

Are G20 Countries Delivering on Climate Goals?

Tracking Progress on Commitments to Strengthen the Paris Agreement

Simran Sukhija, Jhalak Aggarwal, Sumit Prasad, Mohana Bharathi Manimaran, and Ushashi Datta

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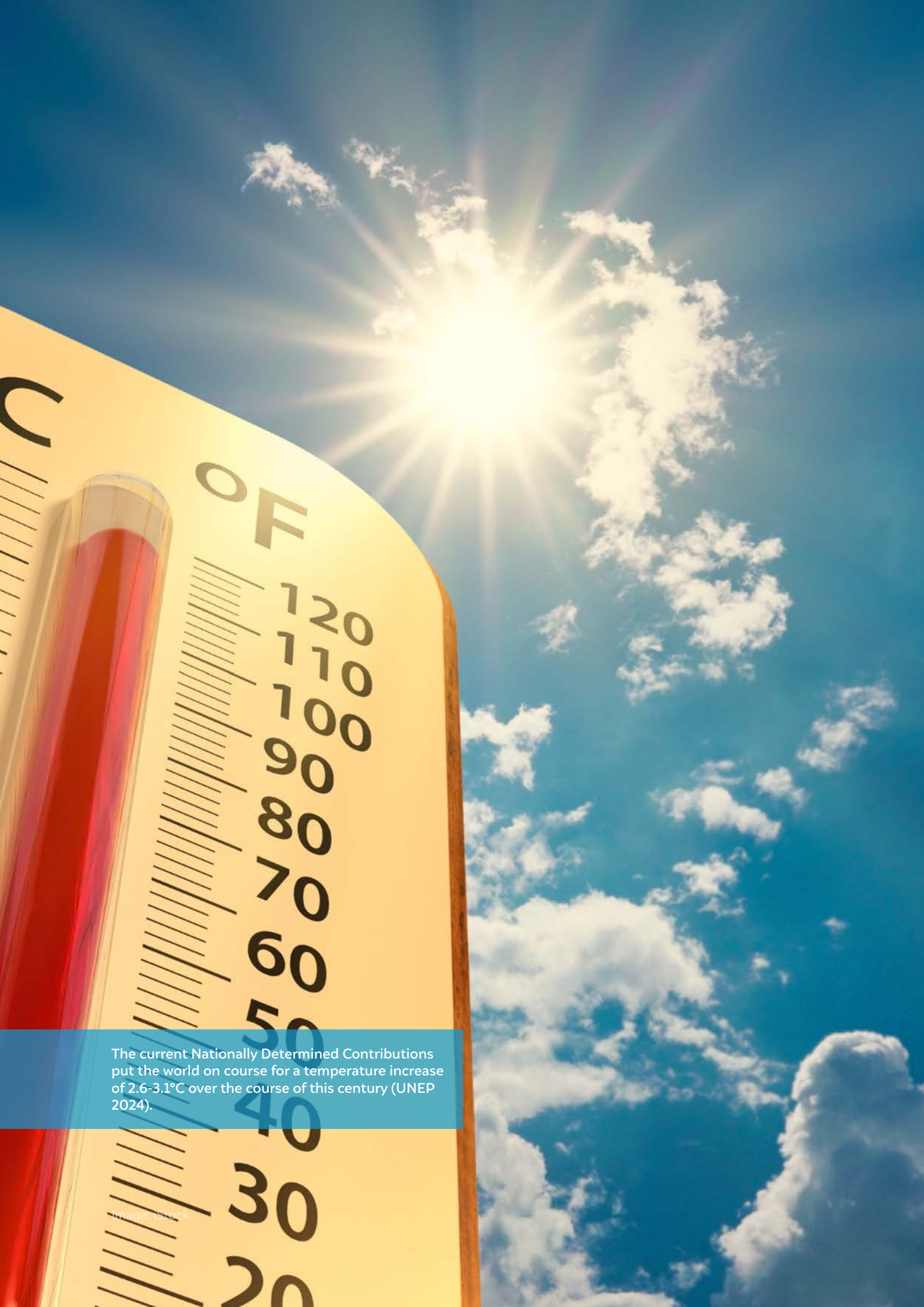
The Council's major contributions include: [Informing India's net-zero goals](#); work for the PMO on [accelerated targets for renewables](#), power sector reforms, environmental clearances, *Swachh Bharat*; [pathbreaking work for India's G20 presidency](#), the Paris Agreement, the HFC deal, the aviation emissions agreement, and international climate technology cooperation; the first independent evaluation of the *National Solar Mission*; India's first report on global governance, submitted to the National Security Advisor; support to [the National Green Hydrogen and Green Steel Missions](#); the 584-page *National Water Resources Framework Study* for India's 12th Five Year Plan; irrigation reform for Bihar; the birth of the Clean Energy Access Network; the concept and strategy for the International Solar Alliance (ISA); the Common Risk Mitigation Mechanism (CRMM); India's largest multidimensional energy access survey (ACCESS); [critical minerals for Make in India](#); India's climate geoengineering governance; analysing energy transition in emerging economies, including Indonesia, South Africa, Sri Lanka, and Viet Nam. CEEW published *Jobs, Growth and Sustainability: A New Social Contract for India's Recovery*, the first economic recovery report by a think tank during the COVID-19 pandemic.

The Council's current initiatives include: State-level modelling for energy and climate policies; consumer-centric smart metering transition and wholesale power market reforms; [modelling carbon markets](#); piloting business models for solar rooftop adoption; fleet electrification and developing low-emission zones across cities; [assessing green jobs potential at the state-level](#), circular economy of solar supply chains and wastewater; assessing carbon pricing mechanisms and India's carbon capture, usage and storage (CCUS) potential; [developing a first-of-its-kind Climate Risk Atlas for India](#); sustainable cooling solutions; developing state-specific dairy sector roadmaps; supporting India's electric vehicle and battery ambitions; and [enhancing global action for clean air via a global commission 'Our Common Air'](#).

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The current Nationally Determined Contributions put the world on course for a temperature increase of 2.6-3.1°C over the course of this century (UNEP 2024).

Image: iStock

Executive summary

The world is in a state of climate crisis, with science providing an ever-clearer view of the dire consequences of climate change. 2023 was the warmest year on record (WMO 2024). The incidence of natural disasters has increased fivefold over the last five decades (WMO 2021), and economic damages in the first half of 2024 alone have already reached nearly USD 128 billion (Atlas Magazine 2024). Underlining the gravity of the situation, the UN Secretary-General warned that we may be nearing critical planetary tipping points, beyond which recovery could be impossible (UNSG 2023).

Despite the urgency of the climate crisis, global action has been limited. According to the latest UN report, without an increase in ambition in the new NDCs and immediate action, global temperatures could rise by 2.6 to 3.1°C over the course of this century (UNEP, 2024). Notably, research also suggests that developed countries are not on track to meet their 2030 targets and, more importantly, that even if they were to achieve net-zero emissions by 2050, they would still consume 40–50 per cent of the carbon budget available to keep temperature rise below 1.5°C (CEEW 2023). Ironically, given these projections, the current situation is no different from that in the pre-2020 era,¹ where progress was limited due to the non-participation of major developed economies, inflated base year emissions, and accounting loopholes (CEEW 2021). While this reiterates that climate actions are and have been insufficient, there is an even more pressing underlying issue – the limited power of international climate agreements to hold countries accountable for their immediate actions. As a testament to this, climate debates have been ridden with ambiguity, with crucial facets of climate action remaining unresolved and contentious, such as equity in the carbon budget, climate finance and its goals, and adaptation funding.

Therefore, it is now more important than ever to hold countries accountable, not just for their actions on mitigation, but also for other facets that are critical to climate action. To this end, few institutions from the Global North have made notable efforts to bridge the accountability gap by showcasing countries' actual progress more transparently.

A. Existing accountability efforts

Several independent global efforts are tracking and assessing the implementation of climate actions by countries. The Climate Action Tracker (CAT) was one of the earliest projects to evaluate government actions against the Paris Agreement goal of limiting temperature rise to 1.5°C, incorporating fairness as a factor in emission reduction assessments. Similarly, the Climate Change Performance Index (CCPI) examines countries' emissions, energy trajectories, and related policy measures, offering insights into the country's past and current environmental protection performance trajectory. Likewise, the Environmental Performance Index (EPI) also contributes by providing a data-driven summary of the state of climate across the world.

Most of these indices offer detailed insights into national policies, recent developments, and future emission pathways and projections. However, their scope is primarily limited to one or two themes of climate action, with an emphasis on mitigation. To gain a comprehensive view of a country's climate efforts, it is important to consider other emerging critical aspects, such as international cooperation, climate adaptation, and means of implementation. Further, with limited research originating from Global South, it is often difficult to reflect on how the different realities and circumstances of the developed and developing world are considered across the assessments.

B. CEEW's Climate Accountability Matrix

To address some of these gaps and build on available knowledge, CEEW developed the Climate Accountability Matrix (CAM). **The CAM adopts an evidence-based approach to analyse countries' climate efforts and endeavours to nudge them to strengthen the implementation of the Paris Agreement.** Importantly, it is a first-of-its-kind assessment tool from the Global South to analyse countries' performance in climate aspects beyond mitigation, including adaptation and means of implementation. To this end, the CAM considers the fundamental principles of equity and common but differentiated responsibilities and respective capabilities (CBDR-RC) to hold countries accountable not just for their promises but for their immediate actions.

¹ Kyoto Protocol (2008–12) and the Doha Amendment to the Kyoto Protocol (2013–20).

The outcomes of the CAM will help provide critical inputs and recommendations for upcoming climate summits and the second Global Stocktake (GST), where countries and non-party stakeholders will deliberate on the implementation and ambitions of global climate efforts. These recommendations can provide the evidence-based insights that both developed and developing countries require to formulate negotiation positions. Additionally, they will help inform the next round of nationally determined contributions (NDCs) in 2025, prompting governments to strengthen existing economy-wide and sector-specific targets for 2030 and set new goals for 2035 and beyond.

C. Countries and assessment

In this study, the Council has considered the G20² countries as they comprise the world's largest developed and emerging economies, responsible for 76 per cent of the world's GHG emissions (G20 Brasil 2024). They also account for over 80 per cent of the global gross domestic product (GDP), 75 per cent of international trade, and roughly 60 per cent of the global population (G20 Italia, 2021). These countries should spearhead the green transition required to limit the rise in global temperature to 1.5°C.

The CAM assessment of countries considers 42 indicators grouped into five critical themes as follows.

- **International cooperation:** Assess engagement in key climate agreements and adherence to obligations.
- **National measures:** Evaluate a country's ambition, emission footprint, and domestic climate frameworks.
- **Sectoral robustness:** Assess the operational efficiency and actions of key sectors (such as energy, industry, transport, waste, agriculture, forestry, and water) towards realising a sustainable transition.
- **Enablers:** Analyse the means of implementation (finance, technology, and capacity-building) at national and international levels.
- **Climate adaptation efforts:** Assess the readiness and recovery capacity of the country to adapt to current and changing climate impacts.

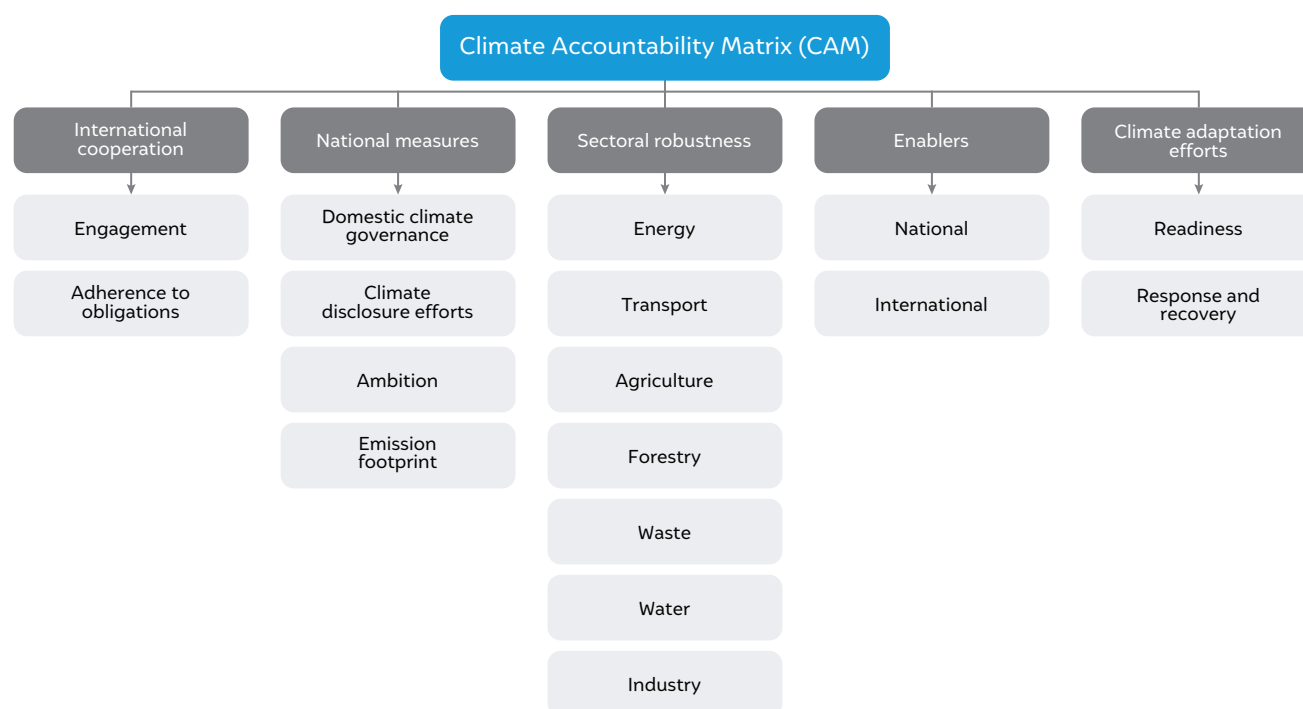
The themes, categories (ES Figure 1), and respective indicators³ are outcomes of meticulous research, review of the existing literature, and consultations with thematic experts to holistically capture the areas of climate action identified. **The indicators** (details of which can be found in Annexure I) **serve as a measurable mix of quantitative and qualitative variables** designed to assess the performance of countries' actions undertaken in the categorical areas identified under each theme.

CAM assesses countries across 42 indicators grouped under five themes.

² The African Union has been included as a member of the G20 group last year. Considering this recent inclusion, there is no data available to analyse this group. Hence, the African Union has not been considered in the current analysis.

³ It is, however, important to note that the CAM is an evolving exercise, and there may be other relevant indicators which could be included in the matrix but have limited/no data.

ES Figure 1 CAM overview: Themes and categories



Source: Authors' conceptualisation

The CAM, as a principle, is guided by equity⁴ and common but differentiated responsibilities and respective capabilities (CBDR-RC), aiming to hold countries accountable for their immediate actions rather than solely their promises. To reflect this principle, Annex I Parties (mostly industrialised developed countries) and Non-Annex I (mostly developing countries) are assessed separately. For the quantitative indicators in the framework, they are assessed based on the relative performance in their groups, while for the qualitative indicators judgement criteria differs between the developing and developed countries. Details on the indicators and their criteria for judgement have been provided in Annexure I. Each indicator is equally weighted and scored from 0 to 1, with the scores then aggregated to arrive at the thematic and overall outcomes for each country. The overall outcomes are ultimately grouped into four performance categories

that elucidate countries' willingness and preparedness to translate their climate commitments into measurable progress – **leaders, reasonable efforts, limited efforts, and needs improvement.**

D. Outcomes of the Climate Accountability Matrix

As depicted in ES Figure 2, the analysis shows that **none of the G20 members currently qualify as a leader.** The countries are broadly distributed among reasonable and limited efforts. They have been engaging positively and have shown considerable national measures. However, measures are needed to improve sectoral robustness and create an enabling environment for ambitious climate actions. The following are some key trends noted across countries:

⁴ It is the underlying principle to assess the accountability of countries on various aspects and reflect on the different realities and circumstances of the developed and developing world.

ES Figure 2 Overall outcomes of G20 members

Source: Authors' analysis

E. Key country-wise trends

The UK, EU, France, Japan, and Germany have made **notable efforts in climate action**, particularly in international cooperation, by actively participating in key climate agreements and adhering to transparency obligations. These countries have also established comprehensive climate governance frameworks and undertaken reasonable adaptation efforts. In the Global South, **India, South Africa, and China have made significant progress**, actively participating in key agreements and making efforts to adhere to their obligations. India and China are expected to take a shorter transition period to net-zero⁵ compared to the average for developing countries, with India having lower per capita GHG emissions. In the renewable energy segment, Brazil and India are performing relatively better than other developing countries. Likewise, South Africa has demonstrated strong domestic climate governance and climate-related disclosures.

Developed countries such as the US, Australia, Russia, and Canada show **limited efforts**. While the US, Australia, and Canada have made efforts to adapt to climate change, concerns regarding their inconsistent engagement in key agreements and weak ambition remains. Further, despite being developed countries, their efforts to support an enabling environment for climate actions are limited.

Finally, **major fossil fuel-dependent economies such as Saudi Arabia and Turkey show limited efforts or needs improvement across all the themes**. For Saudi Arabia, limited domestic climate governance, high per capita emissions, and the increased number of years required to transition to net-zero pose concerns. Turkey also falls short in the categories of sectoral robustness and enablers, due to its weak green transportation policies, high agriculture emissions, and limited efforts to promote climate actions domestically.

⁵ Number of years taken to transition to net-zero based on commitments in NDC compared to the peaking year.

F. Key thematic outcomes

ES Table 1 Thematic outcomes of G20 countries

Countries	International cooperation	National measures	Sectoral robustness	Enablers	Climate adaptation efforts
Argentina	↑	↗	↓	↓	→
Australia	↗	↓	→	→	↗
Brazil	↑	→	→	↓	↗
Canada	→	↓	↓	→	↗
China	↑	→	→	→	→
European Union	↑	↗	→	↗	→
France	↑	↗	↗	↗	↗
Germany	↑	↗	→	→	↗
India	↑	↗	→	→	→
Indonesia	↑	↗	↓	→	→
Italy	↗	→	→	→	↓
Japan	↗	→	→	→	↗
Mexico	↑	→	→	→	→
Russia	↗	→	→	↓	→
Saudi Arabia	→	↓	→	↓	↓
South Africa	↑	↗	→	→	→
South Korea	↑	↗	→	↗	→
Turkey	→	→	↓	↓	→
United Kingdom	↑	↗	→	→	↗
United States	↓	→	→	↓	↗

 Leader
  Reasonable efforts
  Limited efforts
  Needs improvement

Source Authors' analysis

International cooperation assesses countries' engagement in key climate agreements and adherence to obligations. Most countries are climate leaders in this theme, with developing countries such as India, South Africa, Mexico, Brazil, Argentina, and Indonesia showing positive engagement. However, inconsistent participation of developed countries such as the US, Canada, and Australia undermine overall trust and confidence. With regards to obligations surrounding adherence to reporting guidelines, timely submission remains a concern.

National measures evaluate ambition, emission footprint, and domestic climate frameworks. Within this segment, most of the countries are scattered between reasonable and limited efforts. Developing countries fare better in their GHG emissions per capita than developed countries. However, the key area of concern in this category is the poor performance of developed countries in the pre-2020 period and the greater number of years they are expected to require to transition to net-zero, hindering their overall performance.

Sectoral robustness assesses the operational efficiency and actions of key sectors, such as energy, industry, transport, waste, agriculture, forestry, and water, towards realising sustainable transition. Countries in this segment are showing some progress, with encouraging trends in renewable energy, urban mobility, and afforestation. Fossil fuel consumption per capita remains high in a few developing countries (Argentina, China, South Africa) and major developed countries (the US, Australia, Canada). In agriculture, countries such as Argentina, South Korea, Germany, and Italy perform relatively well mainly because of their higher organic land share.

Enablers analyse the means available, both nationally and internationally, to create an enabling environment for climate action. This remains a major area of concern. France, South Korea, and the EU stand out for significant efforts to improve domestic capacity and create an international enabling environment. However, most other countries are evenly distributed in this category and either fall under limited efforts or needs improvement. Despite their economic progress and capability to support climate action internationally, developed countries such as the US, Russia, Canada, and Australia report inadequate performance. This results from their shortfalls in ensuring fairness of contributions towards climate finance and limitations in delivery.

Climate adaptation efforts assess a country's readiness and recovery capacity in response to current and changing climate impacts. While developed countries are relatively better prepared domestically with strong readiness and recovery measures in place, all countries need to improve in this area. Despite facing the most severe consequences of climate change, developing countries are less prepared to mitigate these impacts. Additionally, developing countries' efforts are often constrained by funding and institutional capacity domestically.

G. Some key recommendations

A comprehensive review of the actions taken by G20 members reveals a concerning situation: **no country currently qualifies as a 'climate leader'**, but a few developed and developing countries exhibit efforts that can be deemed reasonable in scale or impact. Their limited initiatives and insufficient accountability underscore a significant gap in the ambition necessary for realising effective climate solutions. To bridge the gap, here are some broad areas of action:

- Developed countries must consistently participate and adhere to UNFCCC obligations:** To advance action on international climate commitments, it is essential that developed countries consistently engage in climate agreements. The analysis reveals that 6 out of 11 developed countries show inconsistent participation, signalling the need for more reliable engagement. Such inconsistent participation not only weakens collective momentum but also undermines trust and credibility. In addition, countries must also adhere to reporting deadlines, reinforce transparency and strengthen the credibility of commitments. Moreover, countries should strive to improve their disclosures, specifically in NDCs, expanding their scope and coverage. However, given the resource and technical constraints in developing countries, it is imperative for developed countries to provide adequate technical and financial support to facilitate this. Independent research institutes can also play a crucial role using such disclosures to offer evidence-based inputs to inform policymakers and hold countries accountable for their actions.
- Developed countries should accelerate the pace of transition to net-zero:** Many developed countries are taking more years to transition to net-zero (51 years on average) and are not in line to meet the 43 per cent emission reduction of 2019 levels by 2030, a global average goal needed to limit warming to 1.5°C. The developed world needs to accelerate emissions reductions by setting ambitious targets, bridging the implementation gap, and expediting its transition to net-zero. This approach is vital to ensure sufficient carbon space for developing countries to address their socio-economic development challenges.
- Ensure a fair transition for developed and developing countries:** The assessment indicates that developing countries remain reliant on coal and cannot immediately transition fuel usage as rapidly as the 1.5°C pathways set out in light of resource constraints and technical capacity. Consequently, developed countries should phase out their fossil fuel consumption (oil and gas). This also aligns with CBDR-RC, where the mandate is shifted to developed countries with more historical responsibility. In the future, there should be an equal focus on coal, oil, and gas to ensure a fair transition away from fossil fuels, keeping in mind the capacity to transition and minimise economic harm for emerging economies.

- **Developed countries should improve both the quantity and quality of climate finance to address critical gaps in delivery and fairness:** None of the developed countries has deposited 100 per cent of the funds they had pledged; and with the exceptions of France, Germany, and Japan, all developed countries are severely short of making their fair share of contributions. Therefore, developed countries must enhance both the flow and accessibility of climate finance according to the needs of developing countries. As COP29 approaches, discussions on the New Collective Quantified Goal (NCQG) should be reinforced and anchored in qualitative and quantitative needs, with a target and structure that responds to the lessons learned from the annual USD 100 billion goal and commitment to support nationally-led climate plans.
- **Foster balanced contribution to adaptation and loss and damage:** Despite reporting a standalone increase in adaptation finance, nearly 80 per cent of countries record a skewed contribution toward mitigation efforts – almost thrice as much funds were allocated to mitigation than to adaptation. Further, total commitment to loss and damage (currently at USD 702 million) continues to lag at the global forum, and the highest pledge by any G20 country is only USD 111.55 million (UNFCCC, 2024). To address this imbalance, climate finance contributions must extend beyond mitigation to encompass robust efforts in adaptation and loss and damage. These must be embedded in a comprehensive manner to build on the fragmented, sector-specific, and incremental efforts that are currently prevalent.
- **While enhanced adaptation is the mandate across the board, developing countries must be adequately supported:** Developed countries are faring well domestically in overall adaptation efforts, but developing countries, which bear the brunt of climate events, remain relatively less equipped to mitigate climate impacts. Given this, they need greater support in building adequate resources, infrastructural capacity, and policy support to build sustainable physical, financial, and technical infrastructure through increased investment and financing. Additionally, critical areas of risk mapping remain inadequate, and it is important for all countries to ensure better data collection to bridge the reporting gap. This could be supported by building technical capacity and making use of existing technical (World Meteorological

Organisation (WMO), Santiago Network, FrLD Secretariat, thematic groups) and financial platforms to leverage their resources and expertise.

In conclusion, in light of different national circumstances, countries are required to put forth stronger NDCs under the Paris Agreement. In this regard, developed countries must take the lead by exceeding the global emission reduction average required to keep the 1.5°C target alive by enhancing their 2030 NDCs beyond 43 per cent reduction from their 2019 levels. They must also pledge to meet their net-zero targets well before 2050. In a world increasingly affected by climate-induced disasters and geo-political tensions, delays in translating pledges into acts are no longer viable. Hence, accountability is critical for ensuring ambitious and accelerated climate action.

1. Introduction

Over the past four decades, efforts to address climate change have been a key focus of global discussions. Despite this, global temperatures continue to rise and break records. The latest UN report indicates that given current national pledges under the Paris Agreement, global temperatures will rise 2.6-3.1°C above pre-industrial levels this century, highlighting the urgent need to intensify climate action (UNEP 2024). The report finds that, by 2030, greenhouse gas (GHG) emissions must decrease by 28 per cent to align with the Paris Agreement's 2°C pathway and by 42 per cent to meet the 1.5°C.

Moreover, science has never been clearer about the dire consequences that will occur if climate change continues unchecked (IPCC 2023). Climate risks and impacts are also increasing. WMO has reported a five-fold increase in the number of natural disasters over the past 50 years (WMO 2021). Nearly every month of 2024 has been the warmest on record, making this likely the hottest year yet. The economic damage caused by natural disasters in just the first half of 2024 reached USD 128 billion (Atlas Magazine 2024). Despite these stark warnings, both action and implementation remain limited, further compounded by worldwide disasters, geopolitical tensions, an impending energy crisis, and a record-breaking rise in global temperatures.

No developed country has deposited 100% of their pledged funds.

Ahead of the 28th Conference of Parties (COP28) in Dubai, the world was presented with a pivotal opportunity with the first Global Stocktake (GST) a comprehensive collective assessment of climate-action by all countries aimed at increasing ambition and informing the next round of NDCs. The GST was perceived as an essential opportunity to set in motion an urgently needed course correction, enhance ambition, strengthen accountability, and accelerate the delivery of climate action while evaluating overall progress. However, the GST outcome restated that “we are not on track towards achieving the purpose of the Paris Agreement and its long-term goals, and there is a ‘rapidly narrowing window’ for raising ambition and implementing existing commitments” (UNFCCC 2023). CEEW research also suggests that developed countries are not on track to meet their 2030 NDC targets. Alarmingly, another statistic suggests that 40–50 per cent of the remaining global carbon budget available for realising the 1.5°C target would be consumed by developed countries even if they achieve net-zero by 2050. This trend mirrors the situation in the pre-2020 era, when developed countries collectively made an array of climate pledges under agreements such as the Kyoto Protocol (2008–12) and the Doha Amendment to the Kyoto Protocol (2013–20). Yet, progress was limited due to delivery gaps in action and support, misuse of accounting provisions, non-alignment of commitments with science, and non-participation of key developed countries (CEEW 2021).

This depicts that climate actions are and have been insufficient. Given that we are in a state of climate emergency, it is now critical to undertake immediate, ambitious action and strengthen the implementation of the Paris Agreement. It is important to hold countries accountable – not only for actions on mitigation but also on other equally important facets, such as international cooperation, means of implementation, adaptation, and sectoral actions.

Currently, climate research that tracks commitments and efforts by countries is heavily skewed towards the Global

North. While there are efforts and indices that judge and rate the performance of countries, these predominantly focus on future emission pathways and projections, largely limited to mitigation aspects. To bridge the gap, highlight the Global South perspective, and introduce a holistic picture on the implementation of climate actions, CEEW developed a Climate Accountability Matrix (CAM), which adopts an evidence-based approach to analyse countries’ climate efforts. The CAM, as a principle, considers equity⁶ and uses the common but differentiated responsibilities and respective capabilities (CBDR-RC) framework to hold countries accountable for their immediate actions and not just their promises.

Such a comprehensive evaluation of progress will provide critical inputs and recommendations for upcoming climate summits and second GST. During these events, countries and non-party stakeholders will deliberate on the implementation and ambitions of climate efforts. The recommendations derived from this can provide evidence-based insights to support the formulation of negotiation positions for both developed and developing countries. Additionally, they will inform the next round of nationally determined contributions (NDCs) set in 2025, encouraging countries to strengthen existing economy-wide and sector-specific targets for 2030, as well as establish new targets for 2035 and beyond.

The subsequent section discusses the methodology used to construct the CAM. This includes an outline of the matrix structure, the methodology used for its construction, indicator descriptions, the assessment process, and data sources. Following this, we explore each thematic component (categories and indicators) and present the findings. The impact of the overall achievements or gaps is discussed in detail. Finally, the countries are compared and scored based on their relative climate performance.

2. Literature review and methodology

There are various trackers and indices that capture the effectiveness of policies, model future pathways, and evaluate current climate performance enabling countries to better understand their status in the fight against these climate challenges. The following Table 1 highlights existing indexes.

Even if developed countries achieve net-zero by 2050, the remaining 40–50 % of the global carbon budget available for 1.5°C will be consumed.

⁶ It is the underlying principle to assess the accountability of countries on various aspects and reflect on the different realities and circumstances of developed and developing world.

Table 1 Existing climate-related indexes and trackers

Name	Objective	Key themes	Countries coverage	Approach
Climate Action Tracker (CAT)	Monitors government climate action and assesses alignment with the Paris Agreement's goal to keep global warming well below 2°C, with efforts to limit it to 1.5°C.	Policies; finance; emission reduction target.	Covers all the biggest emitters covering about 85% of the global emissions and approximately 70% of the global population.	Alignment with the Paris Agreement's 1.5°C temperature limit.
Climate Change Performance Index (CCPI)	Evaluates countries' climate protection performance to enhance transparency in international climate politics.	GHG emissions; renewable energy; energy use; climate policy.	63 countries and the EU, representing over 90% of global GHG emissions.	Used weighted average (follows different criteria of assessment for each theme, such as derived individual country target pathways for GHG emissions; surveys to assess climate policies).
Environmental Performance Index (EPI)	Measures progress at mitigating climate change, safeguarding ecosystem vitality, and promoting environmental health.	Climate change performance; environmental health; and ecosystem vitality. These include critical areas such as air quality, water and sanitation, biodiversity, fisheries, agriculture, and energy.	180 countries.	Uses weighted average.
Climate Risk Index	Analyses to what extent countries and regions have been affected by impacts of weather-related loss events.	Human impacts and direct economic losses from weather events such as storms, floods, heat waves, etc.	63 countries and the EU.	Uses analysis provided by MunichRe's NatCatSERVICE.
Notre Dame Global Adaptation Initiative Country Index (ND-GAIN)	Measures a country's exposure, sensitivity, and capacity to adapt to the negative effects of climate change through two key dimensions of adaptation: vulnerability and readiness.	Food, water; health, ecosystem service; human habitat; infrastructure; and economic, governance, and social readiness.	192 countries.	Survey of recent data and literature, consultation with scholars, adaptation practitioners, and global development experts.
Green growth index	Measures country's performance in achieving sustainability targets, including Sustainable Development Goals (SDGs), Paris Agreement, and Aichi Biodiversity Targets.	Efficient and sustainable resource use; natural capital protection; green economic opportunities and social inclusion.	189 countries.	Normalisation of indicators followed by weighted indexing.

Source: Authors' analysis

These climate trackers employ comprehensive methodologies to provide a broad overview of policies and recent developments. For example, the Climate Action Tracker (CAT) evaluates countries' efforts using two key concepts: fairness and domestic modelled pathways. The 'fair share range' for each country is derived from a range of fairness estimates in existing literature, while modelled domestic pathways represent the emissions reductions a country needs to achieve

under a global least-cost approach. These pathways assess whether targets or policies are on track towards full decarbonisation in line with the 1.5°C warming limit. Similarly, the Climate Change Performance Index (CCPI) assesses climate protection performance across four different weighted categories: GHG emissions, renewable energy, energy use, and climate policy. In the first three categories, performance is defined by four equally weighted indicators that reflect different

dimensions of the category: ‘current level’, ‘past trend (5-year trend)’, ‘well-below 2°C-compatibility of the current level’, and ‘well-below 2°C-compatibility of 2030 target’. Climate policy is evaluated through a detailed questionnaire provided to climate and energy experts from NGOs, universities, and think tanks. Based on this, the final score is calculated from the weighted average of the achieved scores in the individual indicators.

On the other hand, The Council’s CAM adopts an evidence-based approach to analyse countries’ performance. For this, the CAM includes a comprehensive set of indicators across categories to capture a more granular, comprehensive, and holistic (beyond mitigation) understanding of climate efforts by countries. Against these indicators, evidence is gathered based on the data available in the public domain. One of the most important aspects of the approach is that for the assessment of indicators, we have considered common but differentiated responsibilities and respective capabilities (CBDR-RC) principles and analysed Annex I and Non-Annex I Parties differently across all indicators. According to the UNFCCC, Annex I Parties include the industrialised developed countries and Non-Annex I Parties are mostly developing countries. To reflect this principle, for quantitative indicators, developed and developing countries are analysed separately based on their relative performance in their group, while for qualitative indicators, judgement criteria differs. A detailed description of the indicators and their criteria for judgement has been provided in Annexure I.

For this assessment, we consider the G20 as they represent the world’s largest developed and emerging economies. Collectively, the G20 represents about 76 per cent of global GHG emissions, 80 per cent of the global GDP, 75 per cent of international trade, and roughly 60 per cent of the global population. The African Union was included as a member of the G20 last year; however, the limited availability of data for analysing this group means the African Union has not been considered in this study. The subsequent sections discuss the formulation of the climate accountability matrix and assessment procedures.

CAM uses CBDR-RC and equity as the fundamental principles to assess countries.

CAM: Assessment approach

The approach towards the formulation of the Climate Accountability Matrix consists of three key aspects:

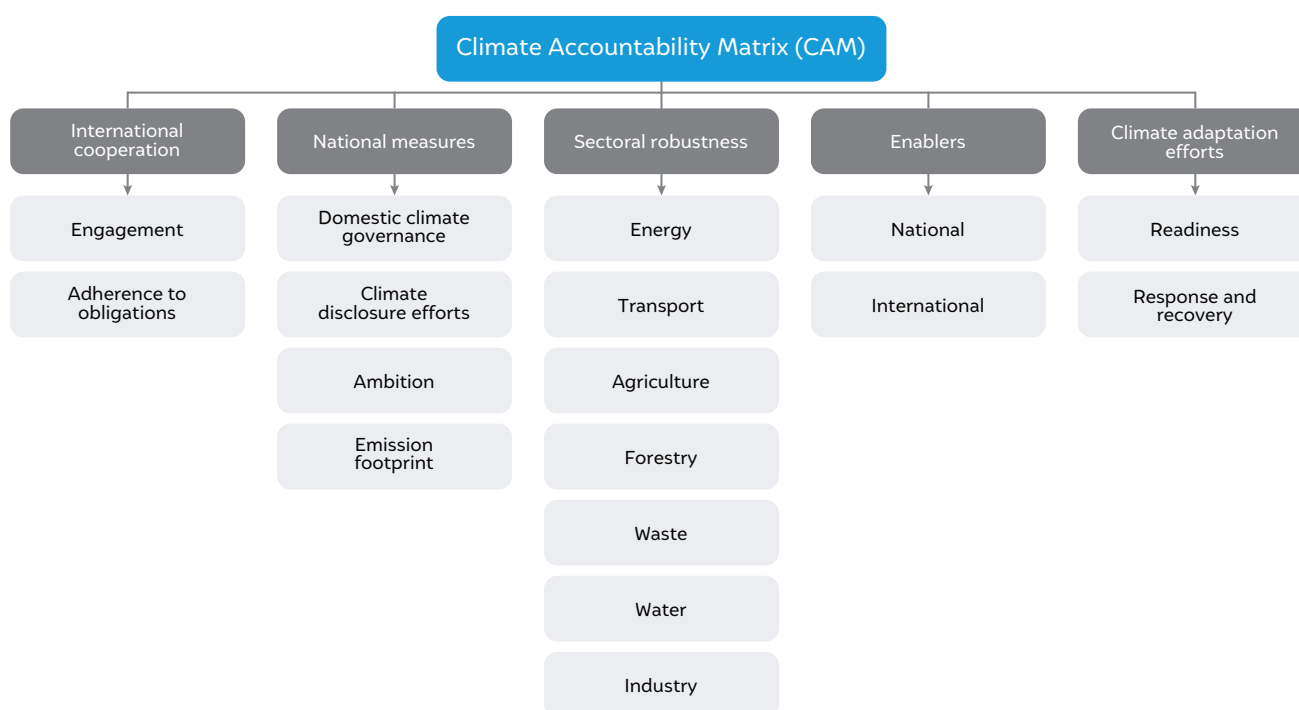
1. Determining the themes, categories, and indicators

The initial step involved a comprehensive literature review to establish a multi-layered approach for evaluating current climate performance. For this, a rigorous literature review was conducted, and key reports such as the Sixth Assessment Report of IPCC, the World Energy Outlook, the UNEP Emissions Gap Report, and the IEA’s ‘Net Zero by 2050: A Roadmap for the Global Energy Sector’, among others, were examined. To further enrich this evaluation, extensive national and international stakeholder consultations were held to gather diverse insights and perspectives that enhanced our understanding on the key parameters and indicators that could help reflect the current climate landscape.

Based on this, broad themes were identified, which are as follows:

- **International cooperation:** Assess engagement in key climate agreements and adherence to its obligations.
- **National measures:** Evaluate a country’s ambition, emissions footprint, and domestic climate frameworks.
- **Sectoral robustness:** Assess the operational efficiency and actions of key sectors (such as energy, industry, transport, waste, agriculture, forestry, and water) towards sustainable transition.
- **Enablers:** Analyse the means of implementation (finance, technology, and capacity building) at national and international levels.
- **Climate adaptation efforts:** Assess the readiness and recovery capacity of the country to adapt to current and changing climate impacts.

Then, each of these themes were meticulously broken down into categories, which serve as more focused sub-divisions that capture specific aspects of each thematic climate action identified. Within these categories, 42 indicators were identified as the measurable variables, a mix of both quantitative and qualitative, designed to assess the performance of the actions undertaken.

Figure 1 Categories and themes of the Climate Accountability Matrix

Source: Authors' conceptualisation

2. Normalisation and assessing each level

For each indicator, the assessment criteria were rigorously defined, considering the quality and nature of the available data. The assessment was further refined through the following components:

- **Weighted indexing:** Certain indicators, particularly those assessing sectoral robustness, were analysed using weighted indexing. Specific weights were assigned to each indicator based on its relative importance.
- **Analysis by intervals:** The data was categorised into intervals to facilitate meaningful comparisons across countries.

- **Relative scoring:** Countries were scored relative to each other, providing a comparative assessment of performance.
- **Categorisation:** Few indicators were also assessed based on different categories (e.g., national, sub-national) to analyse the granularity of domestic efforts.

A detailed description of the indicators and their criteria for judgement has been provided in Annexure I. Indicator assessments were normalised; all indicators were standardised to a uniform scale of 0 to 1, where 0 denotes the lowest score and 1 represents the highest possible score. During the assessment phase, datasets were sourced from the Biennial Update Reports (BURs), Biennial Reports (BRs), International Monetary Fund (IMF), the World Bank, national repositories, and official press releases, among other authentic and credible data sources.

Table 2 Categories of the thematic scores

Leader	Demonstrate strong climate action through comprehensive policies and other significant efforts	0.90-1
Reasonable efforts	Making substantial progress in climate action, with consistent, proactive approach to meeting climate goals	0.75- 0.90
Limited efforts	Demonstrate moderate progress in climate action with few positive initiatives	0.60 - 0.75
Needs improvement	Efforts are marginal, leaving significant room for improvement across key areas	Below 0.60

Source: Authors' analysis

3. Scores aggregation for final scoring

To derive the final scoring of CAM, the scores were aggregated through four levels, using a bottom-to-top approach. Initially, sub-indicators (where applicable) were aggregated to derive the score for each indicator. Subsequently, the scores of individual indicators were aggregated and normalised to get the scores for each category, ensuring that each category was weighted equally, regardless of the number of indicators it contained. The next step involved aggregating these category scores to obtain the overall theme scores, giving equal weights to each theme. Finally, the scores of all themes were combined to derive the final scoring. To interpret the performance of countries, the thematic scores were divided into four categories as shown in the above table:

Limitations

The limitations of CAM and its assessments are broadly around its scope and coverage, which are related to data challenges and their availability.

- Additional indicators could be included within a particular theme or category. For this study, we have restricted the indicators to those that majorly represent the theme and for which data is available. In our subsequent assessments, we intend to move beyond our current set of indicators and gather primary data for such indicators as well.
- Assessment relies on secondary data gathered from credible sources and is evaluated at face value.
- For some indicators, we encountered data gaps for a few countries, primarily caused by limited data accessibility, language differences in documents,

and variations in terminology. For such cases, we consulted experts during the stakeholder consultation to incorporate their guidance and perspectives into the assessments.

- While the indicators are objectively defined to the extent possible, at times, the data interpretations and perspectives on the assessments may vary based on experience and understanding of the indicator.

3. Themes

3.1 International cooperation

Climate change is recognised as a global commons challenge that necessitates a coordinated international response. Cooperation among countries offers opportunities that can surpass what individual countries can achieve independently. In this context, by leveraging collaboration through treaties, conventions, agreements, and climate reporting, countries can significantly enhance their collective capacity to address climate challenges. This notion is reinforced by the IPCC's sixth assessment, which indicates that countries' ambition and speed of emissions reduction are likely to improve when they participate in cooperative agreements, underscoring the importance of shared efforts in maximising mitigation benefits (IPCC 2022a). A similar sentiment was echoed at the Global Stocktake (GST), where countries acknowledged international cooperation as a 'critical enabler for achieving ambitious climate action and encouraging the development and implementation of climate policies' (UNFCCC 2023). The CAM analyses the international co-operation across two key aspects: engagement and adherence to obligations.

Figure 2 Overview of international cooperation and metrics for assessment

Source: Authors' analysis

Engagement

Engagement is assessed by examining a country's involvement in global environmental initiatives and agreements. This involves being a signatory to the UNFCCC and showcasing an overall participation with critical action-oriented frameworks like the Paris Agreement, Doha Amendment, and Kyoto Protocol. Building on this, CAM measures countries' engagement by analysing their participation in the conventions and key climate agreements.

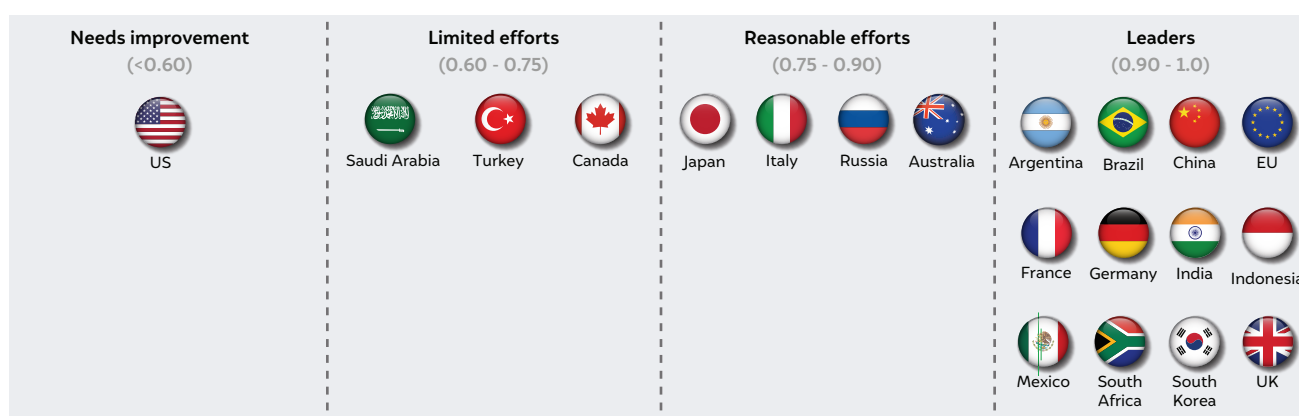
Adherence to obligations

Adherence to climate obligations of the countries is an essential part of international cooperation. Specifically, climate reporting 'obligations' inform actions taken by countries, reduce scepticism, and foster sharing of

critical information related to key economic sectors and GHGs, adaptation plans, and mitigation commitments. Fulfilling these obligations ensures that all countries are aware of each other's efforts, enabling them to coordinate their actions effectively. Consequently, key indicators in this area encompass the submission of biennial reports, communication of Nationally Determined Contributions (NDCs), adaptation plans, net-zero commitments, and long-term strategies (LTS).

Analysis and key findings

In the international cooperation theme, both developing and developed countries have performed well. Except for a few, most of them are seriously engaging in climate agreements and are also adhering to its obligations.

Figure 3 G20 member countries performance: International cooperation

Source: Authors' analysis

Figure 4 International cooperation: Performance report

Countries	Engagement	Adherence to obligations
Argentina	↑	↑
Australia	↗	↑
Brazil	↑	↑
Canada	↓	↑
China	↑	↑
European Union	↑	↑
France	↑	↗
Germany	↑	↗
India	↑	↑
Indonesia	↑	↑
Italy	↑	↗
Japan	↗	↑
Mexico	↑	↑
Russia	↗	↑
Saudi Arabia	↗	→
South Africa	↑	↑
South Korea	↑	↑
Turkey	↗	→
United Kingdom	↑	↑
United States	↓	↗

↑ Leader ↗ Reasonable efforts → Limited efforts ↓ Needs improvement

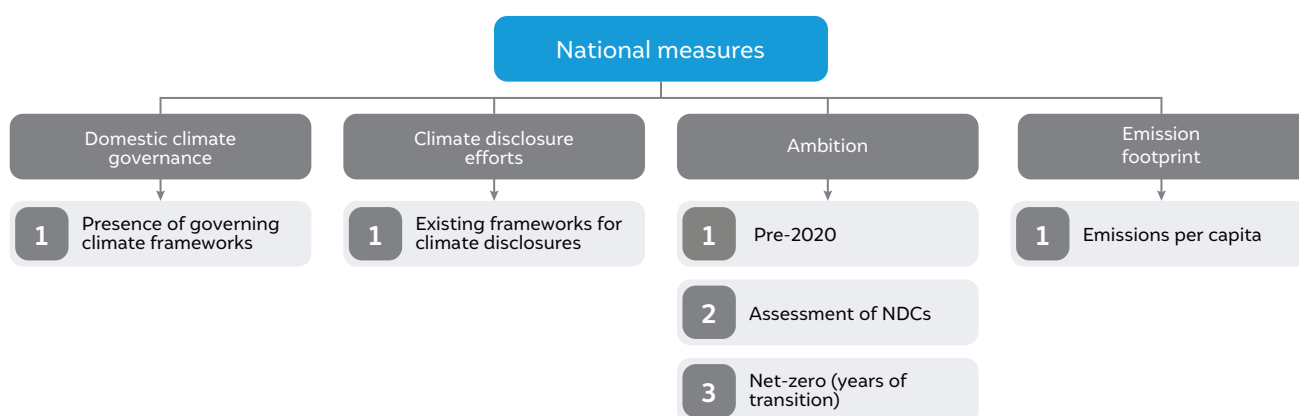
Source: Authors' analysis

- Analysis reveals that major developed countries, including Canada, Japan, Russia, Turkey, and the US, have shown inconsistent participation in climate agreements. The US, in particular, has displayed limited commitment withdrawing from the Paris Agreement due to shifts in their domestic political dynamics.
- While most countries have shared biennial reports, NDCs, and NAPs as per differentiated obligations, their submissions did not follow the timelines specified in the agreements. Russia is the only developed country that has submitted its updated NDC in a timely manner, in accordance with UNFCCC guidelines. Among developing countries, Saudi Arabia's adherence to obligations appears to be lacking particularly in terms of submitting

transparency reports, as well as sharing long-term emission reduction strategies.

3.2 National measures

Shifting focus from the international to the domestic lens, tackling climate change effectively requires robust national-level actions, frameworks, and policies. While these actions may be driven by global goals like the Paris Agreement, they should be planned and implemented at the national level. Hence, the theme of national measures aims to capture these lenses by first, examining the disclosures on legal and reporting frameworks; second, assessing ambition through both targets and actual emissions reductions; and third, analysing each country's emissions footprint to evaluate progress toward a sustainable, low-carbon economy.

Figure 5 Overview of national measures and metrics for assessment

Source: Authors' analysis

Domestic climate governance

Climate-related laws and regulations establish the obligations of state authorities to implement effective climate action and provide the legal foundation for holding them accountable in a court of law for any violations. For instance, when governments set ambitious climate targets within national legislation, these commitments become binding, enhancing accountability and transparency in climate initiatives (Higham 2021). Therefore, the collective implementation of these frameworks lays the groundwork for robust climate action while creating a supportive regulatory landscape that effectively translates commitments into tangible actions. The analysis checks for the presence of such supportive legal frameworks that will support climate action within each country.

Climate disclosure efforts

To understand if countries are performing well in their commitments toward climate action, it is crucial to see how countries are tracking performance sectorally. For instance, tracking schemes, reporting at a national and sub-national level, can help identify successes and gaps in implementation of climate policies. Therefore, having such disclosures in place, can serve as a window to understand areas where climate action is faring well currently and where it needs improvement. Our analysis evaluates the presence of established frameworks within each country that support climate disclosures.

Ambition

The Paris Agreement calls on countries to increase their ambition to limit global warming to 1.5°C (Paris Agreement 2015). As the climate crisis intensifies, the necessity for ambitious actions becomes increasingly pressing. NDCs serve as the primary tool for translating

international climate agreements into concrete targets and measures that countries will work toward over the next 10 years. In addition to NDCs, it is crucial to assess a country's net-zero targets by evaluating the projected timeline for transitioning to net-zero. Further, it is critical to take stock of pre-2020 climate commitments. This includes examining the achievement of targets by developed countries to reduce emissions by 18 per cent under the Doha Amendment, as well as voluntary participation of developing countries in terms of their commitments under the Copenhagen Accord. Given this, the ambition indicators analyse countries based on their pre-2020 outcomes, NDC ambition, and net-zero transitions timelines.

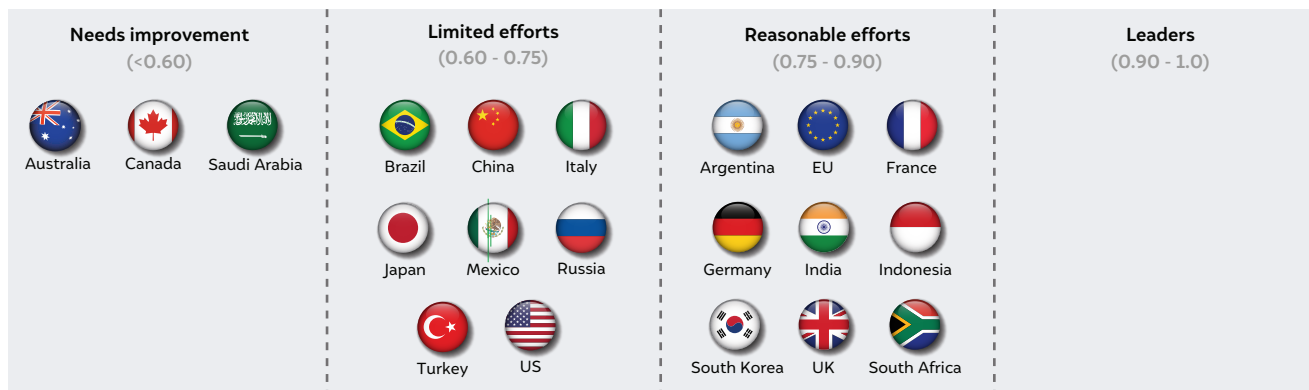
Emission footprint

To assess a country's emission footprint, this category analyses per capita emissions, providing insight into individual contributions to climate change. As the total national emissions do not take population size into account, this can be seen as a fairer way of comparing among the country to highlight the disparities in environmental impact, ensuring that countries are evaluated on a more equitable basis.

Analysis

Analysis indicates that no country qualifies as a leader, with most distributed under reasonable or limited efforts. Since developed and developing countries are different in terms of their economic structures, energy sources, consumption patterns, and priorities, varying performances in domestic climate action are observed. This divide is evident in their governance frameworks, NDCs, projected timelines for achieving net-zero, and emissions footprint.

Figure 6 G20 member countries performance: National measures



Source: Authors' analysis

Figure 7 National measures: Performance report

Countries	Domestic climate governance	Climate disclosure efforts	Ambition	Emission footprint
Argentina	↑	↑	↗	↓
Australia	↑	↑	↓	↓
Brazil	↗	➡	↗	➡
Canada	↑	↗	↓	↓
China	↗	➡	↑	↓
European Union	↑	↑	↓	↓
France	↑	↑	↓	↑
Germany	↑	↑	↓	↓
India	↗	➡	↑	↑
Indonesia	↗	↗	↑	↗
Italy	↑	↓	➡	➡
Japan	↑	↑	↓	↓
Mexico	↑	↓	➡	↑
Russia	↑	↗	↓	↓
Saudi Arabia	↓	↓	➡	↓
South Africa	↑	↑	↑	↓
South Korea	↑	↑	↗	↓
Turkey	↓	↗	↓	↗
United Kingdom	↑	↑	↓	➡
United States	↑	↑	↓	↓

↑ Leader ↗ Reasonable efforts ➡ Limited efforts ↓ Needs improvement

Source: Authors' analysis

Key findings

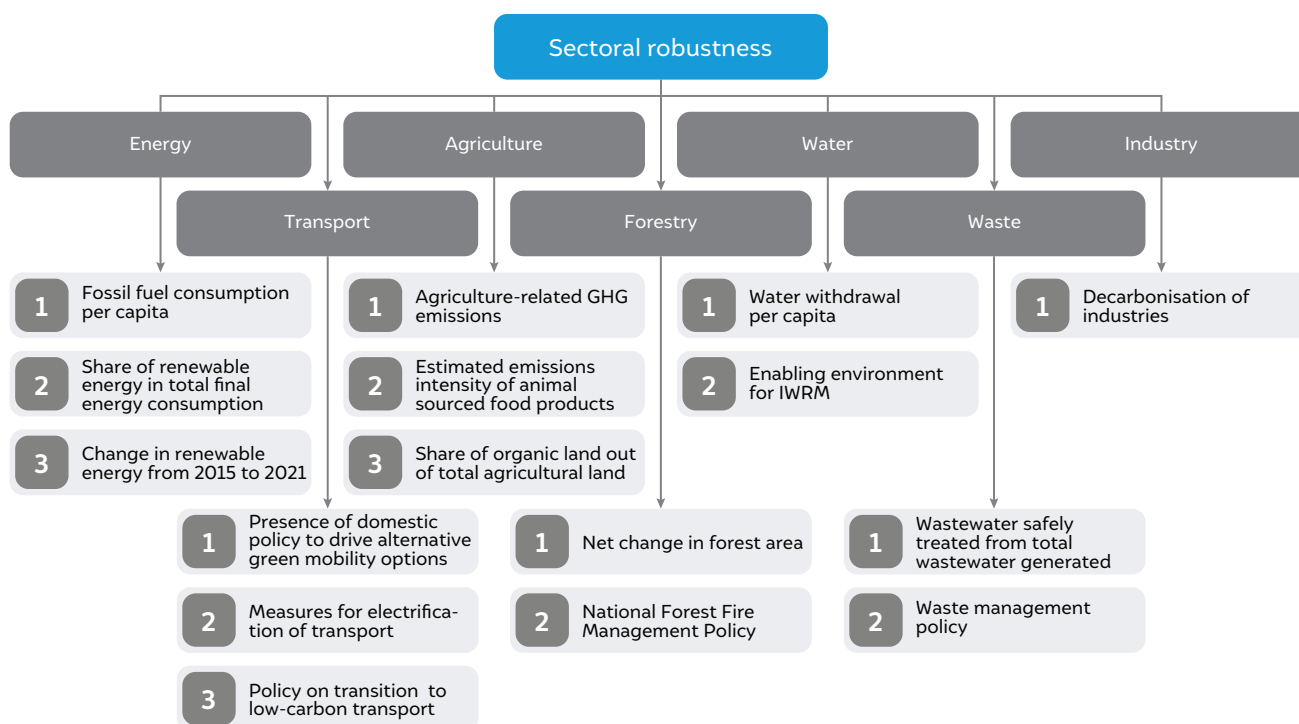
- A holistic climate law addressing all major climate related issues is uncommon among the G20 countries. A few countries, such as India, Indonesia, and Turkey, use policies to regulate and guide climate action domestically.
- Annual national-level reporting on critical sectors remains a greater challenge for many developing countries. A few developing countries, such as India, China, and Brazil, regularly report on key domestically relevant sectors at the national level. However, challenges remain for regular reporting at sub-national level data points.
- In terms of ambition, many developing countries committed to voluntary targets under the Copenhagen Accord. India, China, and Brazil appear to have achieved their voluntary targets. Conversely, numerous developed countries have fallen short of achieving the pre-2020 climate goals or even aligning their NDCs with 43 per cent of the 2019 levels – needed to keep the 1.5°C target alive (by 2030). Additionally, developed countries generally have longer timelines to achieve net-zero from their peak emission years compared to developing countries.
 - The EU is expected to take 71 years to achieve carbon neutrality, while Germany anticipates 55 years, despite both having peaked their emissions decades ago (1979 for the EU and 1990 for Germany). This is considerably greater than the average years of transition by the developing world (33 years). In contrast, India aims to reach net-zero by 2070, taking only 30 years of transition as it expects its emissions to peak between 2040 and 2045 (UNESCO, UNEP, UNCF 2022).

- In terms of emissions footprint, a thin divide exists between developed and developing countries, with developed countries showing higher per capita emissions. Among developed countries, France has lower emissions per capita primarily due to its low-carbon electricity mix, which is heavily supported by its nuclear fleet (IEA 2023). Conversely, countries such as Australia and Saudi Arabia exhibit high per capita emissions, which can be attributed to their dependence on fossil fuels.

3.3 Sectoral robustness

Addressing climate change requires not only setting ambitious global targets but also implementing robust, sector-specific actions. Adopting key sectoral solutions – such as increasing renewable energy capacity, increasing afforestation, promoting active mobility, etc. – can collectively achieve more than the necessary 22 Gt of emissions reduction needed to limit temperature rise to 1.5°C (UNEP n.d.). Given this, sectoral robustness evaluates each country's performance across seven sectors, including energy, transport, agriculture, forestry, waste, water, and industry. The evaluation aims to assess the operational efficiency of these sectors by focusing on the presence of key policies, the adoption of sustainable practices, and the efficient use of resources.

On average, developed countries are expected to take 51 years to reach net zero, compared to 33 years for developing countries.

Figure 8 Overview of sectoral robustness and metrics for assessment

Source: Authors' analysis

Energy

The energy sector, as a critical pillar of global economies, is also a significant contributor to global GHG emissions, which surpassed the critical threshold of over 40 gigatons of CO₂ equivalent (GtCO₂e) in 2023 for the first time (Energy Institute 2024), with CO₂ emissions from fossil fuel combustion accounting for approximately 87 per cent of these emissions.

To align with the Paris Agreement's goals, the growth of renewables must double to achieve net-zero by 2050 (UNFCCC 2021). Therefore, we intend to thoroughly assess a country's performance in the energy sector through key indicators: fossil fuel consumption per capita, the share of renewables in total energy consumption, and the changes in renewable energy usage since the adoption of the Paris Agreement (Annexure I).

Transport

Transport emissions have increased at an average annual rate of 1.7 per cent between 1990 and 2022 (IEA n.d.), surpassing all other end-use sectors except for industry. Given the surge in population and economic expansion, the demand for transportation will continue to increase. If left unchecked, this could cause GHG

emissions from the sector to surge by 60 per cent by 2050 (International Transport Forum n.d.). To mitigate this sector's impact, it is imperative to reduce emissions by approximately 25 per cent by 2030 (IEA n.d.). Achieving this ambitious goal requires a multifaceted approach that includes promoting fuel-efficient vehicles, implementing emission reduction strategies, enforcing stricter vehicle emission standards, and encouraging active mobility. Therefore, this analysis focuses on examining the presence of policies that promote green mobility,⁷ electrification measures, and other critical policies, such as mandatory Euro VI/6 standards, biofuels, scrappage policies, and measures to support low-carbon freight logistics.

Agriculture

Between 1990 and 2010, global agricultural emissions rose by 8 per cent (Climate Watch 2024). Projections indicate that by 2030, emissions could increase by an additional 15 per cent above 2010 levels, reaching nearly 7 billion tonnes per year (Climate Watch 2024). This growing concern is compounded by a projected increase in the global population, expected to rise from approximately 8 billion in 2023 to nearly 10 billion by 2050 (UN - DESA n.d.). This growing demand calls for action to sustainably increase food production, enhance

⁷ Cycling, walking, and public transportation.

productivity on existing land, safeguard vital resources, and reduce emissions – all while striving to keep global warming within the 1.5°C threshold. In response to these escalating demands, Climate-Smart Agriculture (World Bank n.d.) has emerged as a transformative solution, addressing the intertwined challenges of food security and climate change. Therefore, this sector is assessed from two lenses – emissions from agriculture and food systems, and the adoption of organic agricultural practices, (Annexure I).

Forest

Forests, which cover nearly one-third of the Earth's land, are not just vast swathes of greenery; they play a crucial role in mitigating climate change by acting as carbon sinks. From 2001 to 2019, global forests sequestered about twice the carbon dioxide they emitted, absorbing approximately 7.6 billion metric tonnes of CO₂ annually – 1.5 times more than the total emissions of the US (WRI 2021). However, this critical balance is increasingly threatened by human-driven factors such as deforestation, agricultural intensification, and urbanisation. Deforestation alone accounts for 45 per cent of the total Agriculture, Forestry, and Other Land Use (AFOLU) emissions (UNFCCC n.d.), posing a significant threat to this natural carbon sink. Worsening the situation, rising global temperatures are making forests more vulnerable to drought, wildfires, and diseases, resulting in the loss of vast carbon storage capacity. This vulnerability is evident in events such as Canada's record-breaking wildfires in 2023, which released 3 billion tonnes of CO₂ – nearly four times the emissions from global aviation in 2022 (WRI 2024). Thus, this sector is assessed by examining the net change in forest area and forest fire management practices (Annexure I).

Waste

The accelerating pace of global population growth and urbanisation has led to a significant surge in waste generation, creating significant challenges for both environmental and public health. On average, each individual contributes 0.74 kilograms of waste per day (WEF 2022), with high-income countries responsible for over one-third of the total 2.01 billion tonnes of global waste produced annually (World Bank 2018). This escalating waste crisis is compounded by its significant environmental impact: Waste accounts for 20 per cent of global methane emissions (UNEP 2021), a GHG with a global warming potential 80 times greater than that

of carbon dioxide (UNEP 2021). Without significant improvements in waste management, solid waste-related emissions are projected to rise to 2.6 billion tonnes of CO₂ equivalent by 2050 (World Bank 2018). To counter this trend, it is important to implement waste management techniques that could potentially reduce emissions. Thus, evaluating this sector involves assessing wastewater treatment and the presence of waste management policies aligned with Reduce, Reuse, Recycle (RRR) principles (Annexure I).

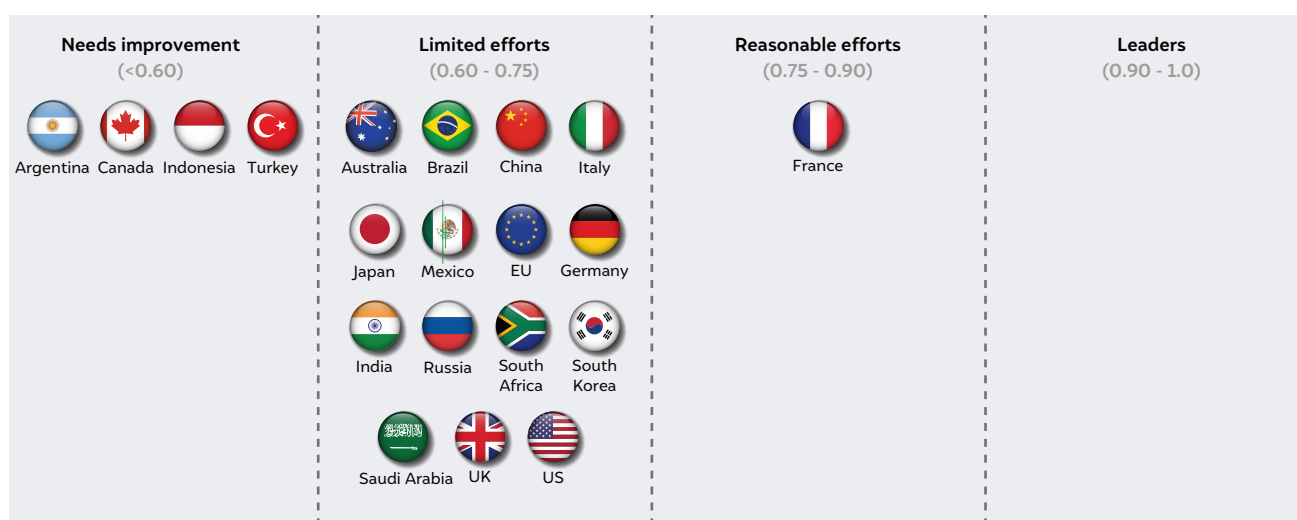
Water

Climate change is exacerbating both water scarcity and water-related hazards, such as floods and droughts, as rising temperatures disrupt precipitation patterns and the entire water cycle. Currently, approximately two billion people lack access to safe drinking water (UN 2022), while nearly half of the world's population suffers from severe water scarcity intermittently (IPCC 2022b). Furthermore, the rate of water withdrawals has surged more than twice as fast as population growth, with one-third of the global population living in areas of medium to high water stress (Department of Earth Sciences n.d.). To effectively address these challenges, the Integrated Water Resources Management (IWRM) (UNEP n.d.) framework is essential, as it promotes a coordinated approach to the development and management of water, land, and related resources. This approach aims to maximise economic and social benefits while sustaining vital ecosystems. Thereby, the analysis focuses on assessing the extent of water stress by examining per capita water withdrawal and evaluating the efforts of countries to foster an enabling environment for IWRM (Annexure I).

Industry

The industrial sector is responsible for 17 per cent of national GHG emissions in emerging economies (1990–2020), while in developed economies, this figure increases to 21.5 per cent (1997–2020) (Abd El-Aal 2024). This higher share in developed economies illustrates that, despite advancements in technology and infrastructure, their industrial sectors remain heavily reliant on fossil fuels, posing significant challenges for global decarbonisation efforts.

France is the only country demonstrating reasonable efforts in sectoral robustness.

Figure 9 G20 member countries performance: Sectoral robustness

Source: Authors' analysis

A closer examination of three key industries – minerals, metals, and chemicals – reveals the complexity of this issue. These industries are essential for economic growth and serve as the backbone for development and infrastructure. However, they are also among the largest sources of emissions in each G20 country. For instance, the mining sector is responsible for 4–7 per cent of global GHG emissions, with a significant portion—28 per cent—classified as Scope 3 emissions⁸, primarily resulting from coal combustion (Delevingne et al. 2020). The chemical industry, characterised by its extensive production networks and interdependent supply chains, contributes about 7 per cent of global CO₂ emissions (Global Efficiency Intelligence n.d.). Meanwhile, the metal industry, particularly iron and steel production, accounts for 11 per cent of global carbon emissions and 7–9 per cent of total GHG emissions (Lempriere 2023). These figures illustrate how deeply embedded emissions are in the very industries that fuel economic growth. It is not only about the total emissions produced by these sectors but also how efficiently they balance emissions with respective economic output. Given this, a crucial aspect of this analysis is the relationship between emissions and revenue, which reveals whether industries are successfully decoupling economic growth from carbon emissions – a key indicator of progress toward decarbonisation.

Analysis

As illustrated in Figure 9, no country has emerged as a leader in sectoral robustness; only France is categorised under reasonable efforts. This is attributed to increasing afforestation initiatives, a higher proportion of wastewater treatment, a strong policy framework for sustainable transportation, and lower per capita water withdrawal.

Conversely, a mix of both developed countries (including the UK, Japan, EU, Australia, Germany, and the US) and developing countries (such as India, South Korea, China, Saudi Arabia, Brazil, South Africa, and Mexico) have demonstrated limited efforts. Among these, most developed countries have made relatively significant efforts by implementing comprehensive strategies to promote sustainable transportation. These include such as electrification⁹ targets, stringent emission standards (EURO 6/VI), low-carbon freight logistics, and biofuel policies, along with creating a significant enabling environment for integrated water management. Notably, the UK has displayed significant efforts in the energy sector compared to other developed countries (previously mentioned) due to lower fossil fuel consumption per capita; Italy has also shown significant progress in the agricultural sector, with a higher share of organic farmland compared to other developed countries.

⁸ Scope 3 emissions are GHG emissions that occur outside of an organisation's direct control, but are still indirectly affected by the organisation's activities.


⁹ The UK targets 80 per cent of new cars and 70 per cent of new vans to be zero-emission by 2030, with a goal of 100 per cent by 2035; Japan's Green Growth Strategy also aims for all new vehicle sales to be electrified or use decarbonised fuels by 2040; the EU has set ambitious public procurement targets for electric vehicles (IEA 2024).

Under the same category, developing countries such as India, despite having competing development priorities, have made significant strides in the energy sector. India has higher share of renewable energy. Additionally, the country is making progress in forest management through increasing afforestation efforts and implementing a forest fire management policy. However, given that agriculture is a primary source of livelihood for about 58 per cent of its population (Pandey 2023), the country faces challenges with high emissions in this sector.

Other countries, such as Turkey, Argentina, Canada, and Indonesia require improvement. Among them, Argentina and Indonesia have higher deforestation and lacks a dedicated forest fire policy, whereas Turkey and Canada have higher agriculture emissions, and lower organic share of agricultural land. Moreover, Canada has seen a decrease in net change in forest area.

Figure 10 Sectoral robustness: Performance report

Countries	Energy	Transport	Agriculture	Forestry	Waste	Water	Industry
Argentina	↓	↓	→	↓	↗	↗	↑
Australia	↓	→	↓	↑	↗	→	↗
Brazil	↗	→	↓	↓	↗	→	↑
Canada	↓	→	↓	↓	↗	↓	→
China	↓	↗	↓	↑	↗	↗	↗
European Union	↗	↗	↓	↓	↑	↓	↑
France	↗	↗	↓	↑	↗	↗	↗
Germany	↓	↗	→	↓	↗	↓	↗
India	↗	↗	↓	↑	↗	↗	↓
Indonesia	→	→	↓	↓	→	↗	↓
Italy	↓	→	→	↑	↑	↓	↗
Japan	↓	↗	↓	↓	↑	↗	↑
Mexico	↓	→	↓	↓	↗	↗	↗
Russia	↓	↓	↓	↑	→	↗	→
Saudi Arabia	↓	↓	↓	NA	↑	↑	↑
South Africa	↓	→	↓	↓	↗	→	↑
South Korea	↓	↗	→	↓	↑	↗	↑
Turkey	↗	↓	↓	↓	→	↓	→
United Kingdom	→	↗	↓	↑	↑	↓	↗
United States	↓	→	↓	↓	↑	→	↗

 Leader
  Reasonable efforts
  Limited efforts
  Needs improvement

Source: Authors' analysis

Note: 95 per cent of Saudi Arabia is classified as desert, therefore it is excluded from assessment in the forestry sector and represented as 'NA'.

Key findings

- Countries have made moderate efforts towards achieving sectoral robustness, with progress varying from country to country. Developing countries, in particular, face challenges due to limited resources, compounded by the need for rapid industrialisation and urbanisation, making comprehensive sectoral robustness more difficult to attain. Conversely, developed countries, despite advancing in some areas, still have opportunities to further strengthen their performance across all sectors.
- Developed countries are more reliant on oil and gas in their energy mix, often prioritising energy security despite being economically best placed to lead the transition away from all fossil fuels to cleaner energy sources. In contrast, developing countries, facing competing development priorities and bearing lesser historical responsibilities, are more dependent on coal consumption. While it is crucial to transition away from all fossil fuels, a fairer and more realistic balance of mitigation efforts requires developed countries to focus on eliminating oil and gas while all countries, including those in the Global South, are swiftly transitioning away from coal power (UCL 2023).

3.4 Enablers

The current decade is marked by a wide range of implementation gaps in NDCs. The Emissions Gap Report 2024 in fact shows a number of G20 countries are less likely to meet their NDC 2030 targets based on current policies (UNEP 2024). In response, the enablers theme seeks to highlight the overarching aspects of climate action that can catalyse country efforts undertaken domestically and internationally to bridge this gap. Key enablers, identified in the Paris Agreement as means of implementation (MoI) (UNFCCC n.d.), include finance for climate action, development and transfer of technology for adaptation and mitigation, and capacity building to improve implementation and reporting.

Despite finance being a critical enabler, the cumulative climate finance gap over 2011–2020 is reportedly around half a billion USD (Pettinotti et al. 2023), and

the annualised global climate finance needed by 2030 is estimated to be between 1.2–1.7 trillion USD (World Bank 2023). The growing need for climate finance and the associated deficits highlight a fundamental challenge in actualising climate efforts. In addition to finance, advancing new technologies is essential for the transition towards a low-carbon economy. According to the OECD, the goal of achieving net-zero emissions by 2050 is critically contingent on these technological advancements (OECD n.d.). With the UNFCCC imploring countries to adopt an ‘integrated approach between technology and climate finance related plans and programmes at the national level’ (UNFCCC-TEC 2015), the development of low-cost technology becomes imminent. However, while finance and technology are crucial elements, their actualisation requires building adequate capacity across governance, policy, and individuals.

Thus, enabling climate action involves a careful prioritisation of these three facets across the national and international levels. The first GST emphasises that ‘there is no climate action without means of implementation’ (UNFCCC 2023). Notwithstanding, the CBDR-RC principle of the Paris Agreement (UNFCCC 2016) requires that the responsibilities to enable climate change efforts be differentially ascribed to developed and developing countries. In this context, the assessment of enablers is made across two categories: **national**, which evaluates domestic actions in both developing and developed countries, and **international**, which examines the support developed countries provide to developing countries beyond their domestic initiatives.

The national-level analysis includes all three MoIs: finance, technology, and capacity-building. Finance is assessed through national government expenditures on climate¹⁰ and the growth rate of green bond issuance (specific to developing countries¹¹). Technology is evaluated based on the development of environment-related technologies¹² and, for developing countries, the extent of international collaboration¹³. Capacity-building is measured through indicators of education, awareness, and research expertise. The international-level analysis

10 Expenditures are based on the classification of the functions of government (COFOG) developed by OECD and UNSD, and encompass government expenses towards environment protection R&D, pollution abatement, waste management, water management and biodiversity and landscape protection and others.

11 Indicator is not assessed for developed countries considering their different national circumstances.

12 As presented in the OECD, it covers technologies relevant to environmental management (pollution and waste), climate change mitigation (related to energy, building and transport), climate change adaptation (water and biodiversity), and CCS (Haščič and Migotto 2015).

13 Indicator is not assessed for developed countries considering their different national circumstances.

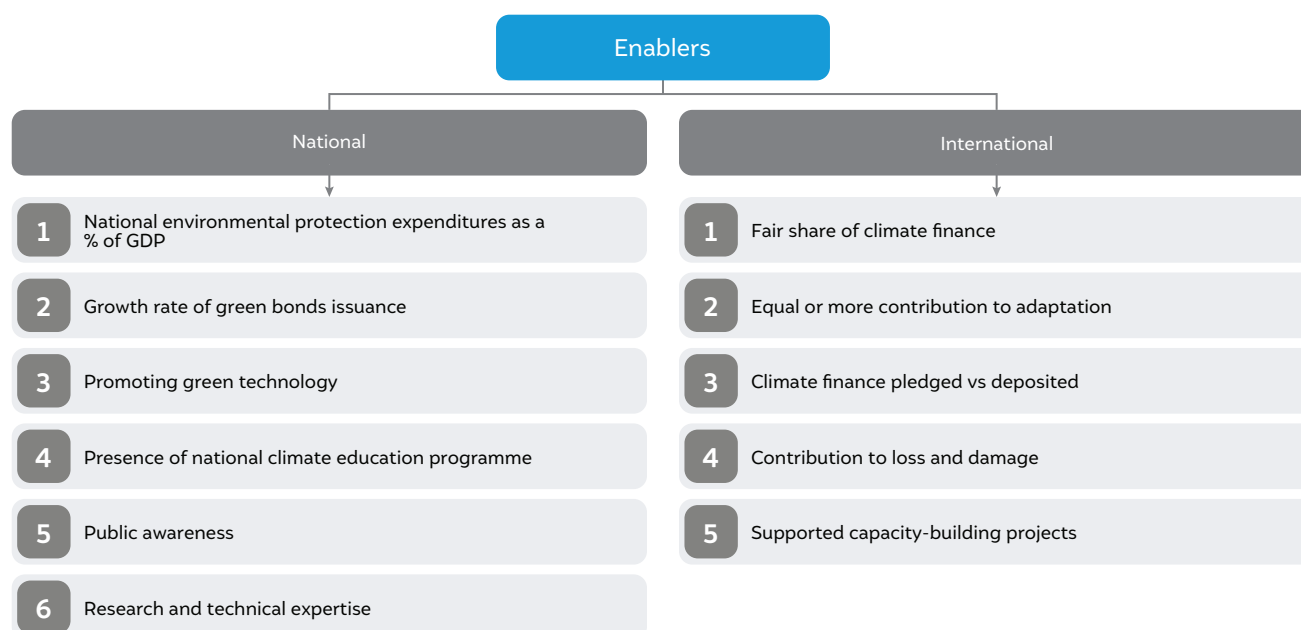
covers two aspects of MoI¹⁴ – finance and capacity-building. In finance, the assessment considers equity, effectiveness in delivery, financing for adaptation, and loss and damage, going beyond just the quantum of mitigation finance. Under capacity-building, developed countries' capacity-building efforts are assessed. Details of the indicators and elaborate methodology can be found in Annexure I.

Analysis

Based on these parameters, the analysis reveals significant challenges in enabling climate action, with no country emerging as a clear leader (Figure 12). However, there are few disparate instances of countries performing reasonably well at the national or international level. South Korea, the EU, and France emerge as notable countries in this regard. For instance, South Korea facilitates domestic climate action at par with other developed European economies, allocating

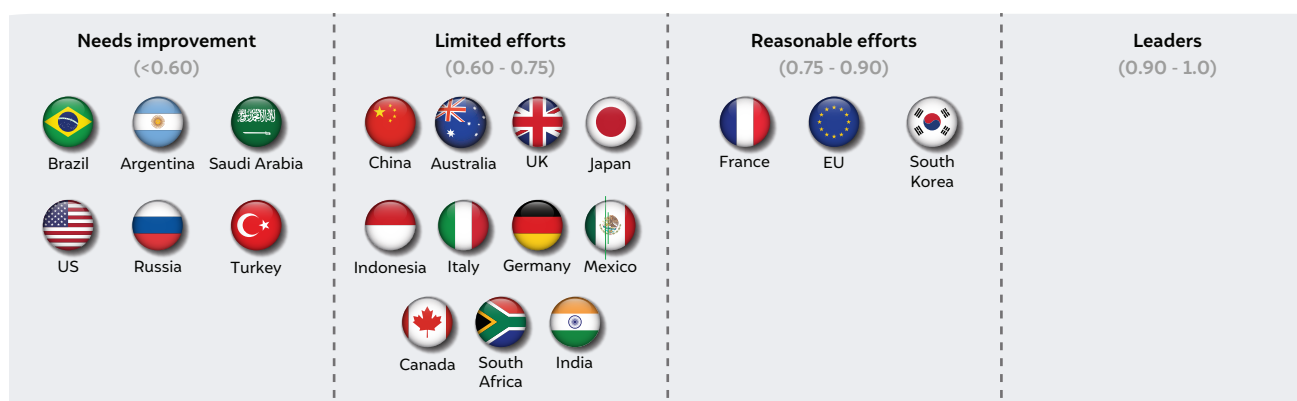
2.29 per cent of its GDP to environmental expenses and recording over 300 per cent increase in green bond issuance (2020–2022). Additionally, it has a relatively high development of environment-related technology domestically, accounting for nearly 12 per cent of overall inventions, and has the highest researcher population per million inhabitants, exceeding 9,000. Similarly, among developed countries, the EU and France have made significant contributions to international climate finance, with France being one of only two countries (alongside Germany) to exceed its fair share of contributions towards the USD 100 billion goal. The EU also registers a considerable balance in focal areas of contribution between mitigation and adaptation and additionally records some of the highest deposit ratios of funds that were pledged. Domestically, both the EU and France allocate relatively higher contributions to the national environmental protection expenditures (close to 1 per cent of GDP).

Figure 11 Overview of enablers and metrics for assessment



Source: Authors' analysis

¹⁴ The scope for technology development and international collaboration are covered at the national level, given the lack of tangible ways to account for technology transfer at the international level.

Figure 12 G20 member countries performance: Enablers

Source: Authors' analysis

Further, major developed economies like the UK, Germany, Japan, Canada, and Australia, are all demonstrating only 'limited efforts', with the US and Russia falling in the 'needs improvement' category. For instance, Japan, while having contributed to a significant quantum in climate finance (nearly close to achieving fairness), its focal area of contribution is skewed towards mitigation. The US, despite its economic prowess, has barely met 21 per cent of its fair share, and has deposited barely 50 per cent of the funds it had pledged. Similarly, Russia, while still classified as an economy in transition (EIT), has notable areas to improve nationally across finance, development of technology, and building capacity for climate efforts. Developed countries therefore need to double down on their international efforts notwithstanding the improvements required in the domestic front.

Developing countries such as India, Mexico, South Africa, China, and Indonesia also fall into the limited efforts category. Nonetheless, they make considerable efforts to realise climate goals domestically, despite the constraints in resources and associated capacities. For instance, we find that Mexico, India, and Indonesia

demonstrate significant efforts for international collaboration (more than 80 per cent) in developing environment-related technology. However, their development of environment-related technology is less than a tenth of their overall domestic inventions. They also fare considerably poor in the researcher capacity when compared to the developing country average (less than 500 per million inhabitants, compared to the developing country average of 1,683 per million inhabitants). Similarly, although Saudi Arabia shows extremely limited efforts, it is ramping up national action to enable climate finance with its green financing framework and has developed 'Sukuks'¹⁵ as a Sharia-compliant alternative to green bonds (Green Financing Framework 2024).

Overall, the outcomes in this theme are reflective of the stark realities in enabling climate action and underscore the need for countries to prioritise climate change efforts in finance, technology, and capacity-building at the national level. Equally important is the role of developed countries in supporting these priorities internationally to assist developing countries in meeting their climate goals.

¹⁵ Islamic finance instruments for bonds

Figure 13 Enablers: Performance report

Countries	National	International
Argentina	↓	-
Australia	→	→
Brazil	↓	-
Canada	↓	→
China	→	-
European Union	↗	↗
France	↗	→
Germany	↓	→
India	→	-
Indonesia	→	-
Italy	→	→
Japan	↗	↓
Mexico	→	-
Russia	↓	-
Saudi Arabia	↓	-
South Africa	→	-
South Korea	↗	-
Turkey	↓	-
United Kingdom	→	→
United States	↓	↓

Leader
 Reasonable efforts
 Limited efforts
 Needs improvement

Source: Authors' analysis

Note: Only Annex II parties are required by UNFCCC to provide financial resources to support other countries, therefore developing countries (Non-Annex I parties) are not assessed and represented as '-'.¹⁶

Key findings

- Cross-cutting areas of MoI must evolve domestically in all countries to foster 'endogenous' enablers. Currently, 80 per cent of the countries contribute less than 1 per cent towards their national environmental protection,¹⁶ which is inadequate against the warranted needs. To address this, countries should create greater fiscal space by dedicating a greater proportion of their budgets to environmental protection and climate change efforts. Notably,

developing countries have, on average, recorded over a 150 per cent increase in green bond issuance (2020–2022), reflecting significant efforts to foster domestic facilities for climate finance.

- Technology development and capacity-building remain essential areas needing domestic improvement. For instance, the development of environment-related technology averages less than a tenth of domestic inventions across countries, and over two-thirds of the G20 countries have yet

¹⁶ Environment related R&D, pollution abatement, waste management, water management, and biodiversity and landscape protection.

to enact mandatory climate-related education. While improvement is needed across the board, developing countries have shown significant efforts, with nearly 50 per cent of their environment-related technology developments involving international collaborations, on average. This also highlights the need for developed countries to support these efforts in environment-related technology development.

- At the international level, only the EU has shown reasonable efforts among developed countries. Finance is identifiably a critical enabler; however, none of the countries have deposited 100 per cent of the funds they have pledged. Barring France and Germany (with Japan as an exception¹⁷), all other countries fall significantly short of their fair share of contributions to the USD 100 billion goal. These findings reiterate the need for the increased quantum of contribution from other developed countries, as well as a focus on closing the delivery gap (ensuring countries actually deposit the funds they have pledged) and enhancing their fair share (with countries truly contributing to their capacities).
- While some countries have reported a standalone increase in adaptation finance, the balance between adaptation and mitigation remains skewed. The analysis highlights that countries have contributed thrice as much to mitigation when compared to adaptation. Further, the total funds currently allocated for loss and damage represent a mere 0.2 per cent of the estimated need, with the highest G20 contribution reaching only USD 111.55 million. These findings underscore the need to balance funding between adaptation, mitigation, and loss and damage, alongside the enhanced contribution to each area.
- Without tangibly monitoring progress in capacity building, a country's actualisation of support received in finance and technology is limited. Currently, capacity-building efforts are uncoordinated between the domestic and global fronts. Notably, even the UNFCCC action areas prioritise reporting, while capacity-building spans a broader range of activities beyond reporting. Thus, countries must cooperate to enhance

capacity-building activities and commit to measures that improve climate change education, public awareness, and participation, while also enhancing research and development.

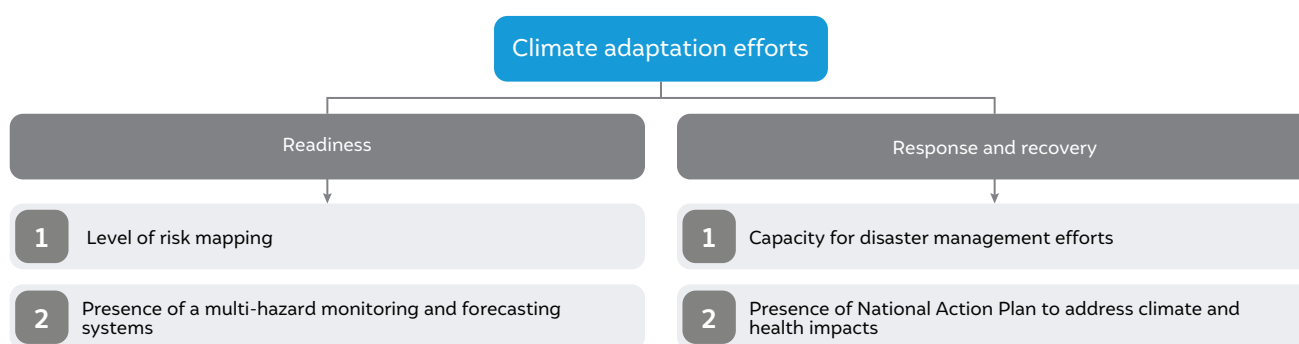
3.5 Climate adaptation efforts

Besides mitigation, efforts towards adaptation, i.e., preparing for the ongoing and future impacts of a changing climate, are crucial to avoid hard adaptation limits. Owing to geographic characteristics, each region is impacted differently; climate impacts are highly localised and assessing the adaptation efforts in terms of infrastructure and capacity is paramount. According to the WMO, natural disasters have increased fivefold over the last 50 years. Thus, adapting to the changing climate will include preparing for changes such as rising sea levels, increased frequency and intensity of extreme weather events, and a myriad of ensuing consequences, such as crop disruption, biodiversity loss, and negative impacts to human health.

Given this, this bucket holds significant importance to elevate adaptation concerns considering the rising intensity and frequency of disasters both in the developed and developing world. In order to assess the ability of the countries to prepare for, recover from, and adapt to these impacts, we have divided this analysis into two areas: readiness, which involves proactive preparation and planning measures taken to anticipate and mitigate impacts; and response and recovery, focusing on the capacity to take immediate and long-term actions taken during and after a climate-related event to manage and minimise damage. However, it is important to highlight the limited data availability. Many critical aspects, such as climate-induced displacement, economic damages, capacity to build resilience infrastructure, and more, remain difficult to assess due to outdated institutional infrastructure and limited capacity to collect data.

Countries have contributed thrice as much to mitigation as compared to adaptation efforts.

¹⁷ It is only 5 per cent points short of fair share.

Figure 14 Overview of climate adaptation efforts and metrics of assessment

Source: Authors' analysis

Figure 15 G20 member countries' performance: Climate adaptation efforts

Source: Authors' analysis

Under the readiness category, two indicators assess a country's status of preparedness and support. These include a geographical understanding of the vulnerable hotspots, the ability to understand the trends, and providing information and early detection to help people prepare for potential hazards. Additionally, we assess the ability and institutions in place to respond to disasters through adequate policies, mandates, and finance in place.

Analysis

The analysis shows that no country currently performs well enough in the category to claim the top spot as a leader in climate adaptation efforts. Many developed countries, such as Japan, Germany, the UK, the US, France, and Canada, demonstrate reasonable efforts, benefitting from detailed risk mapping, early warning systems, and robust economic and infrastructure resources that place them well to adapt to unavoidable

changes. For instance, the US focuses on the integration of climate resilience into federal policies to strengthen the country's resilience, and Australia has aligned its infrastructure and policies to meet with the adaptation needs.

Most countries, such as Brazil, China, India, South Africa, and others, have shown some sincere efforts, but challenges remain. Limited technical, institutional, and financial constraints, alongside competing development priorities hinder the capacity of these countries. In the absence of adequate capacity, developing countries remain vulnerable to significant climate-induced losses, highlighting the need for international support to build economic as well as climate resilience. Lastly, Saudi Arabia performs lowest in the chart, primarily due to its prioritisation of economic stability over action towards being more resilient and a lack of transparency in information reported.

Figure 16 Climate adaptation efforts: Performance report

Countries	Readiness	Response and recovery
Argentina	➡	⬇
Australia	⬇	⬆
Brazil	➡	↗
Canada	⬇	⬆
China	⬇	⬆
European Union	➡	➡
France	➡	⬆
Germany	↗	⬆
India	⬇	⬆
Indonesia	⬇	⬆
Italy	⬇	➡
Japan	⬆	➡
Mexico	⬇	⬆
Russia	⬇	↗
Saudi Arabia	⬇	⬇
South Africa	➡	↗
South Korea	↗	⬇
Turkey	⬇	⬆
United Kingdom	↗	↗
United States	➡	⬆

⬆ Leader ↗ Reasonable efforts ➡ Limited efforts ⬇ Needs improvement

Source: Authors' analysis

Key findings

- Developed countries are relatively well-prepared domestically for climate impacts, with robust readiness and recovery measures in place. Their infrastructure, financial resources, and planning capabilities enable them to both anticipate and effectively respond to climate events. In contrast, developing countries, despite facing the most severe consequences of climate change, are less prepared to mitigate these impacts, given that many are in the early stages of development and are only beginning to adapt to climate change.
- Although most countries have multi-hazard early warning systems (MHEWS), the scope of disasters and coverage area remain limited. Countries fare differently in their progress and efforts towards establishing MHEWS, highlighting the need for greater investments across the MHEWS value cycle, with emphasis on reaching the most at-risk groups.

4. Overall analysis

The analysis reveals that none of the G20 members currently qualify as leaders. The countries are broadly distributed among reasonable and limited efforts. While most countries have been engaging positively and shown considerable efforts at the national level, measures are needed to improve sectoral robustness and create an enabling environment for ambitious climate actions. Key trends noted across countries include the following:

France, the UK, the EU, Japan, and Germany have made notable efforts, particularly through international cooperation, active participation in key climate agreements, and adherence to transparency obligations. Additionally, these countries have established comprehensive climate governance frameworks and demonstrated reasonable adaptation efforts.

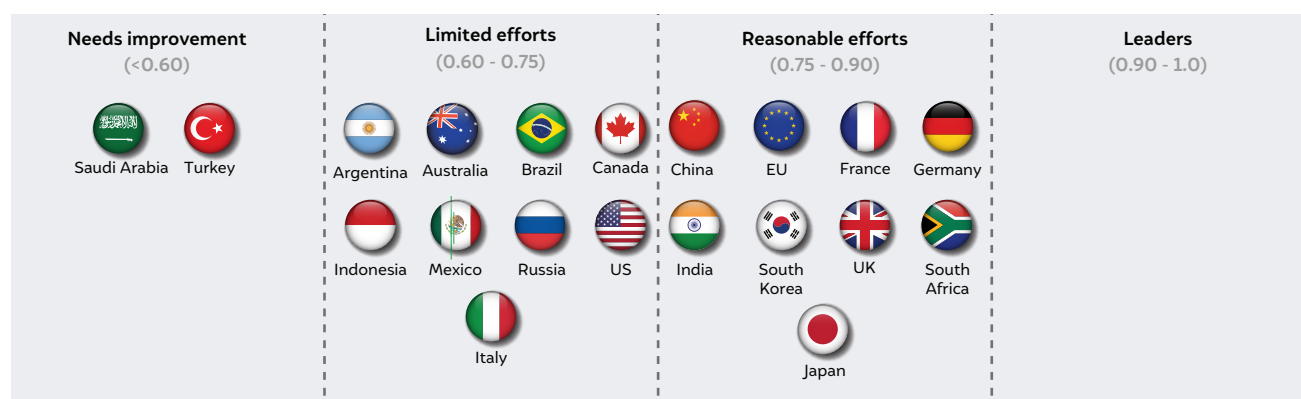
In the Global South, India, South Africa, and China have made significant efforts in climate action by actively participating in key agreements and showcasing efforts to adhere to their obligations. India and China, in particular, are expected to take a shorter transition period to net-zero¹⁸ compared to the average of

developing countries, with India having lower GHG emissions per capita. In the renewable energy segment, Brazil and India are performing relatively better than other developing countries. Likewise South Africa has demonstrated strong domestic climate governance and detailed climate disclosures.

Conversely, developed countries such as the US, Australia, Russia, and Canada exhibit limited efforts. While the US, Australia, and Canada have made efforts to adapt to climate change, concerns regarding their inconsistent engagement in key agreements and weak ambition remain. Further, despite being developed countries, their efforts to support an enabling environment for climate actions is limited.

Finally, major fossil fuel-dependent economies such as Saudi Arabia and Turkey are in the limited efforts or needs improvement category across all the themes. For Saudi Arabia, concerns remain on limited domestic climate governance, high per capita emission, and longer years of transition to net-zero. Turkey also falls short in its sectoral robustness and enablers category, along with weak greener transportation policies, high agriculture emissions, and limited efforts to promote climate actions domestically.

Figure 17 Performance outcome of the G20 countries



Source: Authors' analysis

¹⁸ Number of years taken to transition to net-zero based on commitments in NDCs compared to the peaking year.

Figure 18 G20 member countries: Thematic performance report

Countries	International cooperation	National measures	Sectoral robustness	Enablers	Climate adaptation efforts
Argentina	↑	↗	↓	↓	→
Australia	↗	↓	→	→	↗
Brazil	↑	→	→	↓	↗
Canada	→	↓	↓	→	↗
China	↑	→	→	→	→
European Union	↑	↗	→	↗	→
France	↑	↗	↗	↗	↗
Germany	↑	↗	→	→	↗
India	↑	↗	→	→	→
Indonesia	↑	↗	↓	→	→
Italy	↗	→	→	→	↓
Japan	↗	→	→	→	↗
Mexico	↑	→	→	→	→
Russia	↗	→	→	↓	→
Saudi Arabia	→	↓	→	↓	↓
South Africa	↑	↗	→	→	→
South Korea	↑	↗	→	↗	→
Turkey	→	→	↓	↓	→
United Kingdom	↑	↗	→	→	↗
United States	↓	→	→	↓	↗

↑ Leader ↗ Reasonable efforts → Limited efforts ↓ Needs improvement

Source: Authors' analysis

Here are some thematic findings for the analysis:

International cooperation: In this category, most countries are categorised as climate leaders. Several developing countries, such as India, South Africa, Mexico, Brazil, Argentina, and Indonesia, are exhibiting positive engagement. However, concerns

persist regarding the inconsistent participation of developed countries; notably, the US, Canada, and Australia, undermining overall trust and confidence in international action. In addition, timely adherence to reporting obligations and communication of NDCs remains a significant issue across countries.

National measures: Countries in this category fall between reasonable and limited efforts. When accounting for population size, developing countries generally have lower GHG emissions per capita compared to developed countries. However, a significant concern is the poor performance of developed countries during the pre-2020 period, coupled with their longer transition periods to net-zero. This adversely affects their overall standing in this category.

Sectoral robustness: There has been notable progress in areas such as renewable energy, urban mobility, and afforestation. However, fossil fuel consumption per capita remains high in certain developing countries, particularly Argentina, China, and South Africa, as well as in major developed economies, such as the US, Australia, and Canada. Interestingly, in the agricultural sector, countries such as Argentina, South Korea, Germany, and Italy are performing relatively well due to their higher proportion of organic land.

Enablers: The different enablers play a key role in creating a conducive environment for climate action, yet significant challenges remain both domestically and internationally. France, South Korea, and the EU have made substantial efforts across various domains to enhance domestic capacity and support international climate action. In contrast, other countries are distributed across limited efforts or areas in need of improvement. Despite their economic resources and ability to support climate action on a global scale, developed countries such as the US, Russia, Canada, and Australia have not met expectations, primarily due to shortcomings in making fair contributions to climate finance and delivery.

Climate adaptation efforts: While all countries need to enhance their readiness and recovery capabilities, our analysis indicates that developed countries are generally better prepared for climate impacts with robust measures in place on account of their higher financial, technical, technological, and institutional resources.

In contrast, developing countries, despite facing more severe climate change consequences, exhibit lower preparedness levels. Their adaptation efforts are often constrained by limited funding and institutional capacity at the domestic level.

Recommendations

A comprehensive review of the actions taken by G20 members reveals a concerning situation: no country currently qualifies as a 'climate leader', although a few developed and developing countries exhibit efforts that can be deemed reasonable in scale or impact. More than half of the G20 exhibits limited efforts. Their limited initiatives and insufficient accountability underscore a significant gap in the ambition necessary for implementing effective climate solutions. To bridge the gap, here are some broad areas of action:

- Developed countries must consistently participate and adhere to UNFCCC obligations:** To advance action on international climate commitments, it is essential that developed countries consistently engage in climate agreements. The analysis reveals that 6 out of 11 developed countries show inconsistent participation, signalling the need for more reliable engagement. Such inconsistent participation not only weakens collective momentum but also undermines trust and credibility. In addition, countries must also adhere to reporting deadlines, reinforce transparency and strengthen the credibility of commitments. Moreover, countries should strive to improve their disclosures, specifically in NDCs, expanding their scope and coverage. However, given the resource and technical constraints in developing countries, it is imperative for developed countries to provide adequate technical and financial support to facilitate this. Independent research institutes can also play a crucial role using such disclosures to offer evidence-based inputs to inform policymakers and hold countries accountable for their actions.

- **Developed countries should accelerate the pace of transition to net-zero:** Many developed countries are taking more years to transition to net-zero (51 years on average) and are not in line to meet the 43 per cent reduction target of the 2019 levels by 2030, a global average goal needed to limit warming to 1.5°C. The developed world needs to accelerate emission reductions by setting ambitious targets, bridging the implementation gap, and expediting its transition to net-zero. This approach is vital to ensure sufficient carbon space for developing countries to address their socio-economic development challenges.
- **Ensure fair transition for developed and developing countries:** The assessment indicates that developing countries are reliant on coal and cannot immediately transition fuel usage as rapidly as the 1.5°C pathways set out in light of resource constraints and technical capacity. Consequently, developed countries should phase out their major fossil fuel consumption (oil and gas). This also aligns with CBDR-RC, where the responsibility is shifted to developed countries with more historical responsibility. In the future, there should be an equal focus on coal, oil, and gas to ensure a fair transition away from fossil fuel, keeping in mind the capacity to transition and minimise economic harm for emerging economies.
- **Developed countries should improve both the quantity and quality of climate finance to address critical gaps in delivery and fairness:** None of the developed countries has deposited 100 per cent of the funds they had pledged; and with the exceptions of France, Germany, and Japan, all developed countries are severely short of their fair share of contributions. Therefore, developed countries must enhance both the flow and accessibility of climate finance according to the needs of developing countries. As COP29 approaches, discussions on the NCQG should be reinforced and anchored in qualitative and quantitative needs, with a target and structure that respond to lessons learned from the annual USD 100 billion goal and a commitment to support nationally-led climate plans.
- **Foster balanced contribution to adaptation and loss and damage:** Despite reporting a standalone increase in adaptation finance, nearly 80 per cent of countries record a skewed contribution towards mitigation efforts – almost thrice as much was

allocated to mitigation than to adaptation. Further, the total commitment to loss and damage (currently at USD 702 million) continues to lag at the global forum and the highest pledge by any G20 country is only USD 111.55 million (UNFCCC, 2024). To address this imbalance, climate finance contributions must extend beyond mitigation to encompass robust efforts in adaptation and loss and damage. These must be embedded in a comprehensive manner to build on the fragmented, sector-specific, and incremental efforts currently prevalent.

- **While enhanced adaptation is the mandate across the board, developing countries must be adequately supported:** Developed countries are faring well domestically in overall adaptation efforts, but developing countries, which bear the brunt of climate events, remain relatively less equipped to mitigate the impacts. Given this, they need greater support in building adequate resources, infrastructural capacity, and policy to build sustainable physical, financial, and technical infrastructure via increased investment and financing. Additionally, critical areas of risk mapping remain inadequate, and it is important for all countries to ensure better data collection to bridge the reporting gaps. This could be supported by building technical capacity and making use of existing technical (WMO, Santiago Network, FrLD Secretariat, thematic groups) and financial platforms to leverage their resources and expertise.

In conclusion, in light of different national circumstances, countries are required to put forth stronger NDCs under the Paris Agreement. In this regard, developed countries must take the lead by exceeding the global emission reduction average required to keep the 1.5°C target alive by enhancing their 2030 NDCs beyond 43 per cent reduction from their 2019 levels. They must also pledge to meet their net-zero targets well before 2050. In a world increasingly affected by climate-induced disasters and geo-political tensions, delays in translating pledges into acts are no longer viable. Hence, accountability is critical for ensuring ambitious and accelerated climate action.

Developed countries must take the lead by enhancing their 2030 NDCs beyond 43% from 2019 levels.

Annexure I

Table A1 Details of indicators

Sr No.	Category	Name of Indicator	Year	Rationale	Assessment criteria	Sources
International cooperation						
1	Engagement	Signatory and participation in key climate agreements	2024	Assesses country's engagement with internationally established climate action standards.	Categorical scoring. No differential.	Discrete reports/ Official press releases
2	Adherence to obligations	Transparency reports submission (BUR/BR)	2014–2024	Help judge a country's seriousness by exchanging information on country actions and commitments.	Categorical scoring. <u>Differential:</u> Assessed timeliness of reporting for developed countries whereas the number of submissions for developing countries.	UNFCCC
3		NDC communication (CTU)	Updated NDCs (years vary across countries)	Provide necessary information to ensure that targets are transparent and understandable such that countries' NDCs are comparable.	Categorical scoring. <u>Differential:</u> Timeliness of submission for developed and submission status for developing.	UNFCCC
4		National Adaptation Plan (NAP)	Latest available	Helps identify and address vulnerability to the impacts of climate change.	Categorical scoring. No differential.	UNFCCC
5		Long-term goals (net-zero and LT-LEDs)	2024	Ensure there is guidance for the country to align their net-zero and developmental goals with the Paris Agreement's objective.	Categorical scoring. <u>Differential:</u> For a developing country, either a net-zero commitment or an LT-LEDs submission is considered. For developed, both are considered.	UNFCCC
National measures						
6	Domestic climate governance	Presence of governing climate frameworks	2024	Assesses whether a country has one holistic framework in the form of policy or law that holds actors accountable to address climate change.	Categorical scoring. <u>Differential:</u> For developing countries any policy or law, for developed countries only law.	Discrete reports/ official press releases
7	Climate disclosure efforts	Existing frameworks for climate disclosures	2024	Identify formal systems and procedures within a country, critical for identifying the gaps and tracking progress towards climate goals.	Categorical scoring. <u>Differential:</u> On the basis of the levels of disclosure (national/sub-national level and timelines).	Discrete reports/ official press releases

Sr No.	Category	Name of Indicator	Year	Rationale	Assessment criteria	Sources
8	Ambition	Pre-2020	2020	Crucial for tracking GHG emissions and providing insights into the country's historical contributions to climate change.	Categorical scoring. <u>Differential</u> : Developed and developing countries assessed with respect to their own commitments.	BUR/BR
9		Assessment of NDCs	-	Assess whether a country has raised ambition by enhancing national commitments.	Categorical scoring. <u>Differential</u> : Checks if countries have met the 43% benchmark set under IPCC (only for developed countries) and revised mitigation target (for both).	NDC registry, UNFCCC
10		Net-zero (years of transition)	Latest available	Understand the inequity in transition as net-zero emissions entails transformation that would affect all sectors of the economy.	Interval scoring. <u>Differential</u> : Developed and developing countries assessed differently using respective averages.	CEEW/ Discrete reports/ official press releases
11	Emission footprint	Emission per capita	2020	Since annual emissions do not take population size into account, this provides a nuanced understanding of individual emission contributions.	Interval scoring. <u>Differential</u> : Based on per capita.	Climate watch
Sectoral robustness						
12	Energy	Fossil fuel consumption per capita	2023	Highlights the significant disparities in energy consumption between countries.	Interval scoring. <u>Differential</u> : Based on respective per capita.	Our world in data
13		Share of renewable energy in total final energy consumption	2020	Assessing each country's progress through renewable deployment.	Interval scoring. <u>Differential</u> : Developing countries and developed countries assessed separately.	Our world in data
14		Change in renewable energy from 2015 to 2021	2015–2021	Tracks how rapidly the country is adapting to renewable energy sources.	Interval scoring. <u>Differential</u> : Only assessed for developed countries.	OECD

Sr No.	Category	Name of Indicator	Year	Rationale	Assessment criteria	Sources
15	Transport	Presence of domestic policy to drive alternative green mobility options	Latest available	Policies supporting walking, cycling, and public transport reflect efforts to integrate low-carbon travel options into urban planning and encouraging sustainable travel behaviours.	Categorical scoring. <u>Differential</u> : Developed and developing countries levels classified differently.	Discrete reports/ Official press releases
16		Measures for electrification of transport	Latest available	To assess commercial and public actions and targets for transport electrification to reduce emissions.	Interval scoring. <u>Differential</u> : Developing and developed countries assessed differently.	IEA/ CAT/ Discrete reports/ official press releases
17		Policy on transition to low-carbon transport	Latest available	Understand the efforts towards sustainable transportation by implementing mandatory emission standards (EURO 6/VI), low-carbon freight logistics, scrappage policies, and the use of biofuels.	Categorical scoring. <u>Differential</u> : Developed and developing countries levels classified differently.	GIZ-NITI study/ Discrete reports/ Official press releases
18	Agriculture	Agriculture-related GHG emissions per value of agricultural production	2021	Measures GHG emissions relative to agricultural output.	Interval scoring. <u>Differential</u> : Developing and developed countries assessed differently.	FAO
19		Estimated emissions intensity of animal sourced food products	2021	Evaluates GHG emissions from producing animal-based foods, which have higher environmental impacts compared to plant-based foods.	Relative scoring. <u>Differential</u> : Developing and developed countries assessed differently.	FAO
20		Share of organic land out of total agricultural land	2021	Shows the proportion of agricultural land managed organically, reflecting the adoption of sustainable farming practices.	Interval based scoring. <u>Differential</u> : Developing and developed countries assessed differently.	Study supported by Swiss Confederation
21	Forestry	Net change in forest area	2020	Reflects the difference between afforestation and deforestation efforts.	Interval-based scoring. No differential.	FAO
22		Presence of a national forest fire management policy	Latest available	Demonstrates a country's seriousness towards mitigating effects of forest fires.	Categorical scoring. No differential.	FAO

Sr No.	Category	Name of Indicator	Year	Rationale	Assessment criteria	Sources
23	Waste	Percentage of wastewater safely treated from total wastewater generated	2020	Assess efforts to protect public health, reduce pollution, and promote sustainable development through effective wastewater management practices.	Interval based scoring. <u>Differential</u> : Developing and developed countries assessed differently.	WHO
24		Presence of waste management policy	Latest available	Helps in holding governments responsible for implementing sustainable practices, setting measurable targets, and ensuring compliance towards waste management.	Categorical scoring. <u>Differential</u> : Developed and developing countries levels classified differently.	Discrete reports/ Official press releases
25	Water	Water withdrawal per capita	2020	Helps assess water availability and consumption patterns indicating how much water is being used relative to the population size.	Interval based scoring. <u>Differential</u> : Developing and developed countries assessed differently.	World Bank
26		Enabling environment for IWRM	2023	Helps assess the policies, institutional frameworks, and governance structures that facilitate effective water resource management.	Interval based scoring. <u>Differential</u> : Developing and developed countries assessed differently.	IWRM-UNEP
27	Industry	Decarbonisation of industries	Latest available	Assess the relationship between emissions and revenue to highlight whether industries are successfully decoupling economic growth from carbon emissions.	Categorical scoring. <u>Differential</u> : Developed and developing countries industry coverage classified differently.	BUR/BR

Sr No.	Category	Name of Indicator	Year	Rationale	Assessment criteria	Sources
Enablers						
28	National	National environmental protection expenditures as a % of GDP	2021	Allows to evaluate climate-related spending within the overall budget, shedding light on whether climate initiatives are adequately funded.	Interval based scoring. <u>Differential:</u> Developing countries and developed countries assessed separately.	IMF
29		Growth rate of green bonds issuance	2020–2022	Allows to infer the availability and scope of market-based finance options to fund and bridge the finance gap in climate action.	Interval based scoring. <u>Differential:</u> Developed countries not assessed.	IMF
30		Promoting green technology	2019	Allows to infer a country's commitment to developing new sustainable solutions.	Interval-based scoring. <u>Differential:</u> International collaboration not assessed for developed countries.	OECD
31		Presence of national climate education programme	Latest available	Presents insights into the extent to which the climate education is imbued within the policy and regulatory landscape of the country.	Categorical scoring. <u>Differential:</u> Developed and developing countries assessed differently.	Discrete reports/ Official press releases
32		Public Awareness	2023	Assessing public awareness on government commitments to NDC, emissions reductions, and critical mitigation policies like carbon tax, ETS, emissions and renewable energy.	Categorical scoring. <u>Differential:</u> Developed and developed countries assessed differently.	IMF
33		Research and technical expertise	2023	Allows inference of the technical expertise (researcher per million inhabitant) and research capacities (publication related to SDG 13 climate action) available domestically.	Interval based scoring. <u>Differential:</u> Developing countries and developed countries assessed separately.	UNESCO

Sr No.	Category	Name of Indicator	Year	Rationale	Assessment criteria	Sources
34	International	Fair share of climate finance	2022	Provides insights into the extent of equity in country contributions, based on their respective capacities.	Interval-based scoring. <u>Differential:</u> Developing countries not assessed.	ODI
35		Equal or more contribution to adaptation	2015-2020	Allows to infer priority funding areas for a country. Given adaptation is underfunded, it is crucial to assess whether a country is adequately prioritising the need for long-term adaptation strategies alongside mitigation efforts.	Interval-based scoring. <u>Differential:</u> Developing countries not assessed.	UNFCCC BR submissions
36		Climate finance pledged vs deposited	2003 – latest available	Provides insight into the effectiveness and reliability of climate finance commitments.	Interval-based scoring. <u>Differential:</u> Developing countries not assessed.	Climate Funds Update
37		Contribution to loss and damage	2023	Analysing the share of contribution to loss and damage presents a country's commitment to supporting vulnerable countries facing the unavoidable impacts of climate change.	Categorical scoring. <u>Differential:</u> Developing countries not assessed.	UNFCCC
38		Supported capacity-building projects	2023	Allows to infer the extent of country efforts for supporting capacity-building across developing countries.	Categorical scoring. <u>Differential:</u> Developing countries not assessed.	UNFCCC
Climate adaptation efforts						
39	Readiness	Level of risk mapping	Latest available	To identify vulnerabilities within specific regions, allowing decision-makers to better understand the geographic distribution of risks and prioritise interventions.	Categorical scoring. No differential.	Discrete reports/ Official press releases
40		Presence of a multi-hazard monitoring and forecasting system	Latest available	To track data on trends, frequency, and severity of disasters, enabling targeted and informed adaptive strategies.	Categorical scoring. No differential.	UNDRR
41	Response and recovery	Capacity for disaster management efforts	Latest available	Assess the ability to prepare for, respond to, and recover from disasters.	Categorical scoring. No differential.	Discrete reports/ Official press releases
42		Presence of National Action Plan to address climate change and health impacts	Latest available	To understand the existence of policy to acknowledge and address adverse climate effects.	Categorical scoring. No differential.	Discrete reports/ Official press releases

Source: Authors' analysis

Acronyms

AFOLU	agriculture, forestry, and other land use
BR	Biennial Report
BTR	Biennial Transparency Report
BUR	Biennial Update Report
CAM	Climate Accountability Matrix
CAT	Climate Action Tracker
CBDR-RC	common but differentiated responsibilities and respective capabilities
CCPI	Climate Change Performance Index
CH₄	methane
CO₂	carbon dioxide
COP29	29th session of the Conference of the Parties to the United Nations Framework Convention on Climate Change
CSA	climate-smart agriculture
CSO	civil society organisation
EJ	exajoule
EPI	Environmental Performance Index
ESG	environmental, social, and governance
ETS	emissions trading system
EU	European Union
EURO 6/VI	European vehicle emission standards for light- and heavy-duty vehicles
FrLD	Fund for Responding to Loss and Damage
G20	Group of Twenty
GCF	Green Climate Fund
GDP	gross domestic product
GEF	Global Environment Facility
GGA	Global Goal on Adaptation
GHG	greenhouse gas
GST	Global Stocktake
GtCO₂-eq	gigatons of carbon dioxide equivalent
GW	gigawatts
HFCs	hydrofluorocarbons
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use

IWRM	integrated water resources management
kWH	kilowatt-hour
LDCF	Least Developed Countries Fund
LT-LEDS	long-term low emissions development strategies
LULUCF	land use, land-use change, and forestry
MDB	multilateral development banks
MHEWS	multi-hazard early warning system
MoI	means of implementation
MRV	measurement, reporting, and verification
NAP	National Adaptation Plan
NC	National Communications
NCQG	New Collective Quantified Goal on Climate Finance
NDC	Nationally Determined Contributions
PCCB	Paris Committee on Capacity-building
SCCF	Special Climate Change Fund
UK	United Kingdom
UNDRR	United Nations Office for Disaster Risk Reduction
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations International Children's Emergency Fund
US	United States
WHO	World Health Organization
WMO	World Meteorological Organization

References

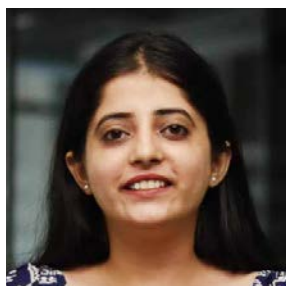
- Abd El-Aal, Mohamed F. 2024. "The Relationship between Co2 Emissions and Macroeconomics Indicators in Low and High-income Countries: Using Artificial Intelligence." *Environment, Development and Sustainability*, April 23, 2024. doi:10.1007/s10668-024-04880-3.
- Atlas Magazine. 2024. "Cost of Natural Disasters in H1 2024." *Atlas Magazine*, July 2024. <https://www.atlas-mag.net/en/natural-disasters/cost-in-h1-2024>.
- Canada Energy Regulator. 2018. "Market Snapshot: Why Do Canadians Use So Much Oil?" Canada Energy Regulator, January 24, 2018. <https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/market-snapshots/2018/market-snapshot-why-do-canadians-use-so-much-oil.html>.
- CEEW. 2021. *Unpacking Pre-2020 Climate Commitments: Who Delivered, How Much, and How Will the Gaps Be Addressed?* New Delhi: Council on Energy, Environment and Water, July 2021. <https://www.ceew.in/sites/default/files/ceew-study-on-pre-2020-climate-commitment-gaps-and-country-wise-results.pdf>.
- Center for Global Development. n.d. "Developed Countries Are Responsible for 79 Percent of Historical Carbon Emissions." Center for Global Development. Accessed October 2024. <https://www.cgdev.org/media/who-caused-climate-change-historically>.
- Climate Transparency. 2022. *Climate Transparency Report: Comparing G20 Climate Action — Saudi Arabia*. Climate Transparency. <https://www.climate-transparency.org/wp-content/uploads/2022/10/CT2022-Saudi-Arabia-Web.pdf>.
- Climate Watch. 2024. <https://www.climatewatchdata.org>.
- Deleavingne, Lindsay, Will Glazener, Liesbet Grégoir, and Kimberly Henderson. 2020. "Climate Risk and Decarbonization: What Every Mining CEO Needs to Know." *McKinsey Sustainability*, January 28, 2020. <https://www.mckinsey.com/capabilities/sustainability/our-insights/climate-risk-and-decarbonization-what-every-mining-ceo-needs-to-know>.
- Department of Earth Sciences, Freie Universität. n.d. "Why do we need IWRM?" Berlin: Freie Universität Berlin. Accessed October 2024. <https://www.geo.fu-berlin.de/en/v/iwr/Introduction/Why-do-we-need-IWRM/index.html>.
- Energy Institute. 2024. *Statistical Review of World Energy 2024*. Energy Institute. <https://www.energyinst.org/statistical-review>.
- European Commission. 2020. "Committing to Climate-Neutrality by 2050: Commission Proposes European Climate Law and Consults on the European Climate Pact." Press release, European Commission, March 4, 2020. https://ec.europa.eu/commission/presscorner/detail/en/ip_20_335.
- Evans, Simon. 2021. "Analysis: Which Countries Are Historically Responsible for Climate Change?" Carbon Brief, October 5, 2021. <https://www.carbonbrief.org/analysis-which-countries-are-historically-responsible-for-climate-change/>.
- First Global Stocktake High-Level Committee. 2023. "First Global Stocktake High-Level Committee: Summary of High-Level Events." COP28, UAE. https://unfccc.int/sites/default/files/resource/GST_HLE%20branded%20V2.pdf.
- Global Efficiency Intelligence. n.d. "Chemical Industry." Global Efficiency Intelligence. Accessed October 2024. <https://www.globalefficiencyintel.com/chemical-industry>.
- G20 Brasil 2024. 2024. "Efforts from the World's Largest Economies Are Urgent to Mitigate Climate Change." G20 Brasil 2024, January 10. <https://www.g20.org/en/news/efforts-from-the-worlds-largest-economies-are-urgent-to-mitigate-climate-change>.
- G20 Italia 2021. 2021. "About the G20." G20 Italia. <http://www.g20italy.org/about-the-g20.html>.
- Ministry of Finance, Saudi Arabia. 2024. Green Financing Framework. Ministry of Finance, Kingdom of Saudi Arabia, March 2024. <https://ndmc.gov.sa/investorsrelations/Documents/Green-Financing-Framework-KSA-28March2024.pdf>.

- Harris, Nancy, and David Gibbs. 2021. "Forests Absorb Twice as Much Carbon as They Emit Each Year." World Resources Institute, January 21, 2021. Accessed October 2024. <https://www.wri.org/insights/forests-absorb-twice-much-carbon-they-emit-each-year>.
- Haščić, Ivan, and Mauro Migotto. 2015. "Measuring Environmental Innovation Using Patent Data." *OECD Environment Working Papers*, June 26, 2015. doi:10.1787/5js009kf48xw-en.
- Higham, Catherine. 2021. "Addressing the 'Credibility Gap': The Role of Domestic Legal Systems in Ensuring Accountability for Climate Action." *Cambridge International Law Journal*, December 29, 2021. <https://cilj.co.uk/2021/12/29/addressing-the-credibility-gap-the-role-of-domestic-legal-systems-in-ensuring-accountability-for-climate-action/>.
- IEA. n.d. "Transport." International Energy Agency. Accessed October 2024. <https://www.iea.org/energy-system/transport>.
- International Institute for Democracy and Electoral Assistance. 2020. *The Global State of Democracy Indices Methodology: Conceptualization and Measurement Framework*, Version 4. Stockholm: IDEA. doi:10.31752/idea.2020.72.
- IPCC. 2022a. "International Cooperation." In *Climate Change 2022 — Mitigation of Climate Change: Working Group III Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, edited by the Intergovernmental Panel on Climate Change, pp. 1451–1546. Cambridge: Cambridge University Press. doi:10.1017/9781009157926.016.
- IPCC 2022b. "Food and Water". Fact sheet, in *Sixth Assessment Report: Working Group II – Impacts, Adaptation and Vulnerability*, October 2022. Accessed October 2024. https://www.ipcc.ch/report/ar6/wg2/downloads/outreach/IPCC_AR6_WGII_FactSheet_FoodAndWater.pdf.
- . 2023. "Summary for Policymakers." In *Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Geneva: Intergovernmental Panel on Climate Change. doi:10.59327/IPCC/AR6-9789291691647.001.
- International Transport Forum. n.d. "Decarbonising Transport Initiative." International Transport Forum. Accessed October 2024. <https://www.itf-oecd.org/decarbonising-transport>.
- Koshy, Jacob. 2024. "India is World's Second Largest Emitter of Nitrous Oxide." *The Hindu*, 13 June, 2024. <https://www.thehindu.com/sci-tech/energy-and-environment/india-is-worlds-second-largest-emitter-of-nitrous-oxide/article68281521.ece>.
- Lempriere, Molly. 2023. "Steel Industry Makes 'Pivotal' Shift Towards Lower-Carbon Production." *Carbon Brief*, July 20, 2023. <https://www.carbonbrief.org/steel-industry-makes-pivotal-shift-towards-lower-carbon-production/>.
- Lo, Joe. 2023. "UN Tells Governments to 'Fast Forward' Net Zero Targets." *Climate Change News*, March 20, 2023. <https://www.climatechangenews.com/2023/03/20/un-tells-governments-to-fast-forward-net-zero-targets/>.
- MacCarthy, James, Alexandra Tyukavina, Mikaela Weisse and Nancy Harris. 2024. "Canada's Record-Breaking 2023 Wildfires Released Nearly 4 Times More Carbon than Global Aviation." World Resources Institute, June 27, 2024. Accessed October 2024. <https://www.wri.org/insights/canada-wildfire-emissions>.
- McNally, Ellen. 2024. "China's Emissions of Two Potent Greenhouse Gases Rise 78% in Decade." *The Guardian*, July 15, 2024. <https://www.theguardian.com/world/article/2024/jul/15/chinas-emissions-of-two-potent-greenhouse-gases-rise-78-in-decade>.
- Mondal, Monica. 2021. "Why India Is Neglecting its Methane Problem." *Dialogue Earth*, December 2, 2021. <https://dialogue.earth/en/climate/why-india-neglecting-methane-problem/>.
- Nair, Purusothmn, S. Bhasker Nair, Raymond R. Tan, Dominic C.Y. Foo and Michael Short. 2022. "A Process Integration-Based Multiperiod Energy Planning Model for Co2-Intensive Industries." *Process Safety and Environmental Protection*, 168: 1188–1200. doi:10.1016/j.psep.2022.10.044.
- OECD. n.d. "Economic and Environmental Outcomes of Innovation." The Organisation for Economic Co-operation and Development. Accessed October 2024. <https://www.oecd.org/en/topics/economic-and-environmental-outcomes-of-innovation.html>.

- Pandey, Pooran Chandra. 2023. "India's Agriculture Sector Produced 12.7% of Global Agricultural CO₂e Emissions in 2021." *Climate Scorecard*, March 10, 2023. <https://www.climatescorecard.org/2023/03/indias-agriculture-sector-produced-12-7-of-global-agricultural-co2e-emissions-in-2021/>.
- Pettinotti, Laetitia, Yue Cao, Tony Kamninga and Sarah Colenbrander. 2023. "A Fair Share of Climate Finance? The Adaptation Edition." ODI Working Paper. London: ODI. https://media.odi.org/documents/ODI-OM-FairShare-WP-Aug23-Proof06_urGrtOo.pdf.
- Pollesch, N.L., and V.H. Dale. 2016. "Normalization in Sustainability Assessment: Methods and Implications." *Ecological Economics*, 130: 195–208. doi:10.1016/j.ecolecon.2016.06.018.
- Price, James, and Steve Pye. 2023. "For Developing World to Quit Coal, Rich Countries Must Eliminate Oil and Gas Faster — New Study." *The Conversation*, February 17, 2023. <https://theconversation.com/for-developing-world-to-quit-coal-rich-countries-must-eliminate-oil-and-gas-faster-new-study-199649>.
- Pucher, John, and Ralph Buehler. 2008. "Cycling for Everyone: Lessons from Europe." *Transportation Research Record*, 2074 (1): 58–65. doi:10.3141/2074-08.
- Quiroz, Yanine. 2024. "Mexico Election 2024: What the Manifestos Say on Energy and Climate Change." *Carbon Brief*, May 1, 2024. <https://www.carbonbrief.org/mexico-election-2024-what-the-manifestos-say-on-energy-and-climate-change/>.
- Reuter, Holly, Jess Wyner and John Thompson. 2024. "Decarbonizing U.S. Industry: Progress and Opportunities." *Clean Air Task Force*, August 16, 2024. <https://www.catf.us/2024/08/decarbonizing-us-industry-progress-opportunities/>.
- Timperley, Jocelyn. 2018. "The Carbon Brief Profile: Brazil." *Carbon Brief*, March 7, 2018. <https://www.carbonbrief.org/the-carbon-brief-profile-brazil/>.
- UN DESA. n.d. "World Population Projected to Reach 9.8 Billion in 2050, and 11.2 Billion in 2100." Accessed October 2024. <https://www.un.org/en/desa/world-population-projected-reach-98-billion-2050-and-112-billion-2100>.
- UN. 2022. "SDG 6: Clean Water and Sanitation — Ensure Availability and Sustainable Management of Water and Sanitation for All." *SDG Report*, United Nations. <https://unstats.un.org/sdgs/report/2022/Goal-06>.
- UNDP. 2023. "Climate Promise: Forests Can Help Us Limit Climate Change — Here is How." United Nations Development Programme, October 25, 2023. <https://climatepromise.undp.org/news-and-stories/forests-can-help-us-limit-climate-change-here-how>.
- UNEP. n.d. "Integrated Water Resources Management." United Nations Environment Programme. Accessed October 2024. <https://www.unep.org/topics/fresh-water/water-resources-management/integrated-water-resources-management>.
- . n.d. "The Sectoral Solution to Climate Change." United Nations Environment Programme. Accessed October 2024. <https://www.unep.org/interactive/sectoral-solution-climate-change/>.
- UNEP. 2024. *Emissions Gap Report 2024: No more hot air ... please! With a massive gap between rhetoric and reality, countries draft new climate commitments*. Nairobi: United Nations Environment Programme. doi:10.59117/20.500.11822/46404.
- . 2021. "Global Assessment: Urgent Steps Must Be Taken to Reduce Methane Emissions This Decade." Press release, United Nations Environment Programme, May 6, 2021. Accessed October 2024. <https://www.unep.org/news-and-stories/press-release/global-assessment-urgent-steps-must-be-taken-reduce-methane>.
- . 2021. "Methane Emissions Are Driving Climate Change. Here's How to Reduce Them." United Nations Environment Programme, August 20, 2021. Accessed October 2024. <https://www.unep.org/news-and-stories/story/methane-emissions-are-driving-climate-change-heres-how-reduce-them>.
- . 2023. *Emissions Gap Report 2023: Broken Record — Temperatures Hit New Highs, Yet World Fails to Cut Emissions (Again)*. Nairobi: United Nations Environment Programme. <https://www.unep.org/resources/emissions-gap-report-2023>.

- UNESCO, UNEP and UNICEF. 2022. Review of Climate Ambition in Asia and the Pacific: Raising NDC Targets with Enhanced Nature-Based Solutions. Bangkok: United Nations. <https://repository.unescap.org/handle/20.500.12870/5085>
- UNFCCC. n.d. Land Use, Land-Use Change and Forestry. United Nations Framework Convention on Climate Change. Accessed September 2024. <https://unfccc.int/topics/land-use/workstreams/land-use--land-use-change-and-forestry-lulucf>
- UNFCCC. 2015. The Paris Agreement. United Nations Framework Convention on Climate Change. https://unfccc.int/sites/default/files/resource/parisagreement_publication.pdf.
- . 2018. “Report of the Conference of the Parties Serving as the Meeting of the Parties to the Paris Agreement on the Third Part of its First Session, held in Katowice from 2 to 15 December 2018.” Decision 18/CMA.1, United Nations Framework Convention on Climate Change. https://unfccc.int/sites/default/files/resource/cma2018_3_add2_new_advance.pdf
- . 2021. “Renewables Growth Must Double to Achieve Paris Goals — IEA.” United Nations Climate Change News, December 1, 2021. Accessed October 2024. <https://unfccc.int/news/renewables-growth-must-double-to-achieve-paris-goals-iea>.
- UNFCCC. 2023. “Outcome of the First Global Stocktake.” Draft decision -/CMA.5, revised advance version. UAE: United Nations Framework Convention on Climate Change. https://unfccc.int/sites/default/files/resource/cma2023_L17_adv.pdf
- UNFCCC. 2024. “Pledges to Fund for Responding to Loss and Damage.” Updated September 26, 2024. Accessed October 2024. <https://unfccc.int/process-and-meetings/bodies/funds-and-financial-entities/loss-and-damage-fund-joint-interim-secretariat/pledges-to-the-loss-and-damage-fund>
- UNFCCC-TEC. 2015. Enhancing Access to Climate Technology Financing. Issue brief, United Nations Framework Convention on Climate Change. https://unfccc.int/ttclear/misc_/StaticFiles/gnwoerk_static/TEC_documents/204f400573e647299c1a7971feec7ace/ea65dboca9264cdbaefeb272dd30b34c.pdf.
- UNSG. 2023. “Point World towards Solutions, Show Need to End Global Heating with Cold, Hard Facts, Secretary-General Tells Intergovernmental Panel on Climate Change.” Press release, United Nations Secretary-General. <https://press.un.org/en/2023/sgsm21722.doc.htm>.
- Van Deursen, Max, and Sumit Prasad. 2023. Trust and Transparency in Climate Action: Revealing Developed Countries’ Emission Trajectories. Issue brief. New Delhi: Council on Energy, Environment and Water, October 26, 2023. <https://www.ceew.in/publications/trust-and-transparency-climate-action-research>.
- World Bank. n.d. “Climate-Smart Agriculture.” Accessed October 2024. World Bank. <https://www.worldbank.org/en/topic/climate-smart-agriculture>.
- . 2018. “What a Waste 2.0 — A Global Snapshot of Solid Waste Management to 2050: Trends in Solid Waste Management.” World Bank. https://datatopics.worldbank.org/what-a-waste/trends_in_solid_waste_management.html.
- . 2023. “What You Need to Know About How CCDRs Estimate Climate Finance Needs.” CCDR Explainer Series, World Bank Group, March 13, 2023. Accessed October 2024. <https://www.worldbank.org/en/news/feature/2023/03/13/what-you-need-to-know-about-how-ccdrs-estimate-climate-finance-needs>.
- WMO. 2021. “Weather-Related Disasters Increase over Past 50 Years, Causing More Damage but Fewer Deaths.” World Meteorological Organization, August 31, 2021. Accessed October 2024. <https://wmo.int/media/news/weather-related-disasters-increase-over-past-50-years-causing-more-damage-fewer-deaths>.
- . 2024. “Record-Breaking Temperatures Continue in August.” World Meteorological Organization, September 13, 2024. Retrieved October 2024. <https://wmo.int/media/news/record-breaking-temperatures-continue-august>.

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