NDC ASPECTS

NDC ASPECTS - Assessing the implementation risks of NDCs: Lessons from 20 cases (Deliverable No. 4.2)

14/12/2022

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Version: 1

December 2022

www.ndc-aspects.eu

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NDC ASPECTS project has received funding from the European Union's Horizon 2020 Research and Innovation programme under grant agreement No 101003866

NDC ASPECTS PROJECT & DELIVERABLE PROFILE	
Project Acronym and Full Name:	NDC ASPECTS – Assessing Sectoral Perspectives on Climate Transitions to support the Global Stocktake and subsequent NDCs
Grant Agreement No.:	101003866
Programme:	H2020-EU.3.5.1. – Fighting and adapting to climate change
Topic:	LC-CLA-10-2020 – Scientific support to designing mitigation pathways and policies
Funding Type:	RIA - Research and Innovation action
Deliverable:	D4.2 – Assessing the implementation risks of NDCs: Lessons from 20 cases
Work Package:	WP4 – Policy Options and Challenges
Deliverable Due Date:	Project month 15 (31/07/2022)
Actual Date of Submission:	15/12/2022
Dissemination Level:	Public
Lead Beneficiary:	UEF
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Preface

The NDC ASPECTS project will provide inputs to the Global Stocktake under the Paris Agreement (PA) and support the potential revision of existing Nationally Determined Contributions (NDCs) of the PA's parties, as well as development of new NDCs for the post 2030 period. The project will focus on four sectoral systems that are highly relevant in terms of the greenhouse gas emissions they produce yet have thus far made only limited progress in decarbonization. To advance these transformations will require to understand and leverage the Eigenlogic of those systems and take into account specific transformation challenges. These sectors are transport & mobility (land-based transport and international aviation & shipping), emission intensive industries, buildings, and agriculture, forestry & land-use, including their supply by and interaction with the energy conversion sector.

1. Changes with respect to the DoW

The deliverable follows the main tasks set out in the Description of Work (DoW) by employing the Task 4 analytical framework, which has been amended based on a state-of-the-art literature review.

One change has been that we have only in exceptional cases drawn on in-depth interviews. The reasons for this are threefold. First, allowing to draw conclusions across the case studies, we have drawn for various criteria on publicly available data for our case study countries, for which interviews were not needed. Second, we have drawn on data from the Climate Change Performance Index (CCPI), which, in turn, draws on in-depth expert interviews. Third, the background documents for some of our cases (e.g. India, Indonesia, EU) were written by national experts.

2. Dissemination and uptake

As detailed in the DoW and the project's Communication, Dissemination and Exploitation Plan, the deliverable will be made available on the project website and advertised via the project's social media channels. In addition, the results will be submitted to the journal *Climate Policy* or *Climate Action*.

The deliverable will be of use to different groups of stakeholders:

- Climate negotiators, who will be able to draw on the insights from this study in considering how the results of the global stocktake can be translated into more ambitious Nationally Determined Contributions (NDCs).
- National-level policymakers, particularly in the 20 case study countries, who can gain insights from this study on how national conditions can be made more amenable to strengthening implementation.
- The research community, which can build on this study to further develop methodologies to assess implementation of NDCs, as well as apply such methodologies to case studies.
- International and national civil society organisations, particularly in the twenty case study countries, who can identify ways to strengthen national implementation.

3. Short summary of results

The deliverable identifies several key results. We establish seven criteria for the assessment of NDC implementation risks, which among our cases include track record, interest groups, resources dedicated to implementation, policy output, embeddedness in legislation, institutional output, and monitoring and enforcement. Based on the criteria, we find that a few of the cases are at higher risk to fail to implement their NDC pledges than others, such as Saudi Arabia, which is categorised as "high risk" for six different criteria. A few countries can be considered "low risk" in terms of implementation risks. For instance, the EU and Norway are the most likely to successfully implement their NDC goals. However, most countries can be considered "low risk" for some criteria and "high risk" for other criteria. Two main conclusions can be drawn from the results of the assessment. First, in line with studies indicating an "implementation gap", it is highly unlikely that NDCs will be fully implemented. Our selected cases exhibit implementation risks for various criteria, calling into question the likelihood of achieving the 1.5°C goal. Second, although NDCs have been gradually

updated, they still are lacking in many crucial regards, such as access to information on government budgeting for climate action. This makes it more to assess and compare countries' financial investments in climate action. Thus, there is a need for more research that captures funding for implementation.

4. Evidence of accomplishment

The evidence of accomplishment of this deliverable is provided through the submission of this report. As detailed in the DoW, the main substantive content has been prepared in the form of an article manuscript.

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Executive Summary

The implementation of the Nationally Determined Contributions (NDCs) is crucial for achieving the goals of the Paris Agreement and limiting global warming to well-below 2 degrees Celsius. This deliverable investigated the potential implementation gap between current commitments and plausible climate actions of the NDCs in 19 countries and the EU. Based on prior literature, we analysed the implementation risks through seven criteria, which include the countries' track record, strength of interest groups, availability of resources for climate action, policy output, embeddedness in legislation, institutional output, and monitoring and enforcement. We defined cases as "low risk" when they ranked relatively strongly among all aspects of a single criterion, and "medium risk" when cases comparatively did not rank neither high nor low within a criterion. We assigned them in the category "high risk" when they tended to rank very weak among all indicators of a single criterion. Overall, we find that some parties to the UNFCCC are at lower risk to fail to implement their NDC pledges than others. Most countries can be considered "low risk" for some criteria, while they are "high risk" for other criteria. Nevertheless, based on the presented data, we find that cases such as the EU and Norway are the most likely to successfully implement their NDC goals. There are no cases of clear low risk across all criteria, except for Saudi Arabia, which is categorised as "high risk" for six different criteria, which is in line with previous studies. In summary, we find that while many countries have made significant progress in implementing their NDCs, the implementation of NDCs faces considerable risks, and the full implementation of the NDCs is currently unlikely. It is vital to highlight the risks associated with different aspects of implementation to improve understanding of the factors that can facilitate or hinder effective implementation of NDCs. This is crucial because achieving NDC targets is not only important in its own right, but also because it can motivate other countries to take similar action. Additionally, a better understanding of the risks to effective implementation can also support efforts to model the overall impact of NDCs and inform the Global Stocktake under the Paris Agreement.

Contents

1 Introduction

The architecture of the 2015 Paris Agreement places significant emphasis on climate change action at the national level, with parties' five-yearly Nationally Determined Contributions (NDCs) – i.e., their climate pledges – forming one of the Agreement's main building blocks. The more ambitious parties' NDCs are in aggregate, the more likely it is that they will succeed in achieving the Paris Agreement's aspirational goal to limit the global average temperature increase to 1.5°C. However, the overall ambition of parties' NDCs falls short of what is needed to keep global warming to 1.5°C: the NDCs promise to reduce emissions by 7% by 2030 (compared to 2019 levels), whereas what is needed for 1.5°C is a reduction of at least 43% (Fransen, Ge, and Huang 2021, 30).

What is more, such estimates assume full implementation of NDCs. That such an assumption is questionable is already indicated by reports of an "implementation gap", defined as "the difference between projected emissions under current policies and projected emissions under full implementation of the NDCs" (UNEP 2022, xix; Roelfsema et al. 2020). While this gap – based on the estimates from governmental and independent studies on the emission reduction effects of national policies – highlights that existing policies are by and large insufficient to meet the NDCs' mitigation targets, successful implementation of NDCs is dependent on more than just the putting in place of relevant policies. Acknowledging the need to look at domestic implementation in a broader sense, and thereby shedding light on the wider set of factors underpinning the "implementation gap", several studies have begun to assess the credibility of climate commitments, which can be defined as "a reflection of expectations that countries will be able to implement their [climate pledges]" (Averchenkova and Bassi 2016, 8; Brunner, Flachsland, and Marschinski 2012; Victor, Lumkowsky, and Dannenberg 2022).

Similarly, studies have begun to identify a broad set of factors through which implementation can be measured and assessed (Averchenkova and Bassi 2016; Zhu et al. 2021). This study seeks to contribute to this literature by assessing NDC implementation risks – i.e., the risk of NDCs not being implemented in full – according to a set of criteria. To this end, we develop and employ an analytical framework that draws on a review of relevant academic literature on policy evaluation, as well as grey literature on NDC implementation. Our analysis of NDC implementation risks draws on policy documents, international databases, and academic research. By shedding light on the risks associated with different aspects of implementation, we seek to strengthen understanding of the drivers and barriers to effective NDC implementation. Doing so is vital, as successful implementation is not just important for the achievement of NDC targets, but also for inducing reciprocal action by other countries. Moreover, a better understanding of the risks to effective NDC implementation can also further inform modelling efforts seeking to understand the aggregate impact of NDCs, thereby informing the Global Stocktake under the Paris Agreement.

Our analysis of NDC implementation risks covers 19 case study countries, plus the European Union (EU), covering 72.3% of global greenhouse gas (GHG) emissions in 2019. We identify seven criteria that we suggest offer an indication of the risks to effective implementation of the Paris climate commitments, namely (1) track record, (2) interest groups, (3) resources dedicated to implementation, (4) policy output, (5) embeddedness in legislation, (6) institutional output, and (7) monitoring and enforcement. We assess the criteria by focusing on a number of relevant indicators. The data for these indicators is drawn from publicly available databases and other sources, but we also draw on information collected through 20 background documents on each case study (see Annex). We begin the study with an overview of the state-of-the-art on the evaluation of the Paris pledges (Section 2). Next, we outline an analytical framework for the assessment of NDC

implementation risks based on the seven criteria and associated indicators (Section 3), and apply this framework to the 20 case studies (Section 4). This is followed by a synthesis of the potential risks to the implementation of the NDCs (Section 5), and a conclusion outlining the main findings and limitations (Section 6).

2 Evaluating climate policy implementation

Implementation refers to the "the penultimate stage of the policy process, where political efforts are intended to put policy instruments into practice" (Schaffrin, Sewerin, and Seubert 2015, 263). While formally the implementation of NDCs started in 2021, a majority of (I)NDCs were submitted in 2014–2015, with many having been updated since. In the coming years, more information will become available about implementation by the parties to the Paris Agreement, with countries required to submit their first biennial transparency reports on progress in implementing and achieving NDCs in 2023/2024 (UNFCCC 2019). In this study, we focus on *ex-post* policy evaluation in order to analyse ongoing NDC implementation and provide *ex-ante* policy analysis (Smismans 2015).

Academic debate about the implementation of international treaties has generally focused on the extent countries are exposed to peer pressure in the global arena (Avdeyeva 2007). However, NDCs are unique international policymaking devices, since countries have a significant amount of leeway in the type of commitments they can propose. The NDCs also combine international and domestic policymaking, which can expose governments to domestic pressures especially from political, economic, and structural factors (Peterson et al. 2022). Thus, implementation is highly dependent on domestic dynamics. NDCs can also be understood as governments' stated preferences, commitment devices, and/or discursive documents that are meant to be "contested, negotiated, and ongoing" (Mills-Novoa and Liverman 2019, 1). Moreover, governments have proposed both unconditional and conditional commitments, with the latter being reliant on the support of other states through climate financing.

Prior literature has emphasised the commitment problem of climate policy due to the long time horizon. In essence, how can one expect governments to implement 10 or 20-year climate pledges if electoral cycles and policy timeframes are much shorter than that? In particular, climate policy implementation is affected by domestic politics, the time inconsistency, and the anarchy problem (see Hovi, Sprinz, and Underdal 2009). With regard to the domestic politics problem, even if governments propose highly ambitious climate targets, implementation can be undermined by shifts in the political landscape and lobbying by powerful domestic interest groups that benefit from blocking the passage of stricter climate measures (Bang, Underdal, and Andresen 2015; Harrison and Sundstrom 2010; Mildenberger 2020). Time consistency refers to the issue that people in general place more value on the present rather than the future and policymaking is in general towards the short-term needs of the population (Galaz 2019). Finally, anarchy concerns the fact that NDCs are flexible instruments and the Paris Agreement does not have strict mechanisms to hold countries accountable to their commitments (Gupta and van Asselt 2019). Rather, aside from meeting procedural obligations (e.g., submitting regular NDCs, and reporting on progress in the implementation), countries have significant discretion in deciding how they implement their pledges. Hence, it is to be expected that while some countries will reach their climate targets or even overshoot their goals, others will struggle to implement their commitments.

Additionally, implementation can be influenced by political institutions (Lachapelle and Paterson 2013), state capacity (Meckling and Nahm 2018), interest groups (Mildenberger 2020), climate finance and domestic investments (Obergassel, Hermwille, and Oberthür 2021; Vandyck et al. 2016), political feasibility (Jewell and Cherp 2020), policy design (Schmidt and Sewerin 2019), the extent to which climate action is embedded in a legislative framework (S. M. Eskander and Fankhauser 2021), and the role of monitoring and enforcement (Schoenefeld, Hildén, and Jordan 2018). This study builds on prior literature that seeks to foreground these broader (political economy) factors influencing implementation, going beyond merely the adoption of policies (Averchenkova and Bassi 2016; Lamb and Minx 2020; de Villafranca Casas et al. 2021; Worker and Palmer

2021; Zhu et al. 2021). While several studies focus on the impact of different climate policies, our goal is to assess the risks to the effective implementation of the international commitments set out in the NDCs. We undertake this research aim by focusing on 20 cases (19 countries and a supranational jurisdiction): Australia, Brazil, China, Colombia, Ecuador, European Union (EU), India, Indonesia, Iran, Japan, Mexico, Morocco, Nigeria, Norway, Russia, Saudi Arabia, South Africa, Turkey, United States (US), and Vietnam. We have chosen the cases to cover variation in socio-economic conditions, regions and climate zones, and negotiation positions at the United Nations Framework Convention on Climate Change (UNFCCC) negotiations.

3 Criteria for the assessment of implementation risks

Based on the literature reviewed above, we propose seven criteria to assess the risks of effective implementation. The criteria cover a wide set of dimensions that can either increase or lower the risk of effective NDC implementation. These criteria are (1) *track record*, (2) *interest groups*, (3) *resources dedicated to implementation*, (4) *policy output*, (5) *embeddedness in legislation*, (6) *institutional output*, and (7) *monitoring and enforcement.* By applying these criteria, we aim to disentangle different elements necessary for NDC implementation in various institutional and socio-economic contexts. Furthermore, this assessment provides policymakers with a policy-relevant overview of both the opportunities and challenges associated with the implementation of NDC commitments, going beyond individual countries.

First, NDC implementation can be estimated based on the prior *track record* of the country, which signifies the extent to which a country has previously delivered on its climate commitments (Averchenkova and Bassi 2016; Zhu et al. 2021). Assessing a country's track record can show us how reliable the implementation of pledges has been in the past. We concentrate particularly on the achievement of past targets under the first commitment period of the Kyoto Protocol (2008-2012, applicable only to developed countries); whether there have been any major climate policy reversals; and past climate policy goal achievements in general. We analyse the history of previous climate policy reversals to account for the likelihood of volatility in future climate action. It should be expected that the more unstable a country's climate policies are, the lower is the overall probability that implementation goes according to plan. For instance, unpredictability can be caused by the partisan polarisation of political parties (Dunlap, McCright, and Yarosh 2016), such as in the case of the US, which withdrew from the Paris Agreement during the Trump presidency, and then re-joined during the Biden Administration. Furthermore, we look at overall climate performance based on the Climate Change Performance Index in order to cover current progress on climate action.

Second, we explore the role of *interest groups*. Recent literature on climate politics explains policy outcomes on the national level frequently as a tug-of-war between various stakeholders (Mildenberger 2020; Stokes 2020). Most notably, on the one side there are coalitions of interest groups, such as fossil fuel producers and emissions-intensive industries, that may look to slow down or impede implementation (Sprinz and Vaahtoranta 2008). In some cases, fossil fuel producers may even influence climate governance through backroom deals that bypass the legislative process (Tyler and Hochstetler 2021). On the other hand, the implementation of climate targets is highly dependent on the role of civil society actors, such as environmental NGOs and labour organisations (Harrison and Sundstrom 2010), but their influence on implementation is highly dependent on civil liberties and access to policymaking processes (von Stein 2022). The relative strength of either coalition can eventually influence the extent to which NDCs are effectively implemented (Rennkamp 2019). Increased mobilisation of the supporters of climate policy tends to lead to the adoption of climate laws despite fossil fuel interests (Böhler, Hanegraaff, and Schulze 2022). Domestic stakeholders also have the opportunity to influence climate policymaking through stakeholder consultations, which many countries have institutionalised for the development of NDCs and other policy processes (Peterson et al. 2022). Business and civil society actors are not able to take policy decisions on their own but aim to affect policymaking either by direct or indirect means. While direct efforts can include lobbying campaigns and active participation in stakeholder consultations, indirect means can incorporate the information campaigns in both mass and social media to shape public opinion and, ultimately, elections (Tresch and Fischer 2015).

Third, we evaluate the extent to which countries dedicate *resources to the implementation* of climate goals. This criterion focuses on both economic and institutional resources. All else being equal, the better access countries have to economic resources for climate action, the more likely that NDCs will get implemented.

Insufficient financial capacity is one of the key barriers to national implementation, although this may be due to misperceptions of the associated costs of climate action (Chasek and Downie 2020, 281). Furthermore, different countries would exhibit different capacities in human resources, training and awareness-raising for climate action. Not all governments can draw upon the same level of scientific and state capacities (Levi, Flachsland, and Jakob 2020; Meckling and Nahm 2018), such as in terms of human resources or readily available modelling tools. Depending on the type of commitments, unconditional commitments by developing countries would be expected to get funded mainly from domestic public and private resources, while conditional pledges draw heavily on international support in the form of climate finance from developed countries.

Fourth, we explore NDC implementation in terms of national *policy output*. One way to assess implementation is by looking at the policy outputs, which can be defined as governments' policy decisions to act or change, or rather maintain the status quo of the policy landscape (Howlett and Cashore 2014). Policy outputs can be evaluated both in terms of *density* – the number of policies and measures – and *intensity* – in terms of the level of ambition in each policy (Schaffrin, Sewerin, and Seubert 2015; Schaub et al. 2022). We aim to go beyond the number of policies adopted and get an overview of the strength of the national climate policies in each country. We also aim to understand whether the country has the appropriate mix of public policies in place to implement the commitments stated in the NDC. By this, we refer to the degree that the policy mix fits with the emissions sources. We also investigate the extent to which carbon is priced in a country as one measure of policy intensity (Baranzini et al. 2017). Moreover, we look at any incoherence between commitments and policies. For instance, in some cases governments may promise international partners that they will aim to decarbonise their economy, but domestically continue to subsidise fossil fuels.

Fifth, we investigate the extent to which climate policy is *embedded in legislation*, specifically whether framework legislation has been adopted to implement NDCs. Climate legislation can establish regulatory stability (Fisher, Scotford, and Barritt 2017), coordinate climate policies, and trigger the mainstreaming of climate action into different sectors (Dubash et al. 2013). In essence, we are asking the question whether laws and regulations have been adopted to implement NDCs and whether (quantifiable) NDC targets are included in the framework legislation. A majority of countries have implemented climate laws of some kind (Iacobuta et al. 2018). The passing of laws related to climate action is a key indicator of countries' ability to implement their NDC pledges (Sridhar et al. 2022) and has been associated with decreased production-related GHG emissions (S. M. Eskander and Fankhauser 2021). We also look at the inclusion of NDC targets in framework legislation since this can exhibit that the country is taking NDC implementation seriously.

Sixth, we examine countries' *institutional output*. Essentially, we want to find out whether countries have the institutional machinery in place to implement the NDC. This can include, for example, "purpose-built" institutions, which are deliberately created to address climate change, "repurposed" institutions, which have been redeployed to the issue of climate action or "layering" in the form of various coordinated climate-related initiatives (Dubash 2021). The institutional arrangements within the countries can have a significant impact on the implementation of national climate policy. Countries with a strong institutional machinery usually tend to have an effective climate policy that facilitates the implementation of NDC targets. In this regard, both purpose-built climate institutions and cases of institutional layering can deliver significant emission reductions (Hochstetler 2021). Hence, we do not consider the implementation of purpose-built and institutional layering as adversaries, rather we look out for cases where neither is taking place.

Finally, we assess *monitoring and enforcement* associated with NDC implementation. The objective of policy monitoring and enforcement is to compare how well policies are being implemented against already made commitments, and apply measures or necessary incentives to improve implementation (Schoenefeld 2021).

In a nutshell, we look at the extent countries monitor and enforce the implementation of their climate commitments. The success of implementing climate commitments is highly contingent on the capacity of the state in monitoring and enforcing its policymaking. When reporting is limited or untransparent, rife with inconsistencies and based on incomparable data, the implementation of climate action becomes hopelessly difficult to assess (Schoenefeld, Hildén, and Jordan 2018). General quality of the enforcement of regulations is key for this criterion as well, as climate outcomes are associated with the quality of government (Povitkina 2018) and rule of law (Ang and Fredriksson 2021). We also account for the inclusion of quantified GHG emission targets in the NDCs, since quantitative targets are clearer and more comparable, which strengthens accountability.

While our list of criteria covers a wide range of aspects about NDC implementation in line with previous literature, there are a few issues our analytical framework does not include. For instance, our focus is on long-term institutions and structures, rather than short-term political factors (e.g., elections) or economic factors (e.g., forecasts of future economic growth). Moreover, we concentrate primarily on public processes and institutions, rather than the activities by private bodies, except for the criterion on interest groups, which deals with their influence on implementation of public policies rather than their direct implementation of climate action. Lastly, we focus on public processes and institutions at the national level. Although subnational climate action is of increasing importance in many countries, it plays a comparatively stronger role in countries in which subnational actors have significant autonomy in the area of climate policymaking (e.g., the United States). Moreover, studying the climate policymaking activity at the subnational level would have significantly expanded the scope of the work.

Based on the findings, for each case we rank each criterion as either “low risk”, “medium risk”, or “high risk”. Countries are defined as “low risk” when they rank highly for each indicator of a single criterion and “high risk” when they underperform for each indicator of a single criterion. We follow this method across all criteria, except in cases where the indicators provide descriptive information instead of ranking the cases. In some cases, the indicators are also hierarchical to each other. For example, the inclusion of quantifiable NDC targets in framework legislation is dependent on the existence of framework legislation on climate change in the first place. We define cases as “medium risk” when they rank high for some indicators but low for others, and their overall implementation risk is less clear.

In Section 5, we provide overarching results across all criteria, and present the final results in an integrated table that covers all countries and the EU. Nevertheless, we have decided against adding up the risk ratings for each country. This is primarily due to the significant qualitative differences and overlap between the chosen criteria, which do not allow for a balanced comparison across all criteria.

4 Assessment

4.1 Track record

4.1.1 Achievement of past climate targets (Kyoto Protocol)

Examining whether past climate commitments have been achieved is one aspect to analyse the track record of a country (Zhu et al. 2021). Under the Kyoto Protocol, countries were divided into Annex I and non-Annex I parties. In its Annex B, the Protocol set quantified emission reduction targets for Annex I parties, comprising industrialised countries and economies in transition. Non-Annex I parties had no binding obligations.

Table 1 highlights the countries listed in Annex B included in this study: Australia, the EU, Japan, Norway, Russia, and the US. Of these countries, the US never ratified the Protocol, meaning that it had no binding emission reduction target. All countries with binding obligations achieved their Kyoto targets in the first commitment period (2008–2012). Australia and Russia surpassed their targets by more than 20% (Shishlov, Morel, and Bellassen 2016). However, Australia's success is attributable to specific accounting provisions contained in the Protocol – known as the "Australian clause" – which allowed for the inclusion of emissions from land-use change, which had significantly declined in Australia between 1990 and 1997 (Dooley and Gupta 2017). Table 1 also highlights that some countries had to rely on the Protocol's flexibility mechanisms to achieve their targets, including Japan and Norway. While all countries complied with their targets, neither Japan nor Russia participated in a second commitment period (2013–2020). Both rejected further targets due to the exclusion of major emitters, such as China and the US, from binding obligations.

While all parties listed in Annex B part of this study achieved their targets and collectively exceeded their Kyoto commitment, there are several external factors to consider. First, the rapid decline in emissions after 1990 can be attributed to the collapse of the Soviet Union and consequent collapse of industry (Shishlov, Morel, and Bellassen 2016). This was significant because the Kyoto Protocol used a baseline year of 1990. In addition, the global financial crisis in 2008-2009 was also responsible for a decline in emissions, which further contributed to "overcompliance". It is also important to reiterate that various countries were only able to realise their targets through the flexibility mechanisms, and that claims in reductions were therefore not representative of true emission cuts. It is important to consider these factors when assessing the credibility of past achievements under the Kyoto Protocol and hence, the implementation risks. It is an open question whether parties would have achieved their individual targets and collective goals under the Kyoto Protocol without the collapse of the Soviet Union, financial crisis and use of flexibility mechanisms.

Table 1. Countries under Annex B that achieved their Kyoto targets.

Country	Is the country listed in Annex B?	If yes, did the country achieve its Kyoto targets (with/without flexibility mechanisms)?
Australia	Yes	Yes
Brazil	No	Not applicable
China	No	Not applicable
Colombia	No	Not applicable
Ecuador	No	Not applicable
EU	Yes	Yes
India	No	Not applicable
Indonesia	No	Not applicable
Iran	No	Not applicable
Japan	Yes, but no targets undertaken for the second commitment period	Yes (flexibility mechanisms required to comply)
Mexico	No	Not applicable
Morocco	No	Not applicable
Nigeria	No	Not applicable
Norway	Yes	Yes (flexibility mechanisms required to comply)
Russia	Yes, but no targets undertaken for the second commitment period	Yes
Saudi Arabia	No	Not applicable
South Africa	No	Not applicable
Turkey	No (Annex I country, but did not become a Party until 2009, so was not included in Annex B)	Not applicable
US	Yes, but never ratified	Not applicable
Vietnam	No	Not applicable

4.1.2 History of major climate policy reversals

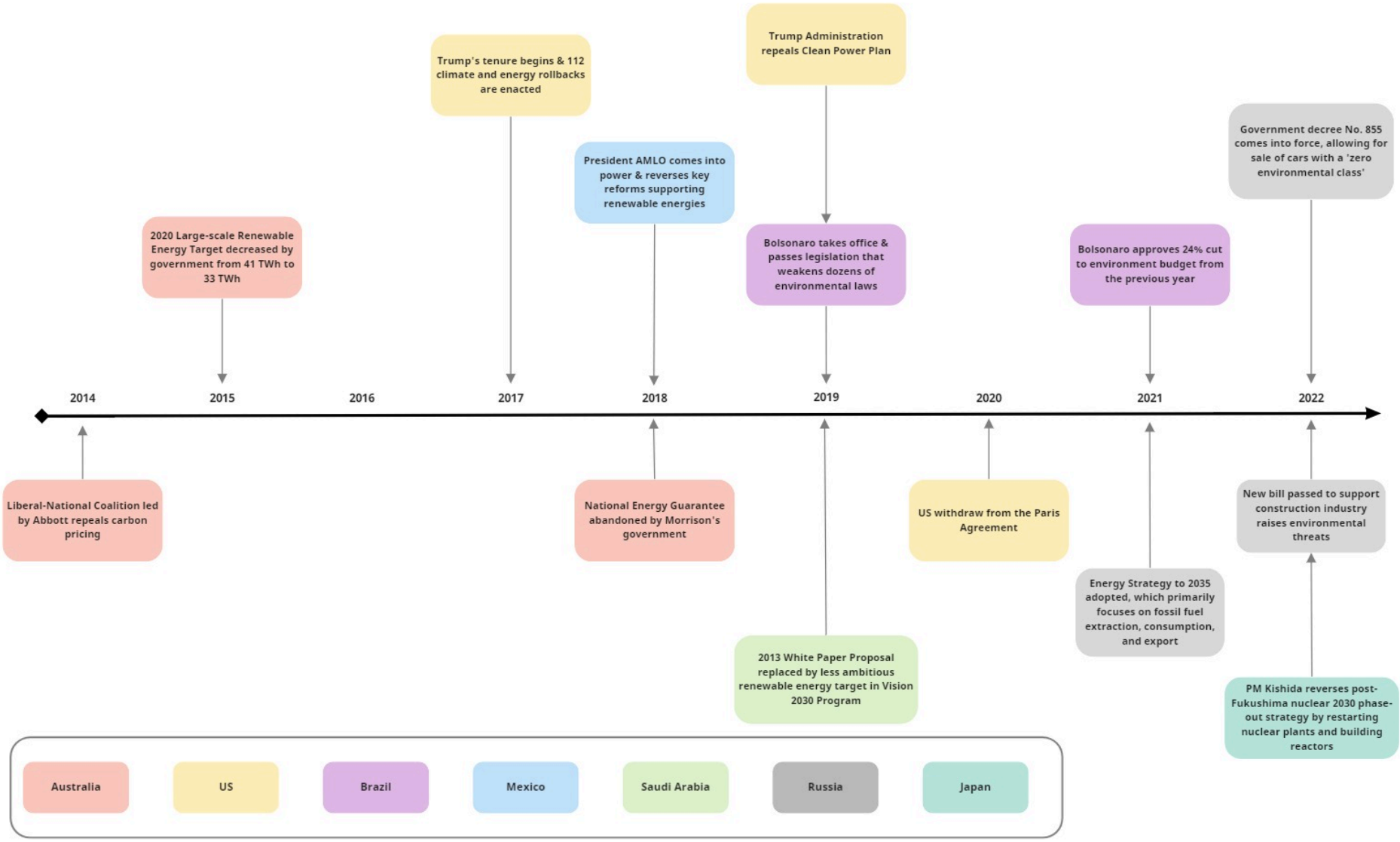
Figure 1 (below) displays several major climate policy reversals across various countries covered in our study. These countries share a history of unstable and unpredictable climate policy environments, rendering NDC implementation riskier. This can often be attributed to shifts in the political landscape in countries such as in the US, where climate policy has been the subject of polarised debates. During the Trump Administration, the US withdrew from the Paris Agreement and many policies were dismantled. Figure 1 notes that a total of 112 climate and energy policies were rolled back,[1] with 98 completed when Trump's tenure ended (Popovich, Albeck-Ripka, and Pierre-Louis 2021). One notable reversal was the repeal of the Obama-era Clean Power Plan, which consequently removed strict guidelines on carbon emission limits from power plants.

[1] A detailed compilation of the rollbacks is available at the Climate Deregulation Tracker of Columbia Law School: https://climate.law.columbia.edu/climate-deregulation-tracker.

Australia also has an entrenched history of policy reversals, such as abandoning its carbon pricing scheme and disbanding the Climate Commission. These are two of various reversals initiated by the Abbott government to dismantle Australia's climate policy (Crowley 2017). Other major reversals include the reduction of the Large-scale Renewable Energy Target and abandonment of the National Energy Guarantee in 2018, which imposed emission reduction targets on energy retailers for 2030 (The Guardian 2018).

The political landscape has also significantly influenced climate policy in Brazil, Mexico, and Russia. Figure 1 indicates that the Bolsonaro administration was especially detrimental for Brazil's climate policy. Various pieces of legislation that were passed significantly weakened a number of environmental regulations. This includes dismantling the legal and institutional framework that limited deforestation and punished environmental crimes, as well as government agencies responsible for climate action (Aleixo and Arima Júnior 2022). In addition, Bolsonaro approved cuts to the environmental budget and threatened to withdraw Brazil from the Paris Agreement. Since President Andrés Manuel López Obrador (AMLO) came into power in Mexico, key reforms that had supported renewable energies have been overridden. Instead, the focus has been on supporting the state-owned oil company PEMEX and national energy company *Comisión Federal de Electricidad* (CFE), to the detriment of renewable energy policies. For example, the Electricity Industry Law has undergone reform to prioritise power generated by CFE (including derived from fossil fuels) over privately owned renewable power in the grid. AMLO also aims to maintain the share of electricity generated by CFE at 53% (Reuters 2020). Russia has also enacted various reversals in recent years, such as the adoption of its Energy Strategy to 2035, which predominantly promotes the extraction, consumption, and exportation of fossil fuels. Further reversals materialised in 2022 in the aftermath of Russia's invasion of Ukraine, including a new 'anti-sanction' bill supporting the construction industry and abolishing restrictions concerning protected natural areas. In addition, government decree No. 855 also came into force, allowing for the sale of cars with a 'zero environmental class', reversing progress made with implementing more stringent vehicle standards.

Figure 1. Timeline showing history of major climate policy reversals in the last decade.



4.1.3 Overall climate performance

In addition to examining past climate targets and policy reversals, we also identify the overall climate performance rating of each country, which are presented in Table 2. In identifying these ratings, we rely on the methodology employed by the Climate Change Performance Index (CCPI), which consists of four key components: GHG emission levels, energy use, renewable energy, and climate policy. The components are weighted differently, as GHG emission score contributes 40% to the comprehensive index and the rest of the components 20% each. The component for GHG emissions is measured through four indicators: current level of GHG emissions per capita, past trend of GHG emissions per capita, current level of GHG emissions per capita compatible with a below-2°C pathway, and GHG emissions reduction 2030 target compatible with a below 2°C pathway. The component for energy use accounts for the current level of energy use, past trends of energy use, current level of energy use compared to a well-below 2°C compatible pathway and the 2030 target compared to a well-below 2°C compatible pathway. The component on renewable energy involves current share of renewables, development of energy supply from renewable energy, the current share of renewables in energy use compared to a well-below 2°C compatible pathway, the renewable energy 2030 target compared to a well-below 2°C compatible pathway. The climate policy component is based on the results of questionnaires with country experts on national and international climate policies.

While Morocco's energy sector is particularly carbon-intensive, there is a fossil fuel subsidy phase-out plan in place and the government has made important progress over the years to eliminate these subsidies (Burck, Uhlich, Bals, Höhne, and Nascimento 2022). Both India and Norway are also rated as high-performing overall. India scores high on the CCPI index due to new targets and positive political signals, but lacks roadmaps and concrete plans (CCPI 2022). The focus on implementing its NDC was specifically highlighted as contributing to India's overall high performance (Burck, Uhlich, Bals, Höhne, and Nascimento 2022). The performance of Norway, which excels in some policy areas such as subsidies for electric vehicles and its high carbon price, is to some extent offset by its large oil and gas exports. The majority of countries achieve medium and low ratings, and some very low. Five countries in Table 2 are rated very low for their overall climate performance: Australia, Iran, Russia, Saudi Arabia, and the US. Data on Ecuador and Nigeria was missing for CCPI.

Table 2. Overall performance rating (CCPI 2022).

Country	Overall performance rating * countries global ranking also included
Australia	59
Brazil	33
China	38
Colombia	25
Ecuador	Not applicable
EU	22
India	10
Indonesia	27
Iran	62
Japan	45
Mexico	28
Morocco	8
Nigeria	Not applicable
Norway	6
Russia	56
Saudi Arabia	63
South Africa	39
Turkey	41
US	55
Vietnam	43

Data on Ecuador and Nigeria was unavailable and hence not included in this analysis. The cases are ranked: the smaller the number, the higher the rank in the list of countries.

4.2 Interest groups

4.2.1 The influence of civil society and industry

We account for the strength of the civil society based on the University of Gothenburg's Varieties of Democracies' civil society index, which aims to measure the robustness of civil society in each country. The index

combines the estimates from indicators on the extent the government controls NGO entry and exit into public life, the extent the government represses NGOs and the degree of voluntary participation in NGOs (participatory environment). We also proxy for the strength of industrial actors by accounting for the value added of industry (including construction) to gross domestic product (GDP) (%) based on data from the World Bank (2022a), which describes the potential power that industrial actors can hold in a country *vis-à-vis* other economic sectors, which tend to be less dependent on high levels of fossil fuel production. For instance, previous studies show that a high share of industry production to GDP and fossil fuel rents are negatively associated with the adoption of carbon taxes (Dolphin, Pollitt, and Newbery 2020) and climate laws (Lamb and Minx 2020), respectively. Although industrial actors are relatively well-organised and known to hold important sway on policymaking (Mildenberger 2020), their role in the overall economy is more confined than in many other countries among our list of cases, while civil society, which includes environmental NGOs, are independent and free to keep policy implementation on track.[2] The findings are presented in Table 3.

The US, Norway, and Japan boast the most robust civil societies among our list of cases. The US is also one of the countries with the smallest industry production as a share of the GDP. The combination of a robust civil society and the lower significance of industrial actors could suggest greater opportunities for more persistent implementation of NDC targets. While relevant legislation has been adopted, in the US industrial actors nevertheless play a major role in influencing the legislative process, which is exemplified by the large-scale lobbying efforts of fossil fuel producers during previous decades (Brulle 2018). High-emitting industrial sectors are more prominent in Norway and Japan in comparison. Norway relies heavily on fossil fuel resources for its exports and is the third-largest gas exporter after Russia and Qatar. The industry has the largest share (36.5%) of Japanese energy-related CO_2 emissions.

The countries with the most limited and repressed civil societies are China, Saudi Arabia, and Iran, which are also the countries with some of the largest domestic emission-intensive industries. The key outlier is Indonesia, which maintains a relatively strong civil society whilst also having a large industrial sector. In Saudi Arabia, oil production makes up 40% of the country's GDP and 85% of exports (IMF 2015). Similarly, the state oil producer Saudi Aramco holds considerable sway over national economic policymaking. In the case of China, the government continues to support the building of coal-fired power plants (Germanwatch 2021). Furthermore, overseas far more fossil plants than clean energy plants are being built, which will lock in significant emissions for decades to come (Lewis 2020, 175). Likewise, as in the case of Saudi Arabia, the combination of a limited civil society and a powerful fossil fuel industry poses implementation risks. Iran will encounter similar difficulties due to political instability, complicated economic circumstances and fossil fuel export dependency (Mahoozi 2021).

[2] We focus on industrial actors, which are considered a more commonplace adversary of further climate action, instead of other type of lobbies, such as the agriculture or forestry lobbies .

Table 3. Civil society and industry prominence.

Country	V-Dem civil society index (0-1) (2021)	Industry, value added to GDP (2021)
Australia	0,872	25,5%
Brazil	0,824	18,9%
China	0,09	39,4%
Colombia	0,882	25,1%
Ecuador	0,646	31,2%
EU	0,883 (EU mean)	22,8% (EU mean)
India	0,334	25,9%
Indonesia	0,825	39,9%
Iran	0,157	35,7% (2020)
Japan	0,942	29% (2020)
Mexico	0,876	31,9%
Morocco	0,458	26,8%
Nigeria	0,824	31,4%
Norway	0,971	35,6%
Russia	0,324	33,2%
Saudi Arabia	0,1	45,5%
South Africa	0,905	24,5%
Turkey	0,203	31,1%
US	0,971	18,4% (2020)
Vietnam	0,317	*NA*

Data from University of Gothenburg and World Bank from 2021. The grey colour signifies lower ranking and green higher ranking.

4.2.2 Stakeholder engagement in NDC development

The successful implementation of NDCs also requires inclusive planning processes with comprehensive stakeholder engagement. Many implementation activities take place at the subnational and sectoral level, highlighting the need for multi-stakeholder participation in implementation planning processes (UNDP et al. 2020; Röser et al. 2020). This is key for identifying and understanding the priorities of varying stakeholders

across sectors, and more generally can help foster buy-in and invoke a sense of responsibility across a wide set of actors.

While the scope and exact processes for stakeholder engagement will vary depending on the individual circumstances of each country, Table 4 shows that several countries have included stakeholder consultations in their NDC planning processes. Some have adopted particularly extensive and robust processes by engaging a diverse range of stakeholders. For example, the review and update of Vietnam's NDC was informed by many actors, including scientists, ministries, localities, NGOs, enterprises, research agencies and international development partners. This included consultation workshops organised by specific sectors to identify methods of implementation.

Table 4. Inclusion of stakeholder consultations in development of NDCs.

Country	Stakeholder consultation mentioned in the NDC?	What did the consultation entail?
Australia	No	Not applicable.
Brazil	Yes	The Brazilian Forum on Climate Change provides for an institutional dialogue between the Brazilian government and civil society to raise 'awareness and mobilise society and to contribute to the discussion of actions needed to deal with global climate change'. Nevertheless, stakeholder engagement update has been previously found to be lacking for the latest NDC (Peterson et al. 2022).
China	No	Not applicable
Colombia	Yes	The participation mechanism included a public consultation and expert surveys. The public consultation obtained feedback on the content of the NDC and its measures and targets, while the surveys collected technical inputs to inform the NDC update. The results of these processes formed part of the inputs for the NDC review rounds through the Inter-sectoral Commission on Climate Change that included information on sectors and geographic areas. This resulted in adjustments to the NDC targets and measures.
Ecuador	Yes	Consultation included, among others, stakeholders from the public, private, academic, non-governmental and research sectors. The process entailed dialogues, workshops and technical meetings.
EU	Yes	The enhanced target is based on an extensive impact assessment, as well as stakeholder input, collected via public consultation.
India	No	Not applicable.
Indonesia	Yes	The government conducted consultations with various stakeholders, representing Ministries and other government institutions, academia, scientists, the private sector and civil society organisations.
Iran (INDC)	No	Not applicable.
Japan	No	Not applicable.
Mexico	Yes	Government agencies, state governments, the private sector and social organisations were consulted during the NDC update. This involved discussions with representatives of each of the sectors in Mexico's NDC.
Morocco	Yes	National institutional arrangements, public participation and engagement with local communities and indigenous peoples, in a gender-sensitive manner.
Nigeria	Yes	The process to update the NDC is described as "collaborative and inclusive", involving a "range of stakeholders".
Norway	Yes	Public participation in decision making processes relevant for the environment is provided for under the Environmental Information Act. Consequently, Norway's Climate Change Act followed a public hearing, including various stakeholders. There were also consultation processes between the central government and the Sámediggi.
Russia	No	Not applicable.
Saudi Arabia	No	Not applicable
South Africa	Yes	The process for updating South Africa's NDC had five components, including consultation within government, but also consultation with broader stakeholders and provincial public stakeholder workshops. Public consultation and participation involved business, labour and civil society, including women and youth constituencies.
Turkey	Yes	The preparation of Turkey's INDC took place through a participatory approach involving multiple stakeholder meetings.

US	Yes	The National Climate Advisor and White House Office of Domestic Climate Policy ran an interagency process across the federal governments and consulted a range of other stakeholders, including groups representing advocates and activists, including youth, unions, scientists, governmental leaders, tribal leaders, businesses, schools and education institutions, as well as specialised researchers.
Vietnam	Yes	The NDC generally refers to the involvement of scientists, ministries, localities, NGOs, research agencies, enterprises and international development partners to inform the review and update of Vietnam's NDC.

4.3 Resources dedicated to implementation

Countries differ greatly in terms of the resources that they have afforded or plan to invest in the implementation of their climate pledges. Investments in clean energy have increased significantly around the world, growing by 8% in 2022 alone to reach USD 2.4 trillion (IEA 2022). Most governments, such as the US, have considerably increased funding to tackle climate issues (e.g., through the recently adopted Inflation Reduction Act). However, a few countries have recently cut budgets dedicated to climate and environmental protection, such as Brazil, which reduced its climate action budget, and left its Green Climate Fund finance unused. The Brazilian Amazon Fund has also been inactive ever since its two major donors stopped contributing to it due to Bolsonaro's undermining of existing environmental policies. Mexico, on the other hand, dissolved its Climate Change Fund in 2020. Although it has increased overall funding for climate and energy issues, 75% of the new climate and energy budget was allocated to the state-owned electric utility's (*Comisión Federal de Electricidad*) natural gas programme (Muller et al. 2021).

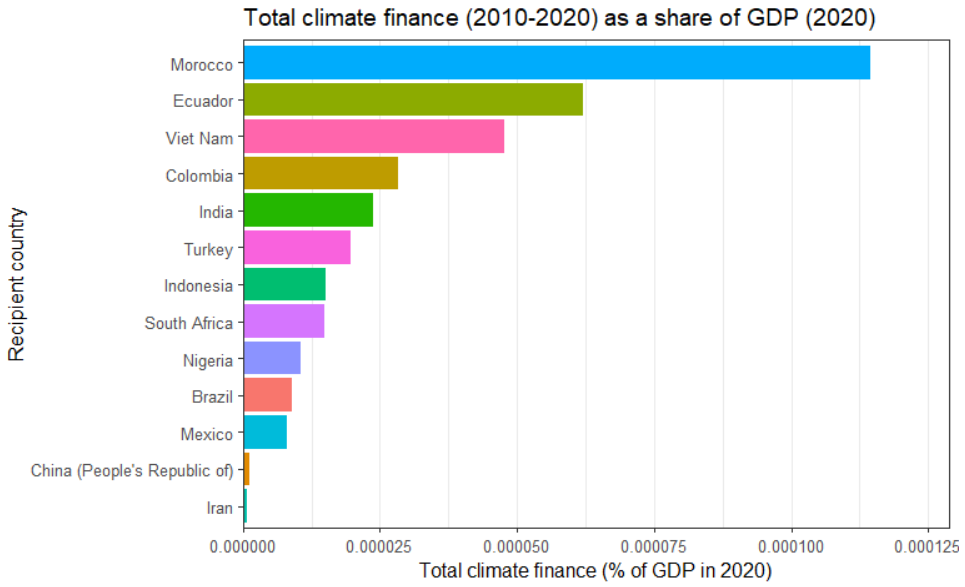
Countries diverge in terms of the size of their government expenditures and their main source of funding. Developed countries tend to rely predominantly on domestic budgets to tackle climate action. However, comparative official information about government budget expenditures to implement the Paris Agreement is scarce for most countries. Many of the countries have established green funds, such as Japan's USD 16 billion Green Innovation Fund to support private sector decarbonisation initiatives. The aim of the fund is to support companies in decarbonisation initiatives, such as research and development (R&D). The EU has several funding mechanisms in place, including a Just Transition Fund, an Innovation Fund to fund new low-carbon technologies, and a Modernisation Fund dedicated to funding lower-income EU Member States that are modernising their energy systems. Moreover, 75% of revenues from the EU's emissions trading system (ETS) (€56.5 billion) are used for climate and energy purposes (European Commission 2021, 17). Due to its size, almost a third of global investment in 2021 for the energy transition came from China (USD 266 billion, 1.5% of GDP), which is followed by the United States (USD 114 billion, 0.5% of GDP), and Germany trailing third (USD 47 billion, 1.1% of GDP) (BloombergNEF 2022). Moreover, the 2022 Inflation Reduction Act of the United States aims to address energy security and climate change with USD 391 billion (US Congress 2022).

Developing countries tend to emphasise the importance of international support in the form of climate finance (Table 5), which can be from either bilateral or multilateral sources. The former includes funding directly from other countries and their bilateral development agencies, while the latter entails funding channelled through international financial institutions supported by several different public and private funders. The majority of climate finance (USD 384 billion) was raised as debt in 2021 (Buchner et al. 2021). The key global multilateral funders for climate action are the Green Climate Fund (GCF) and the Global Environment Facility (GEF). Both funds provide climate financing for mitigation and adaptation purposes. The difference in funding is reflected in NDC pledges, which tend to be *conditional* on international support among developing countries and *unconditional* among developed countries. However, there are exceptions, such as Brazil, China, and Colombia, which submitted unconditional climate commitments, even though they are major recipients of international climate finance. The provision of high levels of climate finance can potentially lead

to positive results as more countries receive additional climate financing for implementation and are better placed to decarbonise their economies.

Table 5 shows that among our sample for the period 2010–2020 the countries that overall received most climate finance were India (USD 59 billion USD in total), Turkey (USD 19.85 billion), and China (USD 17.5 billion). Morocco, Ecuador, and Vietnam were among the countries that received the most climate finance in 2010–2020 measured as a share of their economy in 2020 (Figure 2). For the sake of intuitiveness, we present the findings as a transformed indicator that accounts for share of total climate finance (during 2010-2020) per GDP. We use 2020 data as the reference point for GDP, which is counted in hundreds of thousands of dollars. While this does not make the findings interpretable individually, it allows for a better comparison.

Figure 2. Total public climate finance (2010–2020) as share of GDP in 2020.



Data from the OECD Rio Markers (2020).

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Table 5. NDC conditionality and the receipt of public climate finance

Country	NDC conditionality	Total climate finance received (USD, public sources, 2010–2020)	Total public climate finance (2010-2020) received per GDP (in 100,000 dollars, 2020)
Australia	Unconditional only	Climate finance provider	Climate finance provider
Brazil	Unconditional only	15.6 bln	0,892
China (People's Republic of)	Unconditional only	17.5 bln	0,120
Colombia	Unconditional only	8.5 bln	2,842
Ecuador	Conditional and unconditional	5.8 bln	6,211
EU	Unconditional only	Climate finance provider	Climate finance provider
India	Conditional only	59 bln	2,378
Indonesia	Conditional and unconditional	15.6 bln	1,521
Iran	Conditional and unconditional	317 mln	0,079
Japan	Unconditional only	Climate finance provider	Climate finance provider
Mexico	Conditional and unconditional	9.2 bln	0,799
Morocco	Conditional and unconditional	12 bln	11,440
Nigeria	Conditional and unconditional	5.2 bln	1,054
Norway	Unconditional only	Climate finance provider	Climate finance provider
Russia	Unconditional only	Climate finance provider	Climate finance provider
Saudi Arabia	Unconditional only	Climate finance provider	Climate finance provider
South Africa	Conditional	4.5 bln	1,499
South Korea	Unconditional only	Climate finance provider	Climate finance provider
Turkey	Partially conditional (unspecified mix of domestic/international resources)	20 bln	1,956
US	Unconditional only	Climate finance provider	Climate finance provider
Vietnam	Conditional and unconditional	12.3 bln	4,781

4.4 Policy output

4.4.1 National climate policy

We begin examining policy output by assessing the general state of policy output with the help of CCPI's national climate policy indicator. This indicator is based on an international survey with climate and energy policy experts universities, think tanks and other non-governmental organisations within each country (Burck, Uhlich, Bals, Höhne, Nascimento, et al. 2022, 22). In terms of the national climate policy, both the strength of the policies and level of implementation is analysed. The respondents evaluate the most important climate measures of their government on a scale from "weak" to "strong". We have re-coded that scale from "very weak" to "very strong" to cover variation between countries. In order to properly capture variation, there is also the possibility to further evaluate and comment on single aspects (Burck, Uhlich, Bals,

Höhne, Nascimento, et al. 2022). As for the CCPI overall index, the national climate policy indicator lacks results for Ecuador and Nigeria.

While countries do differ in terms of their ratings, Table 5 shows that none of our case studies achieves a "very strong" rating for their national climate policy. Even countries that are typically considered "frontrunners" are not pursuing the level of policy action needed to achieve their NDC targets. Morocco is the only country in the study that is rated highly in terms of its national climate policy. Many of the large emitters, such as the US, China, and India receive a "medium" rating for their national climate policy. The majority of countries achieve medium and low ratings, and some, such as Australia and Russia, very low. While Australia's increased ambition in its new NDC target is welcomed, the lack of national policies adopted so far to support its NDC will probably render implementation unlikely. Under its current climate policy, domestic emissions are predicted to continue rising (Climate Action Tracker 2022a). Russia's national climate policy is notably deficient, which is likely attributable to its strong focus, and increasing reliance, on fossil fuels. Accordingly, domestic emissions are projected to flatline or continue increasing under current policies (Climate Action Tracker 2022c).

Overall, most countries are rated within the medium-low category, which is indicative of a lack of widespread political will and hence adoption and implementation of strong climate policies across countries generally.

Table 5. National climate policy rating.

Country	National climate policy rating (CCPI 2022)
Australia	Very weak
Brazil	Weak
China	Medium
Colombia	Medium
Ecuador	Not applicable
EU	Medium
India	Medium
Indonesia	Weak
Iran	Medium
Japan	Weak
Mexico	Weak
Morocco	Strong
Nigeria	Not applicable
Norway	Medium
Russia	Very weak
Saudi Arabia	Weak
South Africa	Weak
Turkey	Weak
US	Weak
Vietnam	Weak

4.4.2 Main emission sources and policy coverage

Although one could measure policy output by simply tallying the number of policies a country has adopted, this number does not say much about the coverage of such policies. Therefore, we look at the extent to which the policy coverage in a country reflects its emissions sources. However, we assess whether policies are in place, not how well they are implemented or enforced. Table 6 identifies the three main emission sources in each country, which are obtained from Climate Watch (2022). We juxtapose the main emission sources

against policy coverage rating across five main sectors: electricity/heat, industry, buildings, land transport, and agriculture/forestry. The number of policies for each sector is also provided, although this is not indicative of the policy coverage rating. To identify policy coverage – which is rated on a scale from very good to very poor – we employ the methodology used by the Climate Policy Database (2022), which refers to a matrix of key policy options for each of the five sectors. National policies are checked against these policy options – for example the existence of a renewable energy target for the electricity sector – to calculate the overall policy coverage rating. The coverage indicator reflects the share of policy options with relevant policies in force. The Climate Policy Database measures coverage can seem inconsistent with the scores of the CCPI national climate policy due to the use of different methodologies. Whereas the Climate Policy Database checks whether policies cover specific emission sources, the CCPI aims at assessing the strength of key climate policies.

Countries differ greatly in terms of policy coverage. In some countries, the policy coverage matches their main emission sources to a considerable extent. For example, Brazil's main emission sources are agriculture, land-use change and forestry, and transportation. As shown by Table 6, Brazil receives a "very high" policy coverage rating in its agriculture/forestry and land transport sectors. Other countries, such as India, Japan, Mexico, South Africa, and the EU achieve a combination of very good and good ratings in terms of the policy coverage in relation to their main emission sources.

In a number of countries, however, the policy coverage does not reflect the main emission sources well. For example, Ecuador has a very poor policy coverage rating across all five sectors. Similarly, Morocco receives a policy coverage rating of poor, very poor and poor in relation to its main emission sources of electricity and heat, transportation and agriculture. There are also several countries whose policy coverage overlaps with some of their main emission sources, but not others. For example, in Australia, the two main sources of emissions (electricity/heat and agriculture) achieve a low and very-low rating in terms of their respective policy coverage. Meanwhile, its third main source of emissions (transportation) receives a very high rating for land transport policy coverage. This trend is reflected across multiple countries, such as Saudi Arabia, where electricity and heat, and industrial emissions are only "fairly" covered. This renders full implementation of the NDC less likely.

Of the 20 case studies, only the EU achieves a combination of very good and good ratings in all sectors. None of our cases achieves a very good rating across all of the five sectors, which is indicative of the lack of robust climate policies to implement NDCs. The ratings throughout the remaining 19 countries include at least one sector that scores fair, if not poor or very poor. Accordingly, we find that over half of the case study countries' main sources of emissions are not sufficiently covered by policy.

Table 6. Main emission sources and corresponding policy coverage.

Country	Main emission sources	Number of policies and overall policy coverage rating				
		Electricity/ heat	Industry	Buildings	Land transport	Agriculture/ forestry
Australia	1) Electricity & heat 2) Agriculture 3) Transportation	29	24	25	21	5
Brazil	1) Agriculture 2) Land-use change & forestry 3) Transportation	20	18	11	21	20
China	1) Electricity & heat 2) Industrial processes 3) Transportation	62	39	26	32	20
Colombia	1) Land-use change & forestry 2) Agriculture 3) Transportation	17	12	10	10	4
Ecuador	1) Land-use change & forestry 2) Transportation 3) Agriculture	1	1	0	1	1
EU	1) Electricity & heat 2) Transportation 3) Buildings	36	31	18	43	13
India	1) Electricity & heat 2) Agriculture 3) Transportation	41	17	31	30	23
Indonesia	1) Land-use change & forestry 2) Electricity & heat 3) Agriculture	32	15	14	21	33
Iran	1) Electricity & heat 2) Transportation 3) Buildings	7	1	2	1	0
Japan	1) Electricity & heat 2) Transportation 3) Buildings	42	30	35	42	12
Mexico	1) Electricity & heat 2) Transportation 3) Agriculture	30	12	29	18	12
Morocco	1) Electricity & heat 2) Transportation 3) Agriculture	11	5	2	1	3

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Country	Main emission sources	Number of policies and overall policy coverage rating				
		Electricity/ heat	Industry	Buildings	Land transport	Agriculture/ forestry
Nigeria	1) Agriculture 2) Transportation 3) Land-use change & forestry	9	4	1	4	6
Norway	1) Electricity & heat 2) Transportation 3) Agriculture	13	8	12	20	1
Russia	1) Electricity & heat 2) Transportation 3) Buildings	13	10	15	10	3
Saudi Arabia	1) Electricity & heat 2) Transportation 3) Industrial processes	11	5	7	7	6
South Africa	1) Electricity & heat 2) Transportation 3) Buildings	18	13	18	18	9
Turkey	1) Electricity & heat 2) Transportation 3) Buildings	25	15	22	17	15
US	1) Electricity & heat 2) Transportation 3) Buildings	112	49	56	81	20
Vietnam	1) Electricity & heat 2) Agriculture 3) Industrial processes	17	5	3	4	8

Data on main emission sources from Climate Watch and policy coverage from the Climate Policy Database.

4.4.3 Carbon pricing and fossil fuel subsidies

Carbon pricing has become more common around the world. The World Bank (2022b) reports that 13 countries among our case studies employ either a market-based emission trading system, a carbon tax, or both at the same time. This seems to suggest that carbon pricing has become a common policy to reduce greenhouse gas emissions. Carbon pricing reduces emissions by making renewable and low-emission energy more competitive compared to fossil fuels and sends a strong message to investors that it is worth it to invest in climate-friendly technologies and practices. The OECD measures this as a *carbon pricing score* (CPS), which includes the pricing of carbon either through emission permit pricing, carbon taxation, and/or fuel excise taxes. The higher the value of CPS, the more emissions from energy use the country puts a price on at €60 within its territory. Essentially, a carbon pricing score of 100% against a €60 per tonne of CO_2 means that all emissions are priced at a level that equals or exceeds the benchmark of €60 (OECD 2021).

The frontrunners among our list of cases with the highest effective carbon rates (at €60 per tonne of CO_2) in 2021 are Norway (68%), the EU (44%), and Mexico (30%). Norway implemented CO_2 taxes on mineral oil and petrol already in 1991 and carbon taxes on natural gas and LPG in 2010. Norway plans to triple its carbon tax from NOK 590 (~€57) per ton to NOK 2000 (~€192) per ton by 2030 (Norwegian Ministry of Climate and Environment 2019). Norway also shares the EU's carbon market, the EU ETS, which earned above €14 billion in 2020 and covers 39% of the EU's GHG emissions at an average price of USD 32.46 /tCO_2e and (Postic and Fetet 2021). The Mexican carbon tax entered into force in January 2014 as an upstream system requiring producers or importers of fossil fuel products to pay a fuel-specific tax rate when importing or selling fossil fuels. However, the tax rate has remained the same, lying at a maximum of 3 USD/tCO_2e, since its introduction (World Bank 2022b). Nonetheless, in 2020, the carbon tax generated USD 216 million of revenues (Climate Transparency 2021). Conversely, we find that the countries with the lowest effective carbon rates are members of the BRICS: Brazil (1%), Russia (7%), China (9%), India (13%), and South Africa (13%). Nevertheless, they have implemented some types of carbon pricing measures, which is not the case for most countries in the world (Postic and Fetet 2021).

On the side of financing in favour of the use of non-renewable energy sources, fossil fuel subsidies can act as a "negative carbon price" (OECD 2021; Skovgaard and van Asselt 2019; World Bank 2019, 42). Subsidies for fossil fuels can take many forms, such as direct budgetary transfers, induced transfers or tax expenditures. The beneficiaries can be consumers, such as subsidies for liquid fuels, and producers, by propping up existing fossil fuel production or new capital investments (Erickson et al. 2020). Countries also subsidise fossil fuels in terms of funds for private and public services, and infrastructure that assists fossil-fuel production or consumption in the long term. We analyse fossil fuel subsidies by using data from the OECD and IISD's Fossil Fuel Subsidy Tracker (2022). Subsidies of fossil fuels, however, are especially common among major fossil fuel exporting countries, such as Saudi Arabia, Iran and Indonesia. In 2020, Saudi Arabia spent USD 27.3 billion or 0.02% of its GDP on subsidies for the domestic consumption of fossil fuels. In the same year China distributed USD 28 billion, which makes up 0.002% of its GDP. In total, Iran provided the most subsidies to fossil fuels per GDP, distributing USD 29.6 billion or 0.07% of its GDP on non-renewable fuel sources in 2020. We find that the EU, Vietnam, and Japan provided the least fossil fuel subsidies as a share of their economy in 2018 among our cases.

The World Bank and the OECD, however, employ data sources and methodologies, which can result in disparate findings. For instance, while Vietnam is to establish a carbon market, the OECD does not maintain data on carbon pricing in the country. Similarly, while Australia and Russia do not employ

implicit carbon pricing instruments according to World Bank's methodology, they utilize fuel excise taxes, which are included in OECD's carbon pricing score.

Table 7. National climate policy rating, carbon pricing and fossil fuel subsidies.

Country	Carbon pricing instrument (WB 2022)	Carbon Pricing Score (OECD 2021)	Fossil fuel subsidies per GDP (%, 2020)
Australia	None* (Fuel excise taxes)	20%	0,0049%
Brazil	ETS	1%	0,0034%
China	ETS	9%	0,0019%
Colombia	ETS & carbon tax	25%	0,0028%
Ecuador	None	NA	0,0076%
EU	EU ETS	44%	0,0001%[3]
India	None	13%	0,0028%
Indonesia	ETS & carbon tax	2%	0,0163%
Iran	None	NA	0,0734%
Japan	ETS & carbon tax	24%	0,0007%
Mexico	ETS pilot & carbon tax	30%	0,0103%
Morocco	carbon tax	NA	0,0008%
Nigeria	None	NA	0,0008%
Norway	EU ETS & carbon tax	68%	0,0008%
Russia	None	7%	0,0065%
Saudi Arabia	None	NA	0,0261%
South Africa	carbon tax	13%	0,0143%
Turkey	ETS	24%	0,0033%
US	state-level ETS	22%	0,0045%
Vietnam	ETS	NA	0,0005%

The data carbon pricing instruments is derived from the World Bank (2021), the carbon pricing score from the OECD (2021) and fossil fuel subsidies from the OECD's Fossil Fuel Subsidy Tracker (2022). Different sources of data may lead to dissimilar results.

[3] Mean fossil fuel subsidies provided by EU Member States divided by the GDP of the EU in 2020.

4.5 Embeddedness in legislation

4.5.1 Adoption of laws and framework legislation

All parties to the Paris Agreement have developed laws[4] to address climate change. While some of these exclusively focus on climate change, others are indirectly relevant to climate change, for instance general environmental laws. In 2021, the total number of climate-related laws globally was 1,800, ranging from legislation to executive orders (S. Eskander, Fankhauser, and Setzer 2021).

While these laws differ in terms of their ambition and scope, all countries have adopted at least one climate-related law. Some countries are more comprehensive lawmakers than others, as shown by Table 8. However, just like the number of policies do not tell the full story, the number of laws is not necessarily indicative of a country's climate ambition or progress, particularly in the context of NDC implementation. The question is not about *how many* laws have been adopted, but rather their *quality*. While the number of climate laws in a country is arguably indicative of a certain level of policy engagement, this does not mean that these laws are necessarily stringent or comprehensive (S. Eskander, Fankhauser, and Setzer 2021).

The translation and mainstreaming of NDCs into national law are vital for implementation, in particular, the adoption of framework legislation with binding targets. A number of these laws do not, however, incorporate binding targets. As Table 8 shows, not all of our case study countries, such as Indonesia and India, have adopted framework legislation. While these countries have not implemented framework legislation with binding commitments, however, both have established national action plans that are designed to exclusively address climate change. Similarly, China has not adopted any framework legislation as such, but has developed its 14th Five-Year Plan (2021–2025), which includes provisions that reiterate the pledges made in its NDC.

While all these developments are important, Table 8 demonstrates that some risks remain. Translating pledges into legislated targets could reduce implementation risks by providing for a degree of certainty and, for some countries, the possibility of enforcement. Some countries, such as Norway, have embedded their NDC targets into framework legislation. In its NDC, Norway pledges to reduce its greenhouse gas emissions by at least 50% and towards 55% by 2030 compared to 1990 levels. This target is explicitly replicated in Section 3 of its Climate Change Act. On the other hand, some countries have adopted framework legislation but have failed to integrate their NDC targets into these, such as Brazil and Nigeria.

[4] According to the Climate Change Laws of the World database, laws are classified as such if they were "enacted by the legislative … branch of government". See https://climate-laws.org/methodology-legislation.

Table 8. Number of laws, framework legislation and inclusion of quantifiable NDC targets.

Country	Number of laws	Has framework legislation been adopted?	Are (quantifiable) NDC targets included in framework legislation?
Australia	12	Climate Change Bill 2022	Yes
Brazil	18	Law 12.187/2009, establishing the National Policy on Climate Change	No
China	7	No binding legislation (but see 14th Five-Year Plan)	Not applicable
Colombia	11	Climate Action Law (2021)	Yes
Ecuador	4	No binding legislation (but see National Strategy on Climate Change 2012-2025)	Not applicable
EU	46	Regulation (EU) 2021/1119 establishing European Climate Law	Yes
India	5	No binding legislation (but see National Action Plan on Climate Change)	Not applicable
Indonesia	6	No binding legislation (but see National Action Plan Addressing Climate Change 2007)	Not applicable
Iran	7	No binding legislation (but see National Strategic Plan on Climate Change)	Not applicable
Japan	21	No	Not applicable
Mexico	10	General Law on Climate Change	Yes (unconditional target)
Morocco	8	No binding legislation (but see National Plan Against Climate Change)	Not applicable
Nigeria	2	Nigeria's Climate Change Act	No
Norway	13	Climate Change Act (2017)	Yes
Russia	2	No binding legislation (but see Climate Doctrine of the Russian Federation)	Not applicable
Saudi Arabia	0	No	Not applicable
South Africa	6	No	Not applicable
Turkey	10	No binding legislation (but see Climate Change Action Plan 2011-2023)	Not applicable
US	17	No	Not applicable
Vietnam	4	No	Not applicable

Data on the number of laws from Climate Change Laws of the World database (LSE Grantham Research Institute 2022).

4.6 Institutional output

Table 9 lists institutions in each country that are intentionally created to address climate change and summarises their main tasks and goals. We identify three types of institutional output that may overlap in several countries: new institutions that are purpose-built to tackle climate change, institutional mainstreaming/layering of climate issues in several different institutions, and countries that have neither established purpose-built institutions nor implemented layering.

First, there are several cases of purpose-built institutions. For instance, the so-called “super ministry”, the Ministry of Ecology and Environment (MEE), was established in China in 2018 to oversee environmental issues. Climate was folded into MEE’s portfolio, along with the management of traditional air and water pollutants. MEE is now in charge of both international and domestic climate policy (Lewis 2020). Furthermore, the National Development and Reform Commission is the highest-level climate policy agency since 2020 and takes charge of carbon peaking and neutrality, while the National Leading Group on Climate Change Response, Energy Conservation, and Emissions Reduction is a cross-ministry approach to climate policy at state council. In the EU, a purpose-built institution, the Directorate-General for Climate Action (DG CLIMA) leads the European Commission’s work on addressing climate change at the EU and international level. In addition, a recently established European Scientific Advisory Board on Climate Change provides advice on future EU climate policies, while the European Environmental Agency provides independent information and the European Climate, Infrastructure and Environment Executive Agency supports the European Green Deal (EEA 2022; EC 2022). In another example, Morocco has founded new institutions, such as the Moroccan Agency for Sustainable Energy and a Research Institute for Solar Energy and New Energies to support Morocco’s energy transition. In Nigeria, several institutions, such as the National Council on Climate Change, the Department of Climate Change and the National Council on Environment have been established (Climate Action Tracker 2022b). The Indonesian government has developed purpose-built institutions for particular issues and tasks, such as the Peat and Mangrove Restoration Agency, or the Indonesian Environment Fund, which is the financing mechanism for climate- and environment-related activities.

Second, we find several cases of institutional layering that are frequently combined with the establishment of new institutions. Colombia is such an example, where the strong involvement of territories and local actors is common in climate policymaking (Granados et al. 2020). Here, the responsibility is spread around different ministries, while the Intersectoral Commission on Climate Change is the leading body on intersectoral coordination. There are also indications of layering in Mexico. Here, the responsibility on climate action is spread across several bodies, such as the National Climate Change System, the Inter-Ministerial Commission on Climate Change, the National Institute for Ecology and Climate Change and the Council on Climate Change. Similarly, the US represents a clear example of layering, since the institutional framework has not changed fundamentally in the past three decades, and only minor reforms have been implemented for interdepartmental cooperation (Mildenberger 2021, 71–72). Institutions emerged in the US mainly through layering, where instead of institutional displacement or conversion the mandates of existing institutions have been extended. The White House has become the focal point of climate policy under the Biden Administration, as a result of layering climate governance into the federal executive branch (Mildenberger 2021, 78, 84).

Finally, some countries, such as Australia, Russia and Saudi Arabia, feature no purpose-built institutions to address climate change. Although Australia has established the Climate Change Authority, it is an independent statutory body that works on climate change mainly through research and reviews (Climate Action Tracker 2022a). The suppression of the establishment of climate institutions reflects the unwillingness of the former Morrison government to adopt climate policies and laws (Crowley 2021, 5).

Table 9. Institutional approach to climate action.

Country	Institutional approach
Australia	No purpose-built institutions
Brazil	Purpose-built institutions
China	Purpose-built institutions
Colombia	Purpose-built institutions along with layering
Ecuador	Purpose-built institutions along with layering
EU	Purpose-built institutions
India	Purpose-built institutions
Indonesia	Purpose-built institutions
Iran	Purpose-built institutions
Japan	Purpose-built institutions
Mexico	Purpose-built institutions along with layering
Morocco	Purpose-built and repurposed institutions
Nigeria	Purpose-built institutions
Norway	Purpose-built institutions
Russia	No purpose-built institutions
Saudi Arabia	No purpose-built institutions
South Africa	Purpose-built institutions
Turkey	Purpose-built institutions along with layering
United States of America	Layering
Vietnam	Purpose-built institutions

4.7 Monitoring and enforcement

4.7.1 Monitoring

We cover the countries' level of monitoring with the Transparency Adherence Index (TAI), which accounts for the frequency of engagement with reporting and adherence to UNFCCC reporting standards (Weikmans and Gupta 2021). Higher index scores represent higher levels of transparency adherence. Engagement with UNFCCC reporting standards is assessed based on the submission of four Biennial Reports (BRs) by developed countries and the four Biennial Update Reports (BURs) by developing countries to the UNFCCC. Adherence to reporting standards is based on summary assessments of adherence in the technical reports of B(U)Rs. Countries are also required to submit national reports to the UNFCCC on measurement, reporting, and verification (MRV) efforts in order to "build mutual trust and confidence and to promote effective implementation" (UNFCCC 2015). The country results are divided into two groups based on their designation as either Annex I (developed countries with an obligation to provide support) and non-Annex I countries (developing country parties), which are not comparable due to differing reporting requirements.

According to the TAI, we find that among the Annex I countries, Australia and the EU are some of the most dutiful adherents to the mandatory reporting standards of the UNFCCC. Australia maintains a

mandatory National Greenhouse and Energy Reporting Program to monitor the GHG emission of companies (Australian Government 2022). In the case of the EU, Member States send in their GHG inventories to the European Environment Agency, which are compiled at the EU level. The EU also keeps a comprehensive database on Member States' mitigation measures. The Annex I country in our sample that adheres the least to transparency requirements is Russia, which does not have a dedicated domestic MRV system.

With regard to non-Annex I countries, Brazil and Colombia are among the countries that score the highest for the overall transparency index. Brazil's MRV system consists of national GHG inventories, monitoring and evaluation systems, while Colombia's MRV system focuses on national and regional GHG inventory systems and the voluntary corporate reporting program (Government of Colombia 2018). Among non-Annex I countries, Saudi Arabia and Mexico score the lowest on the overall TAI. In Saudi Arabia, we do not find examples of clear monitoring bodies for Paris targets. However, in Mexico, an evaluation of the Special Climate Change Programme 2014-2018 (PECC) argued that it lacked guidelines, criteria or guidance for measuring, reporting and verification of the climate actions. The multitude of elements (objectives, baselines) contained in the former PECC has been identified as one key barrier to its monitoring and evaluation (CICC 2021).

Table 10. Transparency Adherence Index and Regulatory Enforcement Index.

Country	Party group	Transparency Adherence Index (2021)	Regulatory Enforcement (2021)
Australia	Annex I	93	0.81
Brazil	Non-Annex I	88	0.49
China	Non-Annex I	63	0.49
Colombia	Non-Annex I	86	0.52
Ecuador	Non-Annex I	NA	0.48
EU	Annex I	91	0.75
India	Non-Annex I	73	0.48
Indonesia	Non-Annex I	78	0.55
Iran	Non-Annex I	*NA*	0.45
Japan	Annex I	88	0.79
Mexico	Non-Annex I	45	0.44
Morocco	Non-Annex I	*NA*	0.53
Nigeria	Non-Annex I	89	0.43
Norway	Annex I	83	0.88
Russia	Annex I	78	0.48
Saudi Arabia	Non-Annex I	33	*NA*
South Africa	Non-Annex I	62	0.55
Turkey	Annex I	75	0.41
US	Annex I	90	0.71
Vietnam	Non-Annex I	74	0.44

4.7.2 Enforcement

In Table 10, we also examine overall enforcement based on the World Justice Project's (WJP) "regulatory enforcement" indicator of the Rule of Law Index from 2021, which measures the extent that regulations are enforced fairly and effectively (WJP 2022). The indicator covers both legal and administrative regulations regarding environmental, but also commerce, labour and consumer protection, and public health. The indicator is presented on a scale, where "0" signifies a lack of regulatory enforcement and "1" full regulatory enforcement. The data on regulatory enforcement is collected based on questionnaires, which are administered to more than 300 potential local experts and the general public through local polling companies based on five questions. The respondents are asked whether government regulations are effectively enforced; whether the enforcement of regulations is subject to bribery or corruption; whether public services are provided without bribery; whether administrative proceedings are conducted without unreasonable delay; whether the due process of law is respected in administrative proceedings, and the government refrains from the illegal seizure of private property, or provides adequate compensation when property is legally expropriated.

The findings show that regulations are most fairly and effectively enforced in Norway, Australia, and Japan, while the least fairly and effectively enforced in Turkey, Nigeria, Vietnam, and Mexico. The latter performs satisfactorily both in terms of monitoring and enforcement. Hence, we can also expect that effective and fair implementation of climate action is more likely in the former group and less likely in the latter group.

Among the countries with high levels of regulatory enforcement, in Norway the Ministry of Climate and Environment is the overarching authority for monitoring the implementation of climate change policies, while compliance and reporting requirements under the emissions trading schemes are reported to the Norwegian Environment Agency (Norwegian Ministry of Climate and Environment 2018, 81, 189). The 2017 Climate Change Act introduced a five-year review system of Norway's climate targets and an annual reporting mechanism, whereas the government must submit up to date information on the progress towards the targets to the Parliament (ibid., 81). Australia employs a number of systems to monitor GHG emissions, such as the National Greenhouse and Energy Reporting, the Australian Greenhouse Emissions Information System's online database, and Australia's national inventory. However, Australia focuses on low-emissions technologies for implementation, instead of measures that require high levels of monitoring and enforcement, such as carbon taxes and emissions trading systems (Department of Industry 2022). Japan also ranks highly in terms of regulatory enforcement, and collects data on GHG part of several systems: Mandatory Greenhouse Gas Accounting and Reporting System, based on the Accounting and Reporting System of the Partial Revision of the Act on Promotion of Measures to Cope with Global Warming and the Act on the Rational Use of Energy (Green Finance Platform 2021). The Greenhouse Gas Inventory Office of Japan compiles the annual GHG inventory and provides the technical review of the Japanese national inventory for the UNFCCC.

4.7.3 Inclusion of quantified GHG targets in NDCs

We also note that the inclusion of quantified GHG targets in NDCs is the first step to effective monitoring and enforcement. By setting explicit reduction goals, countries can monitor their progress against measurable and time-bound targets. Hence, the submission of non-quantitative emission targets can hamper implementation in the future due to a lack of a transparent overview or may signal weaker political willingness to implement pledges (Pauw et al. 2018).

All new and updated NDCs currently contain elements to limit or reduce domestic emissions. Accordingly, all countries have set climate change mitigation commitments. While countries define their own NDCs and mitigation commitments, however, the Paris Agreement does encourage the inclusion of emission reduction targets within NDCs, specifically from developed countries who are expected to "tak[e] the lead" (Article 4(4)). As Table 11 indicates, the majority of countries have included emission reduction targets in their NDCs. Of the 20 case studies, 17 countries plus the EU have tied their NDC to a quantified GHG target.

However, there are some countries that have not yet incorporated quantified reduction targets into their NDCs. Instead, these countries have adopted commitments to reduce deforestation or increase renewable energy for example. Table 11 shows that neither Ecuador nor Saudi Arabia have included a quantified GHG target in their NDC. However, both do include commitments within their NDCs to increase their supply of renewable energy. For example, Saudi Arabia commits to a non-GHG target of renewable energy reaching around 50% of the energy mix by 2030. Nevertheless, the number of countries that have included GHG targets has increased from the first-round of NDCs submitted (Fransen, Ge, and Huang 2021).

Table 11. Inclusion of quantified GHG targets in NDCs.

Country	Does the NDC include a quantified GHG target?	If yes, what is the GHG target?
Australia	Yes	Reduce greenhouse gas emissions 43% below 2005 levels by 2030.
Brazil	Yes	Reduce emissions from 2005 levels by 37% in 2025, and by 50% in 2030.
China	Yes	Aims to have CO_2 emissions peak before 2030 and achieve carbon neutrality before 2060. China will also lower its CO_2 emissions per unit of GDP by over 65% from the 2005 level.
Colombia	Yes	Maximum of 169.44 $MtCO_2e$ in 2030 (equivalent to 51% reduction compared to business-as-usual (BAU)) Reduce black carbon emissions by 40% compared to 2014 in 2030.
Ecuador	No	Not applicable.
EU	Yes	At least 55% reduction in greenhouse gas emissions by 2030 compared to 1990.
India	Yes	Commits to reducing its emissions intensity by 45% by 2030 compared to 2005 levels.
Indonesia	Yes	29% (unconditional) and up to 41% (conditional) by 2030 compared to the BAU scenario; 26% (unconditional) reduction in GHG emissions by 2020 compared to the BAU scenario.
Iran	Yes (INDC)	4% (unconditional) up to 12% (conditional) reduction in GHG emissions by 2030 compared to the BAU scenario.
Japan	Yes	Commits to reduce GHG emissions by 46% by 2030 compared to 2013 levels.
Mexico	Yes	Unconditionally, 22% reduction in GHG and 51% reduction in Black Carbon for the year 2030 compared to BAU scenario. Conditionally, GHG reductions could increase up to 36%, and black carbon reductions to 70% in 2030.
Morocco	Yes	Reduce GHG emissions by 18.3% (unconditional) and 45.5% (conditional) in 2030, compared to the BAU scenario.
Nigeria	Yes	Commits to reduce GHG emissions by 20% (unconditional) and 47% (conditional) by 2030 compared to BAU.
Norway	Yes	At least 50% and towards 55% reduction in greenhouse gas emission by 2030 compared to 1990 levels.
Russia	Yes	A reduction in greenhouse gas emissions by 2030 to 70 percent relative to the 1990 level.
Saudi Arabia	No	Not applicable.
South Africa	Yes	Commits to reducing its GHG emissions to 398-510 $MtCO_2e$ by 2025, and to 350-420 $MtCO_2e$ by 2030.
Turkey	Yes	Up to 21% reduction in GHG emissions by 2030 compared to the BAU level.
US	Yes	Economy-wide target of reducing net greenhouse gas emissions by 50-52% below 2005 levels in 2030.
Vietnam	Yes	Unconditional contribution: With domestic resources, by 2025 reduce total GHG emissions by about 7.3% compared to the BAU scenario and by 2030 reduce total GHG emissions by about 9% compared to the BAU scenario. Conditional contribution: The above-mentioned 9% contribution can be increased to 27% by 2030.

5 Synthesis

Table 12. Overview of implementation risk at the country level.

Country	Criterion 1: track record	Criterion 2: interest groups	Criterion 3: resources	Criterion 4: policy	Criterion 5: legislation	Criterion 6: institutions	Criterion 7: monitoring & enforcement
Australia	Medium risk	Medium risk	Low risk	High risk	Low risk	High risk	Low risk
Brazil	High risk	Medium risk	Medium risk	Low risk	Medium risk	Low risk	Medium risk
China	Medium risk	High risk	Medium risk	Low risk	Medium risk	Low risk	Medium risk
Colombia	Low risk	Medium risk	Medium risk	Medium risk	Low risk	Low risk	Medium risk
Ecuador	Medium risk	Medium risk	Low risk	High risk	Medium risk	Low risk	High risk
EU	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk
India	Low risk	Medium risk	Medium risk	Low risk	Medium risk	Low risk	Medium risk
Indonesia	Low risk	Medium risk	Medium risk	Medium risk	Medium risk	Low risk	Medium risk
Iran	Medium risk	High risk	Medium risk	High risk	Medium risk	Low risk	Medium risk
Japan	Medium risk	Medium risk	Low risk	Low risk	High risk	Low risk	Low risk
Mexico	High risk	Medium risk	Medium risk	Low risk	Low risk	Low risk	High risk
Morocco	Low risk	Medium risk	Low risk	Medium risk	Medium risk	Low risk	Medium risk
Nigeria	Medium risk	Medium risk	Medium risk	High risk	Medium risk	Low risk	High risk
Norway	Low risk	Medium risk	Low risk	Medium risk	Low risk	Low risk	Low risk
Russia	Medium risk	Medium risk	Medium risk	High risk	Medium risk	High risk	Medium risk
Saudi Arabia	High risk	High risk	Medium risk	High risk	High risk	High risk	High risk
South Africa	Medium risk	Low risk	Medium risk	Low risk	High risk	Low risk	Medium risk
Turkey	Medium risk	Medium risk	Medium risk	Medium risk	Medium risk	Low risk	High risk
US	High risk	Low risk	Low risk	Medium risk	High risk	Low risk	Low risk
Vietnam	Medium risk	Medium risk	Low risk	Medium risk	High risk	Low risk	High risk

First, to analyse risks related to the *track record* criterion, we assessed the achievement of prior climate targets, the existence of major climate policy reversals, and countries' overall climate performance and national climate policy ratings of the CCPI. We defined our cases as "low risk" for track record when they ranked high on all aspects of the track record criterion and "high risk" when they scored very low among all aspects of the criterion. For instance, Brazil, Japan, Mexico, Saudi Arabia, and the US are all ranked "high risk", since they all ranked low for three of the indicators: either did not achieve their Kyoto targets (if Annex I), have a history of major climate policy reversals, and/or ranked relatively low on indicators of climate change performance, which makes their implementation efforts more insecure. We assign Colombia, the EU, India, Indonesia, Morocco, and Norway to the low-risk group due to a lack of historical climate policy repeals and relatively high climate policy scores. All other intermediate cases are coded as "medium risk".

Second, we assessed the role of implementation risks associated with the influence of *domestic interest groups*, such as industry lobbies and civil society groups. We analysed this based on measures of

V-Dem's civil society index, the value added by industry to the national economy, and the inclusion of stakeholder engagement in the development process of the NDC. We coded China, Iran, and Saudi Arabia as the countries with the highest risks, since they boast large high-emitting industries, maintain weak civil societies and did not engage with the opinions of stakeholders during the development of their NDCs. Conversely, we defined the EU, South Africa, and the US are defined as "low risk" since they nurture a robust civil society, retain relatively small high-emitting industries, and have engaged with key stakeholders for the development of their NDCs. The rest of the countries, with either large industries and strong civil societies or vice versa, and references to stakeholder consultations in their NDCs, were classified as "medium risk".

Third, we assessed the role of *resources* dedicated to implementation. We compared the receipt of international climate finance for the developing countries among our cases. While the members of the OECD among our cases acted as climate finance providers, the developing countries were recipients. We find that while some countries tend to receive more international climate finance per GDP, such as Morocco, Ecuador, and Vietnam, it is difficult to compare this finding for risks pertaining to countries that provide climate finance in the first place. Large medium-income countries, such as Iran, China, and Mexico are among the cases that receive the least climate finance per GDP in our sample. Unfortunately, we have a lack of information on government budgets for climate action as part of our assessment of the risks associated with the implementation of the NDCs. We coded the providers of climate finance and countries that have received a large share of climate finance (% of GDP) as "low risk". The rest of the cases are designated as "medium risk".

Next, we assessed the risks associated with *policy output* dedicated for the implementation of NDC targets. More specifically, we looked at the national climate policy indicator of the CCPI, whether the main emission sources in each country are sufficiently covered by climate change mitigation policies, at what price countries price carbon, and to what extent they provide subsidies for the producers and users of fossil fuels. Cases that had "medium" to "strong" national policy scores, had all the main emission sources are covered by policies with a policy rating of "good" or "very good", and had implemented carbon pricing were defined as "low risk". Cases where the rating for the national climate policy indicator was "very weak", and the policy coverage of the main emission sources were poor or very poor and had not implemented carbon pricing are coded as "high risk". All intermediate cases were defined as "medium risk". We find that Australia, Ecuador, Indonesia, Iran, Nigeria, and Saudi Arabia are among the most uncertain cases of future NDC implementation due to a low national climate policy rating, an insufficient policy coverage of key GHG emissions sources, a lack of carbon pricing instruments, and/or high levels of state subsidies afforded for fossil fuels. At the same time, Brazil, the EU, and Mexico have higher national climate policy scores, covered their main GHG emission sources with climate policies, doing the most to price carbon, and/or provide less fossil fuel subsidies per GDP. Other cases that rank high for some indicators and low for others are coded "medium risk".

With regard to *embeddedness in legislation*, we accounted for the adoption of framework legislation for climate change and the existence of, possibly quantifiable, NDC targets included in the framework legislation. We find that these aspects provide a strong legal safeguard for NDC implementation. A number of our selected cases had adopted framework legislation for climate change, but only a few embraced NDC targets in framework legislation, which were defined as "low risk" countries. The cases of framework legislation with clear NDC targets include Australia's Climate Change Bill 2022, Colombia's Climate Action Law from 2021, the EU's Regulation 2021/1119, Mexico's 2012 General Law on Climate Change with an unconditional target, and Norway's Climate Change Act from 2017. We define the countries that have no framework legislation on climate change as "high risk", countries with

framework legislation (or similar) but without quantifiable targets are coded as “medium risk”, while countries with both framework legislation and quantifiable targets are coded as “low risk”.

The criterion on *institutional output* focused on the presence of purpose-built institutions for climate change, which have been established in many of our cases. We find that only a few countries, such as Australia, Russia, and Saudi Arabia have not created purpose-built climate change institutions and were, thus, coded as “high risk”. All other cases that exhibit the re-purposing of existing institutions, layering or the creation of new purpose-built institutions are defined as “low risk”. For instance, in some cases, we observe layering and mainstreaming, such as the US and Ecuador, where the mandates of existing institutions have been extended to cover climate policy issues, in lieu of the introduction of new institutions.

Finally, for *monitoring and enforcement*, we employed the Transparency Adherence Index by Weikmans and Gupta (2021) and the Regulatory Enforcement from the Rule of Law Index (WJP 2022). We also look at the inclusion of GHG targets in the latest NDCs. We define countries that rank very low in terms of TAI and regulatory enforcement as “high risk” and *vice versa* as “low risk”. In terms of transparency and regulatory enforcement, the highest-ranking cases with the lowest risk of implementation failure due to lack of monitoring and enforcement are high income democracies, such as Australia, the EU, Japan, Norway, and the US. The high-risk group consists of countries that score low in terms of transparency and regulatory enforcement, such as Ecuador, Mexico, Nigeria, Saudi Arabia, South Africa, Turkey, and Vietnam. In addition, the only countries in our sample that have not adopted GHG targets in their NDCs are Ecuador and Saudi Arabia. The rest of the cases that rank intermediate for all indicators were coded “medium risk”.

6 Conclusion

This study investigated the state of effective implementation and a potential implementation gap between current commitments and plausible climate actions. We analysed the implementation risks for seven criteria, which include the countries' track record, strength of interest groups, availability of resources for climate action, but also policy, legislative, and institutional output, and, finally, monitoring and enforcement. We defined cases as "low risk" when they ranked relatively strongly among all aspects of a single criterion, and "medium risk" when cases comparatively did not rank neither high nor low within a criterion. We assigned them in the category "high risk" when they tended to rank very weakly among all indicators of a single criterion.

Overall, we find that some parties to the Paris Agreement are at lower risk to fail to implement their NDC pledges than others. Most countries can be considered "low risk" for some criteria, while they are "high risk" for other criteria. Nevertheless, based on the presented data, we find that cases such as the EU and Norway are the most likely to successfully implement their NDC goals. There are no cases of clear low risk across all criteria, except for Saudi Arabia, which is categorised as "high risk" for six different criteria. This result supports previous findings based on expert surveys by Victor et al. (2022), who find that the EU ranks high both in terms of its level of climate ambition and the credibility of its targets, while Saudi Arabia is perceived to be both less ambitious and also less likely to comply with its NDC pledge. Similarly, Averchenkova and Bassi (2016) find the EU's climate commitments the most credible, while China, India, Indonesia, and Saudi Arabia would need further efforts to improve the credibility of their climate pledges. Analogously, previous research places many of the other cases in our study, such as Australia, Brazil, India, Japan, Mexico, Turkey, and South Africa, in the mid-range of the credibility scale (Averchenkova and Bassi 2016, Victor et al. 2022).

Our results point to several key conclusions. First, in line with studies pointing to an "implementation gap", we find that the full implementation of NDCs is highly unlikely. The majority of our selected cases exhibit implementation risks for a number of different criteria. This is problematic, as it calls into question the likelihood of a greenhouse gas emissions decline of at least 43 percent from 2019 levels by 2030, which according to the IPCC (2022) is needed to keep the 1.5°C goal within reach.

While these risks may be offset by factors outside the control of governments (e.g. technological breakthroughs), governments as well as international institutions ought to monitor these risks and develop strategies to mitigate them. This could be done in the context of the Technical Dialogue of the Global Stocktake (whose last meeting is scheduled for June 2023), where best practices in the implementation of mitigation actions can be discussed. A discussion of implementation risks may also become part of the Enhanced Transparency Framework established by Article 13 of the Paris Agreement, including through the submission of the first Biennial Transparency Reports in 2023/2024, their review by technical experts, and their "facilitative, multilateral consideration of progress". Much here will depend on how countries report their information, but Decision 18/CMA.1 provides minimum requirements in this regard. For example, it requires parties to "provide information on actions, policies and measures that support the implementation and achievement of its NDC …, focusing on those that have the most significant impact on GHG emissions or removals …". Parties are also required to "provide information on legal, institutional, administrative and procedural arrangements for domestic implementation, monitoring, reporting, archiving of information and stakeholder engagement related to the implementation and achievement of its NDC …" (UNFCCC 2018, paras. 62 and 80). This offers an entry point for the identification of progress (or the lack thereof) with regard to the criteria of policy output, embeddedness in legislation, institutions, as well as monitoring and enforcement. Providing information on

resources allocated to climate change mitigation action and on interest groups is not required of parties, meaning that efforts by researchers, civil society organisations and international organisations to collect information on these criteria will be needed.

Second, and related to the first point, while knowledge on NDC implementation has been gradually improving, it is still lacking in many crucial regards. For instance, access to information on government budgeting for climate action or on public finance for domestic clean energy production is still missing for most countries, which makes it difficult to assess and compare countries' financial investments in climate action. Thus, there is a need for more research that captures funding for implementation. Moreover, given that a government's prior track record and the influence of interest groups can give an indication of the potential volatility of implementation, further comparative research on these factors could help shed light on the likelihood of such risks materialising (again) in the future. Moreover, to reduce the risks of interest group opposition, it is important to ensure greater buy-in and acceptance of the NDC targets and their associated policies through stakeholder engagement in the development of NDCs (Peterson et al. 2022).

Finally, we note that the study is limited regarding comparative data for some criteria. Improvement in the collection of comparative data and enhanced transparency on several of the criteria and indicators would help policymakers and researchers better understand potential NDC implementation risks. Future data gathering efforts could focus on domestic determinants of NDC implementation. While we know that domestic politics matters for climate action, we lack systematic data from a wide range of countries, for instance, on the effectiveness of institutional arrangements (e.g., are purpose-built institutions or layered institutions more effective, and under what conditions?), but also the influence of lobbies for and against climate action.

Having said that, we find that despite these limitations our assessment provides a fruitful first look at describing potential risks to NDC implementation. This is especially relevant now that the Global Stocktake is underway to assess global collective progress towards achieving the long-term goals of the Paris Agreement.

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NDC ASPECTS project has received funding from the European Union's Horizon 2020 Research and Innovation programme under grant agreement No 101003866

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