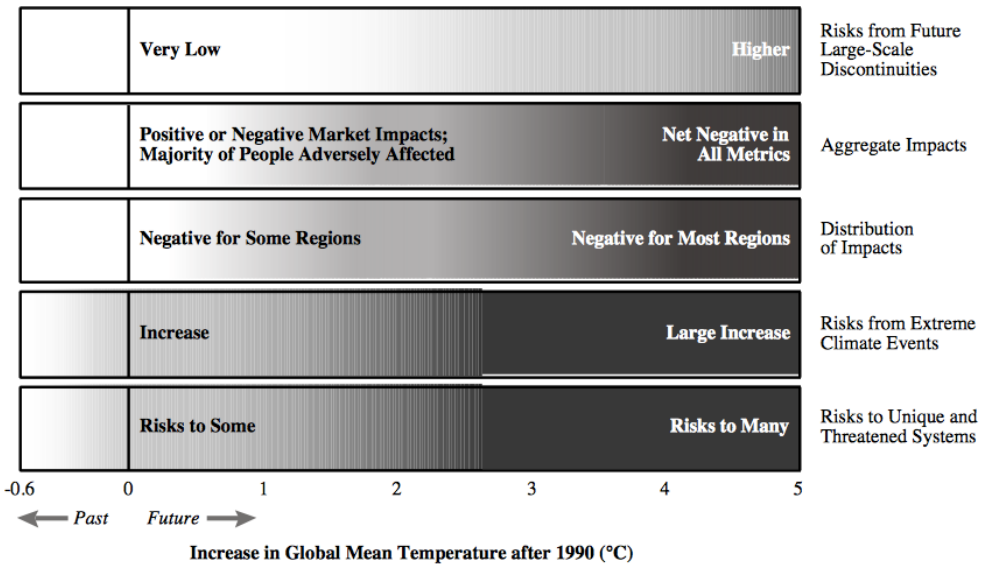


Figure 4.3: "Impacts of or risks from climate change, by reason for concern. Each row corresponds to a reason for concern; shades correspond to severity of impact or risk. White means no or virtually neutral impact or risk, light grey means somewhat negative impacts or low risks, and dark grey means more negative impacts or higher risks. Global average temperatures in the 20th century increased by 0.6°C and led to some impacts. Impacts are plotted against increases in global mean temperature after 1990. This figure addresses only how impacts or risks change as thresholds of increase in global mean temperature are crossed, not how impacts or risks change at different rates of change in climate. Temperatures should be taken as approximate indications of impacts, not as absolute thresholds" (Smith et al. 2001, p.958).

for the two degrees target. Restating its 1996 position, the Council of the European Union argued that, to meet the UNFCCC objective, "overall global annual mean surface temperature increase should not exceed 2°C above pre-industrial levels" (CEU 2005, p.2). It also added that whereas in 1996 it stated that a GHG atmospheric concentration of 550ppmv could meet this temperature target, recent IPCC findings suggest that this should be amended to a "stabilisation of concentrations well below 550 ppmv CO_2 equivalent" (Ibid., p.4).

However the two degrees target was not without its critics. In an Editorial for *Climatic Change*, the prominent climatologist James Hansen argued that it was unlikely that the Earth was ever more than 1°C warmer than 2005 levels during "recent interglacials" (Hansen 2005, p.276), and this corresponded with a several-meter increase in sea levels (Ibid.). Warming beyond 1°C above pre-industrial levels, he continued, constitutes dangerous anthropogenic interference with the climate system, and "the 2°C scenario cannot be recommended as a responsible target, as it almost surely takes us well into the realm of dangerous anthropogenic interference with the climate system" (Ibid., p.277). Similarly, one of the most comprehensive (Jaeger and Jaeger 2011, p.S20) cost-benefit analyses of climate change, the Stern Review (Stern 2006), conducted an economic assessment of limiting GHG concentrations to 450-550ppmv. However, while the Stern Review noted the uncertainties in converting GHG concentrations into levels of warming, it represented the average of this range as roughly a 2 to 3°C increase in global average temperature (Ibid., p.v). What the Stern Review demonstrates is the centrality of GHG concentration levels for economic analysis of policy responses and the difficulty of converting this into an assessment of the likely temperature change and resulting impacts.

It was at COP13, held in Bali in 2007, that Parties to the UNFCCC agreed that a shared vision for long-term action on climate change should be developed and tabled for discussion at the 2009 COP15 in Copenhagen (UNFCCC 2007). However little progress was made in two years leading up to Copenhagen. Parties merely restated their positions in international negotiations (Christoff 2010), with the exception of the 2009 G8 declaration that recognised "the broad scientific view that the increase in global average temperature above pre-industrial levels ought not to exceed 2°C" (G8 2009, p.65). It is to the 2009 Copenhagen talks that this chapter now turns.

4.2.4. Two Degrees and Assuaging Concerns of National Sovereignty

COP15, the 2009 UNFCCC talks held in Copenhagen, saw the coming together of two major tracks of work in international climate negotiations. First, the 2005 Montreal talks had formed the 'Kyoto Track' – conducted through the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol – to discuss targets for industrialized nations

after the initial 2008-2012 commitment period of the Kyoto Protocol (UNFCCC 2006). Second, the 2007 Bali Action Plan formed the Ad Hoc Working Group on Long-Term Cooperative Action under the UNFCCC, which was to develop: a shared long-term vision; mitigation actions for both developed and developing nations; financial and technology transfer from developed to developing nations; and a system for measurement, reporting and verification (MRV) of emissions reductions (UNFCCC 2007). Both of these Ad Hoc Working Groups were to complete their work at the 2009 Copenhagen Conference, and it was for this ambitious agenda that COP15 was referred to as "Hopenhagen" accompanied by the unofficial slogan "Seal the deal" (Bodansky 2010, p.230).

However the negotiations that took place from the 7th to the 19th December 2009 in Copenhagen are widely regarded as a serious disappointment in the UNFCCC process (Christoff 2010; Jaeger and Jaeger 2011). While it was hoped that the US, under leadership of the Democrats, would take a leading role in the negotiations, President Obama faced domestic constraints that stemmed from climate change being perceived as a threat to the US economy (Christoff 2010, p.638). On the one hand, the global financial crisis had drawn political resources away from the issue. On the other hand, without a super-majority in the US Senate, the Obama Administration was unable to challenge the "still popular Bush-era doctrine" (Ibid., p.650) that saw climate agreements as threats to the US economy. Indeed, the Senate's 1997 Byrd-Hagel resolution still required the commitment of China to "substantial, binding and verifiable emissions reduction measures" (Ibid.) before the US would ratify a UNFCCC agreement framed under the Kyoto Protocol. Similarly, with China's emissions exceeding those of the United States in 2007, its diplomatic manoeuvres at COP15 hampered progress on the inclusion of developing nations in the agreement. Bound by domestic pressures pursuing strong economic growth to sustain political and social stability, China pressed for legal commitments from industrialized nations through further commitments under the Kyoto Protocol while avoiding new MRV requirements on their own emissions reductions (Ibid., p.645–9). Moreover, China resisted any inclusion of "significant targets" that "defines and restricts China's future 'emissions space'" – including a percentage for global, developing, or Annex I GHG emissions reductions – seeing this as "a

potential 'external threat' to its sovereign right to define its energy path to development" (Ibid., p.648).

In addition, as early as the 8th December, developing nations had become aware of the so-called 'Danish text', a draft text for a Copenhagen Agreement developed by a small group of countries – including the UK, USA, Australia and Denmark – that was leaked to *The Guardian* (Vidal 2009). The Danish text, dated 27th November 2009 (Danish Text 2009), was downplayed by the UNFCCC Executive Secretary, Yvo de Boer, and the Danish Ministry of Climate and Energy, arguing it was part of the common practice of developing informal texts or working papers during UNFCCC negotiations (Vidal and Milmo 2009; Gray 2009). The Sudanese chairman of the 'G77 plus China' group, on the other hand, commented: "The text robs developing countries of their just and equitable and fair share of the atmospheric space. It tries to treat rich and poor countries as equal" (Vidal and Milmo 2009).

By the final day of COP15, when heads of state returned to Copenhagen, Parties' negotiators had made little progress on a draft text for agreement. Through a side meeting of 28 Parties and a subsequent smaller meeting of five Parties (the United States, China, Brazil, India and South Africa) an outline for the Copenhagen Accord emerged (Bodansky 2010, p.234). The final text totalled a mere three pages. While numerous long-term targets for stabilising emissions concentration and reducing emissions had been developed through the Bali Action Plan, developing countries objected to emissions reduction targets that implied constraints on their own emissions (Bodansky 2010, p.235). On GHG emissions, the text only noted that "deep cuts in global emissions are required according to science" (UNFCCC 2009, p.2). However the proposal for a long-term temperature threshold was met with more support, with the final text recognising the "scientific view that the increase in global temperature should be below 2 degrees Celsius" (Ibid., p.1) and that reductions in global emissions should be "to hold the increase in global temperature below 2 degrees Celsius" (Ibid., p.2). It was also agreed that an assessment of the implementation of the Accord was to be completed by 2015, and that "[t]his would include consideration of strengthening the long-term goal referencing various matters presented by the science, including in relation to temperature rises of 1.5 degrees Celsius" (Ibid., p.3). This final statement of the Accord, Bodansky argues, was a response to the

Maldives and small island states (Bodansky 2010, p.235) who believed the two degrees target would see a disastrous sea-level rise for their low-lying territories.

The recognition of the two degrees target in the Copenhagen Accord represents the outcome of negotiations that sought to define a long-term target while assuaging national sovereignty concerns. These last-minute talks set aside the question of short-term national-level targets, focussing instead on specifying an objective that embedded the scientific basis of climatic impacts and a cost-effective or 'optimal' level of climate change. That is, where emissions-based targets were more prescriptive in constraining a future 'emissions space' for developing nations, the two degrees target established a threshold for 'dangerous anthropogenic interference', while leaving the matter of constraints for discussion at future COPs. In this regard, at the 2009 Copenhagen talks, the two degrees target emerged as a long-term climate objective that could mediate between science, economics and politics; representing 'dangerous' climate change in a single figure that neither jeopardised economic development nor encroached on national sovereignty.

On further commitments from industrialized nations under the Kyoto Protocol, the Copenhagen Accord notes "Annex I Parties commit to implement individually or jointly the quantified economy-wide emissions targets for 2020" (UNFCCC 2009, p.2). To clarify, each Annex I Party was to define its own targets for the post-2012 commitment period and submit these to the UNFCCC. Furthermore, the "[d]elivery of reductions and financing by developed countries will be measured, reported and verified [...] and will ensure that accounting of such targets and finance is rigorous, robust and transparent" (Ibid.). In other words, implementation of the nationally determined emission reduction targets would be scrutinised as part of the UNFCCC process. Mitigation actions of Non-Annex I Parties, on the other hand, would be "subject to their *domestic* measurement, reporting and verification" (Ibid., emphasis added) and reported through 'national communications' every two years. International scrutiny, through consultations and analysis, would be conducted "under clearly defined guidelines that will ensure that national sovereignty is respected" (Ibid.). Taken together this was a marked difference from the centrally determined targets imposed on Parties under the Kyoto Protocol. The Copenhagen Accord envisaged emissions reductions

targets being set independently by each nation and subject to some degree of scrutiny on the international stage. This shift was provoked by the recalcitrance of Parties, especially the US and China, to become subject to targets determined outside their own jurisdictions. By allowing nations to submit domestically-determined targets to the UNFCCC, the new vision was 'sensitive' to shifting "domestic political and economic circumstances" of each Party (Ibid., p.653), while setting out that the short-term targets set by Parties were to be assessed in terms of the long-term two degrees target. Yet the mechanism to enact this vision was a matter for further negotiation at subsequent COPs, with the three-page Copenhagen Accord limiting itself to outlining the new concept of the international mechanism for responding to climate change. Moreover, it left future COPs with the task of committing to and agreeing a long-term objective, as the two degrees target had only been 'recognised' under the Accord.

4.3. Disaggregating the Two Degrees Target

4.3.1. Building Implementation Mechanisms for the Copenhagen Accord

In December 2010 the 196 Parties to the UNFCCC committed to limiting the increase in global average temperatures to two degrees Celsius (UNFCCC 2011, p.3). This agreement of COP16 – held in Cancun, Mexico – appears almost identical to the long-term objective contained within the Copenhagen Accord. The difference, however, is that the Cancun Agreements were 'adopted' at COP16 (whereas the Copenhagen Accord had only been 'noted' during COP15) thereby constituting a commitment to the two degrees target. The Cancun Agreements read:

> "[COP16] [f]urther recognizes that deep cuts in global greenhouse gas emissions are required according to science, and as documented in the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, with a view to reducing global greenhouse gas emissions so as to hold the increase in global average temperature below 2°C above preindustrial levels, and that Parties should take urgent action to meet this long-term goal, consistent with science and on the basis of equity; also recognizes the need to consider […] strengthening the long-term global goal on the basis of the best available scientific knowledge, including in

> relation to a global average temperature rise of 1.5°C" (UNFCCC 2011, p.3).

The 32-page Cancun Agreements also elaborate on many aspects of the Copenhagen Accord vision, building mechanisms through which UNFCCC aspirations may be implemented. In particular it agreed a new work programme for developing "modalities and guidelines" (Ibid., p.11) for measurement, reporting and verification (MRV) of "nationally appropriate mitigation actions". The MRV challenges primarily stemmed from the emissions and mitigation actions of non-Annex I Parties. Annex I nations, on the other hand, prepared annual inventories using IPCC GHG national emissions inventory methods that was subject to expert review to assess the methods applied, identify gaps in the inventory, suggest improvements and potentially recommend a revised estimate. Non-Annex I nations, however, were only required to communicate emissions inventories as part of their national communications to the UNFCCC, and not on a "frequent or uniform basis" (Fransen 2009, p.5). Use of IPCC methods was not compulsory (although were commonly used in practice) and deadlines for the reports were dependent on when funding was received for completing the inventory and were not subject to expert review. Without expert review non-Annex I nations received little feedback on improving the inventory, hampering so-called 'capacity-building' (Ibid., p.6). Under the 2010 Cancun Agreements, non-Annex I nations were required to submit Biennial Update Reports (BURs) "containing updates of national greenhouse gas inventories, including a national inventory report and information on mitigation actions, needs and support received" (UNFCCC 2011, p.11). These BURs would be subject to international consultations and analysis "in a manner that is non-intrusive, non-punitive and respectful of national sovereignty" (Ibid.). This sought to further 'capacity building' for non-Annex I Parties, working to ameliorate issues regarding the lack of activity data as a basis for emissions inventories and the selection of appropriate emission factors[49] for national circumstances. Shortly after the talks, a member of one of the leading national delegations is quoted as saying "It's incremental progress, but progress nonetheless" (Stavins 2010).

[49] Emission factors are coefficients applied to particular units of activity that calculate the range of GHG emissions from that activity.

The UNFCCC process continued to build on the Copenhagen Accord's vision, with the 2011 talks in Durban, South Africa, establishing the Ad Hoc Working Group on the Durban Platform for Enhanced Action (ADP). ADP's mandate was "to develop a protocol, another legal instrument[50] or an agreed outcome with legal force under the Convention applicable to all Parties" (UNFCCC 2012, p.2). It was to complete this work "no later than 2015 in order to adopt [it] at the twenty-first session of the Conference of the Parties and for it to come into effect and be implemented from 2020" (Ibid.). Specifically, four dimensions would constitute the legal character of any protocol or instrument developed through ADP: "the legal form of the agreement, […]; the legal form of commitments within that agreement; the prescriptive nature and content of these commitments; and the procedures and institutions set up under the agreement to hold its parties accountable for complying with their commitments" (WRI 2011). Put differently, the ADP was to develop a protocol to guide the implementation of the Copenhagen Accord's vision, and this was to be negotiated no later than COP21 in 2015. As with the UNFCCC, a state would only be bound by such a 'legal instrument' if it chose to ratify the corresponding UNFCCC agreement or protocol, thereby providing its consent to be bound by the treaty as part of international law. This does not necessarily imply international enforcement mechanisms would be created or, if created, be enacted. Rather, the ratifying nation could not use its own laws as a justification for failure to comply. 'Enforcement' of the legal instrument's requirements, however, could be achieved through the domestic legal system (Hyvarinen et al. 2012).

By COP18 in Doha, Qatar, in 2012, the first commitment period of the Kyoto Protocol was coming to a close.[51] However the 'legal instrument' that

[50] The idea of a 'legally binding' international agreement has been explained as follows: "Under international law, a binding agreement or commitment represents a country's or countries' express consent to be bound, and its willingness to be held accountable by other parties for its compliance with its obligations"(WRI 2011).
However the notion of 'legally binding', it has been argued, may have little relevance to a Party's decision to comply with a treaty. Nations "sign onto agreements and to take action to comply with those agreements for any number of reasons relating to self-interest, public pressure, reputation, horse-trading – in effect, political reasons. The 'legally binding' nature of the obligation is simply not likely to be a significant one of those reasons" (Chang 2010).

[51] A later report would find that developed nations had complied with their commitments for this first commitment period, achieving "low-carbon growth […] explained by better primary energy-mix, the continued expansion of the service

would succeed the Kyoto Protocol, which was being developed by ADP, was only scheduled to enter into force in 2020. To bridge this gap, negotiations at COP18 centred on agreeing a second commitment period to the Kyoto Protocol. The talks produced the Doha Amendment to the Kyoto Protocol, detailing emissions reduction targets for Annex I nations and guidance on voluntary mitigation actions for non-Annex I nations during the 2013-2020 commitment period. Specifically for Annex I nations, emissions were to be reduced "by at least 18 per cent below 1990 levels in the commitment period 2013 to 2020" (UNFCCC 2013, p.10).[52]

The introduction of intended nationally determined contributions (INDCs) at COP 19 in Warsaw, Poland, in 2013 brought a new dimension to ADP's work on a legal instrument. All Parties were invited to prepare INDCs that, as explained in the conference text (UNFCCC 2014a, p.4), detailed their planned level of emissions reductions and associated implementation strategy. These were to be completed "in the context of adopting a protocol, another legal instrument or an agreed outcome with legal force under the Convention applicable to all Parties towards achieving the objective of the Convention as set out in its Article 2" (Ibid.). That is, INDCs should represent the targets and plans for emissions reductions under a legal instrument that would come into force in 2020 and which were prepared with a view to preventing dangerous anthropogenic interference with the climate system. Yet, crucially, the INDCs allowed flexibility in the types of short-term targets a Party could adopt, including a percentage reduction in GHG emissions compared to a particular 'base year', a similar reduction in emissions intensity of GDP, and policy targets (such as, among others, renewable energy, energy efficiency, and forestry). MRV tools for percentage reductions in GHG emissions could be based on IPCC methods developed for the Kyoto Protocol targets; however, comparability issues arose regarding reductions in GHG intensity of GDP as these were typically based on domestic data sources that vary between nations (Levin 2015). There was also a lack of UNFCCC standardized methods for measuring the GHG impacts of policy commitments. Furthermore, due to "differences in data availability, methods, and the

sector, declining GHG intensity of industries and outsourcing the production of goods overseas" (Morel and Shishlov 2014, p.1).

[52] At the time of writing 70 countries have ratified the Doha Amendment. Ratifications from 144 countries are required for it to enter into force. (UNFCCC 2016a).

diversity of policy commitments, the results of such assessments cannot be easily compared across countries" (Ibid.).

In this regard, while INDC submissions were invited by early 2015 with a view to providing an overall view of pledged reductions in advance of COP21, there remained many MRV issues to resolve (UNFCCC 2014a, p.4). ADP swiftly developed guidance for the production of INDCs, with its July 2014 draft text noting that INDCs should "enhance the understanding of whether the aggregate effect of all the Parties' efforts is adequate to hold the increase in global average temperature below 2°C or 1.5°C above pre-industrial levels" (ADP 2014, pp.1–2). In other words, INDCs were to disclose how their national-level efforts contributed to the international target of limiting warming to two degrees. In this regard Parties were made responsible for disaggregating the two degrees target to their own specific circumstances, for which plans and policy implementation had to be reported back to the UNFCCC. ADP's July 2014 draft text detailed the information that should accompany a Party's INDC submissions (such as choice of 'base year',[53] methods for projecting carbon intensity of GDP, and additional mitigation action should support be provided), which would be made public and provide the basis for the UNFCCC secretariat to "summarize, in a technical paper, the aggregated effect of the contributions relative to the 2°C goal, the fairness of their relative efforts and the level of ambition of the contributions" (Ibid., p.2).

COP20 in Lima, Peru, saw an intensification of efforts to agree a draft negotiating text for the highly anticipated 2015 Paris talks at COP21. The 'Lima Call for Climate Action' agreed the rules for INDC submissions, and requested that the UNFCCC Secretariat "[p]repare by 1 November 2015 a synthesis report on the aggregate effect of the intended nationally determined contributions communicated by Parties by 1 October 2015" (UNFCCC 2015a, p.3). It further reiterated the invitation for Parties to communicate their INDCs by the first quarter of 2015 (Ibid.). A new climate action portal was also launched as part of the Lima Climate Action Agenda, "to increase the visibility of the wealth of climate action among cities, regions, companies and investors, including those under international cooperative initiatives" (UNFCCC 2014b). Named the Non-State Actor Zone for Climate Action (Nazca), the portal was

[53] A 'base year' is the year against which changes in national GHG emissions are measured.

"designed to inject additional momentum into the process through to Paris by demonstrating the wealth of non-state action" (Ibid.). Showcasing cooperative initiatives and commitments made by individual organisations was central to this display of non-state support. Indeed, before turning to COP21, it is worth exploring how the two degrees target was being disaggregated to the sectoral- and corporate-levels in non-state actor initiatives outside the UNFCCC process.

4.3.2. Non-State Actors and Disaggregating The Two Degrees Target

Efforts to disaggregate the two degrees target from a global objective to a more refined level was not restricted to the UNFCCC focus on national-level GHG mitigation. By 2011 the Carbon Tracker Initiative, launched by Investor Watch,[54] had released its report that calculated that remaining within two degrees of warming meant that 80% of fossil fuels currently listed on stock exchanges were 'unburnable' (Carbon Tracker 2011). Taking the two degrees target as its foundation, the report identified a corresponding cumulative level of emissions that could be compared to the potential emissions of fossil fuel reserves held by oil, gas and coal companies listed on stock exchanges. With the valuation of those companies partially depending on these supposedly 'unburnable' fossil fuel reserves, the report argued that there was a 'carbon bubble' in capital markets due to the overvaluation of these companies. This disaggregation of the two degrees target into one potential issue for the financial sector is central to Chapter 5, which documents this disaggregation in detail. However, while Chapter 5 focuses on the financial sector, this section highlights that two degrees target was adopted as a foundation for a wider array of work.

Indeed, by 2013 the consulting firm BSR (Business for Social Responsibility), founded in 1992,[55] placed the two degrees target at the core of their 'Business in a Climate-Constrained World' initiative (Cameron 2013). Its 2014 report cited the Copenhagen Accord as demonstrating the scientific

[54] Investor Watch was founded in 2009 to "promote socially responsible investment" through the "incorporation of the principles of social and environmental sustainability into the governance operation of capital markets" (Companies House 2009, p.1).

[55] BSR was founded by members of the Social Value Network (a network of "socially-minded" entrepreneurs that emerged in the late-1980s) as a lobby for socially responsible business in US policy-making (BSR 2016).

and political consensus on the need to limit temperature increase to 2°C above pre-industrial levels (BSR 2014, p.7). The report claims that their services translate climate risks and emissions pathways into "a menu of tangible, actionable steps" (Ibid., p.10) for reducing emissions in line with the two degrees target. It claims that while the

> "current debate on climate and business [...] focuses on aggregate, cumulative risks and consequences that few businesses can relate to. Our translation addresses this problem by downscaling climate risks for specific industries and individual companies in a manner that highlights concrete impacts on business operations and strategy" (Ibid. p.27).

The report proposes the adaptation of Pacala and Socolow's notion of 'stabilization wedges' (Pacala and Socolow 2004) to split the GHG reductions required for a '2°C pathway' into 'wedges' across eight 'industry clusters',[56] with each wedge detailing emissions reduction options for a particular activity, such as land use and energy mix. Here, however, BSR offer only a short example and noted that "further research will be needed to identify the full suite of wedges and each one's mitigation potential" (Ibid., p.34). The point is that BSR was working to split emissions reductions into separate work streams, which would each separately map steps towards an emissions pathway consistent with the two degrees target.

Corporate target-setting initiatives also began to translate the two degrees target into specific goals for businesses. The Science-Based Targets initiative was launched by CDP (formerly the Carbon Disclosure Project),[57] the United Nations Global Compact (UNGC),[58] WRI and the Worldwide Fund for Nature (WWF).[59] The initiative was launched with the overarching goal of

[56] The proposed clusters were food, beverage, and agriculture, energy and extractives, information and communications technology, health care, financial services, transportation and logistics, and travel and tourism.

[57] CDP was launched in 2000, and is a GHG disclosure organisation that gathers information through annual questionnaires. It was formerly known as the Carbon Disclosure Project and changed its name to the abbreviation CDP to reflect their expansion into, in particular, water reporting. (For more detail on CDP see: Kolk, Levy, and Pinkse 2008; Matisoff, Noonan, and O'Brien 2013)

[58] UNGC was launched in 2000 as a United Nations initiative to foster the adoption of corporate social responsibility practices, in particular UN projects such as the Millennium Development Goals and the Sustainable Development Goals.

[59] WWF is an international NGO founded in 1961, working "to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature" (WWF 2016).

raising "the ambition of corporate GHG reduction targets to support a transition to a low-carbon economy and keep the planet below a 2°C temperature rise" (CDP et al. 2015, p.8). A 'science-based target' is explained as one that aims to reduce corporate GHG emissions to "the level of decarbonization required to keep global temperature increase well below 2°C compared to pre-industrial temperatures, as described in the assessment reports of the IPCC." (Ibid., p.10). Their draft manual for target setting identifies three stages (see Figure 4.4).

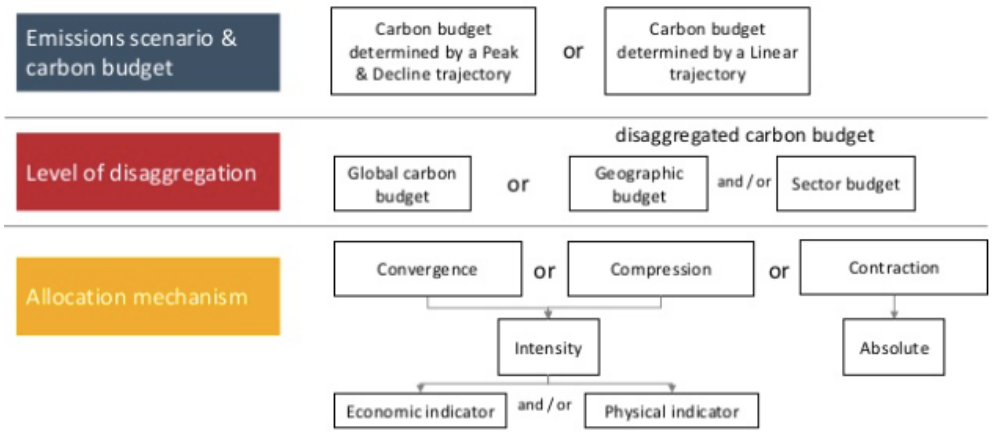


Figure 4.4: Three stages of setting a science-based target (CDP et al. 2015, p.20).

First, an emissions scenario consistent with 2°C of warming is identified from a subset of IPCC or International Energy Agency (IEA) scenarios (Ibid., p.17). Second, the scenario is split into components to identify the relevant regional or sectoral emission pathway within that scenario (Ibid., p,18). For example an energy producer in an Annex I nation would identify the Annex I or power sector emissions trajectory within their chosen 2°C emissions scenario. Finally, the corporation must decide on whether it will set targets for its 'intensity' of production or 'absolute' emissions reductions. Intensity targets would focus efforts on converging with a sectoral intensity average that was consistent with the two degrees target, or on maintaining the same rate of decrease for intensity (compression) as other companies in their sector or region. Absolute targets, on the other hand, would require a contraction of GHG emissions at the same rate as companies in the same sector or region. Through this process the two degrees target is disaggregated

into corporate-level targets that are aligned with either a sectoral or regional two degrees trajectory (Ibid., pp.18-19). By COP21 114 companies – including Ikea Group, Coca-Cola Enterprises, Walmart and Kellogg – had committed to set science-based targets.

As noted, this section set out to highlight how the two degrees target, as the emerging long-term target for addressing climate change, provided a foundation for efforts to disaggregate the climate problem to the industry- and corporate-level. Furthermore, the organisations highlighted had worked on climate issues for many years. Yet the two degrees target, appearing as a politically and scientifically supported objective (by the UNFCCC and the IPCC, respectively), was mobilised as a foundation for their work to align industry- and corporate-level activity with a vision for addressing climate change. This creation of linkages between the two degrees target and local specifics will be explored in depth later in the thesis. This section now turns to recognise that while the businesses and initiatives highlighted in this section claimed that the science supporting the two degrees target was 'clear', scientific scepticism of the target was rife.

4.3.3. Scientists State Scepticism of the Two Degrees Target

Reflecting on the "disappointing Copenhagen conference", Jaeger and Jaeger[60] (2011, p.S15) remark that it "could lead to a healthy rethinking of major assumptions often taken for granted in climate policy." Expectations on international climate policy may lower, they argue, while actions that run in parallel to processes such as the UNFCCC may be stimulated as a result. "Often, international diplomacy needs gestation periods of many years in order to prepare a next breakthrough. The opportunity for such breakthroughs in turn may depend on actions taking place in other arenas" (Jaeger and Jaeger 2011, p.S15). The authors note that the two degrees target "might help to orient both international climate policy and other actions" (Ibid.). In this regard the authors present the two degrees target as enabling work in arenas beyond the

[60] Jill Jaeger (Ph.D. in Climatology from University of Colorado in 1972) compiled the report from the 1987 Bellagio and Villach conferences (Jäger 1988) and continued to work and joined IIASA as Deputy Director in 1994. Her research themes range from energy and climate to linkages between knowledge and action for sustainable development (ESF 2016). Carlo Jaeger (Ph.D. in Economics from J.W. Goethe University in 1979) is an economist working on the issue of climate change and co-Founder of the Global Climate Forum, which focuses on economic approaches to managing climate risk.

UNFCCC, and that by disaggregating the common basis of the two degrees target the different work streams may come to be mutually reinforcing. However this optimistic view of the two degrees target was hardly commonplace in the aftermath of the Copenhagen talks.

Compared to Jaeger and Jaeger's view of the two degrees target as a stimulus and guide for further climate action, Hulme (2012)[61] emphasises four characteristics of the two degrees target – universality, ambiguity, doubtful achievability and questionable legitimacy – that, he argues, challenge the usefulness of the target. He suggests using wider range of climate goals rather than a single 'universal' index. Rather, he argues that targets should be based on factors such as GHG emissions instead of an 'ambiguous' output of the climate system that corresponds with numerous input scenarios (Hulme 2012, pp.123–4). The two degrees target is 'unattainable', Hulme argues, because it presupposes an ability to control planetary system, for which he believes humans are unlikely to possess the necessary knowledge (Ibid., p.124). Moreover, the two degrees target lacks legitimacy because, on the one hand, politicians claim it represents the scientific consensus on dangerous climate change, while the scientific community believe any such target to be a value-laden judgment and not a matter of scientific enquiry (Ibid., pp.124-5). Indeed, Seager's feminist analysis of the two degrees target reinforces the view that the two degrees target is not a geophysical threshold. It is the outcome, she argues, of an international political process that represents a point "when global warming comes 'home' to the rich world" (Seager 2012, p.16).

Perhaps the most damning assessment of the two degrees target is Victor and Kennel's (2014) *Climate policy: Ditch the 2°C warming goal*. Arguing that the two degrees target's "[b]old simplicity must now face reality" (Victor and Kennel 2014, p.30), the authors claim that it allows governments to "pretend they are taking serious action to mitigate climate change, when in reality they have achieved almost nothing". Moreover, they claim that there are more "scientifically meaningful" measures of anthropogenic climate impacts and that without such measures it is hard to explain how government

[61] Mike Hulme (Ph.D. 'Secular variations in Sudan rainfall and water resources' from University College Swansea in 1985) served on the IPCC from 1995 to 2001. His 2009 book, *Why we Disagree About Climate Change*, emphasizes that climate change should not be seen as a problem waiting for a solution, but a catalyst for reshaping how we think about humanity's place on Earth (Hulme 2009).

policies "deliver tangible results" (Ibid.). The authors further point to the target's "heroic assumptions" (Ibid.), such as "immediate global cooperation" and availability of scalable carbon capture and storage methods that underpin simulations showing emissions can be reduced to meet the two degrees target. They also argue that temperature targets are "related only probabilistically to emissions and policies" (Ibid., p.31), offering little guidance for the actions of individuals and governments. Moreover, the "planet's average temperature has barely risen in the past 16 years" (Ibid.). Focussing on temperature ignores that, for example, oceans absorb 93% of energy added to the climate system, which drives sea level rise and other climatic impacts (Ibid.). "The best indicator has been there all along" (Ibid.), the authors proclaim, "the concentrations of CO_2 and the other greenhouse gases" are well-measured and more easily translated into policy efforts. While the authors note that new indicators would not be ready for the 2015 Paris talks, they argue the talks should agree "a path for designing them" (Ibid.).

While the Victor and Kennel (2014) comment piece prompted numerous press articles investigating the scientific basis for the two degrees target (see, for example, Vaughan 2014; Naik 2015), it faced a swift and detailed rebuttal from prominent names in climate science (W. Hare, Schleußner, and Schaeffer 2014). The rebuttal attempted to dismantle the comment piece, paragraph-by-paragraph. Addressing what they see as Victor and Kennel's two core arguments (that it is no longer feasible to limit warming to two degrees and that temperature targets are not translatable into emission limits), the authors highlight how the IPCC assess that "limiting warming below 2°C limit is technically and economically feasible, and at low to modest cost" (Ibid., p.2) and that the two degrees target has already been translated into a policy debate on reducing the current emissions trajectory (Ibid.). They do not deny that achieving the two degrees target will be politically difficult. They do, however, argue that increased pressures stemming from the existence of the two degrees target have triggered "considerable political action at the national, regional, and global level" (Ibid., p.3).[62]

[62] Also see Tschakert (2015), who argues that debates on the scientific basis for the two degrees target are no longer the crux of the matter. Rather, it is more important to examine the role of the two degrees target in the primary challenge of "overcoming

Beyond these debates in the academic community, the two degrees target appeared throughout the IPCC's Fifth Assessment Report, published in 2014. For example, the likelihood of exceeding 2°C of warming at the end of the 21st century is assessed under the IPCC's four 'Representative Concentration Pathways', which describe different scenarios for GHG emissions and atmospheric concentrations (IPCC 2014b, p.10). Similarly, numerous 'key risks' across different sectors are analysed at long-term warming of 2°C and 4°C (Ibid., pp.70-1), and risks at different temperatures are organised under the IPCC's five 'reasons for concern' (Ibid., pp.72-3). The IPCC also produced a chart that mapped the way risks from climate change, at different levels of warming, depend on cumulative CO_2 emissions since 1870. These, in turn, depend on annual GHG emissions in the coming decades (Figure 4.5). Put differently, the chart allows the percentage change in annual GHG emissions by 2050 to be mapped onto the global mean temperature change, which is translated into the 'heat map' for the risks from climate change at different levels of temperature change. The report also notes that the Cancun Pledges (comprised of plans for controlling GHGs that many countries submitted in 2010) "are broadly consistent with cost-effective scenarios that are likely to limit temperature change to below 3°C relative to pre-industrial levels" (Ibid., p.85). Moreover, it states that further mitigation actions are required to hold emissions within the range of "cost-effective scenarios that are likely to about as likely as not to limit warming to less than 2°C this century relative to pre-industrial levels" (Ibid., p.84).

Amidst the scepticism surrounding the two degrees target and the IPCC's analysis of its associated risks and requirements for emissions reductions, the inclusion of the two degrees target in the final COP21 text was far from certain. However with the memory of Copenhagen still fresh in the minds of actors across the climate change debate, the atmosphere leading up to Paris was described by some as "cautiously optimistic" (DECC 2015).

4.3.4. COP21 AND THE PARIS AGREEMENT

By the start of November 2015, INDCs had been submitted covering emissions reduction pledges of 147 Parties to the Convention, "representing 75 per cent of Parties and 86 per cent of global emissions in 2010" (UNFCCC

deeply entrenched divisions on value judgments, responsibility, and finance" (Tschakert 2015, p.10).

2015b, p.8). Taken together the submitted INDCs suggest aggregate GHG emissions will exceed those of the least-cost 2°C scenarios by 19% in 2025 and by 15.1% in 2030 (Ibid., p.37).

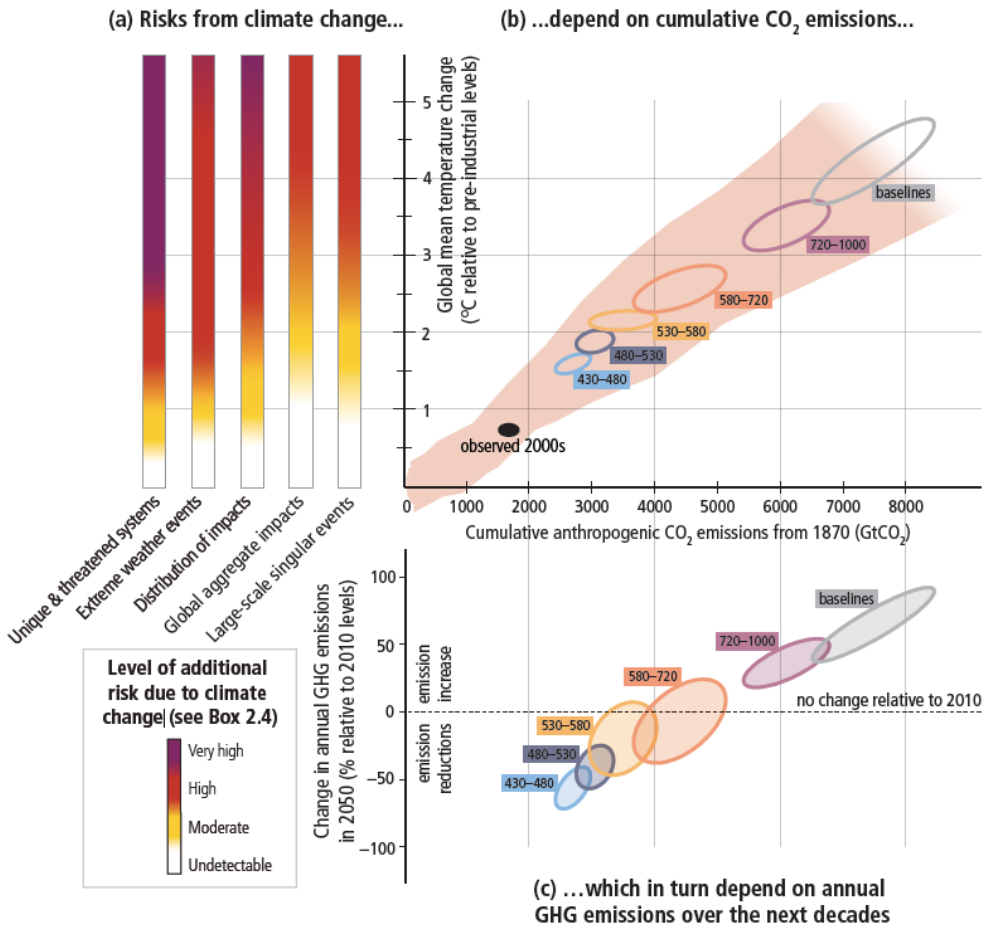


Figure 4.5: "The relationship between risks from climate change, temperature change, cumulative carbon dioxide (CO_2) emissions and changes in annual greenhouse gas (GHG) emissions by 2050. Limiting risks across Reasons For Concern (a) would imply a limit for cumulative emissions of CO_2 (b) which would constrain annual GHG emissions over the next few decades (c). Panel a reproduces the five Reasons For Concern {Box 2.4}. Panel b links temperature changes to cumulative CO_2 emissions (in $GtCO_2$) from 1870. They are based on Coupled Model Intercomparison Project Phase 5 (CMIP5) simulations (pink plume) and on a simple climate model (median climate response in 2100), for the baselines and five mitigation scenario categories (six ellipses). Details are provided in Figure SPM.5. Panel c shows the relationship between the cumulative CO_2 emissions (in $GtCO_2$) of the scenario categories and their associated change in annual GHG emissions by 2050, expressed in percentage change (in percent $GtCO_2$-eq per year) relative to 2010. The ellipses correspond to the same scenario categories as in Panel b, and are built with a similar method" (IPCC 2014, p.18).

Commenting on the synthesis report, Christiana Figueres, then Executive Director of the UNFCCC, remarked "[t]he INDCs have the capability of limiting the forecast temperature rise to around 2.7°C by 2100, by no means enough but a lot lower than the estimated four, five, or more degrees of

warming projected by many prior to the INDCs" (UNFCCC 2015c). The French government had also expressed its hopes that the Paris conference would establish a regular review process through which INDC pledges could be 'ratcheted' (Harvey 2015).

Earlier in 2015 a 20-page draft agreement text, negotiated by Parties' representatives through the ADP process, had been produced (ADP 2015), and the US and China had issued a joint presidential statement outlining a shared vision for the Paris talks. The latter built on President Obama and President Xi's November 2014 announcement on post-2020 targets (The White House 2014) [63] and underscored the need for Parties to develop mid-century strategies "for the transition to low-carbon economies, mindful of the below 2 degrees Celsius global temperature goal" (The White House 2015). Moreover, the announcement emphasised that efforts over the longer term should "ramp up over time in the direction of greater ambition" (Ibid.). The availability of a draft agreement text that had been negotiated through the ADP process and the apparent willingness of the United States and China to push for an agreement at COP21 stood in contrast to the challenges encountered during the 2009 Copenhagen talks.

On the first day of COP21, heads of state and government from over 150 nations, the largest number ever for a UN event, gathered in Paris (UNFCCC 2015e). While security in Paris had been tightened and climate marches banned following the mid-November terrorist attacks (Neslen and Harvey 2015), it was suggested that this also encouraged more leaders to attend as an expression of solidarity (McGrath 2015a). The French Government invited heads of state and government to attend the first day of the conference, before leaving the talks and the "messy business of hammering out a deal to their representatives" (Stefanini 2015). However through the negotiations between Parties' representatives from the 30th of November to the 11th of December 2015, several obstacles had emerged.

[63] The announcement stated the following targets: "the Presidents of the United States and China announced their respective post-2020 actions on climate change, recognizing that these actions are part of the longer range effort to transition to low-carbon economies, mindful of the global temperature goal of 2°C. The United States intends to achieve an economy-wide target of reducing its emissions by 26%-28% below its 2005 level in 2025 and to make best efforts to reduce its emissions by 28%. China intends to achieve the peaking of CO2 emissions around 2030 and to make best efforts to peak early and intends to increase the share of non-fossil fuels in primary energy consumption to around 20% by 2030" (The White House 2014).

In particular, Article 4.4 of the text would have required the US to seek ratification approval from the Senate, stating that developed countries 'shall' undertake economy-wide absolute emission reduction targets. 'Shall' indicates a legal requirement, which on the matter of emissions reduction targets would have forced the US to seek approval from the Senate before ratifying the Paris Agreement (Norton Rose Fulbright 2015). Replacing the term with 'should' (i.e. removing the legal requirement), while apparently the intention when the text was being produced, would not be supported by many developing nations including China (Vidal 2015). However the French presidency of COP21 declared that a typographical error had been made, attributing this to the "sleep deprived negotiating team doing the drafting" (Norton Rose Fulbright 2015), allowing the matter to be dealt with as a technical matter. In addition, the Nicaraguan delegation remained as the only Party refusing to 'agree' the text, arguing that it failed to take sufficient action to protect the climate. While some suggest a personal plea from the Pope influenced the Nicaraguan delegation (Harrabin 2015; Seidler 2015), other reports suggest that Laurent Fabius, the French foreign minister and president of the summit, briefly spoke with the delegation before announcing "I am looking at the room, I see the reaction is positive, the Paris climate accord is accepted" (Stothard and Chassany 2015) and bringing down the gavel to mark the adoption of the Paris Agreement.

One particular highlight of the Paris Agreement was the temperature target of 1.5°C being included in the statement on long-term climate targets. The Paris Agreement states that it strengthens the global response to the threat of climate change by:

> "Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change" (UNFCCC 2015f, p.22).

Beyond reinforcing that 2°C must be seen as an upper limit on warming through the wording "well below 2°C", this statement represents the negotiating efforts of the so-called 'high-ambition coalition' that pushed for the 1.5°C target to be included. In a speech following COP21, Miguel Arias Cañete, EU Climate Commissioner, explained that the EU had started to work

with other Parties behind the scenes following the 2009 Copenhagen talks. This was in an effort to push big emitters towards stronger emissions reduction targets (Arias Cañete 2015). Through numerous discreet talks during the years between Copenhagen and Paris, the 'ambition coalition' grew, with more Parties joining during COP21. After 79 African, Caribbean and Pacific nations joined on the 8th December 2015, the US (who had been in talks with the coalition since the start of the conference) formally joined on the 9th, from which point it became the 'high-ambition coalition' (Ibid.). It was through this coalition that Tony de Brum, foreign minister of the Marshall Islands, pushed for "strong recognition of the below 1.5-degree temperature goal" (McGrath 2015b), with the US lead negotiator, Todd Stern, echoing his calls.

The Paris Agreement also states that "Parties aim to reach global peaking of greenhouse gas emissions as soon as possible […] so as to achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century" (UNFCCC 2015f, p.22). By stating a long-term objective of achieving a 'balance' of emissions, the Paris Agreement allows for the use of negative emissions technologies in reducing GHG emissions. In other words, technologies that capture GHGs from the atmosphere are recognised under the Paris Agreement as part of the long-term strategy for reducing GHG emissions. While the precise definition of 'balance' is unclear,[64] it is believed that the term will be clarified in subsequent meetings and that it broadly relates to the notion of 'net-zero' emissions (Evans and Yeo 2015). As such, it is worth noting GHGs need to be net-zero to achieve any temperature goal. The difference between temperature goals is how quickly emissions need to be reduced to net-zero (Allen 2015). 'Balance' in the second half of this century is aligned with the emissions reductions required for a 2°C scenario; however a 1.5°C scenario requires 'balance' at some point between 2030 and 2050 (Ibid.).

Returning to the synthesis of INDCs that suggests the existing emissions targets would result in 2.7°C of warming by 2100, the Paris Agreement also establishes a 'ratchet' mechanism to increase the strength of emissions reduction pledges over time. This is detailed in Article 4, which

[64] Debates on this Article of the Paris Agreement earlier considered "GHG neutrality" (Evans and Pidcock 2015).

states that Parties "*shall* [emphasis added] prepare, communicate and maintain" successive INDCs, pursue mitigation measures towards the stated objectives, and ensure that each successive INDC "represent[s] a progression beyond the Party's then current nationally determined contribution and reflect its highest possible ambition" (UNFCCC 2015e, p.22). Furthermore, Parties were required to submit an INDC for a UNFCCC 'stocktake' every five years (Ibid., p.23), through which progress towards the goals of agreement may be assessed. Taken together this requires Parties that ratify the Paris Agreement to submit and work towards their INDCs, as well as communicate new INDCs every five years that strengthen targets and plans communicated in their preceding INDC. It has been suggested that this ratchet mechanism is part of a recognition that learning, innovation and technological deployment occurring between stocktakes will reduce the cost of more ambitious emissions reductions (Bailey 2015). Similarly, others suggest that as awareness of climate change increases and private sector support grows for a stable policy environment that tackles climate change, the political feasibility of further emissions reductions is improved (Grantham Research Institute 2015).

The Paris Agreement also contains provisions for enhanced transparency regarding Parties' carbon emissions data. The EU and the US, in particular, pushed for enhanced MRV requirements at COP21 and secured an agreement within the 'high-ambition coalition' that transparency was a core demand (McGrath 2015b). It is reported that this focus on transparency was to ensure developing nations, especially China, faced similar levels of scrutiny on the progress made towards their individual contributions (Evans and Yeo 2015). Indeed, opposition to these demands for transparency came from China – seeing the move to implement different data gathering and analysis systems as an encroachment on their sovereignty – as well as many developing nations, which argued they lacked the resources to implement the enhanced requirements (Grantham Research Institute 2015). However the final text requires Parties to submit national GHG inventories to the UNFCCC (that detail levels and sources of emissions) as well as "[i]nformation necessary to track progress made in implementing and achieving its nationally determined contribution" (UNFCCC 2015f, pp.28–9). In addition, the Paris Agreement established the Capacity-building Initiative for Transparency,

through which developing nations will be assisted in improving their measurement and reporting practices for national emissions inventories.

As with the Kyoto Protocol, however, the Paris Agreement will not enter into force until it is ratified by "at least 55 Parties to the Convention accounting in total for at least an estimated 55 percent of the total global greenhouse gas emissions" (Ibid., p.31). The signing ceremony for the Paris Agreement took place on the 22nd April 2016 in New York. A record 175 Parties signed the Paris Agreement, indicating their support for the deal, with 15 countries also submitting their instruments of ratification (UNFCCC 2016b). Furthermore, the US and China called on Parties to ratify the Paris Agreement as early as possible, with a view to bringing the Paris Agreement into force before the initial target date of 2020 and potentially during the Obama Administration (Goldenberg 2016). At the time of writing, 191 Parties have signed and, moreover, 61 Parties representing 48% of global emissions have ratified the Paris Agreement.[65]

4.4. Discussion

4.4.1. The Two Degrees Target as a Mediating Instrument

In their study of the semiconductor industry Miller and O'Leary (2007) conceptualise Moore's Law (that, after being revised in 1975, predicted that every two years the number of electronic elements on a semiconductor would approximately double) as a mediating instrument. Moore's Law held promise not just for technological development; but for technological development that would restore the pre-eminence of an American strategic industry at risk, the US semiconductor industry, which had fallen behind its Japanese counterpart (Miller and O'Leary 2007, p.715). The pursuit of his predictions became significant beyond the future of one particular industry, and appealed to the future of US wealth and security. While Moore's predictions were highly abstract and simplified, it modelled a beneficent relationship between science and the economy that support from the broader political environment would strive to enact (Ibid., p.716). Indeed it is through its apparent simplicity that

[65] For updated figures, see the World Resources Institute's 'Paris Agreement Tracker' (www.cait.wri.org/source/ratification/).

the two degrees target renders the complexities of climate change into a common vision for addressing the issue.

Yet as well as envisaging a seemingly "simple, imaginable and 'manageable'" future (Jordan, Mitterhofer, and Jørgensen 2016, p.1), it is the flexibility (*cf.* Revellino and Mouritsen 2009; Jørgensen, Jordan, and Mitterhofer 2012, p.112) of the two degrees target that enabled it to embed scientific, political, and economic concerns regarding long-term action on climate change. Moreover, this chapter shows that new ideas and concerns were elicited through discussions regarding potential targets in new domains. The assembling of these ideas and concerns and their embedding in the target were central its the stability and coherence. That is, as Gooding writes, "recalcitrances" came to the fore, which "indicate a discrepancy between theory, instrumentation, practice and results" and that assist in identifying "the assumptions that matter in *the world as engaged* in that particular laboratory" (Gooding 1992, p.69, emphasis in original). This section discusses the two degrees target as a mediating instrument – framed as an apparently simple and manageable vision that is flexible in implementation – and argues that it is unsuited to the 'boundary object' framework adopted elsewhere (Randalls 2010; Cointe, Ravon, and Guérin 2011).

Section 4.1 studied the efforts to establish a long-term target for addressing climate change from 1975 to 1992, which centred setting a single threshold based on which economic analyses of 'optimal' policy responses could be conducted. The efforts pursued a concretion of the complexities of climate change, which rendered it into a form amenable to analyses at different scales. Where Cointe *et al*. (2011) frame the two degrees target as a vague and ambiguous boundary object that is 'weakly structured in common use',[66] Section 4.1 shows that efforts to create a long-term target for climate change were aimed precisely at establishing an apparently fixed point that represented a complex issue. Defining a long-term target was seen as fundamental in the report from the 1987 Bellagio-Villach workshops (Jäger 1988) to addressing coordination challenges on controlling GHG emissions and, the report stated, "would be extremely advantageous as a management

[66] Star and Griesemer see boundary objects as enabling communication and cooperation across different domains, and define them as being "weakly structured in common use, and become strongly structured in local site use" (Star and Griesemer 1989, p.393).

tool." (Ibid., p.21). Yet the report also recognised that such a target should allow for a smooth economic transition, guided by interim targets, through which gradual adjustments towards alignment with the long-term target could occur. Setting a target was central to rendering climate change manageable through policy analysis, and that analysis as well as the transition towards the target was to be 'cost-effective' and avoid economic shocks.

Regarding the link between the two degrees target and climate science, the 2001 Third Assessment Report of the IPCC analysed the 'reasons for concern' in terms of the costs of different temperature changes as well as producing 'cost-effective' emissions trajectories for the two degrees target. It is important to note that concentration targets for atmospheric GHGs were also strong contenders as metrics for the IPCC analysis. However most of the literature being assessed only studied climatic impacts up to 2100, whereas published timeframes for stabilizing atmospheric GHG concentrations assumed stabilisation after the 21st century. Conversely, the impact literature was often based on temperature or precipitation variables. Similarly, common forms of climate modelling – such as general circulation models – produce estimates in terms of changes in global mean temperature. In this regard, temperature thresholds were compatible with the literature being assessed as well as the common approaches to modelling the climate system.

It was the IPCC's focus on temperature increase that later provided the apparent scientific justification for adopting the two degrees target as a long-term objective for the UNFCCC (UNFCCC 2009). Moreover, the target was defendable on the grounds that IPCC emissions scenarios showed that limiting warming to 2°C was still possible at a 'reasonable cost' (W. Hare, Schleußner, and Schaeffer 2014). Yet it was the flexibility of the two degrees target that led to it being 'noted' in the 2009 Copenhagen Accord. Indeed, one component of Cointe *et al.*'s (2011) argument is that the two degrees target is "[s]ufficiently vague to allow several interpretations" (Cointe, Ravon, and Guérin 2011, p.18). While this chapter highlights that 'vague' is an inaccurate description of the two degrees target, it also recognises that there is flexibility in how linkages form between it and different entities. In this regard the target may be seen as 'allowing several interpretations', as Cointe *et al*. suggest.

Yet this flexibility also highlights that the two degrees target does not prescribe how it is to be implemented and used; rather linkages with the two degrees target may be configured to the specifics of a particular entity or entities. That is, the target is not "strongly structured in local site use" (Star and Griesemer 1989, p.393). This was central to the target's adoption in the Copenhagen Accord. Whereas GHG-based targets were seen as encroaching on national sovereignty by restricting developing nations' ability to chart their own path to development, the two degrees target did not prescribe a 'future emissions space' or, per se, how it was to be achieved. Taken together the two degrees target provides a fixed point that envisions an apparently simple and manageable future for addressing climate change, while the flexibility in linking it to the local specifics of different entities enables it to mediate between multiple and potentially conflicting ideas.

4.4.2. Contribution to Studies of the 2°C Temperature Threshold

In his 2007 paper, Tol "reviews the scientific literature that may substantiate, perhaps even justify a 2°C target" (Tol 2007, p.425) that the EU supported as international and long-term climate goal. He concludes that Germany, the Netherlands and the UK relied on unrepresentative studies and ignored contradictory results in a "lackadaisical attitude to setting targets" (Tol 2007, p.429). He ventures explanations, ranging from the two degrees target being an aspiration to "make the public feel good about their government, not to be met" (Ibid.) to it being a starting point for negotiations, albeit "too strong" (Ibid.) for other nations to engage. He argues that his analysis demonstrates that the two degrees target is not justified by scientific findings or cost-benefit analyses (Ibid., p.430). Shaw (2013) further notes that there is an "evolving body of climate science [that] is highlighting how unsafe two degrees of warming will be" (Shaw 2013, p.569) and argues that public discourses should focus on a more "honest depiction" (Ibid.) of scientific definitions of dangerous climate change. This chapter does not refute that the scientific basis for the two degrees target is contested. Rather it suggests that closer attention to international climate negotiations and the mode of climate governance being developed reveals more about the prominence of the two degrees target than it is possible to achieve by examining its scientific justification alone. Specifically, the target emerged as a central feature in the climate debate as it came to mediate between political, economic and scientific

concerns on climate change. Moreover, as part of the decentred climate regime enshrined in the 2015 Paris Agreement, the two degrees target provides the common objective towards which nationally determined strategies and targets for addressing climate change must be oriented.

Jaeger and Jaeger's (2011) and Tschakert's (2015) studies provide further insights into the emergence of the two degrees target in international climate talks. Both remark on the usefulness of the two degrees target in the UNFCCC process, with Tschakert offering a close assessment of the UNFCCC's 'structured expert dialogues' in the early 2010s. She concludes that "it is in the utmost interest of a large number of countries to pursue the 1.5°C target, as ambitious or idealistic it may appear to date, and to see it anchored as a binding goal in the next agreement" (Tschakert 2015, p.9). This is both due to the vulnerability of small island states and other developing nations to temperature rises. Jaeger and Jaeger (2011), on the other hand, argue that the two degrees target provides a focal point for initial efforts that "gather the necessary experience" (Jaeger and Jaeger 2011, p.S25) to inform the evolution of a global regime on climate change. They remark: "no other possible target has achieved similar salience" as the two degrees target (Ibid., p.S23). Further, the authors argue, temperature has more "intuitive appeal than, say, ppm of some molecule equivalents" (Ibid.), and with further experience, the focal point may be redefined as the global climate regime evolves (Ibid., p.S25).

However, while Jaeger and Jaeger (2011) and Tschakert (2015) shed light on the two degrees target as part of the UNFCCC process, they largely overlook the mode of climate governance envisioned in the Copenhagen Accord and developed through COPs between 2010 and 2015. INDCs, in particular, have become central to enacting the emerging voluntary, decentred and incremental approach to pursuing national-level emissions reductions. Indeed, in contributing to earlier studies through its analysis of the Paris Agreement, this chapter highlights the mechanisms – from emissions scenarios and global stocktakes to emerging MRV requirements – that centre on 'ratcheting' emissions reductions to limit the increase in global average temperatures to 'well below' 2°C. The two degrees target not only addresses concerns of economic growth, national sovereignty, and the scientific basis for 'dangerous' climate change, it is amenable to disaggregation through

instruments that embed a post-Copenhagen mode of climate governance. It is to such disaggregation that this chapter now turns.

4.4.3. Disaggregating the Two Degrees Target

The two degrees target provides a single figure that envisages an apparently simple and manageable future for addressing climate change. In this regard, the two degrees target renders climate change into a form where diverse and distributed actors can split the underling problem into component parts, a process that Mary Morgan terms *disaggregation*. Moreover, it provides a flexible basis for linking the underlying climate problem to multiple entities of different scales and scopes, enabling the creation of mechanisms that orient actions towards the 'two degrees vision'. As Bebbington and Larrinaga (2014b) note, issues within the sustainable development agenda, such as climate change, are not caused by a single entity. Rather, the actions of multiple entities produce these issues. In illustrating instances where the two degrees target is disaggregated – within the UNFCCC process as well as through linkages with sectoral- and corporate-entities – Section 4.3 highlighted that the two degrees target provided a basis for linking climate change to the local specifics at the national-, sectoral-, and organisational-level.

INDCs, for example, represent a mechanism for disaggregating the two degrees target to the national-level, linking it to the targets and strategies of Parties to the Paris Agreement. Parties that ratify the Paris Agreement, if it comes into force, will be required to develop and communicate INDCs every five years that represent their nation's targets and plans for reducing GHG emissions to a level consistent with the objectives in the Paris Agreement. As such, the two degrees target has become a guiding objective for climate planning at the national level. However the emphasis on flexibility in the post-Copenhagen mode of climate governance enshrined in the Paris Agreement has enabled Parties to base their targets on a wider set of metrics than CO_2, or GHG, data alone. This poses new challenges for national-level carbon accounting. For example, targets based on emissions intensity of GDP require carbon accounting to be combined with approaches to forecasting GDP growth. Similarly, 'policy targets' allow Parties to detail their contributions to international efforts to address climate change through specific strategies on, among other matters, renewable energy, energy efficiency, and forestry. Yet

how the contributions of these policy targets will be made commensurable and aggregated into a measure of global progress on climate change remains a challenge for the UNFCCC.

This is not to say that carbon accounting literature on the accuracy of national-level GHG data is misplaced (La Motta et al. 2005; Stechemesser and Guenther 2012). Rather, it highlights that the flexibility that is central to the post-Copenhagen mode of climate governance presents new challenges to carbon accounting. It is now called upon to "enable the diverse forms of carbon governance" (Larrinaga 2014, p.2) that may be adopted by different Parties to the UNFCCC, and to enable the commensuration of these varied approaches into an aggregate measure of global progress towards the objectives of the Paris Agreement. The chapter highlights these challenges, which are central to the MRV UNFCCC work stream as well as the Capacity-building Initiative for Transparency established under the Paris Agreement. As such, the chapter argues that the adoption of the 2015 Paris Agreement presents an opportunity to "investigate the dynamics of accounting systems of governance as they emerge" (Bebbington and Larrinaga 2014a, p.207). Such studies would provide insights into the accounting practices underpinning the UNFCCC's 'pledge and review' mechanisms for INDCs, which are central to the Paris Agreement's 'ratchet' mechanism for strengthening the targets set by Parties.

Beyond the UNFCCC, the IPCC has analysed the emissions scenarios consistent with a 2°C increase in temperatures, producing a trajectory of emissions between the present and a future point in time at which emissions are reduced to net-zero. This provides a benchmark against which progress towards the two degrees target may be monitored. The UNFCCC INDC synthesis report is one example of this (UNFCCC 2015d), highlighting that the pre-COP21 pledges were only consistent with limiting warming to 2.7°C. In this regard the IPCC disaggregated the two degrees target into a trajectory of annual emissions, providing a benchmark against which deviations between Parties' pledges and the two degrees target may be rendered visible. Indeed a similar method is adopted by initiatives such as Science-Based Targets, instead using 2°C emissions scenarios to set corporate-level emissions goals. Those goals could be based on metrics that had already been developed, such as carbon accounting practices for GHG emissions or the conversion of that

accounting into GHG intensity indicators (i.e. emissions per unit of output). That is, by mobilising the two degrees target, it became possible to frame corporate activity in terms of its deviation from the pathway to addressing climate change.

This is not to say that IPCC scenarios capture all aspects of the climate change represented in the two degrees target. Indeed, the chapter has demonstrated the inherent uncertainties in translating between temperature changes and atmospheric GHG concentrations. Rather the chapter highlights that diverse and distributed groups already working on a particular aspect of climate change (e.g. the IPCC on emissions trajectories, or CDP, UNGC, WRI and WWF on promoting the adoption of corporate sustainability practices) come to apply their own expertise and resources to a particular aspect of two degrees target. Seen as a mediating instrument that provides the basis for disaggregation, the two degrees target reorients expectations and aspirations towards its vision of the future, stimulating and orienting work to develop instruments that align the actions of multiple entities of different scales and scopes with that vision. As Chapters 5 and 6 will show, the linking of the two degrees target to the sectoral-, corporate- and investment portfolio-levels depends on the interconnected work of multiple actors whose expectations have been reoriented towards the vision of a two degrees future.

4.5. CONCLUSION

This chapter has charted the emergence of the two degrees target from the range of climate metrics applied in monitoring and analysing climate change as early as the 1960s. It initially focussed on efforts between 1975 and 1992 to call for a long-term objective for climate change that would enable economic analyses of cost-effective responses to the climate problem. Following the formation of the UNFCCC in 1992 with the objective to prevent 'dangerous anthropogenic interference' with the climate system, the chapter demonstrated how the flexibility of the two degrees target enabled it to mediate between the literature on climate impacts, concerns of national sovereignty and 'cost-effective' GHG controls. This flexibility was central to its inclusion as the 'noted' long-term climate objective in the 2009 Copenhagen Accord. With the apparent backing of the scientific community and the UNFCCC, the two degrees target provided a foundation for disaggregating the

climate problem into component parts. The chapter illustrates such disaggregation across regional, sectoral and corporate entities between 2009 and 2016. Indeed Chapters 5 and 6 will further investigate the emergence of linkages that refine the two degrees target to local specifics of the financial sector.

The two degrees target was framed as a mediating instrument (Miller and O'Leary 2007) that provided an apparently simple and manageable vision for long-term efforts to address climate change (Jørgensen, Jordan, and Mitterhofer 2012), while maintaining a flexibility in forming linkages across multiple entities of different scales and scopes (Revellino and Mouritsen 2009). The chapter contends that the 'boundary object' (Star and Griesemer 1989) framing adopted in other studies (Randalls 2010; Cointe, Ravon, and Guérin 2011) is unsuitable with regards to the 'structure' of the two degrees target, as it is strongly (rather than weakly) structured in common use and weakly (rather than strongly) structured in local site use. Building on this analysis, the chapter demonstrates how the two degrees target became a basis for reshaping the "setting within which organisations operate" (Bebbington and Larrinaga 2014b, p.401). Indeed this is a theme that runs through the thesis. This chapter shows how the two degrees target came to represent the complexity of climate change through a single figure, and how that single figure began to underpin a diversity of distributed efforts to develop linkages between climate change and national, sectoral and organisational entities.

The thesis now directs its attention to the mobilisation of the 'carbon budget' – the maximum level of cumulative GHG emissions from 2000-2050 to remain within 2°C of warming – as a more concrete rendering of the two degrees target. Specifically, it examines how the carbon budget was mobilised to emplace ideas of climate risk and potential threats to financial stability. Taken together, Chapter 5 demonstrates how the financial sector discourse was reshaped as the vision of a two degrees future was translated into the implications of that future for global capital markets. Where Chapter 5 focuses on the refinement and linking of the two degrees target to the sectoral-level, Chapter 6 brings the reader inside the meeting rooms of the UNEP FI and GHG Protocol's Financed Emissions Initiative, focussing on linkages between the two degrees target and corporate- and portfolio-level investment and lending decisions.

CHAPTER 5 – CIVIL SOCIETY AS A QUASI-REGULATOR: MOBILISING THE CARBON BUDGET

5.0. INTRODUCTION

Chapter 4 charted the emergence of the two degrees target as a guiding vision and long-term objective for efforts to tackle climate change. This chapter shows that the 'carbon budget' – the maximum amount of cumulative GHG emissions that limits the probability of exceeding 2°C of warming to 20% – provided a more concrete rendering of the two degrees target and was mobilised to reshape the financial sector discourse on climate change. It is based on a participant observation of a UNEP FI and GHG Protocol standard-setting project, insights from which were investigated further through 18 semi-structured interviews. Framing the carbon budget as a mediating instrument (Miller and O'Leary 2007), the chapter argues that the two degrees target was rendered into a more concrete form (Morgan and Morrison 1999) and that it was mobilised to mediate between ideas of investment risk, financial stability and divestment (Wise 1988). The chapter specifically builds on O'Sullivan and O'Dwyer's (2015) study of how an NGO movement, over time, enhanced social responsibility and reporting practices in project finance activities. In particular, this chapter shows how civil society actors – such as think tanks, campaigning-NGOs, disclosure groups and standard setters – envisaged a carbon-constrained future (*cf.* Busch and Hoffmann 2007; Bebbington and Larrinaga-González 2008, p.707) through the carbon budget, generating concerns of the vulnerability of capital markets to the transition to a low-carbon economy.

Prior sustainable finance literature has explored the intersection of the sustainability agenda with the financial sector, with academic studies in the 1990s investigating how investment appraisals responded to environmental legislation (Coulson and Dixon 1995; Coulson and Monks 1999). Recent attention has been directed at the influence of NGO campaigns in driving sustainability issues into capital markets (Waygood 2006; Coulson 2009; Wilson 2010) and the dialogue between NGOs and investors (Coulson

2009; Gond and Piani 2013). In particular, within this stream of research, the Equator Principles became a prime site for investigating how NGOs pressure financial organisations to adhere to environmental and social criteria in their project finance activities (Wright 2009; O'Sullivan and O'Dwyer 2009; Macve and Chen 2010; Meyerstein 2011; O'Sullivan and O'Dwyer 2015). However this focus on the Equator Principles has focussed research on project finance, which constitutes a small portion of investment and lending activities.[67] Moreover, O'Sullivan and O'Dwyer (2015) call for research into the evolution of the NGO movement surrounding the Equator Principles, specifically with regards to the integration of human rights and climate change into investment and lending activity (O'Sullivan and O'Dwyer 2015, p.51).

This chapter responds to O'Sullivan and O'Dwyer's (2015) call by examining the movements influencing discourses at the intersection of climate change and finance. On the one hand, the chapter demonstrates how BankTrack – the global network of campaigning-NGOs studied by O'Sullivan and O'Dwyer – maintained pressure on commercial banks to develop and implement reporting practices for GHG emissions (Section 5.3.2.). This is consistent with O'Sullivan and O'Dwyer's argument that, over time, BankTrack achieved deeper concessions on social responsibility from commercial banks (Ibid., p.50) and supports their nuancing of Archel *et al.* (2011), who argue that civil society actors can only achieve second-order concessions. On the other hand, this chapter highlights an emerging strategy adopted by civil society actors to enrol the carbon budget in arguments of risks and financial stability to establish a vision of a carbon-constrained future (Busch and Hoffmann 2007; Bebbington and Larrinaga-González 2008, p.707). Furthermore, their efforts frame climate change as a systemic threat across investment and lending activities. In particular, Carbon Tracker[68] and Ceres[69] mobilised the carbon budget and framed it as posing impairment risk to

[67] O'Sullivan and O'Dwyer (2015) notes that project finance "represented less than 5 per cent of commercial bank activities" (O'Sullivan and O'Dwyer 2015, p.43).

[68] Carbon Tracker is a London-based non-profit think tank, launched in 2009, that produces reports on the risks of climate change to the financial sector.

[69] Ceres is a non-profit sustainability advocacy organisation that aims to bring together businesses, financial organisations and public interest groups to develop and promote the adoption of sustainable business practices. Initiating the Global Reporting Initiative (GRI) is among its major accomplishments, as well as founding the Investor Network on Climate Risk, made up of 100 leading institutional investors.

investments in carbon-intensive sectors (Section 5.3.1.) as well as a threat to financial stability (Section 5.4.).

As such, where Archel *et al.* (2011) and O'Sullivan and O'Dwyer (2015) focus on civil society actors that engage in enhancing corporate reporting (also see Cooper and Owen, 2007), this chapter shows how civil society actors worked to mobilise the carbon budget as the foundation for discourse centring on the vulnerability of capital markets to climate change. In particular, it highlights that the work of civil society actors is interwoven with state-backed objectives (i.e. the two degrees target) as well as their relationships with market participants (Chandhoke 2002). On the one hand, they build upon the 2010 UNFCCC commitment to the two degrees target and shape the agendas of financial regulatory authorities; and on the other hand, they mobilise the carbon budget through a risk and financial stability framing in attempts to appeal to the concerns of financial sector actors. It is in this regard that civil society actors take on a quasi-regulatory role: shaping regulatory conditions to catalyse pre-emptive adaptation to the envisaged regulatory agenda of the state and to prompt a realignment of capital markets by rendering an abstract and complex issue into a form to be integrated into the existing strategies of financial organisations and regulators. To develop this contribution to the ongoing debate (Cooper and Owen 2007; Archel, Husillos, and Spence 2011; O'Sullivan and O'Dwyer 2015), the chapter analyses the carbon budget as a mediating instrument (Miller and O'Leary 2007), which was mobilised by civil society actors as it became enrolled in arguments that climate change poses a systemic threat to capital markets.

Analysing the carbon budget as a mediating instrument (Miller and O'Leary 2007) frames it as a relatively fixed and common vision of the constraints under a two degrees scenario, towards which expectations and actions are aligned. The carbon budget embeds ideas of investment risk, financial stability and the imperative for climate action, providing financial organisations and regulators as well as grassroots climate movements with a common vision of a carbon-constrained future that is seen through different lenses by each. However this chapter examines how the carbon budget "[came] to embed distinct and possibly competing ideas into an operating ensemble" (Kurunmäki and Miller 2011, p.222). Indeed, where earlier studies have examined the maintenance of mediation in practice (Jordan, Jørgensen,

and Mitterhofer 2013; Jordan, Mitterhofer, and Jørgensen 2016), this chapter examines the construction of an instrument and its mediating role through the work of civil society actors. In this regard it also nuances the finding that there is a "preference to select the known and the mundane as mediating instruments" (Thomson, Grubnic, and Georgakopoulos 2014, p.471) by emphasising the work involved in framing the carbon budget in a manner familiar to financial organisations and regulators as well as grassroots activists. Where Thomson *et al.* (2014) focus on the influences shaping 'selection' of mediating instruments, this chapter focuses on the work through which mediating instruments are connected to the concerns of diverse actors. Through this, the chapter argues that civil society actors produced a vision of climate change that posed a systemic threat to capital markets, and that their work was based on the foundation of the carbon budget as a more concrete representation of the two degrees target.

This chapter analyses the carbon budget is in two stages. First, the carbon budget constructed by Carbon Tracker forms a bridge between the "abstract and idealised" (Morgan and Morrison 1999, p.30) two degrees target and a "level of concrete detail" (Ibid.), such as the carbon emissions potential of fossil fuel reserves. This enabled Carbon Tracker to compare the achievement of the two degrees target with the 'potential' carbon emissions of proven fossil fuel reserves and to show that only 20% of those reserves could be burned to remain within the carbon budget. Second, the carbon budget was enrolled in arguments tailored to: financial organisations that the future impairment of fossil fuel reserves posed investment risks (Sections 5.2.1. and 5.3.1.); financial regulators that the current mispricing of this risk posed a threat to capital market stability (Section 5.4.); and grassroots activists that a divestment campaign to oppose the fossil fuel industry was 'urgent' (Section 5.3.3.). While each group came to see the future envisaged by the carbon budget through different lenses (*cf.* Wise 1988), each began applying their expertise to potential responses to a two degrees scenario. The work of civil society actors is, in this regard, seen as assembling and adjusting instruments and ideas (Hacking 1992) to link an abstract issue such as climate change to the concrete level of investment decisions. Furthermore, by applying the mediating instruments concept to analyse the concretion of a specific issue on the sustainability agenda, the chapter responds to Unerman and Chapman's

(2014) call for further theoretical development in this arena "characterized by added layers of complexity and unpredictability on top of the already very complex economically-focused accounting practices" (Unerman and Chapman 2014, pp.386–387. Also see O'Dwyer and Unerman 2016).

This chapter proceeds as follows. Section 5.1 examines the refinement of the two degrees target into a set of emission budgets that can be compared to the carbon potential of proven fossil fuel reserves. Section 5.2 focuses on Carbon Tracker's notion of the 'carbon budget', its framing as posing investment risks, and how this compared to prior notions of climate risk in the financial sector. Section 5.3 addresses the mobilisation of the carbon budget as one of the pressures on financial organisations to integrate a climate change framing in their investment and lending decisions. Section 5.4 details the response of financial regulators to the idea of climate risk, and Section 5.5 provides a discussion before Section 5.6 concludes the chapter.

5.1. Emission Budgets for 2°C and the Carbon Potential of Fossil Fuel Reserves

In 2009 *Nature* published Meinshausen *et al.*'s attempt to quantify "GHG emission budgets for the 2000–50 period that would limit warming throughout the twenty-first century to below 2°C" (Meinshausen et al. 2009, p.1158). 2°C was selected as the threshold on the grounds that "[m]ore than 100 countries [had] adopted a global warming limit of 2°C or below (relative to pre-industrial levels) as a guiding principle for mitigation efforts to reduce climate change risks, impacts and damages" (Ibid.). On the one hand, the study set out to enhance the limited scientific knowledge regarding the GHG emissions corresponding to warming targets. On the other hand, the authors sought to compare the GHG emissions potential of proven fossil fuel reserves[70] with efforts to limit warming to 2°C or below. However the former had only been quantified in terms of the cumulative CO_2 emissions from "burning all proven fossil fuel reserves" (Ibid., p.1160). By calculating emission budgets,

[70] The study defines proven fossil fuel reserves as "the fraction of fossil fuel resources that is economically recoverable with current technologies and prices" (Meinshausen et al. 2009, p.1160).

the authors bridge between warming targets and fossil fuel usage, representing 2°C in terms of a maximum levels of cumulative GHG emissions.

However the emission budgets are far from mirrors of the two degrees target. Rather, they are based on particular models of the climate system that enable the rendering of the two degrees target into a type of information compatible with analyses of fossil fuel reserves. Indeed, such models had been developed through research into 'carbon budgets' as early as the 1980s, where the term 'carbon budget' pertained to the levels of GHGs in the atmosphere, oceans and land (Bouwman 1989). By studying the sources of emissions and the 'sinks' that absorbed them, this literature sought to enhance predictions of future concentrations of greenhouse gases and their impact on the rate and extent of climate change (R. A. Houghton 2007). Meinshausen *et al.* note the "wide variety of modelling approaches" (Ibid., p.1158) used in studies of the climate response to GHG emissions, presenting 19 published climate sensitivity probability distributions to illustrate this (see Figure 5.1). "For illustrative purposes" the authors select one approach as their default, which "closely resembles the [IPCC's Fourth Assessment Report] estimate (best estimate, 3°C; likely range, 2.0-4.5°C)" (Ibid.) and is presented as being nested among the other 18 approaches (see Figure 5.1).

Second, rather than presenting a single figure for the emission budget for 2°C, the uncertainties inherent in climate modelling necessitate emission budgets for different probabilities of exceeding 2°C. Furthermore, cumulative emission budgets are calculated for both CO_2 as well as the wider set of gases covered by the Kyoto Protocol (CO_2, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and SF_6), with the non-CO_2 Kyoto gases estimated to constitute approximately one-third of total emissions over first half of the twenty-first century (Ibid. p.1158). Tabulating their results for emissions budgets (see Figure 5.2), the authors also include the probabilities of exceeding 2°C for levels of annual Kyoto-gas emissions at both 2020 and 2050. In this regard the table presents an overall limit to cumulative GHG emissions alongside waypoints at 2020 and 2050 for annual emissions levels that are consistent with different probabilities for exceeding 2°C of warming.

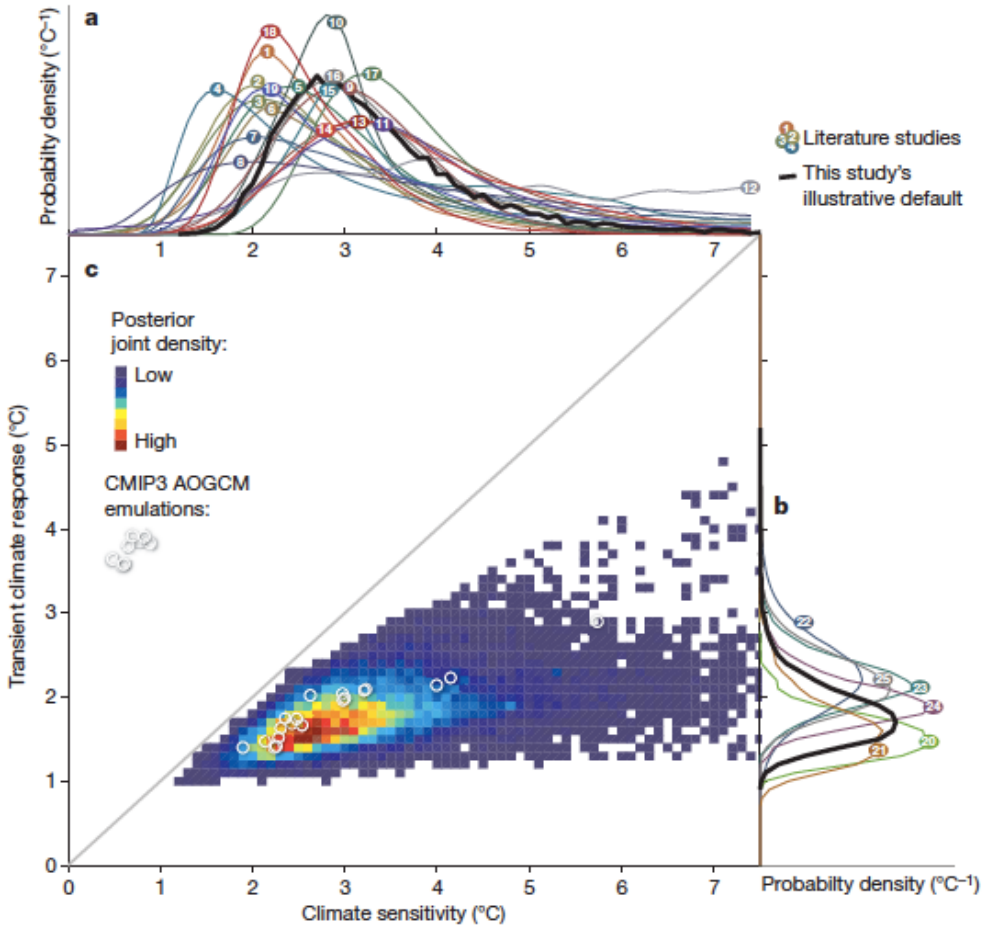


Figure 5.1: "Joint and marginal probability distributions of climate sensitivity and transient climate response. a, Marginal probability density functions (PDFs) of climate sensitivity; b, marginal PDFs of transient climate response (TCR); c, posterior joint distribution constraining model parameters to historical temperatures, ocean heat uptake and radiative forcing under our representative illustrative priors" (Meinshausen et al. 2009, p.1159).

Having quantified the CO_2 emission budgets, the authors framed the impact of burning proven fossil fuel reserves in terms of the two degrees target. Based on existing literature, the authors derived a mid-estimate for burning all proven fossil fuel reserves of 2,800Gt (Gigatons) CO_2 emissions, with a corresponding uncertainty range of 2,541 to 3,089 Gt CO_2 (Ibid., p.1160). Comparing this to the CO_2 emission budgets, the authors conclude that "[e]mitting the carbon from all proven fossil fuel reserves would therefore vastly exceed the allowable CO_2 emission budget for staying below 2°C" (Ibid.). This is stated somewhat more cautiously in their introduction where they write that (after subtracting the 234 Gt CO_2 emitted between 2000-06 from the emission budgets) "less than half the proven economically recoverable oil, gas and coal reserves can still be emitted up to 2050 to achieve such a goal [the two degrees target]" (Ibid., p.1158).

Probabilities of exceeding 2 °C

Indicator	Emissions	Probability of exceeding 2 °C*	
		Range	Illustrative default case‡
Cumulative total CO_2 emission 2000–49	886 Gt CO_2	8–37%	20%
	1,000 Gt CO_2	10–42%	25%
	1,158 Gt CO_2	16–51%	33%
	1,437 Gt CO_2	29–70%	50%
Cumulative Kyoto-gas emissions 2000–49	1,356 Gt CO_2 equiv.	8–37%	20%
	1,500 Gt CO_2 equiv.	10–43%	26%
	1,678 Gt CO_2 equiv.	15–51%	33%
	2,000 Gt CO_2 equiv.	29–70%	50%
2050 Kyoto-gas emissions	10 Gt CO_2 equiv. yr^{-1}	6–32%	16%
	(Halved 1990) 18 Gt CO_2 equiv. yr^{-1}	12–45%	29%
	(Halved 2000) 20 Gt CO_2 equiv. yr^{-1}	15–49%	32%
	36 Gt CO_2 equiv. yr^{-1}	39–82%	64%
2020 Kyoto-gas emissions	30 Gt CO_2 equiv. yr^{-1}	(8–38%)†	(21%)†
	35 Gt CO_2 equiv. yr^{-1}	(13–46%)†	(29%)†
	40 Gt CO_2 equiv. yr^{-1}	(19–56%)†	(37%)†
	50 Gt CO_2 equiv. yr^{-1}	(53–87%)†	(74%)†

* Range across all priors reflecting the various climate sensitivity distributions with the exception of line 12 in Fig. 3a.
† Note that 2020 Kyoto-gas emissions are, from a physical perspective, a less robust indicator for maximal twenty-first century warming with a wide scenario-to-scenario spread (Supplementary Fig. 1c).
‡ Prior chosen to match posterior of ref. 19 with uniform priors on the TCR.

Figure 5.2: Probabilities of exceeding 2°C and corresponding emission budgets (Meinshausen et al. 2009, p.1161).

The carbon budget, as a more concrete representation of the two degrees target, made it possible to analyse the potential implications for the fossil fuel industry of a carbon-constrained future. Rather than an abstract goal for the 21st century, the budgets detail various limits on cumulative and annual GHG emissions for remaining within a two degrees scenario. However while the Meinshausen *et al.* (2009) analysis provided a scientific bridge between the two degrees target and the GHG potential fossil fuel reserves, it was the adoption of a single figure as the 'carbon budget' that provided a seemingly simple foundation for arguments on the vulnerability of the financial sector to the transition to a low-carbon economy. It is to this simplification and mobilisation of emission budgets that this chapter now turns.

5.2. Connecting Emission Budgets to Finance

The following two sections (Sections 5.2 and 5.3) focus on the refinement of emission budgets into the carbon budget, and how its apparent simplicity was central to arguments on the investment risks and threats to financial stability posed by efforts to tackle climate change. Particular attention is paid to the work of civil society actors in constructing the idea of a carbon-constrained future and its implications both for financial organisations and financial regulatory authorities. This is in contrast to Section 5.1, which framed emissions budgets as technical bridges between the two degrees scenario and the more concrete matter of fossil fuel reserves. This section, Section 5.2, centres on 'the carbon budget'; the use of one figure drawn from Meinshausen *et al.*'s (2009) emission budgets to analyse the investment risks of a two degrees scenario. Furthermore, it attends to how arguments based on the carbon budget were tailored to the concerns of financial organisations and regulators. Section 5.3 turns its attention to the initiatives that enrolled the carbon budget in movements to integrate climate change into existing risk management systems and new regulations in the financial sector.

5.2.1. The Carbon Budget

In 2011 the Carbon Tracker Initiative (hereafter Carbon Tracker), a London-based non-profit think tank, released what would become their landmark report, *Unburnable Carbon: are the world's financial markets*

carrying a carbon bubble? (Carbon Tracker 2011). Carbon Tracker was the first project of the non-profit company Investor Watch, which was founded in 2009 with the mission to "align the capital markets with efforts to tackle climate change" (YourSRI 2016). With finance from The Rockefeller Brothers Fund – a philanthropic foundation established in 1940 to coordinate the Rockefeller Family's charitable efforts – Carbon Tracker set out to "provide the financial and regulatory analysis to ensure that the risk premium associated with fossil fuels is correctly priced" (Carbon Tracker Initiative 2015). Senior individuals at Carbon Tracker[71] presented themselves as 'ex-bankers' and economists with the technical skills to produce robust reports. Climate change, to their team, was a problem to be tackled through economic transition; a transition away from carbon-intensive modes of production and towards investment in emerging low-carbon technologies. Reconfiguring capital markets to support this transition was central to the arguments presented in their 2011 *Unburnable Carbon* report:

> "[T]oday's financial architecture is not fit for purpose to manage the transition to a low-carbon economy and serious reforms are required to key aspects of financial regulation and practice firstly to acknowledge the carbon risks[72] inherent in fossil fuel assets and then take action to reduce these risks on the timeline needed to avoid catastrophic climate change." (Carbon Tracker 2011, p.i)

This 2011 *Unburnable Carbon* report based its analysis of a carbon-constrained future on the Meinshausen *et al.* (2009) findings. It further reinforced the two degrees target as a long-term objective for climate change by opening its analysis with: "The Cancun Agreement in December 2010 captured an international commitment to limit global warming to two degrees Celsius (°C) above pre-industrial levels" (Carbon Tracker 2011, p.6). However the *Unburnable Carbon* report did not analyse the range of emission budgets calculated by the Meinshausen *et al.* study. Rather it focussed solely on the budget for limiting the chance of exceeding two degrees of warming to 20%, which it termed the 'carbon budget'. It did not mention the other three CO_2

[71] As a participant observer of the UNEP FI and GHG Protocol's standard-setting project, the Financed Emissions Initiative, there were multiple opportunities to engage with two senior individuals at Carbon Tracker.

[72] This chapter refers to 'climate risk' regarding the range of physical, legal, reputational and market risks stemming from climate change. 'Carbon risk', on the other hand, is a term that started to be used specifically for the risks stemming from future carbon constraints (this latter term features more prominently in Chapter 6).

budgets in the Meinshausen *et al.* study or that the study had adopted 20% as the 'illustrative default' for the 8-37% probability range of exceeding 2°C. Instead, the foundation of the report was conveyed through the simple statement: "To reduce the chance of exceeding 2°C warming to 20%, the global carbon budget for 2000-2050 is 886 [gigatons of carbon dioxide ($GtCO_2$)]" (Carbon Tracker 2011, p.2). It was complicated only to highlight that more than a third of that had already been emitted: "Minus emissions from the first decade of this century, this leaves a budget of 565 $GtCO_2$ for the remaining 40 years to 2050" (Ibid.). This image, portrayed at the outset of the *Unburnable Carbon* report, envisioned a carbon-constrained future that conveys the two degrees scenario through the more concrete form of 565 $GtCO_2$.

Following the Meinshausen *et al.* (2009) argument, the *Unburnable Carbon* report notes that "the Earth's known fossil fuel reserves comes to 2795 $GtCO_2$ […] equivalent to nearly 5 times the carbon budget for the next 40 years" (Carbon Tracker 2011, p.2). However it refines this figure into the fossil fuel reserves held by *listed* oil, gas and coal companies to increase its compatibility with financial analysis of capital markets:

> "The fossil fuel reserves held by the top 100 listed coal companies and the top 100 listed oil and gas companies represent potential emissions of 745 $GtCO_2$. […] On top of this further resources are held by state entities. Given only 20% of the total reserves can be used to stay below 2°C, if this is applied uniformly, then only 149 of the 745 $GtCO_2$ held by listed companies can be used unabated." (Carbon Tracker 2011, p.2)

The construction of these two figures – the carbon budget and the carbon potential of reserves held by major listed oil, gas and coal companies – creates a point of comparison between the two degrees target and listed fossil fuel reserves. Yet the implications of this comparison for investment hinges on the crucial assumption that policies are designed and implemented to achieve the two degrees target. Briefly noting this assumption before stating its bold conclusion, the report reads:

> "*If the 2°C target is rigorously applied*, then up to 80% of declared reserves owned by the world's largest listed coal, oil and gas companies and their investors would be subject to impairment as these assets become stranded." (Carbon Tracker 2011, p.2. Emphasis added.)

By assuming a 'rigorous application' of the two degrees target, Carbon Tracker argues that regulations to restrict the burning of fossil fuels to remain within the carbon budget 'will' result in impairment of those reserves and of investments in companies whose valuations are based on their reserves. This assumption was stated at a time, as Chapter 4 has shown, when the two degrees target was challenged on grounds that ranged from its scientific feasibility to the likelihood of policy implementation to achieve it. The report, however, sets this question aside and focuses on the three steps through which they build their idea of climate risk: to achieve the two degrees target, there is a finite carbon budget, which exceeds the carbon potential of fossil fuel reserves.

However this is not to say that Carbon Tracker's logic went unchallenged. In presentations during the Financed Emissions Initiative and those at major climate conferences (such as the 2013 UNEP FI Global Roundtable and the 2015 Investor Climate Summit held during Paris Climate Week, among others[73]) questions ranged from the impact of Carbon Capture and Storage (CCS)[74] on the percentage of reserves that could be used to the carbon budget for a three degrees scenario. From the responses observed, the Carbon Tracker team argue that from their investigations current CCS technology would make a negligible difference and that in a three degrees scenario more of the reserves, but by no means all, can be used. Furthermore, the team frames their chosen numbers as prudent because, they argue, states are likely to burn their own reserves while regulating the use of those held by private companies. The point is that, while it is impossible to know whether the two degrees target will be achieved, Carbon Tracker argued that their analysis of climate risk applies to different variations of the transition to a low-carbon economy. In doing so, the *Unburnable Carbon* report creates a foundation for arguments stemming from the climate risks that capital markets overlook. As an Executive Director at a large ratings agency remarked when reflecting on why their clients started asking about climate risk:

[73] See Appendix 3B for details of participant observation conducted at climate events outside the Financed Emissions Initiative.

[74] CCS refers to technologies designed to capture CO_2 emissions produced from the use of fossil fuels, preventing the gases from entering the atmosphere. The captured carbon is then stored, for example, in depleted oil and gas fields.

> "To be honest there is a big marketing thing to the way thematic issues emerge. There is a messaging angle, and if the message is convoluted then you don't get traction from people. And if don't get traction from people you don't get traction from institutions […] The thing that happened with climate that broke a lot of this open is the Carbon Tracker work on, you know: 'there's a finite carbon budget, our reserves exceed that budget, what's going to happen to the rest?' It's like putting numbers to a bit of very clean narrative. When you try it out with something social like global inequality it's really complex and, you know, there isn't a simple enough narrative that just immediately grabs someone." (Interview: Eag1516)

The above interview was conducted in 2015, and the interviewee acted as if rehearsing an old argument with her line "'there's a finite carbon budget, our reserves exceed that budget, what's going to happen to the rest?'" It should be noted that by 2015 there was already widespread awareness of the *Unburnable Carbon* report, so it is perhaps unsurprising the interviewee felt it almost unnecessary to repeat the argument. Yet this highlights the point that the apparent simplicity of the argument and firmness of the carbon budget became mutually reinforcing. Following up on how the interviewee would think about climate change if the idea of a two degrees scenario didn't exist, the Executive Director responded:

> "[…] To actually do something about [an issue], it has to be quantifiable, and I think there has to be a story or a link to risk and opportunity for it to really catch on. […] I mean finance doesn't model sentences and paragraphs and essays and opinions. You need finite assumptions that are quantitative in nature to anchor an argument or to do a scenario test. So with the two degrees scenario piece, I don't think anyone cares what the actual number is for the global carbon budget. It could be like 800 gigatons or it could be 920, I don't know, but it is the fact that there is a framing of it that helps." (Interview: Eag1516)

The interviewee starts out by stating that both a narrative and a quantitative base are needed to talk about an issue. On the one hand, the narrative is not compatible with the models, which is why numbers are needed. On the other hand, the narrative of the conversation is anchored by the existence of a number. The two appear as co-constitutive, with the narrative being unanchored without a number, and the number requiring a narrative to "catch on". It is the combination of the carbon budget and a logic of climate risk that renders the two degrees target into a type of information

that can connect specifically to the investment strategy of a financial organisation. Furthermore, as a conference presenter during the May 2015 Paris Climate Week noted, the *Unburnable Carbon* report (to restate its full title: *Unburnable Carbon: are the world's financial markets carrying a carbon bubble?*) was built on a post-financial crisis lexicon. A senior manager at a US sustainability coalition of investors echoed this sentiment:

> "Whoever it was who first came up with the concept of the carbon budget [...] couldn't have come up with it at a better time because, at least in the US, the 2008 collapse is still so fresh in people's consciousness. This idea of having these assets that no one really understands how to value and are, in a sense, hidden – not only in the metaphoric way but are also hidden underground – is something that I think really captured people's imagination and really was something that they could rally around" (Interview: Eag1522).

The narrative of the carbon budget was not only about risks to investments, it was also about potentially systemic risks (i.e. a 'carbon bubble') that had been overlooked by financial organisations as well as financial regulatory authorities. Yet the role of Carbon Tracker in developing the notion of climate risk must not be overstated. The idea of climate risk pre-dated Carbon Tracker's *Unburnable Carbon* report, and one of the organisations at the core of climate risk debates since the early-2000s, Ceres (the Coalition for Environmentally Responsible Economies), came to collaborate with Carbon Tracker to mobilise its new arguments about climate risk.

5.2.2. Ceres and Climate Risk in the Early-2000s

> "I mean to be honest we feel like we coined the term climate risk. That was around 2002 [...] We really tried to lay out climate change much more from an economic and risk standpoint than had been done before, and yeah it resonated pretty well. We managed to get a lot of media attention and we worked with a bunch of investors" (Interview: Eag1523)

The director quoted above, from a prominent US-based non-profit organisation, presented their role in rendering climate change into an economic and risk register as a pioneering move. Appearing proud that "it resonated pretty well", his NPO benefited from the traction of their argument with both the media as well as investors. While Ceres was founded in 1989, its work on creating an economic and risk framing of climate change began in the early 2000s, with 2001 seeing the publication of their first climate risk report,

Value at Risk: Climate Change and the Future of Governance (Ceres and Innovest 2002). At this time "staff at Ceres [were thinking] about the different issues that investors and Ceres could work on" (Interview: Eag1515), and through discussions with investors, "climate change came up as one of the most important serious issues and one that has financial effects, risks and opportunities for investors" (Interview: Eag1515). Working at the interface of sustainability and finance, climate risk presented an opportunity for Ceres to engage with financial organisations on developing sustainable business practices. Climate change was an issue that could be rendered into a language of risk and opportunity, with Ceres' *Value at Risk* report reframing the issue in terms of its physical risks – either directly to operations or through more widespread disruption – and the potential risks of any future mitigation policies aimed at reducing GHG emissions – such as cap-and-trade mechanisms or carbon taxation schemes.

However, in the early 2000s, the idea of climate risk was in its infancy and many investors were uninterested in the issues or "just didn't know what to do with this information" (Interview: Eag1515). Even those investors that engaged with the discussion "ten years ago were just thinking 'Does this affect my investment decisions in any way, can I get external managers who manage money for me to consider this issue?'" (Interview: Eag1515). The main point that investors were interested in was "which particular industries are vulnerable and maybe even which regions of the country are vulnerable". Yet uncertainty over the timing, location and magnitude of physical impacts of climate change, as well as the possible mitigation policies for reducing GHG emissions, meant these questions were difficult to answer. As such, the client advice offered by investment advisory firms "was really about being ethical, not about managing long-term risk […] [because] there was less awareness or less acceptance that these factors impacted investments in a material way" (Interview: Eag1516). This interviewee's organisation, on the other hand, "was really about [a] materiality driven approach, which in the early year-2000s people thought was silly." Indeed, while Ceres was a leading organisation in the climate risk discourse in the early-2000s, the idea primarily had traction and was developed through their working relationships with investors. This was coordinated through their newly formed Investor Network on Climate Risk (INCR):

> "In the early 2000s Ceres came up with the idea of founding the Investor Network on Climate Risk and doing an investor summit with the United Nations. […] Their investor summits helped a lot, and investors also learned through working with Ceres. Participating on working groups is a big part of investors' work, and since even before 2002 that has involved filing shareholder resolutions to companies on energy and climate change and related issues. That's where most of the investors put most of their time and […] I think that's where investors learn the most – by engaging with companies, and then continuing to work with Ceres on different projects" (Interviewee: Eag1515).

The INCR and its investor summits developed a structured engagement between Ceres and investors, with summits providing a forum to familiarise investors with emerging ideas and with working groups entailing a longer engagement to develop understandings of specific aspects of climate risk. A senior manager with experience within investor networks such as INCR remarked that investors who "have been engaged on climate risk since 2001 […] are kind of what I would call 'true believers' in terms of climate change. They really believe and acknowledge that climate creates lots of risks – economic, financial and physical – and they've been pushing companies to do something about that for a while" (Interview: Eag1522). Yet, outside this group of investors that became closely connected through Ceres' INCR, climate risk only appeared to begin permeating discussions in the early-2010s. At this time, Ceres had begun collaborating with Carbon Tracker on their framing of climate risk in the financial sector. Carbon Tracker's *Unburnable Carbon* arguments had captured the imagination of senior figures at Ceres with, according to a senior manager at a US sustainability coalition, "Ryan Salmon and Andrew Logan [from Ceres] reaching out to James Leaton and Anthony Hobley, who were two of the main folks at [Carbon Tracker], and began talking with them about what could be done to galvanise some action around this issue" (Interview: Eag1522). It was through this collaboration that the carbon budget was initially mobilised in the financial sector discourse on climate change, to which this chapter now turns.

5.3. Mobilising the Carbon Budget

> "Within a year after the Carbon Tracker Initiative was founded, I spoke to James Leaton [Carbon Tracker's Research Director] in New York, […] and I think my thought at that

> time was, 'Well this is a great argument but are you going to make it real? How are you going to get people to act on the information?' Because at the beginning the information was just that the science doesn't agree with company actions. In other words, 'a scientist says 2°C is the most that we can allow the climate to change and corporations, specifically fossil fuel corporations, have too much reserves and they are going to go over the carbon budgets'. And I thought 'That's a really intriguing argument, but how is that going to lead to action?'" (Interview: Eag1515)

Sections 5.1 and 5.2 focussed on how the two degrees target became connected to pre-existing ideas of climate risk, with Section 5.2 also noting some interaction between civil society actors and investors on climate change. This section focuses specifically on how the carbon budget and its narrative were mobilised and came to reconfigure the idea of climate risk, while also becoming connected to concerns of its threat to financial stability as well as serving as a foundation for an emerging grassroots divestment movement targeted at fossil fuel companies. As the senior manager of a non-profit organisation quoted above commented, the *Unburnable Carbon* report by itself presented a new argument about the intersection of climate change and the financial sector. Yet it was through the work of civil society actors to mobilise the carbon budget that it came to mediate between the concerns of financial organisations and regulators as well as climate activists.

5.3.1. Ceres and Carbon Tracker Collaborate on Climate Risk

The discussions between leading figures at Ceres and Carbon Tracker gave birth to a collaboration aiming to stimulate action on climate risk. As one interviewee remarked "Carbon Tracker was essentially providing data" (Interview: Eag1522) while Ceres used its INCR and investor summits to raise awareness of Carbon Tracker's analysis:

> "I think in terms of investors getting really engaged in the Carbon Tracker work, Ceres did a lot of webinars designed for investors to join, and listen to, on the initial [*Unburnable Carbon*] report. And you are talking about over 100 investors that are part of the Investor Network on Climate Risk. And so getting access to [investors] through the webinars – but also through direct meetings at the Ceres conferences and other events that were being convened primarily in New York City but also in other financial hubs around the US – was part of it." (Interview: Eag1522)

The Carbon Tracker argument was not confined to the pages of the *Unburnable Carbon* report. Webinars served as a forum to familiarise

investors with the analysis and senior figures at Carbon Tracker became regular and prominent speakers at climate conferences beyond those organised by Ceres. As noted in Section 5.2, presentations provided Carbon Tracker with the opportunity to be challenged by investors and to defend the logic that underpinned their idea of climate risk. However the collaboration went beyond providing a platform to espouse the reconfigured idea of climate risk, "[Ceres, Carbon Tracker] and a couple of the more active investors [in the INCR] discussed the idea of creating a letter and sending that out to some of the companies that were most likely to be impacted" (Interview: Eag1522). Named the *Carbon Asset Risk Initiative*,[75] Carbon Tracker and Ceres leveraged the backing of 75 institutional investors – managing a total of $3 trillion of collective assets (Ceres 2013) – to confront the boards of 45 leading coal, oil and gas corporations on their investment strategies and plans for a two degrees scenario (See Figure 5.3 for a diagrammatic representation of the relationships and interactions). Carbon Tracker's idea of climate risk was at the core of the letter sent to these companies:

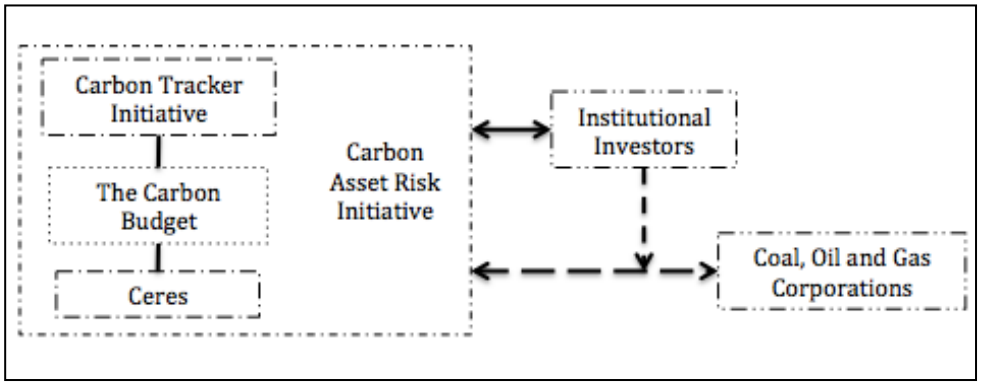


Figure 5.3: The Carbon Asset Risk Initiative, its engagement with institutional investors and its dialogue with fossil fuel corporations that was backed by institutional investor support.

> "As investors with diversified portfolios, we recognize the critical importance of having affordable energy to support economic growth. We also recognize that more than 80% of the world's growing energy demand is currently met by fossil fuels, but that to achieve the 2˚C goal, fossil fuel-related GHG emissions will have to be reduced by about 80% by 2050. It is therefore important to understand how current and probable future policies to make these emissions reductions will impact capital expenditures and current assets in the oil

[75] Carbon asset risk is explained by the WRI as a "type of financial risk is driven by non-physical factors during the transition to the low-carbon economy: changing public policy and private sector regulation, rapidly evolving technologies, unpredictable economic markets, and shifting public opinion" (WRI 2015). From observations, the term appeared to be used interchangeably with 'carbon risk'.

> and gas sector and how the physical impacts of unmitigated climate change will impact the sector's operations" (Carbon Tracker Initiative and Ceres 2013).

Through these letters the carbon budget narrative was framed as a challenge to the investments and assets of fossil fuel companies. With the support of institutional investors, Carbon Tracker and Ceres called for transparency regarding exposure to "risks associated with current and probable future policies for reducing GHG emissions by 80% by 2050 to achieve the 2°C goal" as well as those of "increasing extreme weather associated with the world's current path to a warming of 3.6°C or more" (Carbon Tracker Initiative and Ceres 2013). Moreover, the letters called for concrete responses that detailed the "options there are for (insert company name) to manage these risks by, for example, reducing the carbon intensity of its assets, divesting its most carbon-intensive assets, diversifying its business by investing in lower-carbon energy sources, or returning capital to shareholders" (Carbon Tracker Initiative and Ceres 2013).

In this regard, the Carbon Asset Risk Initiative prompted efforts to understand the implications of a carbon-constrained future by challenging the investment practices of fossil fuel companies. Furthermore, it pressured those companies to develop means of analysing their operations in terms of a two degrees scenario as well as the current path of at least 3.6°C of warming. That is, it pushed for fossil fuel companies to being experimenting and tinkering (Gooding 1992) with ideas and instruments to link the two degrees target to the specifics of their operations. Indeed, the initiative did not attempt to construct a technical bridge between the carbon budget (or the two degrees target) and the investment decisions of fossil fuel companies. Rather, whereas the carbon budget *refined* the two degrees target into a more concrete representation, the Carbon Asset Risk Initiative called on fossil fuel companies to develop their own practices for analysing concrete operations in terms of the two degrees target. This exposed a particular application of fossil fuel companies' knowledge to the two degrees target (albeit one for public consumption) and, in doing so, it engaged them in a dialogue focussed on the potential implications of a carbon-constrained future. To illustrate this it is worth considering Royal Dutch Shell plc. and ExxonMobil's responses to the letters.

Shell's statement to the Carbon Asset Risk Initiative was premised on "the view in the recent Intergovernmental Panel on Climate Change ("IPCC") Report that there is a high degree of confidence that global warming will exceed 2°C by the end of the 21st century" (Royal Dutch Shell plc. 2014, p.1). It argued that scenarios based on the current proposed GHG mitigation policies (one produced by Shell and the other by the IEA) "do not limit emissions enough to be consistent with the back-calculated 450 ppm 2°C scenario. We also do not see governments taking the steps now that are consistent with the 2°C scenario" (Royal Dutch Shell plc. 2014, p.6). Yet Carbon Tracker, whose idea of climate risk is malleable regarding the warming scenario applied, retorted that "Shell has missed an opportunity to explain to its shareholders how its capital expenditure plans are resilient to the impending energy transition" (Carbon Tracker Initiative and Energy Transition Advisors 2014). Carbon Tracker presented action on climate change as being inevitable, scorning Shell's response "as classic a case of Orwellian double think as you are likely to find" as it "[acknowledges] the seriousness of the climate challenge whilst at the same time asserting no effective action will be taken until the end of the century" (Ibid.). Specifically, the "no effective action" element of this criticism condemns Shell's choice of scenarios. These were based on the current policy landscape and did not include assumptions regarding the strengthening of policy responses to climate change over time. In contrast, Carbon Tracker's *Unburnable Carbon* report is premised on the assumption that enhanced policy intervention is inevitable, and that shareholders should be concerned that Shell dismissed the potential of economic transition.

Ceres, however, focussed less on maintaining Carbon Tracker's idea of climate risk and more on enhancing the traction of their institutional investor support in prompting changes to fossil fuel companies' investment strategies. Andrew Logan, Director of Ceres' Oil and Gas Program, was quoted in a statement on the ExxonMobil response saying, "[m]oving forward, Ceres and Investor Network on Climate Risk will be looking for concrete commitments by companies to avoid making riskier investments in the most carbon-intensive assets, which would demonstrate the companies' ability to adapt as the world transitions to a low-carbon economy" (Arjuna Capital and As You Sow 2014). This maintains focus on carbon-intensive assets as those at risk

and the need to plan for a carbon-constrained future, taking the initial dialogue as a foundation for further engagement. In terms of action stimulated by the carbon budget, the letters were more than a one-off challenge to fossil fuel companies; they initiated a dialogue through which Ceres, leveraging institutional investor support, sought to pressure those companies to implement more concrete responses to the risks of climate change. While Ceres worked to further their own agenda of deeper engagement, the dialogue generated through the Carbon Asset Risk Initiative was focussed on responses to the carbon-constrained future envisaged by the *Unburnable Carbon* report.

Shortly after ExxonMobil and Shell released their letters of response to the Carbon Asset Risk Initiative, fieldwork was conducted as an observer of the Advisory Committee meeting of the Financed Emissions Initiative in May 2014. Indeed, climate risk became a focal point of discussions among representatives of banks, investors, insurers, UNEP FI, NGOs and think tanks. Remarking on the impact of Carbon Tracker's idea of climate risk, one think tank representative argued that "[methods for calculating carbon footprints] and carbon metrics have existed for 8 or 9 years now and gained no traction in the investment community until Carbon Tracker published their stuff on the carbon bubble". He was arguing that to create carbon accounting tools that reframe investment and lending decisions within organisations, "the buy-in from the investment community" is based on the relevance of such practices to measuring and managing climate risk.

It is, however, important to recognise that while the carbon budget narrative had become prominent during meetings of Financed Emissions Initiative (as well as climate events and conferences) it was not the only form of risk that climate change posed to financial organisations. In particular, the next section responds to O'Sullivan and O'Dwyer's (2015) call for research into the relationship between the NGO movement driving the Equator Principles and the integration of, in particular, the issue of climate change into investment and lending activities beyond project finance (O'Sullivan and O'Dwyer 2015, p.51). Indeed it supports their argument by highlighting that BankTrack – the global network of campaigning-NGOs studied by O'Sullivan and O'Dwyer – maintained pressure on commercial banks to develop and adopt reporting practices for GHG emissions. However it also highlights the contrast between their strategy aimed at posing reputational risks to

commercial banks and the work of Carbon Tracker and Ceres to render climate change into a systemic threat to be addressed by aligning capital markets with a transition to a low-carbon economy.

5.3.2. NGO Campaigns and Disclosure Groups

O'Sullivan and O'Dwyer (2015) document an early-2000s movement by BankTrack, a global network of NGOs, to campaign for adherence to the Equator Principles – a set of environmental and social risk management guidelines for project finance – that, over time, enhanced social responsibility and reporting among commercial banks. As a Vice President at a large commercial bank noted, "We were also one of the founders of the Equator Principles, and RAN, Rainforest Action Network[76], was involved in that because they were kind of pushing us through the conversations we were having" (Interview: Eag1519). RAN continued to target campaigns at this commercial bank: "One of their demands… Or 'requests'… was that we report on the greenhouse gas emissions tied to our portfolio. And so we did commit to do that, we did do that, we are to this date one of the only banks that do that." Commenting on the reasons that commercial banks engage in measuring and disclosing their climate impacts, an interviewee from a large US think tank commented it is "plain and simple – campaigning NGOs were naming-and-shaming" (Interview: Eag1514). Furthermore, and as shown by O'Sullivan and O'Dwyer (2015), pressures from NGOs within BankTrack persisted over time. The Vice President quoted above already highlighted RAN's influence on their involvement with the Equator Principles in the early-2000s. Yet in the early-2010s the commercial bank came under pressure to participate in the Financed Emissions Initiative:

> "We got involved [with the project] because RAN – who historically had big campaigns against us for client structure and financing coal, but pressure had been off us for a few years – reached out to us […] and were like, 'We are really disappointed that we don't see enough decrease in your financing of mountaintop removal [mining], we don't see enough decrease in your financing of coal-fired power' […] and 'we are going to start a campaign against you'. And one of their demands was, 'We need you to be reporting on your portfolio' […]" (Interview: Eag1519).

[76] Rainforest Action Network (RAN) is a US-based campaigning-NGO and a member of the global NGO network, BankTrack.

However a representative from one of the members of BankTrack attempted to convey a more nuanced explanation of their engagement strategy, focussing especially on the importance of campaigns in prompting behaviour change:

> "We approach banks […] from behind the scenes, via email or a phone call with an environmental risk manager at a bank. It can also be anything up to or including a sustainability yearlong campaign, involving pressure from constituents, email writing, in person protests or even non-violence disobedience in certain circumstances. So it will vary by group, vary by circumstance. " (Interview: Eag1414).

Whereas the Vice President emphasised the pressure stemming from RAN's "big campaigns against" them and the threat of initiating a new campaign, the experienced campaigner and policy analyst added that such campaigns are one aspect of a long-term engagement with commercial banks. Yet, the interviewee continued, commercial banks were reluctant to shift their lending activities "even if you have a good case and a good reason why a bank shouldn't be involved with the project" (Interview: Eag1414). As such, campaigns were presented as a complement to these 'behind the scenes' efforts, with the interviewee arguing "to actually change a bank's behaviour often requires more than just making the case to them" (Interview: Eag1414). Considering that the interviewee was a policy analyst within a campaigning-NGO, such comments are perhaps unsurprising. However it is a sentiment that was echoed, and that contrasted with the more indirect approach of Carbon Tracker, by some commercial banks during a May 2014 Advisory Committee meeting of the Financed Emissions Initiative:

> "When I talk to portfolio managers they are pretty much aware of this carbon budget concept. Their difficulty is to buy it, because they are investors with time horizons that are usually much shorter and people are pretty convinced that they can just go out of the door if it becomes serious. […] But, of course, [the Board of the bank] are pretty aware of criticism that we are getting at the moment particularly for financing the fossil fuel industry. That's the topic senior people are pretty open to and know about" (Commercial bank representative).

While the idea of climate risk promoted by Carbon Tracker and Ceres may have started to gain traction in financial discourse, the maintained and immanent pressure from campaigning-NGOs appeared to permeate further into the decision-making authorities of commercial banks. This is not to say,

however, that the idea of climate risk was dismissed by commercial banks. Rather, civil society actors generated a range of pressures on financial organisations to integrate a climate change framing into their investment and lending decisions and their public disclosures. For example, during the same May 2014 Advisory Committee meeting a member of the Secretariat remarked, "already today CDP [(formerly the Carbon Disclosure Project)] is demanding [in their annual questionnaire] for financial institutions' Scope 3 [supply chain emissions]." As the leading disclosure group on GHG emissions, the reporting requirements of CDP's annual questionnaire appeared to have considerable influence over financial organisations' climate change disclosures. As one commercial bank remarked during the June 2014 Technical Working Group in-person meeting of the Financed Emissions Initiative, "as soon as the Scope 3 guidance came out [from the GHG Protocol], the finance sector said 'by the way no-one knows how to do this'. And CDP, without question, suddenly shoved this into their survey. So [...] what comes out of this [standard-setting project] will still be fairly influential." While NGO campaigns pressured commercial banks, in particular, to engage in developing new carbon accounting tools, the integration of such tools into CDP's disclosure requirements similarly drove enhanced reporting. The point is that while financial organisations faced a range of pressures from civil society actors, the carbon budget's rendering of the two degrees target into a more concrete form provided a foundation for a new, more indirect, strategy of integrating the apparent systemic threat of climate change into investment and lending activities.

It should also be recognised that this is by no means an exhaustive list of the pressures on financial organisations to adopt practices that integrate a sustainability or climate change framing into their decisions. It does, however, offer valuable context for Chapter 6, by demonstrating why financial organisations engaged with the Financed Emissions Initiative. This enables Chapter 6 to focus on how the standard-setting project was reconfigured by the two degrees target. Yet this is not intended to suggest that Carbon Tracker's work was separate from NGO campaigns and the work of disclosure groups. Indeed, the chapter now turns to the connecting of the carbon budget narrative with the movement to divest from fossil fuels.

5.3.3. The Carbon Budget and The Divestment Movement

At the start of Section 5.3, a senior manager of a large US non-profit organisation was quoted commenting that the carbon budget narrative was "'a really intriguing argument, but how is that going to lead to action?'" (Interview: Eag1515). Reflecting on activity since that initial impression, the interviewee answered his own question: "I think it can lead to action over time because others are working on this issue and the arguments are being influential" (Interview: Eag1515). Maintaining that an economic and risk framing of climate change provided traction to the issue in financial circles, he was keen to emphasise that "those [Carbon Tracker] arguments actually had a great deal to do with leading to the divestment movement in the US, so that's been a huge influence" (Interview: Eag1515). The 350.org[77] divestment movement, *Go Fossil Free: Divest from Fossil Fuels!*, was launched in 2012 to coincide with the 20-city month-long *Do The Math* tour led by Bill McKibben, the founder of 350.org. The tour, taking place in November and December 2012, proclaimed:

> "**We're jumpstarting a new movement, and we need your help.**
>
> It's simple math: we can emit **565 more gigatons of carbon dioxide** and stay below **2°C of warming** — anything more than that risks catastrophe for life on earth. The only problem? Burning the fossil fuel that corporations now have in their reserves would result in emitting **2,795 gigatons of carbon dioxide** — five times the safe amount.
>
> **Fossil fuel companies are planning to burn it all — unless we rise up to stop them.** In November 2012, Bill McKibben and 350.org hit the road to build a movement strong enough to change the terrifying math of the climate crisis." (350.org 2012, emphasis in original)

The argument mirrored McKibben's July 2012 *Rolling Stone* article, *Global Warming's Terrifying New Math*, that centred on "[t]hree simple numbers that add up to global catastrophe – and that make clear who the real enemy is". An analysis of the first two numbers, 2°C and 565 $GtCO_2$, was drawn together with Carbon Tracker's 2,795 $GtCO_2$ estimate of the total carbon

[77] 350.org is an international environmental organisation that works to foster grassroots movements on climate change, deriving it's name from the view that limiting atmospheric concentration of CO_2 to 350ppm is necessary to "preserve a planet similar to that on which civilization developed" (Hansen et al. 2008, quoted on 'The Science' page on 350.org).

potential of fossil fuel reserves. The article, frequently referenced by interviewees and at climate conferences, recognises Carbon Tracker's "relatively modest goal – they simply wanted to remind investors that climate change poses a very real risk to the stock prices of energy companies" (McKibben 2012). However, the article claims, "it hasn't been easy to convince investors", and quotes James Leaton from Carbon Tracker as saying the reason bubbles emerge "'is that everyone thinks they're the best analyst – that they'll go to the edge of the cliff and then jump back when everyone else goes over'" (Ibid.). As with the NGO campaigner that saw a good 'investment case' as insufficient to prompt behavioural change without more coercive pressures (Section 5.3.2), McKibben highlights investors' resistance to the carbon budget narrative in arguing that "pure self-interest probably won't spark a transformative challenge to fossil fuel. But moral outrage just might – and that's the real meaning of this new math" (Ibid.). Where Carbon Tracker used the carbon budget as the foundation for a narrative of the vulnerability of capital markets to action on climate change, McKibben enrolled it in calling for a divestment campaign that applied the lessons from apartheid to the fossil fuel industry (Ibid.). The 350.org *Go Fossil Free* campaign was launched, as part of the *Do The Math* tour, to target the fossil fuel industry as, in McKibben's terms, "Public Enemy Number One to the survival of our planetary civilization" (Ibid.).

By 2013 the *Go Fossil Free* movement was the fastest growing divestment campaign in history (Ansar, Caldecott, and Tilbury 2013), with grassroots activists calling on individuals to pressure their universities, pension funds, and religious organisations to divest from fossil fuels. Combined with its enrolment in the divestment movement, the carbon budget began to generate more widespread attention among investors. One portfolio analyst at an investment advisory firm attributed the "growing interest in climate risk over the past year, maybe two years[78] […] to the divestment campaign and the whole carbon budget and stranded assets debate" (Interview: Eag1520). This portfolio analyst went on to highlight Rockefeller Brothers Fund's 2014 commitment to divest as an event that, in his words, "sent a serious signal" to investors. Divestment of their $900million portfolio, would first focus on coal and tar sands, with a more gradual divestment from

78 For reference, this interview was conducted in August 2015.

other fossil fuel stocks (Rockefeller Brothers Fund 2014). Commenting on the decision at a European Green Party Conference, Stephen Heintz, President of the Rockefeller Brothers Fund, remarked that it was the argument developed by Carbon Tracker "that helped us persuade our investment advisors and our investment committee [… that] investments in the fossil fuel industry are going to be risky investments that are not going to pay returns" (Heintz 2015).

However this is not to argue that the broader investor community immediately began divesting from fossil fuel holdings. Indeed divestment decisions had largely been taken by funds with an ethical mandate, university endowments, and the investment and pension funds managed by city councils. As the portfolio analyst quoted above remarked, "divestment itself, I mean, it's mostly a moral argument. Okay, maybe they talk about risk when they talk about divesting, but really the idea is based on more of a moral choice" (Interview: Eag1520). Rather, according to a senior manager at a global investor coalition, the divestment movement "put branding pressures on investors" and prompted them to understand the underlying issue and possible responses, with the senior manager stating: "I talked to people at Ceres and they were getting calls from the investors they work with saying, 'How do you think we should handle this?'" (Interview: Eag1515). The combination of the divestment movement and an increasing range of research into the impact of climate change on the financial sector had refined the debate "from a relatively simple issue to one where you are thinking about asset classes, and different strategies, and which people to work with at the pension funds – be it governance people or investment staff or outside consultants" (Interview: Eag1515). For an executive director of a large global index provider, "the first questions we got were around divestment were, you know, 'I'm an investor being asked to divest and I don't want to divest. What do I do?' That's kind of like the tone of it." (Interview: Eag1516). Her organisation began "researching what's the impact of divestment" and created more refined investment products "by […] putting together a fossil fuel free index family – ex coal, ex fossil fuels. I mean, if you are going to divest you should have the appropriate index" (Interview: Eag1516). As with the fossil fuel companies' responses to the Carbon Asset Risk Initiative, investors responded to the divestment movement by looking to connect their concrete processes to the more abstract ideas of the movement. Constructing a fossil

fuel free index family, for example, provided an instrument that could potentially appeal to pressures to divest, while designed to be compatible with existing investment and lending practices (see Figure 5.4 regarding relations).

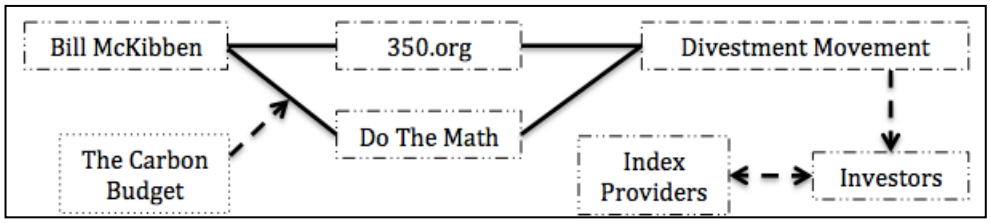


Figure 5.4: Initiating a divestment movement and its impact on investors and index providers

In summary, Section 5.3 has, thus far, focussed on the work of civil society actors that connected the carbon budget to the way financial organisations understand and act on climate change. In particular, it highlighted that the 2010 UNFCCC commitment to the two degrees target provided the foundation for civil society actors to construct the idea of a carbon-constrained future, and that the carbon budget provided the bridge between the two degrees target and these efforts. For Carbon Tracker and Ceres, the carbon budget narrative shaped their coordination of institutional investor pressure on fossil fuel companies, while 350.org enrolled it in their development of the *Go Fossil Free* divestment movement. In this light the section demonstrated that the carbon budget became more than a bridge that renders the two degrees target into a more concrete form. It also gained traction with the concerns of diverse groups through the way it was mobilised by civil society actors. A financial reasoning of climate risk connected the carbon budget to concerns of investors and lenders, while it became a rallying message for the divestment movement against the fossil fuel industry. It was through this work that the carbon budget came to mediate between civil society actors' concerns of gaining traction with investors and lenders, financial organisations' ideas of risk management, and the 'urgency' of a divestment movement. However the carbon budget narrative also claimed that the economic transition to a two degrees scenario posed a threat to financial stability, an argument based on the incorrect pricing of carbon-intensive stocks by capital markets. Section 5.3.4 focuses on the response of financial regulatory authorities to this apparent threat.

5.3.4. State Responses to Climate Risk

In parallel to the civil society actor movements and initiatives that built momentum behind the idea of climate risk, policy formulation and implementations from financial stability authorities added to the perceptions policy risk. The French government was among the first to begin discussions on the potential implications of climate change for the financial sector. In 2012 it began working on the Energy Transition Law, dedicating one article to climate-related disclosures from institutional investors. Adopted by the French Parliament in July 2015, *Section VI of Article 173 of the Law for the Energy Transition and Green Growth* requires that institutional investors (i.e. public pension funds, insurance companies operating under French insurance law, and public institutions) "[disclose] information on how their investment decision-making process takes social, environmental and governance criteria into consideration, and the means implemented to contribute to the energy and ecological transition" (Assemblée Nationale 2015). With its emphasis on how institutional investors "contribute to the energy and ecological transition", Article 173 was designed to bring investment and lending activities into alignment with the French and EU strategies for tackling climate change. Furthermore, the mandatory disclosures centred on climate risks, carbon footprints, and a framing of investment and lending activities in terms of an international long-term climate objective:

> "The information relative to the consideration of environmental objectives includes: the exposure to climate-related risks, including the GHG emissions associated with assets owned, and the contribution to the international goal of limiting global warming and to the achievement of the objectives of the energy and ecological transition" (Assemblée Nationale 2015).

From conversations at conferences and workshops, the wording "contribution to the international goal of limiting global warming" did not specify a temperature or emissions target because the law was passed five months before COP21 where said international goal was on the agenda. Rather this wording links the French law to the international goal agreed under the UNFCCC. Furthermore, "exposure to climate-related risks" (Ibid.) pertained to both the physical risks of climate change and the so-called "transition risks" of an economic transition to a low-carbon economy. Those conversations, as well as remarks from several interviewees, also highlighted

that the adoption of the French Energy Transition law strengthened institutional investors' perceptions of policy risk, seeing the law as an example for other states and financial regulatory authorities.

However civil society actors also worked to provoke and shape policy responses from other financial regulatory authorities. Indeed in September 2015 Mark Carney, as Governor of the Bank of England, delivered his "Tragedy of the Horizon" speech at Lloyds of London. He highlighted climate risk as a threat to financial stability, arguing that the horizon for financial stability policy is about a decade and so "once climate change becomes a defining issue for financial stability, it may already be too late" (Carney 2015). Central to his speech was Carbon Tracker's carbon budget narrative:

> "Take, for example, the [Intergovernmental Panel on Climate Change's] estimate of a carbon budget[79] that would likely limit global temperature rises to two degrees above pre-industrial levels. That budget amounts to between a fifth and a third of the world's proven reserves of oil, gas and coal. If that estimate is even approximately correct it would render the vast majority of reserves 'stranded' – oil, gas and coal that will be literally unburnable" (Carney 2015).

Carbon Tracker had engaged with the Bank of England for a few years preceding Carney's speech,[80] with the Bank beginning an investigation into the 'carbon bubble' in late-2014 (Carrington 2014). Governor Carney emphasised that the Bank of England's role was "in developing the frameworks that help the market to adjust itself efficiently" and that "[a]ny efficient market reaction to climate change risks as well as the technologies and policies to address them must be founded on transparency of information" (Carney 2015). If the lack of information could be remedied, Governor Carney argued, "[a] 'market' in the transition to a two-degree world can be built [and] has the potential to pull forward adjustment" (Ibid.).

At COP21, Governor Carney's comments were reinforced by the Governor of the Bank of France, François Villeroy de Galhau, through his calls

[79] In its Fifth Assessment Report the IPCC provided its own carbon budget for the first time. To the IPCC, the carbon budget offered an additional way of articulating the implications of limiting warming to two degrees Celsius (IPCC 2013).

[80] Discussions regarding Carbon Tracker's engagement with the Bank of England took place during the participant observation of the UNEP FI and GHG Protocol's standard-setting at two events, the evening dinner following the May 2014 Advisory Committee meeting and the drinks reception following the June 2014 in-person Technical Working Group meeting.

for greater regulatory action to bring the financial sector into line with the two degrees target (Bank of France 2015). This speech also saw Governor Villeroy de Galhau endorse the Governor Carney's formation of the Task Force on Climate-related Financial Disclosures (TCFD). At COP21 Governor Carney announced the task force, which was to be chaired by Michael Bloomberg. It was tasked with making "recommendations for consistent company disclosures that will help financial market participants understand their climate-related risks [...] which are likely to grow with time" (FSB 2015).

Carbon Tracker's engagement with the Bank of England highlights that the mobilisation of the carbon budget was not only directed at integrating climate change into financial organisations' risk management processes. It was also enrolled in arguments that challenged the extent to which existing financial stability policy could address 'the carbon bubble'. By constructing the vision of a carbon-constrained future, civil society actors mobilised the carbon budget to challenge the time horizon for financial stability policy on the grounds that existing horizons were incompatible with addressing the systemic threat of climate change. The response from the Financial Regulatory Authority was to begin developing disclosure tools that render visible the apparently overlooked risks of climate change, providing the information on which "[a] 'market' in the transition to a two-degree world can be built" (Carney 2015).

5.5. Discussion

This Chapter has investigated how mobilisations of the carbon budget influenced the financial sector discourse on climate change. Prior to its mobilisation, major financial organisations were confronted with NGO campaigns targeting specific carbon-intensive projects, with an understanding that climate risk stemmed from potential reputational harm and the possibility of regulation surrounding cap-and-trade or carbon taxation schemes. The carbon budget, however, was mobilised to portray the implications of the carbon-constrained future of a two degrees scenario in terms of investment risk and the threat to financial stability. This started to reorient the financial sector discourse on climate change towards one of managing the transition to a two degrees scenario. In other words, the idea of

climate risk was reframed as one stemming from the economic transition in pursuit of the two degrees target. The point, which is discussed in this section, is that the carbon budget envisaged the vulnerability of the financial sector to the transition to a low-carbon economy. In doing so it began to orient actions towards rendering that vulnerability visible and manageable.

5.5.1. The Carbon Budget as a Mediating Instrument

As an apparently simple representation of climate change, the two degrees target remains abstract with regards to actual investment and lending decisions. It was through its rendering into the more concrete form of the carbon budget that civil society actors were provided a foundation for building arguments of investment risks, threats to financial stability and the 'urgency' for campaigns against fossil fuels. This section discusses the carbon budget as a bridge between the two degrees target and the carbon potential of resources and emission levels of different entities. The next section (Section 5.5.2) discusses the enrolment of the carbon budget in civil society actors' arguments on the implications of the two degrees target for financial organisations and regulators as well as for grassroots climate activists.

Chapter 4 charted how the two degrees target became an apparently simple objective to guide efforts to mitigate emissions and adapt to the impacts of climate change, while allowing flexibility in how it is implemented. However Section 5.1 demonstrated the difficulties in translating the target into emission budgets (Meinshausen et al. 2009), illustrating one attempt by the scientific community to address considerations such as the likelihood of exceeding 2°C of warming and the range of gases included in the budgets. The emission budgets produced enabled a comparison between the two degrees target and the carbon potential of fossil fuel reserves, through which the authors showed that "less than half the proven economically recoverable oil, gas and coal reserves can still be emitted up to 2050 to achieve such a goal" (Ibid., p.1158). Indeed Carbon Tracker's *Unburnable Carbon* report (Carbon Tracker 2011) is underpinned by this analysis and logic, as well as the 2010 UNFCC commitment to the two degrees target. However in addressing only one of the budgets calculated by Meinshausen *et al.* (2009) the report centres on an apparently simple correspondence between the two degrees target and a carbon budget of 565 $GtCO_2$. That is, the report argues that achieving the two degrees target implies keeping cumulative emissions from 2010 to 2050

below 585 $GtCO_2$. This is not to say that the *Unburnable Carbon* report misrepresents Meinshausen *et al.* (2009). Rather, that it anchors its analysis on a single figure corresponding to the two degrees target. Moreover, the apparently straightforward logic presented in the *Unburnable Carbon* report was central to Carbon Tracker's efforts to gain traction in the financial sector discourse, with the climate risk narrative and the single carbon budget figure becoming mutually reinforcing. Furthermore, the numbers used to illustrate that logic, as was demonstrated during several Carbon Tracker presentations, were malleable when faced with diverse concerns while still maintaining their conclusion that investments in fossil fuels were overvalued in the transition to a low-carbon economy.

However, while the carbon budget is more concrete than the two degrees target, it remains abstract with regards to actual investment and lending decisions. This differs from Morgan and Morrison's (1999) notion of mediating instruments, which the authors use to analyse how models bridge between theory and data by simultaneously embodying the higher-level structure of a theory and producing concrete-level data through simulations (Morgan and Morrison 1999, p.31). Similarly the industry roadmaps studied in Miller and O'Leary (2007) appear as bridges that codify Moore's Law into "key, generic aspects of product development" such as "to at least double product functionality every three years" and "seek manufacturing cost reductions per three year period of roughly 65% (Miller and O'Leary 2007, p.719). The carbon budget, on the other hand, translates the two degrees target into ideas of climate risk and threats to financial stability for the financial sector. It bridges between a global objective and the industry-level through its vision of a carbon constrained-future with implications for the financial sector.

Where the two degrees target envisages a direction for efforts to tackle climate change, the carbon budget envisages an apparently simple constraint on carbon-intensive sectors and investments in them. However the carbon budget does not detail the levels or timings of emissions reductions, apart from its specificity to the period 2000-2050. Rather, it provides a more concrete frame that problematizes existing investment strategies and financial stability regulations. In this regard, it provides an instrument based on which, as one interviewee remarked, an "intriguing argument" (Interview: Eag1515)

can be made. However, and as this discussion now turns to consider, it was through a range of work from civil society actors that the carbon budget narrative connected to the concerns of diverse actors and began orienting efforts towards making visible a systemic threat of climate change.

5.5.2. Civil Society as a Quasi-Regulator

Based on the work of Chandhoke (2002), this chapter frames its observations in terms of the work of civil society actors that shapes and is shaped by the regulatory agenda of the state as well as the strategies of market actors. Specifically, the 2010 UNFCCC commitment to the two degrees target provided a foundation for the work of civil society actors who enrolled the carbon budget in their arguments of climate risk and threats to financial stability. Compared to NGO campaigns in the 2000s that specifically targeted the financing of carbon-intensive projects, civil society actors mobilised the carbon budget to reshape the financial discourse on climate change towards one of a systemic threat. In particular, this section of the discussion focuses on how civil society actors created several lenses through which the carbon budget came to mediate between the concerns of diverse actor groups.

It is through their work to stimulate action based on the two degrees target that civil society actors came to take on a quasi-regulatory role. In the most basic sense, this focuses on civil society actors' role in shaping regulatory conditions – whether this is in enforcing existing pledges or regulations, producing policy recommendations, or shaping expectations as to the inevitability of regulatory interventions – while doing so in a manner that is not legally binding. In terms of Hood *et al.*'s three components of regulation (Hood et al. 1999), the carbon budget was enrolled in efforts to, first, gather information both from fossil fuel companies (through the Carbon Asset Risk Initiative) and through new disclosure requirements (through financial regulatory authorities). Second, to alter behaviours by shifting finance away from carbon-intensive sectors (through ideas of climate risk as well as the divestment movement). Third, to create standardised reporting of climate risks (explored further in Chapter 6). However in another sense, seeing civil society actors as quasi-regulators draws attention to the emerging strategies that break with the tradition of NGO campaigns. They instead work to render an abstract and complex issue such as climate change into a form to be integrated into the existing strategies of financial organisations and

regulators. This emerging strategy was both enabled by a more concrete rendering of climate change and taken up by other civil society actors as the climate risk framing began to resonate with financial organisations and provide traction to their arguments.

Regarding the ongoing debate on the ability of civil society actors to enhance corporate accountability (Cooper and Owen 2007; Archel, Husillos, and Spence 2011; O'Sullivan and O'Dwyer 2015), the above discussion partially supports Archel *et al.*'s (2011) argument that the work of civil society actors becomes reoriented through a 'dominant discourse'. Climate change, through its representations as the two degrees target and the carbon budget, was refined in terms of risk management and financial stability rationales. On the other hand, where Archel *et al.* (2011) focus on enhancing corporate accountability through institutional change, this chapter sees civil society actors as quasi-regulators that render an abstract issue into a form compatible with existing investment and lending frameworks. As suggested elsewhere (cf. Owen, Gray, and Bebbington 1997; Cooper and Owen 2007), this construction of a 'business case' for reconfiguring decision-making processes may not prompt institutional reform that empowers a wider range of stakeholders. However the chapter focuses attention on the way the cases that were built upon the carbon budget centred on and oriented expectations towards, as one interviewee remarked, the inevitability of state-backed policy intervention:

> "[O]ne of the best weapons that the fossil fuel industry has used against climate activists and others is creating a sense of inertia that things are just not going to change. […] What I see now is that climate activists and investors have started to embrace the idea that the 'inevitability of *inaction*' is shifting towards an 'inevitability of *action*'" (Interviewee: Eag1522, Emphasis added).

At their time of writing, Cooper and Owen observed "[i]n the absence of government regulation, which is clearly not on the agenda in the prevailing voluntaristic climate dominating matters of CSR policy […] [a]n alternative means of introducing a greater measure of social control over business behaviour, it has been suggested, lies in civil regulation" (Cooper and Owen 2007, 658). This chapter does not disagree with this observation. Rather, it highlights the role of civil society actors in changing expectations of policy intervention as a means of shaping action through existing 'institutional arrangements'. Policies may be absent; however an expectation of policy and a

carbon-constrained future is nurtured by civil society actors and tailored to the concerns of shareholders. Yet it should also be noted "the extent to which different entities will be exposed to carbon constraints varies significantly" (Busch and Hoffmann 2007, p.525). It has been argued that competitive and regulatory risks would prompt the development of accounting practices "from which they can assess the carbon intensity of corporate products and services and estimate the regulatory and competitive risks that a corporation is likely to face" (Bebbington and Larrinaga-González 2008, p.707). However where Bebbington and Larrinaga-González point to introduction of regulations and shifting competitive environments, the work of civil society actors centres on creating expectations of a carbon-constrained future. That is, this chapter extends Bebbington and Larrinaga-González's argument by demonstrating that the *perception* of constraints focuses efforts on understanding and managing regulatory and competitive risks. In this regard, shifting the expectations of financial sector actors towards a carbon-constrained future stimulated work to experiment with assembling and adjusting ideas and instruments as part of a process for understanding and managing that future (Gooding 1992).

It is, however, important not to overstate this emerging strategy as one that has been adopted by all civil society actors. Indeed, O'Sullivan and O'Dwyer's (2015) argument that BankTrack improved corporate accountability over time (through, in their case, enhancing compliance with Equator Principles) is supported by this chapter's findings. In particular it was widely acknowledged that the naming-and-shaming efforts of campaigning-NGOs, and specifically RAN in the US, pressured financial organisations to develop and adopt GHG reporting methods for their investment portfolios. However where O'Sullivan and O'Dwyer argue that "powerful field incumbents" shape the emergence of an issue to "suit their preferred rationale and logics" (O'Sullivan and O'Dwyer 2015, p.35), this chapter shows that climate change became framed by a financial rationale and logic through Carbon Tracker's analysis of the carbon budget. To reiterate, the prevailing dissidence of earlier campaigning efforts was transformed into a mode of pragmatism (Chandhoke 2002), where civil society actors reimagined the financial sector's role in tackling climate change as one of adapting to and supporting an economic transition.

As the expectations of investors, civil society actors and state agencies became oriented towards the pursuit of the two degrees target through the transition to a low-carbon economy, they began searching for ways to measure and report climate risk exposure across investment portfolios. To reiterate, actions became oriented towards rendering the transition to a two degrees scenario visible on a more refined level – for both the financial sector and individual investment portfolios – and compatible with strategic planning and risk management. As Chapter 6 will demonstrate, efforts to create this visibility reoriented an emerging carbon accounting standard away from carbon footprints of portfolios and towards indicators of alignment with investment roadmaps for the transition to a low-carbon economy.

5.6. CONCLUSION

This chapter has studied how the two degrees target came to reshape the financial sector discourse on climate change. It specifically examined the more concrete rendering of the two degrees target as the carbon budget and the enrolment of this new instrument in arguments of investment risks and threats to financial stability, as well as in calls for grassroots activism. As a bridge (Morgan and Morrison 1999) between the two degrees target and the more concrete carbon dioxide potentials of fossil fuel reserves, the carbon budget is analysed as a mediating instrument (Miller and O'Leary 2007) that enables the local analysis of a global objective. In particular, by focussing on the development and mobilisation of that carbon budget, the chapter examined the construction of its mediating role. In doing so, it showed how the concretion of climate change enabled civil society actors to deploy a new strategy for arguing that climate change poses a systemic threat to the financial sector, warranting attention by framing the problem as one of risk and financial stability.

On the ability of civil society actors to enhance corporate accountability, the analysis supports O'Sullivan an O'Dwyer's (2015) argument that, through maintained campaigning against financial organisations, an NGO movement enhanced reporting on the sustainability agenda. However it primarily demonstrates an emerging strategy deployed by civil society actors, working to develop and mobilise concrete renderings of

climate change as a systemic threat to the existing institutional arrangements of the financial sector. As such, while it supports Archel *et al.*'s (2011) observation that civil society actors come to adopt the 'dominant discourse' of those they seek to influence, it argues that this enabled the carbon budget to mediate between multiple concerns and catalyse efforts to align capital markets with the transition to a low-carbon economy. The chapter also responds to the call for further theoretical development in accounting scholarship on sustainable development (Unerman and Chapman 2014; O'Dwyer and Unerman 2016), arguing that the concept of mediating instruments focuses the researcher on the instruments through which the abstract and complex issues on the sustainability agenda are rendered into a more concrete form that provides a foundation for civil society movements.

Relatedly, the chapter expands on the bridging role of mediating instruments. In particular, it demonstrates that the carbon budget enabled a form of scenario testing through which existing investment and regulatory strategies were problematized. Specifically the two degrees target became seen as posing constraints on carbon-intensive industries that could result in asset impairments, thereby raising concerns of investment risk and threats to financial stability. Furthermore, the perceived simplicity of the carbon budget was central to the traction of a narrative on climate risk, while it also remained flexible in responding to challenges so as to maintain the logic underpinning the idea. Indeed, the idea of climate risk created by the carbon budget is still somewhat abstract, albeit more concrete than the two degrees target. This differs from Morrison and Morgan (1999) who discuss the bridging principle of mediating instruments as connecting theory and data. Rather, the carbon budget refines the two degrees target from a global vision for tackling climate change into a vision of the vulnerability of the financial sector to the transition to a low-carbon economy. Seen in this light, the carbon budget stimulated experimentation (Gooding 1992) with ideas and instruments to link the global objective of the two degrees target to the local specifics of the financial sector.

The thesis now brings the reader inside the meeting rooms and webinars of a UNEP FI and GHG Protocol standard-setting project, with Chapter 6 examining the influence of a shifting financial sector discourse on an emerging carbon accounting standard. In particular, it focuses on the

reorienting of the emerging carbon accounting standard towards rendering visible the alignment of investment portfolios with investment roadmaps for economic transitions to tackle climate change. Furthermore, it demonstrates that the two degrees target came to permeate the project as the expectations of actors were reoriented towards that target and as they began applying their expertise and resources to rendering it visible.

CHAPTER 6 – MAINTAINING STANDARDS: CARBON ACCOUNTING AND LINKING WITH THE TWO DEGREES TARGET

6.0 INTRODUCTION

Chapter 5 highlighted that the carbon budget provided a more concrete rendering of the two degrees target and was mobilised and reshaped the financial sector discourse on climate change. This chapter demonstrates how the shifting discourse came to reconfigure an emerging carbon accounting standard away from a focus on transparency for campaigning-NGOs and towards managing carbon risk and monitoring the alignment of portfolios with a two degrees scenario. The empirical core of the chapter is a participant observation of the UNEP FI and GHG Protocol's Financed Emissions Initiative, which set out to standardise the disclosure of GHG emissions enabled by investment and lending activities (so-called 'financed emissions'). It frames this standardisation work as the configuration of a mediating instrument (Miller and O'Leary 2007), viewing the emergent standard as an instrument that is adjusted to embed ideas stemming from the two degrees target. Furthermore, through this remoulding the standard is interconnected with two other mediating instruments, the carbon budget and investment roadmaps for the transition to a low-carbon economy. Based on this framing, the chapter nuances Botzem and Dobusch's claim that a standard's *output legitimacy*[81] is "predominantly related to its diffusion" (Botzem and Dobusch 2012, p.741). It argues that the development of input and output legitimacy is interrelated during standard formation, with the concerns and expertise of stakeholders being drawn on to develop the "effectiveness and coordinative capacity" of a standard (Ibid.).

The participant observation of the Financed Emissions Initiative forms the empirical core of this chapter, providing the basis for studying the

[81] Botzem and Dobusch explain output legitimacy as "the effectiveness and coordinative capacity of a standard" and input legitimacy as originating "from stakeholder involvement in the process of standard formation" (Botzem and Dobusch 2012, p.741).

corporate- and portfolio-level refinement of the two degrees target through the creation of new carbon accounting tools. The initial aim of the Financed Emissions Initiative was to standardise the measurement and reporting of 'financed emissions' – the GHG emissions enabled by investment and lending activities – by financial organisations. It set out to both tailor the GHG Protocol's core standards to the specificities of the financial sector, as well as respond to campaigning-NGOs' calls for enhanced transparency of financial organisations' climate impacts. Observations were conducted through 120 hours of participation in a range of sites, from online webinars, to in-person workshops in London, Milan and New York, as well as conferences in Paris. Guided by Spradley's (1980) insights, involvement was as an "active participant" (Spradley 1980, 58) in discussing and drafting the standard, and engaging with the community during informal events surrounding the in-person meetings (see Chapter 3 for further discussion). In addition, 18 semi-structured interviews enable this chapter to probe into specific aspects of the standard-setting project, and these were conducted across 2014 and 2015 with individuals from major financial organisations, campaigning-NGOs, think tanks, and government treasuries.

The growing academic interest in standardisation processes (Brunsson, Rasche, and Seidl 2012) has brought attention to the development and diffusion of accounting standards, ranging from studies of the harmonization of international accounting standards (Botzem and Quack 2006) to the fragility of international standardisation projects in settings such as post-Soviet Russia (Mennicken 2008). Others have focussed on standardisation of social and environmental performance (Gilbert, Rasche, and Waddock 2011) through projects such as the Global Reporting Initiative (Etzion and Ferraro 2006; Brown, de Jong, and Lessidrenska 2009b; D. L. Levy, Brown, and Jong 2010) and organisations such as the GHG Protocol (J. F. Green 2010), Fairtrade International (Casula Vifell and Thedvall 2012) and the Forestry Stewardship Council (Boström 2006). Similarly, Slager, Gond and Moon (2012) draw on interview and archival material in their study of the creation and maintenance of a responsible investment index, the FTSE4Good index (Slager, Gond, and Moon 2012). In doing so, the authors attend to the lack of attention to the production of standards, which has been called the "'black box' of standardization" (Gilbert, Rasche, and Waddock 2011, p.38).

Similarly, it is by studying the formation of a standard that this chapter nuances Botzem and Dobusch's interpretation of *input* and *output legitimacy* (Botzem and Dobusch 2012).

Botzem and Dobusch distinguish between *input* and *output* legitimacy, seeing input legitimacy as being generated during standard formation – through the inclusion of those considered to be stakeholders of the standard – and output legitimacy being "predominantly related to standard diffusion" – resulting from its "effectiveness and coordinative capacity" in responding to collective problems (Botzem and Dobusch 2012, p.741). Yet this chapter highlights that moments during standard formation that appear as efforts to maintain *input legitimacy* are simultaneously negotiations over the expected *output legitimacy* of the standard. That is, both the concerns of stakeholders and the codification of those concerns into measurement and reporting practices are negotiated during standard formation. This is not to disagree with Botzem and Dobusch's argument that during diffusion "high adoption contributes to output legitimacy […] due to network or crowd effects" (Ibid., p.743). Rather, the chapter argues that a standards' "effectiveness in achieving the goals" (Scharpf 1997, p.19) is negotiated during standard formation. Furthermore, standard formation draws on diverse and distributed expertise to address "the high level of technical complexity" (Scharpf 1999, p.16) of translating identified goals into measurement and reporting practices. In this light, the output legitimacy that fosters initial adoption of the standard is both configured and generated during standard formation, and is interdependent with the pursuit of input legitimacy. To develop this argument the chapter draws on the work of Miller and O'Leary (2007) to frame the negotiations as the configuration of a mediating instrument.

By framing the Financed Emissions Initiative as the configuration of a mediating instrument, the analysis focuses on the codification of shifting concerns into measurement and reporting requirements. Furthermore, it highlights the linkages that were formed between the standard and other mediating instruments, connecting the standard to emerging instruments and practices for refining the two degrees target to the corporate- and portfolio-level. Specifically, it demonstrates how the permeation of new ideas into the Financed Emissions Initiative – ideas that stemmed from the two degrees target – came into conflict with the initial vision guiding the configuration of

the standard. Through this conflict the Financed Emissions Initiative became unstable, and was subsequently relaunched with a focus on linking the carbon budget and sectoral roadmaps for the transition to a low-carbon economy with corporate- and portfolio-level metrics. This draws from Miller and O'Leary's (2007) study of the refinement of Moore's Law into technology roadmaps to frame cost-of-ownership calculations for developing optical forms of lithography. This chapter shows that the Financed Emissions Initiative developed risk management tools to connect to growing concerns of carbon risk, while also aligning its standardisation work with refining roadmaps into corporate- and portfolio-level metrics. However the chapter specifically examines how the reorientation of actors' expectations towards the two degrees target stimulated work to link these instruments. Seen in this light, the Financed Emissions Initiative simultaneously identifies participants' concerns (input legitimacy) while linking the standard with instruments and practices for connecting the two degrees target to portfolio- and corporate-level investment and lending decisions (output legitimacy).

The chapter is structured as follows. Section 6.1 provides background on the UNEP FI and GHG Protocol's Financed Emissions Initiative, the researcher's role as a participant observer, and the pressure on financial organisations to participate in the project. Section 6.2 traces discussions on two aspects of the Financed Emissions Initiative, the 'Business Goals' and the 'Boundary Setting' sections, to follow the emergence of ideas that came to destabilise the project. Section 6.3 examines the project's relaunch as the Portfolio Carbon Initiative, highlighting its new focus on enabling the transition to a two degrees scenario. Section 6.4 discusses the project as the production of a mediating instrument, and the contribution of the chapter to the standard-setting literature, before Section 6.5 concludes the chapter.

6.1. Background to the Financed Emissions Initiative

The Financed Emissions Initiative is a standard-setting project coordinated by UNEP FI and GHG Protocol to develop a carbon accounting standard specifically for the emissions that are enabled through the investment and lending activities of a financial organisation. This section

begins by providing the reader with background to the GHG Protocol and their previous efforts to create carbon accounting methods for so-called 'financed emissions' (6.1.1). It then considers the initial aims of Financed Emissions Initiative (6.1.2), before presenting the structure of the standard-setting project (6.1.3). Building on insights from Chapter 5, this section explores why representatives of different groups volunteered their time and expense to participate in developing the standard (6.1.4). Finally, the emergence and remit of the Financed Emissions Initiative work stream on 'Carbon Asset Risk' is detailed (6.1.5), before turning Section 6.2 regarding discussions on 'Business Goals' and 'Boundary Setting' during the project.

6.1.1. The Greenhouse Gas Protocol and Financed Emissions

The GHG Protocol has become the dominant global standard-setter for carbon accounting (J. F. Green 2010; Lovell and MacKenzie 2011) since it was launched in 1998 in a collaborative initiative between the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD).[82] Publishing its *Corporate Standard* in 2004, the GHG Protocol began its efforts to standardise the measurement and reporting of GHG emissions specifically for the corporate entity and now serves as the foundation for almost all corporate-level GHG disclosure requirements around the world. This includes, among others, the International Standards Organisation's ISO-14064, the UK's Department for the Environment, Food and Rural Affairs' (DEFRA) requirements for mandatory GHG reporting, and voluntary disclosures both under the Global Reporting Initiative's (GRI) sustainability reporting and to CDP (formerly the Carbon Disclosure Project). In terms of Botzem and Dobusch's characterisation of the standardisation process (Botzem and Dobusch 2012), the *formation* of carbon accounting standards for the corporate entity has been driven by the GHG Protocol, while

[82] WRI is a global think tank, headquartered in Washington D.C., that seeks to shift societal behaviour towards protecting the Earth's environment so that is can provide for future generations (WRI 2016b). Since its founding in 1982 it has avoided what it terms the 'prevailing activist model' (WRI 2016a) in favour of work that advances an evidence-based understanding of sustainable development issues and works to bring this to the attention of decision-makers across the public and private sectors.
WBCSD was founded shortly before the Rio Earth Summit in 1992 in an effort to ensure the business voice was present (WBCSD 2016), and based its work on the belief that business had an inescapable role to play in sustainable development (Schmidheiny 1992). It is a CEO-led organization that works to influence the business community towards creating a "sustainable future for business, society and the environment" (WBCSD 2016).

the *diffusion* of those standards is enabled through their incorporation in both state regulation as well as voluntary reporting requirements. As such, by studying the GHG Protocol's standard-setting process this chapter is able to, first, study the emerging linkages between the two degrees target and the corporate entity and, second, focus on how the ideas for monitoring the climate impact of financial organisations both shape and are shaped through the standard-setting process.

The GHG Protocol's standards address three 'Scopes' of emissions that determine different boundaries for measuring and reporting an entity's GHG emissions. Scope 1 emissions are those directly caused by assets owned or controlled by a company, while Scope 2 emissions are those caused indirectly through energy usage. Measurement and reporting practices for each of these are detailed in the GHG Protocol's core *Corporate Standard*. Scope 3 emissions are detailed in the 2011 *Corporate Value Chain Accounting and Reporting Standard*, and refer to indirect emissions within the supply chain such as outsourced activities, extraction and production of purchased materials, and investments that fall outside the Scope 1 and 2 boundary (GHG Protocol 2004, pp.26–29). This chapter centres on the Scope 3 emissions of financial organisations, focussing on the climate framing of investment and lending activities that have the potential to influence decision making across economies towards developing and implementing low-carbon modes of production (Coulson and Dixon 1995; Richardson 2009).

The GHG Protocol's 'core' standards, however, often lack refinement to the specifics of particular industries. Rather, they detail measurement and reporting practices that apply across sectors on a more general level. For the financial sector, the Scope 3 standard provided four pages of guidance on measuring and reporting for investments (GHG Protocol 2011, pp.51–4), which had been developed through a workgroup of financial organisations comprised mostly of commercial banks. However a member of the Secretariat commented that this workgroup "never got to the level of detail that we needed to be very helpful to the banks. So, […] we always had the idea in mind that afterwards we would develop sector guidance with the financial sector" (Interview: Eag1412). Indeed, the GHG Protocol often developed sector-specific guidance to both tailor the core standard to and encourage adoption of the standards in certain industries (J. F. Green 2010).

The Financed Emissions Initiative was launched to create sector-specific guidance for the financial sector on measuring and reporting GHG emissions from its supply chain. In other words, the initiative aimed to create tools for measuring and reporting the carbon footprint of investment and lending activities, the aforementioned 'financed emissions'. To coordinate the project the GHG Protocol partnered with UNEP FI in mid-2012, partly due to similar agendas and partly to foster the uptake of the standard. By partnering with UNEP FI the GHG Protocol also extended the reach of its calls for participation in the Financed Emissions Initiative, contributing to "larger participation in the technical working groups than [GHG Protocol] have ever had before" with "representatives from nearly 60 different countries [… and] a pretty good balance between industry, consultants, governments and NGOs."[83]

6.1.2. Introducing the Financed Emissions Initiative

The 'kickoff call' for the Financed Emissions Initiative, held in January 2014, was conducted via webinar using the online platform GoToWebinar. Invitations to join the webinar were emailed to all of the 280 participants (representing a variety of groups: institutional investors, commercial banks, asset managers, consultancies, accounting firms, financial market data providers, government treasuries, multi-lateral development banks, academics, think tanks, campaigning-NGOs, and voluntary disclosure organisations) whose requests to participate in the project had been accepted by the Secretariat.[84] Upon signing-in, a holding screen greeted participants, displaying the webinar title and host's name.[85] Participants could interact through a small control panel and dialogue box on screen (see Appendix 6A for an example), and were periodically reassured by an automated message, 'The webinar will begin shortly, please remain on the line', which would be heard hundreds of times across the two years of the standard-setting project. When the host logged in the presentation window would switch to mirror their screen, usually displaying PowerPoint slides or draft documents to all

[83] Comments made by one member of the secretariat during the launch webinar of the Financed Emissions Initiative TWG process on 30th January 2014.

[84] During a phone call with one member of the Secretariat it was explained that they only declined requests if they felt there was no clear contribution that the individual could make and that the individual's interest in the project was solely journalistic. Also note that Chapter 3 provides further details of access for the participant observation.

[85] Participants could also join the webinar via telephone by calling a number specific to their country.

participants (see Appendix 6B). The purpose of the initial 'kickoff call' was to explain why the Financed Emissions Initiative had been launched and what it was trying to achieve.

The Secretariat (comprised of representatives from both the GHG Protocol and UNEP FI that oversaw and coordinated the standard-setting project) hosted this initial webinar, which focussed on the findings of a one-year scoping phase conducted in 2013. They explained that this had highlighted the need for a standardized approach to measuring 'financed emissions'. Based on 130 survey responses, two workshops, and a consultation with UNEP FI members, one member of the Secretariat explained that there was strong support for standardising and harmonising the approach for measuring and reporting financed emissions:

> "What we mainly wanted to establish [during the scoping phase] is that there was a need for this, for the standard and a harmonized approach to accounting and reporting for financed emissions. And [...] the majority of the survey respondents supported that there was a need for guidance."

The Secretariat remarked on "a need for guidance" throughout the first webinar, emphasising that the 'demand' for the standard indicated there would be 'strong take-up' (adoption of the standard) following its publication. However as well as allowing the Secretariat to assess the potential adoption levels, the scoping phase suggested "accounting and reporting of the environmental impacts of financial operations is important for the finance sector to be able to see whether or not it is, over time, evolving in line with the transition to the low-carbon economy" (Secretariat). More specifically, it was not about industry-level metrics for monitoring the evolution of the financial sector as a whole; rather it was about monitoring at the organisation- and portfolio-level. "Developing guidance on that is precisely the objective of the first track of our process, which is focused on accounting guidance" (Secretariat). By creating accounting tools for measuring and reporting carbon footprints of investment portfolios (financed emissions), the Financed Emissions Initiative sought to render visible the development of the financial sector in terms of the transition to a low-carbon economy. However it should also be noted that aligning the financial sector with the transition to the low-carbon economy is one of the core objectives of UNEP FI. It is perhaps unsurprising that a consultation with members of UNEP FI – as well as UNEP

FI's involvement in conceiving and coordinating the project – revealed the transition to a low-carbon economy was as one of the main goals.

The same Secretariat member went on to detail numerous problems in the current landscape of GHG emissions accounting and reporting, identified through the scoping phase, which the project would address. Central to this was the "proliferation, or great number of, different methods and approaches out there, some developed by the finance sector itself, others developed by the NGO community, and others developed by consultancies." These standards emphasised different aspects of the sustainability agenda and, where overlaps existed, a degree of cross-compatibility had emerged and was enabled through tools that would compare the requirements of multiple standards.[86] This "coexistence" (Botzem and Dobusch 2012, p.744) of standards was presented as a problem to the adoption of methods on the grounds that "as a financial institution you might simply be a bit overwhelmed and confused about what to do with this ecosystem of existing approaches" (Secretariat). However, as Botzem and Dobusch (2012) note, the coexistence of standards "can be the first stage of negotiating comprehensive collective standards" (Botzem and Dobusch 2012, p.744). Indeed, the Financed Emissions Initiative was presented as an attempt to connect with and build upon existing methods of carbon accounting, "trying to harmonize and standardize […] focussing on what is out there, and […] trying to tailor the frameworks used by many companies in the real economy to the needs of the actors in the financial economy" (Secretariat). To the Secretariat, the Scope 3 standard was "probably not detailed enough, it's probably not nuanced enough, and it's probably not being truly tailored to the needs of the many subsectors in the financial economy."[87] The Secretariat argued that this lack of refinement, combined with range of available methods for assessing financed emissions (e.g. those developed by Trucost, Inrate, Profundo, and Ecofys), explained why "we're not seeing a mainstream, upscale use of these methods by financial practitioners".

[86] See, for a recent example, the Climate Disclosure Standards Board's *Making the Connections* report (CDSB 2015).

[87] The Scope 3 Standard categorised investments across financial organisations into equity investments, debt investments, project finance and managed investments and client services. Informal conversations during the in-person Financed Emissions Initiative meetings suggested that further refinements should allow for differences between types of financial organisations and asset classes.

6.1.3. Structure of the Financed Emissions Initiative

Access was granted for a participant observation as a member of Technical Working Group 4 (TWG 4), the group tasked with discussing 'cross-cutting issues' that are relevant to the work of more than one, and often all, TWGs. TWG 4 considered and drafted sections on accounting principles, boundary setting rules, target setting, performance metrics, assurance and relevant information regarding on fossil fuel reserves. In contrast, TWGs 1, 2 and 3 worked on guidance for specific types of finance; company and project finance guidance is considered by TWG 1, government finance by TWG 2, and consumer finance by TWG 3. These first four TWGs worked separately on their respective aspects of the standard and were overseen by the Secretariat, who coordinated across the groups to avoid overlap and to relay concerns that arose elsewhere to the relevant TWG. TWG 5, which will be discussed in further detail in the Section 6.1.5, worked on a 'sister' guidance document[88] dealing with measuring and managing carbon asset risk, which pertained to the risk investors face as a result of new regulations, changing customer preferences, threats to reputation and impairments to underlying assets.

Each of the TWGs divided its workload between subgroups, which worked on the draft of their particular topic and presented back to the TWG. TWG 4 members were allocated to the subgroups more or less based on their individual preferences, and the meetings were conducted via webinars. However there was no prescribed process for the discussions and work of these subgroups. Rather, the subgroup leader, appointed by the project secretariat, decided on the course of action. The boundary setting subgroup, for example, held two meetings to identify the core issues and objectives for the section. However when consensus could not be reached within the subgroup, it reported its progress back to the whole of TWG 4 for further guidance. Once a subgroup produced a draft or decided that further guidance was required, it reported back during a TWG 4 webinar and subsequently worked on finalising a draft in line with the feedback received.

There were two key milestones for the TWG process in the first half of 2014. First, in May there was a two-day in-person meeting of the Advisory

[88] See Appendix 6C for the diagram presented by the Secretariat to explain the planned structure for the document and the responsibility allocated to each TWG.

Committee in Milan. The Advisory Committee consists of between 20 and 25[89] representatives of the major stakeholder groups – investment banks, insurance companies, investor alliances, think tanks and NGOs. The head of each TWG also attended the meeting and provided an update on the progress made, highlighting areas where the TWG was in need of advice and direction. For example even after the boundary setting subgroup raised its concerns with the whole of TWG 4 the matter remained unresolved. Following a lengthy discussion, the Head of TWG 4 concluded that boundary setting should be on the Advisory Committee meeting agenda. Following prolonged deliberation, the Advisory Committee agreed on three possible options for boundary setting, which the head of TWG 4 relayed to the members in a webinar a fortnight later. As such, the role of the May 2014 Advisory Committee meeting was to provide feedback to TWGs on matters where disagreements arose. However the specific content of the draft standard was to be decided within the TWGs. As such, the Advisory Committee steered the work of the TWGs and would also review and comment on the TWGs' completed drafts.

The second milestone was a two-day in-person meeting in June 2014 in Washington D.C.. All TWGs were invited to attend and the head of each TWG presented a progress update and raised aspects of their work requiring further guidance. The intention was for TWGs to have received feedback from the May Advisory Committee meeting and to present the updated drafts or work plans during the June TWG meeting. It also provided an opportunity for participants to meet the members of their TWG for the first time. While most of the Advisory Committee members were acquainted before the May 2014 meeting (either through earlier involvement with the GHG Protocol or through international climate finance conferences), the relationships between most TWG members were restricted to their interactions during webinars and related email correspondence. However with the global participation base of the project many TWG members were unable to attend in person, instead listening to the meeting through a live stream and sending their comments and questions by email to the Secretariat. During the presentations any aspect of the TWG's work could be questioned and debated by members of other TWGs. As well as offering a milestone to work towards, this meeting allowed

[89] The number of Advisory Committee members varied slightly across the participant observation. This was because individuals changed roles or organizations and could no longer take responsibility for their position in the project.

for discussion between the TWGs to raise concerns, confusions and to reshape the overall direction and objectives of the standard-setting project.[90] As will be shown in Section 6.3.2 of this chapter, however, it was at the June TWG meeting that conflict between participants' objectives produced tensions that brought the Financed Emissions Initiative to the brink of collapse.

6.1.4. Pressures on Financial Organisations to Participate

When the TWG process began it had attracted the highest level of participation, 280 individuals, of any GHG Protocol standard setting project. These participants included representatives from major financial organisations, with Bank of America, Barclays, RBS, State Street, Unicredit and Wells Fargo all sitting on the Advisory Committee. Numerous other financial organisations were represented through investor networks such as the Investor Group on Climate Change, whose members are institutional investors from Australia and New Zealand (see Appendix 6E for a full list of all advisory committee members). Many of these representatives were the Heads of Sustainability of their respective organisations and, from informal conversations during the participant observation, would sometimes be required to report to their Board of Directors on matters such as a specific type of environmental risk or media scrutiny resulting from NGO campaigns. However, as shown in Chapter 5, financial organisations were under pressure to integrate a climate change framing in their investment and lending decisions from a range of civil society actors. This section provides the reader with background to the connections between such pressures and the Financed Emissions Initiative, shedding light on why these individuals would volunteer their time to attend webinars, travel internationally to several in-person meetings, and to discuss and draft what would become a publically available document.

Disclosure Groups as an "Implementation Partner"

First, upon publication of the Scope 3 Standard in 2011 CDP[91] included a new segment in their annual survey on reporting GHG emissions from

[90] See Appendix 6D for an overview of the governance structure for the Financed Emissions Initiative.

[91] CDP is a GHG disclosure organisation that gathers information through annual questionnaires, and was formerly known as the Carbon Disclosure Project. It changed its name to the abbreviation CDP to reflect their expansion into, in particular, water

investments, requiring compliance with the new standard. The financial sector, however, was unfamiliar with the standard that they were suddenly required to comply with. By participating in the Financed Emissions Initiative, financial organisations sought to both shape the refinement of carbon accounting methods for investment and lending activities as well as develop an understanding of a method that they expected would be required by future CDP annual surveys. During following exchange from the May 2014 Advisory Committee, representatives from financial organisations pressed the Secretariat to confirm the degree of alignment between the Financed Emissions Initiative and the future requirements of CDP:

> "This would be akin to hard coding some of the CDP questions for example? Potentially. In accounting regulation. (Investor community)
>
> Exactly. (Think tank)
>
> Well yes, […] aren't they evolving their questionnaire to make it more industry specific? So theoretically I mean some of the issues could be addressed in the next CDP [survey]. (Banking community)
>
> Is there a plan for a financial sector supplement? CDP is going to develop a financial sector supplement once this project completed. (Secretariat)
>
> […] they've been waiting for this [standard]. They don't see any point in coming out with a bunch of questions only to find out it's not what anybody wanted. (Non-profit community)
>
> Yeah. I mean I would say rather than try to address this here, just make sure that the input from this script is aligned with what CDP is doing and what you guys want with that process. (Banking community)
>
> Yes, well that's kind of why they are here. (Secretariat)
>
> [Laughter from around the room]
>
> Yes, well CDP will base its questions on what comes out of this guidance." (Secretariat)

The above exchange also highlights the Secretariat's awareness of CDP's influence. A member of the Secretariat explained that they had reached an agreement that CDP would "develop a financial sector supplement once

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reporting (For more detail on CDP see: Kolk, Levy, and Pinkse 2008; Matisoff, Noonan, and O'Brien 2013).

we're done with the project", describing them as "sort of like an implementation partner" (Interview: Eag1413). Indeed this supports Botzem and Dobusch's observation that "third parties can play a fundamental role in pushing adopters to follow a standard, making them virtually obligatory" (Botzem and Dobusch 2012, p.740), with financial organisations' desire to disclose to CDP driving adoption of and compliance with the GHG Protocol standards.

Campaigning-NGOs Demands on Commercial Banks to Participate

The influence of NGO campaigns on financial organisations (Chapter 5) had provided organisations such as Rainforest Action Network (RAN) [92] with, as Gough and Shackley write, "a place at the negotiating table" (Gough and Shackley 2001, 329). It should be noted, however, that even though participants recognized RAN's influence, the organisation did not hold a position on the Advisory Committee. RAN was, as members of the Secretariat explained during informal conversation, consulted on whether the decisions being made within the Financed Emissions Initiative would satisfy the campaigning-NGOs demands for transparency from commercial banks. Yet they were not invited to join the Advisory Committee or its meetings. This was, the Secretariat explained during informal conversations, in order to promote a 'more open and collaborative atmosphere'.

However as well as working to align the Financed Emissions Initiative with RAN's transparency demands, RAN also placed substantial pressure on US-based commercial banks to participate in the project. While their influence in the financial sector as a whole was studied in Chapter 5, RAN also made demands to specific commercial banks that they disclose their financed emissions, with RAN acknowledging participation in the Financed Emissions Initiative as part of a commercial bank's response. As an interviewee of a large US commercial bank explained, "we are not going to go out and develop our own policy. First we need to develop an industry standard [...] If we take a leadership role in [the Financed Emissions Initiative], then that's our response to the activists, saying 'Look we are trying to work with the industry to find a way to make this happen'" (Interview: Eag1519). RAN had threatened to

[92] RAN is a member of BankTrack, a network of campaigning-NGOs whose activism in the financial sector have been well documented through O'Sullivan and O'Dwyer's work (O'Sullivan and O'Dwyer 2009; O'Sullivan and O'Dwyer 2015).

initiate a campaign against the interviewee's commercial bank, similar to RAN campaigns faced by the same bank during the early-2000s. By maintaining pressure, especially on US commercial banks, RAN sought to build a "quiet consensus among banks that NGO pressure on this issue is not going to go away so they might as well be transparent and disclose" (Interview: Eag1414). Indeed the memory and experience of being targeted by earlier RAN campaigns underpinned comments from the commercial bank representative. Moreover, the initial aims for the Financed Emissions Initiative aligned with the combined pressures from CDP and RAN to make visible the GHG emissions that are enabled by investment and lending activities. It should be noted that this section only set out to provide background to the pressures on financial organisations to engage with the standard-setting project. The chapter now turns its attention to the gradual reconfiguration of the standard away from a focus on financed emissions and towards metrics for monitoring the alignment of investment and lending activities with a two degrees scenario. To study this, the next section brings the reader inside the TWG webinars and the in-person meetings of both the Advisory Committee (in May 2014) and the project as a whole (in June 2014).

6.1.5. Technical Working Group 5 and Carbon Asset Risk

In October 2013 the Advisory Committee met at Bank of America's New York office to build a common vision for the standard and to set its objectives and scope, as well as agreeing the project development timeline. Prior to this meeting the Financed Emissions Initiative maintained a strong focus on developing accounting guidance for financed emissions. However at that meeting the representatives of a major US bank pushed for the creation of a guidance document on managing carbon asset risk. Discussing this proposal during an interview, a representative from a large US commercial bank commented:

> "[That bank] proposed carbon asset risk because of the *Unburnable Carbon* thesis. Carbon asset risk was kind of newer on the horizon and it's something everyone was talking about and [that bank] was really kind of saying, 'Hey, this is something that actually could have an impact on our balance sheets, could potentially change our risk management analysis'" (Interview: Eag1519)

As Carbon Tracker's work on the carbon budget came to shape the financial sector discourse on climate risk, this major US bank turned to its

involvement in the Financed Emissions Initiative as a means of developing the tools to understand and manage such risks. However while the Secretariat suggested that financed emissions information had relevance to risk management, this generated little support among Advisory Committee members during the October 2013 meeting. This was primarily because carbon asset risks stemmed from impairment of underlying assets stemming from new carbon constraints. However financed emissions were argued to have little relevance to risk management because they only provide an annual emissions figure, whereas 'locked-in' or 'cumulative' emissions[93] of an asset, for example, could be compared more easily with scenarios for carbon constraints. Through these discussions the idea for a fifth TWG emerged, which would create a 'sister guidance' document developed in parallel with the core Accounting work stream. Specifically, this group would use existing risk management practices as its foundation, working to render the idea of carbon risk into a compatible form. As such it should be noted that the group was not working on refining the carbon budget into portfolio-level risk management metrics. Rather, it worked to render the idea of carbon risk into a form compatible with existing risk management practices, such as Environment, Social and Governance (ESG) analysis and stress testing through scenario analysis.

Beyond the interest in measuring and managing carbon asset risk from the US bank, the sister guidance document was presented to the Secretariat as providing "a new way to get climate mainstream within [their bank]" (Interview: Eag1514). It was claimed that it would enable the bank's sustainability team to "have a convincing conversation with risk managers, [who] are the influencers on what you're going to invest in and where you are going to focus your business" (Interview: Eag1514). To the Secretariat, the formation of TWG 5 promised to extend the reach and influence of the Financed Emissions Initiative's output within adopting organisations. However, the member of the Secretariat remarked that the guidance developed by TWG 5 "was different than other types of documents from the GHG Protocol in that it wasn't only focussed on reporting, it was only for internal decision-making" (Interview: Eag1514). Prior to the formation of

[93] Locked-in emissions refer to the pre-determined lifetime emissions of an asset and cumulative emissions is the total emissions associated with a particular investment.

TWG 5, the GHG Protocol had developed standards to guide the corporate-level reporting of GHG emissions in order to enhance the accuracy and comparability of the information being produced. In contrast, TWG 5 was formed to develop tools that could factor the idea of climate risk into existing risk management practices.

During the January 2014 'kickoff call' for the TWG process, the Carbon Asset Risk work stream was presented by the Secretariat as creating tools to "highlight how greenhouse gas risks materialize for different financial institutions and in different points along the provision of capital to companies and to assets. Particularly those companies and those assets that have a high exposure to greenhouse gas emissions." While there had been disagreement among the Advisory Committee as to the relevance of financed emissions for the risk guidance document, the Secretariat explained during the kickoff call that the work of TWGs 1 to 4 would inform the risk guidance produced by TWG 5. This was premised on the idea that financed emissions had relevance to risk management. However, as the next section explores, this assumption was central to growing tensions within the project, tensions that would bring the Financed Emissions Initiative to the brink of collapse in June 2014.

6.2. Tensions Emerge in Discussions on 'Business Goals'

This chapter now turns its focus to discussions on the 'Business Goals'[94] section of the standard for two reasons. First, tensions began to emerge between the Secretariat and Advisory Committee members regarding the relevance of financed emissions to the proposed business goal of managing risk. It should be noted that, whereas the idea of 'climate risk' (Chapter 5) relates to the physical, regulatory, competitive and litigation risks that climate change poses, the Financed Emissions Initiative focussed on the financial risks to intermediaries and investors that stem from their financial stake in companies, referred to as 'carbon asset risk'. Second, an

[94] 'Business goals' refers to – as will be explained further in Section 6.2.1 – the section of the standard that outlines the purposes for which an organization would adopt the standard. In the case of the Financed Emissions Initiative, the business goals relate to the reasons a financial organization would measure and report their financed emissions.

understanding of the 'Business Goals' component of the standard is necessary for understanding later discussions on boundary-setting rules, addressed in Section 6.3.

6.2.1. Background to Business Goals

Since the GHG Protocol's *Corporate Standard* in 2001, the first stage in measuring and reporting GHG emissions is for an organisation to define the business goals it pursues by measuring and reporting on GHG emissions. The GHG Protocol's updated 2004 *Corporate Standard* details such goals:

> "A well-designed and maintained corporate GHG inventory can serve several business goals, including:
> - Managing GHG risks and identifying reduction opportunities
> - Public reporting and participation in voluntary GHG programs
> - Participating in mandatory reporting programs
> - Participating in GHG markets
> - Recognition for early voluntary action." (GHG Protocol 2004, p.3)

Business goals play a significant role in the GHG Protocol standards because their guidance on boundary setting allows a reporting organisation to tailor their measurement and reporting to the specific business goals they select. Put differently, business goals do more than offer a reason to report, they allow reporting organisations the flexibility of stating their reasons for producing GHG accounts and to tailor their efforts specifically to those reasons. What is important to note is that the GHG Protocol standards are designed to provide toolkits that cater to the numerous motivations for measuring and reporting on GHG emissions. This reasoning was expressed in the 2004 *Corporate Standard* as follows:

> "Companies generally want their GHG inventory[95] to be capable of serving multiple goals. It therefore makes sense to design the process from the outset to provide information for a variety of different users and uses—both current and future. The GHG Protocol Corporate Standard has been designed as a comprehensive GHG accounting and reporting

[95] A GHG inventory can be thought of as a reporting entity's annual carbon account. The GHG inventory accounts for the GHG pollutants emitted into the atmosphere by an organization's activities that are within the reporting entity boundaries set out in the standard. However GHG inventory (and emissions inventory) is a general term referring to, for example, the annual submissions of Parties to the UNFCCC regarding their net emissions, which consist of annual emissions less the 'sinks' (or removals) of GHGs from the atmosphere.

> framework to provide the information building blocks capable of serving most business goals." (GHG Protocol 2004, p.11)

In this regard, companies may adopt the GHG Protocol standards for reasons other than requirements to do so for a particular reporting regime. Indeed, this also allows the GHG Protocol standards to remain *flexible* in how they are implemented, while appearing as the standardised approach that underpins numerous disclosure requirements. For example compliance with the GHG Protocol standards is required by the DEFRA mandatory GHG reporting rules for companies listed on the FTSE Main Market (DEFRA 2012), as well as the voluntary disclosures to CDP outlined in Section 6.1.4. In other words, the GHG Protocol standards are designed to offer a comprehensive toolkit that is compatible with different motivations and initiatives for measuring and reporting GHG emissions. It is when they are combined with regulatory requirements that the standards become more prescriptive. However this chapter focuses on the emergence of a standard and, as such, incorporation into other regulatory regimes, while perceived by many participants as likely, is a matter for further study. Instead, this section focuses on 'Business Goals' discussions to highlight tensions that emerged regarding the relevance of financed emissions to the shifting objectives of project participants.

6.2.2. TWG 4 Develops Draft Business Goals

During a March 2014 webinar one of the TWG 4 leaders explained that the Business Goals subgroup had developed four separate goals, which were almost identical to those in the Scope 3 Standard. Again, one of the key aspects of establishing a business goal was to provide flexibility to the adopting organisation, allowing it to tailor the measurement and reporting practices to their specific concerns. As such, the business goals were being developed to represent the concerns of project participants, as well as establishing financed emissions as an appropriate basis for addressing those concerns at corporate- and portfolio-level. This section will explore the tensions that emerged around four business goals, which were outlined in the April 2014 Business Goals draft text as:

> "Goal 1: Identify carbon risks and opportunities […]
> Goal 2: Develop a carbon management plan/strategy […]
> Goal 3: Engage value chain partners […]
> Goal 4: Stakeholder engagement." (April 2014 Business Goals draft text)

The first business goal, "Identify carbon risks and opportunities", was motivated by the view that "[c]orporate carbon footprints and management strategies are increasingly subject to public scrutiny, legislation and regulation. This translates into two principal sources of carbon risk and opportunity for financial institutions:[96] [regulatory and reputational risks and opportunities]".

"In the second goal", one of the TWG 4 coordinators explained during a webinar, "[the subgroup on Business Goals is] looking to take that information, once you've actually gone through the process of using the standard to map out what your key risks and opportunities are, to develop a strategy and a response". Titled "Develop a carbon management strategy", this goal argues that financed emissions information helps to identify 'hotspots' where emissions are particularly high. This, it continues, puts the financial organisation "in a better position to determine potential risk mitigation approaches, or new market opportunities, that should be considered within the broader corporate strategy."

"The third goal ['Value Chain Engagement']" the coordinator explained, "is looking to very much address the question of how you would then leverage the whole value chain in order to more effectively deliver that response". Central arguments in the draft document are that the standard offers "a unified approach to GHG management" as well as helping to "achieve common and differentiated business objectives – driving collaboration, knowledge sharing, efficiencies and cost reduction." As such, the first three goals were interconnected parts of creating and implementing a risk management strategy: identification, planning, and implementing.

The fourth and final goal, however, appeared more as a standalone objective and one that had been central to the project since the start of its 2012 scoping phase. The coordinator noted that it addresses "the benefits of

[96] UNEP FI Investor Briefing: Portfolio Carbon. http://www.unepfi.org/fileadmin/documents/UNEP_FI_Investor_Briefing_Portfolio_Carbon.pdf

disclosure and what some of the stakeholder benefits are". The argument was based on the opinion that environmental campaigns "are shifting their focus from the environmental performance of corporations to that of financial institutions" (April 2014 Business Goals draft text). Particular attention was drawn to the recent RAN campaigning effort "for enhanced disclosure of "financed emissions" by commercial banks in the US" as well as the Asset Owners Disclosure Project's (AODP)[97] campaign to mobilise the beneficiaries of institutional investors to "increase transparency on [institutional investors'] GHG emissions and broader climate change related risks" (Ibid.). "Responding to stakeholder interest by disclosing GHG emissions" was highlighted in the draft text as "a core business objective of developing a scope 3 invested assets inventory."

This very brief presentation of the four business goals during a March 2014 webinar was followed with a range of questions, focussing in particular on the three goals pertaining to risk management. Indeed, these remained the focus of discussions in the in-person Advisory Committee and TWG meetings over the coming months, as examined later in this section. However in one of the more animated exchanges during the webinar participants challenged whether financed emissions could be made compatible with risk assessments without a carbon price through which the emissions information could be monetized:

> "I would just have one comment on it, just from what I've heard other financial institutions have to say about this. They would say greenhouse gas emissions on their loans are not useful for their risk management models, because right now emissions don't equate to risk because there is not, in any countries, a price on carbon." (TWG participant)

Central to this criticism is that financed emissions are not compatible with risk assessment methods without a price on carbon. However without the ability to monetize emissions data, participants argued that financed emissions had little relevance to risk. That is, making climate change compatible with risk was not only a matter of quantifying GHG emissions, but also of costing those emissions. Indeed, participants argued that it was

[97] AODP is a London-based not-for-profit organization "whose objective is to protect asset owners from the risks posed by climate change […] by working with pension funds, insurance companies, sovereign wealth funds, foundations and universities to improve the level of disclosure and industry best practice" (AODP 2012, p.4).

because a carbon price could not be applied across financed emissions that TWG 5, in working on the Carbon Asset Risk guidance, had focussed on developing a general framework to guide investors and lenders in assessing, evaluating and managing risk. The exchange continued:

> "Yes. Yes, ok. That is a valid point. (TWG lead)
>
> > I definitely think it's worth highlighting or at least pointing out this issue in the guidance. I mean eventually there will be a price on carbon and then hopefully then you will be able to more easily translate emissions directly to risk. That was like one of the main drivers for developing the second guidance document." (TWG participant)

However the participant leading the discussion on Business Goals appeared keen to support the link between financed emissions and risk management, connecting the core accounting standard to the growing carbon asset risk concerns among participants. Without a carbon price, the project was limited to developing a standard that created information with a degree of relevance to risk management, and it was the relevance of financed emissions that continued to be challenged in later meetings. While acknowledging the participant's point, the TWG lead sought to maintain the connection and to adopt the criticism as a caveat to that link:

> "That's true. I mean it also sometimes translates to market risk in that regard as well, or investment risk; where you have concentrated emissions activity in your portfolio, if there is regulatory change or a technological shift or behavioural shift. So I think that's a good point, and I don't think we have to be too explicit about it, but definitely saying that [financed emissions] can aid in that [risk management] process perhaps." (TWG lead)

The fourth business goal, on the other hand, was only questioned during the following webinar, held in April 2014. A participant from a campaigning-NGO commented "Rainforest Action Network is only one of several NGOs that is campaigning on this issue so I recommend reframing in paragraph two: 'several global NGOs are campaigning for banks to disclose their financed emissions'" instead of only remarking on the campaigning efforts of RAN in the US. In particular, the participant drew attention to the "partners in the BankTrack network that focus on the European banks […] so that will sort of globalise the scope of that." The participant also went on to outline that campaigning-NGOs will come to expect more than transparency in

the near future, building on earlier campaigns to push financial organisations to demonstrate their performance plans and targets for reducing the financed emissions figures:

> "Rainforest Action Network is actually interested in performance improvements and emissions reduction. So in terms of the long-term stakeholder expectations, we foresee that, over the next five to ten years, at least major high-profile investment banks will face an expectation from civil society that they should not only disclose their financed emissions [...] but also develop performance plans and performance targets for reducing them, so I think that is worth capturing. (TWG Participant from an NGO)
>
> And would that be in the stakeholder engagement [Business Goal 4] bit? (TWG Presenter)
>
> Yes, I think that is worth putting in the stakeholder engagement part. (TWG Participant from an NGO)
>
> Ok then, I'll do my best to address those comments and perhaps circulate those back to you individually just to confirm that captures what you put forward. (Subgroup Lead)
>
> That sounds great. [...] (TWG Participant from an NGO)
>
> To be honest I actually had the comment around 'what about the other groups? They might get a bit miffed.' [Laughter] [...] (TWG Presenter)
>
> Yeah, we have to be very careful not to look US-centric." (Secretariat)

However apart from the standard emphasising that transparency demands will be strengthened to include plans and targets for reducing financed emissions, the stakeholder engagement business goal received little attention. Discussions instead focussed on the connection between financed emissions and the emerging concerns of carbon asset risk. Having discussed the Business Goals draft twice with the entire TWG, the subgroup made minor alterations to the Business Goals draft before it was presented to the Advisory Committee at their in-person meeting held in May 2014 in Milan. This chapter now turns to consider the emerging tensions surrounding the relevance of financed emissions to risk management systems, and how this cast doubt on the connection between the core accounting standard and the 'sister' guidance on risk management.

6.2.3. Relevance of Financed Emissions Questioned by Advisory Committee

At UniCredit's headquarter, the May 2014 Advisory Committee meeting commenced promptly at 8.30am in a 12th floor conference room with views stretching across Milan.[98]Observations were made from the corner of the room, with the centre of the room being occupied by tables arranged in a 'horseshoe' and focussed on a projector screen at the front of the room where presentations were made.[99] Advisory Committee members in attendance included representatives of commercial banks, institutional investors, investor networks, disclosure groups, think tanks and NGOs.

During this meeting it was the NGO and think tank community that challenged the relevance of financed emissions to risk. Members representing financial organisations also voiced concerns, however they primarily challenged what they saw as overly cumbersome requirements within the guidance. The challenges were presented on two grounds: first, whether it would help inform financial organisations' risk management practices; and second, the extent to which the numbers would help reveal the alignment of investment and lending activities with the transition to a two degrees scenario. This section considers each in turn.

Relevance of Financed Emissions to Risk Management

Whereas in the October 2013 Advisory Committee meeting the commercial banks had pushed for a fifth TWG on carbon asset risk, it was the think tank and NGO community that pushed for the accounting guidance to be relevant to risk management at the May 2014 meeting. As the discussions commenced the think tank and NGO community argued that the core accounting standard should be tailored to gain traction by demonstrating relevance to risk management practices. After the four business goals (see

[98] For images of the UniCredit tower and the rooms in which the Advisory Committee met and took breaks see Appendix 6F.

[99] After being introduced as an observer of the Advisory Committee meeting and briefly explaining the research project, participants agreed that material from the meeting could be used in the research, but that it should not be attributed to individuals or their organisations. As such, excerpts from this meeting are contextualised by indicating whether comments were made by the 'NGO and think tank community', the 'finance community' or the 'Secretariat'. For a list of Advisory Committee members see Appendix 6E, and note that this is publically available information and that some Advisory Committee members were unable to attend the May 2014 meeting in Milan.

Figure 6.1) had been presented, the first three became the centre of their concerns.

Figure 6.1: Business Goals slide presented at Advisory Committee meeting in May 2014.

The centre of their concern was that "the value of publishing Scope 3 emissions for financial institutions today is mostly related to reputation and totally disconnected from risk management" (Think tank and NGO community) because it is focussed on responding to the demands and threats of certain campaigning-NGOs. They argued that as a result the "buy-in from top management and risk management teams is very weak," whereas the idea of climate risk had started gaining traction. To these think tanks, connecting the new carbon accounting tools to the idea of climate risk was central to their strategy of engaging with decision makers within financial organisations. In this regard, stakeholders (both the finance and the NGO and think tank communities) expressed their desire for the standard to address carbon asset risk concerns. Yet they simultaneously challenged whether the choice of metric, financed emissions, would provide an "effective" basis for risk management (*cf.* Botzem and Dobusch 2012). That is, their participation in the project was not only about identifying the preferences of the "constituents"

(Scharpf 1997, p.19) of a standard (i.e. developing the input legitimacy of the standard), it also applied their expertise to developing practices that embed those preferences into an instrument that is compatible with risk assessment in financial organisations (Scharpf 1999, p.16).

Yet, to the Secretariat, creating accounting guidance on financed emissions was an opportunity for the GHG Protocol to extend its Scope 3 Standard specifically to the financial sector. To develop different metrics or indicators would break from the GHG Protocol's focus on producing GHG emissions data. However for the NGO and think tank community the connection between financed emissions and, in particular, risk was unfounded:

> "We may try to categorize some industries that are perceived as highly exposed to regulatory risks. But we don't need the actual [financed emissions] calculations to do that. (NGO and think tank community)
>
> Right. But it could be one indication though. If you saw the emissions of fossil fuel investments in certain sectors and the weighting of those versus others, that could give you some indication of the risks from this one company versus another. […] What I'm just hearing though is that we have to think carefully about how you would report for the inventory to be useful for providing information on regulatory risks. (Secretariat)
>
> I think for at least for the first four [TWGs] it is just not in the scope of the work we are doing. It's just disconnected from regulatory risks." (NGO and think tank community)

To the Secretariat, the Financed Emissions Initiative presented an opportunity to foster further adoption of the GHG Protocol standards in the financial sector. It was similarly a chance for them to demonstrate the relevance of their standards to the growing concerns regarding carbon risk, which appeared to be a key element of their adoption strategy. However to those representatives of the NGO and think tank community engaging with financial organisations, a standard specifically on financed emissions would be of little use to integrating carbon risk considerations in risk management practices.

Indeed in the limited time remaining after the extensive discussions on the accounting guidance, TWG 5 outlined their approach to assessing, evaluating and managing carbon asset risk and made little mention of

financed emissions. Rather, it centred on comparing portfolio-level risk exposure to risk scenarios by, first, develop a portfolio-level 'carbon risk exposure'. This was to be based on assessments of policy, economic and reputational risks, and focus only on those sectors most exposed to such risks (typically the most carbon-intensive). Second, this carbon risk exposure was to be compared against 'risk scenarios' either through stress testing or applying a 'shadow' carbon price (assigning a price as a proxy for estimated controls on GHG emissions). The scenarios, it was suggested, could be based on different levels of policy intervention or those derived from particular levels of warming. However, as noted, time constraints meant that TWG 5 only outlined the proposed structure of their document and approach during the Advisory Committee meeting. Yet the approach it highlighted was based on rendering an investment or lending portfolio into a form that could be analysed in terms of scenarios for future efforts to address climate change. Financed emissions, on the other hand, only appeared relevant as one component of identifying industries with potentially high exposure to policy, economic and reputational risks.

Following the Advisory Committee meeting, the feedback for TWG 4 was outlined and discussed via webinar. Regarding the redraft of the Business Goals section, the Secretariat noted the limited relevance of financed emissions to risk assessments and suggested the TWG focus instead on the relevance of accounting specifically to reputational risk management. Concerns over risk relevance would surface again at the June 2014 in-person TWG meeting in Washington D.C., however this section remains within the May 2014 Advisory Committee meeting and focuses on discussions regarding whether the Financed Emissions Initiative would assist in rendering visible the alignment of investment and lending activities with a two degrees scenario.

Calls for Relevance to Financing the Two Degrees Scenario

Beyond calling for an enhanced focus on the 'risk relevance' of the accounting guidance, the NGO and think tank community questioned whether financed emissions information was useful for monitoring the alignment of financial organisations' investment and lending activities with a two degrees scenario. In particular, the International Energy Agency (IEA) had produced investment roadmaps of industrial transition for different policy scenarios for

climate change, including a scenario aimed at limiting the average increase in global temperatures to two degrees Celsius. These roadmaps were based on emission budgets for different warming scenarios as well as emissions trajectories to remain within those budgets. One member of the NGO and think tank community pressed for the section of the accounting standard on 'performance metrics' to use the IEA roadmaps to benchmark investment portfolios against this two degrees scenario:

> "When you assess the climate performance of a portfolio, carbon emissions are just a part of the story and you benchmark this against something. Usually it's benchmarked against the carbon emissions of the benchmark, which is not relevant because the benchmark is very carbon intensive. [laughter] 'So it would be better than the worst thing possible' [laughter]. So the idea here is to compare it with what you want to achieve, which is basically to finance the two degrees scenario." (NGO and think tank community)

Compared to the calls for transparency over financed emissions, benchmarking portfolios against a two degrees scenario would expose the deviations of a financial organisations' investment and lending activities from the common vision for tackling climate change, the two degrees target. Moreover, the investment roadmaps produced by the IEA mapped the emissions trajectories and the related investment requirements, refining the two degrees target into a form that could be compared to the existing investment landscape on an annual basis. That is, it appeared as a potential instrument through which carbon accounting could be linked to the two degrees target. However the roadmap was for the investment needs of the energy sector as a whole. As such, the participant's suggestion was for the Financed Emissions Initiative to work on translating that roadmap to the corporate- and portfolio-level. To reiterate, campaigning-NGOs had previously called on the Financed Emissions Initiative to create methods to for enhancing transparency over the financed emissions of commercial banks. The increased availability and comparability of financed emissions figures could then serve as a foundation for the campaigning and engagement efforts regarding the financial sector. However the NGO and think tank community at the May 2014 Advisory Committee meeting presented demands that stepped away from a case-by-case approach to pressuring financial organisations, instead proposing that the Financed Emissions Initiative should be underpinned by investment roadmaps for a two degrees scenario.

It should be highlighted, however, that this idea of monitoring alignment with a two degrees scenario came to the fore during discussions centring on the 'relevance' of financed emissions data. That is, the Financed Emissions Initiative provided a forum in which the metrics and the ideas to be embedded developed simultaneously. Each developed through efforts to grapple with the vision of the two degrees that had come to permeate the project. Claims that financed emissions were relevant to 'transparency' prompted challenges regarding whether that notion of transparency corresponded to 'financing the two degrees scenario'. As this idea entered discussions, financed emissions were challenged regarding their relevance as a basis for monitoring alignment. This is not to say that the metrics being developed were immediately overhauled through one discussion during an Advisory Committee meeting. Rather, it is to highlight an early instance in the simultaneous adjustment of ideas and instrument into a form cohering with the two degrees target (as well as its more concrete representations as the carbon budget and investment roadmaps). However this raised concerns among members of the financial community, becoming seen as overly prescriptive with regards to the way a financial organisation reported:

> "I don't know… I would advocate for having good rigour in terms of metrics but to give the flexibility for institutions to, if they so want to, talk about their business and how that may overlay with that two-degrees future scenario of staying within the two degrees Celsius threshold." (Financial community)

To this Advisory Committee member, the Financed Emissions Initiative was to create accounting guidance that enhances the "rigour" of climate metrics and to focus specifically on establishing a common method for their calculation. Yet financial organisations, it was argued, should be given flexibility in how they represent those metrics. The argument was that the Financed Emissions Initiative should establish the metrics that frame investment and lending decisions in terms of warming trajectories, yet allow flexibility with regards to the reasons financial organisations adopt the metrics and how they present the information produced. Put differently, ensuring flexibility in how the instrument was to be connected to the local specifics within a particular financial organisation would allow it to mediate multiple concerns. The comment continued, "I don't want the requirements or the elements in the report to kind of force an institution into reporting

because that might sound daunting, and because I think many people would argue that we're not going to make a two degrees target" (Financial community). The Financed Emissions Initiative was to focus on the methods for producing information, while ensuring flexibility in its implementation that enabled it to simultaneously connect to the concerns of multiple actors.

So far, this section has focussed on emerging concerns regarding both the risk relevance of financed emissions information, as well as the ability to use the tools created through the Financed Emissions Initiative to monitor the alignment of investment and lending activities with a two degrees scenario. Indeed, each of these two concerns had emerged through the orientation of participants' objectives towards the two degrees target: TWG 5's work on 'Carbon Asset Risk' was initiated as Carbon Tracker's *Unburnable Carbon* report gained traction within financial organisations; and the NGO and think tank community attempted to connect the measurement and reporting requirements to investment roadmaps for the two degrees scenario. Moreover, the two degrees target continued to permeate into the Financed Emissions Initiative and, with the resulting pressures to reorient the project becoming amplified at the June 2014 TWG in-person meeting, cast doubt on the purpose of the project and the timeline for its completion.

By 10am on the first day of the June 2014 TWG in-person meeting in Washington D.C. scepticism over the risk-relevance of financed emissions had become central to discussions. It appeared that TWG members – as well as the Advisory Committee members in attendance – had arrived at the meeting prepared for a heated exchange. Challenges were first raised by members of TWG 5, asking "will the output from a Scope 3 measurement be *at all* useful to how [financial organisations] think about risk?" They appeared startled by the way participants in discussions would "keep saying financed emissions and risk in the same sentence." To TWG 5 members the Accounting work stream and their risk work stream "were two distinctly separate paths". As one TWG 5 member commented:

> "The [financed] emissions number is not really where we focus. Carbon asset risk is evident to us […] in carbon-intensive sectors. […] We focus on the carbon-intensive sectors and then, once we have established that, we're not really overly interested in the exact number of emissions" (Consulting community).

Participants developing the accounting guidance, on the other hand, had been guided to focus exclusively on measurement of financed emissions and not on their relevance to risk management. Rather, the suggestion of risk relevance was proposed as a business goal and, moreover, was implicit in the Secretariat's assertion that the accounting guidance would inform the Carbon Asset Risk work stream. Once again, the Secretariat's efforts to connect their carbon accounting standards to managing carbon asset risk were undermined, with financed emissions challenged as being irrelevant to the first three proposed Business Goals. This is not to say that participants disagreed that the first three Business Goals addressed certain participants' concerns. Rather, that financed emissions were unsuited to addressing those concerns. In an impassioned appeal to the room an individual from of the consulting community argued:

> "We actually don't need Scope 3 [financed emissions] to do the first three [business goals] (Consulting community)
>
> [Affirmation from several individuals in the finance community]
>
> But the fourth [on transparency to stakeholders], I don't know if that's the business goal of a financial institution, but it's certainly what has been asked of them. Let's get that! They [financial organisations] don't really want to do that, but okay they get asked to do it and it costs them a lot of money to do it and that's why they don't want to do it." (Consulting community)

In what appeared to be an attempt to calm the discussion the Secretariat shifted focus to a discussion of on the seemingly less controversial fourth Business Goal on transparency. The Secretariat invited a question from a member of the NGO and think tank community, who wanted to respond to earlier comments regarding Business Goal 4, framing this as one of the core pursuits of the accounting guidance:

> "In response to [two participants'] point about providing transparency to stakeholders, one way to think about it… sort of zooming out… is streamlining and standardising transparency to stakeholders. A lot of banks are already publishing information about carbon, Scope 3 emissions, and stakeholders are asking for more. Stakeholders have their own methodologies that they are using, and I think that one benefit to really digging in and providing a standardised methodology is having clarity and rigour in how these are measured." (NGO and think tank community)

It is worth recalling that the initial thrust of the Financed Emissions Initiative was to standardise the financed emissions figures already being reported some of the major financial organisations. Indeed, transparency was at the core of campaigning-NGOs' pressure on financial organisations to participate in developing and adopting more refined Scope 3 carbon accounting methods. Rather, it was the emergence of the risk- and alignment-based objectives stemming from the two degrees target that raised challenges regarding the project's purpose. While there was still disagreement on the specifics of Business Goal 4, the focus on transparency brought a calm to the discussion as the NGO and think tank community as well as the finance community understood the role of financed emissions in achieving this goal. As one member of TWG 5 phrased it,

> "[My banking friends] all understand transparency to stakeholders. They don't know why they want it, by the way. [laughter] But let me tell you on their behalf, publically, they don't know what the hell you're going to do with it. But they know you [campaigning-NGOs] want it. So they think it's a name-and-shame process." (Consulting community)

Yet the desire for transparency did not go unchallenged. In particular, the idea of monitoring alignment with the transition to a low-carbon economy was highlighted as a significant omission from the Business Goals, and something to be addressed in Business Goal 4 on transparency to stakeholders. While the concerns regarding risk may have challenged the connection between the two work streams, the idea of monitoring efforts to 'finance the transition to a low-carbon economy' brought a challenge to work on the core accounting guidance. Indeed it was premised on the problems of comparing reported financed emissions across different countries:

> "If I'm a bank in Australia, at the moment the economy is underpinned by brown coal. I'm going to look shocking to New Zealand, which if you compare is 75% renewables – hydro, geothermal, *etcetera*. So if you're a ratings agency how do you compare these things in a meaningful way by just looking at financed emissions?" (Finance community).

The participant was arguing that name-and-shame campaigns based on financed emissions specifically related to the energy sector (as per RAN's campaigning focus) would target banks in nations with a carbon-intensive energy infrastructure. The member of the financial community went on to argue, "none of this discussion lets me account for what my investment in the

transition to a cleaner economy is. If I've got money being funnelled [through green investments], 'oh no, you can't count that, […] subtract it out'. So there are some material issues here in that fourth box around transparency" (Finance community).

While the link between financed emissions and the demands from campaigning-NGOs had been present from the start of the project, financed emissions began to be questioned regarding their connection to the emerging idea of the financial sector's role in financing the transition to a low-carbon economy. However the Secretariat remarked that the heated exchanges in this first half-day had put the two-day meeting behind schedule and that TWG 4 had feedback on developing the Business Goals draft. They were eager for the discussion to move on to TWG 4's work on Performance Metrics and Boundary Setting. Indeed, this chapter now turns to study TWG 4's work on boundary setting and how disagreements surrounding this section of the standard brought the Financed Emissions Initiative to the brink of collapse.

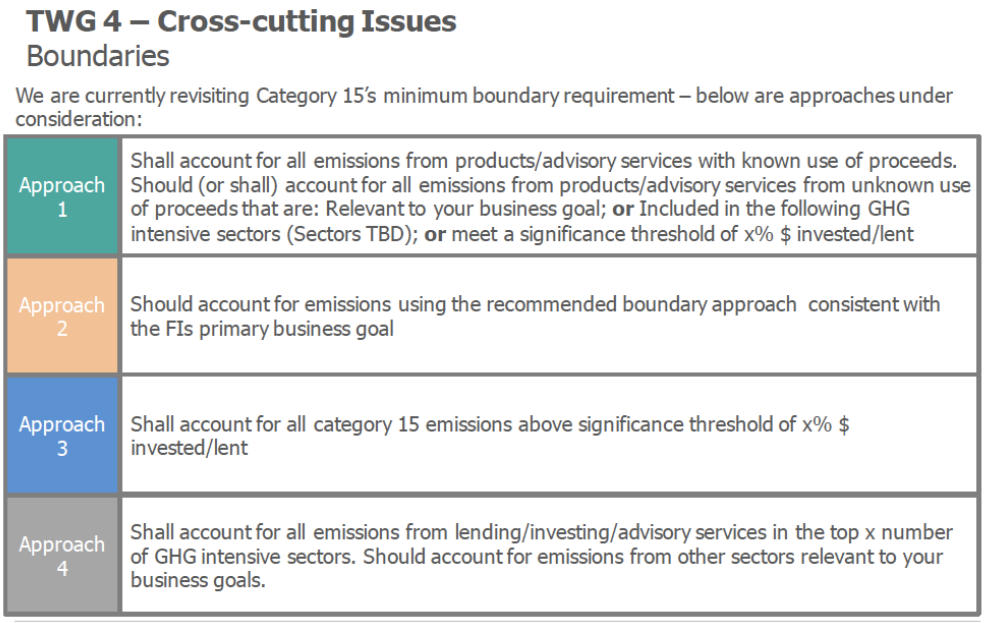
6.3. Boundary Setting: To the brink of collapse

This section begins by returning to the May 2014 Advisory Committee meeting in Milan in order to introduce and explain different proposed approaches for the Boundary Setting aspect of the standard. It then returns to the TWG in-person meeting in Washington D.C. to examine how the combination of concerns over both Business Goals and Boundary Setting destabilised the initial direction of the project and brought the Financed Emissions Initiative to the brink of collapse.

6.3.1. Boundary Discussions at the May 2014 Advisory Committee Meeting

Following a 90-minute discussion during the May 2014 Advisory Committee meeting in Milan, the Secretariat called a vote to "check the temperature of the room" on the different approaches to Boundary Setting. TWG 4, having been unable to reach an agreement on a single approach, produced four options (see Figure 6.2) for consideration by the Advisory Committee. The Boundary Setting approach would underpin the core carbon accounting standard, establishing the range of investment and lending activities for which financed emissions figures were to be produced. As such,

the material in this section is more focussed on the work of TWGs 1-4 to develop the core accounting standard for financed emissions, whereas the previous section focussed on the connections between that standard and the Carbon Asset Risk work stream.



TWG 4 – Cross-cutting Issues

Boundaries

We are currently revisiting Category 15's minimum boundary requirement – below are approaches under consideration:

Approach 1	Shall account for all emissions from products/advisory services with known use of proceeds. Should (or shall) account for all emissions from products/advisory services from unknown use of proceeds that are: Relevant to your business goal; **or** Included in the following GHG intensive sectors (Sectors TBD); **or** meet a significance threshold of x% $ invested/lent
Approach 2	Should account for emissions using the recommended boundary approach consistent with the FIs primary business goal
Approach 3	Shall account for all category 15 emissions above significance threshold of x% $ invested/lent
Approach 4	Shall account for all emissions from lending/investing/advisory services in the top x number of GHG intensive sectors. Should account for emissions from other sectors relevant to your business goals.

Figure 6.2: Boundary options presented during the May 2014 Advisory Committee meeting.

In the GHG Protocol's Scope 3 Standard, published in 2011, financial organisations were required to report on all Scope 3 emissions from investment and lending activities and to explain any omissions. However, while this boundary prioritised the comprehensiveness of measurement and reporting, discussions on the four options sought to simultaneously tailor the boundary to participants' concerns while balancing it with the practicality of implementing the requirements.

The draft of Approach 1 (see Figure 6.2) placed its emphasis on the quality of the emissions data reported, requiring[100] the measurement of emissions where there was a "known use of proceeds" from investment and lending activities. This first part of the approach, the Secretariat explained, created a narrow boundary mostly regarding project finance. Indeed, individuals from the finance community commented that the 'known-use of proceeds' aspect of this approach was only relevant to project finance, which was a small part of investment and lending activities. However the approach

[100] The 'shall' at the start of Approach 1 indicates a requirement, whereas the use of 'should' indicates a recommendation.

was also supplemented by an additional boundary for which three options were presented. These three options overlap with Approaches 2-4, which are explained below.

Approach 2 ties the Boundary Setting decision to the Business Goal that an organisation chooses as their motivation for measuring and reporting financed emissions. It is worth noting that the "recommended boundary approach" for each Business Goal had not been drafted at this stage in the project. This focus of this approach, the Secretariat explained, was "just to provide recommendations that are helpful for companies to think about how to draw boundaries that will help them achieve a specific business goal." Flexibility was presented as its main advantage, as well as allowing an organisation to tailor the boundary to their internal decision-making processes. However "the con would be [that] it will not create consistency, which was one of the main intentions of this guidance [...] and it's not going to satisfy some of the NGOs' desires for greater transparency from [financial organisations]."

Approach 3 was based on the idea that a certain percentage of activities could be excluded from the boundary. This was intended to reduce the burden on reporting organisations while ensuring the most 'material' activities remained within the boundary. However the use of an "x%" placeholder and the lack of guidance on how this approach would be implemented caused confusion during the Advisory Committee meeting:

> "So, sorry. To understand that better. What is the basis for this 1 or 5%? (Insurance community)
>
> How do we come up with the number? (Secretariat)
>
> No, no, no not just the number. (Insurance community)
>
> How we apply it? (Secretariat)
>
> Yes. 1% of what? (Insurance community)
>
> Exactly. (Secretariat)
>
> Yeah. (Insurance community)
>
> Exactly, we did not really clarify that well (Secretariat)
>
> [Laughter around the room]

> So, it could be, it could be looking at your whole loan portfolio. Look at how much money do you lend, and then try to figure out some place to cut it off where [there is] 5% you can exclude. Maybe there is a bunch of little loans you would cut out that only total 5% of the total dollars. You do the same for the investment portfolio. Something like that. We never got into detail of how to apply this. […] It's, I guess, it's a simple approach to enable [financial organisations] to exclude what's not significant to them." (Secretariat)

Approach 4, on the other hand, set a much narrower boundary than the other options, focussing on the most carbon intensive sectors and emphasising the relevance of the measurement and reporting exercise. As with Approach 3, one aim was to reduce the workload for organisations that adopt the standard. However in discussions during both the TWG 4 and Advisory Committee meetings there was disagreement on the appropriate shortlist of sectors, and how this could be defined in a manner that preventing 'gaming' of the standard.

The Secretariat called for a vote on the 4 options, which caused concern among representatives from several individuals in the finance community who did not want their votes documented. Assuaging these concerns, the Secretariat said that the results would only be used to indicate preferences across the options. As such, the precise number of votes for each approach cannot be reproduced in this chapter. The vote was conducted in two rounds by a show of hands regarding the Boundary Option that should be applied to, in the first round of voting, banks and, in the second round, to investors. For banks, it was argued that where there are 'known use of proceeds' this was the most straightforward and reliable data for financed emissions and "roughly half of the AC [Advisory Committee] members favoured a more limited reporting boundary focused on known use of proceeds and GHG-intensive sectors only (a variation on boundary option 1)" (Summary document of Advisory Committee meeting). The inclusion of reporting for GHG intensive sectors was to extend the boundary beyond the relatively narrow scope of activities where 'known use of proceeds' exists. For investors, on the other hand, most Advisory Committee members supported Approach 3, creating a "broad and inclusive boundary […] based on a prescribed significance threshold" with the availability of average emissions data for industries and subsectors making a broader approach less cumbersome. However based on the Advisory Committee vote "there was

little support for boundary option 2" with members preferring "a more prescriptive approach that creates further consistency across [financial organisations]."

Based on the Advisory Committee feedback TWG 4 decided to remove Approach 2, leaving three remaining options to be presented at the in-person TWG meeting in Washington D.C. in June 2014. With the Washington D.C. meeting taking place just over a month after the Advisory Committee meeting there was little time for TWG 4 to discuss further revisions to the boundary options. As can be seen by comparing Figure 6.3 with Figure 6.2, several minor amendments were made: the second stage of Boundary Approach 1 was narrowed down from three possible requirements to the one regarding GHG-intensive sectors; and the threshold for Approach 3 (now Approach 2) was set at 5% of total dollars invested or lent.

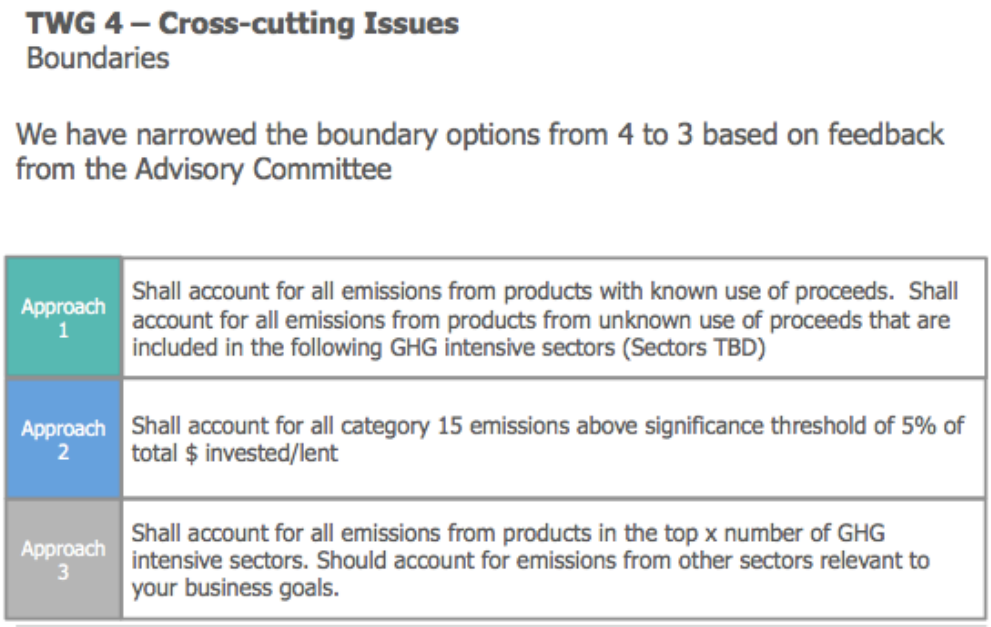


Figure 6.3: Boundary Options presented at the June 2014 TWG in-person meeting.

6.3.2. Revised Boundaries Create Concern in Washington D.C.

Returning to the June 2014 TWG in-person meeting in Washington D.C., the final session of the first day focussed on the three revised Boundary Setting approaches. Discussions centred on the practicality of measuring financed emissions under different Boundary Approaches, while also producing information tailored to the day-to-day concerns of financial organisations as well as the campaigning efforts of NGOs. However the tense

atmosphere from earlier disagreements over Business Goals carried through to this session, having remained the focus of discussions over coffee breaks and lunch. This section of the chapter attends to the discussion, highlighting that the definition of an accounting entity was simultaneously a challenge of connecting to the diverse concerns of participants while ensuring the workload placed on financial organisations would not discourage initial adoption of the standard.

As with the May 2014 Advisory Committee meeting, the availability of average emission factors[101] – from data providers such as Bloomberg and MSCI – was enrolled in arguments for the "broad and inclusive" boundary defined by Approach 2. A member of the consulting community, rather than the NGO and think tank community, raised the argument: "[i]n order to exclude sectors […] you need to evaluate them […] based on these metrics that we use in order to calculate emissions. So I really don't see the point of excluding them if […] it is possible to do Approach 2 without much more effort than Approach 1 or Approach 3." As had been argued by other participants, if to exclude a sector you had to know its emissions then it would be more work to exclude it than include it. While the presenter argued that the exclusion would be a "one-off assessment" that would save time when measuring financed emissions "on a quarterly or six monthly basis," the consultant maintained that the potential need to revise the system meant it was "easier to do it all rather than to have to evaluate and reiterate." Reinforcing the comments, a member of the NGO and think tank community remarked, "to [exclude sectors] properly, you really need to figure out the exposure of every company on your balance sheet to these activities, which, in terms of being time-consuming, it's a nightmare!" Rather, these arguments claimed that the most practical approach was to report all of the financed emissions by using average emissions factors.

However while this was aimed at countering concerns from the finance sector on the practicality of the carbon accounting exercise, the use of

[101] An emission factor may be applied to a statistic for a particular activity to produce an emission estimate for that activity (Emission = Factor x Activity). There are numerous data providers for these emission factors, from private organizations such as Bloomberg and MSCI to government-funded databases such as the UK's National Atmospheric Emissions Inventory. For the Financed Emissions Initiative, the average emission factors referred to could potentially be applied to the USD lent to or invested in a particular sector or subsector.

average emission factors tied disclosures to the carbon-intensity of the sector rather than the specific investment or client. For commercial banks, this raised the concern that "you're going to get criticised because people out there will not understand that's an average and it doesn't reflect your client." In other words, banks that specifically lent to clients who were less carbon-intensive than their sectors would have to measure and report financed emissions figures that represented the industry average. Yet discussions became heated when a member of the consulting community challenged these concerns:

> "If there are portfolios that are focussed on certain portions of that [sector] obviously they would want to highlight their benefits. So they would reduce that [emission] factor and justify it […] [saying] 'we are not using 0.7, we are using 0.3 and here is the justification for it. Because we want to market ourselves as a greener bank' (Consulting community)
>
> Oh! So then the good guys have to do the work and the bad guys can just report the average? It's complete bullshit! (Commercial bank)
>
> No, no, no, no… I'm saying that… (Consulting community)
>
> No, no, no. This is exactly what you're saying. You're saying if I want to demonstrate that I'm actually a good person and I'm selecting the right companies then I can do the extra work but everybody else gets the average. (Commercial bank)
>
> What I'm saying is […] you are not going to develop everything from scratch. So you might have cases where you say, 'No I don't want to use that average factor because I think I'm better than that.' You are free to do that." (Consulting community)

On the one hand, the consultant was proposing how to incorporate flexibility into Boundary Approach 2 so that it could be tailored to the specific reporting objectives of a commercial bank. On the other hand, the individual from the finance community saw the purpose of creating the standard as driving a change in investment and lending practices, for which the second approach increased the measurement and reporting burden. Reiterating the point later in the discussion, the individual from the finance community argued "the objective is […] to use that information to work with the client or work with people you are actually investing in so that they change their emission profile and that you have changes in the structure of the economy." While this only represented, as another individual from the finance

community put it, "one example of a Business Goal", it was further argued that average emissions factors were incompatible with bankers' incentive systems for influencing client relationships. By applying an average emissions factor, any reduction in a client's carbon-intensity of production would be hidden from the financed emissions measurements that would remain based on a sectoral average. The point is that while Boundary Approach 2 was supported as the least onerous method for measuring financed emissions – seen as crucial to fostering adoption of the standard – it was seen as disconnected from commercial banks' low-carbon investment strategies and their influence through client relationships. Moreover, the disagreement stemmed from the conflicting objectives of project participants, with Boundary Approach 2 being unable to appeal simultaneously to aspirations to foster adoption, highlight 'green' lending strategies, and to influence the production methods of banks' clients.

The banking community did offer some support to Boundary Approach 3. However they supported an initial step of measuring financed emissions for one specific carbon-intensive sector, and then adjusting the requirements based on that experience before extending them to other industries. It was proposed by the banking community as "one thing that we can all probably come to agreement on" because it reduces the burden of adoption while focussing on a "sector that is known to be emissions intensive, like the power and utility sector, and taking an iterative approach." While this was an effort to appeal to both concerns of adoption and refinement of the measures, it also prompted concerns regarding a list of GHG-intensive sectors. To the NGO and think tank community, campaigns already targeted investments in and lending to the most carbon-intensive sectors. The standard, they argued, had the potential to expose the "other industries [that] might be more strategic, […] like the transport sector is carbon intensive, […] and to say to NGOs, 'Maybe you should focus on investment in airports and highways, and so on, rather than just focusing on the power sector.'" However asset managers raised concerns that users would misunderstand the reported information. One participant remarked, "What is something my CEO can be on CNN and say? […] We don't want to be in the midst of political conversation of, you know, oil and gas has to be reported but agriculture doesn't. […] I need to have something that's very simple and my CEO can sit there […] and be like

'this is simple, this is what we do, this is what is required.'" It appeared that none of the Boundary Approaches could establish a carbon accounting entity for investment and lending activities that could simultaneously be practical enough to foster adoption while providing a flexibility of application enabling it to connect to concerns across NGOs, think tanks, and financial organisations.

The TWG 4 presenter, recognising that the first day had already overrun by more than an hour, and keen to identify the direction for the redrafting work, proposed "there are a lot of feasibility questions that I'm hoping could be resolved through the roadtesting process." The Financed Emissions Initiative had scheduled to roadtest the draft standard in several financial organisations in order to inform the drafting and publication of the final standard. In appealing to the roadtesting phase, as a participant from the NGO and think tank community commented, the discussion could focus on the questions "what approach is most desirable to external stakeholders? [And] what approach is most feasible for the financial institution?" The technical configuration, this participant argued, was something to be refined through roadtesting and not something to be agreed at such an early stage. To this participant: "for what's most desirable, obviously Approach 2 is simple […] and in terms of feasibility I think there's a lot of questions […] and my hope would be that through the roadtesting process, a lot of things will come to light." The sentiment was echoed by the attempt of the TWG 4 presenter to conclude the discussion by suggesting "for commercial banks, a narrow version of Boundary Option 3 makes sense to move forward with through the first draft. But for asset owners and asset managers I thought what I heard was Boundary Option 2 was preferred."

While some of the Secretariat supported this conclusion, one member remained concerned that "we have been leading our discussion around boundaries and scopes assuming certain things are in Business Goals," where "Business Goals 1 and 3 are off-the-table [… and Business Goals 2 and 4] are still, more or less, on-the-table." To this member of the Secretariat, "the discussion we had so far on scope and boundaries is under the assumption of those Business Goals [2 and 4] are still there." As discussions on both Business Goals and Boundary Setting began to resurface, the Secretariat called an end to the discussion on the agreement that all decisions would be revisited at the end of the second day. However it was during the second day of the meeting,

to which this chapter now turns, that the Financed Emissions Initiative was brought to the brink of collapse.

TO THE BRINK OF COLLAPSE

During the second day of the meeting tensions over the Business Goals and the workload required by different boundary options persisted. By the end of the first day it was suggested that some agreement had been reached on Business Goal 4 regarding transparency, yet by the second day impassioned challenges targeted this sole point of apparent consensus:

> "It's a fundamental comment I believe. If [the standard] is about assigning guilt […] then this becomes an issue entirely of reputational risk management (Finance community 1)
>
> Yeah (Finance community 2)
>
> And then we can forget the whole thing all together. Because then this an exercise in futility; going through a massive construction of evaluation of stuff and accounting for things, when at the end of the day we can just do what is already happening. You know, league tables are created of who finances the most coal and who finances the most this-and-that. And some people care about it and some people don't much care about it. So some manage their reputation around it and others say well we are willing to take that reputational risk because, you know, whatever. So if that is what this is about I think we should shut this all down! (Finance community 1)
>
> [Pause]
>
> Thank you for that perspective" (Secretariat)

The tone was sombre. News had spread that one of the prominent organisations in the NGO and think tank community was considering withdrawing from the project as it was losing relevance to their demand for transparency. Similarly, during the evening function following the first day of the meeting, financial organisations been arguing that the standard appeared to present a significant workload that would produce largely irrelevant information. Following a heated exchange regarding double counting of emissions, where further confusion over Scope 3 emissions had become apparent, an individual from the consulting community became exasperated:

> "Does anyone here from the ten major investment banks in the world think they're going to do this? (Consulting community)

> No (audible from 3 individuals from the finance community)
>
> And because it's voluntary, you know. Without being... I sound very negative but I'm actually trying to be helpful. I'm not sure that if you spend this vast amount of work […] and are giving this out to people with no finance experience… […] this is so far beyond them it's ridiculous - it's like Ph.D. Rocket Science – if you're spending all this time and then no-one's going to do it… Is that a valid question?" (Consulting community)

The Boundary Setting and accompanying measurement methods had become seen as overly complicated; a result of trying to adjust them to connect with the diverse demands from project participants. While the Secretariat appealed to the roadtesting phase as refining these technical aspects of the standard, participants from the finance community, especially commercial banks, maintained their arguments that the resulting standard would not be adopted. As the third session of the second day drew to a close, TWG 5 was scheduled to break off for a separate discussion on their risk guidance document. TWGs 1 to 4, however, would remain in the conference room to reflect on the comments received and to continue the discussion. This concerned several members of TWG 5, with one remarking "I suppose the question from our chapter [leads] is 'so what are we missing out on in here?'" The Secretariat suggested that the individual TWG workshops could be postponed to allow the project-wide discussion to continue, with their proposition being welcomed enthusiastically.

This discussion was due to continue after a short coffee break. However during that break three separate clusters of participants emerged, with: TWG 5 members forming a circle in one corner; the Secretariat speaking together at the front of the room; and several members of the NGO and think tank community sitting at the back of the room. After approximately five minutes the Secretariat appeared to reach an agreement among their cluster and approached the circle of TWG 5 members. After a ten-minute discussion, the Secretariat commenced the final session by announcing:

> "It was proposed to us during the break, the idea of doing a landscape analysis of all the metrics out there that all the banks are using, both public and private, and looking at what the data providers are also producing, which we can definitely do as a next step." (Secretariat)

The core accounting guidance, it appeared, would be put on hold to consider alternative metrics to financed emissions. Their concern, however, was that financed emissions were within the scope of GHG Protocol standards, while this was less clear for alternative metrics. The Secretariat asked, "Do GHG Protocol and UNEP FI have a role in coming up with a standardised template that will enable stakeholders to understand the climate impacts and the climate friendliness of banks through the set of metrics that we've tried to standardise?" Earlier discussions had already considered other metrics that could supplement the financed emissions information, however it appeared that at some point during the coffee break the idea of adjusting the direction of the project gained momentum. Among the confusion this caused for many participants, one individual from the finance community sought to clarify the information that would be fed back to the TWG members that were not present at the in-person meeting:

> "So just to be clear, and so we're not appearing kind of schizophrenic, are we basically going back to our Technical Working Groups – those [members] that aren't in the room that have been a part of the process – to say we're making a course correction here? At least in terms of trying to figure out if we need to turn the ship a little bit and find a better methodology? (Finance community 1)
>
> So we are considering that, yeah. And we'll go back after this and rethink the scope. […] We have to go back, come up with a new strategy, our proposed strategy, and bring it out to the advisory group and the Technical Working Groups. (Secretariat member)
>
> […] And the 'why'? As to why we are doing this, we will need that. (Finance community)
>
> Absolutely. (Finance community 2)
>
> Because it seems like we did make some progress on that the last couple of days, but the fact that there are so many people that are just still concerned about how you would even do financed emissions…" (Finance community 1)

Taking on a more energetic tone, the discussion focussed on questions about the process for changing the direction of the project. However the Secretariat also wanted to clarify that they should be engaging directly with campaigning-NGOs that weren't present at the in-person meeting in order to gauge their support of this new direction for the Financed Emissions Initiative. This new direction, the Secretariat argued, would still need to connect with

the transparency demands from campaigning-NGOs. Playing out their expectation of the NGO response:

> "What they are going to say in a first step is they have no alternative to financed emissions at the moment. But we can say… Our approach would be – and this is for everyone in the room, this is not only for X, Y, Z organisations – to say financed emissions is one [option] and here's a set of alternatives, what do you think? […] (Secretariat member 2)
>
> And I think you know [an individual from the NGO and think tank community] said yesterday that [they are] open to discussion of other metrics. If, you know, you invent a better mousetrap then let's build it." (Finance community)

The two-day meeting came to a close, concluding that a 'landscape review' was required. Many participants appeared encouraged by the outcome, and during the drinks reception that followed one individual from the finance community joked, 'this is great; we now have the 'why'. Why we are doing this'. Others felt that people had already been thinking that the project should refocus away from financed emissions, however no one had wanted to say it at the start of the meeting. On the other hand one individual from the finance community took issue with the term 'climate friendliness' that had emerged within the last two hours, saying that 'the NGOs will rip us apart for claiming our activities are friendly'. The Secretariat, surprised at the range of misunderstanding across the two days, appeared unsure of what the next steps would look like. However they felt that by conducting their review and refocusing the project they would push the debate forward.

6.4. The Portfolio Carbon Initiative is Launched

Three months after the TWG in-person meeting in Washington D.C. preliminary findings from the landscape review were presented by the Secretariat during a webinar with all participants. Trends identified in the reporting landscape varied from broader observations, such as "[Financial Organisations'] CSR [Corporate Social Responsibility] reports disclose almost exclusively positive metrics; stakeholders demand both positive and negative metrics", to more specific characteristics of the reported information. Four categories of metrics – Financed emissions (units CO_2e); Other emissions metrics (units CO_2e); Energy-related metrics (units MW, MWh, etc.); Exposure-based metrics (units $, €, etc.) – were noted.

After presenting these early findings to TWG participants, the Secretariat sought feedback on the new direction for the project. Some participants suggested continuing with 'business as usual' for the project, continuing to develop Scope 3 accounting and reporting guidance, and some suggested a 'wait and see' approach that focussed on analysing the results of the landscape review once this phase of the project was completed. However the majority of participants favoured an approach that maintained momentum in the project, while allowing for a so called 'course correction'. As such, a 'phased' and 'hybrid' approach emerged with significant support. This was to press ahead with developing guidance for asset owners – for which there was stronger agreement and appetite – and would refocus the guidance being developed for banks.

In February 2015, when the project was relaunched, the restructuring of work streams into separate guidance documents for 'Asset Owners' and 'Banks' reflected this 'phased' and 'hybrid' approach (see Figure 6.4). The email announcing the relaunch explained that "Given the broader scope of work", which resulted from the new 'phased' and 'hybrid' approach, "the project has been renamed The Portfolio Carbon Initiative." This was to tie the purpose of the project more closely to "several exciting and related initiatives [that had] launched [since the June 2014 meeting], including PRI's [the Principles for Responsible Investment's] Montreal Pledge and the Portfolio Decarbonization Coalition". These two initiatives had emerged as an alternative to divestment, with financial organisations (especially those other than university and charitable funds) proving resistant to the idea of divesting from fossil fuels. Their arguments hinged on the idea that by "selling stock in a company […] they lose the influence they build with [investees]" (Interview: Eag1515). Rather, they preferred to 'engage' with the companies they invest in and lend to as a way of, for example, pushing for reductions in the carbon intensity of production.

Through the claimed nuances of engagement over divestment this emerging movement worked towards 'portfolio decarbonisation', described as "the process through which investors reduce portfolio exposure to GHG-emissions and align their portfolios with the climate economy of the future." (PDC 2015, p.2). The two initiatives at the centre of this decarbonisation movement were the Portfolio Decarbonization Coalition (PDC) and the

Montréal Carbon Pledge (MCP). The Financed Emissions Initiative was relaunched by the Secretariat as the Portfolio Carbon Initiative. This was to align the project with an idea of portfolio decarbonisation, focussing on metrics that bring the financial sector into a 'supporting role' in efforts to tackle climate change.

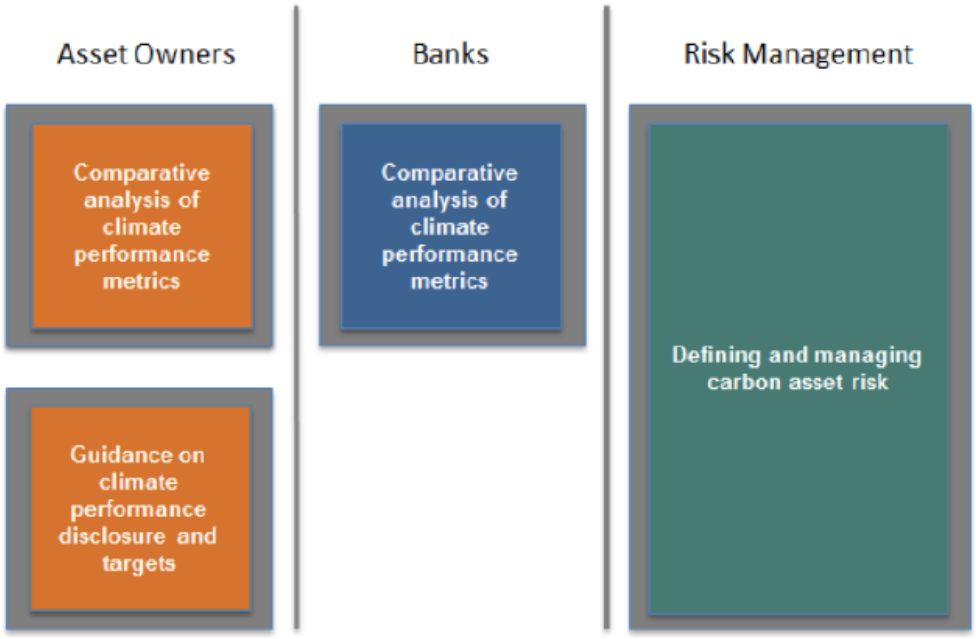


Figure 6.4: Portfolio Carbon Initiative Work Stream Structure and 4 Deliverables.

However it is crucial to note that both the MCP and PDC centred on disclosure of financed emissions and using the metric as a basis for target setting. By pledging to the MCP, financial organisations committed "to measure and publicly disclose the carbon footprint of their investment portfolios on an annual basis" (PRI 2014). Through the PDC, financial organisations would also "commit to concrete and quantifiable carbon-footprinting *as well as portfolio decarbonization targets*" (PDC 2016, emphasis added). Yet the relaunched Portfolio Carbon Initiative only aligned with the idea of portfolio decarbonisation. Its new concept note stated: "as providers of debt and equity, capital financial institutions can be considered potential financiers, and hence key enablers, of the transition to the low-carbon economy" (Portfolio Carbon Initiative Concept Note). Yet the concept note, while acknowledging the MCP and PDC, also highlighted the view that "[d]espite this growing appetite to develop carbon footprinting guidance for institutional investors, […] stakeholders in the [Portfolio Carbon Initiative] are divided over the practicality and meaningfulness of using the Scope 3

emissions concept to deliver transparency and disclosure to external stakeholders and shareholders." Rather, the metrics now being developed by the project focussed instead on 'climate performance', briefly explained as "the contribution of a financial institution to financing the transition to a low-carbon economy" (Portfolio Carbon Initiative Concept Note, p.2).

It is also important to note that the Portfolio Carbon Initiative now focussed on assessing the 'practicality and meaningfulness' of existing climate metrics, viewing this as the first step in the standardisation of carbon risk and climate performance measurement and reporting. Only the Asset Owner 'Guidance on climate performance disclosure and targets' would inform the application of the GHG Protocol's Scope 3 Standard, whereas the assessments presented through the other three deliverables were seen as a foundation for future standard-setting. In this regard, concerns of carbon asset risk and financing the transition to a low-carbon economy had become the guiding ideas for the Portfolio Carbon Initiative.

Furthermore, transparency to stakeholders was now to be achieved through metrics representing the climate performance of investment and lending activities. Emerging ideas of carbon risk and 'financing the transition to a two degrees scenario' had permeated the project. These gradually came into conflict with its initial focus on transparency to campaigning-NGOs through carbon accounting for financed emissions. Put differently, the Financed Emissions Initiative became destabilised as the shifting financial sector discourse on climate change infiltrated, through participants' changing demands, the standard-setting project. Where such suggestions and concerns had emerged as central features to the May 2014 Advisory Committee meeting, the objectives of the project and the metrics being developed had been adjusted into a form cohering to the two degrees target. Yet the indicators for rendering the emerging concerns visible were a matter for further work. Whereas a carbon accounting approach was based on the GHG Protocol's core standards, the measurement and reporting options for a performance metrics approach were to be assessed before standard setting could resume.

The Portfolio Carbon Initiative also restructured the work of TWGs 1-4 into two work streams (one for Banks, one for Asset Owners), each shifting

focus towards the aforementioned climate performance metrics. In addition, the drafting process was restructured, with the Secretariat preparing the drafts and then presenting them to TWGs for feedback. To assist in producing these drafts the Secretariat initiated a formal relationship with the 2° (Two Degrees) Investing Initiative, a Paris-based think tank, as a research partner for the project. The 2° Investing Initiative works "to promote the integration of climate goals in financial institutions' investment strategies and financial regulation" (2° Investing Initiative 2013, p.2), and its employees had been involved with the project through the Advisory Committee and several TWGs. Moreover, the Secretariat noted that the 2° Investing Initiative's 2013 report, *From Financed Emissions To Long-Term Investing Metrics: State-of-the-art review of GHG emissions accounting for the financial sector* (2° Investing Initiative 2013), "was our bible for starting our technical working group process […] that was a really useful reference document […] we share with all the technical working group members as background. […] We didn't want to start from scratch, we just wanted to build from these existing methods that were already out there" (Interviewee: Eag1513).

On the other hand TWG 5's work continued in a third work stream on 'Carbon Asset Risk' and, as a member of the Secretariat commented during an interview, "nothing changed, it has continued down the same direction. It has run pretty smoothly, it is a lot less controversial and it's really just a discussion framework so it's not requiring anything" (Interview: Eag1513). Indeed, this section briefly outlines how TWG 5's work progressed, before moving on to the new metrics being developed under the Asset Owners and Banks work streams.

6.4.1. TWG 5, Portfolio Risk Exposure and Climate Scenarios

In February 2015 TWG 5 circulated a draft of the Carbon Asset Risk Guidance for feedback from all TWG participants. It detailed a similar approach to that outlined at the May 2014 Advisory Committee meeting, comprised of assessing portfolio 'carbon risk exposure' and evaluating this against climate scenarios to identify risks to be managed. The assessment of portfolio 'carbon risk exposure' was divided into three stages, with the first "assessing the potential implications that a strong climate mitigation (i.e., 2°C) scenario could hold for various categories of physical assets and economic sectors" (CAR Draft, February 2015, p.15). This two degrees scenario was

adopted for the analysis, with the document stating, "the implications are unlikely to differ for alternative (>2°C) scenarios (though they clearly would for [Business as Usual] scenarios)" (Ibid., p.16). Based on this scenario the report identifies four asset classes that have a high exposure to carbon risk: Fossil-fuel assets, Fossil-fuel dependent infrastructure, High-carbon assets facing shift to low-carbon technologies, and High-carbon assets without low-carbon competitors (see Figure 6.5).

Category	*Example Sectors*	*Principal Types of Risk Facing the Category*	*Typical Financial Asset Classes*
1) Fossil-fuel assets	Coal mining, oil & gas production	Policy; Market/Economic; Reputational	Equities; bonds; corporate lending
2) Fossil-fuel dependent infrastructure	Oil & gas pipelines, rail lines (e.g., those shipping coal)	Policy; Market/Economic; Reputational	Bonds; project finance
3) High-carbon assets facing shift to low-carbon technologies	Fossil fuel-fired power plants	Policy; Market/Economic	Equities; bonds; corporate lending
4) High-carbon assets without low-carbon competitors	Cement, steel, glass	Policy; Market/Economic	Equities; bonds; corporate lending

Figure 6.5: Summary of typical risk types and asset classes associated with each sector/asset category (CAR Draft, February 2015, p.17).

The second step entails an assessment of sectoral exposure to risk, with the document stating that the exposure of the four asset types will differ across sectors. In particular, the analysis highlights that sectors are more exposed where there is relatively high carbon intensity, high average physical asset lifespan, and low EBIT margins. As with the sectoral-nuance of this risk exposure, the third step assesses company exposure, and recommends that the financial intermediaries or investors that are conducting the assessment should draw on the corporate-level environmental metrics available from data providers such as Trucost, MSCI and South Pole Carbon.

The document frames this assessment as enabling financial intermediaries or investors to evaluate the carbon risk exposure of an investment or lending portfolio against climate policy scenarios. In particular, the IEA's World Energy Outlook (IEA 2013b) is referred to as "an accepted and trusted source of future scenarios" (CAR Draft, February 2015, p.45), which

"include[s] scenarios for carbon, demand, supply, risk and capex for key carbon intense industries." Taken together, by conducting such an assessment a financial organisation renders its portfolio into a form comparable with scenarios for particular levels of warming or for particular levels of climate policy intervention. In this regard, while the mobilisation of the carbon budget (Chapter 5) raised concerns of carbon asset risk, the Carbon Asset Risk guidance emerged from experimentation with ways to render portfolios compatible with warming and policy scenarios. That is, the mobilisation of the carbon budget stimulated efforts to develop and adjust risk management practices for analysing the impact of "a global GHG-constrained economy" (Ibid., p.viii) on investment and lending portfolios.

6.4.2. Carbon Risk and Climate Performance

By March 2015 the first draft document for the Asset Owners work stream had been produced, titled *Assessing Climate-Related Metrics and Targets: An Overview for Institutional Investors*. The document, addressing the decarbonisation movement, identified "two key and distinct drivers behind the momentum around investor pledges and setting climate performance targets, […] the carbon risk view [… and] the climate performance view." (2ii, UNEP FI, GHG Protocol, 2015, p.6). In this first draft the carbon risk view was based on the idea "the transition to a low-carbon economy may create financial risks to portfolios that investors may seek to manage." (Ibid.) The climate performance view, on the other hand:

> "Relates in particular to the impact of portfolio allocation decisions on investment in the real economy or capital stewardship of investees […] Climate performance is the umbrella term for the impact of an agent or an asset on climate change. The climate impact appears in the form of financing or investing activity that reduces GHG-emissions in the real economy." (2ii, UNEP FI, GHG Protocol, 2015, p.6).

While the Portfolio Carbon Initiative had already connected to emerging concerns of carbon risk through TWG 5, in restructuring the project around these two views it also came to focus on metrics to monitor alignment of the financial sector with the transition to a low-carbon economy. Rather than using carbon accounting for financed emissions to provide a 'broad and inclusive' transparency primarily to campaigning-NGOs, performance metrics would render visible the alignment of investment and lending activities with the economic transition for tackling climate change. From this understanding

of climate performance the guidance outlined three interrelated climate performance strategies as well as climate performance metrics for implementing them. Through *portfolio construction*, the first strategy, "investors influence the cost and availability of capital through portfolio allocation decisions, and influence investees' strategies to align their strategies with portfolio allocation constraints" (Ibid., p.12). *Capital stewardship*, the second strategy, aimed to influence capital allocation decisions of investee companies through a range of engagement tactics, from relationship building and shareholder resolutions to, ultimately, reallocation of funds and divestment. The third strategy, *investor positioning*, sought to enhance the impact of the first two strategies by providing guidance on how to tailor the overall strategy to one of three approaches: 'do-it-yourself' as an individual investor; mobilise a 'critical mass' of investors; or send a signal to influence policymakers.

Three different categories of metrics were proposed in this April 2015 draft, which had been developed by the GHG Protocol, UNEP FI and, the 2° Investing Initiative, as their new research partner. The draft outlined and discussed each category through the table shown in Figure 6.6. The first category, *carbon metrics*, would enable comparison across sectors at a portfolio level. However when refined beyond the portfolio level these metrics introduced significant error. Addressing this shortcoming, as well as emphasising that "in climate scenarios, the shift in capital allocation is primarily an increase of green investment" (2ii, UNEP FI, GHG Protocol, 2015, p.41), 'green/brown metrics' were proposed as a second category. Green metrics were based on "a categorization of products and services as part of the climate solution," such as renewable energy generation and R&D in low-carbon technologies, while brown were "part of the climate problem" (Ibid. p.33), such as oil and gas capital expenditure.

However these metrics also faced several issues, primarily that green/brown metrics are only available for specific carbon-intensive sectors – such as fossil fuels, power generation and car manufacturing – and cannot be "easily aggregated" (Ibid. p.34) to provide an overview for a portfolio. The draft proposed a third category, climate scores, produced by data providers and, as was explained during the April 2015 webinar, based on "green/brown metrics, qualitative indicators – like sustainability strategy, CO_2 reduction

targets and reporting – and carbon metrics." As climate scores could be aggregated, the three forms of metrics would reveal the extent to which a portfolio financing requirements of a transition to a low-carbon economy at the levels of specific investments within portfolios, whole portfolios, and the company's overall investment and lending activities. However it was in the revised draft of this Asset Owner's guidance that the standardisation work became tied to sectoral roadmaps for the two degrees target. It is to this refinement of the two degrees target into portfolio-level metrics that this chapter now turns.

6.4.3. Climate Performance and Roadmaps to the Two Degrees Target

By September 2015 the guidance for institutional investors had been finalised. Whereas the draft report had focussed on the technical foundation for climate performance strategies, the final report emphasised an overarching vision of aligning investment portfolios to "the global political objective [of] limiting global warming to 2°C above pre-industrial levels" (2ii, UNEP FI, GHG Protocol, 2015b, p.17).

In particular, it was claimed, "[i]nvestors must connect the dots between climate change and their portfolios. The first step in connecting the dots is to define a roadmap from today's economy to a low-carbon economy" (Ibid.). The report drew particular attention to the IEA World Energy Investment Outlook as "research on the implications of reaching this goal [the two degrees target] for high-emitting sectors" and that also "highlights the changes in investment needs between a scenario aligned with the 2°C climate goal (450[ppm]) and a scenario associated with current policy commitments" (Ibid.). Indeed, during the participant observation, the IEA's roadmaps were the most commonly referenced among project participants, and it is worth briefly familiarising the reader with their analysis.

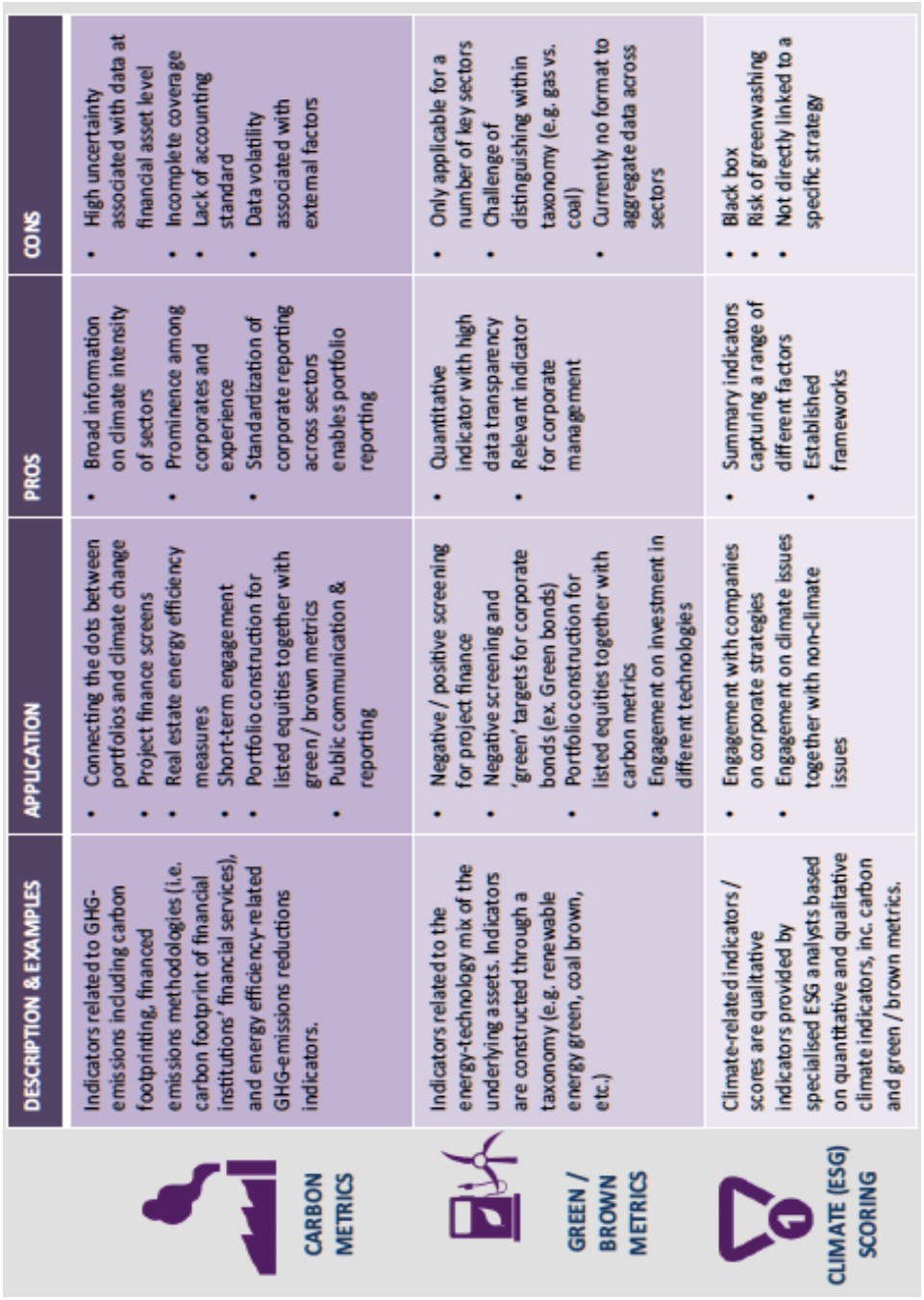


Figure 6.6: Overview of Three Categories of Climate Performance Metrics for Institutional Investors (2ii, UNEP FI, GHG Protocol, 2015, p.25).

The IEA's annual *World Energy Outlook* presents analysis of future trends in energy demand and supply under different policy scenarios, and the expected level of warming under each scenario. The 2013 World Energy Outlook finds that under their 'New Policies Scenario'[102] the average increase in global temperatures is likely to be between 3.6°C and 5.3°C (IEA 2013b). Based on this finding the IEA published a separate report in 2013, *Redrawing the Energy-Climate Map*, focussing on how to guide the energy sector from a 3.6°C and 5.3°C path, towards one consistent with the two degrees target (IEA 2013a). The carbon budget of 884 $GtCO_2$ by 2050 was central to this report, which further refines the carbon budget into a set of emissions trajectories. By representing the emissions pathways for remaining within the carbon budget, the roadmaps enable annual emissions figures to be compared to emissions trajectories for remaining within a particular carbon budget. In particular, the report notes "it becomes clear that the longer action to reduce global emissions is delayed, the more rapid reductions will need to be in the future to compensate" (IEA 2013a, p.16).

In their 2014 Special Report, the *World Energy Investment Outlook*, the IEA detail the financing needs to support the policy scenarios and their associated emissions trajectories. The report addresses the implications of changes in fossil fuel use for investment, and the investment requirements for both the low-carbon restructuring of the power sector and for advancing energy efficiency. Taking the 450ppm policy scenario as an example – which is the scenario they propose "for the global energy sector that gets it on track for 2°C" (IEA 2014, p.40) – the report highlights that, between 2013 and 2035, investment in low-carbon power generation needs to increase threefold, and eightfold for investment in efficiency improvements. This chapter now turns to show how the Portfolio Carbon Initiative came to see these emerging roadmaps as an instrument that could underpin their metrics that revealed the alignment between investment and lending activities and a two degrees scenario.

[102] The 'New Policies Scenario' takes into consideration changes in policy based on current commitments and recent legal developments. In other words, it assumes that current commitments are maintained, but does not assume any strengthening of these commitments in the future.

BENCHMARKING CLIMATE FRIENDLINESS AS THE WAY FORWARD

In January 2016 the first draft of the Banks guidance was presented for feedback. The draft presented a combination of financed emissions and green/brown ratios. The application of financed emissions was restricted to "project finance and related activities" as a result of "challenges associated with practicality and meaningfulness when the use of proceeds are not known" (2ii, UNEP FI, GHG Protocol, 2016, p.31). Green/brown ratios, on the other hand, offered "relative practicality" across a lending portfolio because they only required two sets of information. The first component is data on projects and the loan book, which are "tracked as part of the core business of banking". The second is a "taxonomy of which of the activities, sectors, etc. are considered 'green' and 'brown'" (Ibid., p.27). For this, the "most comprehensive solutions […] are classification systems and standards specific to the ESG [Environment, Social and Governance] space, such as developed by the Climate Bonds Standard and commercial 'green' taxonomies from providers like MSCI, FTSE, and others" (Ibid., p.30). However the draft also recognised the drawbacks of specific metrics and the variability between types of banks "make it very difficult to deliver a single set of recommendations or a single standard approach to tracking climate friendliness at bank level" (Ibid., p.33).

Rather, the draft emphasised the emergence of "'roadmaps' showing the breakdown of financing needs by region, technology, and asset type," through which it would become possible to "assess and benchmark [banks'] current financing to the respective needs for the energy transition" (Ibid.). In particular, the draft made the case that the purpose of measurement and reporting would shift away from managing reputational risk from NGO campaigns and towards planning for the so-called 'energy transition':

> "Although currently most banks track climate friendliness for reasons of mandate or reputational management, the impending energy transition driven by climate policy and technoeconomic change is changing the landscape. With the unprecedented capital needs needed for the transition, forward thinking banks are now planning for the transition by assessing the financing needs needed for different critical technologies, sectors, and regions by the type of financing" (Ibid., p.35).

By tying the notion of climate friendliness to the energy transition, the Portfolio Carbon Initiative became focussed on rendering visible the alignment of the financial sector with the financing needs for tackling climate change. However the draft noted that these roadmaps were still in development and, in the Asset Owner guidance document, that "Climate scenarios do not enable setting GHG reduction or investment targets for each sector or company" (2ii, UNEP FI, GHG Protocol, 2015a, p.63). The point, however, is that benchmarking the alignment of portfolios against investment roadmaps had become central to the strategy of developing indicators for the climate impact of investment and lending activities. From its initial focus on pursuing transparency through financed emissions disclosures, the standard-setting project had gradually been reoriented and now focused on framing investment and lending activities in terms of their alignment with the two degrees scenario. Indeed the two documents highlighted that "two international research efforts, both based on the IEA scenarios – the Sectoral Decarbonization Approach […] at company level and the Sustainable Energy Investment (SEI) Metrics Research Consortium (Fig. [6.7]) at portfolio level – are currently addressing this issue" (Ibid., p.63).

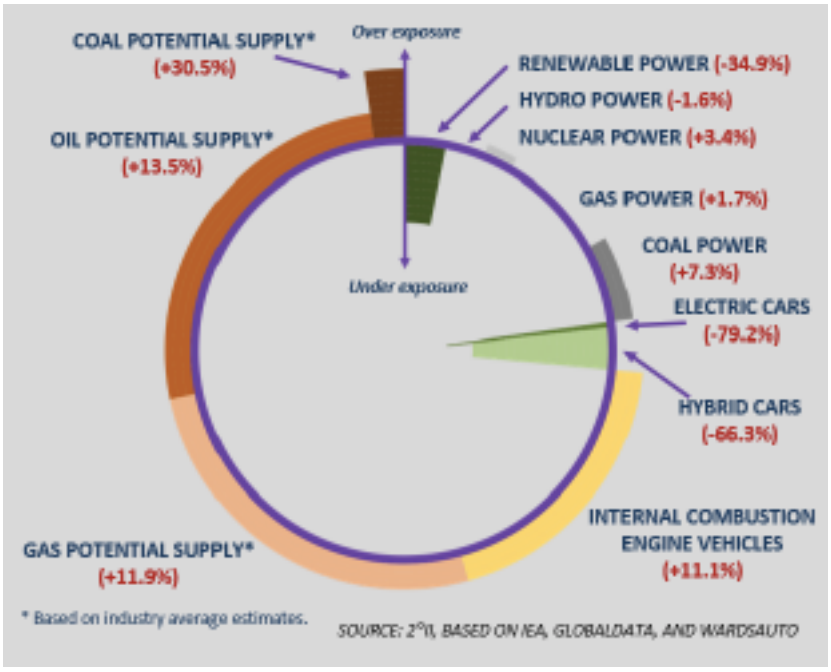


Figure 6.7: SEI Metrics Consortium: Comparing MSCI World Exposure with 2°C Roadmaps (2ii, UNEP FI, GHG Protocol, 2015a, p.63).

This new focus on benchmarking portfolios against roadmaps featured prominently in the final feedback webinar for the Banks work stream in January 2016, with the secretariat emphasising that they wanted to continue the Portfolio Carbon Initiative's work beyond the publication of the guidance documents. Before this webinar, TWG participants were under the impression that the publication of Banks and Asset Owners guidance documents marked the end of the project. However the Secretariat expressed a desire to continue the work, specifically to explore how it could be more closely connected to the IEA Roadmaps:

> "[W]e really think that the future is in assessing each bank's role in the transition and what banks are doing with both respects to green and brown in the energy transition. And we are hoping that we'll see the development of financing roadmaps that would show, for each region and different sectors, different types of transactions and asset classes on what different institutions, given their midst of business lines, should be doing." (Secretariat)

Reinforcing this new vision of monitoring the alignment of banks with an energy transition, a different Secretariat member explained, "we've been thinking through various options for how we could be working together through [this project] and there's two main categories of projects that we will be working on." The first was to contribute to the development of more refined roadmaps, noting that "[a member of the 2° Investing Initiative] will do a little bit on the financing roadmap". The second "is to take that work a step further and develop a methodology for how to set reduction targets that we would call 'science-based targets', targets for financial institutions to ensure their alignment with the transition to a two degrees world."

Two minutes later, having informed TWG participants that they would be contacted regarding further projects, the Secretariat thanked participants and drew the Portfolio Carbon Initiative to a temporary close:

> "Well from my side, I want to thank everyone for joining in. (Secretariat member 1)
>
> Yes, same here. Thanks so much for taking part everyone and this presentation will be available online, we'll send it out afterwards and we look forward to hearing your feedback. Thanks so much. (Research partner 1)
>
> Thanks everyone, bye." (Secretariat member 2)

6.5. Discussion

6.5.1. Creating a Mediating Instrument

Launched in 2012 as the Financed Emissions Initiative, the collaborative UNEP FI and GHG Protocol standard-setting project brought together financial organisations, think tanks, campaigning-NGOs, and government representatives to develop new carbon accounting methods. The initial appeal of this standard was to provide: financial organisations with a response to pressure from campaigning-NGOs; campaigning-NGOs with further transparency on the climate impacts of investment and lending activities; and to further tailor the GHG Protocol's Scope 3 Standard to the specifics of financial organisations. For the Secretariat, the GHG Protocol pursued its usual strategy of developing sector-specific guidance to extend the reach of the core Scope 3 standard, while UNEP FI could offer its membership a common framework for participating in disclosure initiatives. The Financed Emissions Initiative had emerged as a process that would create a common measurement and reporting framework to advance this plethora of objectives.

However by tracing the emergence of new concerns stemming from the two degrees target this chapter demonstrates how the Financed Emissions Initiative became unstable. Moreover, after being relaunched as the Portfolio Carbon Initiative, the emergent standard became interconnected with instruments linking a global objective to the local specifics of investment and lending decisions. To analyse this, the chapter frames the standard-setting project as the configuration of a mediating instrument (Miller and O'Leary 2007). In particular, Miller and O'Leary highlight the interconnections between several mediating instruments, with Moore's Law being connected to the development of optical forms of lithography through technology roadmaps and cost-of-ownership calculations. This chapter that documents the construction of linkages between the emergent standard, the carbon budget and IEA roadmaps through which the two degrees target comes to frame investment and lending decisions.

These linkages between mediating instruments were formed as project participants' expectations shifted towards the implications of a two degrees target, introducing new demands on the emergent standard. This does not disagree with Miller and O'Leary's argument that roadmaps refined

highly general rules into detailed requirements and timings (Ibid., p.729). Rather, it draws attention to the way actors stimulate the formation of linkages between instruments. Specifically, the emergent standard became connected to IEA roadmaps as participants placed demands on the project to render their new concerns of carbon risk and financing the transition to a low-carbon economy visible. Indeed it was the conflict between these new demands and the initial direction of the Financed Emissions Initiative that destabilised the standard-setting project. It was through the reconfiguration of the project to embed the ideas and instruments of carbon risk and financing the transition to a low-carbon economy that a temporary stability was fostered, and the emergent standard developed coherence with the two degrees target.

This discussion first examines how emerging ideas, specifically around risk and monitoring alignment with the transition to a low-carbon economy, were initially addressed through the inclusion of a new TWG and work stream, yet eventually led to the project becoming unstable. It then turns to consider how the envisaged standard and guidance became connected to both the IEA Roadmaps and the carbon budget, and how this reoriented the project towards the two degrees target.

The Financed Emissions Initiative Becomes Unstable

As Carbon Tracker's arguments on the risk implications of the remaining global carbon budget gained traction (Chapter 5), several of the major financial organisations on the Advisory Committee (one large US investment bank in particular) pushed for the Financed Emissions Initiative to provide guidance that built upon existing risk management practices. Understanding and managing risk had emerged as a core concern of commercial banks, and the Advisory Committee and Secretariat sought to connect the standard to the idea to foster future adoption of the standard. They responded in late-2013 by initiating a fifth TWG to manage a 'Carbon Asset Risk' work stream. The Financed Emissions Initiative would not only produce a standard to allow financial organisations to respond to campaigning-NGOs' calls for enhanced transparency, it would also produce guidance on how to respond to the concerns raised by the risk implications of the carbon budget. However TWG 5 did not link the carbon budget to the corporate- or portfolio-level. Rather, the mobilisation of the carbon budget

stimulated work to develop risk management practices through which portfolios could be rendered comparable with climate scenarios. This maintained the initial vision for the Financed Emissions Initiative, while adding flexibility to its implementation by financial organisations. In this regard the configuration of the financed emissions standard was maintained, with the Carbon Asset Risk work stream being created to connect the core standard to emerging risk concerns.

However by June 2014 new challenges emerged regarding the relevance of financed emissions to risk management as well as to monitoring the climate impacts of investment and lending activities. Financed emissions were at the core of the accounting standard being developed by TWGs 1-4, yet across both days of the in-person TWG meeting in Washington D.C. their relevance was questioned.[103] On the other hand financed emissions remained relevant for the asset owners and campaigning-NGOs participating in the project. The point is that tensions grew between the initial vision for the standard and participants' new demands for risk relevance and monitoring the financing of the transition to a low-carbon economy. It was through participants' demands for relevance to these two emerging concerns that the shifting financial sector discourse came to permeate the Financed Emissions Initiative. Moreover, refinements of two degrees target stimulated and underpinned these concerns that became guiding objectives for configuring the standard.

Having envisioned financed emissions as the core practice that would allow the standard to connect with numerous ideas of different actors, the Advisory Committee and Secretariat initiated a landscape review to examine a wider range of metrics and the extent to which a change in direction could connect with the emerging ideas. Accounting alone was deemed insufficient for rendering visible the risks of and alignment with the transition to a two degrees scenario. Rather, performance indicators at the portfolio- and corporate-level were to be assessed for their capacity to operationalize the concerns stemming from the two degrees target. Furthermore, the landscape review emphasised a new focus on developing metrics that connect with the

[103] These concerns, as the Chapter highlights, began to surface earlier in the project and had been at the core of conflicts during the May 2014 Advisory Committee meeting. However it was at the Washington D.C. June 2014 TWG in-person meeting that the conflict destabilized the Financed Emissions Initiative.

ideas of different financial organisations, specifically banks and to asset owners. This discussion now turns to the relaunch of the project as the Portfolio Carbon Initiative.

The Portfolio Carbon Initiative and Connecting to Roadmaps

After the landscape review, the work of TWG 5 remained unchanged, continuing to connect the project with financial organisations' growing concerns of carbon asset risk. However the Portfolio Carbon Initiative reconfigured the core accounting standard into separate work streams for banks and asset owners as well as refocusing that work on developing metrics for corporate- and portfolio-level measurement and reporting of *carbon risk* and *climate performance*. In addition, a formal relationship with the 2° Investing Initiative was established – drawing on their expertise in climate metrics beyond carbon accounting – with the think tank becoming a research partner to the project.

By the first draft of the 'comparative assessment of metrics' for Asset Owners the climate performance objective had been firmly connected to monitoring the alignment between investment and lending activities and the transition to a low-carbon economy. The metrics detailed in this document – green/brown ratios, climate scores, as well as financed emissions – were claimed to have increased relevance to 'transition risks' of climate change as well as providing visibility to the extent to which financial organisations were contributing to the transition to a low-carbon economy. However, by the final draft of the Asset Owners document, the future standardisation work of the Portfolio Carbon Initiative was to be guided by developing metrics for benchmarking investment and lending activities against IEA Roadmaps for the transition to a two degrees scenario. This benchmarking connected to asset owners' concerns over transparency as well as think tanks' ideas of bringing financial organisations into a supporting role in tackling climate change. Where the roadmaps refined the global carbon budget into sector-specific transitions, the Portfolio Carbon Initiative metrics were to connect those roadmaps to the corporate- and portfolio-level investment and lending activities.

As noted, however, the initial Portfolio Carbon Initiative publications only set out to create a foundation for further standardisation work, which

was not focussed on rendering alignment with the transition to a low-carbon economy visible at corporate- and portfolio-level. To work towards this vision, the Portfolio Carbon Initiative aligned itself with efforts to render climate scenarios compatible with setting climate performance targets – such as the Sectoral Decarbonization Approach and Sustainable Energy Investment Metrics Research Consortium. Roadmaps had become central to the Portfolio Carbon Initiative's future standardisation efforts. What this highlights is that as implications of a carbon-constrained future came to reshape the financial sector discourse on climate change, new notions of risk gradually permeated the Financed Emissions Initiative, destabilising its initial direction and reorienting it towards concerns stemming from the two degrees target. It is in this regard that standard formation, in the case of the Financed Emissions Initiative, was not simply about identifying the concerns of stakeholders, but rather creating an instrument that could become part of a working ensemble for coordinating action towards the two degrees target. It is based on this analysis that the discussion now turns nuance Botzem and Dobusch's (2012) work on input and output legitimacy.

6.5.2. Output Legitimacy in Standard Formation

By analysing the Financed Emissions Initiative as the configuration of a mediating instrument the chapter demonstrates that generating output legitimacy – "the effectiveness and coordinative capacity of a standard" (Botzem and Dobusch 2012, p.741) – is central to the process of standard formation. That is, standard formation is not simply a matter of identifying stakeholder concerns, but a process of negotiation through which diverse and distributed expertise is brought together to codify those concerns into measurement and reporting practices. Viewing standard formation as primarily the generation of input legitimacy (cf. Botzem and Dobusch 2012) would have focussed this study on how stakeholder participation was maintained and the procedures for identifying their concerns. Yet this chapter demonstrates that the discussions during the Financed Emissions Initiative centred on the 'effectiveness and coordinative capacity' of the standard in aligning the financial sector with the two degrees target. Based on this analysis the chapter argues that the process of standard formation is central to configuring and generating output legitimacy, driven by the diverse and distributed expertise brought together in the Financed Emissions Initiative.

It is in this regard that Scharpf's (1997; 1999) distinction between input-oriented and output-oriented legitimation in transnational governance provides valuable insight. To Scharpf, input-oriented legitimation is plausible when dealing with "local problems where all persons affected by a decision, or representatives closely associated with them, can be brought together in deliberations searching for 'win-win' solutions to which all can agree" (Scharpf 1999, p.7) so that "choices should be derived, directly or indirectly, from the *authentic preferences* of citizens" (Scharpf 1997, p.19, emphasis in original). In contrast, output-oriented legitimation "presupposes the existence of an identifiable constituency" (Scharpf 1999, p.11), which is less onerous than that for input-oriented legitimation as it requires "no more than the perception of a range of common interests that is sufficiently broad and stable to justify institutional arrangements for collective action" (Ibid.). Indeed, the Financed Emissions Initiative participants represent only some of the many potential users of the emergent standard. Moreover these participants contribute to the project through their technical expertise, identified by Scharpf as one of the output-oriented legitimation mechanisms for dealing with problems with "a high level of technical complexity" (Ibid., p.16).[104] In such situations, the output-oriented legitimacy that stems from "a high degree of effectiveness in achieving the goals" (Scharpf 1997, p.19) is generated by the application of expertise to embedding the identified and potentially conflicting concerns into an instrument.

Two interconnected aspects of output legitimacy during standard formation come into focus by drawing from Scharpf (1999). First, the Financed Emissions Initiative depended on participants' expertise to draft the standard; not only for identifying concerns to be addressed but also to shape the technical configuration of the standard to ensure its 'effectiveness and coordinative capacity'. As Boedeltje and Cornips (2004) argue, "input legitimacy is needed to know what the preferences of people are, but this is

[104] It should be noted that Scharpf develops notions of input- and output-oriented legitimation for analysing policy-making in transnational governance. In such a setting, the application of expert judgment becomes an output-oriented legitimation mechanism where "the mechanisms of electoral accountability are thought to be unsuited [...] for assuring public-interest oriented policy choices" and where "electorally accountable office holders would still be able to override the expert judgement" (Ibid., p.17). Furthermore, Scharpf considers that the experts making such decisions are "most effectively controlled by critique within their professional communities" (Ibid.).

not a guarantee for legitimacy on the output side" (Boedeltje and Cornips 2004, p.7). In this regard, the GHG Protocol standards are seen as generating output legitimacy by bringing together different expertise as a way of simultaneously identifying concerns and embedding them into carbon accounting practices. Second, the emergent standard is configured to be compatible with other instruments and practices for working towards the identified 'common interests'. That is, participants' concerns are embedded into the standard in a form that renders them compatible with existing efforts to advance the vision that underpins their concerns. In this case, by 2016 the Portfolio Carbon Initiative had formed linkages with the carbon budget and IEA roadmaps. These were to guide the development of measurement and reporting practices, connecting the underlying vision of a two degrees target to corporate- and portfolio-level assessments of investment and lending activities.

By treating the output legitimacy of a standard as "predominantly related to its diffusion" (Botzem and Dobusch 2012, p.741), Botzem and Dobusch overlook that during its formation a standard is configured to become compatible with, and a temporarily stable instrument within, "institutional arrangements for collective action" (Scharpf 1999, p.12). On the other hand, Botzem and Dobusch do argue for the interconnectedness of standardisation with the work of 'third parties', whose requirements for adopting the standard "make them virtually obligatory for the actors depending on them" (Botzem and Dobusch 2012, p.740). Similarly, Slager Gond and Moon (2012) find that "a standard's successful diffusion can be related to the emergence of new actors who aid in the translating of the standard's requirements for actors seeking to adopt it" (Slager, Gond, and Moon 2012, p.784). Yet both of these findings, which focus on fostering the compatibility of a standard, focus on its diffusion. This chapter, on the other hand, highlights that such coordination with third party actors is prevalent throughout standard formation. In particular, organisations such as CDP (who would require adherence to the resulting standard as part of their disclosure requirements) maintained an informal partnership with GHG Protocol to ensure the vision guiding standard formation is compatible with their own strategies for enhanced disclosures from financial organisations. In this light, output legitimacy spans standard formation and diffusion, and stems from the

embedding of a shared vision for collective action into measurement and reporting practices. In this chapter, that shared vision was underpinned by the two degrees target, with the experts brought together through the Financed Emissions Initiative working to embed that vision in emergent measurement and reporting requirements.

6.6. CONCLUSION

This chapter showed how an emerging carbon accounting standard was destabilised and subsequently reconfigured to become interconnected with instruments and ideas for aligning actions with the two degrees target. It focussed on the permeation of a shifting financial sector discourse into the UNEP FI and GHG Protocol's Financed Emissions Initiative. This introduced new demands that came into conflict with the project's initial aim of enhancing transparency of financial organisations' climate impacts to campaigning-NGOs. The relaunch of the Financed Emissions Initiative as the Portfolio Carbon Initiative connected the emergent standard to growing concerns over carbon risk and financing the transition to a low-carbon economy. Furthermore, the project connected to these concerns through the formation of linkages with two other mediating instruments that refine the two degrees target, namely the carbon budget and IEA roadmaps. Indeed, the chapter framed the Financed Emissions Initiative as the configuration of a mediating instrument (Miller and O'Leary 2007), a process through which the emergent standard was reoriented to connect to the shifting concerns of project participants. In doing so the chapter demonstrated that the output legitimacy of a standard is configured and generated during its formation, and is therefore not "predominately" but only partly "related to its diffusion" (Botzem and Dobusch 2012, p.741).

On input and output legitimacy, the analysis highlights that standard formation is not simply a matter of generating input legitimacy by maintaining stakeholder participation. Rather, standard formation draws on participants' expertise in the technical configuration of the standard to ensure it simultaneously embeds participants' concerns and is compatible with existing institutional arrangements. This compatibility advances the "effectiveness and coordinative capacity of a standard" (Botzem and Dobusch 2012, p.741) by

aligning it with the common vision guiding collective action at the interface of climate change and finance, which was underpinned by the two degrees target. This argument does not disagree with Botzem and Dobusch's observation that during standard diffusion "high adoption contributes to output legitimacy [...] due to network or crowd effects" (Ibid., p.743). Rather it demonstrates that negotiations during standard formation configure output legitimacy in efforts to foster the initial adoption of the standard.

The chapter bases its nuancing of Botzem and Dobusch's (2012) argument on its analysis of the Financed Emissions Initiative, which it frames as the configuration of a mediating instrument (Miller and O'Leary 2007). Where Chapter 5 framed the carbon budget as a bridge between the two degrees target and the financial sector discourse, this chapter highlights how an emergent instrument was reconfigured as shifts in that discourse came to permeate the Financed Emissions Initiative. Specifically, the guiding vision for the standard moved away from developing carbon accounting methods to enhance transparency for campaigning-NGOs and towards metrics for managing carbon risk and monitoring the alignment of investment and lending activities with the transition to a low-carbon economy. Yet it also highlights the interconnections between the two degrees target, the carbon budget, IEA roadmaps and the emergent standard through which a global objective becomes linked to the local specifics of investment and lending activities. Indeed this draws specifically on Miller and O'Leary's (2007) attention to the refinement of Moore's Law into technology roadmaps that frame cost-of-ownership calculations for developing optical forms of lithography. However this chapter emphasises that these linkages were stimulated as Financed Emissions Initiative participants' expectations shifted towards the two degrees target. Furthermore, it was negotiations between diverse and distributed expertise that configured the linkages between the emergent standard and the ensemble of instruments and practices for aligning investment and lending decisions with the two degrees target.

Having traced and examined the connections between the two degrees target and investment and lending activities across multiple entities, the thesis now presents a discussion of the contributions that cut across Chapters 4, 5 and 6, and provides concluding remarks as well as addressing limitations of the thesis and areas for further research.

CHAPTER 7 – MEDIATING INSTRUMENTS AND CLIMATE CHANGE: A DISCUSSION AND CONCLUSION

7.0. INTRODUCTION

This thesis has employed the concept of mediating instruments (Miller and O'Leary 2007) in mapping the emergence of the two degrees target and its linkages with investment and lending activities across the financial sector. While Chapters 4, 5 and 6 present discussions tailored to their specific empirics and analysis, this chapter discusses the coordination of action across multiple entities on climate change (Bebbington and Larrinaga 2014b). It does this specifically in terms of the investigation into four mediating instruments – the two degrees target, the carbon budget, industry roadmaps, and the emergent standard – and the work surrounding their development and mobilisation. Section 7.1 attends to the characteristics of and interconnections between the four instruments, focussing on the calculations through which a global objective becomes linked to sectoral-, organisational-, and portfolio-level activity. It then turns its attention to the work of assembling and adjusting components and practices through which these interconnected instruments develop a degree of coherence and stability. Section 7.2 builds on these two sections to discuss the coordination of action across multiple entities, linking this to the sustainable finance and carbon accounting literatures. Finally, Section 7.3 provides concluding remarks for the thesis.

7.1. MEDIATING INSTRUMENTS AND CO-PRODUCTION

7.1.1. CHARACTERISTICS OF MEDIATING INSTRUMENTS

This thesis identified and studied four mediating instruments (Miller and O'Leary 2007) – the two degrees target, the carbon budget, investment roadmaps and the emergent carbon accounting standard – to trace linkages between global objectives on climate change and the carbon accounting practices being developed to frame the climate impact of investment and lending decisions. In particular, it has investigated how the interconnections

between these instruments represent the problem of climate change at the global-, sectoral-, organisational-, and portfolio-level. This section attends to how the implications of climate change for the financial sector have been "assembled at various collective levels […] and how the ensembles that emerge make it possible to link local issues to larger questions, and vice versa" (Miller and Napier 1993, p.634).

Central to each of the four instruments is their representation of multiple ideas regarding efforts to address climate change in a simple and abstract form. The two degrees target, for example, crystallizes the climate problem into a task of limiting the increase in global average temperatures to a particular level. It does not, however, prescribe *how* this is to be achieved. Rather it "convey[s] an ideal picture of a collaboration" (Jørgensen, Jordan, and Mitterhofer 2012, p.112) towards which diverse and distributed actors may adjust their actions. For example, while the investment roadmaps studied in Chapter 6 provide a refinement of the two degrees target into the timings of different financing requirements, they remain abstract representations, relative to investment decisions, of 'financing the two degrees scenario'. Indeed, the roadmaps detail "key, generic aspects of product development" or, in this case, the future investment and lending landscape for achieving the two degrees target (Miller and O'Leary 2007, p.719). Yet, as was demonstrated through the observations of the Portfolio Carbon Initiative, much work was required to refine these industry-level roadmaps into a form compatible with organisation- and portfolio-level indicators. As abstract representations these mediating instruments make the climate problem appear 'manageable' (Jordan, Mitterhofer, and Jørgensen 2016), yet managing the apparently simple vision entails the refinement of the instruments into a more locally-specific form – from a global- to a sectoral-level, and further to that of the organisation or portfolio.

It is also necessary to highlight that this refinement is not only a matter of outlining "key, generic aspects of product development" (Miller and O'Leary 2007, p.719). Rather, Chapter 5 frames the carbon budget as a 'bridge' (Morgan and Morrison 1999, p.30) that provides a more concrete rendering of the global objective that is compatible with analyses of future constraints on the financial sector. It does not, however, specify adjustments to investment and lending activities. Instead, it specifies a limit on cumulative GHG emissions

that can be enrolled in arguments of the investment risk and threats to financial stability that climate change poses. To clarify, the refinement of the two degrees target entails more than a series of calculations connecting it to local decision-making. It also requires that ideas and concerns are elicited and generated at multiple levels that establish implications of the two degrees target and that warrant action on this global vision for addressing climate change. The carbon budget, as an instrument bridging between the global level and the financial sector, provided a single figure that could be enrolled in arguments to stimulate and orient action from financial organisations and financial regulators. In this regard, the creation of a mediating instrument entails an embedding of particular ideas and concerns into an instrument that refines the two degrees target, as well as the simultaneous and interrelated work to elicit, generate and shape those ideas and concerns. As Miller and O'Leary (2007, p.708) write on the instruments that link Moore's Law to investment decisions across organisations and sectors, "it was a question of assembling and adjusting diverse components and practices so that they might operate as a more or less stable and coherent working ensemble". It is to these processes of 'co-production' (Hacking 1992) that this section now turns its attention.

7.1.2. Co-Production

Pollock and D'Adderio argue that studies employing the mediating instruments framework "have only begun to specify the process by which we might study and theorise interactions between material objects and wider calculative conceptions" (Pollock and D'Adderio 2012, p.567). In doing so, the authors call for attention to the processes of "assembling and adjusting diverse components and practices" (Miller and O'Leary 2007, p.708) and direct their attention to "the nuanced interplay involved between the conceptualisation of a market domain and its incorporation within various format and furniture" (Pollock and D'Adderio 2012, p.581). While this thesis does not share Pollock and D'Adderio's focus on the 'format and furniture' (or graphical display) of instruments, it draws on Gooding (1992) to analyse the work involved in developing and mobilising a particular instrument as a process of tinkering and experimenting through which ideas and instruments

are 'mutually adjusted' (Hacking 1992, p.30).[105] To Hacking, laboratory sciences become stable as they mature and develop "a body of types of theory and types of apparatus and types of analysis that are mutually adjusted to each other" (Ibid.). He continues, "[o]ur preserved theories and the world fit so snugly less because we have found out how the world is than because we have tailored each to the other." (Ibid., p.31). Where Section 7.1.1 discussed the 'fit' between the four mediating instruments, this section discusses how ideas of how the financial sector influences, and is influenced by, climate change were mutually adjusted with those four instruments. To do so it draws on Gooding's study of the "manipulative practices" through which 'experimenters' gradually explore the interactions between theories and observations (Gooding 1992, pp.65–66). Indeed, Hacking – while developing his 'taxonomy' of ideas, things and marks – notes Gooding's focus on the work of scientists as "the way in which 'representations and phenomena gradually *converge*' (his [Gooding's] emphasis) to a point where the resemblance between what is observed and what is sought is (as Faraday put it) 'very satisfactory'" (Hacking 1992, p.32, quoting Gooding 1992).[106] What this foregrounds is the processes of tinkering and experimenting with an instrument through which actors explore and discover possible configurations of instruments and ideas and which informs efforts to develop coherence and stability.

Chapter 6, for example, highlighted the adjustments between the ideas and instruments through discussions during the standard-setting project that grappled with a reorientation of participants' expectations towards a two degrees target. The co-production was between the financial sector discourse on climate change and the accounting tools called upon to render the climate impact of investment and lending activities visible. That is not to say the discourse was created during the standard-setting project; rather, there was a

[105] Also see Wise on "mutual adaptation" (Wise 1988, p.79) and Mennicken on "how audit and market ideals mutually shape and condition one another" (Mennicken 2010, p.354).

[106] Similarly highlighting the role of the 'model builder' in the process of experimentation, Morgan and Morrison argue that "there are no rules for model building and so the very activity of construction creates an opportunity to learn: what will fit together and how? [...] It does seem to require acquired skills in choosing the parts and fitting them together, but it is wise to acknowledge that some people are good model builders, just as some are good experimentalists" (Morgan and Morrison 1999, p.31).

"mutual adjustment" of discourse and instruments (Hacking 1992, p.30)[107] as the two degrees target came to permeate discussions during project meetings and webinars. Yet this emerged through the testing of different ideas and instruments through webinar and meeting discussions. In other words, it highlights standard-setting discussions as processes of experimentation, framing them as a "situated form of learning in which the manipulation of conceptual objects is often inseparable from the manipulation of material ones, and vice versa" (Gooding 1992, p.66). Where the project began with a focus on measuring and reporting 'financed emissions' to provide transparency to NGOs, it shifted towards indicators for monitoring alignment of investment and lending activities with the transition to a low-carbon economy. This idea of 'monitoring alignment' gradually emerged as the idea of working towards the two degrees target came to permeate discussions regarding the 'relevance' of financed emissions to the different stakeholders participating in the project. In other words, participants 'tinkered' simultaneously with ideas of acting on climate change and the measurements to render climate impacts visible, gradually adjusting each to the other to develop further coherence with an abstract and simplified vision for addressing climate change

While the discussions during the standard-setting project highlight a gradual process of co-production through work to make sense of a new vision for addressing climate change, Chapter 4 demonstrates co-production through the 'elicitation' of ideas and concerns to be assembled and embedded in a particular instrument. Where initial work on a long-term target centred on analysing 'cost-effective' GHG control, Chapter 4 shows that as potential targets travelled into different domains they provoked responses that revealed the concerns and ideas to be embedded in an instrument that represents the complexities of the underlying problem. For example, GHG concentration targets elicited developing nations' concerns of national sovereignty with regards to target setting, being seen as a prescriptive metric that encroached on their ability to determine their own path to development (Section 4.2.4). These concerns are what Gooding refers to as "recalcitrances" (Gooding 1992, p.69), which "indicate a discrepancy between theory,

[107] Also see Wise on "mutual adaptation" (Wise 1988, p.79) and Mennicken on "how audit and market ideals mutually shape and condition one another" (Mennicken 2010, p.354).

instrumentation, practice and results" and that assist in identifying "the assumptions that matter in *the world as engaged* in that particular laboratory" (Ibid., emphasis in original). In this regard, the emergence of the two degrees target entailed both the assembling of ideas and concerns that were elicited through testing particular targets in different domains as well as adjusting the base metric and choice of threshold to embed those ideas and concerns. Where Chapter 6 highlights co-production through adjusting ideas and instruments to develop coherence with new expectations, Chapter 4 focuses on experimentation with an instrument in new domains as a process of simultaneously eliciting ideas to be assembled and adjusting the instrument to embed those ideas.

However the thesis also highlights that instruments may enable efforts to catalyse experimentation on a problem. The carbon budget, for example, was mobilised by civil society actors to model the implications of regulations aligned with a two degrees scenario for the financial sector. Their arguments centred on the investment risks and threats to financial stability, prompting financial organisations and financial regulatory authorities to analyse the implications of two degrees scenario. It is in this regard that Chapter 5 presented the carbon budget as a 'bridge' (Morgan and Morrison 1999) and, as Morgan and Morrison argue, it is in the mobilisation of the instrument "to interrogate the world or our theory that learning takes place" (Ibid., p.32). To reiterate, the mobilisation of the carbon budget compelled financial organisations and regulators to 'interrogate' their ideas of risk and threats to capital markets in terms of a two degrees scenario. Furthermore, this experimentation led to the development of measurement and reporting techniques to assist in understanding and managing the problems. For example the ongoing work of the Taskforce on Climate-related Financial Disclosures (Section 5.4.4) aims to develop disclosure practices to further investigate the potential implications of climate change for financial stability, and was catalysed by arguments based on the carbon budget as a more concrete rendering of the two degrees target. In other words, the experimentation catalysed by the mobilisation of the carbon budget entailed a simultaneous assembling and adjusting of ideas of risk and threats to capital markets and the instruments for producing data with which to analyse and manage the problem.

By highlighting these three mechanisms of assembling ideas and instruments and their mutual adjustment, this thesis offers a response to Pollock and D'Adderio's (2012) call for attention to the co-production "between material objects and wider calculative conceptions" (Pollock and D'Adderio 2012, p.567). This response focuses on the construction and mobilisation of instruments, whereas other studies have applied the framework more extensively to the performances induced by particular instruments (Jørgensen, Jordan, and Mitterhofer 2012; Jeacle and Carter 2012; Jordan, Jørgensen, and Mitterhofer 2013; Jordan, Mitterhofer, and Jørgensen 2016). In this regard the thesis highlights the work of experimenting and tinkering with an instrument as central to the assembling and adjusting of "diverse components and practices so that they might operate as a more or less stable and coherent working ensemble" (Miller and O'Leary 2007, p.708), and draws on Gooding (1992) to analyse the processes through which 'mutual adjustment' (Hacking 1992) takes place.

7.3. Coordinating Across Multiple Entities

So far this discussion has focussed on how the interconnections between the four mediating instruments create linkages between a global objective and the specifics of particular sectors, organisations and portfolios (Section 7.1), as well as identifying three processes of mutual adjustment through which ideas and instruments develop a stability and coherence in creating conditions to align action with a two degrees scenario (Section 7.2). Building on these, this section provides a more focussed discussion on how the two degrees target begins to align diverse and distributed action on climate change. Specifically, it returns to the issue that "no one single entity creates and sustains" sustainable development issues (Bebbington and Larrinaga 2014b, p.401) to explore how the future envisaged by the two degrees target coordinates action as well as draws on expertise across multiple entities.

While the two degrees target, the carbon budget, investment roadmaps and the emergent standard present an idea of what is to be achieved, the instruments do not prescribe the actions to be taken. That is, they allow flexibility in how their visions are to be achieved. On the one hand,

the two degrees target provides a seemingly simple and manageable limit for the increase in global average temperatures, yet does not per se set out whether this target is to be pursued by emissions reductions, a particular emissions trajectory, other metrics such as carbon intensity or even the application of negative emissions technologies and geo-engineering. Indeed, it was this flexibility in working towards target that assuaged developing nations' concerns that the UNFCCC was encroaching on their national sovereignty. In a similar manner, the Portfolio Carbon Initiative has come to focus on benchmarking of portfolios against a hypothetical portfolio that is aligned with a particular warming scenario. This would reveal the sectors where an organisation's portfolio is 'overexposed' or 'underexposed' with regards to alignment, however it does not require that particular actions be taken. In this regard, mediating instruments provide a "stable frame of reference" while being "flexible enough to be associated to local concerns and activities" (Jørgensen, Jordan, and Mitterhofer 2012, p.112). Or, as Miller and O'Leary (2007, p.717) write, the instruments "mediate between […] investment decisions, bringing them into alignment without permeating the confidentiality of individual companies' capital budgeting processes or seeking to determine their technology choices." They present a common vision of the future for diverse and distributed actors to work towards, while, crucially, allowing those diverse and distributed actors to tailor that work to their local specifics.

In this regard mediating instruments not only align actions towards a common vision, they do so by stimulating the creation of responses that are tailored to local specifics. This occurs as actors' expectations are reoriented towards the common vision, prompting them to apply their expertise and resources to understanding the implications of that common vision to the conditions in which they operate and their potential responses. This draws on the knowledge and resources distributed across multiple entities (*cf.* O'Malley 2009), prompting the decentred development of solutions to a sustainable development problem as represented by a particular instrument. Chapter 4 demonstrated this point by detailing instances of *disaggregation*,[108] where actors began working on particular components of the two degrees target,

[108] As noted earlier in the thesis, Professor Morgan presented her work on both *aggregation* and *disaggregation* at an LSE400 lecture on 20th February 2015.

from sectoral shares of required emissions reductions to target-setting at the level of an individual organisation (Section 4.3.2). Beyond "appear[ing] simple, imaginable and 'manageable'" (Jordan, Mitterhofer, and Jørgensen 2016, p.1), the underlying problems are rendered into a form that enables diverse and distributed actors to analyse the local implications of the problem and aligns the range of responses towards a common objective.

Returning to the reshaping of conditions in the financial sector, climate change became a problem of managing the risks and threats to stability of the carbon-constrained future of limiting warming to two degrees Celsius. The literature on sustainable finance has highlighted that changes in legislation are central to the risk concerns of financial organisations (Coulson and Dixon 1995; Coulson and Monks 1999; Richardson 2009), and these organisations and their stakeholders "could be expected to need information from which they can assess the carbon intensity of corporate products and services and estimate the regulatory and competitive risks that a corporation is likely to face" (Bebbington and Larrinaga-González 2008, p.707). Such competitive risks to corporations emerge, Bebbington and Larrinaga-González (2008) argue, in a carbon-constrained future where carbon-intensive modes of production become obsolete (Kolk and Levy 2001) during periods of technological shifts (Busch and Hoffmann 2007). Indeed, in becoming a common vision for addressing climate change, the two degrees target provided a basis for developing the idea of a carbon-constrained future and analysing its implications for financial regulatory authorities and financial organisations. In other words, as the idea of a carbon-constrained future emerged through the carbon budget's concretion of the two degrees target, it started to become possible for individual financial organisations to work on analysing potential changes in legislation and the competitive risks faced by investee companies. While efforts to understand and develop ways of managing this carbon-constrained future are ongoing through initiatives such as the Taskforce on Climate-related Financial Disclosures, the vision has prompted numerous actors across the financial sector to consider and plan for the impact of a two degrees scenario on their investment and lending activities.

On the one hand this gradual realignment of action may be prompted as an instrument comes to be seen as addressing the ideas and concerns of

multiple actors, such as the risks of a two degrees scenario discussed above. On the other hand, the instruments may be enrolled in efforts to place new pressures on those actors. Chapters 5 and 6, for example, documented how the carbon budget was mobilised as a 'call to action' through a divestment campaign, being enrolled in arguments that grassroots pressure on financial organisations was 'urgent'. In this regard, the pressure these actors placed on organisations to address their climate impact stemmed from the two degrees target. Similarly, O'Sullivan and O'Dwyer have demonstrated that the influence of a global network of campaigning-NGOs, over time, enhanced the adoption of and compliance with the Equator Principles among commercial banks (O'Sullivan and O'Dwyer 2015). Indeed, Chapter 5 supports this finding. Chapter 5 further highlights an evolution in the coordination of strategies between civil society actors in their pursuit of aligning investment and lending activities with the two degrees target. The point is that it is not only the calculative infrastructure of interconnected mediating instruments that links concrete activity to a global objective, but the work of civil society actors that is integral to developing and mobilising these instruments in a manner that reorients organisation-level activity.

Yet the refinement of the two degrees target into the targets and actions for entities of various scales and scopes is shown to present considerable challenges for the development of carbon accounting practices. Indeed, as Bebbington and Larrinaga suggest, the participant observation of a carbon accounting standard-setting project provided the opportunity to study a "process that is in play" (Bebbington and Larrinaga 2014a, p.207). While this fieldwork was studying organisation- and portfolio-level carbon accounting practices, the thesis does not overlook the impact of the two degrees target on carbon accounting at the national-level. Indeed, Chapter 4 demonstrates that the decentred approach to target setting under a post-Copenhagen climate regime allows flexibility in how Parties to the UNFCCC set their targets for working towards the two degrees target. In addition to GHG reductions and GHG trajectories, Parties may set targets based on reductions in emissions intensity of GDP and targets for policy implementation (centring on, among others, renewable energy, energy efficiency, and forestry). Taking emissions intensity of GDP as an example, the UNFCCC's Measurement, Reporting and Verification (MRV) requirements must go beyond an accounting of GHG

emissions from a particular nation, and develop methods for connecting this to forecasts of national GDP to work towards the consistent reporting and monitoring on emissions intensity targets. This is in contrast to the literature on national-level carbon accounts, which has directed attention towards the accuracy of IPCC methods (La Motta et al. 2005; Stechemesser and Guenther 2012) and the application of a consumption- instead of a production-based national carbon entity (R. Andrew, Peters, and Lennox 2009; Minx et al. 2009; Wiedmann et al. 2010). This thesis highlights the extension of national-level carbon accounting practices beyond GHG data in order to measure and monitor the more flexible post-Copenhagen approach regarding national-level contributions to an international effort to address climate change.

With regards to the GHG Protocol and UNEP FI standard-setting project, the challenges in linking a global objective to organisation- and portfolio-level investment and lending decisions appeared to stem from question of a price on carbon. Section 6.2.2 highlighted that participants saw the integration of emissions data in risk analysis and management as being more straightforward if there is a price on carbon through which the problem of climate change can be monetized. In this light, the shift from a project focussed on 'financed emissions' to one of developing alignment indicators may be seen as working around the challenge of monetizing the climate impacts of investment and lending activities. Indeed, the compatibility of emissions information with risk analysis has been highlighted as an explanation for the limited use of emissions disclosures by investors (Kolk, Levy, and Pinkse 2008; Sullivan and Gouldson 2012; J. Andrew and Cortese 2011; Dragomir 2012), with Sullivan and Gouldson finding "where there are clear rules around carbon accounting and reporting, and where there is a clear price signal, investors will take account of this information in their investment decisions" (Sullivan and Gouldson 2012, p.65). Yet this thesis, and Chapter 6 in particular, demonstrates efforts to extend carbon accounting from producing GHG emissions information to indicators that frame investment and lending decisions in terms of a global climate objective. On the one hand, carbon accounting provides 'market-enabling' practices (Ascui and Lovell 2011) for carbon pricing mechanisms (MacKenzie 2009). On the other hand, and as highlighted in this thesis, an indicator-based approach to developing carbon accounting practices came to embed a global objective, becoming part of a

calculative infrastructure to coordinate actions across multiple entities towards a common vision for addressing climate change.

7.4. Conclusions

7.4.1. Coordinating Action Across Multiple Entities

This thesis has mapped the instruments through which a global objective for limiting global warming became linked with the accounting practices that frame the climate impacts of investment and lending decisions. A participant observation of a UNEP FI and GHG Protocol standard-setting project conducted over two years was combined with documentary analysis and eighteen semi-structured interviews to form the empirical base for this analysis. The thesis responds to Bebbington and Larrinaga's call for studying sustainable development issues by attending to the shifting conditions in which organisations operate and how this influences action across multiple entities (Bebbington and Larrinaga 2014b, p.401). It argues that, in establishing a common vision for addressing climate change, the two degrees target provided the basis for refining a global problem to the specifics of entities of different scales and scopes and, in doing so, began to coordinate decentred responses to working towards that vision. In particular, the thesis employs Miller and O'Leary's (2007) concept of *mediating instruments* to analyse four instruments – the two degrees target, the carbon budget, investment roadmaps and an emergent carbon accounting standard – that interconnect to link a global vision to local specifics. As such, the thesis also responds to Unerman and Chapman's call for further theoretical development in accounting scholarship on sustainable development (Unerman and Chapman 2014. Also see O'Dwyer and Unerman 2016). Specifically, the mediating instruments framework places emphasis on the rendering of sustainable development issues into apparently simple and manageable visions of what is to be achieved, while allowing flexibility in how actors develop strategies for achieving that vision. This, the thesis argues, enables the researcher to focus on how efforts to address 'complex' sustainable development issues[109] are coordinated while simultaneously stimulating the

[109] The term 'complex' refers to the view that climate change is a 'wicked' or 'super-wicked' problem (Milne and Grubnic 2011, p.949), with the former defying "resolution because of the enormous interdependencies, uncertainties, circularities, and

application of diverse and distributed expertise and resources to developing tailored local responses to global problems.

On the application of the mediating instruments framework, the thesis focuses on the construction of the four mediating instruments in order to analyse the assembling and adjusting of ideas and instruments to develop a degree of coherence and stability in the calculative infrastructure linking the two degrees target to investment and lending decisions (*cf.* Miller and O'Leary 2007, p.708). Elsewhere, applications of the framework have focussed on the performances induced by pre-existing instruments (Jørgensen, Jordan, and Mitterhofer 2012; Jeacle and Carter 2012; Jordan, Jørgensen, and Mitterhofer 2013; Jordan, Mitterhofer, and Jørgensen 2016), while placing less emphasis on how those instruments come into being (see, for an exception, Thomson, Grubnic, and Georgakopoulos 2014). This thesis argues that a focus on the construction and mobilisation of mediating instruments shows the tumultuous work of experimenting and tinkering with instruments (Gooding 1992), enabling the researcher to study the gradual assembling and 'mutual adjusting' (Hacking 1992) of ideas and instruments that is central to the stability and coherence of a "working ensemble" (Miller and O'Leary 2007, p.708). Specifically, Section 7.1.2 highlights processes of adjusting to new expectations, eliciting ideas to be embedded by an instrument as it extends into new domains, and catalysing experimentation with existing arrangements through the mobilisation of mediating instruments as models. In this regard, the thesis offers a partial response – one focussed on the construction and mobilisation of mediating instruments – to Pollock and D'Adderio's (2012) call for attention to the co-production "between material objects and wider calculative conceptions" (Pollock and D'Adderio 2012, p.567).

7.4.2. Chapter-Specific Contributions

In addition to these contributions that cut across the thesis, the three substantive chapters make their own specific contributions. Chapter 4 charted the emergence of the two degrees target from a range of climate metrics as a long-term objective for tackling climate change. The chapter argues that the 'boundary object' framing (Star and Griesemer 1989) adopted in earlier

conflicting stakeholders implicated by any effort to develop a solution" (Lazarus 2008, p.1159) and with the latter adding that "time is not costless, so the longer it takes to address the problem, the harder it will be to do so" (Ibid., p.1160).

studies of the two degrees target (Randalls 2010; Cointe, Ravon, and Guérin 2011) is an inappropriate analytical lens. Where boundary objects are "weakly structured in common use, and become strongly structured in local site use" (Star and Griesemer 1989, p.393), the two degrees target provides an apparently simple vision of *what* is to be achieved in common use (i.e. is strongly structured in common use) while allowing flexibility in *how* to achieve that vision (i.e. is weakly structured in local site use). The chapter argues that this 'structure' of the two degrees target corresponds to that of a mediating instrument (Miller and O'Leary 2007), and adopts this framework to analyse how the target renders the complexities of climate change into a common vision that forms the basis for diverse and distributed efforts to tackle climate change. The chapter further argues carbon accounting practices are being combined with economic and other physical measurements to provide the basis for national-, sectoral and organisational-level planning and target setting. This stems from the flexibility in how diverse and distributed actors develop strategies for working towards the two degrees target, and highlights the need for studies of carbon accounting that go beyond scrutinising the accuracy of GHG data (La Motta et al. 2005; Stechemesser and Guenther 2012) and its role in carbon pricing (MacKenzie 2009; Braun 2009), and that examine its hybridisation (Kurunmäki and Miller 2011) with other forms of measurement expertise.

Chapter 5 transitions from Chapter 4's focus on the global vision for addressing climate change to examine how that vision was refined to the sectoral-level. In particular, it focuses on the mobilisation of the carbon budget to model a carbon-constrained future and the implications for the financial sector in terms of investment risk and threats to financial stability. This demonstrates the 'bridging role' (Morgan and Morrison 1999) of mediating instruments in enabling the analysis of an abstract objective in the context of the local specifics of the, in this case, financial sector. Moreover, it contributes to the ongoing debate regarding the ability of civil society actors to enhance corporate accountability (Cooper and Owen 2007; Archel, Husillos, and Spence 2011; O'Sullivan and O'Dwyer 2015), by framing such actors as 'quasi-regulators' whose work is interwoven with the regulatory agenda of the state as well as their relationships with market participants (Chandhoke 2002). This specifically responds to O'Sullivan and O'Dwyer's call for studies

of movements around investment and lending activities on the issue of climate change (O'Sullivan and O'Dwyer 2015, p.51). Indeed, the chapter supports their finding that campaigning-NGOs, over time, achieved deeper concessions on social responsibility from commercial banks. However it also offers some support to Archel *et al*.'s (2011) observation that civil society actors adopted the 'dominant discourse' of those they work to influence. The point is that the chapter demonstrates an evolution in the strategies adopted by civil society actors, whose quasi-regulatory work mobilised the carbon budget to render climate change into a systemic issue to be addressed through risk management and financial stability regulations.

Chapter 6 brings the reader inside the webinars and meetings of a UNEP FI and GHG Protocol standard-setting project, demonstrating how the shifting financial sector discourse on climate change permeated and destabilised the project. Following its relaunch as the Portfolio Carbon Initiative, the project centred on producing instruments that frame investment and lending activities in terms of their alignment with the transition to a low-carbon economy and investment roadmaps for the financing needs of a two degrees scenario. The chapter challenges Botzem and Dobusch's argument that output legitimacy[110] is "predominantly related to standard diffusion" (Botzem and Dobusch 2012, p.741). It argues that the development of input and output legitimacy is interrelated during standard formation, with perceived 'effectiveness' being central to maintaining participation in the standard formation process. Furthermore, stakeholder participation in the standard-setting project was not only a means of "know[ing] what the preferences of people are" (Boedeltje and Cornips 2004, p.7), it also allowed the Secretariat to draw on the expertise of commercial bankers, investors, think tank researchers, campaigners, academics and data providers in developing an 'effective' standard. In this regard, standard formation is framed as a process that draws on the expertise of participants to configure a standard into a form compatible with "institutional arrangements for collective action" (Scharpf 1999, p.12), entailing both the identification of preferences and their codification into a standard. The result of this

[110] *Input legitimacy* stems from the inclusion of potential stakeholders in the creation of a standard so that their preferences and ideas may be identified and included. O*utput legitimacy* results from the standard's "effectiveness and coordinative capacity" in responding to collective problems (Botzem and Dobusch 2012, p.741).

negotiation between input and output legitimacy was a reorientation of the project towards rendering alignment with the transition to a low-carbon economy and the two degrees target visible at the organisational- and portfolio-level. In particular, this highlighted that in the absence of a price on carbon, carbon accounting is being called upon to provide indicators and metrics for aligning investment and lending strategies with a common vision for addressing climate change.

7.4.3. Limitations and Directions for Further Research

In studying an emerging calculative infrastructure between a global climate objective and carbon accounting practices, this thesis has focussed on the instruments that link different entities rather than providing a detailed study of the decision-making processes within financial organisations. Indeed, the intention was to study the shifting conditions that shape action across multiple entities. However this also constrained the thesis in that it provided little insight into the influence of a shifting financial sector discourse and emergence of new carbon accounting tools on the practices and decisions within organisations. As such, the thesis supports the call for further attention to the integration of social and environmental measurement and reporting practices through studies of "institutionalization processes at the organizational level" (O'Sullivan and O'Dwyer 2015, p.51). In addition, the majority of data collection was conducted during 2014 and 2015, and so the influence of the two degrees target detailed in this thesis largely pre-dates the Paris Agreement of COP21 in December 2015. This thesis is therefore unable to shed light on the impact of a landmark global agreement on climate change on the development of carbon accounting tools as it "unfolds" (Bebbington and Larrinaga-González 2008, p.711). On the other hand this emphasises that the work stimulated and shaped by the two degrees target emerged before it had been formally adopted by the UNFCCC.

It should also be recognised that Chapters 5 and 6 focus on the ramification of the two degrees target specifically in the financial sector. While it was necessary to focus the scope of the project to enable a depth to the study, this also restricted the extent to which the thesis could provide insights into the impact of the two degrees target in different sectors, or lack thereof. Chapter 4 provided some insight into efforts, such as the Science-Based Targets initiative and new consulting services, which base their efforts on

addressing the two degrees target at the sectoral- and organisational-level. However these insights were illustrative of the work enabled and shaped by the target, rather than providing detailed studies against which the core financial sector study could be contrasted. In this regard, thesis provides a study that centres on the coordination of action across multiple entities (*cf.* Bebbington and Larrinaga 2014b) specifically in the financial sector. While the configuration of investment and lending activities has potential impacts on a variety of sectors and regions, further research into the modes of governance employed for acting on climate change in different settings are necessary to study the roles of accounting in coordinating diverse and distributed action. A related limit to the response this thesis provides to Bebbington and Larrinaga (2014b) is that it focuses on climate change, which is only one of many sustainable development issues. In the same way that the impact of the two degrees target will vary across sectors and regions, coordination of diverse and distributed action on other sustainable development issues is likely to take different forms and a target-based approach to aligning action may be incompatible with the specifics of the problem. Where this thesis set out to specifically investigate climate change, studies of the Millennium Development Goals and Sustainable Development Goals, as examples, provide sites where multiple sustainable development issues are addressed through the application of accounting, indicators and targets (as noted by Chenhall, Hall, and Smith 2013) and would enable a more comparative study than that provided in this thesis.

The thesis has also highlighted three areas, in particular, for further research. First, the Paris Agreement represents a more flexible mode of climate governance than the centrally determined GHG targets of the Kyoto Protocol, which raises new challenges for carbon accounting at the national level. Indeed, the Paris Agreement, as Falkner writes, "managed to transform the international [UNFCCC] negotiations from a distributional conflict over legally binding targets into a bottom-up process of voluntary mitigation pledges" (Falkner 2016, p.1124). These national pledges, however, may be based on a range of policies and measures other than the Kyoto-style GHG reduction targets, including reductions in GHG intensity of GDP as well as the formulation and implementation of policies on, as examples, renewable energy, energy efficiency, and forestry. As such the Measurement, Reporting

and Verification (MRV) UNFCCC work stream is faced with the challenge of combining carbon accounting with economic forecasts (for GHG intensity of GDP) as well as developing data collection and reporting requirements that enhance consistency and comparability in monitoring the progress made by Parties to the UNFCCC and combining this into progress towards achieving the two degrees target. The development of such MRV requirements and the implementation of these by individual Parties, as well as the Capacity-building Initiative for Transparency established under the Paris Agreement, provide sites for studying carbon accounting as a practice that enables the commensuration of diverse strategies adopted by different Parties and their aggregation into metrics for monitoring global progress towards climate objectives. Such studies could provide a comparison of the ways in which carbon accounting enacts the different modes of governance adopted across Parties to the UNFCCC.

Second, and related to the call for organisation level studies (O'Sullivan and O'Dwyer 2015, p.51), the implementation of carbon accounting practices that render visible deviations from a 'two degrees benchmark' portfolio requires further attention. Where this thesis has mapped the linkages between a global objective and investment and lending decisions, organisation level studies could attend to the pressures on financial organisations to act on such deviations and the extent to which efforts are made to bring portfolios into alignment. This is not necessarily restricted to the financial sector (however the work surrounding the Sectoral Decarbonization Approach and the Sustainable Energy Investment Metrics Research Consortium provide starting points for studying a benchmarking approach to monitoring the climate impacts of investment and lending portfolios). The Science Based Targets initiative, for example, offers a focal point for studies outside the financial sector to attend to company-level adjustments in pursuit of the two degrees target. As highlighted in Chapter 6 and reiterated in this chapter, this refinement of the two degrees target into corporate objectives and 'two degrees benchmarks' provides an opportunity to study coordination on climate change in the absence of, and aside from, a carbon price. On this point, the mediating instruments framework (Miller and O'Leary 2007) appears to provide a useful analytical lens, focusing the researcher on the common vision presented by such objectives and

benchmarks while allowing, and being refined through, diverse and distributed efforts to develop local strategies for achieving that common vision.

Third, the ongoing debate regarding the extent to which civil society actors can enhance corporate accountability (Cooper and Owen 2007; Archel, Husillos, and Spence 2011; O'Sullivan and O'Dwyer 2015) has centred on the relationship between these actors and organisations, as has much of the sustainable finance literature (Coulson 2009; O'Sullivan and O'Dwyer 2009; Wright 2009). This thesis argues that the role of civil society actors should also be studied as part of a regulatory dynamic between state and market, with their work being interwoven with the regulatory agenda of the state as well as the strategies of the organisations they seek to influence (Chandhoke 2002). This thesis highlights the work of civil society actors as central to the experimentation through which interconnections emerged between four mediating instruments and how the two degrees target came to stimulate, orient and frame action in the financial sector. However, further research should attend to the influence of this work in catalysing, hampering and reconfiguring the regulatory dynamic between the state and the market. Initiatives such as the Montreal Pledge and Portfolio Decarbonisation Coalition sought to demonstrate the financial sector support for an agreement to be reached at COP21, and the UNFCCC commitment to the two degrees target has been shown to catalyse activity in the financial sector. Furthermore, the strengthening of Parties' contributions to the global effort to tackle climate change is argued to depend on technological development (Falkner 2016) that depends on a shifting investment landscape, referred to more generally as 'policy feedbacks' (Jänicke 2012). The point is that the interrelation and mutual reinforcement of state and market action is central to the strengthening of efforts to limit the increase in global average temperatures, and the role of civil society actors in addressing deadlocks and catalysing this regulatory dynamic requires further attention.

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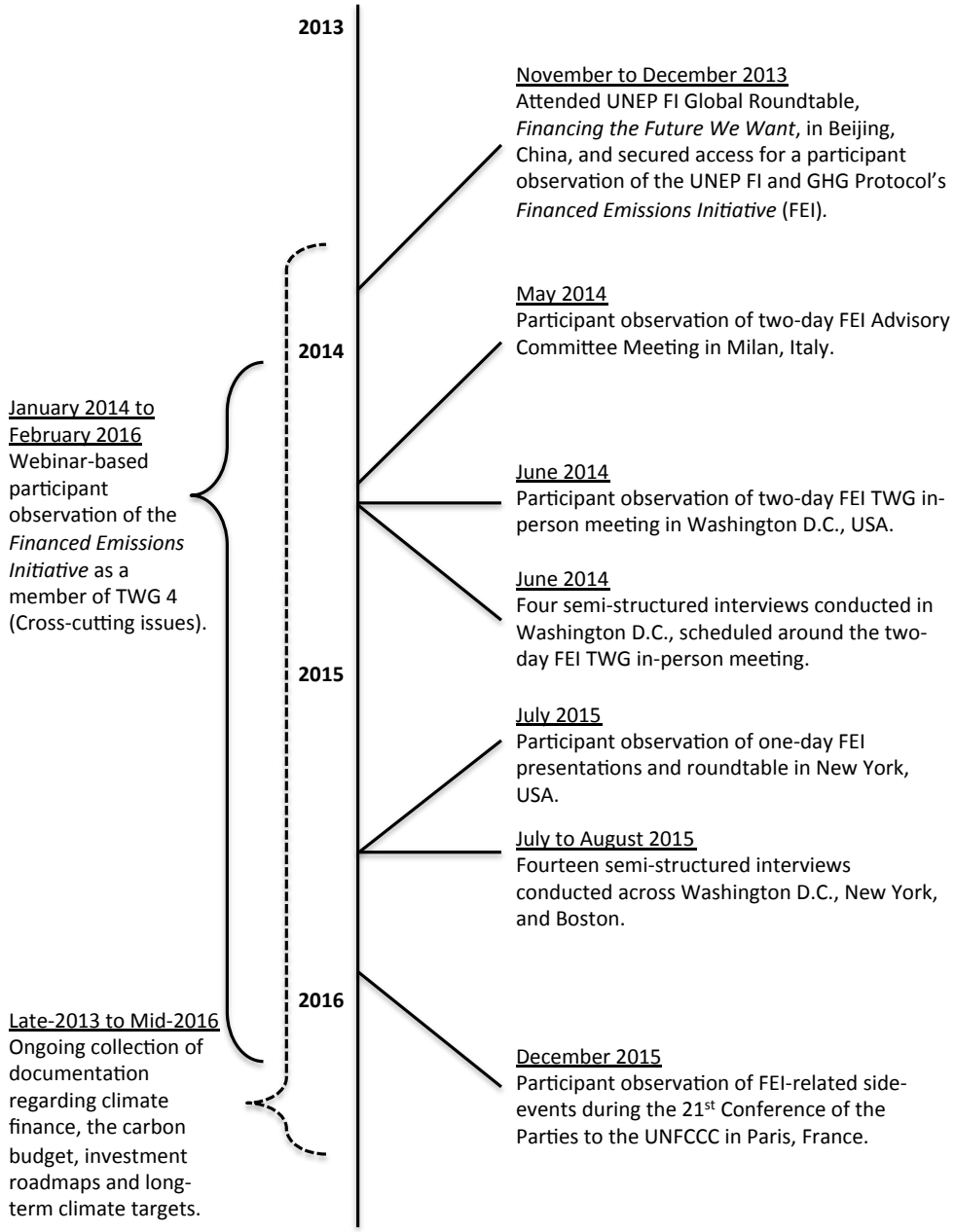
APPENDICES

APPENDIX 3A

Below is a timeline detailing events and processes of data collection between 2013 and 2016, which accompanies the discussion of methods in Chapter 3.



APPENDIX 3B

This appendix contains three tables detailing observations and materials from the participant observation. The first relates to the meetings of the Financed Emissions Initiative as well as those following the project's relaunch as the Portfolio Carbon Initiative. The second provides a summary of the documents gathered from that project. The third details 'climate finance' workshops, conferences and webinars attended beyond the Financed Emissions Initiative.

OBSERVATIONS OF MEETINGS OF THE TWG PROCESS

DATE	*EVENT TYPE*	*GROUP(S)*	*TOPIC (MAIN)*
20/02/14	Webinar	TWGs 1-4	Background - General
20/03/14	Webinar	TWG 4	Business Goals
02/04/14	Webinar	TWG 4 - AP Subgroup	Accounting Principles
17/04/14	Webinar	TWG 4	Boundary Setting
30/04/14	Webinar	TWG 4	Advisory Committee - issues to raise
12/05/14	In-person - ACM	ACM	TWG 1-4 progress
13/05/14	In-person - ACM	ACM	TWG 5 progress
20/05/14	Webinar	TWG 4	Performance Metrics
20/05/14	Webinar	TWG 4	Advisory Committee - Feedback
29/05/14	Webinar	TWG 4	Boundary Setting
30/05/14	Webinar	TWG 4 - PM Subgroup	Performance Metrics
05/06/14	Webinar	TWG 4	TWG 4 Progress
12/06/14	Webinar	TWG 4 - BS Subgroup	Boundary Setting
16/06/14	Webinar	TWG 4 - PM Subgroup	Performance Metrics
18/06/14	Webinar	TWG 4	TWG 4 Progress
24/06/14	In-person - All TWGs	All TWGs	TWG 5 progress

24/06/14	In-person - All TWGs	All TWGs	TWG 1-4 progress
06/08/14	Webinar	All TWG Members	Feedback on in-person and next steps
07/08/14	Webinar	All TWG Members	Feedback on in-person and next steps
27/07/15	Workshop	TWG members welcome, Moody's, and Mercer. Wall Street attendees.	Launch of the Carbon Asset Risk guidance
26/08/15	Webinar	All TWG Members welcome, interested groups from financial sector invited	Launch of the Carbon Asset Risk guidance
02/09/15	Webinar	Banking TWG Kickoff Call	Banking Guidance
26/01/16	Webinar	Banking TWG	Banking Guidance

DOCUMENTATION FROM TWG PROCESS

PUB. DATE	*DOCUMENT TYPE*	*DOCUMENT TITLE*	*TOPIC*
01/01/13	Concept Note	2013_01 Concept Note - GHG Protocol Financial Sector Guidance (version 2).pdf	Financed Emissions Initiative Outline
01/01/13	Survey Results	2013_01 GHG Protocol Financial Sector Guidance Survey Results Report.pdf	FI interest in Financed Emissions
01/02/13	Agenda	2013_02 London Scoping Workshop Agenda.pdf	Scoping Questions
01/02/13	Summary	2013_02 London Scoping Workshop Summary - GHG Protocol Financial Sector Guidance v_2.pdf	Purpose of Creating a Standard
01/02/13	Presentation	2013_02 London Workshop Presentations (part two).pdf	Case Studies of FE Accounting before project began
01/02/13	Presentation	2013_02 London Workshop Presentations (part one).pdf	Reasons for project + Deep Background
01/04/13	Agenda	2013_04 Financial Sector NY Scoping Workshop Agenda_0.pdf	Scoping Questions

01/04/13	Summary	2013_04 New York Scoping Workshop Summary - GHG Protocol Financial Sector Guidance_0.pdf	FI interest in Financed Emissions
01/04/13	Presentation	2013_04 NY_Workshop_Presentations .pdf	Reasons for project + Deep Background
19/07/13	Press Release	2013_07_19 UNEP_FI_Investor_Briefing_ Press_Release_- _19_July_2013.pdf	Reasons for measuring Financed Emissions
01/08/13	Project Plan	2013_08 UNEP FI - GHG Protocol - Project Plan Document.pdf	Rationale for project
01/10/13	Summary	2013_10 Advisory Committee Meeting Oct 9-10 2013 Summary of Outcomes.pdf	Vision
01/10/13	Press Release	2013_10 GHGP Financial sector press release final_0.pdf	FIs and low-carbon economy
01/11/13	Terms of Reference	2013_11 Terms of reference for Financial Sector Guidance TWG members.pdf	Financed Emissions Initiative Outline
01/02/14	Concept Note	2014_02 Concept Note GHG Protocol Financial Sector Guidance final.pdf	Financed Emissions Initiative Outline
05/02/14	Email - Reading List	TWGs 1-4	Background - General
19/02/14	Webinar ppt	TWG4_CrossCuttingIssues_C all1_020414 (1)	Overview for TWG 4
13/03/14	Draft	TWG4Businessgoalsdrafttex t (2).pdf	Business Goals - TWG 4
13/03/14	Participant List	TWG 4 subgroup participation Sheet_1.xls	TWG 4
20/03/14	Webinar ppt	TWG4_CrossCuttingIssues_C all1_0319 (1).pptx	Overview for TWG 4
21/03/14	Summary	Summary of TWG4Call#2.docx	Overview for TWG 4
21/03/14	Example methodology	20130407 - Methodology GHG footprinting ASN investments.doc	Scope 3 Emissions Measurement
24/03/14	Template for Webinar ppt	TWG4_CrossCuttingIssues_S ubgroup template (1).pptx	TWG 4 Procedure
26/03/14	Participant List	TWG 4 subgroup participation Sheet_1 (3).xls	TWG 4
02/04/14	Webinar ppt	TWG4_CrossCuttingIssues_S ubgroup accounting principles.pptx	Accounting Principles - TWG 4

09/04/14	Webinar ppt	TWG4_CrossCuttingIssues_Subgroup boundary agenda20140410 (1).pptx	Boundary Setting - TWG 4
17/04/14	Webinar ppt	TWG4_CrossCuttingIssues_boundaries discussion final (1).pptx	Boundary Setting - TWG 4
17/04/14	Webinar ppt	Accounting Principle Sub-group Final Draft. (1).ppt	Accounting Principles - TWG 4
17/04/14	Webinar ppt	Accounting Principle Sub-group Final Draft. (2).ppt	Accounting Principles - TWG 4
17/04/14	Webinar ppt	TWG4_CrossCuttingIssues_boundaries discussion final_Martacomm.pptx	Accounting Principles - TWG 4
29/04/14	Draft	Corrected version of Accounting Principle sent to Emma on 27-4-14.pdf	Accounting Principles - TWG 4
29/04/14	Draft	2014-04-29.Financed Emissions - Business goals draft (2).docx	Business Goals - TWG 4
30/04/14	Draft	2014-04-29.Financed Emissions - Business goals draft.docx	Business Goals - TWG 4
30/04/14	Draft	Draft finalised on 29th April 2014_.pdf	Accounting Principles - TWG 4
30/04/14	Agenda	TWGcall#4 agenda.docx	TWG 4
06/05/14	Summary	Summary of TWG4Call#4.docx	TWG 4
08/05/14	Agenda	AC meeting agenda and schedule_5514 (1).docx	ACM
10/05/14	Agenda	AC meeting agenda and schedule_5914.pdf	ACM
10/05/14	ACM ppt	Financial Sector Guidance AdCom Meeting final.pdf	ACM
01/06/14	Example methodology	CGD_BalanceSheet_2012.pdf	Boundary Setting - TWG 4

03/06/14	Webinar ppt	Emissions-intensive sectors.pptx	Boundary Setting - TWG 4
06/06/14	Webinar ppt	boundary options 5-29.pptx	Boundary Setting - TWG 4
11/07/14	Summary	TWG Meeting Summary of Outcomes 71114 (1).docx	DC Meeting
05/08/14	Webinar ppt	TWG Update Webinar_Final2 (2).pdf	Whole Project
29/09/14	Landscape Review	GHGP___UNEP_FI_Financed_Emissions_Initiative___Project_update	Review of the TWG process and current demand for guidance
20/04/15	Webinar ppt	20150420 BankingTWG_Webinar1.pdf	Kickoff webinar for Banking TWG
02/09/15	Discussion points and outline for draft	20150902 BankPaperOutline_01092015.pdf	Banking TWG
03/04/15	Draft for review	20150403 PCI_Assessing_Climate_Metrics_Targets_draft-2.pdf	Institutional Investors TWG
19/05/15	Final Draft for review	20150519 Climate targets_FINAL_DRAFT_DISCUSSION.pdf	Institutional Investors TWG
01/12/15	Final report	20150519 Climate targets_FINAL.pdf	Institutional Investors TWG
25/02/15	Draft for review	20150225 CAR Guidance Draft2Final-2.docx	Carbon Asset Risk TWG
25/02/15	Template for comments	20150225 CAR_Guidance_Draft2 Comment Template.docx	Carbon Asset Risk TWG
21/01/16	Draft for review	20160121 Climate_Strat_Metrics_Banks_DRAFT1.pdf	Banking TWG

ATTENDANCE OF WORKSHOPS AND CONFERENCES ON CLIMATE FINANCE

DATE	*HOST*	*TITLE*	*DUR.*	*LOC.*	*TOPIC*
11/11/13	UNEP FI and Natural Capital Declaration	Natural Capital Declaration Event at UNEP FI's 2013 Sustainable Finance Week	4 hrs	Beijing, China	Accounting for natural capital
12/11/13	UNEP FI	2013 Global Roundtable: Financing the Future We Want	2 days	Beijing, China	Financing transition to low-carbon economies
14/11/13	2 Degrees Investing & MSCI	Measuring the carbon impact of the financial sector: From financed emissions methodologies to long-term investing metrics	2 hrs	Beijing, China	Connecting climate goals to investment metrics
16/12/14	ICAEW	Rethinking Capitals Conference	2 days	London, UK	Accounting for different forms of capital
21/01/15	Greenhouse Gas Protocol	Transforming energy: Bringing electricity procurement into corporate carbon footprints	5 hrs	London, UK	Launch of a revised carbon accounting standard for Scope 2 emissions
30/04/15	Principles for Responsible Investment, UNEP FI	Climate Related Metrics and Targets for Investors	5 hrs	London, UK	Climate performance targets for investment portfolios
19/05/15	2 Degrees Investing & Caisse des Depots	Finance and Climate Change: Metrics	1 day	Paris, France	Measuring portfolio performance on climate change and carbon asset risk exposure
20/05/15	United Nations	Climate Week: Climate and Business Summit	2 days	Paris, France	Sustainable Business
22/05/15	UNEP FI	Climate Finance Day	1 day	Paris, France	Emerging climate risks and related management methods

27/07/15	GHG Protocol, UNEP FI, Moody's, Mercer and 2 Degrees Investing	Rotating Roundtable on Carbon Risk Assessment Strategies	1 day	New York, USA	Metrics for integrating climate risk and warming scenarios into portfolio analysis and risk management
24/09/15	Oxford University	1st Stranded Assets Conference	2 days	Oxford, UK	Impact of climate regulation on risk due to asset stranding
01/10/15	ICAEW	What will Successful Climate Talks Mean for Business?	4 hrs	London, UK	Implications of COP21 for business strategy and investments.
19/11/15	Cambridge Institute for Sustainability Leadership	Climate Implications for Finance	2 hrs	Webinar	Current finance landscape regarding low-carbon investments
24/11/15	Climate Policy Initiative	Discover How Much Global Climate Finance is Flowing	1 hr	Webinar	Sources and levels of finance supporting low-carbon growth
30/11/15	2 Degrees Investing	CLIMATE CHANGE: THE FINANCE SECTOR AND PATHWAYS TO 2°C - Investing billions and shifting trillions	1 day	Paris, France	Aligning investment portfolios with warming scenarios
01/12/15	United Nations	21st Conference of the Parties to the UNFCCC (COP21) - Climate Generations Zone	2 wks	Paris, France	Using public finance to leverage private finance
17/12/15	Grantham Institute, LSE	Post COP21 panel debate | After Paris: is COP21 a turning point for international action on climate change?	2 hrs	London, UK	Detailed discussion of COP21 negotiations and the Paris Agreement

APPENDIX 3C

Below is a summary of the semi-structured interviews conducted over the course of 2014 and 2015.

DATE	*GROUP REPRESENTED*	*RECORDING LENGTH*	*CODE*
23/06/14	Government	1:07:21	Eag 1410
25/06/14	Secretariat	47:32	Eag 1411
26/06/14	Secretariat	39:08	Eag 1412
08/07/14	Campaigning NGO	55:09	Eag 1413
30/07/15	Advisory Committee + Development Finance	44:42	Eag1511
30/07/15	Trader	43:13	Eag1512
31/07/15	Secretariat	58:14	Eag1513
31/07/15	Secretariat	38:04	Eag1514
03/08/15	Investor Coalition	55:42	Eag1515
04/08/15	Ratings Agency	46:23	Eag1516
05/08/15	Advisory Committee + Insurance	46:29	Eag1517
05/08/15	Advisory Committee + Business Association	51:47	Eag1518
06/08/15	Advisory Committee + Investment Bank	42:25	Eag1519
06/08/15	Secretariat	Not recorded	Eag1520
11/08/15	Advisory Committee + Investment Bank	37:32	Eag1521
11/08/15	Investor Coalition	57:40	Eag1522
11/08/15	Investor Coalition	39:39	Eag1523
13/08/15	Disclosure Body	46:19	Eag1524

APPENDIX 3D

This appendix lists the reports (3D.1) and literature (3D.2) gathered and analysed as part of the documentary analysis underpinning Chapter 4.

APPENDIX 3D.1: REPORTS

ADP. 2014a. "Intended Nationally Determined Contributions of Parties in the Context of the 2015 Agreement." ADP.2014.7.DraftText. Ad Hoc Working Group on the Durban Platform for Enhanced Action. UNFCCC.

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CEU. 2005. "Council of the European Union. Information Note 724205; 11th March 2005.pdf."

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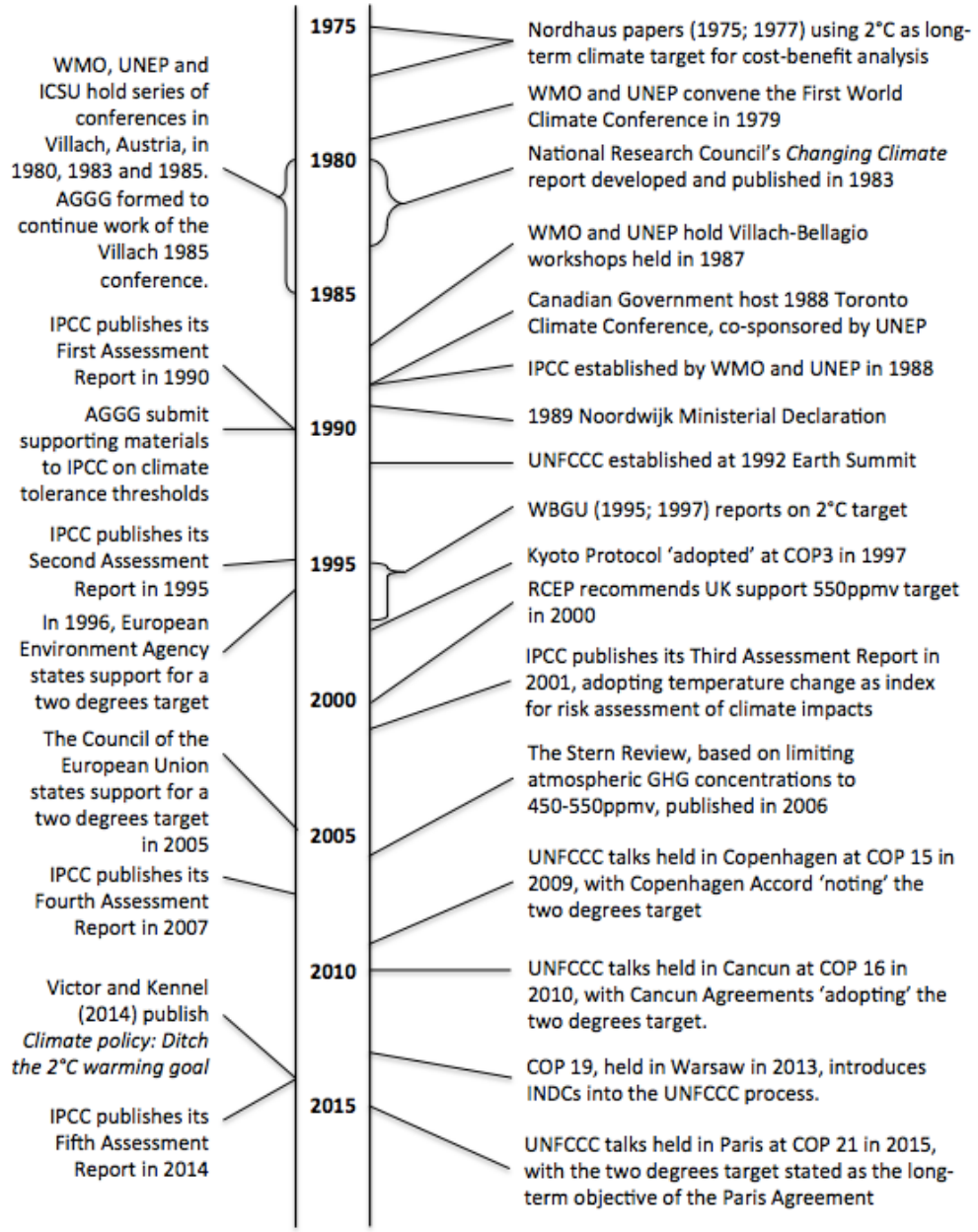
APPENDIX 4A

A timeline of events in the emergence of the two degrees target, corresponding to those detailed in Chapter 4.



APPENDIX 4B

Outcome of the Villach-Bellagio workshops: A framework for assessing the relative costs of limiting and adapting to climatic changes as well as resulting externalities, and that these should be assessed across three policy scenarios, business as usual, moderate efforts, and concerted efforts (Jäger 1988, p.29).

Relative costs of four different types of effort undertaken in three different strategies for responding to climatic change. The relative costs are indicated by w,x,y,z. In addition, the relative costs of a surprise occurence are shown.

	LIMITATION (reduce emissions)	ANTICIPATORY ADAPTATION (primarily adjust to effects)	FORCED ADAPTATION	RESIDUAL (absorbed costs)
Business as Usual	w	xx	yyyyy	zzzzz
Moderate Efforts	ww	xxxx	yyy	?
Concerted Efforts	wwwww	xx	y	z
Surprise			yyyyyyy	zzzzzzzz
Comments	long lead time	varying lead time	no lead time	

APPENDIX 4C

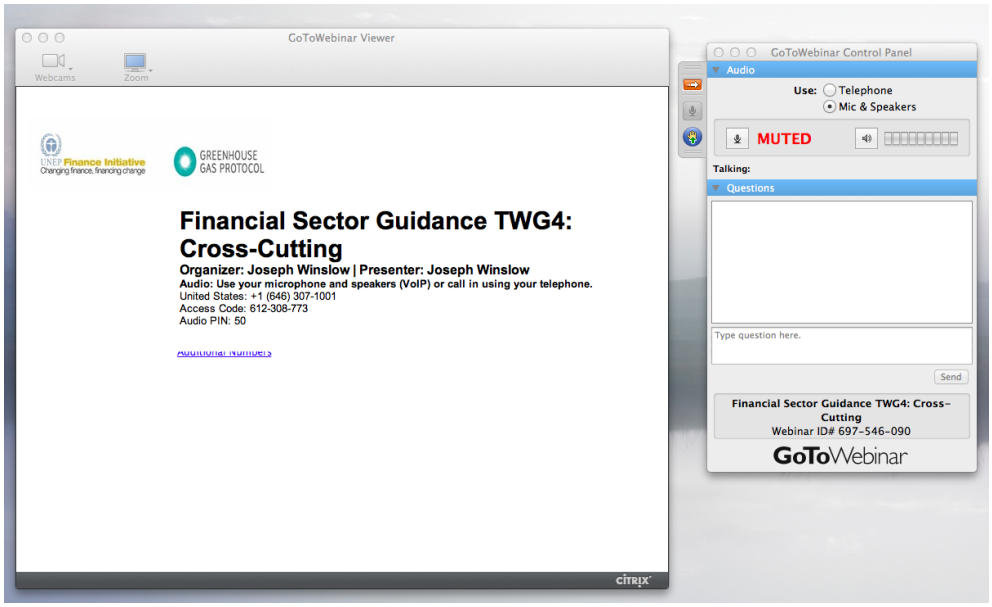
Emissions reduction targets for each of the Annex I nations for the 2008-2012 first commitment period of the Kyoto Protocol (UNFCCC 1998, p.20).

Party	Quantified emission limitation or reduction commitment (percentage of base year or period)
Australia	108
Austria	92
Belgium	92
Bulgaria*	92
Canada	94
Croatia*	95
Czech Republic*	92
Denmark	92
Estonia*	92
European Community	92
Finland	92
France	92
Germany	92
Greece	92
Hungary*	94
Iceland	110
Ireland	92
Italy	92
Japan	94
Latvia*	92
Liechtenstein	92
Lithuania*	92
Luxembourg	92
Monaco	92
Netherlands	92
New Zealand	100
Norway	101
Poland*	94
Portugal	92
Romania*	92
Russian Federation*	100
Slovakia*	92
Slovenia*	92
Spain	92
Sweden	92
Switzerland	92
Ukraine*	100
United Kingdom of Great Britain and Northern Ireland	92
United States of America	93

* Countries that are undergoing the process of transition to a market economy.

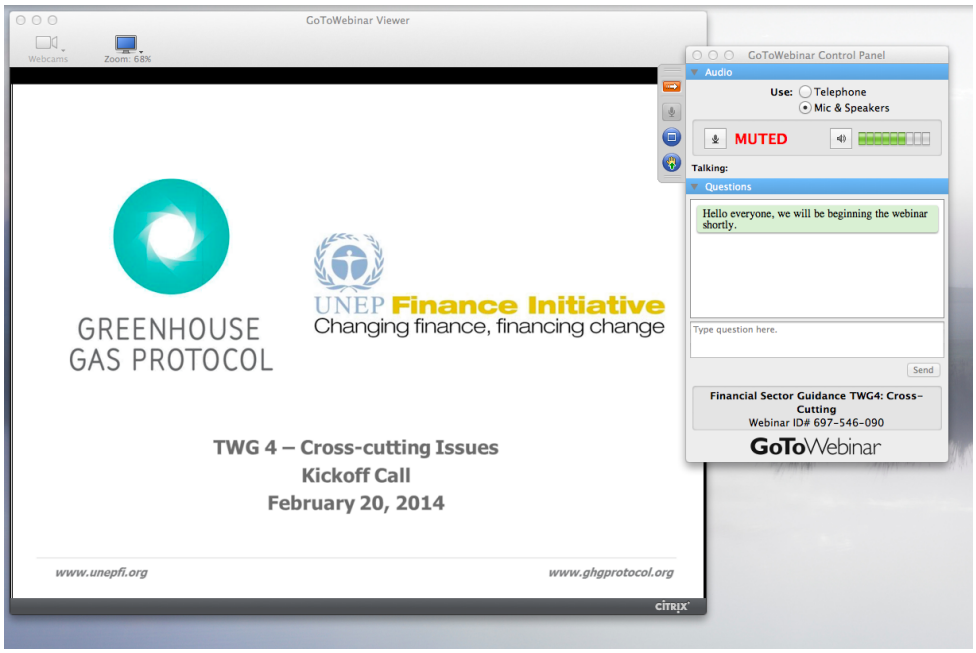
APPENDIX 6A

On-screen greeting display after signing in through the GoToWebinar online webinar platform. The main presentation screen on the left outlines details of the webinar that will commence shortly, with a control panel providing participants with a range of options such as 'raising their hand', typing comments, and choosing to mute your microphone or to indicate that your have been muted by the webinar host (it was common practice to mute all participants unless they were asking questions or presenting due to the feedback that would result otherwise).



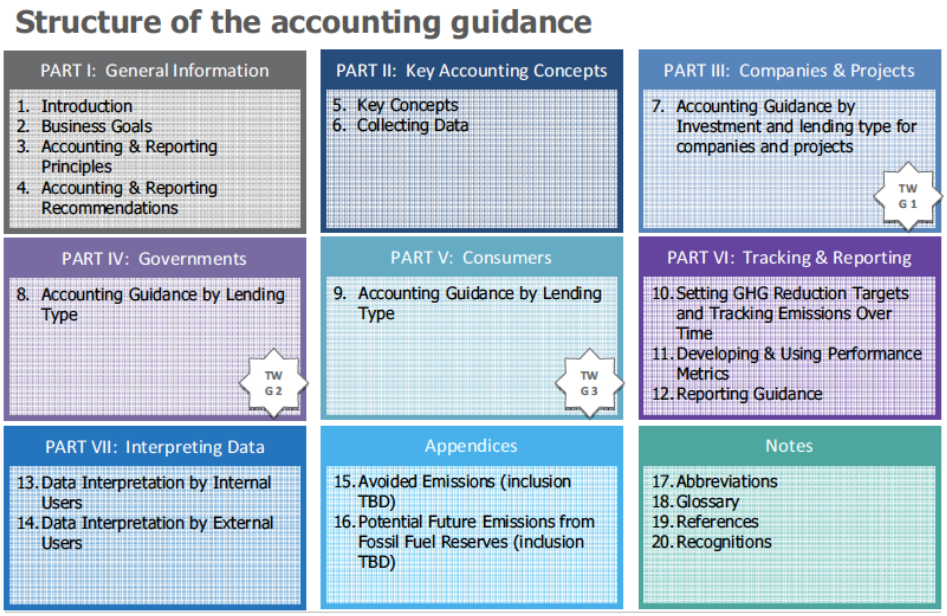
APPENDIX 6B

On-screen display once webinar commenced, taken from a webinar held in February 2014 for the initial call of TWG 4. Questions posed in the dialogue box would only appear to the hosts of the webinar, while the hosts' messages would be displayed to all participants.



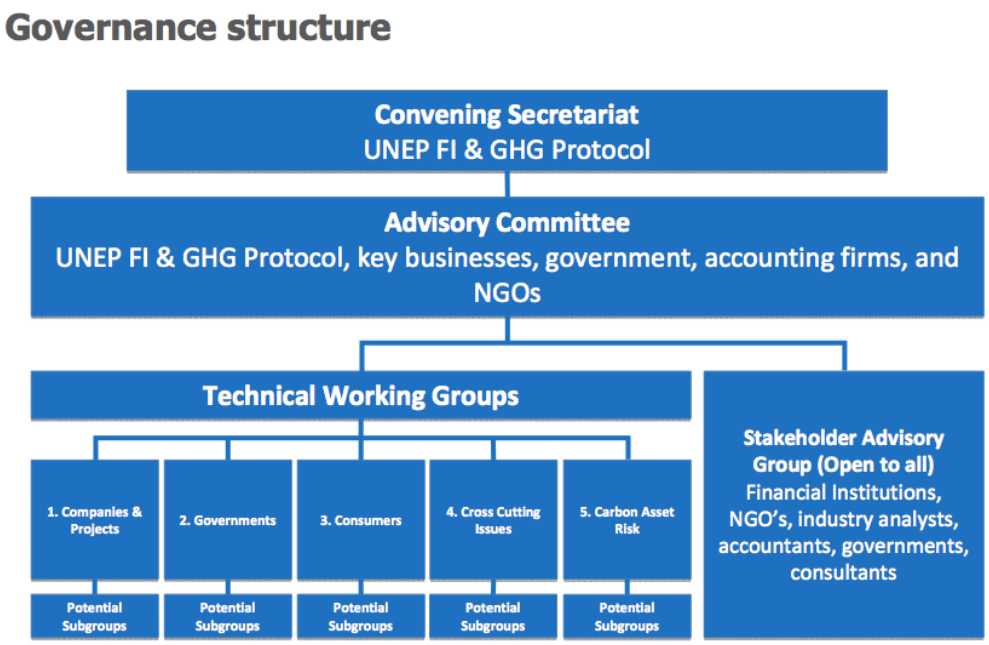
APPENDIX 6C

The image below is taken from a PowerPoint slide displaying the structure of the document being drafted by the 'Accounting' work stream and the responsibility for different sections of that document across TWGs 1-4. Note that TWG 4 'cuts across' this structure, while it's main responsibilities were for drafting Parts I, II, and VI, as displayed in the above slide.



APPENDIX 6D

The chart below is taken from a PowerPoint slide displaying the governance structure of the Financed Emissions Initiative, as detailed in Section 6.1.3.



APPENDIX 6E

A list of all Advisory Committee members, adapted from a publically available summary of an Advisory Committee meeting.[111]

Advisory Committee Membership	
Name	**Organisation**
Christopher Bray	Barclays
Mark Campanale	Carbon Tracker Initiative
Giorgio Capurri	UniCredit
Stanislas Dupre	2° Investing Initiative
Tim Hassett	WWF US
James Hulse	CDP
Kaj Jensen	Bank of America
Nathan Fabian	Investor Group on Climate Change (IGCC)
Karsten Loeffler	Allianz Group
Richard Pearl	State Street
Chris Walker	EY
Christopher Rowe	Prudential Investment Management
Cory Weiss	PwC
Tom Kerr	IFC
Robyn Luhning	Wells Fargo
Julie Fox-Gorte	Pax World
Bill Harnett	Local Government Super
Sefton Laing	RBS
Daniel Marroquin	Banamex
Julian Poulter	Asset Owners Disclosure Project
Steve Priddy	London School of Business and Finance
Elisa Tonda	UNEP Business and Industry Unit (observer)
Namita Vikas	YES Bank

[111] (accessed on 10/03/2016 at http://ghgprotocol.org/files/ghgp/AC%20Meeting%20Summary%20of%20Outcomes%20Final.pdf)

APPENDIX 6F

Right: View of the UniCredit tower, located on Piazza Gae Aulenti in Milan.

Below: View from the 12th floor conference room in which the Advisory Committee meeting was held.

Above: 12th floor conference room in which the two-day Advisory Committee meeting took place.

Below: Break room where Advisory Committee members congregated during breaks and where coffee and lunch was served.