2024

CCPI
Climate Change
Performance Index

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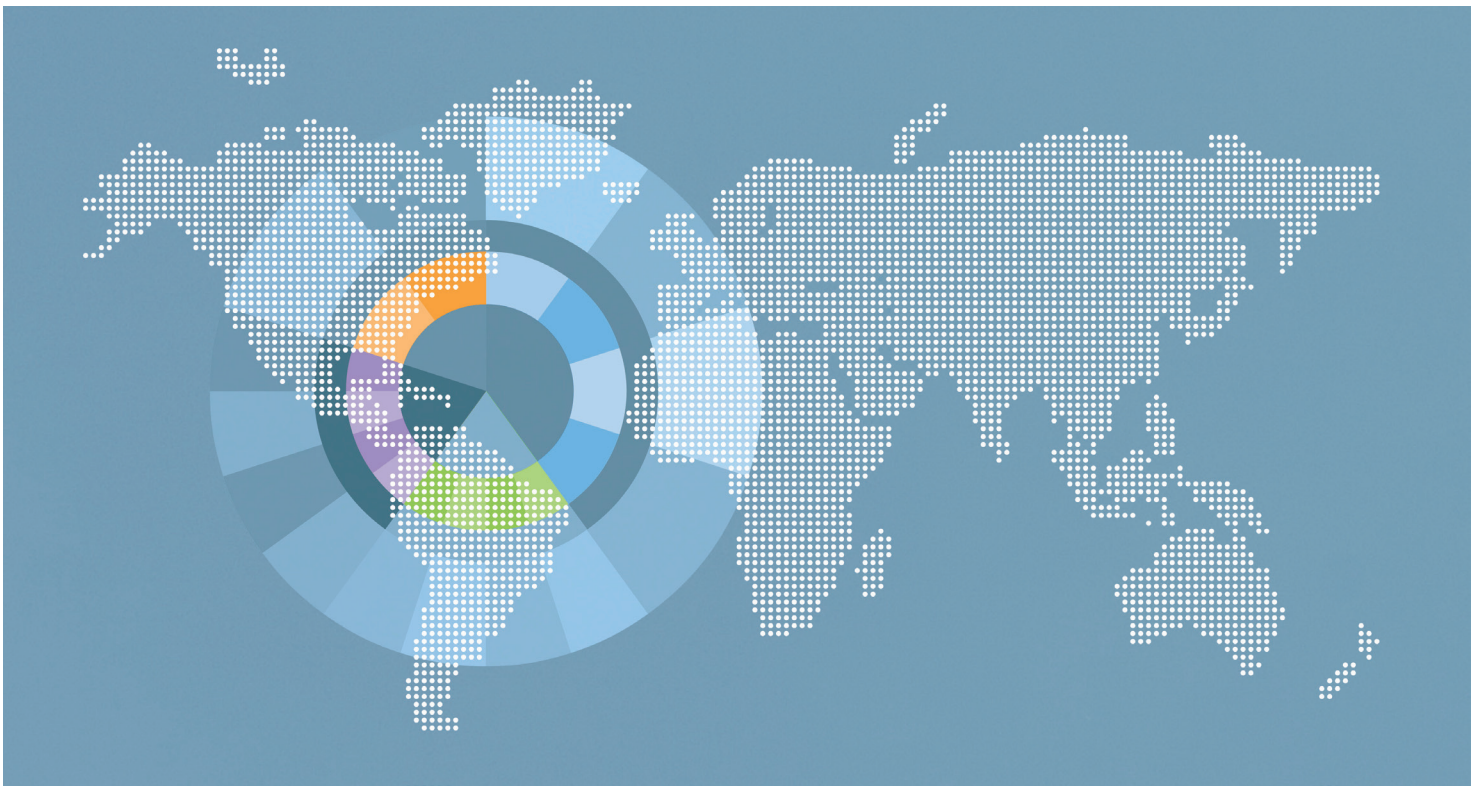
BACKGROUND AND METHODOLOGY



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www.ccpi.org/methodology

Contents

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Summary

The Climate Change Performance Index (CCPI) is an independent monitoring tool for tracking countries' climate protection performance. It aims to enhance transparency in interntional climate politics and enables comparison of climate protection efforts and progress made by individual countries. This publication explains how the CCPI 2024 is calculated. Furthermore, it lists the literature and data sources used for these calculations.

1. Introduction

Enhancing Transparency in International Climate Politics

Getting a clear understanding of national and international climate policy is difficult, as the numerous countries which need to be taken stock of, each have various initial positions and interests. To untangle the knot of differentiated responsibilities as well as kept and broken promises and to encourage steps towards an effective international climate policy, Germanwatch developed the Climate Change Performance Index (CCPI). As of now, the index compares 63 countries as well as the European Union (EU) that together are responsible for more than 92% of global greenhouse gas (GHG) emissions.

The climate change performance is evaluated according to standardised criteria and the results are ranked. Under the Paris Agreement of 2015, every country has put forward own mitigation targets and the global community emphasised the need to limit global temperature rise well below 2°C or even 1.5°C. The CCPI evaluates how far countries have come in achieving this goal. It helps to assess and judge the countries' climate policy, their recent development, current levels and well-below-2°C compatibility of GHG emissions, renewable energies, energy use (as an indication of their performance in increasing energy efficiency) and their targets for 2030.

The component indicators provide all actors with an instrument to probe in more detail the areas that need to see movement. As an independent monitoring tool of countries' climate protection performance, it aims at enhancing transparency in international climate politics and enables the comparability of climate protection efforts and progress made by individual countries. With this in mind, the NewClimate Institute, the Climate Action Network and Germanwatch present the CCPI every year at the UN Climate Change Conference, thus creating as much attention as possible in the observed countries and pushing forward the discussion on climate change. The astounding press echo to the CCPI shows its relevance: Both at the national and international level, numerous media report about the outcomes and on how well their country performed in the latest edition of the index. Awareness was also raised in politics. Many delegates at the climate conferences as well as national government institutions inform themselves on ways of increasing their countries' rank.

By simplifying complex data, the index does not only address experts, but everyone. We would like to emphasise that so far no country has received the overall rating "very high". That is why, up until now, the first three ranks of the CCPI have been left open. We want to use the picture of an empty podium to stress that not one country in the listed in the CCPI has done enough to prevent dangerous climate change. We hope that the index provides an incentive to significantly change that and step up efforts. As a tool for climate protection information and communication, the index is also available online for general public interest at: **www.ccpi.org.**

The following publication explains the background and the methodology of the Climate Change Performance Index.

As has been the case with the previous editions, the CCPI 2024 would not have been possible without the help of about 450 climate experts from all over the world, who evaluated their countries' climate policy. We would like to express our deep gratitude and thank all of them.

2. Methodology

The climate change performance is assessed in four categories:

1. **"GHG Emissions"** (40% of overall score);
2. **"Renewable Energy"** (20% of overall score);
3. **"Energy Use"** (20% of overall score);
4. **"Climate Policy"** (20% of overall score).

A country's performance in each of the categories 1-3 is defined by its performance regarding four different equally weighted indicators, reflecting different dimensions of the category: "Current Level", "Past Trend (5-year trend)", "well-below 2°C-Compatibility of the Current Level" and the "well-below 2°C-Compatibility of 2030 Target". These twelve indicators are complemented by two indicators under the category "Climate Policy", measuring the country's performance regarding its national climate policy framework and implementation as well as regarding international climate diplomacy.

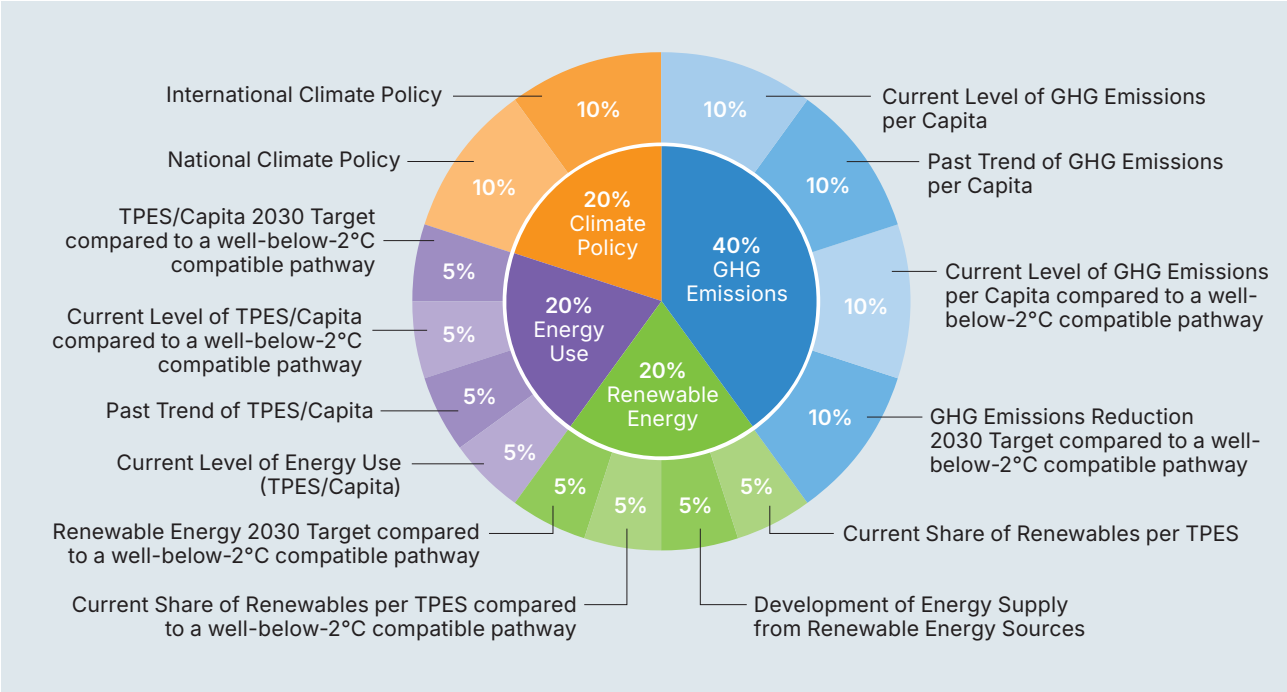
Figure 1 gives an overview of the composition and weighting of the four categories and 14 indicators defining a country's overall score in the CCPI. For details on the constitution of a country's scoring, please see chapter 3 "Calculation and Results".

The index rewards policies which aim for climate protection, both at the national level and in the context of international climate diplomacy. Whether or not countries are stimulating and striving towards a better performance can be deduced from their scores in the "Climate Policy" indicators. Whether these policies are effectively implemented, can be read – with a time lag of a few years – in the country's improving scores in the categories "Renewable Energy" and "Energy Use" and lastly in positive developments in the category "GHG Emissions" (s. figure 2). Following this logic, the index takes into account the progress in the three areas ultimately showing their effect in a country's GHG emissions performance with a weighting of 20% each:

- an effective climate policy,
- an expansion of renewable energy,
- improvements in energy efficiency, energy savings and thus control over domestic energy use.

This weighting scheme allows the CCPI to adequately capture recent changes in climate policy and newly achieved improvements on the way to reduce GHG emissions. As GHG emissions reductions are what needs to be achieved for preventing dangerous climate change, this category weighs highest in the index (40%). Measuring

Figure 1 | **Components of the CCPI**

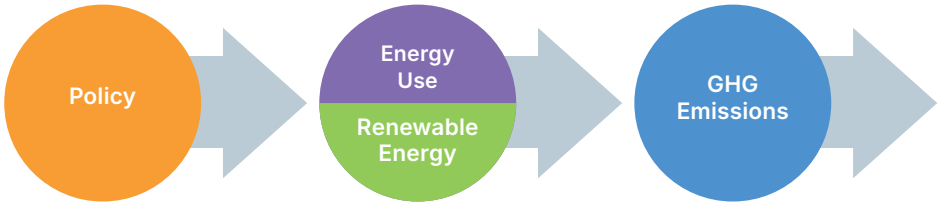


GHG = Greenhouse Gases | TPES = Total Primary Energy Supply

both, emissions trends and levels within this category, the CCPI provides a comprehensive picture of a country's performance, neither too generously rewarding only countries, which are reducing emissions from a very high level, nor countries, which still have low levels but a vast increase. This combination of looking at emissions from different perspectives and, since 2017, also taking into account a country's performance in relation to its specific well-below-2°C pathway ensures a balanced evaluation of a country's performance.

For each of these indicators the countries receive a rating between "very high" and "very low". The indicator-specific limits for the rating can be found in the section focussing on the very indicator as well as in table 1: rating limits in the annex.

Logic followed by the CCPI



Data Sources and Adaptions

The CCPI is using the PRIMAP[1] data base to assess all GHG emissions arising across all sectors. As the PRIMAP data base does not cover Land Use, Land Use Change and Forestry (LULUCF) emissions, the LULUCF emissions are taken from FAO[2], the national inventory submissions 2023[3] and the biannual country reports[4]. Due to data availability, past CCPI editions (until CCPI 2022) were calculated using data recorded two years prior. However, since the CCPI edition 2023 the timelag for the PRIMAP GHG emissions data was reduced from two years to one. Thus the CCPI 2024 edition includes GHG emission data for 2022 (for details, please see box 2).

For all energy-related data in the categories "Renewable Energy" and "Energy Use", the index continues to use data from the International Energy Agency (IEA)[5], generally following the definitions given by the IEA. However, the CCPI assessment excludes non-energy use from all data related to total primary energy supply (TPES) as well as traditional biomass from all numbers provided by the IEA for both, TPES numbers and the assessment of renewable energy.[6]

1 PRIMAP (annually updated)
2 FAO (annually updated)
3 UNFCCC (2022-a)
4 UNFCCC (2022-b)

5 IEA (2022): Renewables Information. Paris.
6 Since the IEA does not explicitly identify traditional biomass as such, it is assumed that the residential use of biomass (explicitly listed in the IEA statistics) strongly coincides with traditional use of biomass, especially in developing countries. In industrialised countries this quantity is negligible in most cases.

The evaluation of the countries' mitigation targets is based on their Nationally Determined Contributions (NDCs), communicated to the UNFCCC.[7] Since clear guidelines and frameworks for the framing of NDCs are lacking, the countries' targets partly had to be inter-/extrapolated to the year 2030 in order to assure comparability (for details, please see chapters 2.1.4 for GHG reduction targets, 2.2.4 for RE targets and 2.3.4 for energy use targets). Lastly, evaluations of countries' performance in climate policy is based on an annually updated survey among national climate and energy experts from the coutry's civil societies (for details, please see chapter 2.4).

Box 1 | Comparability of Different Editions of the CCPI

An index that compares the climate change performance of different countries over several years encourages comparing a country's ranking position to the past years. We need to point out that three factors limit the comparability across CCPI editions.

Revision of Historic Data in Databases

The first reason is limited comparability of the underlying data. The calculation of the CCPI is partly based on different databases by the International Energy Agency (IEA) and from PRIMAP. In many cases the IEA and others have revised historic data retroactively in later editions, if it needed to complete former results, e.g. due to new measuring sources. Consequently, it might not be possible to reproduce the exact results of one year with updated data from the same year but taken from a later edition of the databases.

Survey Respondents

The second factor that leads to limited comparability is that our expert pool providing the data basis for the "Climate Policy" category is continuously being extended and altered. We strive to increase the number of experts so that new evaluations of the countries' policies depict a more differentiated result. At the same time, some experts are not available anymore, e.g. due to a change of job. When the people acting as the judges of a country's policy change, differences in judgements can occur.

Methodological Changes

Thirdly, in 2017, the underlying methodology of the CCPI has been revised and adapted to the new climate policy landscape of the Paris Agreement. Even though the new methodology is based on similar ranking categories and data sources, some indicators as well as its weighting scheme have been adapted. With its new composition, the CCPI was extended to measuring a country's progress towards the globally acknowledged goal of limiting temperature rise well below 2°C. Furthermore, the index now also evaluates the country's 2030 targets. And finally, the former scope of looking at energy-related CO_2 emissions has been extended to GHG emissions.

The CCPI G20 Edition of July 2017 and the CCPI 2018 were the first index publications based on the new methodology, therefore the country-scores of CCPI 2018, CCPI 2019, CCPI 2020, CCPI 2021, CCPI 2022 and CCPI 2023 are comparable. Chile (CCPI 2020), Colombia, Philippines and Vietnam (CCPI 2022) were added after the last methodological change.

7 UNFCCC (2021-b)

Box 2 | **PRIMAP Dataset**

The PRIMAP-hist dataset combines several published datasets to create a comprehensive set of greenhouse gas emission pathways for every country and Kyoto gas, covering the years 1750 to 2022, and all UNFCCC (United Nations Framework Convention on Climate Change) member states as well as most non-UNFCCC territories. The data resolves the main IPCC (Intergovernmental Panel on Climate Change) 2006 categories. For CO, CH_4, and N_2O subsector data for Energy, Industrial Processes and Product Use (IPPU), and Agriculture are available. The "country reported data priority" (CR) scenario of the PRIMAP-hist dataset prioritizes data that individual countries report to the UNFCCC. For developed countries, Annex I in terms of the UNFCCC, this is the data submitted anually in the "common reporting format" (CRF). For developing countries, non-Annex I in terms of the UNFCCC, this is the data available through the UNFCCC DI interface (di.unfccc.int) with additional country submissions read from pdf and where available xls files. For a list of these submissions please consult the data description document available with the dataset on zenodo (https://zenodo.org/record/10006301). For the Republic of Korea the latest official GHG inventory has not yet been submitted to the UN but is included in PRIMAP-hist. PRIMAP-hist also includes official data for Chinese Taipei which is not recognized as a party to the UNFCCC.

Gaps in the country reported data are filled using third party data such as CDIAC, Energy Institute (fossil CO_2), Andrew cement emissions data (cement), FAOSTAT (agriculture), and EDGAR v7.0 (all sectors). Lower priority data are harmonized to higher priority data in the gap-filling process.

Data for earlier years which are not available in the above mentioned sources are sourced from EDGAR-HYDE, CEDS, and RCP (N_2O only) historical emissions.

The v2.4 release of PRIMAP-hist reduced the timelag from two years to one. Thus the present version 2.5 includes data for 2022. For energy CO_2 growth rates from the Energy Institute's statistical review of world energy are used to extend the country reported data to 2022. For CO_2 from cement production Andrew cement data are used. For all other sectors and gases no emission estimates exist. Thus PRIMAP-hist relies on numerical methods and uses a linear extrapolation based on the last 15 years. COVID-19 has primarily impacted energy related emissions and in tests with CRF data no impact of COVID in the performance of linear extrapolation of emissions data in the other sectors has been detected.

Version 2.5 of the PRIMAP-hist dataset does not include emissions from Land Use, Land-Use Change, and Forestry (LULUCF) in the main file. LULUCF data are included in the file with increased number of significant digits and have to be used with care as they are constructed from different sources using different methodologies and are not harmonized.

PRIMAP-hist v2.5 is available under the DOI 10.5281/zenodo.10006301

2.1 GHG Emissions (40% of Overall Score)

The greenhouse gas (GHG) emissions of each country are what ultimately influences the climate. Therefore, they can be taken as the most significant measure in the success of climate policies. That is why the "GHG Emissions" category contributes 40% to the overall score of a country.

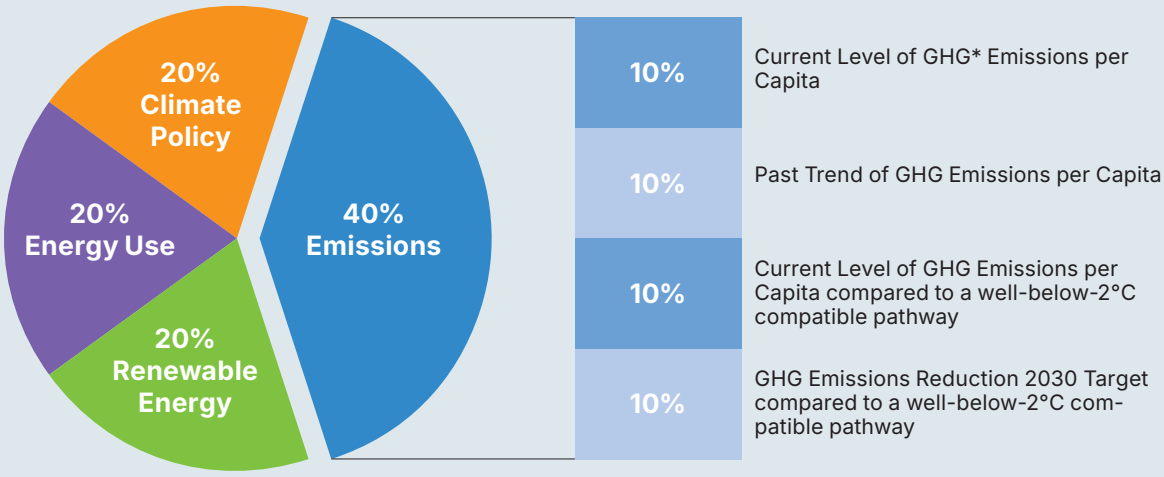
However, the diversity of countries evaluated in the CCPI is enormous. It is therefore indispensable that more than just one perspective needs to be taken on the emissions level and how the GHG emissions of a given country have developed in the recent past.

The "GHG Emissions" category thus is composed of four indicators: "Current Level" and "Past Trend" of per capita GHG emissions are complemented by two indicators, comparing the countries' current level and 2030 emissions reduction targets to its country-specific well-below-2°C pathway. All of these indicators are weighted equally with 10% each.

Since the CCPI edition of 2018, the index covers all major categories of GHG emissions. This includes energy-related CO_2 emissions, CO_2 emissions from land use, land use change and forestry (LULUCF), methane (CH_4), nitrous oxide (N_2O), and the so-called F-gases hydrofluorocarbons (HFCs), per-fluorocarbons (PFCs) and sulphur hexafluoride (SF6) for which we use data from PRIMAP provided by the Potsdam Institute for Climate Impact Research (PIK)[8]. As the PRIMAP data base does not cover LULUCF emissions, the LULUCF emissions are taken from FAO[9], the national inventory submissions 2022[10] and the biannual country reports[11] submitted to UNFCCC.

By using overall GHG-related instead of only energy-related CO_2 emissions as in previous editions (until CCPI 2017) of the CCPI, the index now reflects a more comprehensive picture of the actual mitigation performance of a country, taking into account that emissions from other sectors play a crucial role in some of the evaluated countries. In sum, the CCPI accounts for the GHG emissions with 40%, as they are the main drivers of the climate crisis.

Figure 2 | **Weighting of Emissions Level Indicators**



*Greenhouse Gas

8 PRIMAP (annually updated)
9 FAO (annually updated)
10 UNFCCC (2022-a)
11 UNFCCC (20221-b)

Box 3 | Emissions Accounting and Trade

The current standard of accounting for national GHG emissions encompasses all emissions emerging from domestic production using a territorial system boundary while excluding international trade. In this sense, the nation producing the emissions is also the one held accountable, no matter if those emissions are closely connected to an outflow of the produced goods to other countries. Considering that national governments can only exert political influence on domestic production but have no power over production-related emissions abroad, this conception seems plausible at first sight.

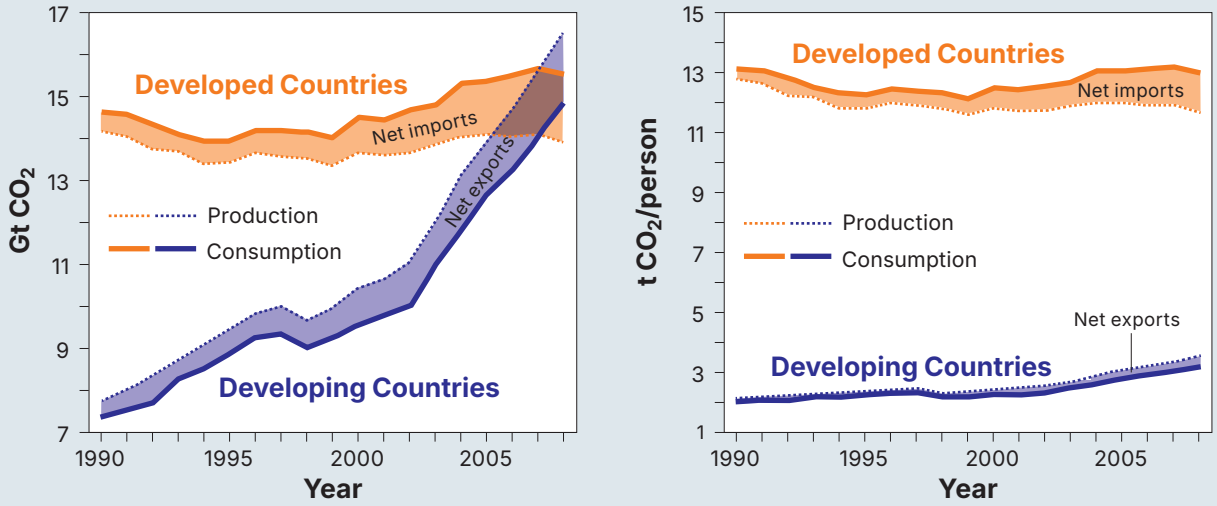
In the course of globalisation, international trade has caused an increasing spatial separation between the production and consumption of goods. Thus, on the one hand, China, Kazakhstan and South Africa, who belong to the group of high-producers and greenhouse gas exporters, currently report emission levels that are considered too high. On the other hand, Sweden, Switzerland and the UK are large importers of CO_2-intensive goods but the emissions imported are not charged to their account.

With increasing international trade influencing national economies as well as related emissions, an alternative emission accounting approach has emerged from scientific research. In contrast to the production-based approach, it is focused on emissions caused by national consumption. As a basis for calculating national-level emissions this account uses the total of national consumption as the sum of all goods produced, less the ones exported, plus the ones imported by a country. Measuring emissions based on what is consumed would lead to an increase of the absolute amount of CO_2 for several of the industrialised countries, induced by their emission intensive trade record. In contrast, countries like China and other emerging economies have proactively attracted production industries and continue to do so. In general, those countries also profit from their exports of emission intensive goods and should therefore not be entirely relieved of their responsibility.

The evaluation of emission data from the production and consumption of goods and services as presented in the graph in figure 3 by Caldeira and Davis (2011: 8533) shows significant differences between consumption-based and production-based data, while their development is clearly related. Generally, the amount of emissions embodied in global trade is constantly growing, increasing the importance of understanding and acknowledging consumption-based emission data. At the same time, the graph implies a high level of aggregation, wiping away diversity within the aggregate groups of developed and developing countries. Acknowledging this diversity, however, would require far more detailed analyses.

This CCPI is calculated with production emissions only.

Figure 3 | Historic CO_2 Emissions from Production and Consumption of Goods and Services*



Historic CO_2 emissions from 1990 to 2010 of developed (Annex B) and developing (non-Annex B) countries with emissions allocated to production/territorial (as in the Kyoto Protocol) and the consumption of goods and services (production plus imports minus exports). The shaded areas are the trade balance (difference) between Annex B/non-Annex B production and consumption. Bunker fuels are not included in this figure.

*Source: Caldeira and Davis (2011: 8533)

2.1.1 Current Level of GHG Emissions per Capita

Even with an ambitious climate policy, the level of current per capita GHG emissions usually only changes in a longer-term perspective. Thus, it is less an indicator of recent performance of climate protection than of the respective starting point of the countries being investigated. From an equity perspective, it is not fair to use the same yardstick of climate protection performance on countries in transition and on developed countries. The level of current emissions (incl. LULUCF) therefore is a means of taking into account each country's development situation and thus addressing the equity issue.

For a maximum of 2.5 CO_2te/Capita, a country receives a "very high" ranking for this indicator. Emissions of up to 5.5 or 7.5 CO_2te/Capita receive either a "high" or "medium" rating, while more than 10 CO_2te/Capita represent a "very low" rating (see table 1: rating limits in the annex).

2.1.2 Past Trend of GHG Emissions per Capita

The indicator describing the recent development of GHG emissions accounts for 10% of a country's overall score in the CCPI. To reflect the development in this category, the CCPI evaluates the trend over a five-year period of greenhouse gases per capita. The indicator measuring recent development in emissions is comparatively responsive to effective climate policy, and is therefore an important indicator of a country's performance. Due to the volatile character of LULUCF emissions we exclude them in this indicator.

Only countries with a decrease of emissions by more than 10% over the past 5 years will receive a "high" rating, while only a decrease of at least 20% means a "very high rating". If emissions are even increasing, a country receives a "low" rating whereas countries are categorized/rated "very low", if emissions have increased by more than 5% over the past 5 years (see table 1: rating limits in the annex).

2.1.3 Current Level of GHG Emissions per Capita Compared to a Well-Below-2°C Compatible Pathway

The benchmark for a well-below-2°C compatible pathway in the index category "GHG Emissions" is based on a global scenario of GHG neutrality in the second half of the century, which is in close alignment with the long-term goals of the Paris Agreement. To stay within these limits, GHG emissions need to be drastically reduced, a peak needs to be reached between 2020 and at the latest before 2025 and CO_2 emissions need to decline to net zero by around 2050.[12]

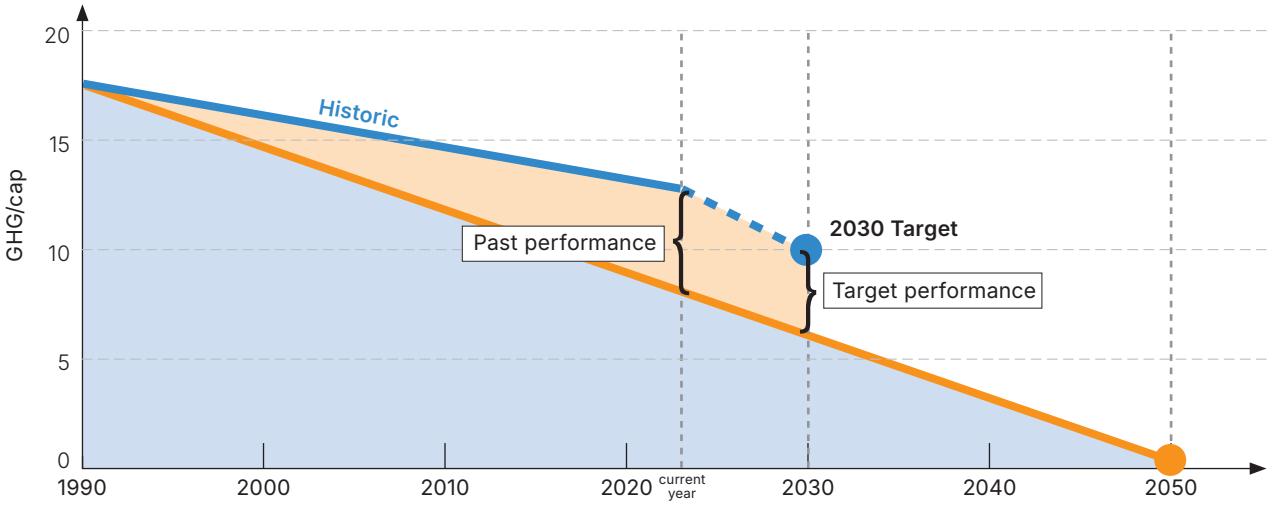
The calculation of individual country target pathways is based on the common but differentiated convergence approach (CDC).[13] It is based on the principle of "common but differentiated responsibilities and respective capabilities" laid forth in the Framework Convention on Climate Change. "Common" because all countries need to reduce their per capita emissions to the same level (here net zero) within the same time-period. "Differentiated" because developed countries start on this path as of 1990, while developing countries do so once they reach the global average per capita emissions. Hence, some developing countries can temporarily increase their emissions without letting the overall limit of well below 2°C out of sight.

For this indicator we measure the distance of the country's current (2022) level of per capita emissions (incl. LULUCF) to this pathway. If a country undercuts its pathway, it will receive a "high" rating or even a "very high" if the difference is above 2 CO_2te/Capita. "Medium" and "low" ratings are defined by a difference of up to 2 and 4 CO_2te/Capita to the pathway. Anything above is a "very low" performance (see table 1: rating limits in the annex).

12 IPCC (2022)
13 Höhne, N. et al. (2006)

Figure 4 | **GHG Emissions Pathway**

Current Level of GHG Emissions per Capita Compared to a Well-Below-2°C Compatible Pathway
Actual pathway **(blue)** vs. well-below-2°C target pathway **(orange)**.



2.1.4 GHG Emissions Reduction 2030 Target Compared to a Well-Below-2°C Compatible Pathway

The CCPI also evaluates a country's 2030 mitigation target, i.e. its emissions reduction plans for 2030. We do so by measuring the distance between this target and the country's pathway determined using the common but differentiated convergence approach (see 2.1.3). This difference is measured in absolute terms (tCO_2e/capita).

In this year's edition, we include GHG emissions targets adopted up until August 2023.

GHG targets are usually not presented in absolute terms when communicated by countries in their NDCs, or other formal commitments. Therefore, targets must often be interpreted to arrive at absolute GHG emission limits for 2030. We use other studies, which have done this interpretation, as a starting point for our quantification. We take absolute emissions from the sources (Climate Action Tracker (CAT)[14] or Climate Resource[15]), divide this by the population in both target and base year to obtain the emissions per capita in both years – that allowing for the calculation of growth factors. The CAT country assessments are updated up to twice a year, so it is the preferred source. If a country is not included in the CAT analysis, the respective factsheet is used to quantify the emissions. If neither of these sources reflect a country's most recent target, we use values provided in the national policy document(s) instead. We apply the resulting growth factors to the CCPI tool emission values in the base year, to arrive at a target value that is consistent with the emissions dataset used in the other CCPI indicators.

We apply the growth rates from the CAT and factsheets, which *exclude* LULUCF, to emissions from CCPI, which *include* LULUCF. We choose this approach due to the lack of consistent LULUCF projections across all the countries in the index. LULUCF emissions estimates vary strongly between different datasets and the methodologies used for those estimates. Our current approach has the underlying assumption that the growth of the LULUCF sector is equivalent to the growth in the other sectors of the economy. We deviate from this approach in cases where the LULUCF sector is responsible for a substantial share of emissions and the absolute emissions target is quantified in the official NDC submission. This is the case for Brazil and Indonesia.

Both the CAT and the factsheets use UN population medium fertility variant projections, which we use to adjust the absolute emissions to per capita.

In this version of the CCPI, we include countries' internationally supported NDC targets as part of the emission range in 2030. Countries that require international support and submit conditional targets in addition to their unconditional ones indicate a higher level of ambition. They

14 Climate Action Tracker (2019)

15 Meinshausen, M, J. Lewis, J. Guetschow, Z. Nicholls, R, Burdon (2021) "NDC Factsheets", 2021

submit a target that pushes them beyond its own unilateral actions and receive a higher score than a country with similar levels of ambition in their unconditional targets but no conditional target.

In this version, we also apply the EU's Updated NDC target to all Member States which do not have their own national binding target, instead of using the targets they present in their individual National Energy and Climate Plans (NECPs). The most recent NECP process finished prior to the adoption of the EU's Updated NDC, hence Member State's current NECP targets do not yet necessarily reflect their required future contributions under the updated EU-wide target.

A "high" or "very high" rating can be achieved with a target below the country's pathway. If the difference is even above -2 CO_2te/Capita, a country will receive the best rating "very high". In case of a difference of up to 2 CO_2te/Capita the country will receive the rating "high". Targets with a difference of up to 2 CO_2te/Capita to the pathway are assessed as a "medium" performance and a difference of up to 4 CO_2te/Capita as "low". If there is no target or it is even above 4 the country receives a rating of "very low" (see table 1: rating limits in the annex).

2.2 Renewable Energy (20% of Overall Score)

Since 2016 was the first year with a constant CO_2 concentration in the atmosphere above 400 parts per million, swift action is required.[16] Vast majority of the researchers anticipate that a permanent transgression of this threshold will lead to a temperature rise above 2°C.[17] Therefore, a constant expansion of renewable energies and a complete phase out of fossil fuel combustion are essential.

Substituting fossil fuels with renewable energies is one of the most prominent strategies towards a transformed economic system that is compatible with limiting global warming well below 2°C. It is equally important to increase energy efficiency, leading to a reduction in global energy use. For example, in the year 2015, renewable energies in Germany accounted for approximately 14.9% of total final energy consumption. Calculations show that deployment of renewable energies resulted in a net avoidance of 156 mt CO_2 in 2015.[18] This shows that an targeted increase in the share of renewable energies can make a vital contribution to climate change protection efforts. The "Renewable Energy" category assesses whether a country is making use of this potential for emissions reduction. This category, therefore, contributes with 20% to the overall rating of a country, within which each of the four indicators accounts for 5%.

In the absence of data assessing traditional biomass (which is mainly wood and peat) only, all renewable energy data are calculated without solid residential biomass for heat production, in order to prevent disadvantages for countries increasing their efforts to replace the unsustainable use of traditional biomass in their energy mix.

The recent developments exclude hydropower, while values for the current level and the 2°C compatibility of the 2030 target include hydropower (see Box 4).

Furthermore, all values for total primary energy supply (TPES) integrated in the CCPI exclude non-energy use, such as oil usage for other reasons than combustion. This is done to not distort the picture and avoid disadvantages for countries with e.g. a larger chemical industry which is usually predominantly export-oriented, leading to the allocation problems.

2.2.1 Current Share of Renewable Energy Sources per Total Primary Energy Supply (TPES)

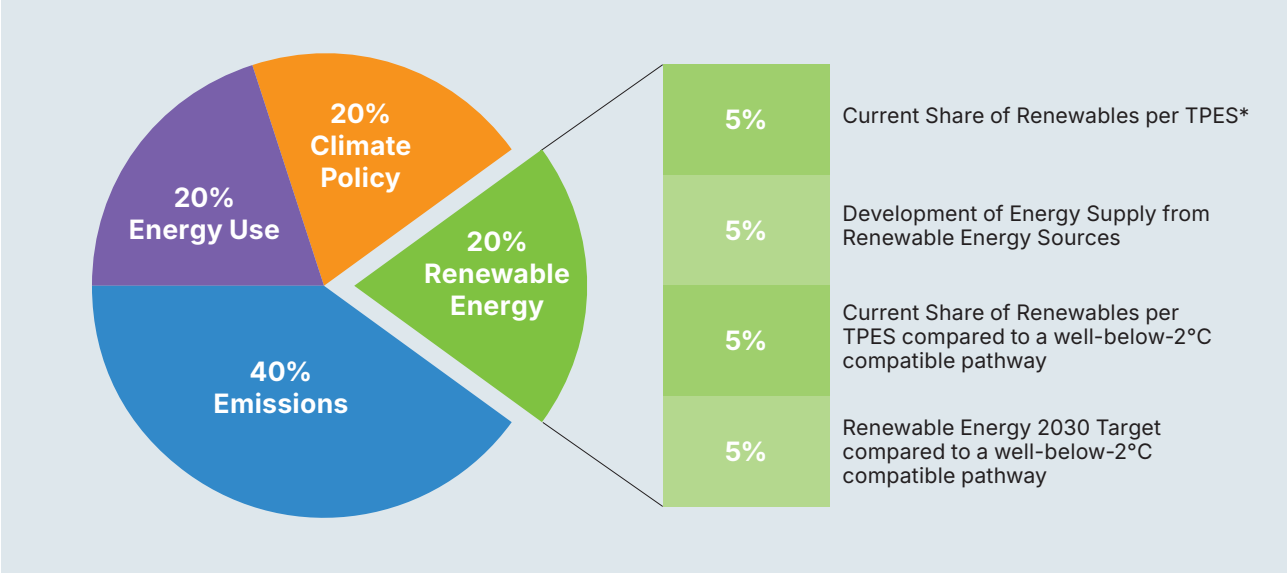
To recognise countries such as Brazil that have already managed to gain a major share of their total energy supply from renewable sources and therefore have less potential to further extend their share of renewable energies, 5% of the overall ranking is attributed to the share of renewable energies in the total primary energy supply (incl. hydropower).[19]

For a minimum of 35%, a country receives a "very high" ranking for this indicator. A share of at least 25% or 15% receives either a "high" or "medium" rating, while less than 5% represent a "very low" rating (see table 1: rating limits in the annex).

16 Betts, R.A. et al. (2016)
17 OECD (2012)
18 BMWi (2015)

19 See Box 4: Hydropower and Human Rights Violation, p.14

Figure 5 | **Weighting of Renewable Energy Indicators**



*Total Primary Energy Supply

2.2.2 Past Trend of Energy Supply from Renewable Energy Sources per TPES

The second indicator of a country's performance in the "Renewable Energy" category shows the recent development of energy supply from renewable sources over a five-year period. Like the other indicators in this category, this dynamic indicator accounts for 5% of the overall CCPI score. To acknowledge the risks surrounding an expansion of hydropower (see box 4) and to adequately reward countries that concentrate on more sustainable solutions, it excludes this technology from the data and therefore focuses on "new" renewable energy sources, such as solar, wind and geothermal energy.

Countries with an increase of the share of renewables by more than 30% over the past 5 years will receive a "high" rating, while an increase of at least 75% leads to a "very high" rating. If the share of renewables is even decreasing, a country receives a "very low" rating. "Medium" and "low" ratings leads to an increase in the share of renewables of at least 15% or 5% (see table 1: rating limits in the annex).

2.2.3 Current Share of Renewables per TPES Compared to a Well-Below-2°C Compatible Pathway

The benchmark for a well-below-2°C compatible pathway within the index category "Renewable Energy" is a share of 100% renewable energy by 2050 (incl. hydropower). The Paris Agreement requires net zero greenhouse gas emissions in the second half of the century, while energy-related emissions need to reach zero already by 2050. Renewable energy will play a significant role in the transition. Accordingly, the CCPI continues to emphasise the necessity of making progress in renewable energy, even if other low or zero carbon options which result in other severe challenges could be available (such as nuclear energy or carbon capture and storage). Although the target is very ambitious, studies emphasise the possibility of reaching almost 100% renewable energy even with current technologies by mid-century.[20] Many non-governmental organisations therefore support a 100% renewable target to set the right incentives for countries in transforming their energy systems, also taking into account the necessity to establish and follow a consistent approach to sustainable development and intergenerational justice.

If a country exceeds its pathway, it will receive a "very high" rating, while "high" is an undercutting of up to 10%. "Medium" and "low" ratings are defined by a difference of up to 15% and 20% to the pathway. Anything above is a "very low" performance (see table 1: rating limits in the annex).

20 WWF et al. (2011)

Box 4 | Hydropower and Human Rights Violation

One of the largest contributors to renewable energy supply is the generation of hydropower. However, many large hydropower projects are considered to be not sustainable. Large hydropower projects often have profound negative impacts on local communities, wildlife and vegetation in the river basins and sometimes even produce additional greenhouse gas emissions where water catchments are particularly shallow.

This causes a double challenge to the CCPI. Firstly, countries that already meet a large share of their energy demand with supply from renewable energies – often old and potentially non-sustainable hydropower – can hardly raise their production in relative terms as easily as a country that starts with near-zero renewable energy supply. On the contrary, if a country already covers nearly 100% of its demand via renewable energy supply and at the same time increases efficiency, the total renewable energy supply might even fall. In such an extreme case a country would receive a low CCPI score in the "Renewable Energy" trend indicator while demonstrating exemplary climate change performance.

Secondly, if the CCPI fully included large hydropower, it would reward to some degree the development of unsustainable dam projects when an increase in renewable energy supply is solely driven by such projects. Such an approach is not regarded as adequate climate protection by the authors of the CCPI.

Unfortunately, data availability on the structure or even sustainability of hydropower generation and a distinction between large non-sustainable projects and sustainable small-scale hydropower generation is insufficient. In its attempt to balance the extent of rewarding countries for expanding large-scale hydropower, the CCPI excludes all hydropower from one of four indicators in the "Renewable Energy" category. As a result, the recent developments in renewable energy exclude hydropower, while the other three indicators include hydropower.

If data availability on large-scale and non-sustainable hydropower changes in the future, we will include these data and therefore exclude non-sustainable hydropower only from all four indicators.

Non-sustainable approaches and human rights violations related to the expansion of renewable energy are also increasingly affecting other renewable energy technologies. The drain of land resources for energy generation from biomass and the resulting conflict with land resources for food production is only one example of the complexity surrounding the necessary expansion of renewable energies. Also, both fields of conflict are increasingly being seen in reaction to the expansion of onshore wind power generation. The authors of the CCPI are well aware of the increasing importance of these developments and will continuously examine possibilities to acknowledge them in future editions of the ranking.

2.2.4 Renewable Energy 2030 Target Compared to a Well-Below-2°C Compatible Pathway

Moreover, the CCPI evaluates the distance between a country's renewable energy targets for 2030 and the country's desired pathway from 2010 to 100% renewable energy in 2050, including hydropower (using a linear pathway for methodological reasons).

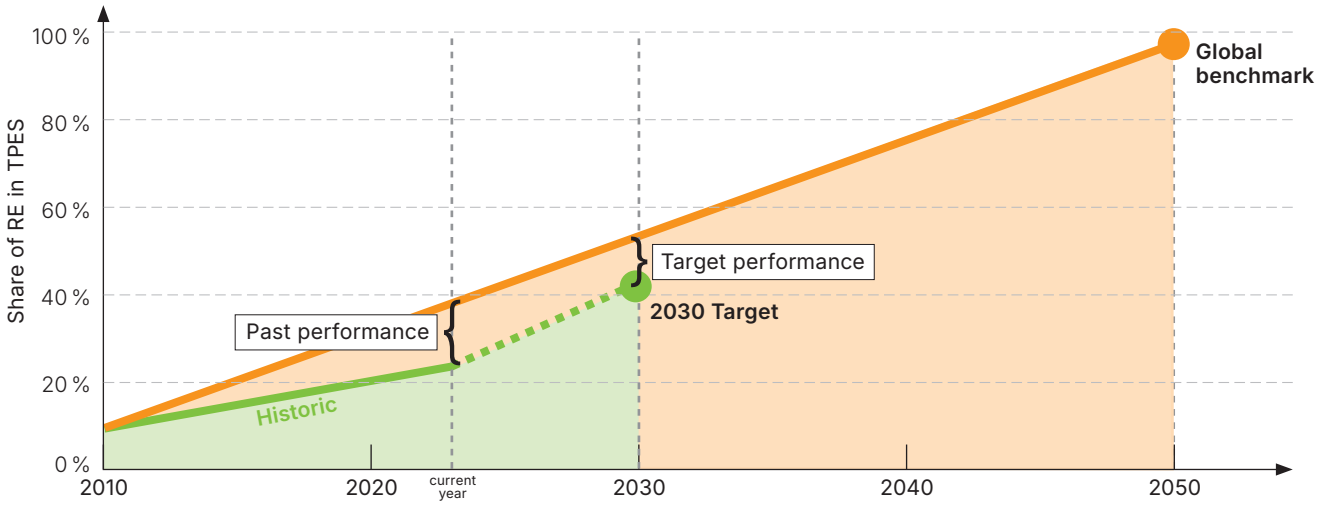
Comparing renewable energy targets is a substantial challenge because countries put forward their renewable energy targets in many ways, due to an absence of uniform rules for such target setting. While some countries only have targets for subnational states, others have national targets. Others define their targets in terms of electricity generation, installed electricity capacity or share of total final energy consumption (TFC), rather than the share of renewables in the TPES.

To convert these different types of targets into a share of renewable energy in the TPES, we proceeded as follows:

- Targets provided as share of the TPES or total primary energy consumption are taken directly. We avoid quantifying targets given in terms of TFC when possible due to a lack of a consistent and accurate method to convert targets from TFC to TPES across many different countries.
- Electricity generation targets are converted to share of renewable energy in the TPES according to the method described in the appendix. When installed capacity targets are available, country-specific capacity factors are used to convert capacity targets into generation targets, before the conversion to TPES.

Figure 6 | **Renewable Energy Pathway**

Current Share of Renewables per TPES Compared to a Well-Below-2°C Compatible Pathway
Actual pathway (green) vs. well-below-2°C target pathway (orange)



- When no national target is available, we do not quantify the share renewable energy in the TPES. Most often in these cases, countries rely on sub-national targets to drive renewable energy uptake. Here, we analyse national climate policy and exclude sub-national targets.
- Whenever a target is formulated for a year other than 2030, a 2030 value is calculated by linear interpolation or extrapolation of the target share.

All historical data used in the estimates are taken from the IEA energy balances.

The table in the annex explains the approach chosen for each individual country including the main assumptions.

A “very high“ rating can be achieved with a target above the country’s pathway. If the difference is only up to 10%, a country will receive the second best rating. Targets with a difference of up to 20% to the pathway are assessed as a “medium” performance and a difference of up to 30% or even above as “low” and “very low”.

2.3 Energy Use (20% of Overall Score)

Besides an expansion of renewable energies, a vast increase in energy efficiency is crucial to achieving global decarbonisation and overall greenhouse gas neutrality by mid-century. The more efficient energy can be used, the faster and easier countries can reach net-zero emissions. Therefore, one major step in combatting the global climate crisis is to reduce the energy needed to provide for products and services.

Increases in energy efficiency in its strict sense are complex to measure and would require a sector-by-sector approach, for which there are no comparable data sources available across all countries at the present time. The CCPI therefore assesses the per capita energy use of a country and measures progress in this category.[21] As in the categories "GHG Emissions" and "Renewable Energy", the CCPI aims to provide a comprehensive picture and balanced evaluation of each country, acknowledging the different development stages of countries and thus basing their performance evaluation in per capita energy use on four different dimensions: current level, recent development and the 2°C compatibility of both the current level and the 2030 target.

As in the "Renewable Energy" category, TPES data excludes values for non-energy use and traditional biomass (see chapter 2.2).

2.3.1 Current Level of Energy Use Measured as TPES per Capita

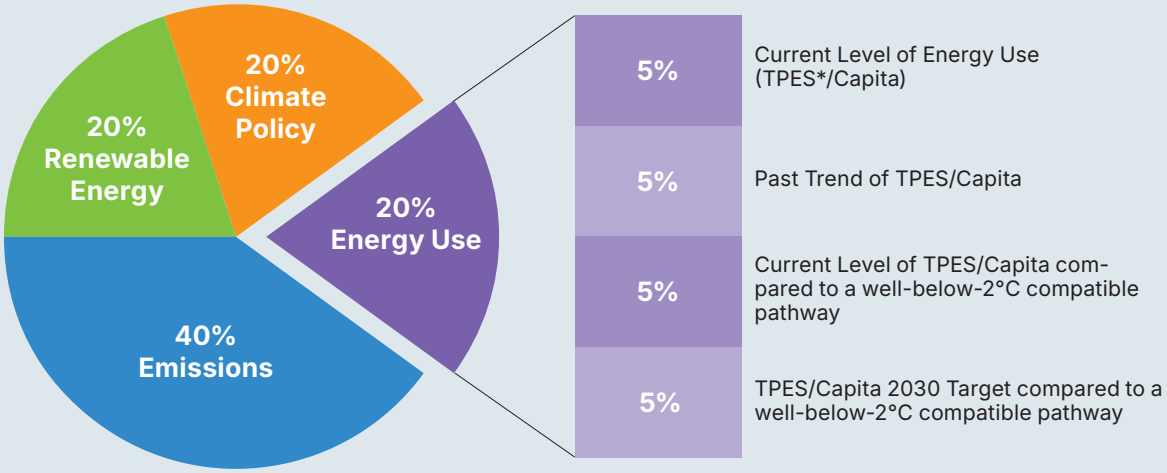
To recognise some countries increasing their per capita energy use but doing so from a still very low level, this indicator gives the current TPES/capita values, which account for 5% in the overall index ranking.

For a maximum of 60 UnitTPES/Capita, a country receives a "very high" ranking for this indicator. Energy Use of up to 90 or 120 UnitTPES/Capita receives either a "high" or "medium" rating, while more than 150 UnitTPES/Capita represent a "very low" rating.

2.3.2 Past Trend of Energy Use measured as TPES per Capita

In accordance with the categories "Renewable Energy" and "GHG Emissions", the indicator measuring recent developments in per capita energy use describes the trend in the period of the last five years for which there is data available that allows for comparison across all evaluated countries. This indicator also accounts for 5% of the overall CCPI ranking.

Figure 7 | **Weighting of Energy Use Indicators**

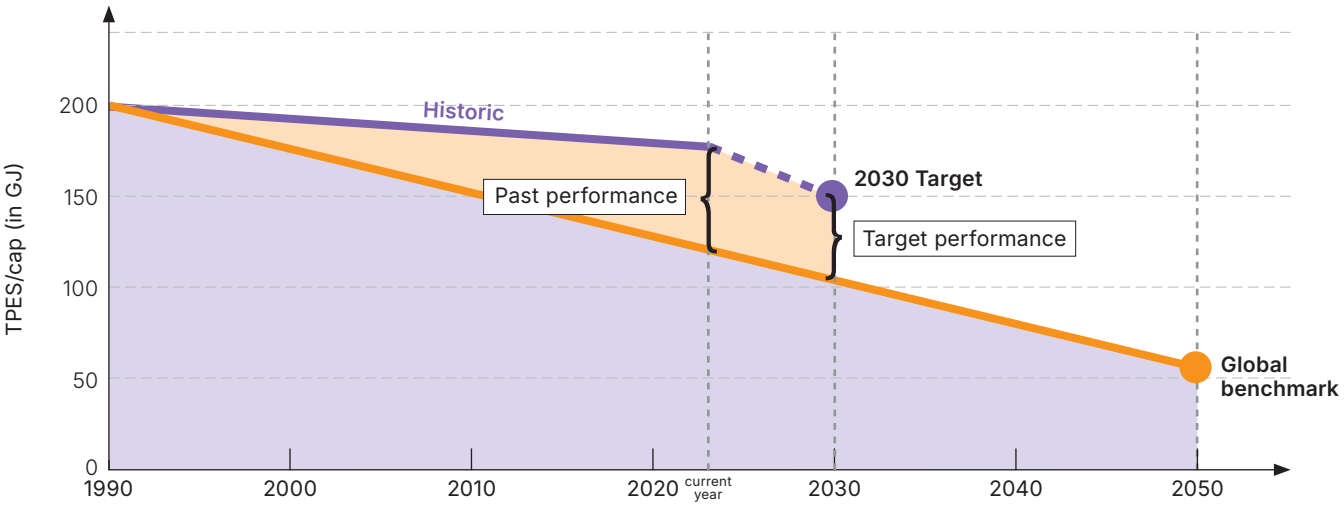


*Total Primary Energy Supply

21 Rebound effects can diminish positive effects of increased efficiency or even reverse them. Still, we cannot forgo these efficiency improvements, but rather must complement them with adequate measures that limit rebound effects.

Figure 8 | **Energy Use Pathway**

Current Level of TPES per Capita Compared to a Well-Below-2°C Compatible Pathway
Actual pathway **(violet)**, well-below-2°C target pathway **(orange)**



Countries with a decrease of energy use by more than 7.5% over the past 5 years will receive a "high" rating, while only a decrease of at least 15% means a "very high rating". If energy use is even increasing, a country receives a "low" or "very low" rating, if energy use has increased by more than 7.5% over the past 5 years (see table 1: rating limits in the annex).

2.3.3 Current Level of TPES per Capita Compared to a Well-Below-2°C Compatible Pathway

For 2°C and 1.5°C scenarios, a decrease in emissions by reducing the (growth in) energy use is as crucial as deploying renewable or other low-carbon technologies. We analysed the scenario database of the IPCC Sixth Assessment report to define the level of energy use per capita compatible with Well-Below-2°C pathways.[22]

From the scenarios available, we observe that the total amount of global energy use per capita must be reduced by roughly 20% between 2020 and 2050, with a margin of uncertainty. We therefore chose the well-below-2° compatible benchmark to be approximately 60 gigajoules per capita in total primary energy supply in 2050 (TPES).

Current energy use per capita is vastly diverse. At the present time, the value for India is only a third of the global average, while for the United States it is more than three times higher than the global average. Consequently, the chosen benchmark would allow India to nearly triple its energy use per capita by 2050, while absolute energy demand can grow even further due to population growth. The United States would need to cut per capita energy use to one quarter by 2050.

We calculate a linear pathway from 1990 to the described benchmark in 2050 and measure the distance of the country's current level to this pathway.

If a country undercuts its pathway, it will receive a "high" rating or even a "very high" if the difference is above 15%. "Medium" and "low" ratings are defined by a difference of up to 10% and 30% to the pathway. Anything above is a "very low" performance (see table 1: rating limits in the annex).

2.3.4 Energy Use TPES per Capita 2030 Target Compared to a Well-Below-2°C Compatible Pathway

Furthermore, the CCPI evaluates the distance between the country's energy targets for 2030 along the country's pathway to the 2050 benchmark. This distance is measured in absolute terms rather than in relative terms.

Energy use targets are not formulated in standardised units. Some countries present targets as a relative re-

22 Byers, E. et al. (2022)

duction in terms of the level of the TPES or TFC. Others provide targets for efficiency gains compared to a baseline scenario, or for reductions of the economy energy intensity.

We combined various data sources to transform all targets expressed in different units into a targeted TPES per capita. For this purpose, we relied on population projections by the United Nations.[23]

To convert the different types of targets into energy use per capita, we proceeded as follows:

- Targets presented in terms of the TPES or total primary energy consumption are taken directly. Targets presented in terms of TFC are translated into TPES using the average annual ratio of TPES to TFC observed from 2015-2019.
- For targets expressed as efficiency gains or economy energy intensity, we project the TPES per capita, accounting for economic growth using the average growth rate of GDP observed in the previous five years.
- Whenever no explicit economy-wide target is available, we assume the trend in per capita energy use of the previous five years is maintained until 2030. We calculate the annual change rate and average over the past five years.
- Whenever the country presents a target for a year other than 2030, we interpolate or extrapolate the result linearly to obtain a value for 2030.

The table in the annex specifies the approach we chose for each individual country. All historical data on TPES are taken from the IEA energy balances.[24]

A "very high" or "high" rating can be achieved with a target undercutting the country's pathway. If the difference is only up to 20% to its pathway, a country will receive the second best rating. Targets with a difference of up to 20% difference to the pathway are assessed as a "medium" performance and a difference of up to 40% difference or even above as "low" and "very low" (see table 1: rating limits in the annex).

23 UN (2017)

24 IEA (annually updated-b)

2.4 Climate Policy (20% of Overall Score)

The "Climate Policy" category in the CCPI considers the fact that measures taken by governments to reduce greenhouse gases often take several years to show their effect on the categories "GHG Emissions", "Energy Use" and "Renewable Energy". On top of this, the most current greenhouse gas emissions data enumerated in sectors of origin, provided by PRIMAP and the IEA, is about two years old. However, the assessment of climate policy includes much more recent developments. The effect that current governments benefit or suffer from the consequences of the preceding administration's climate actions is thereby reduced.

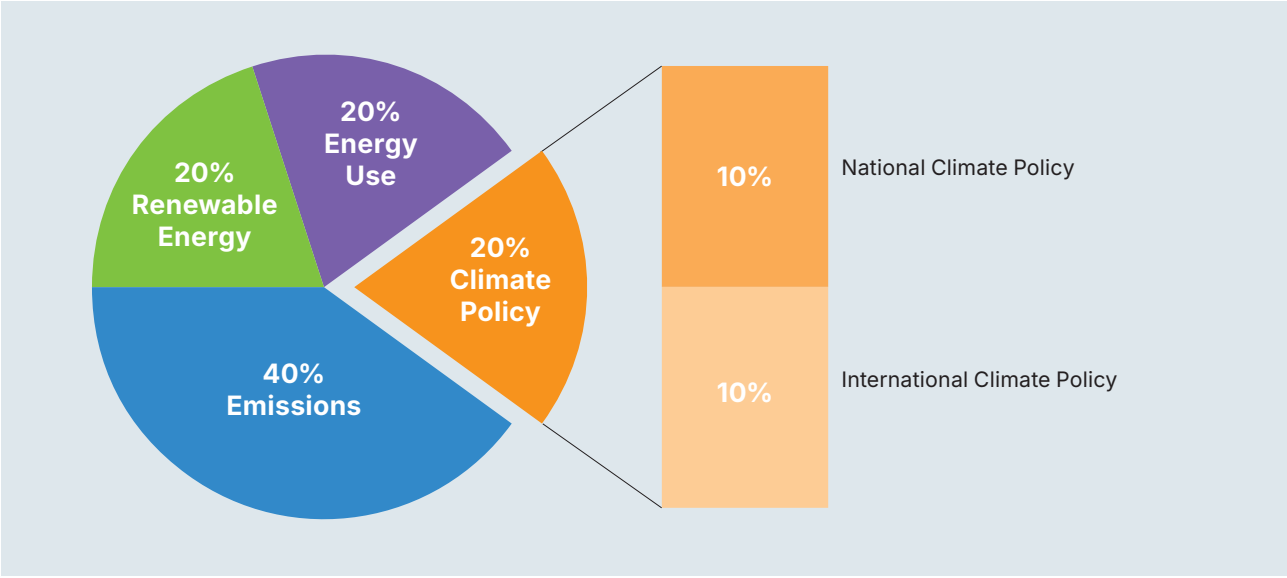
The data for the category "Climate Policy" is assessed annually in a comprehensive questionnaire. Its basis is the performance rating by climate and energy policy experts from non-governmental organisations, universities and think tanks within the countries that are evaluated. In a questionnaire, they provide a rating on a scale from one ("weak") to ten ("strong") on the most important measures of their government. In order to obtain more differentiated results, there is also the possibility to further evaluate and comment on single aspects. Both the national and international efforts and impulses of climate policies are scored (s. 2.4.1 and 2.4.2).

To compensate the absence of independent experts in some countries (due to the lack of functioning civil society or research structures), the national policy of such countries is flatly rated as scoring average points. The goal is to close these gaps in the future and steadily expand the network of experts. For the CCPI 2024, about 450 national climate experts contributed to the evaluation of the 63 countries plus the EU. They each evaluated their own country's national and international policy. The latter is also rated by climate policy experts who closely observe the participation of the respective countries at climate conferences.

Climate policy has an overall weight of 20%, with national and international policy making up 10% each. Despite the apparently low influence of climate policy, this category has quite a considerable influence on short-term changes in the overall ranking. Unlike the rather "slow-moving" categories of "Emissions", "Renewable Energy" and "Energy Use", a positive change in climate policy can lead a country to jump multiple positions. On the other hand, the "sluggish" categories can only be changed through successful climate change mitigation – policy therefore plays a decisive role for future scores within the CCPI.

The ratings for the national and international Climate Policy indicators are quite simple: Grades above 9 or 7 in our survey receive a "very high" or "high" rating. Anything above 5 would still results in "medium", while anything below 3 is a "very low" performance (see table 1: rating limits in the annex). To determine an overall category rating for the Climate Policy category we calculate the average from

Figure 9 | **Weighting of Climate Policy Indicators**



the national and international climate policy grades in our survey and then assign a rating to the climate policy grade (average between national and international climate policy grade) according to the rating limits described above and in table 1: rating limits in the annex.

2.4.1 National Climate Policy

For the indicator "National Climate Policy", the annual climate policy performance questionnaire covers concrete policies on the promotion of renewable energies, the increase in energy efficiency and other measures to reduce greenhouse gas emissions in the electricity and heat production sector, the manufacturing and construction industries, as well as transport and residential sectors. Beyond that, current climate policy is evaluated with regard to a reduction in deforestation and forest degradation brought about by supporting and protecting forest ecosystem biodiversity, fossil fuel extraction, and national peat land protection. Within each of these policy areas, experts evaluate both strength and the level of implementation of the respective policy framework.

In line with the Paris Agreement, experts also examine the ambition level and well-below-2°C compatibility of their country's Nationally Determined Contributions (NDCs) as well as their progress towards reaching these goals.

2.4.2 International Climate Policy

The CCPI also evaluates countries' performance at UNFCCC conferences and other international conferences and multilateral agreements. The questionnaire asks experts to assess the recent performance of their country in international fora.

3. Calculation and Results

The current evaluation method sets zero points as the bottom cut off, and 100 points are the maximum that can be achieved. A country that performed best in one partial indicator receives full points (in that indicator). While interpreting the results, the following limitation should be kept in mind: 100 points are possible in principle, but for each partial indicator, and for the overall score, this still only means the best relative performance, which is not necessarily the optimal climate protection effort.

The CCPI's final ranking is calculated from the weighted average of the achieved scores in the separate indicators with the following formula:

$$I = \sum_{i=1}^{n} w_i X_i$$

I: Climate Change Performance Index,
X_i: normalised Indicator,
w_i: weighting of X_i,

$$\sum_{i=1}^{n} w_i = 1 \; and \; 0 \leq w_i \leq 1$$

i: 1,...., n: number of partial indicators (currently 14)

$$X_i \text{ (Score)} = 100 \left(\frac{actual\ value - minimum\ value}{maximum\ value - minimum\ value} \right)$$

The differences between countries' efforts to protect the climate are only to be seen clearly in the achieved score, not in the ranking itself. When taking a closer look at the top position of the CCPI 2024, one can see that Denmark as the highest-ranking country was not at the top in all indicators, let alone has it achieved 100 points. This example shows that failures and weak points of a country can only be recognised within the separate categories and indicators.

The current version of the Climate Change Performance Index including model calculations and the press review can be downloaded from:

www.ccpi.org

Development and Prospects

The CCPI was first introduced to a professional audience at the COP11 – Montreal Climate Conference in 2005.

Since the beginning CAN International supports the index through its international network of experts working on the issue of climate protection.

Following a methodological evaluation of the seventh edition of the CCPI, we began to include the carbon emissions data from deforestation. However, due to the lack of comparable data for various other sectors, like agriculture, peatland or forest degradation, the corresponding emissions could not be taken into account until 2017.

Thanks to the methodological revision in 2017, we are able to assess all GHG emissions arising across all sectors. The index also includes assessments of the countries' current performance and own targets set for the future in relation to their country-specific well-below-2°C pathway.

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5. Annex

Table 1 | **Rating Limits**

	Very High	High	Medium	Low	Very Low
GHG/C (Unit: CO_2te/Capita)	0 – 2.5	>2.5 – 5	>5 – 7.5	>7.5 – 10	>10
GHG/C Trend (Unit: %)	< -20%	-20% – -10%	-10% – 0%	>0% – 5%	>5%
GHG/C Benchmark (Unit: CO_2te/Capita)	>2	>0 – 2	-2 – 0	-4 – -2	< -4
GHG/C Target Benchmark (Unit: CO_2te/Capita)	< -2	-2 – <0	>0 – 2	>2 – 4	>4 (and *No Target*)
RE/TPES (Unit: share in %)	>35%	>25% – 35%	15% – 25%	5% – 15%	<5%
RE/TPES Trend (Unit: %)	>75%	>30% – 75%	>15% – 30%	>5% – 15%	<5%
RE/TPES Benchmark (Unit: Distance from a Well-below 2°C pathway in percentage points)	>0	<0 – -10	-10 – -15	-15 – -20	< -20
RE/TPES Target (Unit: Distance from a Well-below 2°C pathway in percentage points)	>0	<0 – -10	-10 – -20	-20 – -30	< -30 (and *No Target*)
TPES/Capita (Unit: TPES/Capita)	>0 – 60	>60 – 90	>90 – 120	>120 – 150	>150
TPES/Capita Trend (Unit: %)	< -15%	> -15% – -7.5%	> -7.5% – 0%	>0% – 7.5%	>7.5%
TPES/Capita Benchmark (Unit: %)	< - 15%	> -15% – 0%	>0% – 10%	>10% – 30%	>30%
TPES/Capita Target Benchmark (Unit: Distance from a Well-below 2°C pathway in percentage points)	< -20	> -20 – 0	>0 – 20	>20 – 40	>40
Policy International (Unit: Grades)	>9	>7	>5	>3	<3
Policy National (Unit: Grades)	>9	>7	>5	>3	<3

Legend for general assumptions used for many countries:

a) The share of electric energy remains constant in the total final consumption.

b) The average efficiencies of transforming primary energy into secondary energy (before losses and energy industry own use) remain constant for energy from renewable and from fossil sources with respect to today.

c) The "energy industry own use" is distributed between the electric and non-electric energy sector according to the share they hold in the TPES – in both sectors renewable energy generation is assumed not to consume any energy for energy generation.

d) Within the non-electric sector, the share of renewable energy remains constant in TPES and TFC respectively.

e) The share of renewable energy in the final consumption of electricity is the same as the share of renewable energy in electricity generation, i.e. losses affect equally electricity from renewable and fossil sources.

Table 2 | **GHG Emission Targets**

Countries	Comment
Algeria	Algeria's existing NDC sets an unconditional target of a 7% emission reduction and a conditional target of a 22% reduction by 2030 compared to a BAU scenario. Quantification is based on projec-tions emissions (excl. FOLU) from Meinshausen, M, J. Lewis, J. Guetschow, Z. Nicholls, R, Burdon (2022) "NDC Factsheets", 2022, version 13th March 2023.
Argentina	In its NDC, Argentina has set an unconditional target of not exceeding 349 MtCO2e in 2030. This target covers all sectors. Quantification is based on projected emissions (excl. LULUCF) from Climate Action Tracker.
Australia	Australia's updated NDC sets a target of a 43% emissions reduction by 2030 from 2005 levels. Quan-tification is based on projected emissions (excl. LULUCF) from Climate Action Tracker.
Austria	The EU Updated NDC sets a target of a 55% emission reduction from 1990 levels by 2030 (incl. LU-LUCF), which is used. Austria's 2019 NECP sets a target of a 36% emission reduction in non-ETS sectors by 2030 from 2005 levels. Quantification is based on total emissions level (excl. FOLU) in 2030 from Meinshausen, M, J. Lewis, J. Guetschow, Z. Nicholls, R, Burdon (2021) "NDC Factsheets", 2021, version 14th February 2022.
Belarus	Belarus' updated NDC sets an unconditional target of a 35% emission reduction and a conditional target of a 40% emission reduction by 2030 from 1990 levels (incl. LULUCF). Quantification is based on projected emissions (excl. FOLU) from Meinshausen, M, J. Lewis, J. Guetschow, Z. Nicholls, R, Burdon (2022) "NDC Factsheets", 2022, version 13th March 2023.
Belgium	The EU Updated NDC sets a target of a 55% emission reduction by 2030 from 1990 levels (incl. LU-LUCF), which is used. Belgium's 2019 NECP sets a target of a 35% emissions reduction by 2030 from 2005 levels in non-ETS sectors (excl. LULUCF). Quantification is based on total emissions level (excl. FOLU) in 2030 from Meinshausen, M, J. Lewis, J. Guetschow, Z. Nicholls, R, Burdon (2021) "NDC Factsheets", 2021, version 14th February 2022.
Brazil	Brazil updated its Nationally Determined Contribution (NDC), returning to the absolute values present-ed in 2015. In the case of Brazil we consider both target and historical emissions incl. LULUCF due to the high contribution of the sector to total emissions.

Countries	Comment
Bulgaria	The EU Updated NDC sets a target of a 55% emission reduction by 2030 from 1990 levels (incl. LULUCF), which is used. Bulgaria's 2019 NECP sets a target of a 0% emission reduction from 2005 levels by 2030 in non-ETS sectors (excl. LULUCF). Quantification is based on total emissions level (excl. FOLU) in 2030 from Meinshausen, M, J. Lewis, J. Guetschow, Z. Nicholls, R, Burdon (2021) "NDC Factsheets", 2021, version 14th February 2022.
Canada	Canada's existing NDC sets a target of a 40-45% emissions reduction by 2030 from 2005 levels. Quantification is based on projected emissions (excl. LULUCF) from the Climate Action Tracker.
Chile	Chile's NDC sets an unconditional target of an emission reduction to 95MtCO2e and a conditional target to 90 MtCO2e by 2030. Quantification is based on projected emissions (excl. LULUCF) from the Climate Action Tracker.
China	China's updated NDC sets a target for reaching peak CO2 emissions by 2030 and carbon neutrality by 2060, but does not specify absolute emissions. Quantification is based projected emissions (excl. LULUCF) from the Climate Action Tracker.
Chinese Taipei	Chinese Taipei is not a party to the UNFCCC so there is no INDC. Instead, Taiwan's 2015 Greenhouse Gas Reduction and Management Act is used, which sets a target of a 50% emissions reduction by 2050 from 2005 levels, including a 20% reduction by 2030. Quantification is based on base emissions from Taiwan's 2016 Greenhouse Gas Inventory.
Colombia	In its updated NDC, Colombia has set an unconditional target of not exceeding 161 MCO2e (AR4) in 2030 (equivalent to a 51% reduction in emissions compared to the projection of emissions in 2030 in the reference scenario). This target covers all sectors. Quantification is based emissions projections (excl. LULUCF) from the Climate Action Tracker.
Croatia	The EU Updated NDC sets a target of a 55% emission reduction from 1990 levels by 2030 (incl. LULUCF), which is used. Croatia's 2019 NECP sets a target of a 43% and 7% emissions reduction in ETS and non-ETS sectors (incl. LULUCF), respectively, by 2030 from 2005 levels. Quantification is based on total emissions level (excl. FOLU) in 2030 from Meinshausen, M, J. Lewis, J. Guetschow, Z. Nicholls, R, Burdon (2021) "NDC Factsheets", 2021, version 14th February 2022.
Cyprus	The EU Updated NDC sets a target of a 55% emission reduction by 2030 from 1990 levels (incl. LULUCF), which is used. Cyprus' 2020 NECP sets a target 24% emissions reduction by 2030 in non-ETS sectors. Quantification is based on total emissions level (excl. FOLU) in 2030 from Meinshausen, M, J. Lewis, J. Guetschow, Z. Nicholls, R, Burdon (2021) "NDC Factsheets", 2021, version 14th February 2022.
Czech Republic	Czech Republic's 2017 Climate Protection Policy Government Resolution no. 207 sets an emissions reduction target of 44 MtCO2e (30%) by 2030 from 2005 levels, or 100.2 MtCO2e (incl. LULUCF). Quantification is based on base emissions level (excl. FOLU) from Meinshausen, M, J. Lewis, J. Guetschow, Z. Nicholls, R, Burdon (2021) "NDC Factsheets", 2021, version 14th February 2022.
Denmark	Denmark's 2020 Climate Act sets a target of 70% emissions reduction by 2030 from 1990 levels (incl. LULUCF). Quantification is based on base emissions incl. LULUCF from Denmark's national inventory, base emissions (excl. FOLU) from Meinshausen, M, J. Lewis, J. Guetschow, Z. Nicholls, R, Burdon (2021) "NDC Factsheets", 2021, version 14th February 2022, and projected LULUCF emissions in 2030 from the Danish Ministry of Climate, Energy and Utilities.
Egypt	Egypt's updated NDC sets three sector-specific emissions reduction targets for electricity (37%), oil and gas (65%), and transport (7%), which together accounted for about 43% of total emissions in 2015. However, Egypt's NDC lacks an economy-wide target, hence quantification is based on Climate Action Tracker.
Estonia	Estonia's 2019 NECP sets a target for 70% total emission reduction by 2030 from 1990 levels, reaching 10.7-12.5 MtCO2e (excl. LULUCF), which is used as it is more ambitious than the EU Updated NDC. The EU Updated NDC sets a target of a 55% emission reduction by 2030 from 1990 levels (incl. LULUCF). Quantification is based on base and projected emissions from Estonia's NECP.

Countries	Comment
European Union (27)	Under the European Climate Law, the EU sets of 55% emission reduction by 2030 from 1990 levels. The EU target in this report is related to its NDC. Quantification of emission projections is based on Climate Action Tracker 2021 and base emissions on Meinshausen, M, J. Lewis, J. Guetschow, Z. Nicholls, R, Burdon (2021) "NDC Factsheets", 2021, version 14th February 2022.
Finland	Finland's 2022 Amendment of the Climate Act set a target for a 60% emission reduction by 2030 from 1990 levels (incl. LULUCF). Quantification is based on base emissions from Finland's 2021 national inventory.
France	France's Climate and Resilience Law no. 2021-1104 reconfirms its target of a 40% emission reduction by 2030 from 1990 levels (incl. LULUCF), as in previous laws. Quantification is based on base and projected emissions from France's 2020 NECP. An average value of LULUCF is calculated from 2024-2028 and 2029-2033 projections.
Germany	Germany's 2021 Bundes-Klimaschutzgesetz sets a national emissions reduction target of 65% by 2030 from 1990 levels (excl. LULUCF). Quantification is based on base and projected emissions from the Climate Action Tracker.
Greece	Greece's 2022 National Climate law reflects the EU Updated NDC and sets an emission reduction target of 55% by 2030 from 1990 levels. Given its mirroring of the EU Updated NDC, it assumed to include LULUCF, although it is not clear in the legislation. Quantification is based on total emissions level (excl. FOLU) in 2030 from Meinshausen, M, J. Lewis, J. Guetschow, Z. Nicholls, R, Burdon (2021) "NDC Factsheets", 2021, version 14th February 2022.
Hungary	Hungary's 2020 Law on Climate Protection sets an emissions reduction target of 40% by 2030 from 1990 levels, as given in its 2020 NECP. It is assumed that this is excl. LULUCF given that current emissions are reported as excl. LULUCF in the NCEP, although it is unclear in the law. Quantification is based on base and projected emissions from Hungary's NECP.
India	India has an emissions intensity of 45% below 2005 levels by 2030 and a conditional target to reach 50% cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030. Quantification is based on emissions projections (excl. LULUCF) from the Climate Action Tracker.
Indonesia	Indonesia's existing NDC sets an unconditional target of a 29% emission reduction and a conditional target of a 41% emission reduction by 2030 from BAU. However, this does not increase its ambition from its previous target. Quantification is based on emissions projections presented in the country's NDC.
Ireland	Ireland's 2021 Amendment to the 2015 Climate Action Law Carbon Development Act sets an emissions reduction target of 51% by 2030 from 2018 levels. The Law is not explicit about incl./excl. LULUCF, but since Ireland's Climate Action Plan to support the enactment of the Law includes for LULUCF in its breakdown of the target, it is assumed that the Law also includes LULUCF. Quantification based on base emissions from Ireland's national inventory and LULUCF projections from Ireland's Climate Action Plan.
Islamic Republic of Iran	The Islamic Republic of Iran has not ratified the Paris Agreement yet. Its INDC sets an unconditional target of 4% emissions reduction and conditional target of 12% emissions reduction by 2030 from BAU. Quantification is based on emission projections for its unconditonal target (excl. LULUCF) from the Climate Action Tracker.
Italy	The EU Updated NDC sets a target of a 55% emission reduction by 2030 from 1990 levels (incl. LULUCF), which is used. Italy's 2019 NECP sets a target of a 33% emissions reduction in non-ETS sectors, by 2030 from 2005 levels. Quantification is based on total emissions level (excl. FOLU) in 2030 from Meinshausen, M, J. Lewis, J. Guetschow, Z. Nicholls, R, Burdon (2021) "NDC Factsheets", 2021, version 14th February 2022.
Japan	Japan's updated NDC increases ambition and sets an unconditional target of a 46% emission reduction (incl. LULUCF) by 2030 from 2013, to 760 MtCO2. Quantification is based on emissions projections (excl. LULUCF) from the Climate Action Tracker.

Countries	Comment
Kazakhstan	Kazakhstan's NDC sets an unconditional target of a 15% emissions reduction and conditional target of a 25% emissions reduction by 2030 from 1990 levels. Quantification is based on emissions projections (excl. LULUCF) from the Climate Action Tracker.
Korea	The Republic of Korea's NDC sets a target of a 40% emissions reduction by 2030 from 2019 levels. Here, we use the domestic component of the target. Quantification is based on emissions projections (excl. LULUCF) from the Climate Action Tracker.
Latvia	Latvia's 2020 NECP sets a target of 65% total emissions reduction by 2030 from 1990 levels (excl. LULUCF), which is used as it is more ambitious than the EU Updated NDC. The EU Updated NDC sets a target of a 55% emission reduction by 2030 from 1990 levels (incl. LULUCF). Quantification is based on emissions projections from Latvia's NECP. Base emissions are from Meinshausen, M, J. Lewis, J. Guetschow, Z. Nicholls, R, Burdon (2021) "NDC Factsheets", 2021, version 14th February 2022.
Lithuania	The EU Updated NDC sets a target of a 55% emission reduction by 2030 from 1990 levels (incl. LULUCF), which is used. Lithuania's 2019 NECP sets a target of 40% emissions reduction target by 2030 from 1990 levels (incl. LULUCF). Quantification is based on total emissions level (excl. FOLU) in 2030 from Meinshausen, M, J. Lewis, J. Guetschow, Z. Nicholls, R, Burdon (2021) "NDC Factsheets", 2021, version 14th February 2022.
Luxembourg	The EU Updated NDC sets a target of a 55% emission reduction by 2030 from 1990 levels (incl. LULUCF), which is used. Luxembourg's amended Climate Law of 15 December 2020 sets a target of 55% emissions reduction in non-ETS sectors only by 2030 from 2005 levels. Quantification is based on total emissions level (excl. FOLU) in 2030 from Meinshausen, M, J. Lewis, J. Guetschow, Z. Nicholls, R, Burdon (2021) "NDC Factsheets", 2021, version 14th February 2022.
Malaysia	Malaysia's updated NDC sets a target of an economy-wide GDP carbon intensity reduction of 45% (incl. LULUCF) by 2030 from 2005 levels. It does not specify an absolute emissions target. Quantification is based on emissions projections (excl. FOLU) from Meinshausen, M, J. Lewis, J. Guetschow, Z. Nicholls, R, Burdon (2022) "NDC Factsheets", 2022, version 13th March 2023
Malta	The EU Updated NDC sets a target of a 55% emission reduction from 1990 levels by 2030 (incl. LULUCF), which is used. Malta's 2019 NECP sets a target of a 19% emissions reduction in non-ETS sectors by 2030 from 1990 levels (incl. LULUCF). Quantification is based on projected emissions (excl. FOLU) from Meinshausen, M, J. Lewis, J. Guetschow, Z. Nicholls, R, Burdon (2021) "NDC Factsheets", 2021, version 14th February 2022.
Mexico	The submission includes an unconditional emissions reduction target from BAU by up to 35% in 2030 for all greenhouse gases. It specifies that 30% of the reduction is to be achieved with own resources and the additional 5% with already agreed international cooperation and finance for 'clean energies'. The NDC update also includes a climate target conditional to international support to reduced up to 40% emissions from BAU in 2030. Quantification is based on emissions (excl. LULUCF) from the Climate Action Tracker.
Morocco	Morocco's NDC sets an unconditional target of a 18.3% emissions reduction and a conditional target of a 45.5% reduction by 2030 from BAU. Quantification is based on emissions projections (excl. LULUCF) from the Climate Action Tracker.
Netherlands	The Dutch Climate Act sets a target for 49% emissions reductions by 2030 compared to 1990 levels (incl. LULUCF). Quantification is based on application of the target on base emissions from the Netherland's 2020 NECP, as projected emissions given in the NECP are made assuming the target is not met.
New Zealand	New Zealand's updated NDC sets a target of a 50% emissions reduction (incl. LULUCF) by 2030 from 2005. Quantification is based on emissions projections (excl. LULUCF) from the Climate Action Tracker.
Nigeria	Nigeria's NDC sets an unconditional target of a 20% emissions reduction and a conditional target of a 47% emissions reduction by 2030 from BAU. Quantification is based on emissions projections (excl. LULUCF) from the Climate Action Tracker.

Countries	Comment
Norway	Norway's existing NDC sets a target of at least 52% and towards 55% emissions reduction by 2030 from 1990 levels (excl. LULUCF). Quantification is based on emissions projections (excl. LULUCF) from the Climate Action Tracker.
Pakistan	Pakistan's updated NDC sets an unconditional target of a 15% emissions reduction and a conditional target of a 35% emissions reduction by 2030 from BAU. Quantification is based on projected emissions (excl. FOLU) from Meinshausen, M, J. Lewis, J. Guetschow, Z. Nicholls, R, Burdon (2022) "NDC Factsheets", 2022, version 13th March 2023.
Philippines	The Philippines' existing NDC sets an unconditional target of 2.71% emissions reduction and a conditional target of 72.29% emissions reduction by 2030 from BAU. Quantification is based on emissions projections (excl. LULUCF) from the Climate Action Tracker.
Poland	The EU Updated NDC sets a target of a 55% emission reduction from 1990 levels by 2030 (incl. LULUCF), which is used. Poland's 2019 NECP sets a target of a 7% emissions reduction in non-ETS sectors by 2030 from 2005 levels. Quantification is based on total emissions level (excl. FOLU) in 2030 from Meinshausen, M, J. Lewis, J. Guetschow, Z. Nicholls, R, Burdon (2021) "NDC Factsheets", 2021, version 14th February 2022.
Portugal	Portugal's Climate Basic Law sets a target of a 55% emission reduction by 2030 from 2005 levels, the upper bound of its 2019 NECP. It is assumed this is excl. LULUCF as in the NECP target, although the law is not clear. Quantification is based on base emissions in Portugal's NECP.
Romania	The EU Updated NDC sets a target of a 55% emission reduction from 1990 levels by 2030 (incl. LULUCF), which is used. Romania's 2020 NECP sets a target of a 43% and 2% emissions reduction in ETS and non-ETS sectors, respectively, by 2030 from 2005 levels. Quantification is based on total emissions level (excl. FOLU) in 2030 from Meinshausen, M, J. Lewis, J. Guetschow, Z. Nicholls, R, Burdon (2021) "NDC Factsheets", 2021, version 14th February 2022.
Russian Federation	The Russian Federation's existing NDC sets a target of a 30% emissions reduction by 2030 from 1990 levels. Quantification is based on emissions projections (excl. LULUCF) from the Climate Action Tracker.
Saudi Arabia	Saudi Arabia's updated NDC sets an unconditional target of absolute emission reduction of 278 MtCO2e, which is assumed to be from a baseline scenario but this is not explicitly stated. Quantification is based on emissions projection (excl. LULUCF) from the Climate Action Tracker.
Slovak Republic	The EU Updated NDC sets a target of a 55% emission reduction from 1990 levels by 2030 (incl. LULUCF), which is used. The Slovak Republic's binding target under the EU ESR for non-ETS emissions is a 12% reduction by 2030 compared to 2005. Slovakia's 2019 Envirostrategy raises this to 20% for non-ETS sectors and 43% for ETS-sectors, respectively, by 2030 from 2005 levels. Quantification is based on total emissions level (excl. FOLU) in 2030 from Meinshausen, M, J. Lewis, J. Guetschow, Z. Nicholls, R, Burdon (2021) "NDC Factsheets", 2021, version 14th February 2022.
Slovenia	The EU Updated NDC sets a target of a 55% emission reduction from 1990 levels by 2030 (incl. LULUCF), which is used. Slovenia's 2020 NECP sets a target of a 20% emissions reduction in non-ETS sectors by 2030 compared to 2005. Quantification is based on total emissions level (excl. FOLU) in 2030 from Meinshausen, M, J. Lewis, J. Guetschow, Z. Nicholls, R, Burdon (2021) "NDC Factsheets", 2021, version 14th February 2022.
South Africa	South Africa's existing NDC sets an unconditional target of an absolute emissions range of 350-420 MtCO2e (incl. LULUCF) for 2026-2030. Quantification is based on emissions projections (excl. LULUCF) from the Climate Action Tracker.
Spain	Spain's Law on Climate Change and Energy Transition sets an emissions reduction target of 23% by 2030 from 1990 levels, excl. LULUCF as indicated in its NECP. Quantification is based on base and projected emissions from Spain's 2020 NECP.

Countries	Comment
Sweden	The EU Updated NDC sets a target of a 55% emission reduction from 1990 levels by 2030 (incl. LULUCF), which is used. Sweden's only target for total emissions net-zero by 2045, otherwise Sweden's 2020 NECP sets a target of a 63% emission reduction in non-ETS sectors by 2030 from 1990 levels. Quantification is based on total emissions level (excl. FOLU) in 2030 from Meinshausen, M, J. Lewis, J. Guetschow, Z. Nicholls, R, Burdon (2021) "NDC Factsheets", 2021, version 14th February 2022.
Switzerland	Switzerland targets a reduction of at least 50% by 2030 compared with 1990 levels, corresponding to an average reduction of greenhouse gas emissions by at least 35% over the period 2021–2030. However, in its NDC, Switzerland does not specify a domestic emissions reduction component of its 2030 target, but instead clearly states its intention to apply Article 6 of the Paris Agreement. Our quantification is based on the unconditional emissions projections (excl. LULUCF) from the Climate Action Tracker.
Thailand	Thailand's NDC sets an unconditional target of a 30% emissions reduction and a conditional target of a 40% reduction (excl. LULUCF) by 2030 from BAU. Quantification is based on emissions projections (excl. LULUCF) from the Climate Action Tracker.
Turkey	Türkiye's NDC sets a target of 41% emissions reduction by 2030 from BAU. Quantification is based on emissions projections (excl. LULUCF) from the Climate Action Tracker.
United Arab Emirates	The UAE has a target to reduce net GHG emissions to 182 MtCO2e (incl. LULUCF). Quantification is based on emissions projections (excl. LULUCF) from the Climate Action Tracker.
United Kingdom	The UK's existing NDC sets a target of a 68% emissions reduction by 2030 from 1990 (incl. LULUCF). Quantification is based on emissions projections (excl. LULUCF) from the Climate Action Tracker.
United States	The United States' existing NDC sets a target of a 50-52% emissions reduction by 2030 from 2005 levels. Quantification is based on projected emissions (excl. LULUCF) from the Climate Action Tracker.
Uzbekistan	Uzbekistan's NDC targets a 35% improvement in GHG emission intensity by 2030 relative to 2010. Quantification is based on projected emissions (excl. FOLU) from Meinshausen, M, J. Lewis, J. Guetschow, Z. Nicholls, R, Burdon (2022) "NDC Factsheets", 2022, version 13th March 2023
Vietnam	Vietnam has unconditionally committed to reduce GHG emissions by 15.8% below business-as-usual levels (BAU) by 2030. Vietnam is willing to reduce GHG emissions by 43.5% below BAU, conditional on international support. The conditional target is a cumulative one. GHG emissions reduction from international support alone are 28% from 2030 BAU emissions.. Quantification is based on emissions projections (excl. LULUCF) from the Climate Action Tracker.

Table 3 | **Renewable Energy Targets**

Countries	Comment
Algeria	Algeria's NDC sets a target of a 27% renewables share in electricity by 2030. For quantification this was translated to renewables share in TPES assuming that renewables input increases proportionally to its share in electricity production, and that replacing fossil electricity reduces TPES by a factor of one to two (approx. 1kWh renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh).
Argentina	Argentina's 2015 Renewable Energy Law sets a target of a 20% renewables share in electricity by 2025 (excl. large hydro). For quantification, this was combined with the average of the projected share of large hydro power in 2030 under different scenarios from the Secretariat of Strategic Energy Planning. This was translated to renewables share in TPES assuming renewables input increases proportionally to share in electricity production and that replacing fossil electricity reduces TPES by a factor of one to two (approx. 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh). This share is assumed to remain constant from 2025 to 2030.
Australia	Australia does not have a national target. Its national projections state 55% renewables share in electricity in 2030, however, this is based on sub-national targets which are not considered.
Austria	The EU sets a target of 40% renewables share in gross final energy demand, which is 20 percentage points above the 2019 level. For quantification, this 20 percentage-point increase is applied as each member state's target. Austria's 2020 NECP sets a 2030 target of 46-50% renewables share in gross final energy consumption and 100% renewables share in gross final electricity consumption.
Belarus	Belarus does not have a national target.
Belgium	The EU sets a target of 40% renewables share in gross final energy demand, which is 20 percentage points above the 2019 level. For quantification, this 20 percentage-point increase is applied as each member state's target. Belgium's 2019 NECP sets a 2030 target of 17.4% renewables share in total final consumption, and estimates 10 TWh renewable electricity generation by 2030 (approx. 37% of final electricity consumption).
Brazil	Brazil's 2016 INDC and 2007 National Energy Plan for 2030 set a target of 45% renewables share in total primary energy supply by 2030, which is used. The new Ten-Year Energy Expansion Plan (PDE 2029) includes a more optimisitic projection of 48% by 2029. The updated 2020 NDC does not include a target. Quantification of the renewables share in electricity generation is based on the projections presented in the PDE2029 (Table 11-3).
Bulgaria	The EU sets a target of 40% renewables share in gross final energy demand, which is 20 percentage points above the 2019 level. For quantification, this 20 percentage-point increase is applied as each member state's target. Bulgaria's NECP sets a 2030 target of 30.33% renewables share in gross final electricity consumption and 30.33% renewables share in gross final electricity consumption.
Canada	Canada does not have a national target currently. Its 2018 Energy Supply and Demand Projections to 2040 estimate the share of "non-emitting" electricity generation to increase to 84-90% by 2040.
Chile	Chile's National Energy Policy 2050 sets a target of a 60% renewables share in electricity by 2035, against approx. 40% in 2018. Quantification is based on a linear interpolation to obtain a value for 2030. This was translated to renewables share in TPES in 2030 assuming that renewables input increases proportionally to its share in electricity production, and that replacing fossil electricity reduces TPES by a factor of one to two (approx. 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh).

Countries	Comment
China	China has multiple energy targets. China's 14th Five Year Plan (14FYP) sets a target of 33% share of renewables in electricity consumption by 2025 (incl. hydro) and 18% from non-hydro sources. It also has a target to reach 39% non-fossil share in electricity generation by 2025. China's Energy Supply and Consumption Revolution Strategy 2016-2030 (ESCR) extends this target to 50% by 2030. Our quantification uses the Climate Action Tracker's projection of TPED in 2030 (incl. hydro and excl. nuclear), which is based on several policies such as the 14FYP and the ESCR Strategy. The share of renewables in TPED is applied to TPES, and the average is taken from the Climate Action Tracker's range of estimates.
Chinese Taipei	Chinese Taipei's government set a target of 20% renewables share in electricity by 2025. In addition, Taiwan Government will rise the Renewable Energy up to 30% by 2030, including solar, wind, Geothermal, and Ocean Energy. For quantification, this was translated to renewables share in TPES in 2030 assuming renewables input increases proportionally to share in electricity production, and that replacing fossil electricity reduces TPES by a factor of one to two (approx. 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh).
Colombia	Colombia's National Energy Plan 2020-2050 sets a target for non-conventional renewable energy to account for 10-20% of primary energy supply by 2050. In the most conservative scenario (Actualización), which excludes nuclear and hydrogen, these sources including hydrogen account for 25% of total primary energy supply in 2030.
Croatia	The EU sets a target of 40% renewables share in gross final energy demand, which is 20 percentage points above the 2019 level. For quantification, this 20 percentage-point increase is applied as each member state's target. Croatia's 2019 NECP sets a 2030 target of 36.4% renewables share in gross final energy consumption and 63.8% renewables share in gross final electricity consumption.
Cyprus	The EU sets a target of 40% renewables share in gross final energy demand, which is 20 percentage points above the 2019 level. For quantification, this 20 percentage-point increase is applied as each member state's target. Cyprus' 2020 NECP sets a 2030 target of 23% renewables share in final energy consumption and 30.3% renewables share in gross final electricity consumption (in the PPM scenario).
Czech Republic	The EU sets a target of 40% renewables share in gross final energy demand, which is 20 percentage points above the 2019 level. For quantification, this 20 percentage-point increase is applied as each member state's target. The Czech Republic's 2019 NECP sets a 2030 target of 22% renewables share in gross final energy consumption and 16.9% renewables share in gross final electricity consumption. Its previous 2015 State and Energy Policy projected 247.5 PJ renewable out of 1756.5 PJ total of TPES in 2030 (approx. 14%).
Denmark	The EU sets a target of 40% renewables share in gross final energy demand, which is 20 percentage points above the 2019 level. For quantification, this 20 percentage-point increase is applied as each member state's target. Denmark's 2019 NECP sets a 2030 target of 55% renewables share in gross final energy consumption and over 100% renewables share in gross final electricity consumption.
Egypt	In May 2023, Egypt's Minister of Electricity and Renewable Energy announced in the Senate a new target to achieve 42% renewable electricity share by 2030 instead of 2035.
Estonia	Estonia passed legislation in October 2022 targeting 100% share of renewable electricity generation by 2030. The quantification is based on Estonia's 2023 draft NECP, which indicates that share of renewables in gross energy consumption will reach at least 65% in 2030. We assume this to apply to TPES.
European Union (27)	The EU reached a provisional agreement targeting at least 42.5% of its total final energy consumption from renewable sources by 2030, which is 21 percentage points above the 2019 level. The EU also aim to achieve 45% by the same year. However, here we consider the lower end of the target until the EU commits to a stronger target. We apply the percentage point increase to the 2019 total primary energy supply level to quantify the EU's target.

Countries	Comment
Finland	The EU sets a target of 40% renewables share in gross final energy demand, which is 20 percentage points above the 2019 level. For quantification, this 20 percentage-point increase is applied as each member state's target. Finland's 2019 NECP sets a 2030 target of 51% renewables share in final energy consumption, and estimates 53% renewables share in gross final electricity consumption under the WAM scenario.
France	France's 2015 Law on the Energy Transition for Green Growth (LTECV) and its 2020 NECP set a target of 40% renewables share in electricity generation by 2030 (incl. hydro). For quantification, this was translated to renewables share in TPES assuming renewables input increases proportionally to share in electricity production, and that replacing fossil electricity reduces TPES by a factor of one to two (approx. 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh). Under the EU target, France must contribute to reaching 40% renewables share in in gross final energy demand by 2030.
Germany	Germany has set a target to achieve 80% of its power consumption from renewable energy sources by 2030. This translates to about 78.4% share of renewables in electricity generation in 2030, according to the scenario “Climate-neutral Electricity System 2035” (KNS2035) produced by Agora Energiewende. According to the Projektionsbericht 2023 für Deutschland this target translates to approximately 34% in TPES in 2030 considering the "with measures scenario".
Greece	Greece's 2023 draft National Energy and Climate Plan (NECP) sets a 2030 target of 80% renewables share in gross final electricity consumption. Under the EU target, Greece must contribute to reaching at least 42.5% renewables share in in gross final energy demand by 2030. Quantification is based on the average between the renewable levels implied by the NECP and EU-level targets.
Hungary	The EU sets a target of 40% renewables share in gross final energy demand, which is 20 percentage points above the 2019 level. For quantification, this 20 percentage-point increase is applied as each member state's target. Hungary's NECP sets a 2030 target of 21% renewables share in gross final energy consumption and 20% renewables share in gross final electricity consumption, estimated to reach 971 ktoe.
India	India's Ministry of Power and New & Renewable Energy sets a target of a 500 GW installed non-fossil fuel capacity by 2030. For quantification, the estimated electricity generation under the Stated Policies Scenario of the World Energy Outlook 2022 was translated to renewables share in TPES. We then assume that renewables input increases proportionally to share in electricity production, and that replacing fossil electricity reduces TPES by a factor of one to two (approx. 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh). The results is also in line with India's renewable share in TPES in the same scenario of the World Energy Outlook 2022.
Indonesia	Indonesia's Just Energy Transition Partnership (JETP) with international partners sets a target for renewable energy to comprise 34% of its electricity generation by 2030. This was translated to renewables share in TPES in 2030 assuming renewables input increases proportionally to share in electricity production, and that replacing fossil electricity reduces TPES by a factor of one to two (approx. 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh).
Ireland	Ireland's 2021 Climate Action Plan sets a target of a 80% renewables share in electricity generation by 2030, raising its 2019 NECP target of 70%, and of 34% renewables share in gross final energy consumption. For quantification, its electricity target was translated to renewables share in TPES assuming renewables input increases proportionally to share in electricity production, and that replacing fossil electricity reduces TPES by a factor of one to two (approx. 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh). Under the EU target, Ireland must contribute to reaching 40% renewables share in in gross final energy demand by 2030.

Countries	Comment
Islamic Republic of Iran	Iran's Sixth Development Plan 2017-2021 sets a target of a 5GW renewable power (excl. hydro) installed by 2021. Because Iran has not met this target yet, it is assumed to hold until 2030 in the absence of an updated target. For quantification, this is translated into 8% renewables share in electricity, adding a third of capacity (5 GW) and share to the currently 10 GW hydro / 5% share in electricity production. This was translated to renewables share in TPES assuming renewables input increases proportionally to share in electricity production and that replacing fossil electricity reduces TPES by a factor of one to two (approx. 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh).
Italy	Italy's 2023 draft National Energy and Climate Plan (NECP) sets a target of 65% renewables share in gross final electricity consumption and 40% renewables share in gross final energy consumption by 2030. Quantification is based on the latter, which is applied as Italy's target for the share of renewables in TPES in 2030.
Japan	Japan's 6th Strategic Energy Plan sets a target of a 36-38% renewables share in the electricity mix by 2030. This average of these targets was translated to renewables share in TPES assuming renewables input increases proportionally to share in electricity production, and that replacing fossil electricity reduces TPES by a factor of one to two (approx. 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh).
Kazakhstan	Kazakhstan's Green Economy Concept sets a target of a 10% renewables share in electricity generation by 2030, which President Kassym-Jomart Tokayev raised to 15% in May 2021. Target of 15% share of alternative and renewable electricity by 2030 was translated to renewables share in TPES assuming renewables input increases proportionally to share in electricity production, and that replacing fossil electricity reduces TPES by a factor of one to two (approx. 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh). We assume the share of nuclear energy to remain zero.
Korea	The Republic of Korea's 10th Basic Plan for Long-Term Electricity Supply and Demand sets a target of 21.6% renewables share in electricity by 2030 and 30.6% in 2036. For quantification, this was translated to renewables share in TPES assuming renewables input increases proportionally to share in electricity production, and that replacing fossil electricity reduces TPES by a factor of one to two (approx. 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh).
Latvia	The EU sets a target of 40% renewables share in gross final energy demand, which is 20 percentage points above the 2019 level. For quantification, this 20 percentage-point increase is applied as each member state's target. Latvia's 2019 NECP sets a 2030 target of 50% renewables share in gross final energy consumption and 60% renewables share in electricity production.
Lithuania	The EU sets a target of 40% renewables share in gross final energy demand, which is 20 percentage points above the 2019 level. For quantification, this 20 percentage-point increase is applied as each member state's target. Lithuania's NECP sets a 2030 target of 45% renewables share in gross final energy consumption and gross final electricity consumption.
Luxembourg	The EU sets a target of 40% renewables share in gross final energy demand, which is 20 percentage points above the 2019 level. For quantification, this 20 percentage-point increase is applied as each member state's target. Luxembourg's 2018 NECP sets a 2030 target of 25% renewables share in gross final energy consumption and 33.6% gross final electricity consumption.
Malaysia	Malaysia's Ministry of Economy sets a target of 70% renewables share in electricity generation by 2050. This translates to an estimated target of 22% share of renewables in electricity generation by 2030, as calculated by Ember. For quantification, this was translated to renewables share in TPES assuming renewables input increases proportionally to share in electricity production, and that replacing fossil electricity reduces TPES by a factor of one to two (approx. 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh).

Countries	Comment
Malta	The EU sets a target of 40% renewables share in gross final energy demand, which is 20 percentage points above the 2019 level. For quantification, this 20 percentage-point increase is applied as each member state's target. Malta's 2019 NECP sets 2030 targets of 11.5% renewables share in gross final energy consumption and 11% gross final electricity consumption.
Mexico	Mexico has no economy-wide renewable target. Mexico announced a target to install more than 40 GW of wind and solar capacity by 2030 at a joint USA-Mexico press conference. However, no clear legislation was adopted to support those pledges. Its National Electric System Development Plan 2021-2035 (PRODESEN) sets a target of 43% clean energy generation by 2030. However, clean energy according to Mexican law includes renewable energy sources, nuclear power, CCS as well as efficient cogeneration.
Morocco	Morocco's NDC sets a target of a 52% of installed electricity production capacity from renewable sources by 2030. For quantification, this was translated into a 35% renewables share in electricity target, assuming a factor 1.5 for capacity over average production. This was translated to renewables share in TPES assuming renewables input increases proportionally to share in electricity production and that replacing fossil electricity reduces TPES by a factor one to two (approx. 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh).
Netherlands	The EU sets a target of 40% renewables share in gross final energy demand, which is 20 percentage points above the 2019 level. For quantification, this 20 percentage-point increase is applied as each member state's target. The Netherland's 2019 NECP sets a 2030 target of 27% renewables share in gross final energy consumption and 70% renewables share in gross final electricity consumption, with an estimated value of 84 TWh.
New Zealand	New Zealand's 2022 Emission Reduction plan sets a target of a 50% renewables share in total final energy consumption by 2035, as well as 100% renewables share in electricity generation by 2030. For quantification, the electricity target was translated to renewables share in TPES in 2030 assuming renewables input increases proportionally to share in electricity production and that replacing fossil electricity reduces TPES by a factor one to two (approx. 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh).
Nigeria	Nigeria's Vision 30:30:30 and updated NDC set a target of 30% renewables share in electricity by 2030 (incl. hydro). For quantification, this was translated to renewables share in TPES in 2030 assuming renewables input increases proportionally to share in electricity production and that replacing fossil electricity reduces TPES by a factor one to two (approx. 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh).
Norway	Norway is subject to The EU sets a target of 40% renewables share in gross final energy demand, which is 20 percentage points above the 2019 level. For quantification, this 20 percentage-point increase is applied as each member state's target. Many member states present targets in their NCEPs, however these are not quantified due to insufficient data for converting final energy consumption to total primary energy supply for all states.
Pakistan	Pakistan's updated NDC submitted in 2021 sets a target of 60% renewables share in electricity generation by 2030 (excl. hydro). For quantification, this total was translated to renewables share in TPES assuming renewables input increases proportionally to share in electricity production and that replacing fossil electricity reduces TPES by a factor of one to two (approx. 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh).
Philippines	The Philippine's National Renewable Energy Program 2020-2040 sets a target of a 35% renewables share in electricity by 2030. In May 2021, the Department of Energy announced raising this target to 37.3%, but this has not been included in the NREP yet. For quantification, the original target was translated to renewables share in TPES in 2030 assuming renewables input increases proportionally to share in electricity production and that replacing fossil electricity reduces TPES by a factor one to two (approx. 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh).

Countries	Comment
Poland	The Polish Ministry of Climate unveiled the third scenario of the "Energy Policy of Poland until 2040" which targets 51% share of renewables in electricity generation by 2040, but this is not officially in force. The 2019 National Energy and Climate Plan (NECP) sets a target of 21-23% renewables share in gross final energy consumption and 32% renewables share in gross final electricity consumption by 2030. Under the EU target, Poland must contribute to reaching at least 42.5% renewables share in in gross final energy demand by 2030. We use the EU target for quantification.
Portugal	Portugal's 2023 draft National Energy and Climate Plan (NECP) sets a target of 85% renewables share in electricity consumption by 2030. For quantification, this was translated to renewables share in TPES assuming renewables input increases proportionally to share in electricity production, and that replacing fossil electricity reduces TPES by a factor of one to two (approx. 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh).
Romania	The EU sets a target of 40% renewables share in gross final energy demand, which is 20 percentage points above the 2019 level. For quantification, this 20 percentage-point increase is applied as each member state's target. Romania's 2020 NECP sets a 2030 target of 30.7% renewables share in gross final energy consumption and 49.4% renewables share in gross final electricity consumption.
Russian Federation	Russia set a target of 4.5% renewables share in electricity by 2024 (excl. hydro). Neither its Energy Strategy to 2035, adopted in 2020, nor Climate Change Bill, adopted in 2021 set new targets. For quantification, this was combined with current share of large hydro power, which is assumed to remain constant, and translated to renewables share in TPES assuming renewables input increases proportionally to share in electricity production and that replacing fossil electricity reduces TPES by a factor one to two (approx. 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh). The share is assumed to stay constant until 2030.
Saudi Arabia	The Saudi Green Initiative sets a target 50% renewables share in electricity generation by 2030. For quantification, this was translated to renewables share in TPES assuming renewables input increases proportionally to share in electricity production and that replacing fossil electricity reduces TPES by a factor one to two (approx. 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh).
Slovak Republic	The EU sets a target of 40% renewables share in gross final energy demand, which is 20 percentage points above the 2019 level. For quantification, this 20 percentage-point increase is applied as each member state's target. Slovakia's Low-Carbon Development Strategy of the Slovak Republic until 2030 with a View to 2050 and 2019 NECP set a target of 19.2% renewables share in gross final energy consumption and 27.3% renewables share in electricity generation by 2030.
Slovenia	The EU sets a target of 40% renewables share in gross final energy demand, which is 20 percentage points above the 2019 level. For quantification, this 20 percentage-point increase is applied as each member state's target. Slovenia's 2020 NECP sets a 2030 target of 27% renewables share in gross final energy consumption and 43% renewables share in gross final electricity consumption.
South Africa	South Africa's 2019 Integrated Resource Plan sets a target of 33.1% renewable share of annual energy contribution by 2030 (sum of individual renewable shares in Table 5 of 2019 IRP). This was translated to renewables share in TPES assuming renewables input increases proportionally to share in electricity production and that replacing fossil electricity reduces TPES by a factor one to two (approx. 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh).

Countries	Comment
Spain	Spain's 2023 draft National Energy and Climate Plan (NECP) sets a target of 81% share of renewables in electricity generation by 2030. For quantification, this was translated to renewables share in TPES assuming renewables input increases proportionally to share in electricity production, and that replacing fossil electricity reduces TPES by a factor of one to two (approx. 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh).
Sweden	The EU sets a target of 40% renewables share in gross final energy demand, which is 20 percentage points above the 2019 level. For quantification, this 20 percentage-point increase is applied as each member state's target. Sweden's 2020 NECP does not set a target for renewable energy for 2030 but projects 65% renewables share in gross final energy consumption. It sets a target of a 100% renewables share in electricity by 2040, with an expected share of 82.6% renewables share in gross final electricity consumption by 2030.
Switzerland	Switzerland's Energy Strategy 2050 sets a target of increasing renewable electricity from non-hydro sources to 11,400 GWh and hydro to 37,400 GWh in 2035. See below for how this was translated into renewables share of electricity. We use a linear interpolation to obtain a target for 2030. The electricity share was converted to renewables share in TPES assuming renewables input increases proportionally to share in electricity production and that replacing fossil electricity reduces TPES by a factor one to two (approx. 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh).
Thailand	Thailand's Alternative Energy Development Plan 2018-2037 sets a target of a 30% renewable share in total final energy consumption by 2036, up from 11.9% in 2014. For quantification, linear interpolation is used to obtain a target value for electricity demand by 2030, which is applied as percentage of renewables in TPES.
Turkey	Türkiye National Energy Plan for 2035 sets a target of 42.5% renewables share in electricity generation by 2030. For quantification, this was translated to renewables share in TPES assuming renewables input increases proportionally to share in electricity production and that replacing fossil electricity reduces TPES by a factor one to two (approx. 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh). Share is assumed to remain constant until 2030.
United Arab Emirates	UAE's National Energy Strategy sets a target to install 14.2 GW capacity of renewable energy by 2030. This is estimated to translate to approximately 30% of UAE's electricity generation in 2030. For quantification, this was translated to renewables share in TPES assuming renewables input increases proportionally to share in electricity production and that replacing fossil electricity reduces TPES by a factor one to two (approx. 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh). Share is assumed to remain constant until 2030.
United Kingdom	The UK does not have a national target currently. In October 2021, former Prime Minister Boris Johnson confirmed the target of fossil-free electricity generation by 2035. However, this includes nuclear power which currently account for more than half of the UK's 'renewable' electricity.
United States	Although individual states have set targets for renewable energy, the United States does not have a national target currently.

Countries	Comment
Uzbekistan	The President of Uzbekistan signed a resolution in December 2022 setting a target to achieve 30% share of renewables in electricity generation by 2030. For quantification, this was translated to renewables share in TPES assuming renewables input increases proportionally to share in electricity production and that replacing fossil electricity reduces TPES by a factor one to two (approx. 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh).
Vietnam	Vietnam's Power Development Plan 8 sets a target of 30.9%-39.2% share of renewables in electricity generation by 2030. Quantification is based on the average of this range. This was translated to renewables share in TPES assuming renewables input increases proportionally to share in electricity production, and that replacing fossil electricity reduces TPES by a factor of one to two (approx. 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh).

Table 4 | **Energy Use Targets**

Countries	Comment
Algeria	Algeria's 2015 Renewable Energy and Energy Efficiency Plan does not contain an overall energy efficiency target. Quantification assumes that TPES per capita will follow the trend observed in the last five years preceding the pandemic (2014-2019). Algeria's INDC states that the national programs for renewable energy and energy efficiency aim at reducing the global consumption of energy by 9% by 2030.
Argentina	Quantification is based on Argentina's 2019 Renewable Energies and Energy Efficiency Sub-secretariat's target to reduce energy consumption by 8.8% by 2030 compared to a business as usual (BAU) scenario. The absolute energy supply level is estimated by the government to reach between 93.3 and 109.2 Mtoe in 2030 (an average of these estimates is used for quantification). The National Energy Transition Plan (July 2023) also sets a target to reduce electricity and gas consumption by up to 8.5% in all sectors of the economy by the year 2030 compared to a reference scenario. However, sufficient information is not available to quantify this target.
Australia	Australia's 2015 National Energy Productivity Plan sets a target to increase in energy productivity by 40% between 2015 to 2030. Quantification is based on TPES per capita in 2015 with a GDP growth of 2.25% per year between 2015 and 2030.
Austria	Austria's 2019 NECP sets a target to improve primary energy intensity by 25-30% by 2030 compared to 2015. This corresponds to an estimated absolute value 28,712-30,763 ktoe for TPES and 25,634-23,925 ktoe for final energy consumption (based on an annual economic growth rate of 1.5%). Quantification is based on the average of the estimations for TPES.
Belarus	Belarus' National Strategy of Sustainable Socio-Economic Development sets a target to reduce energy intensity of GDP by 35% by 2030 compared to 2015 (in 2005 prices). Quantification is based on TPES per capita in 2015 with a GDP growth rate of 0.19% per year between 2015 and 2030. The ongoing invasion of Ukraine affects economic growth projections and consequently our estimates. The full effect of the war on targets is not quantified.
Belgium	Belgium's 2019 NECP sets a target of 15% reduction in primary energy consumption by 2030 compared to the PRIMES 2007 scenario. Quantification is based on the expected absolute value of primary energy consumption, estimated to be 42.7 Mtoe in 2030. Compared with the PRIMES 2007 baseline, which estimates primary energy consumption at 50.1 Mtoe in 2030, this implies an energy saving of 7.4 Mtoe (15%).
Brazil	Brazil's PDE 2031 (10 Year Energy Expansion Plan) presents a total primary energy supply of 1.7 toe per capita in 2031. Quantification is based on this value as the target for 2030, assuming it to remain constant from 2029.
Bulgaria	Bulgaria's NECP sets a target to reduce primary energy consumption by 27.89% and final energy consumption by 31.67 % by 2030 compared to the PRIMES 2007 scenario. Quantification is based on the expected absolute value of 17,466 ktoe for primary energy consumption in 2030.
Canada	Canada does not have a national target for energy efficiency. Quantification is based on the assumption that TPES per capita follows the trend observed in the last five years preceding the pandemic (2014-2019). In July 2022, the Government of Canada joined the Three Percent Club, by which The Honourable Seamus O'Regan, Minister of Natural Resources, announced Canada's commitment to "a three percent improvement in energy efficiency every year". However, this target is not used as it has not been formally adopted.
Chile	Chile's Energy Efficiency Law sets a target of reducing energy intensity by at least 10% by 2030 compared to 2019. Quantification is based on TPES per capita in 2019 with a GDP growth rate of 1.91% per year between 2019 and 2030.
China	China's 14th Five Year Plan sets a target to lower energy consumption per unit of GDP by 13.5% (from 2020 level) during the 2021-2025 period. Quantification assumes target is met and that GDP grows at the rate of 4.32% per year from 2026-2030.

Countries	Comment
Chinese Taipei	Chinese Taipei's 2008 Strategic Framework for Sustainable Energy Policy sets a target to reduce energy intensity by 50% by 2025, compared to 2005 levels. Quantification is based on TPES in 2005 with a GDP growth rate of 2% per year between 2005 and 2025. No further reduction is assumed after 2025 and energy use per capita is assumed to increase by 2.66% per year, proportional to GDP.
Colombia	Colombia's PROURE 2022-2030 aims to reduce energy consumption by approximately 28% between 2019 and 2030. Quantification is based on TPES per capita in 2019 with a GDP growth rate of 2.98% per year from 2020-2030.
Croatia	Croatia's 2019 NECP sets a target of reducing primary energy consumption to 344.38 PJ (8.23 ktoe) by 2030. Quantification is based on this value of primary energy consumption in 2030.
Cyprus	Cyprus' 2020 NECP a target of reducing primary energy consumption by 17% by 2030 compared to the PRIMES 2007 scenario. Quantification is based on the expected absolute value of primary energy consumption in 2030, given as 2.4 Mtoe.
Czech Republic	Czechia's 2019 NECP sets a target of reducing energy intensity of GDP to 0.157 MJ/CZK by 2030, which corresponds to an absolute value of primary energy sources of 1,735 PJ and final energy consumption of 990 PJ. Quantification is based on the value of primary energy sources in 2030.
Denmark	Denmark's 2019 NECP sets a target of an annual 0.8% decrease in final energy consumption from 2021 to 2030, relative to the average energy consumption in the period 2016-2018. Quantification is based on the expected absolute value for primary energy consumption in 2030, given as 767.4 PJ (18.33 Mtoe).
Egypt	Egypt currently does not have a national target, it's National Climate Change Strategy adopted in 2022 does not contain a quantified target for energy efficiency. Quantification is based on the assumption that TPES per capita follows the trend observed in the last five years preceding the pandemic (2014-2019). Egypt's previous ISES 2035 (Integrated Sustainable Energy Strategy) presented a most likely scenario that would lead to a 8% reduction in energy use from 2006 levels by 2022.
Estonia	Estonia's 2019 NECP sets a target of a 14% reduction in primary energy consumption by 2030 compared to the peak of previous years, which was 69.4 TWh in 2013. Quantification is based on the expected primary energy consumption in 2030 under the target, given as 230 PJ.
European Union (27)	In March 2023, the European Parliament and Council reached a provisional agreement to reduce final energy consumption at EU level by 11.7% in 2030, compared with the energy consumption forecasts for 2030 made in 2020. This translates to an upper limit to the EU's final energy consumption of 763 Mtoe and of 993 Mtoe for primary consumption. The lower limit is calculated based on the EU's total final energy consumption forecast for 2030 as per the Reference Scenario 2020 (REF2020). Quantification is based on the average ratio of TFC to TPES from 2015-2019, which is used to convert the target from total final consumption to total energy supply.
Finland	Finland's 2019 NECP sets a target for an absolute final energy consumption of 290 TWh in 2030. This corresponds to a primary energy consumption of 405 TWh. Quantification is based on the expected value of primary energy consumption under the target in 2030.
France	France's Law on Energy Transition for Green Growth of 2015 and Law on Energy and Climate of 2019 set a target of 20% reduction in final energy consumption by 2030 compared to 2012 levels (6680918.054 TJ). The Energy Sobriety Plan released in 2022 following the energy crisis sets a non-binding interim target to reduce energy consumption by 10% by 2024. Quantification uses the binding 2030 target and is based on the average ratio of TFC to TPES from 2015-2019, which is used to convert to target from total final consumption to total energy supply.

Countries	Comment
Germany	Germany's Energy Efficiency Act was approved in September 2023 and sets a target to reduce final energy consumption by 26.5% by 2030 to 1,867 TWh compared to 2008, and "aims to" reduce final energy consumption by 39% by 2040 and 45% by 2045. Quantification is based on the average ratio of TFC to TPES from 2015-2019, which is used to convert the target from total final consumption to total energy supply.
Greece	Greece's 2019 NECP sets a target of a 38% reduction in final energy consumption and 43% reduction in primary energy consumption by 2030 compared to the 2007 PRIMES scenario. This corresponds to absolute levels of 16.5 Mtoe and 20.55 Mtoe in 2030, respectively. Quantification is based on the level of primary energy consumption in 2030.
Hungary	Hungary's National Clean Development Strategy (NCDS) sets a target to reduce final energy consumption to 734 PJ by 2030, and to around 500 PJ by 2050. Quantification is based on the average ratio of TFC to TPES from 2015-2019, which is used to convert the target from total final consumption to total energy supply.
India	India does not have a national target for energy efficiency. Quantification is based on the assumption that TPES per capita follows the trend observed in the last five years preceding the pandemic (2014-2019).
Indonesia	Indonesia's RUEN sets a target to reduce energy intensity by 1% per year from 2009-2025. Quantification is based on TPES in 2009 with a GDP growth rate of 4.77% per year between 2009 and 2025. No further reduction is assumed after 2025 and energy use per capita is assumed to increase by 4.79% per year, proportional to GDP.
Ireland	Ireland does not have a national target, hence the EU's target of a 32.5% reduction in primary and final energy consumption by 2030 compared to 2007 levels is applied. The public sector is required to achieve a 50% improvement in energy efficiency by 2030. Ireland's 2019 NECP predicts 192,905 GWh of primary energy consumption in the WEM scenario and 159,146 GWh in the WAM scenario in 2030. However, given the lack of a target, quantification is based on the 19% reduction in TPES from 2013 to 2030 required at the EU level of each individual member state.
Islamic Republic of Iran	Iran does not have a national target for energy efficiency. Quantification is based on the assumption that TPES per capita follows the trend observed in the last five years preceding the pandemic (2014-2019).
Italy	Itay's 2023 draft NECP sets a target to achieve final energy consumption of 100 MTOE by 2030. Quantification is based on the average ratio of TFC to TPES from 2015-2019, which is used to convert the target from total final consumption to total energy supply.
Japan	Japan's Energy Outlook projects its 2030 energy demand to be 9.69% below 2013 levels due to various targets for energy efficiency improvements. Quantification is based on the assumption that this corresponds to a 9.69% in TPES per capita.
Kazakhstan	Kazakhstan's Concept on Transition to Green Economy sets a target to reduce the energy intensity of GDP by 30% by 2030 compared to 2008 levels. Quantification is based on TPES per capita in 2008 with a GDP growth rate of 3.44% per year between 2008 to 2030.
Korea	The Republic of Korea's Third Energy Plan sets a target to reduce final energy consumption by 18.6% by 2040 from 2017. The Electricity Security Policy targets electricity generation of 572 TWh for 2030, which is 11% below the reference generation scenario of the 10th Basic Plan for Long-Term Electricity Supply and Demand. Quantification is based on a linear interpolation to obtain a value for 2030, which is applied to TPES per capita.
Latvia	Latvia's 2020 NECP sets a target of cumulative final energy savings of 1.76 Mtoe from 2021-2030, corresponding to an annual reduction of 0.8%. Quantification is based on expected primary energy consumption, given as 165-170 PJ, from which the average is taken.
Lithuania	Lithuania's 2020 NECP sets a target of a 1.5x reduction of energy intensity by 2030 compared to 2017 levels. Quantification is based on the expected absolute value of primary energy consumption in 2030, given as 5461 ktoe.

Countries	Comment
Luxembourg	Luxembourg's NECP sets a target of 40-44% reduction in final energy demand compared to the PRIMES 2007 scenario, resulting in a final energy consumption of 35,568 GWh in 2030. Quantification is based on the average ratio of TFC to TPES from 2015-2019, which is used to convert is target from total final consumption to total energy supply. Note, GWh is converted into PJ using a conversion factor of 0.0036.
Malaysia	Malaysia's National Energy Efficiency Action Plan 2016-2025 focuses on electricity and sets a target of 8% reduction in electricity demand growth against a BAU scenario. In the absence of a primary energy target, quantification is based on the assumption that TPES per capita follows the trend observed in the last five years preceding the pandemic (2014-2019).
Malta	Malta's NECP sets a target of new savings each year from 1 January 2021 to 31 December 2030 equivalent to 0.24% of annual final energy consumption averaged over the most recent three-year period prior to 1 January 2019. Quantification is based on the expected absolute value of primary energy consumption, given as 1051 ktoe.
Mexico	Mexico's 2016 Transition Strategy to Promote the Use of Cleaner Fuels and Technologies sets a target of a 2.2% annual reduction in the energy intensity of final energy consumption from 2020 to 2035, compared to a BAU scenario. The expected absolute value of final energy consumption in 2030 is given as 5363 PJ. Quantification is based on the average ratio of TFC to TPES from 2015-2019 to convert is target from total final consumption to total energy supply.
Morocco	Morocco's 2021 NDC sets a target of 20% energy saving of by 2030 compared to 2016 levels. Quantification is based on TPES per capita in 2016 with a GDP growth rate of 2.53% per year between 2016 and 2030.
Netherlands	The Netherland's NECP sets an indicative target of cumulative energy savings from 2021-2030 period based on an annual 0.8 % savings in final energy consumption in the years 2016, 2017 and 2018 (the reference consumption). Quantification is based on the expected absolute value of primary energy consumption in 2030, given as 1950 PJ.
New Zealand	New Zealand currently has no energy efficiency target. The Aotearoa New Zealand Energy Strategy, which sets policies for a "highly renewable, sustainable and efficient energy system", will be developed by the end of 2024, as successor to the previous New Zealand Energy Efficiency and Conservation Strategy 2017-2022. Quantification is based on the assumption that TPES per capita follows the trend observed in the last five years preceding the pandemic (2014-2019).
Nigeria	Nigeria's 2021 NDC sets a target to reduce energy intensity by 2.5% per year. No further details are given but the previous NDC estimated 120 Mtoe energy consumption in 2030 under this scenario. Quantification is based on TPES per capita in 2019 with a GDP growth rate of 0% per year from 2019-2030.
Norway	Norway's White Paper on energy policy sets a target of reducing energy intensity (energy consumption/GDP) by 30% by 2030 compared to 2015. Quantification is based on TPES per capita in 2015 with a GDP growth rate of 2.53% per year between 2015 and 2030.
Pakistan	In 2020, Pakistan's National Energy Efficiency and Conservation Authority (NEECA) set a goal of saving up to 3 Mtoe of primary energy supply by 2023 relative to 2020 levels. This translates to an expected total primary energy supply of 104.84 Mtoe in 2023, relative to the 2020 value (107.8 Mtoe) obtained from the IEA World Energy Balances. In the absence of a target for the post-2023 period, we assume energy use grows at the same rate as Pakistan's JETP.
Philippines	The Philippines' Energy Efficiency Roadmap 2017-2040 sets a target of reducing energy intensity by 3% by 2040. The Roadmap indicates that this is equivalent to annual energy savings of 1.6%. Quantification is based on this annual reduction in TPES per capita between 2017 and 2030.

Countries	Comment
Poland	Poland's 2019 NECP sets a of reducing primary energy consumption by 23% by 2030 compared to the PRIMES 2007 scenario. Quantification is based on the expected absolute value for primary energy consumption in 2030, given as 91.3 Mtoe.
Portugal	Portugal's NECP sets a target of reducing primary energy consumption by 35% by 2030 compared to the PRIMES 2007 scenario. Quantification is based on the average expected absolute value for primary energy consumption in 2030, given as 15.6-21.5 Mtoe. Note: mistake in Table 14, values are in Mtoe not ktoe.
Romania	Romania's 2020 NECP sets a target of a 45.1% reduction in primary energy consumption by 2030 compared to the PRIMES 2007 scenario. Quantification is based on the expected absolute value for primary energy consumption in 2030 under the WAM scenario, given as 32.3 Mtoe.
Russian Federation	Russia's Energy Strategy 2035 sets a target of 44% reduction in energy intensity of GDP by 2030 compared to 2005. Quantification is based on TPES per capita in 2005 with a GDP growth rate of 1.9% per year from 2005-2030. The ongoing war affects economic growth projections and consequently our estimates. The full effect of the war on targets is not quantified.
Saudi Arabia	Saudi Arabia does not have a national energy efficiency target. Its first NDC aims to improve energy efficiency through its Energy Efficiency Program which targets the industry, building and land transportation sectors, but the NDC does not set a quantified target. Quantification is based on the assumption that TPES per capita follows the trend observed in the last five years preceding the pandemic (2014-2019).
Slovak Republic	Slovakia's 2019 NECP sets a target of reducing primary energy consumption between 28.36 and 30.32% compared to the PRIMES 2007 scenario. Quantification is based on the average of estimates for primary energy consumption in 2030, given as 15.7-16.15 Mtoe, under its realistic and ambitious scenarios, respectively.
Slovenia	Slovenia's 2020 NECP sets a target of reducing primary energy consumption by 35% by 2030 compared to the PRIMES 2007 scenario. Quantification is based on the expected absolute value for primary energy consumption in 2030, given as 73.9 TWh (6,356 ktoe).
South Africa	South Africa's Draft Post-2015-2030 National Energy Efficiency Plan sets a target of a 29% reduction in final energy consumption by 2030 compared to 2015 levels. Quantification is based on the average ratio of TFC to TPES from 2015-2019, which is used to convert is target from total final consumption to total energy supply.
Spain	Spain's Climate Change and Energy Transition Law sets a target of reducing primary energy consumption by 39.5% by 2030 compared to the PRIMES 2007 scenario. Quantification is based on the expected absolute value for primary energy consumption, given as 104,099 ktoe (98,460 excl. non-energy uses).
Sweden	Sweden's 2020 NECP sets a target of 50% improvement in energy efficiency by 2030 compared to 2005 levels (primary energy supply/GDP). Quantification is based on TPES per capita in 2005 with a growth rate of 2% per year from 2005-2030. According to Sweden's NECP, assuming GDP growth of 2% per year, primary energy consumption in 2030 will be 461 TWh.
Switzerland	Switzerland's Energy Strategy 2050 sets a target to reduce average per capita energy consumption by 43% by 2035 compared to 2000 levels. Quantification is based on a linear interpolation to obtain the target value for 2030, which is then applied to TPES per capita in 2000.
Thailand	Thailand's Alternative Energy Development Plan sets a target to reduce energy intensity by 30% by 2036 compared to 2010 levels, reaching a final energy consumption of 131,000 ktoe. Quantification is based on TPES per capita in 2010 with a GDP growth rate of 2.8% per year from 2010-2036. The value for 2030 is linearly interpolated.

Countries	Comment
Turkey	Turkey's National Energy Efficiency Plan 2017-2023 sets a target to reduce energy intensity by 20% by 2023, compared to 2008 levels. Quantification of TPES per capita until 2023 is based on TPES per capita in 2008 with a GDP growth rate of 2.8% per year from 2008-2023. It is assumed there is no further reduction after 2023, yet TPES per capita increases by 3.42% per year, proportional to GDP.
United Arab Emirates	The UAE has a target to reduce power consumption but no economy-wide energy efficiency target. Quantification assumes that TPES per capita will follow the trend observed in the last five years preceding the pandemic (2014-2019).
United Kingdom	The United Kingdom's 2020 NECP sets a target of an absolute value of 151 Mtoe for primary energy consumption in 2030. This target is in accordance with its commitments under the Withdrawal Agreement with respect to leaving the EU in 2020. The UK also aims to reduce energy consumption from buildings and industry by 15% by 2030. Quantification is based on the absolute value of primary energy consumption in 2030, as given in the NECP.
United States	The United States does not have a national energy efficiency target. In 2013, former President Barack Obama set a target for energy productivity to double from 2010 to 2030, yet this was not adopted by any administrations. Neither the National Action Plan for Energy Efficiency 2025 or the Long Term Strategy of the United States set a quantified economy-wide target. Quantification is based on the assumption that TPES per capita follows the trend observed in the last five years preceding the pandemic (2014-2019).
Uzbekistan	The President of Uzbekistan signed a resolution in December 2022 setting a target to reduce energy intensity per unit of GDP by 30% by 2030. The decree does not specific a base year for the reduction to be calculated from. Here we assume the target corresponds to a reduction compared to 2022 value, the year when the decree was signed.
Vietnam	Vietnam's National Green Growth Strategy for 2021-2030 Vision towards 2050 sets a target to re-duce energy intensity (primary energy consumption per unit of GDP) by 1.0-1.5% annually on average from 2021-2030. Quantification assumes an average annual improvement in energy inten-sity of 1.25% per year and a GDP growth rate of 6.01% per year from 2021-2030.

Germanwatch

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Climate Action Network

CAN members work to achieve this goal through information exchange and the coordinated development of NGO strategy on international, regional, and national climate issues. CAN has regional network hubs that coordinate these efforts around the world.

CAN members place a high priority on both a healthy environment and development that "meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland Commission). CAN's vision is to protect the atmosphere while allowing for sustainable and equitable development worldwide.

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