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**Reductio ad unum:
New Perspectives on the Two Degree Climate Target**

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Abstract

The paper investigates the 2°C target in climate governance from a political perspective, using a historical reconstruction that identifies different phases in the evolution of the target. The first phases are marked by a target that was science-driven and EU-based, but then progressively accepted at the international level, despite a lack of thorough debate among governments on the policy implications and measures for implementation. Once the 2°C target was endorsed at United Nations level, the debate generated by the implications of the target favoured the emergence of target that was rather symbolic while lacking effectiveness. At present, the target can be described as a “disembedded object” in global environmental policy. The paper will analyze an option to overcome this condition, and make the 2°C target an earth system governance target.

1 INTRODUCTION

Targets have become an increasingly important component of environmental governance, from national environmental targets up to the Millennium Development Goals (MDG). In this paper, we conceptualise such targets as a meaningful reference-value expressing in a synthetic form (often numeric) a desired policy outcome arising from the objective to be achieved.

Setting such targets is a process which entails several steps: identification, discussion, negotiation, agreement, and implementation. Usually this process involves numerous stakeholders at multiple levels of governance, from local to international (e.g. Mitchell 2003; Jänicke and Jörgens 2007; Hák et al. 2007; Lester and Neuhoffand 2009). Targets give direction and credibility to undertaken commitments, facilitate measuring progress towards the achievement of the desired goals, and promote awareness and participation among stakeholders.

The widespread use of targets in the policy arena—control targets, performance targets, service-level targets, safety targets, etc.—stresses the complexity of issues, often even within one single target. Likewise, it is difficult formulating a taxonomy of targets which takes into account the influence of different forms of knowledge and worldviews. However, this complexity should not discourage the study of targets in the scientific and in the social and political domains, given the relevance of targets in policy design and policy outcome.

In the international environmental governance context, a target-based approach has been proposed or employed in a number of cases. Examples are the 1982 World Park Congress (which proposed 10% of country-land area as protected areas); the 1987 Montreal Protocol (which phased-out the production of ozone-depletion substances); the 1988 Toronto targets (which proposed 20% reduction in CO₂ emissions); the 1997 Kyoto Protocol (which set country-targets for greenhouse-gases emission in the commitment periods 2008-2012 and 2013-2020); the 1999 Gothenburg Protocol (which defined emission cuts of acidification substances); the 2000 United Nations Millennium Development Goals (with its Goal 7, “Ensure Environmental Sustainability” and three specific targets on the environment); the 2002 World Summit on Sustainable Development (which defined biodiversity targets); and the 2010 Convention on Biological Diversity (which approved the so called Aichi biodiversity targets). To this list belongs the 2°C target, which was decided at the 15th Conference of Parties of the United Nations Framework Convention on Climate Change (UNFCCC) in 2009, and that is one of the most prominent targets in global environmental governance.

Different approaches to the study of environmental policy targets are found in the literature. In some cases, targets are considered in the broader context of environmental regime studies (e.g.

Young and Levy 1999; Mitchell et al. 2006; Haas et al. 1993). Others see them in relation to scientific assessments (e.g. Cash 2000; Watson 2005), or environmental diplomacy (e.g. Barrett 2003; Grubb 1990). In other cases, authors addressed specific typologies of targets. Bodansky (2003), for instance, analysed the role of international climate commitments and their relation with, among others, emission targets. Dietrich (1995) scrutinized critical loads (that is, threshold-type targets that identify the limits a key variable not to overcome) assessed on the basis of selection, policy design, and negotiation. Threshold targets were also extensively analysed in a European Union commissioned study for policy-making implication and applications (Ecologic Institute and SERI 2010).

This paper analyses the target of a maximum 2°C mean global temperature increase above preindustrial values beyond which—as many scientists and now also policymakers agree—the global climate could cause catastrophic and unpredictable damages to human and natural systems.

The political scrutiny of this target has great value in terms of earth system governance and planetary stewardship. The 2°C target is a political target that is backed, however, by scientific knowledge, which has profound implications for addressing policy responses to climate change at any scale. If analysed in depth, the target can reveal how scientists and policy-makers interact, and clarify how decision makers build their convictions and foster actions (or lack of actions). At the same time, studying the 2°C target allows to appreciate how climate policy is framed and the implications of this framing.

By focusing on the 2°C target as a case study, this work also aims at contributing to a better understanding of the environmental science-policy interface and effective policy design. Hence, the paper analyses how the target has supported decision-making, including peculiarities, flaws, and weaknesses that can be inferred from its evolution. The factors that shaped the target during its development are therefore investigated to understand if it was constructed in a way to guide policy action towards the desired outcomes it was designated for. The process that led to the target is considered through the role of trust between scientists and policymakers, the role of actors, and the role of countries, to finally evaluate the role of the target in current international environmental governance, specifically in the research field of earth system.

The paper is organized as follows. Section two introduces the analytical approach, with the following sections explaining the evolution of the target over different periods. In the last period considered we provide a reinterpretation of the 2°C target, which is critically examined. The final section resumes the key findings, and suggests possible open questions, and next research steps.

2 ANALITICAL APPROACH

The 2°C target was first mentioned, to our knowledge, in a paper by Manabe and Weatherald (1967), who estimated a temperature response to doubling carbon dioxide concentrations of approximately 2°C (Randalls 2010). Since then, the target has been discussed in various studies, including in relation to climate governance (Bodansky 2010, 2011; Dimitrov 2010); its implications and policy options (Geden 2010; van Vliet et al. 2012; Höhne and den Elzen 2013); and conceptual or critical aspects of the target (Boycoff 2010; Lenton 2011b; Knopf 2012; Jordan et al. 2013). Other authors followed the chronology of events for investigating the multifaceted characteristics of the 2°C: to consider different interpretations of the target (Jaeger and Jaeger 2010; Knopf et al. 2012); to explore its strengths and weaknesses (Randalls 2010); and to examine its role as an intertwined element of science and policy (Cointe et al. 2011). Building on these works, our paper contributes by offering a detailed historical reconstruction of the emergence of the target, drawing on extensive document analysis of reports, scientific literature, official documents, as well as on a series of ten in-depth interviews¹ with individuals who were involved with the 2°C target at diverse levels and in different functions. Even if the historical viewpoint was employed in the study of the 2°C target and related issues (notably Oppenheimer and Petsonk 2005), we use this approach to look at the target in a new perspective, to address three research questions: what factors shaped the emergence and development of the 2°C target in the policy discourse, how and why did the target persist in the political arena, and which correspondence exists between the desired policy outcome and its implementation. The paper will also inquire if the device was flexible enough to serve different functions, and change over time.

To show this evolution, different phases are identified and critically examined. The phase-methodology aims at addressing the research questions in the following way: first, it facilitates identifying the actors, approaches, and institutional context that marked the progression of the target. Second, it makes easier to confront the target with key concepts from the fields of environmental governance and science and technology studies (distinctively on the interplay between scientists and policy-makers, the interests of political actors, and on strategic approaches in negotiations). Third, it allows appreciating if the 2°C target fulfils the scope it was thought for.

¹ An account of interviews and interview methods can be found in the appendix.

3 THE FRAMING PHASE (1988-1996)

The 2°C target rarely appeared in the scientific literature in the late 1960s, 1970s and 1980s, but was used then rather as heuristic rather than as normative policy-guidance (Randalls 2010). For this reason we consider the *political history* of the 2°C target to start in 1988 when the World Meteorological Organization report “Developing Policies for Responding to Climatic Change” was published (WMO 1988). The report summarized the findings of two first meetings of the Advisory Group on Greenhouse Gases, a small advisory body of highly-reputed international experts created by the World Meteorological Organization, the International Council for Science and the United Nations Environment Programme. This document was intended to make recommendations for the development of a climate convention, examining the related science and its implications for policy (Torrance 2006). The two meetings were held in Villach (Austria) and Bellagio (Italy) in 1987. In Bellagio, the 2°C emerged together with a 0.1°C temperature increase per decade as the maximum acceptable limit. According to anecdotic evidence, the targets were first debated at a dinner conversation and then formally discussed the following day (Tol 2007; Randalls 2010).

Hereafter the scientific rationale for the target was strengthened. In July 1988, the Advisory Group on Greenhouse Gases established three working groups, all coordinated by the Stockholm Environment Institute. In the report of the “Targets and Indicators of Climate Change” working group—chaired by scientists Pier Vellinga and Peter Gleick—it was specified that the choice of the targets “will be a product of the political process of negotiations”, arguing “that the present generation of assessment models makes the target-setting approach feasible for temperature and sea-level rise targets” (Rijsberman and Swart 1990, X). The temperature targets set then were 0.1°C increase per decade, and 1° or 2°C temperature targets, reflecting respectively a lower or higher risk of grave damage to ecosystems and non-linear responses. Later the target of a 0.1°C temperature increase per year faded away from the policy discussion, possibly because at decadal scales there is a greater natural variability, which makes this target less convincing in political practice (Tol 2007).

Around this time, the debate on quantitative maximum targets for global warming entered the political arena in some countries. Oppenheimer and Petsonk (2005) underline the interest of the Netherlands and the key role played by Vellinga (as Oppenheimer a participant of the Bellagio workshop) in informing policy about the impacts of climate change. The Netherlands was well placed for being influential in this early framing phase of the target: it had wide-ranging climate-change research (van Eijndhoven et al. 2001) together with dedicated political institutions (Interviewee 4, Interviewee 5). For instance, the National Institute for Public Health and the Environment issued the report “Concerns for Tomorrow” (RIVM 1988), the first environmental

survey discussing environmental problems at global national and local levels, while in the late 1980s it developed an innovative computer model for climate scenario-analysis called IMAGE (see Rotmans 1990), which is still employed today.

In 1989, Vellinga was assigned by the Dutch Ministry of the Environment to organize the Noordwijk Ministerial Conference, which was attended by 67 ministers of both developed and developing countries, along with representatives of 11 international organisations. This important political venue proved to be relevant for setting fundamental principles such as the notion of climate change as a common concern of humankind (Biermann 1997), and, following a Dutch proposal, the concept of “tolerable limits” of climate change. However, the conference was unable to reach an agreement on temperature limits. A step in this direction was possible in 1990 with the Second World Climate Conference, when the Dutch and Austrian delegations were decisive in supporting the idea of a long-term objective (Oppenheimer and Petsonk 2005).

A further step occurred in 1991, when Vellinga and Swart published “The Greenhouse Marathon: A Proposal for a Global Strategy”, in which the 2° value first appeared in a climate-change scientific context as clear-cut threshold (Cointe et al. 2011), and as a “means of normatively framing a target-based approach to global climate policy” (Mahony and Hulme 2012, 77). The article had a particular political significance as it proposed an advanced visual explanation based on traffic-light representation that supported the necessity of the 2°C as temperature limit. The essay stated, “In absolute terms we are in the red zone when the increase in global mean temperature is 2° or more above preindustrial levels” (Vellinga and Swart 1991, VII). The 2°C target was then authoritatively accredited, but it needed to be discussed further at the political level.

In 1992, article 2 of the climate convention stipulated that the convention’s “ultimate objective is the stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system” (UNFCCC 1992). The treaty did not, however, provide a numeric value. It is important to record that “negotiators finally agreed on a treaty language that combined elements of the Noordwijk and Second World Climate Conference statements” (Oppenheimer and Petsonk 2005, 203). Moreover, the long-term target approach was taken from the ones employed for the acid deposition and the water quality in the Rhine (the so-called “salmon back” project, see Swart and Vellinga 1994), both developed in northern Europe. These European traits are important marks of the increasingly important role played by European countries.

Shortly before the climate convention’s first conference of the parties in Berlin in 1995, the German Advisory Council on Global Change proposed an innovative approach to climate change mitigation based on temperature ranges and emission quotas. The so-called “Tolerable Windows

Approach” recommended to limit global-mean temperature rise to less than 2°C (WBGU 1995). Jaeger and Jaeger (2010) underline the importance of this German institution, especially of its later chairman Hans-Joachim Schellnhuber, in convincing the Minister of the Environment of Germany, Angela Merkel, about the relevance of the 2°C target.

During Merkel’s term as environment minister (1994-1998), the Council of the European Union sanctioned in 1996 that “given the serious risk of such an increase [in temperature] ... the Council believes that global average temperatures should not exceed 2 degree above pre-industrial level” (EU Council 1996). The limit was deduced from the evidence available at the time, mostly from impacts studies that were considered in the 1996 Intergovernmental Panel on Climate Change’s Second Assessment Report (Metz 2010). This political act can be considered the last and most relevant of the “framing” phase, as the 2°C target received recognition by a congregation of 15 European countries.

Regarding the 2°C target at its early stage of its political development, some important points should be emphasised.

First, some scholars evaluate the emergence of the target biased by value judgements meaning that scientists drew the line on what limit is considered dangerous (Metz 2010). The 2°C value falls into the consensus-estimate of 1.5-4.5°C for the so-called climate sensitivity, the equilibrium global mean surface temperature change following a doubling of the atmospheric CO₂ concentration relative to the pre-industrial concentration (van der Sluijs et al. 1998). The target was a suitable simplification for non-specialists as a much handier and understandable concept. However this scientific simplification was never proposed in absolute terms to policy. Related uncertainty was constantly stated. Equally the role of policymakers in deciding what is dangerous for society was always recognized. Still, in climate science “some form of value judgement is inevitable” (Gupta and Van Asselt, 2006, 84) as experts’ activity is “a hybrid activity that combines elements of scientific evidence and reasoning with large doses of social and political judgement” (Jasanoff 1990 page 229).

Second, the role played by a number of pioneering countries, notably the Netherlands and Germany, which promoted the target both in the scientific and political domain. The Netherlands made available scientists and experts for the target definition, together with crucial support by environmental ministers (Interviewee 6; Interviewee 7). Germany had embraced the 2°C scientific and political process slightly later (Interviewee 6; Interviewee 8), then it flexed its political muscles in the process with the involvement of top politicians and scientists.

Third, these pioneering countries also marked the prominence of Europe in giving stability and political substance to the target. This prominence can also be understood in comparison to the United States. Despite being at the forefront of scientific research, US policy was keen in stabilizing greenhouse gas concentration (Oppenheimer and Peterson 2005), but it was reticent (Randalls 2010) in accepting any target. Randalls explains that the United States favoured instead the rise of IPCC “as a means to prevent a, perceived, politically activist Advisory Group on Greenhouse Gases from advancing an agenda ahead of scientific and governmental review of climate change science” (Randalls 2010, 601).

Therefore a first instability at the political level emerged, with two powerful actors in the climate-process having different position: Europe strongly believing in the target-approach, and the US reluctant in engaging with it.

From a political view, it should be highlighted another instability attributable to the lack of debate among decision-makers on the implications of the target and how to implement it. From interviews and document analysis it can be inferred that the 2°C target materialised in Europe as an easy and useful guidance for policy, and that it was very smoothly accepted by EU policymakers. The absence of intense debate on the meaning and implications of the target is not to be interpreted as carelessness by policymakers, but it can be rather justified in terms of trust. Trust in matters of scientific assessment is particularly important (see Whyte and Crease 2010) as one non-specialist has to count on a specialist. In this phase trust played a crucial role as decision-makers did not ask for further scientific scrutiny, neither did they challenge the idea of a limit or its value (Interviewee 2; Interviewee 3; Interviewee 8). The ease in political decision was related to both to the quality of the dossier presented and to the comprehensibility of the proposal.

Trust might be attributed to opportunism of policymakers in placing responsibility for action onto the scientists (Grundmann 2006), or to misinterpretation by policymakers of the content of the 2°C target. Yet this was based on allegedly best-available science and got the positivist allure to be easily understood and consensually accepted. Decision-makers therefore accepted the level of risk assessed by scientists, translating it into the level of risk society would take, but without a thorough inquiry into its societal implications.

In sum, this first framing phase showed a 2°C target that was: science-driven (quantified as a possible target for climate change), EU-grounded (mainly driven by northern-European countries and experiences of policy making, with only marginal resistance by the United States), trust-based (easily accepted without further investigation by policymakers), but debate-defective (with a substantial lack of debate by decision-makers on the implication of the target in political and

effective terms). Different actors, including scientists, advisory bodies, policy-makers as well as national, and international bureaucrats, were involved, and many events took place to mark the institutionalization of the 2°C science/policy nexus. This early framing process that gave shape to the target, also highlighted peculiarities and incoherencies, interestingly offering insights for the analysis of the following phase.

4 THE CONSOLIDATION AND DIFFUSION PHASE (1997-2009)

The year 1997 was marked by the adoption of the Kyoto protocol in which prevailed the agreement on emission-reduction targets for industrialised countries over the short run. Besides the effort of the European Union for a long-term temperature target (Metz 2010), no evolution ensued in Kyoto in terms of political decisions. Since this time, the 2°C target almost disappeared from the main political scene. Ultimately the Protocol, a cornerstone of the entire climate-change regime, required great adjustment efforts to make it enter into force in 2005 (Oberthür and Ott 2010). In 2005, however, the 2°C target strongly came back in the political discourse through a dense sequence of events. In January 2005, a report by the International Climate Change Taskforce—an alliance of the Institute for Public Policy Research in the United Kingdom, the Center for American Progress in the United States and the Australia Institute—recommended “a long-term objective of preventing average global surface temperature from rising by more than 2°C” (ICCT 2005, 3). In February 2005, the Exeter Conference in preparation of the G8 summit (UK) explored temperature thresholds that could trigger irreversible catastrophic events. These scientific findings were collected in a book (Schellnhuber et al. 2006), in which the 2°C target was analysed, alongside other limits, and evaluated in terms of emissions pathways.

Few days after the Exeter Conference, the European Union Commission’s Communication remarked: “scientific evidence indicates that even meeting the 2°C target will require significant preventive and remedial adaptation efforts around the globe” (EU COM 2005). In March the European Union Presidency Conclusions stated: “The European Council [...] confirmed that, with a view to achieving the ultimate objective of the UNFCCC, the global annual mean surface temperature increase should not exceed 2°C above pre-industrial levels” (EU-Council 2005).

In mid 2005 occurred the 31st G8 in Gleneagles in which climate change was for the first time a relevant topic in the G8 agenda summit. In this venue also took place the first G8 Climate Change Roundtable—constituted in January at the World Economic Forum in Davos. Even if the 2°C was discussed, it was not mentioned in the summit final document (G8 2005) as it was instead

in the ‘Breaking the Climate Deadlock Initiative’ led by former Prime Minister Blair and presented at the G8 held in Japan in 2008 (Climate Group 2008).

Before the 2009 conference of the parties to the climate convention, three relevant events occurred. Firstly, the publication of a German Advisory Council on Global Change’s report (WBGU 2009) that provided a better scientific foundation of the target. This study proposed a new approach, called “budget approach”—from the calculated budget of carbon dioxide emissions still available worldwide—for countries’ commitments on the basis of global/national decarbonisation-trajectories to hold the 2°C line (Schellnhuber 2010).

Secondly, and thirdly, the declarations respectively by the G8 countries and by the Major Economies Forum on Energy and Climate (a space for dialogue of 17 largest economies, G8-countries plus Australia, Brazil, China, India, Indonesia, Korea, Mexico, Russia, South Africa), which recognized the scientific view that global temperature ought not to exceed 2°C (G8 2009; MEF 2009). These declarations are significant as they showed how the target found increasing international support and diffused beyond Europe, especially among some relevant developing countries.

The sequence of events in the 2005-2009 period underlines the increasing global acceptance of the target, and allows for some reflections on its political development.

First, Europe remained the main force behind its political consolidation, creating a strong linkage among international actors while giving impulse to the target’s acceptance. European countries organized the major international rallies of this phase and the EU political action remained visible in terms of declarations and outputs. The 2°C target was an already established strategic objective in the Europe Union, which tried to extend its idea of the target internationally.

Second, the target proved to be stable in the international scene: it held together a variety of different actors from the social, institutional, economical, and social domains, while keeping at the same time its significance and proposition. The political events outlining this phase, represented the strata to create a path-dependence that enforced the temperature limit in the international landscape. Here the path-dependence was made by a cascade of events and outcomes that progressively endorsed the “globalization” of the 2°C with consequent worldwide reverberation². The 2°C target in fact was able to catalyze interest and broader consent of decision-makers being easy, appealing and memorisable. Policy acknowledged the 2°C target being the most readable (and conveyable to the public) formulation, but also “the vaguest and the least directly binding” (Cointe et al. 2011, 1). In this vein, it should be stressed that the “consolidation and diffusion phase” often occurred under the impulse of political leaders—concurrently to a growing attention by public opinion (Death

² See Boykoff (2011); Cointe et al. (2010) specifically the figure number 6 at page 19 and related analysis.

2011). This impulse was functional to grant extended legitimacy to the target, although wrapped with sufficient vagueness to avoid the perils of policy implications.

Consolidation and diffusion ensued through “eventification”, that is, the organization of prestigious meetings that gave spotlight and emphasis to the target through statements and announcements, creating further path-dependency for the future. But here is the point: the lack of a thorough debate among the involved policymakers on the political and practical implications of 2°C still persisted in this phase, although the 2005-9 period was characterized by a great activity of consensus-seeking and consensus-making, and by the drifts-alignment of top decision-makers.

The 2°C target then succeeded in being accepted and approved in different contexts and in particular in most relevant economic forums, yet without the evaluation of its economic consequences. However, approval and consensus remained at the surface. Events were filled with rhetoric which gave shine and prestige to the target while making it more elusive. Despite these facts, the lack of debate accompanying the target is problematic to assess, and casts a shade of doubt on the real sedimentation of the 2°C target in policy on a deeper level i.e. implications, implementation measures, coordination strategy. What seems plausible is that the opportunism of policy-makers, or their misinterpretation of scientific content, highlighted in the first phase, persisted even in this phase: the 2°C continued to be regarded as a prescription by science to which society had to adapt, but without considering how. Even if one accepts this explanation, it is difficult to understand the lack of reactivity of policy in engaging in a discussion with concrete proposals. It can be advanced that in that period, because of events like the non-ratification of the Kyoto protocol by the United States government, the main actors supporting the 2°C aimed at building the largest consensus around the target, then avoiding any possible reasons for discord.

In sum, the period of 1997-2005 marked the consolidation and diffusion of the 2°C target, with Europe remaining at the forefront but now accompanied by the endorsement of other relevant states. Some inconsistencies persisted in this phase, and policymakers still avoided engaging in a debate on the implications of the targets and possible actions for its implementation. However, the idea that the target was ready for approval at the highest international political level had been finally established.

5 THE ADOPTION PHASE (2009-2010)

This phase encompasses the 15th and 16th conference of the parties to the climate convention in Copenhagen (2009) and Cancun (2010), in which the target was respectively adopted (Decision 2/CP.15, UNFCCC 2009) and ratified (Decision 1/CP.16, UNFCCC 2010).

Because in terms of the 2°C target the Cancun Accord was a translation of the Copenhagen Accord into the climate convention text, the paper will focus on the conference in Copenhagen being more relevant for investigating the factors that shaped the target's final outcome.

At Copenhagen the target had a favourable start. In the opening ceremony a high number of relevant countries³ explicitly declared their support for an agreement that would include it. The target was formally adopted on the final day with the accord of 141 countries. This snapshot might picture a diplomatic success, but for the target was instead a “tragic triumph” (Schellnhuber 2010) as problems and instabilities had emerged before and during the conference.

In the preparation of the conference, the two climate convention's Ad-Hoc Working Groups met five-times, but no advancement was made in terms of agreements (Bodansky 2011). The lack of progress in the last preparatory meeting in November 2009 made negotiators discouraged the idea of a binding agreement (Dimitrov 2010). Negotiations in Copenhagen were predictably slow and the impossibility to associate the 2°C target to any obligations was confirmed, showing the difficulties to find tangible measures to implement the target. For the same reason no global-emissions reduction was specified, nor a timeline defined, depriving the target of specific context and instruments for its concrete achievement. Many scholars (e.g. Christoff 2010, Hulme 2010; Bodansky et al. 2011) attribute the lack of such a solution to the difficulties in offsetting differences among some member states. In particular the United States and China—world's largest greenhouse gas emitters, and sizeable representatives of a developed and a developing country—remained uncooperative and substantially stuck in their position over who should bear the burden of actions for complying with the 2°C target (Barresi 2011, Hare et al. 2011).

On the other side, the European Union made a great effort to make the Copenhagen conference a turning point in climate governance, while extending its own vision of 2°C as an accepted global climate-system boundary. As previously in this paper, the European Union hence remained the main force around the 2°C target being internationally recognized; it “succeeded in

³ Notably Australia for the Umbrella Group (formed by Australia, New Zealand, Iceland, Russian Federation, Japan, Norway, Ukraine, Canada and the US), Switzerland for the Environmental Integrity Group (formed by Mexico, Republic of Korea and Switzerland), Sweden for the EU (formed by 27 countries).

getting all relevant partners in the negotiations—including even China and the United States—to commit to the two-degree target” (Geden 2010, 2). Nonetheless, Europe entered the negotiations with a firm idea of the target (Haug and Berkhout 2010) and it was unable to shape the course of events. In fact, the United States confirmed to be uncomfortable with legally binding accords (Hare et al. 2011) that could represent a menace to its wealth and economic structure. At the same time, China, Brazil, South Africa, and many other developing countries were focused to their economic growth (see Christoff 2010). This competing-interests scenario, favoured instead a cross-veto attitude, mutual distrust or at least great caution among the parties. It resulted therefore impossible to create a shared understanding on specific political solutions and coordinated measures to comply with the target.

This leads to a substantial reflection about the target. After two phases, here called “framing” and “consolidation and diffusion”, characterized by a absence of debate about the implications and measures for the 2°C target, finally this debate opened up at the United Nations level. Having not been debated in depth by policymakers, declarations that characterized the target (particularly in the “consolidation and diffusion” phase, up to the opening statements of the conference) crashed against the mosaic of interests and diverging worldviews. We can abridge that the target was thriving when no debate was evident, but it became weak in its meaning when a debate on possible implementation especially among so many players, ensued.

This result can be attributed to the dense concentration of strong decision-making power (almost 120 state leaders) attending the conference (Dimitrov 2010), and by the contextual great media coverage (see Boykoff 2011⁴) and high public expectations. At the beginning of the conference, the presence of heads of state and ministers was seen by negotiators as an unlocking factor of previous consultations, and by the general public a guarantee that something important was about to happen. As the debate went on, the “superstar effect” generated eagerness first, then anxiety for the risk of a clamorous political failure. Such an impelling necessity pushed a restricted number of top policymakers to save their face and bring home a “political something” or rather any pompous, but substantially harmless, result that would have been acceptable. Therefore “pens in hand, 25 prime ministers and presidents began crafting a declaration themselves” (Dimitrov’s 2010, 20). Besides the difficulties, and without a genuine overall consensus, a twelve-paragraphs political accord was reached, but merely noted rather than adopted (Christoff 2010; Eckersley 2010).

The state-leaders’ bold involvement was particularly relevant for the 2°C target as its function and nature radically changed. The hasty accord transformed the target into a “last resort” since the digit was the only element on which consensus was met as long as no measures or

⁴ In particular diagrams at pages: 25/6/7, 38, 90, 110.

prescriptions were attached to it. With the impending need for a result and the public expectations for a tipping-point after Kyoto, the best possible result was a target built in vagueness, purposely formulated with constructed ambiguity and in sufficiently generic terms that everybody could agree upon. This gave form—rather than substance—to the 2°C target, which was agreed to in principle, but with no indications for being operationalised and implemented, as also confirmed by the conference of parties in Cancun (2010) that ratified the content of the Copenhagen accord.

In sum, this phase was characterized by the reduced influence of Europe, the emergence of new political powers, the opening-up of the debate over the consequences of the target, and the burdensome presence of political leaders. These elements favoured a target that was symbolic but downgraded in effectiveness. Nonetheless the target proved to be resilient and survived becoming the answer to article 2 of the climate convention. The target was then successful in reaching the common goal, but political circumstances were not favourable for defining common and coordinated actions.

6 THE DISEMBEDDNESS PHASE (since 2011)

The Copenhagen and Cancun accord made the 2°C target affirmed in the international arena. The conferences of the parties of the climate convention that followed—Durban, (2011), Doha (2012), Warsaw (2013)—revived the international negotiations; however in terms of 2°C they did not lead to more ambitious policy responses (Blok et al. 2012), nor they provided substantial addition to the 2°C target in terms of fulfilment (see Bodansky and Diringer 2014). Neither were negotiating parties able to propose a common climate agenda, despite planning to do so as wished in the Bali Action Plan⁵ in 2007 that would bring to an implementation phase.

The 2°C target is therefore a stable and solidified element but with no mobilizing role in climate governance at all encompassing level, outlining then a new phase that we define “suspension phase”. This phase is characterized by lack of changes or specifications to make the 2°C target more effective, and by the inability to compel near-term political action (Lenton 2011a). The target continues to fulfil a symbolic and declarative function, but it does not provide political guidance for the problem-solving process (Geden 2013). Borrowing from the neologism “disembedded” coined by Polany (2001, 1944)⁶ as opposite to the adjective embedded, we argue

⁵ “a shared vision for long-term cooperative action, including a long-term global goal for emission reductions, to achieve the ultimate objective of the Convention” (Decision 1/CP.13 in FCCC/CP/2007/6/Add.1).

⁶ The terms disembedded was developed in social terms by Giddens (1990).

that the 2°C target had become a “disembedded” object: officially a global goal, but without established methods for its successful implementation, the target is politically inert and unable to promote the political effectiveness for staying within the agreed temperature-limit. In fact, no major economy has significantly changed its emission reduction pledge (see Höhne and den Elzen 2013)—which are at a worldwide level not consistent with the 2°C target (UNEP 2013; Sanford et al. 2014).

That the 2°C is a disembedded object is indirectly confirmed by some academic and political positions that invoke a revision, a reinterpretation, a replacement, or a removal of the target from the international climate discussions (see Geden and Beck 2014; Jordan et al. 2013; Knopf et al. 2012). These positions witness how the target, in its current state, needs stronger links, renewed commitments, and a more robust entrenchment in international environmental governance in order to be purposefully achieved.

In our view the disembedded state in which the 2°C target lays can be explained from the points of view of: a) science and policy; b) governance; and c) global governance.

In terms of science and policy, temperature is a concept ideal to connect scientists, policymakers and the general public. However the 2°C target, a global value for all, is difficult to be associated with national or local compliance programme, as temperature is a local variable that varies significantly over space and other variables (see Thornton et al. 2014). Moreover, temperature is both a cause and a consequence of environmental change, and is related to other critical thresholds in the earth system of which there is no indication in the current configuration of the target. For instance it lacks the interlinkage with an array of country/local sub-targets (Philibert and Pershing 2001), or targets at planetary scale like the nine interrelated biogeochemical planetary boundaries (Rockström et al. 2009). Finally the 2°C target is not correlated with social, economic indicators. All these elements dampen policymakers’ engagement to the target, which result not easily translatable in agency and action, and is not easily appropriable by policy.

In terms of governance, the current absence of a shared agenda for implementing the 2°C target, and the lack of connected mitigation programmes, inevitably disaggregates countries’ actions making the global effort to stay with the 2°C-limit inconsistent (Raupach et al. 2014). Although some countries have independently nominated their climate goals (Roelfsema et al. 2014), currently it is not in place an institutional mechanism that defines, sets and verifies national or regional contributions to stay within the 2°C (see Friedlingstein et al. 2014, Raupach et al. 2014). Therefore the common goal defined by the target remains expressed in global terms but difficult to operationalise globally and fine-tune locally as currently different national capacities and priorities are not taken into account. In addition, in the current frame of the 2°C target, the involvement of

society is still limited, and transition and transformational change of society are little taken into account (see Wise et al. 2014; Park et al. 2012). In fact, even if commendable initiatives have been launched (see Blok et al. 2012), and although voluntary arrangements like the International Cooperative Initiatives acknowledged by the Durban Platform for Enhanced Action show great potential (see Widerberg and Pattberg 2014), these projects are still not representative of a true engagement of society as a whole to reach the target globally, while the range of stakeholders involved remains marginal.

In terms of international governance, the 2°C target poses problems of coordination among institutions. The role of international organizations is unclear. It is also not clear if one of them would be in a position of leadership to stimulate nations to comply with the 2°C limit. In an extremely fragmented global environmental policy (Biermann et al. 2009) with organizations having different aims, approaches and structures, the 2°C target proves difficult to be governed in a global architecture that does not clarify roles and functions for achieving it. Moreover, in the current state of the target, it is not envisaged a monitoring mechanism that allows to track the changes to stay within the 2°C limit while reporting the effective performance of the progresses achieved.

In sum, after a sequence of phases (figure 2), the 2°C target results a powerful and evocative reference for climate policy to which countries may confront respective efforts independently, but it remains incapable of promoting effective coordination among relevant actors. A global mean temperature results a too vague attribution to make the target a focal point for policy intervention at different levels therefore, in the current state, the 2°C target results a disembedded object, too weak and isolated to give strength and direction to those coordinated actions to contrast the climate consequences it was thought for.

8 OUT OF DISEMBEDDNESS

Any effective implementation of the 2°C target should require overcoming the state of disembeddness in which it lays, unless it is abandoned as target, or if policymakers decide to leave the current state unaltered at the international level. In particular it seems necessary to address the weaknesses previously identified: a) the science and policy dimension, which asks for interlinkages with other relevant targets in the environmental and human domains; b) the governance dimension, which requires the fine tuning of the global temperature target within different scales of governance

while enlarging the range of stakeholders involved; c) the global governance dimension, which suggests adjustments in the institutional architecture and a monitoring and reporting system on the achievements in terms of 2°C target.

In order to address these challenges this paper considers the approach proposed by Young et al. (2014) for the Sustainable Development Goals. This approach is equally suitable for the 2°C target and can be used for creating a consistent and effective framework to implement the target within an earth system governance perspective.

Young et al. (2014) envisage a multi-layered approach encompassing four tiers: i) global goals that safeguard the human needs and earth life support systems; ii) individual goals and targets framed in such a way that they can serve as focal points for a wide range of stakeholders; iii) targets framed in global terms but—where possible and relevant—tailored at regional, national, local, or corporate/organizational levels; iv) define indicators and promote monitoring capabilities with the capacity to track change and report on progress.

This approach, if applied to the 2°C target, would have several implications.

First, it would frame the temperature target within a wide system of global goals of the human and natural systems. Here we define goals as nonoperational overarching objectives that require the employment of interrelated targets and indicators to be achieved. For the 2°C target it would imply to be related to anthropogenic drivers, earth transformation indicators, environmental and human development targets etc. that affect and are affected by temperature increases up to the 2°C limit. In fact “in the interlinked social and ecological systems of planet earth, nothing remains independent, and complexities and interconnections abound” (Biermann 2012, 7). Therefore a systemic and comprehensive framework of interlinked targets and indicators would make the 2°C target more meaningful and coherent with the operational context in which it should be accomplished.

Second, the multi-layered approach by Young et al. (2014) would allow considering horizontal and vertical interactions while bridging levels of governance from global to local (Biermann and Pattberg, 2012). The entrenchment of global commitments with national/sub national priorities and actions would also foster knowledge production/transfer while helping to identify new policy options. In this way it would be promoted that coordination and convergence of measures that is currently lacking to the 2°C target. The coherent governance that derives should facilitate achieving the 2°C more efficiently on the basis of the capabilities of each country. At the same time this approach would foster participation and support as the target can become a focal for multiple and interacting actors, network and institutions. In this way government, international bureaucracies, non-governmental organization, civil societies, action networks and the private sector would be

collectively involved in actions for staying within the 2°C boundary. Through this it would be overcome the inherent normative logic of the 2°C target, and adaptation to climate change would be conceptualised as an element of pathways of interacting global changes and societal responses (see Wise et. Al. 2014).

Third, the approach by Young et al. (2014) can be employed to coherently adjust and enforce the global-governance architecture in a way to define comprehensive international programs, institutional arrangements and practical commitments to comply with the 2°C target. In these terms it would bridged the gap among sectoral silos by formulating the temperature target within crosscutting programmes while promoting a better articulation and integration in international governance. To complement and enforce these achievements it is necessary to devise effective procedures to track progress. A shared and institutionalised process of performance review should monitor advancements and provide indications for corrections or prescriptions to act in accordance with the 2°C.

This approach by Young et al. (2014) , is inherently political as it requires the approval and decision by policymakers. However if the 2°C target is opportunely framed within this scheme, it could become an “earth system governance target” that we define as a critical node to address multiple issues, and a pivotal element able to steer institutions at local and global level toward the desired outcomes of mitigating and adapting to the earth system. A target so conceived can be coherently connectable with other significant targets, promote coordination among different actors, and foster effectiveness in the measures against environmental transformations. Through this it could become a linchpin in global environmental governance.

This view, if viable, has to be elaborated further, refined, negotiated and agreed by main actors chiefly by international decision-makers. Unfortunately, as the 2°C target evolution showed, negotiation can be extremely slow and prolonged, but, in a hotter and hotter climate, time is running short to stay within the 2°C limit.

8 CONCLUSIONS

The reconstructed long history of the 2°C target presented in this paper has highlighted some traits and features that characterised its political dynamic (summarized in figure 1).

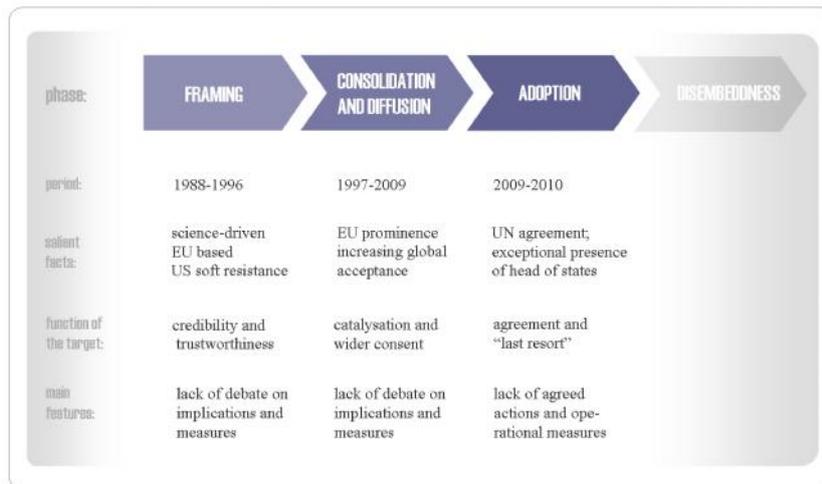


Figure 1: summary of 2C°-target's first three phases

In the early phase, the target was science-driven, EU-based—promoted by group of northern European countries, and with soft resistance by the United States. The prominence of Europe persisted in the following phase, gaining, since 2005, the support of a larger number of countries, through a path-dependence of events, here called “eventification”, that consolidated the target in the international arena. The adoption at the highest international level occurred at conference of parties of the climate convention in Copenhagen (2009), which was characterized by an unprecedented number of head of states.

During the phases the target served policy with different functions and within different contexts. In the first phase, the target was a credible and trustable element in the science-policy interface, then turned to be a catalytic factor around which to build consent, to finally become a “last resort” element in the Copenhagen accord because of the state-leaders’ bold intervention to get an outcome from the conference.

Among government and international decision-makers, a thorough political debate on engaging effectively with the target lacked in the first two phases; when this debate finally emerged in Copenhagen, it became evident that far-reaching commitments to stay within the limit were impossible to agree on.

The *reductio ad unum*, reducing a complex issue to a single element, which characterized the history of the 2°C target, was produced by events and circumstances. As every simplification, it brought ease in acceptance and difficulties in fulfilment. The selection of an absolute target with no articulation and shared global and local actions attached to it had transformed the 2°C target into a disembedded object. Yet, this condition can be changed if countries boldly decide to act and foster a

courageous agenda, making the target a meaningful reference for policy outcomes. “Catalyzing Actions”, the tagline that accompanied the title of the Climate summit 2014, are needed to make the 2°C more tangible and practical, but within a conceptual framework that facilitates real and global commitments. This paper analysed as possible framework the one proposed by Young et al. (2014), within the research field of earth system governance. If this scheme is applied in its main principles, it could bring far reaching results to the 2°C target in terms of implementation while overcoming its disembodied state.

Future research should support policymakers in defining and agreeing on such a framework—or any comparable one—in a way they can accomplishing their mandate more effectively. However, one open question is how long and how successfully the international community will be able to agree on such a framework? And from this other questions might ensue. If framework like the here considered is chosen (or any other suitable one), what will be the design setting for the 2°C and other targets that will be easy to be defined while keeping ambitions high? And what adjustments to the global environmental governance architecture will be the most feasible and energising for this purpose?

If these questions remain unanswered, the 2°C runs the risk to populate the crowded cemetery of unaccomplished targets, and possibly with them, our hopes to avoid catastrophic climate changes we might have been able to prevent.

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9 APPENDIX

This paper was supplemented by data collected through 10 in-depth, interviews with, in alphabetical order: Marcel Berk (The Netherlands Ministry of Infrastructure and the Environment), Kornelis Blok (Ecofys; University of Utrecht), Michel Den Elzen, (PBL - The Netherlands Environmental Assessment Agency), Niklas Höhne (Ecofys), Jip Lenstra (ECN - Netherlands Energy Research Centre), Henk Merkus (Dutch Ministry of Infrastructure and the Environment), Leo Mayer (PBL – The Netherlands Environmental Assessment Agency), Bert Metz (European Climate Foundation), Robert Swart (Wageningen University and Research Centre), Pier Vellinga (VU University Amsterdam; Wageningen University and Research Centre). All the interviews, except one, were conducted by the one of the authors (PM) in August 2012. Eight out of ten interviews was vis-à-vis, while the remaining interviews were conducted over the phone.

The interview format was based on a interview protocol structured on 12 main questions (with some sub-question in function of the question), identical for each interviewers.

A given interview ranged from 1 hour to 1 hour and 15 minutes. The conversations were recorded (with permission of the interviewees), and transcribed verbatim.