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# Transitions through numbers? A critical inquiry into superior numeric targets in climate and energy policymaking

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A B S T R A C T

Policy discourses regarding sustainability transitions intersect with a host of quantitative targets, articulated to guide efforts to achieve such transitions. This paper analyses 'superior numeric targets' in climate and energy policy; overarching, quantified articulations of missions for sustainability transitions. We use interviews and political documents to investigate how policymakers in Norway have established and enacted two superior numeric targets; one articulates the need to dramatically reduce greenhouse gas emissions, the second presents a quite ambitious measure to improve the energy efficiency of all buildings. Thus, we study cases of numeric governance of sustainability transitions, combining perspectives from sustainability transitions and quantification studies. We identify two distinct, but related, target biographies. The first target was successfully framed, consolidated, and accepted through a co-production of science and politics. However, the presumed final stage of target biographies – the embedding of the target – was only partially achieved. Relevant actors inside the government were mobilised but not so much actors on the outside, which may explain Norway's failure to substantially reduce greenhouse gas emissions. The second target met with resistance due to scepticism and a lack of enthusiasm from actors within the government administration who questioned its scientific basis. Thus, it and was neither accepted nor embedded. In this manner, the paper shows that numeric governance is less straightforward than quantification scholars suggest but also that such inquiries are needed to understand both the potential and the limitations of numeric governance of missions of sustainability transitions.

## 1. Introduction

Policy discourse around sustainability transitions intersects with a host of goals and quantitative targets, which act to guide efforts in achieving such transitions [1–3]. There is a hierarchy of policy objectives, where some are overarching, and others are their derivatives. To differentiate between these two tiers, Parris and Kates [4] usefully distinguish between 'goals', which are "broad, qualitative, statements about objectives"; and more quantitative 'targets', which serve to make goals specific with endpoints and timetables (p. 8068). Morseletto et al. [5] define a 'target' as a meaningful reference value: expressing a desired operational policy outcome in a synthetic, often numerical, manner; meanwhile, the related concept 'goal' is a non-operational, overarching objective that usually requires targets for execution (p. 657). While the use of the terms 'goal' and 'target' may not always be rigorous, they do have different meanings.

The quantitative sub-targets developed and intended for concrete policymaking are formulated from what we call "superior targets". In this paper, we study two such superior targets within Norwegian climate and energy policy: the first is quite broad, referring to the amount of greenhouse gas emissions to be reduced within a given timeframe; meanwhile, the second is more specific, relating to the degree of improvement in the energy efficiency of buildings. Of course, the two targets are not independent, but as we shall see, their relationship is discursive rather than quantified.

We start with the following research question: how are superior targets within climate and energy policy established, and how are they enacted and considered by policymakers? According to international agreements, the two superior targets we study are in principle devices used to orchestrate climate change mitigation and include the shaping of sub-targets and policy instruments. We intend to contribute to the study of governance as it relates to sustainability transitions, mainly in clarifying what is involved when such governance is based on quantification, including what limits the effectiveness of superior targets. In order to understand their dynamics, we explore the paths of the two chosen numeric targets in the climate and energy field. We use this exploration to analyse how policymakers manage the numeric targets and, in turn, how their influence impacts relevant sustainability transition efforts.

The research site of this paper is Norway, yet we consider the findings relevant outside the Norwegian borders, given the role superior targets play in international and national climate and energy policy.

In 2015, nearly every country in the world signed onto the Paris Agreement, pledging to limit global warming in a legally binding, international treaty on climate change [6]. The signees agreed to keep

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global warming well below a 2 °C increase, preferably 1.5 °C, when compared with the pre-industrial levels of 1850. National targets, such as the Nationally Determined Contributions (NDCs) submitted by countries under the Paris Agreement may be effective to achieving a global goal such as limiting global warming. The making of such superior national targets is expected to result in further action, such as the articulation and implementation of new sub-targets. However, we need to study the dynamics of setting and implementing sub-targets to understand the role of numeric governance through superior targets in sustainability transitions.

The global goal of climate change mitigation was upheld at the UN Climate Change Conference in Glasgow in 2021, where world leaders gathered to discuss how to limit global warming to 1.5 °C. For the first time, nations have been called upon to accelerate efforts towards the phasing down of unabated coal power and phasing out inefficient fossil fuel subsidies. A quantitative outcome of the pact was recognising that carbon dioxide emissions must be reduced by 45 % by 2030, compared to 2010 levels [7], to be successful.

As a signatory of the Paris Agreement and UN climate convention, Norway is committed to reducing emissions and strengthening sustainability measures in order to limit the average increase in global temperature. This paper uses interviews and political documents to investigate how policymakers in Norway establish and enact superior numeric targets with respect to climate and energy issues. The category of policymakers includes Members of Parliament (MPs), but also experts working in relevant ministries and government agencies. They provide policy suggestions and consequence assessments in their formal role as advisors to politicians, so their inclusion is relevant, even if they do not actively decide policies.

The two superior national targets we analyse have different scopes. The first that aims at reduced greenhouse gas emissions is wide-ranging, the other, to improve the energy efficiency of buildings, is more specific. Although the latter could be seen as a response to the former, their establishment was not closely linked, since the policy concern for energy efficiency in Norway emerged already in the 1970s, prior to the emissions target [8]. Thus, we analyse their establishment separately. Similar superior targets can be found in many other countries. Still, the processes of making and applying them may be easier to observe among policymakers in the small, reasonably transparent government of Norway.

We have chosen to analyse the making of the two superior targets as biographies in order to emphasise the temporal aspects of the involved policy practices since the targets have a history that we believe relevant to explore. We take inspiration from Hyysalo et al. [9], who outline a comprehensive method for studying the biographies of artefacts and practices. Their conclusions highlight the advantages of using multi-sited [10], diachronic investigations to clarify the social shaping processes involved and their temporality, the least of which being applications and users. In the case of our two superior targets of study, the Norwegian climate and energy policymaking community plays a dual role. It is involved both in the setting of the targets and their enactment. Both targets have emerged over time, and the community operates through multiple, interconnected sites.

We expect the biography of superior numeric targets to be complex. We learn from Morseletto et al. [5] and Randalls [11], that the original 2 °C target for global climate change mitigation was the outcome of a range of events, circumstances, and actors over a long period of time; it emanated from scientific efforts regarding climate sensitivity, but it increasingly became an object of international politics. The target was stabilised through a complex web of coproduction of science and politics [12,13]. These studies relating to previous targets are useful as points of departure for our analysis, in particular, the finding of Morseletto and collaborators who describe the construction of the 2 °C target as proceeding through four stages: *framing*, *consolidation and diffusion*, *adoption*, and *disembeddedness* [5]. These may be seen as four possible stages in the biography of a superior numeric target. Scholars who have previously studied the climate targets of the EU have also found them to be the outcome of a long-term, hybrid, and largely political processes that have shaped their dynamic journeys (e.g., [14–16]).

In the *framing* stage, targets are considered science-driven and regionally located. *Consolidation and diffusion* happen through national or international agreements when a superior target is able to catalyse interest and the broad consent of decision-makers through being easy, generally appealing, and memorable. The third phase, *adoption*, happens when, as the name suggests, a superior target is adopted politically. The fourth stage, the *disembeddedness* of the target, is a state described by Morseletto and collaborators as officially recognised, but without any established method for a successful implementation. With regard to the fourth phase, we alternatively consider the possibility that it can be a phase of *embedment* in the sense that the target was followed up with implementation measures.

When we analyse the target biographies, we will study whether they follow such a four-stage development. Furthermore, we will pursue research questions related to the dynamics of sustainability transitions through numeric governance, with regard to climate and energy issues. In the next section, we introduce some theoretical perspectives that may be fruitful for such analyses.

## 2. Governing sustainability transitions by numbers

Despite the increasing interest in researching governance in sustainability transitions [17,18], the focus has mainly been on governance systems, regimes, or innovations [19–21]. From the widely used multi-level perspective, it is unclear what role government has regarding superior numeric targets. In the paper, we ask whether the targets originated in the landscape to provide changes in the regime, or if they just were made within the regime level. Further, we study the potential of such targets to lead to radical change. In this manner, we aim to contribute to the understanding of numeric governance of sustainability transitions.

The issue of which change strategy to use, radical versus small-step or mundane, invites reflections upon the promises of the latter form [22]. We consider the use of superior numeric targets in climate and energy policy as a well-established government practice, and in that sense "mundane". However, the effects may turn out to be quite radical. For example, superior numeric targets may be points of departure for what recent policy discourses label "missions" [23,24]. Missions are not just calls for innovation, but also for broad mobilisation of actors to achieve the intended changes. Superior numeric targets involve, as we shall see, the intent to mobilise broadly towards their enactment. However, we inquire whether the targets we analyse lead to broad mobilisation in practice.

The study of sustainability transitions can benefit from the inclusion of perspectives from quantification studies, through noticing the pervasive role of calculative practices in modern political culture [25]. Thus, 'governing by numbers' and quantifying the effects of governance are vital areas of study [26–28]. Demortain argues that one of the most frequent claims in quantification studies is that "numbers are a technology of governance and that one may govern by numbers" ([29] p. 974). To evaluate this claim, we study how governance by numbers is enacted.

Quantitative targets direct governance and are required for the assessment of achievements to reach aims, such as in the case of sustainability transitions in climate and energy. Measurements and calculations are included in many governance issues and practice [27,30] and: "[c]alculative practices should be analysed … as the mechanisms through which programmes of government are articulated and made operable" ([26] p. 379). A particularly important mechanism is the setting of numeric targets: they are a precondition for measuring achievements, which is a cornerstone of New Public Management practices [31]. Studying how such targets are established and enacted provides important insights into the governance of sustainability

transitions; in effect, this means giving attention to efforts of collective mobilisation capabilities rather than to a Foucauldian emphasis on the *governmentality* of numeric targets. Furthermore, this perspective emphasises the need to study the importance of political coalition-building in the making of targets [29].

As suggested by Morseletto et al. [5] in their study of the case of the 2 °C global warming objective, superior numeric targets may not primarily be the outcome of scientific calculations – although science may play a significant role. We assume that politics will be important, and here, we draw on Jasanoff [32] and her idiom of the co-production of knowledge and politics: designating a process through which both science and political governance are ordered and stabilised. Thus, we study the establishment of the two superior numeric targets as co-productions, but with an open mind regarding the relative importance of scientific and political action in the processes as a strictly empirical issue. We apply a constructivist approach, in the sense that we examine how targets are made and used by involved actors.

The two superior targets we study are recognised parts of promissory policy discourses related to global warming. If the targets are reached, they would help mitigate climate change, which may be an important aspect of their stabilisation. At the same time, they are potentially ordering devices that may shape the related discourses. It is clear from recent Norwegian policy documents that the government has established a comprehensive accounting apparatus to oversee and govern sustainability transitions related to climate and energy [33,34]. The role of accounting practices, based on indicators and other metrics, is central in studies of numeric governance [30,35]. We analyse whether or not our two superior targets of study function as ordering devices, and if so, whether those devices are recognised by policymakers.

Through such considerations of quantitative targets, policymakers may also notice other features. For example, Rottenburg and Merry [31] claim that quantitative representations have become the most robust way of making arguments appear objective. Moreover, it is argued that numbers provide trust, allow for comparability [36,37], and facilitate auditing [35]. Therefore, superior quantitative targets may help to increase the transparency of political processes and democratic involvement [29]. However, this is an empirical issue.

The aim of this paper is to analyse the construction and enactment of two superior numeric targets concerning sustainability transitions. We discuss if their construction follows a trajectory similar to the four-stage model of Morseletto et al. [5] and if their enactments have led to broad mobilisation where the targets represent what Mazzucato [23] call missions. Above, we have briefly reviewed sustainability transitions studies and quantification studies in the area of governance. The paper intends to fill a gap in both fields. Increasingly, sustainability transitions studies have become concerned with governance [17,18] but have given less attention to numeric governance which has been a concern of quantification studies. However, the latter strand of research has shown less concern for the processes of enacting numeric targets, which we study in this paper.

## 3. Methods

We chose a qualitative approach combining document analysis and interviews to respond to the research questions. Data collection was designed to answer our research questions: how Norwegian climate and energy policymakers consider superior quantitative targets; and how they account for their articulation and enactment. With respect to the superior target to reduce greenhouse gas emissions, we studied relevant documents published after the 2008 "climate compromise" in the Norwegian Parliament [38]: the white papers in particular, and a review of the policy options with respect to climate change mitigation [34]. In addition, we explored the superior target to improve the energy efficiency of buildings using the energy policy documents from the "Arnstad Commission" report [39] where the target of a 10 TWh reduction of annual energy consumption in buildings first appeared.

The first author interviewed a group of policy actors that well represent policymakers in the Norwegian climate and energy context. She conducted 21 semi-structured, in-depth interviews. Twelve of the interviewees worked in relevant ministries or government agencies; six were Members of Parliament (MP) and had seats in the Standing Committee of Energy and the Environment, one of which also had been a Minister of Oil and Energy. The committee has a total of seventeen seats, meaning the author interviewed nearly one-third of the committee. The three remaining interviewees were political advisors to MPs. The interviewees were asked about the kind of knowledge they considered to have the most impact and be the most persuasive; they were also asked for their opinions of superior quantitative targets. We consider all the interviewed experts from the ministries and the government agencies as policymakers; these experts provide policy suggestions and consequence assessments in their formal roles as advisors to politicians, even if they do not directly decide policies.

The interviews took place between June 2016 and February 2018. Fifteen interviews were conducted in person for 45–90 min; the remaining six were conducted by telephone, with call times ranging from 25 to 45 min. All interviews were recorded and later transcribed verbatim. The quotes used in this paper have been translated into English by the authors. All interviewees have been anonymised and referred to by abbreviations; Members of Parliament are designated MP1-MP6, political advisors PA1-PA3, employees in ministries M1-M3, and those working in directorates, agencies, and municipalities D1-D9.

We consider the interviewees to be competent in their positions as politicians, advisors, and civil servants, and thus, to be experts [40,41]. It is possible that experts will view researchers as potential critics, and thus be unwilling to share much information [40]; however, in our study, it was easy to establish rapport with the interviewees who eagerly shared information and their points of view. In general, the political culture in Norway encourages openness, and the topic of our research was considered important. The responses may have been strategic in their emphasis and filtered for reasons of appearance. However, given the diversity of the interviewees in terms of position, political party, and the high degree of consistency in the responses we consider the information to be reasonably comprehensive and trustworthy.

We analysed the interview data drawing inspiration from grounded theory using the *open coding* method. Our first step was to code everything we considered relevant in the transcripts. The second step made use of *axial coding* to identify the relationships between the open codes. In this way, we were able to identify categorical patterns in the data, i.e., 'the origin of numbers' or 'the enactment of numbers'. These categories served as the basis for further analysis, coupled with the developed, theoretical concepts. We have therefore used an abductive approach [42]. The selected documents were examined to observe how the superior quantitative targets were established and articulated, and how they were linked to other targets, indicators, and calculations. In the analysis, we focused mainly on the timelines of important events, in order to pursue a biographical approach. Despite writing about several distinct steps of analysis, the actual process was more complex. The writing process in practice involved a lot of going back and forth between the data, theoretical concepts, and analysis. Thus, we have followed a practice that is quite common in qualitative social science research [43].

We believe our findings to be robust and have tried to make the analysis transparent in the text through quoting directly from interviews and documents. Social science climate and energy research offers many possibilities regarding framing and methods [44]. This paper might have benefitted from including an analysis of relevant debates in the Parliament, which could have allowed for checking and extending the findings from the interviews. Yet, time and resources were limited and for this paper, we chose to interview and to study documents.

In the next section, we discuss how the interviewees in general talked about numbers as expressions of political targets. We then turn to the focus of this article, the biographies of our two superior targets: reducing

greenhouse gas emissions and improving the energy efficiency of buildings. Finally, we draw our conclusions.

## 4. Results and discussion

### 4.1. Governance by number: policymakers' assessments

The state's systematic collection of information has been emphasised in quantification studies, which provides a basis for bureaucratic power through an increasing amount of statistical overviews of parts of society. Moreover, quantification has been observed to facilitate governance by restricting the interpretation of social and economic issues and thus imposing standards [25,27,29]. Numeric targets are necessary tools to allow for assessment and intervention. From this perspective, we would expect policymakers working with climate and energy issues to be committed to such targets as centrepieces of their practices. To explore this, we asked the interviewees about the general benefits and effects of formulating quantitative targets.

The interviewees mentioned several aspects, one of which was that numeric targets facilitated the auditing of achievements. D9, who worked in an organization centred around reaching numeric targets related to energy efficiency and renewable energy, explained that such numbers were important because "they give us a sense of speed". Likewise, his colleague, D8, told us that numbers were used to check whether "we [got] to the finish line". The emphasis on auditing was not surprising, given previous research on the issue [27,35].

D3 provided more detail. He explained that, through the Paris Agreement, Norway is committed to reporting its efforts internationally, to meet the agreed requirements. The set numeric targets defined the work needed to fulfil the obligations of the agreement. However, assessing achievements through auditing has not been a simple matter. D3 expressed the need for a well-functioning management and calculation system, which would ease documentation and help signal the need to revise efforts to reach the targets.

> These are our targets. This is what we have done so far. This is what we intend to do, this will give us an emission path roughly in that direction: is it sufficient or not for us to reach the targets? What more are we going to do?

D8 pointed to another advantage of numeric targets, their ability to facilitate robust ways of communicating action and accomplishments to the public. "Look, we are doing something, – we have set targets, we are not just 'talking the talk'" (D8). The way targets are linked to action may help to improve the transparency of political processes and democratic involvement, as observed by Demortain [29].

The main task of D6 was to oversee the achievement of the numeric targets. He explained that the targets he worked with had several functions, and further, that different contexts required different target setting processes: "…in some settings, it is important to have a target that you are sure to reach, while in other settings the target can be ambitious". Ambitious targets, in this context, were viewed as motivational. D6 and his colleagues did their best to reach ambitious targets: targets that, had they been set significantly lower, probably would have slowed down the pace of work and they would not have achieved the best possible results. He stressed that it is easy to overestimate the meaning and accuracy of numbers, yet in his view, numeric targets did not have to be correct to motivate: "'nine' or 'ten', it does not matter, – we have to start with number 'one', anyway". The aspect of motivation adds an effective dimension to otherwise instrumental tools.

The interviewees did not experience quantitative targets as unambiguously beneficial, however. A ministry employee, M3, told us that policymakers would sometimes be tempted to set an ambitious target, despite knowing how difficult it could be to achieve. The preference for high ambitions among politicians appeared in the interview with D8 as well: "there are, of course, political ambitions to achieve as much as possible – and the target should be ambitious, – but it should not be a castle in the air". D8 pointed to the importance of having targets to strive for. However, the targets also had to be realistic. Ambitious targets were welcomed, but if they were overambitious, assessing achievements was considered less meaningful.

Ultimately, as we expected, the interviewees considered numeric targets to be useful. They were reported to help assess actions and accomplishments, – and they were motivating. Moreover, they were shown to provide robust ways of making arguments public by appearing objective and improving the transparency of policy processes, thus allowing for democratic involvement. Numbers were seen to invite trust and providing comparability. In the subsequent sections, we shift the focus and discuss, in some detail, the two superior numeric targets that are the focus of our study. The interviewees described these targets as useful, but we wanted to explore their biographies to investigate how they emerged and how they were acted upon.

### 4.2. How superior numeric targets are made and enacted: a biographical analysis

In analysing the biographies of the two superior numeric targets, we pursued the stage model drawn from Morseletto et al. [5] with the co-production idiom [32] as a backdrop. Furthermore, we looked for mobilisation efforts linked to the targets such as political coalitions but also the use of the targets to achieve the overall objectives through the development of instruments, indicators, and sub-targets. We ask how the superior numeric targets came to be a part of quantitative governance in the field of climate and energy.

#### 4.2.1. Case I: the biography of the superior target to cut greenhouse gas emissions

Norway's climate policy is anchored in the Parliament through two political compromises: one in 2008 and the other in 2012, which were supported by a broad coalition of nearly all political parties [38] and are articulated through the Norwegian climate policy white paper published in 2012 [45]. The two "Climate Compromises" contain both targets, and instruments for achieving the targets. In 2008, a superior numeric target to cut greenhouse gas emissions was established, following a previous Norwegian Climate Policy white paper, from 2007 [46]. The white papers based their superior numeric target proposals on evidence from climate science, providing evidence of a co-production of science and politics. The first superior numeric target decided on resulted in a broad mobilisation of experts in the government administration to produce a comprehensive plan for how to reach the target and an overview of available instruments and their effects [47]. Thus, the target was consolidated and adopted fairly quickly.

The target proved to be dynamic, however, the decision by the Parliament in 2008 to set a superior numeric target of a 30 % reduction in greenhouse gas emission by 2020, appears in hindsight mainly to reflect a felt need to have this kind of a target. On December 12th, 2015, Norway joined the Paris Agreement and committed to a Nationally Determined Contribution target of at least a 40 % reduction in non-quota, greenhouse gas emissions by 2030 compared to 1990 levels [48]. The climate target was included in the Norwegian Climate Change Act [49]. When joining the Paris Agreement, Norway pledged to update and tighten their national emission targets every five years. For this reason, in 2020, when the EU announced to cut its carbon emissions by at least 55 %, Norway, which is not part of the EU, followed suit and upgraded its climate target to at least 50 % and towards 55 % by 2030 compared to 1990 levels [50].

In January 2021, the government presented the Climate Plan for 2021–2030 [33]. The introduction states that the government is certain of fulfilling the target of at least 40 % emission reductions by 2030, as stated in the Paris Agreement. However, the latest Climate plan was a strategy for meeting the old target of 40 % emission reduction by 2030, not the upgraded climate targets of 50 % to 55 % reduction the Norwegian government had already decided on when the plan was

publicised. The climate plan explained that it would take time before the new targets were established in regulations, and in April 2021, the government proposed to implement the new climate targets – reducing emissions by 50 %–55 % by 2030, and 90–95 % by 2050 – in the Climate Change Act [51].

The changing ambitions to reduce emissions have stabilised the superior target and have embedded it in wider policymaking. The target was not disembedded [5] but led to comprehensive policy efforts. In 2020, the government administration updated and extended its 2010 review of climate science and its menu of policy instruments to mitigate climate change [34]. The achievements in terms of actual reductions may be questioned, but there is no doubt that the target has led to a considerable mobilisation of efforts in the government.

In response to a question about their perception of the situation, quite a few of the interviewees commented upon the ambitiousness of the targets. Some understood this as Norway wanting to be a role model for other countries on target achievements. M3, at the Ministry of Oil and Energy, saw climate as an issue with shifting political and public attention, but as consistently important: climate concerns have remained high on the agenda of Norwegian governments because the issues are important, though the emphasis may change.

M3 was concerned with the numeric targets that they and their subordinate agency shared. "It would have been really great if we could already set very ambitious targets for reduced $CO_2$ emissions through the agency's activities next year". However, targets, such as reduced $CO_2$ emissions, would not yet produce significant results in the coming year. "It might be that the work we do at the moment will contribute to important reductions of $CO_2$ emissions in 10, 15, or 20 years". For this reason, he explained, climate targets were usually long-term and ambitious and, therefore, could be challenging to communicate. He continued to say that climate policy has been characterised by nice words, high targets, and ambitions. Pointing to previous climate agreements, M3 explained that the way targets, such as the 2020 targets on greenhouse gas emissions, are accounted for is, "completely incomprehensible to other people". Moreover, he argued that Norway's commitment to EU targets has led to confusion and opacity for most people. The solutions and mechanisms to achieve the targets were based on EU calculations and EU policies, which might not be relevant in the Norwegian context. This complicated a broad mobilisation to pursue the superior target.

The capacity of political documents to stabilise numeric political targets was explained by a political advisor, PA1, who highlighted the significance of the information in the white paper on climate strategy towards 2030: "It is a valuable document, in terms of information for us, because it describes a lot of facts in relation to the status of climate work, the follow-up on the target, and how far we have come in climate work".

When we turned to the issue of mobilising to reach the targets, the interviewees gave a more moderate impression than the policy documents. MP4 first described Norway as a country that is known for being at the forefront of important issues – gender equality, achieving an open-minded society, taking responsibility for major societal challenges in general – but when it came to climate issues, she described it as a controversial area, which may seem surprising, given the broad political coalition behind the emissions reduction superior numeric target. She explained that, in the political landscape, the traditional left have a main objective that differs from traditional conservatives, implying different preferences for the use of the various policy instruments.

According to MP6, there were no cost calculations done prior to the global warming limit target being strengthened in the Paris Agreement from the original 2 °C limit to 1,5 °C, but certainly, the costs would increase dramatically to attain the new target. Moreover, MP6 told us that there were few, agreed-upon measures to reach the target. He described the targets as very ambitious but without much drive for initiatives. The only shared, international obligation is to report regularly on progress. Thus, he was in some doubt regarding how well the superior numeric target of emission reductions was embedded in government efforts.

Experts in the government administration were most concerned with the challenge of making sense of the superior target and the involved policymaking, especially compared to the EU. While Norway is not a member, EU policies are still watched carefully. D3 told us that "understanding the EU targets is one thing", but also emphasised that the EU is providing analyses showing the possibilities, what relevant measures will cost, and the consequences of different policies. In connection with the Paris Agreement, an international research project has been established with the aim to accelerate clean energy innovation, which is considered essential to climate change mitigation. M2 and colleagues at the Ministry of Oil and Energy became responsible for following up with this project and reporting Norway's achievements. M2 described it as a top-down project, where "Obama, Erna [Norway's then Prime Minister], and the whole gang made the decision to carry out the project, – and then it became up to us to find out how to specifically realise the targets". His tasks involved reporting figures from the state budgets, communicating with the Research Council of Norway, and producing overviews of achievements in technological areas such as hydrogen, solar energy, and bioenergy. Thus, his work proceeded directly from the superior numeric target of reduced greenhouse gas emissions, but with distinct challenges in how to pursue it.

Other interviewees, such as D2, pointed to the complexity of calculating emission reductions in a globalised world of international trade. The target of reducing emissions by at least 50 % has been set for Norwegian territory, but what Norwegians do may affect the emissions of other countries. D2 offered the case of China as an example. Norway has large imports from China but cannot control how Chinese factories operate. The guiding principle is that countries must manage the emissions within their borders; however, as D2 explained, Norway may induce other countries to reduce emissions by making demands with respect to the production of, for example, imported biofuel. Emissions from international shipping and aviation were another complexity that was mentioned. Therefore, D2 saw the issue of emission impacts on other countries as quite complex.

D2 further explained that, when one thinks of reducing emissions, one often considers end-of-pipe cuts: reducing emissions from industry, coal power, transport, etc. This would involve measures such as transitions to renewable energy and improved energy efficiency. He explained the challenges emission reduction targets could encounter in more detail. "You use land areas, for example, to plant forests, – but if you also are going to produce bioenergy, that also requires space. So then, you have competition around land". Due to the challenges D2 described, communicating information about climate and climate policy was complex and demanding. Setting the superior numeric target was easy but explaining how it should be achieved has proven more difficult. Mobilisation has been a challenge, mainly due to the difficulty in translating the target into practices.

Given that the climate policy documents highlight the importance of improved energy efficiency to reduce greenhouse gas emissions [34,47], we should expect the superior numeric target for energy consumption in buildings to display some tailwind in its biography; the story, however, is more complicated and has demonstrated considerable challenges in consolidation, adaption, and embedding.

#### *4.2.2. Case II: the biography of the superior target to cut 10 TWh annually in buildings*

Energy efficiency, especially in buildings, has been a long-time political concern in Norway. However, efforts using a varied set of instruments have had limited success [8]. The target passed the framing stage when, in December 2009, the Ministry of Local Government undertook a new initiative: a working group, called the Arnstad commission, was appointed to provide input for an action plan to improve energy efficiency in buildings. The committee consisted of key players in the construction industry, R&D institutes, and government. It was asked to propose targets and the instruments that would be needed to reach

them, for both new and existing buildings. The report from the commission was submitted to the Ministry in August of 2010, which came to be called the "Arnstad report", named after the commission chair [39].

The report outlined the challenging context society faces in curbing global warming and noted that several international studies have argued that improved energy efficiency is the simplest, and cheapest, mitigation measure. It is estimated that the operation of buildings consumes approximately 40 % of all energy used in Norway, similar to the situation in the rest of Europe. The report claims that the improved energy efficiency of buildings will contribute to reduced greenhouse gas emissions, improve energy supply security, in addition to being profitable ([39] p. 12). It was thus argued that the energy efficiency of buildings would be a key area for climate and energy policymaking.

The Arnstad commission presumed it would be necessary for the government to set specific targets for the improvement of energy efficiency in buildings. In Appendix B, the report explained how they determined 10 TWh to be a realistic annual energy saving target. The 10 TWh figure was calculated upon expectations in three areas: 1) the construction rate of new buildings and the extent to which existing buildings are refurbished each year, known as *area projection*; 2) the level of ambition to reduce energy use, done by estimating the effects of future regulatory levels, compared with the current standards, in construction and rehabilitation; and 3) the estimated additional costs involved for the levels of ambition and estimations of what incentives should be ([39] p. 62). Johansen, Almklov, and Skjølsvold [52] show that it may be challenging to calculate and measure the effects of energy efficiency policies but it was, nevertheless, the basis for the Arnstad report.

The target of reducing supplied energy for the operation of buildings with 10 TWh annually by 2020 (pp. 62–70) was decided based on the committee's calculations, in combination with the desire for a $CO_2$-free construction sector and upon the suggestion of a previous Ministry of Oil and Energy report [53]. According to the Arnstad report, the existing building stock had the largest potential for energy reduction, which made the implementation of energy efficiency measures, through the renovation of buildings, crucial to achieving the target. The Arnstad commission describes the target as very ambitious, but one that could be achieved with a combination of strict regulations and generous subsidies ([39] p. 68).

The report stresses the need for action to be triggered through major motivational and informational measures: information about energy efficiency would be particularly important for private homeowners, who manage a major part of the existing building stock ([39] pp. 38 and 53). Reaching the target also presupposed a significant improvement in the competence of the construction industry ([39] p. 68). Despite their 10 TWh target decision, the Arnstad commission emphasised the need for a new, more thorough, and detailed study of the efficiency potential of buildings and construction.

The report was well-received by industry and environmental organisations, but the target was not adopted by the government at that time. The white paper on Norwegian climate policy that led to the Climate Agreement of 2012 [45], mentioned the Arnstad report, but proposals were moderated with reference to other policy work [47]. The white paper strongly emphasised the need for improved energy efficiency in buildings as a climate mitigation effort, but it was stated in the manner of a *goal*, not a numeric *target*. The lack of quantification was possibly due to the considerable optimism expressed in the white paper that existing policy instruments were sufficient to drive energy efficiency efforts. Seemingly, the 10 TWh superior numeric target was shelved.

Three years later, the office of the Auditor General of Norway examined the government's efforts to improve energy efficiency during the period of 2009 to 2015. The result was strong criticism of the authorities: the employed instruments had been found to have contributed little in achieving a significant reduction of the energy consumption in buildings. The Auditor's office also stated that there remained a great need for information about energy efficiency measures and for coordination of the administration's efforts. At that time, the individual agencies preferred to only report on their own instruments [54]. This critical audit meant that the superior numeric target proposed by the Arnstad commission was back on the table.

In 2016, the target began to be consolidated, meaning the target was able to catalyse interest and the broader consent of policymakers, and the Parliament finally adopted the target of reducing 10 TWh of annual energy consumption in buildings; the target, however, was to be reached by 2030, not the original target of 2020. The Standing Committee on Energy proposed that "the Parliament asks the government to set a target of 10 TWh reduced energy consumption in existing buildings compared with the current level" [55]. It was suggested to include the plan in the budget proposal for the fiscal year of 2018. The plan should provide concrete targets, both in reductions for specified parts of the building stock and in creating a package of existing and new instruments to realise them.

Adoption of the target in government plan was slow, however. When the plan appeared in the budget proposal for 2018, the proposal simply repeated the stance of the Norwegian climate policy white paper [45]: that existing instruments were sufficient to achieve the target. It stressed that "[m]ore than 10 TWh of energy savings will be realised by 2030: through the rehabilitation of existing buildings, changes in energy use because of the demolition of old buildings, and other energy efficiency measures in existing buildings. The existing instruments in the area are sufficient to realise these savings" ([56] p. 151). In 2019, the political coalition in government finally agreed to a more direct realisation of the 10 TWh energy saving target [57].

Despite the decision in Parliament in 2016, the great potential for reducing energy consumption in buildings was only qualitatively acknowledged in the 2020 annual report from the state enterprise, Enova, responsible for implementing government energy efficiency measures [58]. The annual report did notice, however, that accessible and profitable measures had yet to be realised. In Enova's view, this was due to the lack of professional energy competence among building owners, the small financial returns on investing in the improvement of energy quality in buildings, and the lack of comprehensive plans in rehabilitation and renovation initiatives to improve buildings' energy quality. The report noticed that these barriers must be reduced to trigger the energy-saving potential ([58]: 23).

Both industrial associations and environmental non-governmental organisations (ENGOs) have criticised the government for the lack of concrete measures to reach the target of a 10 TWh reduction in the annual energy consumption of buildings by 2030. The largest, and oldest ENGO in Norway, Norges Naturvernforbund (Friends of the Earth Norway), have argued as late as 2021, that far too few measures have been implemented [59]. Industry has also been critical of the slow implementation [60].

Our interviewees provided mixed responses to the 10 TWh target, and thus, demonstrated the range of engagement with the target. Those working in Enova have been developing strategies to reduce the energy use of buildings for many years, and their achievements are reported annually to the Ministry of Petroleum and Energy. When the interviews were undertaken, there was still no aim specifically directed at the building sector, only clear expectations that energy efficiency improvements, together with new renewable energy, should contribute to an increase in annual access to energy by 7 TWh in Norway. This 7 TWh quantitative target was important to the Ministry, according to D9: "In meetings, the Ministry is very concerned about how we stand compared to that quantitative target".

The emerging target of an annual reduction of 10 TWh was brought up in several of the interviews, mainly because it is considered to be overly ambitious. Several were concerned with the origin of this superior target and were critical of its basis. D9 said that the 10 TWh figure was a number that "suddenly just appeared", and he was uncertain what it meant. However, another employee at Enova, D8, did not find the vagueness odd, and instead saw it as a common feature of numeric target

origins in energy policy. “If you look back in time, you will see that it is very much like holding up a finger in the air”. The same interviewee told us that, when numbers are presented in official reports, they end up looking solid and safe even if, in reality, they are not based on much solid ground. D7 argued that numbers expressing how much energy one could save on any given measure, seem to consolidate themselves, like rules of thumb. D8, referring to the Arnstad report, described how he thought a baseless number could come to have authority:

> So, they made an estimate: but where does that figure come from? Then you go back and find reference after reference. Then you see that some things emerged from someone, who at one point, was just thinking about a number based on experience and such. Sound judgement may have been exercised: but it's like someone saying something in a meeting that someone else later refers to, – then others write reports based on that reference, and suddenly someone is referring to that report, – and before you know it, another report is referring to that report, which is used again as a reference in a fourth and fifth report, and so on. Suddenly, the numbers appear as almost scientific.

D8 explained that, after appearing in the Arnstad report, the 10 TWh target was seized by interest groups and policymakers. Even though the report shows that the target was based on admittedly rough calculations, several of the interviewees questioned how the 10 TWh figure became a superior target. They questioned why that number was chosen. D8 saw the target as a “round and nice number”, suggesting it might be an aesthetical choice. Similarly, D6 emphasised that one should not underestimate the importance of catchy numbers, using the EU “20-20-20” targets as an example, he explained that precise estimates such as 10.854 do not work. “You can be forgiven for rounding the number off a little, to make the target easier to communicate”.

With respect to calculating and setting targets, interviewees also described the temporal aspects to be important: specifically, the importance of estimated deadlines for the achievement of the targets. D8 argued that the further ahead in time the target was to be reached, the less accurate the calculations would be. He saw such superior numeric targets mainly as setting a direction for actions and as a tool to focus efforts.

The Norwegian Water Resources and Energy Directorate (NVE) had been assigned the task of analysing how to reach the 10 TWh target. One of the advisors at NVE, D5, described how they used the TIMES energy scenario model: “to see how the distribution between different energy carriers in the energy system would develop, and also to measure the savings”. According to D4, another advisor at that directorate, the analysis was not straightforward due to the target's lack of clarity: “What do they mean by ‘existing buildings’ in 2030? What do they mean by ‘reduced’? In relation to the absolute level today, – or what it would be without measures?”. Additional complexity was voiced by the many other actors who engaged with the superior target.

> We had opinions about what we should do, – and clever ideas – but the Ministry of Petroleum and Energy also had opinions, and the politicians had their opinions. […] so yes, [the calculation] was very difficult (D4).

The Arnstad report claims that the numeric target of a 10 TWh annual reduction of energy consumption in the building stock was partly based on calculations, but the report only presented the results, not how they were obtained. This led many interviewees to describe the target as having an ‘unknown pedigree’. While the policy documents suggest that the target has been consolidated and adopted, experts in government agencies considered the 10 TWh target to be a political construct, not a co-production making use of science. The critical attitudes of the experts may explain why embedment has been slow.

## 5. Discussion and conclusion

The biographies of the two superior targets that we have analysed may be fruitfully considered as occurring in stages. With the target to reduce greenhouse gas emissions, we saw that the framing stage had already been passed when we started to study its establishment. We observed that it became consolidated, adopted, and partly embedded. The target was based on broad political compromise and scientific consensus: it mobilised actors in the government to develop instruments to reach the target and to assess their success. It had been embodied to some extent, not disembodied, like in the stage model proposed by Morseletto et al. [5]. Thus, our findings regarding the greenhouse emission target suggest that superior numeric targets may be relevant ways of governing sustainability transitions: at least, in the sense that they may generate a lot of activity and mobilise actors within the government for its purpose.

The efficacy of the targets was reflected in the interviewees' appreciation for the superior targets' articulation in numbers: numeric targets were considered to be more precise and easier to communicate. They also noticed how high ambitions could be motivating, but not always. Not only calculation, but also aesthetics, may be important for the targets to be inspiring, consolidated and accepted: nice, round figures were particularly helpful. Demortain suggests that governance through quantification may help to increase the transparency of political processes and democratic involvement [29]. However, the interviewees did not support this assumption: rather, they highlighted the need for comprehensive calculation work related to the superior targets. It was suggested that governance by numbers requires expertise in order to become transparent. Thus, quantification may be an added complexity in understanding policymaking for transitions to sustainability.

It is noteworthy that policy efforts to implement the greenhouse gas emission reduction target were not derailed by the increased ambition and the changes in its numeric articulation. Instead, the changes were accommodated without much concern. D3 used the mundane term ‘technical adjustments’ to describe the revisions and expansions to measures needed when the superior target's numbers changed. Moreover, we observe a stabilisation of the superior numeric target where reflexivity has become inherent in the process, as demonstrated by the outcome of the climate change conference in Glasgow in 2021. Every country agreed to maintain the level of 1.5 °C from the Paris accord, as well as to re-examine their national plans and targets: possibly even increasing their ambitions again by the end of 2022, a mere year after the last update [61].

The second superior target, the 10 TWh target, had a biography that was different from the first in interesting ways. We began our analysis with the Arnstad report [39], while also noting that the framing had started much earlier [8]. In contrast to the first superior target, the 10 TWh target met with considerable lack of enthusiasm. This was not because the improved energy efficiency of buildings was a low priority or because such goals occur frequently in climate and energy policy documents. Rather, the problem was that it was believed that the goal would be achieved without additional government intervention. When this belief finally was set aside by a majority in Parliament, the government still resisted to put the 10 TWh target into the plans for improving energy efficiency. This may be due to the observed scepticism among experts in the government about the scientific basis of the target and its high level of ambition. The target was first consolidated and adopted by a majority politicians nearly a decade after it first was proposed. Even then, it was not embedded in the government administration, despite that qualitative goals of improving energy efficiency in buildings definitively were pursued. The biography of the 10 TWh target illustrates the complexities that may occur in the development of superior numeric targets; it shows that governance by numbers for sustainability transitions may be challenging. The biographies of both the targets also show that the superior numeric target for greenhouse gas emissions did not pave the way for the 10 TWh target, even with energy

efficiency occasionally being linked to climate change mitigation in the relevant policy documents.

The biography of the greenhouse gas emission superior numeric target demonstrates the importance of co-producing science and politics to achieve a stable target. The possible consequence of a deficient co-production is shown in the second biography. Generally, energy efficiency policies appear to be informed by research, as well as political consideration, but this was not the case with the 10 TWh target. That it mainly was a political decision, made the 10TWh target vulnerable to scepticism among the government experts responsible for implementing the target. Even though the experts formally accepted the task of calculating potential sub-targets, strategies of implementation, as well as consequences of the strategies: the effectiveness of these efforts remains to be seen. Political agreement on targets may not sufficiently provide for actions that will trigger broad mobilisation to achieve sustainability transitions.

Our study shows that governance by numbers is not straightforward, particularly with respect to sustainability transitions. The modified stage model of framing, consolidation, adoption, and embedment that we propose, identifies four stages that are challenging achievements if numeric governance of sustainability transitions shall succeed. The two biographies that we have presented, suggest that embedment may be challenging. In the case of the climate emissions target, the target was mainly embedded in the government through the development of sub-targets, indicators, and calculations. Norway only reduced the emission of greenhouse gases with 4,5 % between 1990 and 2021, 0,3 % between 2020 and 2021 [62]. This shows a lack of success in achieving a broad mobilisation among Norwegians to reduce substantially the greenhouse gas emissions. In the case of the 10 TWh target, it is still not even embedded in the government. Thus, governance by numbers may be less effective than quantification studies scholars have suggested, see, e.g., [29].

Nevertheless, the perspectives of quantification studies should be drawn upon to study governance by numbers also in the area of sustainable transitions where numeric targets and quantitative information abound. Sustainability transitions studies could benefit from a greater interest in how governance by numbers in the sustainability area are performed, the kind of obstacles that it may encounter, and what efforts that may be needed for the embedding of superior and other numeric targets and achieving a broad mobilisation of actors to reach the goals. Superior numeric targets are a quantified way to articulate missions for sustainability transitions, and hopefully we have shown why they should be studied in field of climate and energy issues also in other contexts than Norway.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. The work is funded by The Research Council of Norway. Grant nr: 296205.

## Data availability

The data that has been used is confidential.

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