CCPI Climate Change Performance Index

Background and Methodology

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Summary

Recognising the urgency to take immediate action in protecting the global climate, the 21st Conference of the Parties, held in December 2015 in Paris, made a ground-breaking achievement in adopting the goal to limit global warming to well below 2°C and pursue efforts to limit warming to 1.5°C. With its new methodology, the Climate Change Performance Index (CCPI) is now suited to measure the progress of countries towards contributing to the climate goals agreed to in Paris. It is applied for the first time for the G20 countries in July 2017 and was now adopted for all 56 countries evaluated in the Climate Change Performance Index (CCPI) and the EU for the CCPI 2018 edition.

The Climate Change Performance Index is an instrument designed to enhance transparency in international climate politics. Its aim is to put political and social pressure on those countries which have, up until now, failed to take ambitious action on climate protection. It also aims to highlight those countries with best practice climate policies.

Content

Foreword

Corresponding to the record breaking global emissions of the last years, the carbon dioxide (CO_2) concentration in our atmosphere already exceeds the historic value of 400ppm. If this trend is not inverted, our chances to stay well below the 2°C guardrail and thus avoid climate change with all its expected impacts are virtually zero. With business as usual (BAU) scenarios, at the moment we are heading towards an average global warming of 4 to 6°C and still towards an up to 3°C, if countries fulfil their publicly announced mitigation targets.

The subsequent worldwide dramatic consequences are impressively documented in the World Bank report “Turn down the Heat”. The World Energy Outlook from the International Energy Agency (IEA) states clearly that, if we want to protect our atmosphere properly, two-thirds of the available fossil fuel resources must remain in the ground.

At the same time the future of our energy supply system is at a crossroads. For one thing, we may well be seeing the start of a new fossil age. The shale gas revolution in the United States, the tar sands in Canada and a lot of other unconventional new sources of fossil fuels are being exploited right now. This new supply is driving down the price of conventional fossil fuels. For another, we witness massive investment in renewable energy all over the world. Renewable energy technologies are constantly improving and the costs involved are sinking at an impressive pace. Especially wind and solar energy provide already a sustainable and affordable - oftentimes already cheaper - energy alternative. The competition of the two supply systems – new fossil fuels vs. renewable energies – has not been decided yet. But this competition is one key issue and will be decisive for the success or failure of decarbonisation process.

The other key issue is energy efficiency. We must produce our electricity and goods much more efficiently, yet simultaneously avoid rebound effects that are typically associated with gains in efficiency. The two most promising strategies for a low-carbon future, that are large-scale deployment of renewable energies and efficiency improvements leading to a globally stable or even decreasing energy use, play a prominent role in the methodology of the Climate Change Performance Index (CCPI). The CCPI was developed to accompany countries along this low-carbon pathway as well as to point out the weaknesses and strengths in the development of their national and international climate policies.

After the twenty-first session of the Conference of the Parties (COP21) in Paris 2015, the next years will decide on the path towards a sustainable future. Alongside the COP23 in Bonn, Germanwatch, the NewClimate Institute and the Climate Action Network will present a Climate Change Performance Index 2018 to the global public. The CCPI compares countries by their development and current status in the three categories "GHG Emissions", "Renewable Energy" and "Energy Use", the 2°C-compatibility of their current status and future targets in each of these categories and their ambition and progress in the field of climate policy aiming at inducing enhanced action on climate change both, domestically and in international diplomacy.

As has been the case with the previous editions, the CCPI 2018 would not have been possible without the help of about 300 climate experts from all over the world, who evaluated their countries’ climate policy. We would like to express our deep gratitude and thanks to all of them.

By simplifying complex data the Index not only addresses experts, but everyone. We would like to emphasize that so far not one country in the world has done enough to protect the climate. We hope that the index provides an incentive to significantly change that and step up efforts.

The following publication explains the background and the methodology of the Climate Change Performance Index. The results of the CCPI can be accessed online at www.germanwatch.org/en/ccpi.

1 Who does how much to protect the climate?

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). The index usually compares those 56 countries that together are responsible for more than 90 percent of annual worldwide carbon dioxide emissions.

The climate change performance is evaluated according to uniform criteria and the results are ranked. With reaching the Paris Agreement in 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 access 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. The objective is to raise the pressure on decision makers, both at the political and civil society level, and to move them to systematically protect the climate. Thus, the index is to be both a warning, as well as an encouragement, to everybody involved. 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. Naturally, the index is also available online for general public interest.[1]

[1] Burck et al. (2017)

2 Methodology

The climate change performance is measured via fourteen indicators, classified into four categories:

1. "GHG Emissions" (40%),

2. "Renewable Energy" (20%),

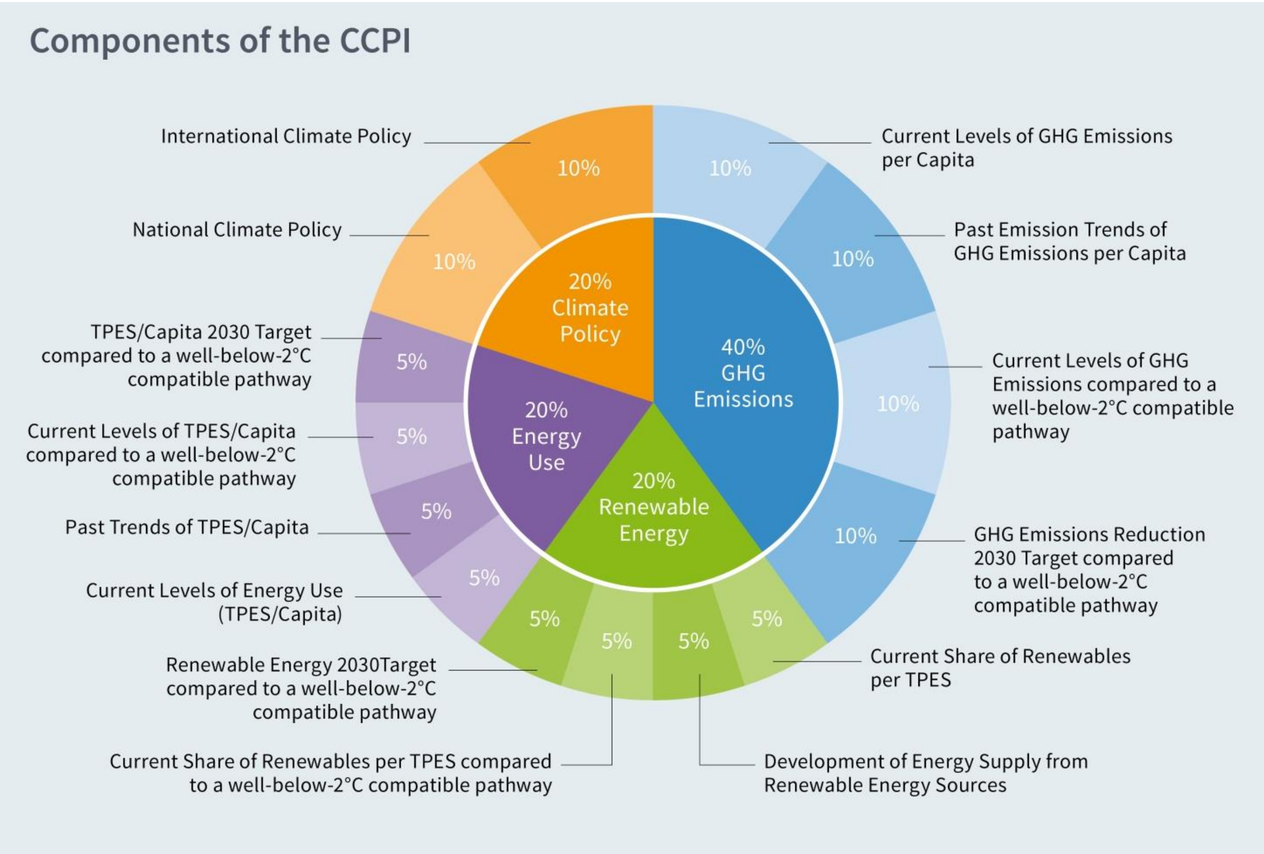
3. "Energy Use"(20%)

4. "Climate Policy" (20%).

A country's performance in each of the categories 1-3 is defined by its performance regarding four different equally weighted indicators, reflecting four different dimensions of the category: "current levels", "recent developments (5-year trend)", "2°C compatibility of the current level" and the "2°C compatibility of its 2030 target". These twelve indicators are complemented by two indicators, measuring the country's performance regarding its national climate policy framework and implementation as well as regarding international climate diplomacy in the category "Climate Policy".

Figure 1 gives an overview of the composition and weighting of 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".

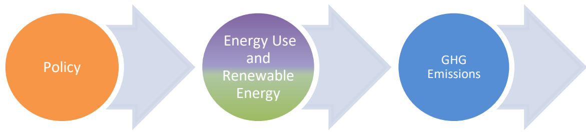
Figure 1: **Components of the CCPI: Fourteen indicators (outer circle) in four categories (inner circle)**



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. If 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". Following this logic, the index takes into account the solutions with a weighting of 20% each:

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

This weighting scheme leaves the CCPI responsive enough 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 weights highest in the index (40%). Measuring both, emissions trends and levels, 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.



Data sources and adaptions

For the first time, the CCPI assesses all GHG emissions arising across all sectors, using the PRIMAP [2]data base. 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)[3], 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[4].

The evaluation of the countries' mitigation targets is based on their Nationally Determined Contributions (NDCs), communicated to the UNFCCC[5]. Since clear guidelines and frameworks for the framing of NDCs are not existent, the countries' targets partly had to be inter-/extrapolated to 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). Evaluations of countries' performance in climate policy is based on an annually updated survey among national climate and energy experts from the country's civil societies (for details, please see chapter 2.4).

[2] PRIMAP (annual updated)
[3] IEA (annual updated-a)
[4] 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 biomass, especially in developing countries. In industrialised countries this quantity is negligible in most cases.
[5] UNFCCC (2017)

Box 1: What's new? – 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, especially when comparing this year's results with previous ones.

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 has revised historic data retroactively in later editions, if it needed to complete former results, e.g. due to new measuring sources. So 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.

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 any more, e.g. due to a change in job position. When the people acting as the judges of a country's policy change, differences in judgements can occur.

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 CO2 emissions has been extended to GHG emissions.

The CCPI 2018 (for 56 selected countries and the EU) and the CCPI G20 Edition of July 2017 are the first index publications based on the new methodology. Hence, comparing previous with current editions of the CCPI might lead to misinterpretation.

2.1 GHG emissions (40% of overall score)

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

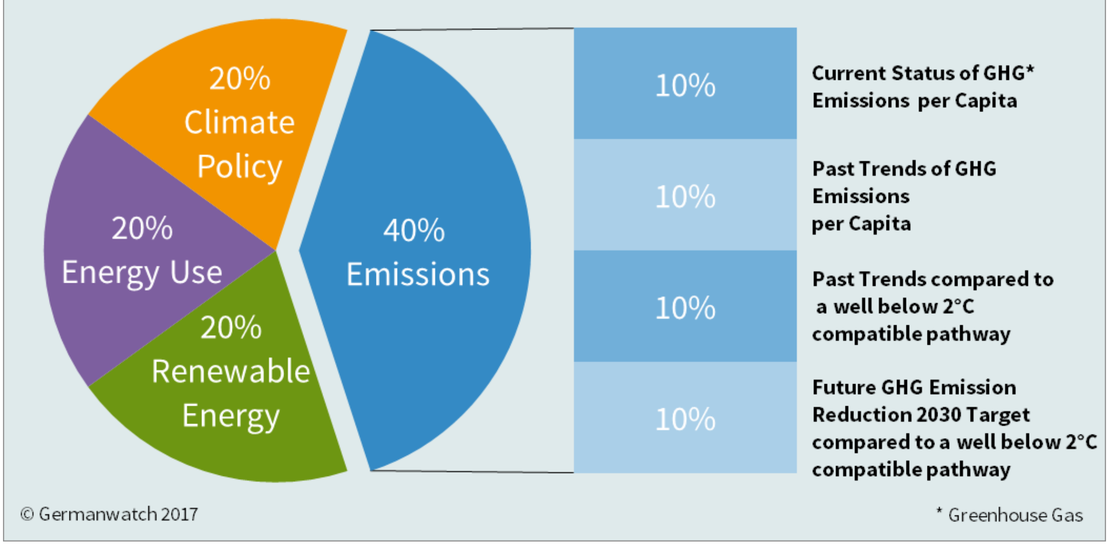
However, the diversity of countries evaluated in the CCPI is enormous. It is therefore indispensable that more than just one perspective be taken on the emissions level and how the GHG emissions of a given country have developed in the recent past.

The GHG emissions category therefore is composed of four indicators. "Current Level", "Recent Developments" of per capita GHG emissions and the of per capita 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.

For the first time, the CCPI 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), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) for which we use data from PRIMAP provided by the Potsdam Institute for Climate Impact Research.[6]

With using overall GHG-related instead of only energy-related CO_2 emissions as in previous editions 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.

Figure 2: Weighting of Emissions Indicators



[6] Potsdam Institute for Climate Impact Research (2017)

Box 2: Emissions accounting and trade

The currently prevailing way of accounting for national 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.

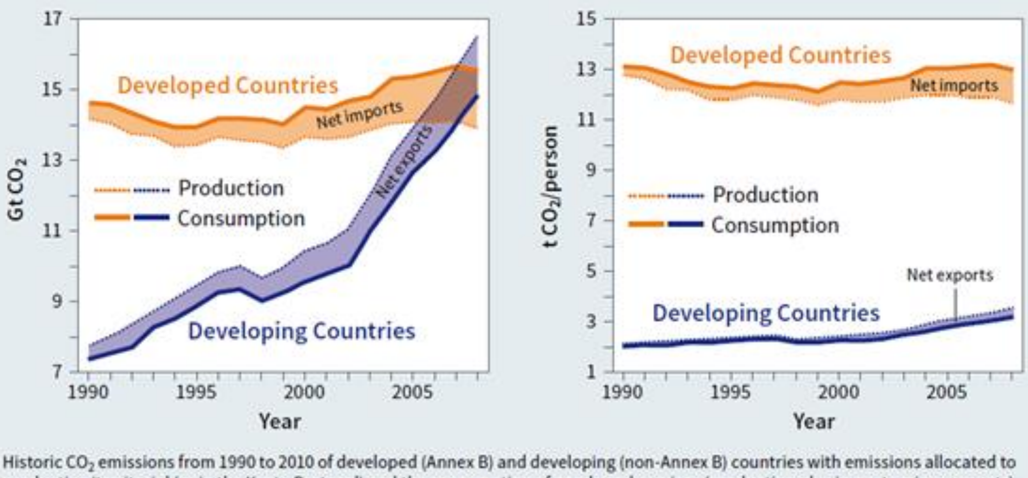
In the course of globalisation, international trade has caused an increasing spatial separation between production and consumption of goods. Thus, on the one hand China, Thailand and South Africa, who belong to the group of high-producers and greenhouse gas exporters, currently report emission levels that are considered too high. On the other hand, France, Switzerland and the USA are large importers of CO2 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 nation-level emissions this account uses the total of national consumption being 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 CO2 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[10]



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.

2.1.1 Current level of GHG emissions per capita

Even with 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 an indicator 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 as on developed countries. The level of current emissions therefore is a means of taking into account each country's development situation and thus addressing the equity issue.

2.1.2 Recent developments 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.

2.1.3 Well-below-2°C compatibility of current level of GHG emissions

The benchmark 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 by 2020 and CO_2 emissions need to decline to net zero by around 2050.[7]

Figure 4: GHG emissions: actual pathway (green) vs. well-below-2°C target pathway (orange). Example of an over-performing country.

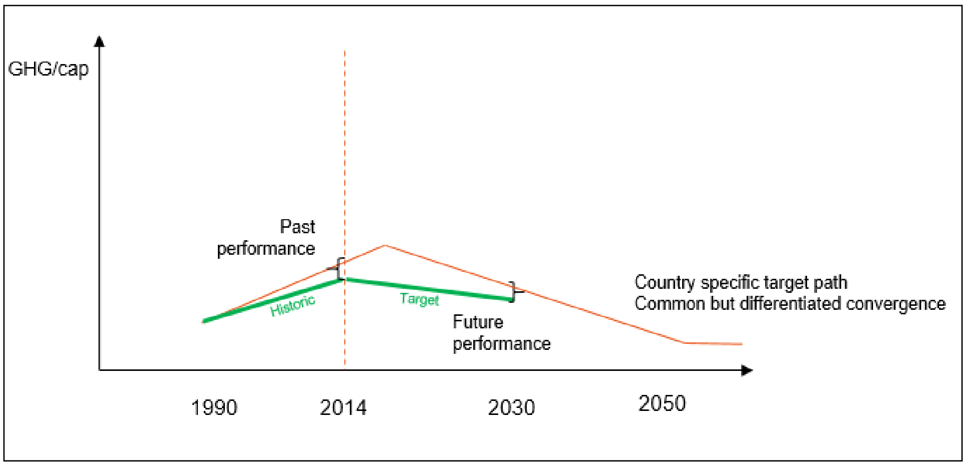


Illustration: Germanwatch/ NewClimate

[7] Rogelj, J., et al. (2015)

The calculation of individual country target pathways is based on the common but differentiated convergence approach (CDC)[8]. 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 (here 60 years), "differentiated" because developed countries start on this path as of 1990, developing countries only 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 (2015) level of per capita emissions to this pathway.

2.1.4 2030 target compared to a well-below-2°C compatible Benchmark

The CCPI also evaluates a country's future 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.

The GHG emission targets of the countries were taken from the Climate Action Tracker.[9]

2.2 Renewable Energy (20% of overall score)

Swift action is required as 2016 was the first year with a constant CO2 concentration in the atmosphere above 400ppm.[10] Most of the researchers anticipate that a permanent transgression of this threshold will lead to a temperature rise above 2°C.[11] Therefore, a constant expansion of renewable energies and a decline in 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. CO2 in 2015.[12] This shows that a targeted increase in the share of renewable energies can make a vital contribution to climate change protection efforts. The "renewable energies" 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%.

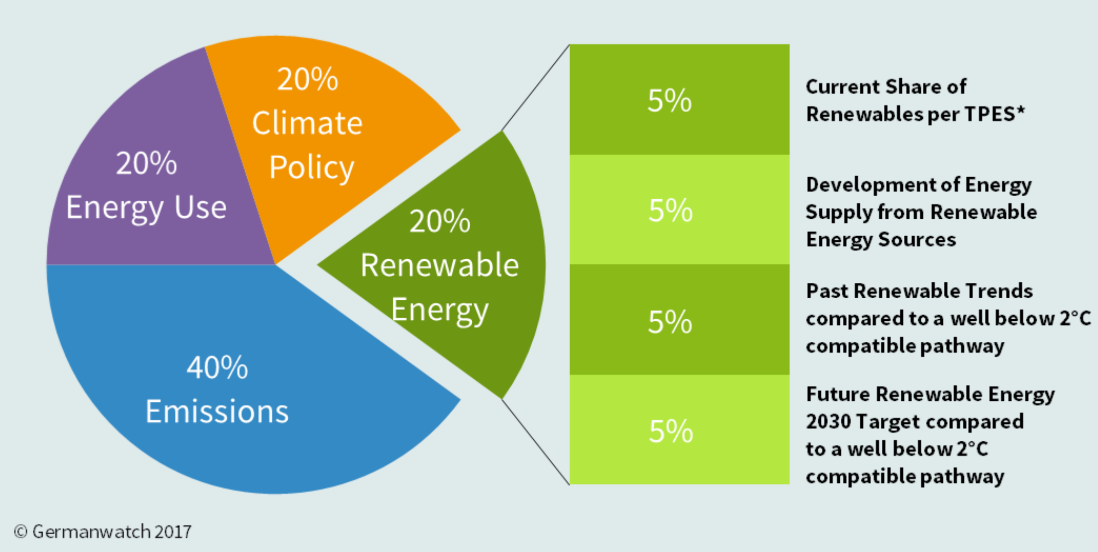
In the absence of data assessing traditional biomass only, all renewable energy data is calculated without residential biomass for heat production, in order to prevent disadvantages for countries increasing their efforts to replace the unsustainable use of traditional biomass in their energy mix.

The recent developments and the 2°C compatibility of the current level exclude hydropower, while values for the current level and the 2°C compatibility of the 2030 target include hydropower (see Box 3).

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, in order not to 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 mentioned in Box 2.

[8] Höhne, N. et al-(2006).
[9] Climate Action Tracker (2017).
[10] Betts, R.A. et al. (2016).
[11] OECD (2012).
[12] BMWi (2015).

Figure 5: Weighting of Renewable Energy Indicators



2.2.1 Recent developments of Renewable Energy per unit of total energy supply (TPES)

The first dimension 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 dimensions in this category, this dynamic indicator accounts for 5% of the overall CCPI score. To acknowledge the previously described risks surrounding an expansion of hydropower and to adequately reward countries that concentrate on more sustainable solutions, it excludes this technology from the underlying data and therefore focuses on "new" renewable energy sources, such as solar, wind and geothermal, only.

2.2.2 Current level of Energy Supply from Renewable Energy sources

To recognize 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.[13]

[13] See Box 3: Hydropower and Human Rights violation, p.14

Box 3: 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, total renewable energy supply might even fall. In such an extreme case a country would receive a very low CCPI score in the Renewable Energy Category 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 two of four indicators in the renewable energy category. As a result, the recent developments in renewable energy as well as the indicator that measures the current level of renewables to a country's well-below-2°C pathway exclude hydropower, while the total values of the current level and the indicator evaluating the 2030 renewably energy target include hydropower.

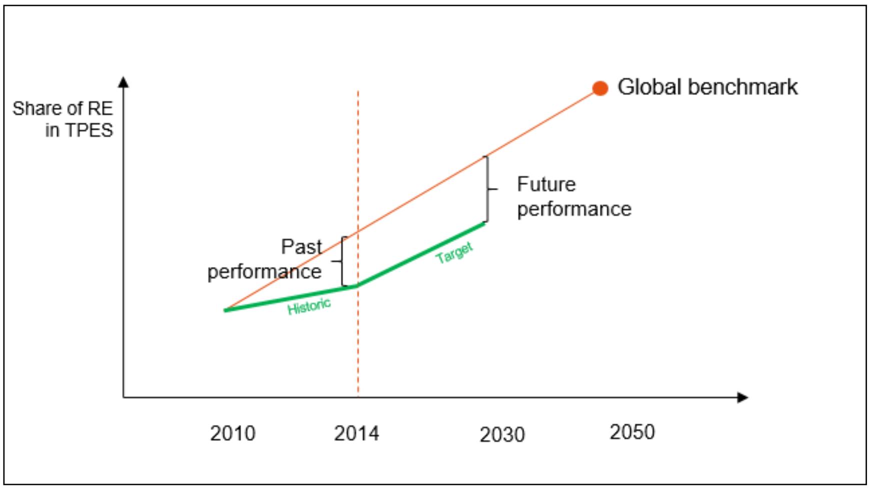
If data availability on large-scale and non-sustainable hydropower changes in the future, we will include these data and therefore exclude non-sustainable hydropower only from all four indicators.

Non-sustainable approaches and human rights violations related to the expansion of renewable energy are increasingly also 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. Both fields of conflict are also increasingly being seen in reactions 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 be continuously examining possibilities to acknowledge them in future editions of the ranking.

2.2.3 Well-below-2°C compatibility of current level

The benchmark within the index category "Renewable Energy" is a share of 100% renewable energy by 2050. 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 the middle of the century. 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 (nuclear 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.[14] Many NGOs 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 inter-generational justice.

Figure 6: Renewable Energy pathway



2.2.4 2030 target compared to a well-below-2°C compatible benchmark

The CCPI also 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 (using a linear pathway for methodological reasons).

Comparing renewable energy targets is a substantial challenge, because countries put forward their renewably energy targets in many ways, as there is an absence of uniform rules for such target setting. Some countries only have targets for subnational states, others have national targets. Some define their targets in terms of installed capacity rather than share of renewables in the TPES.

In order to convert these different types of indication into a future share of renewable energy in the TPES, we proceeded as follows:

[14] WWF et al. (2011).

- When available, we referred to numbers projected by the World Energy Outlook (WEO) 2016 current policy scenarios, since this outlook "translates" policies into national renewable energy deployment, taking into account federal policies as well as sectoral targets.
- Whenever a target is formulated for a year other than 2030, a 2030 value is calculated by linear interpolation of the target share.
- All numbers for the current share of renewables in a country's energy supply are taken from the IEA energy balances.

The Table in the Annex explains the approach chosen for each individual country including all accompanying assumptions (see also legend below table for an explanation of assumptions a to e).

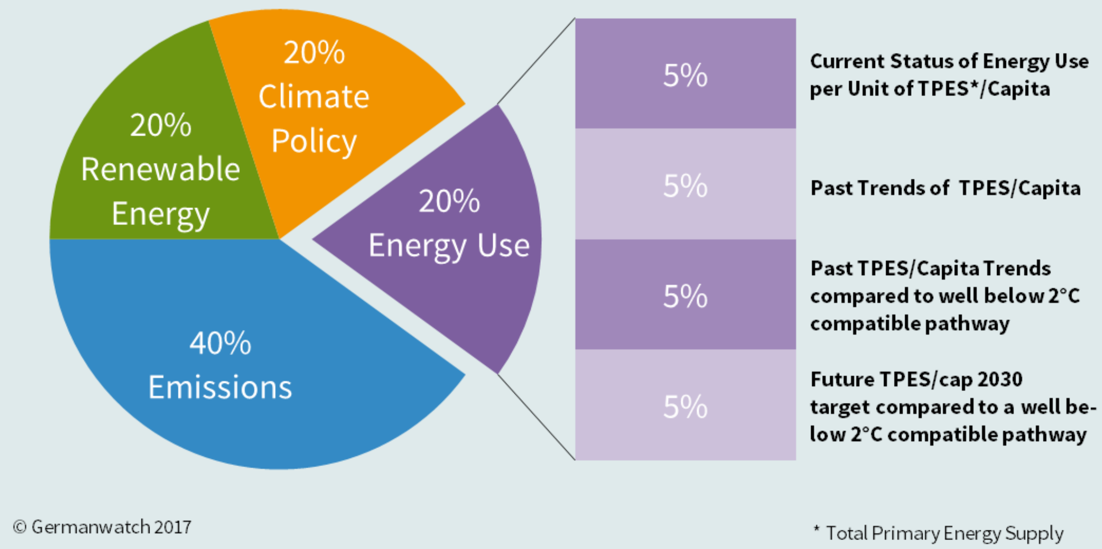
2.3 Energy Use (20% of Overall Rating)

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 across all countries available at the present time. The CCPI therefore assesses the per-capita energy use of a country and measures progress in this category.[15] As in the categories "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).

Figure 7: Weighting of Energy Use Indicators



[15] 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.

2.3.1 Recent developments of Energy Use measured as Units of Total Primary Energy Supply per Capita (TPES/capita)

In accordance with the categories on renewably energy and 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.

2.3.2 Current level of Energy Use measured as Units of Total Energy Supply per Capita (TPES/capita)

To recognize 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.

2.3.3 Past Trends compared to well-below-2°C compatible benchmark

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. The IPCC carried out a scenario comparison using a large number of integrated assessment models.[16]

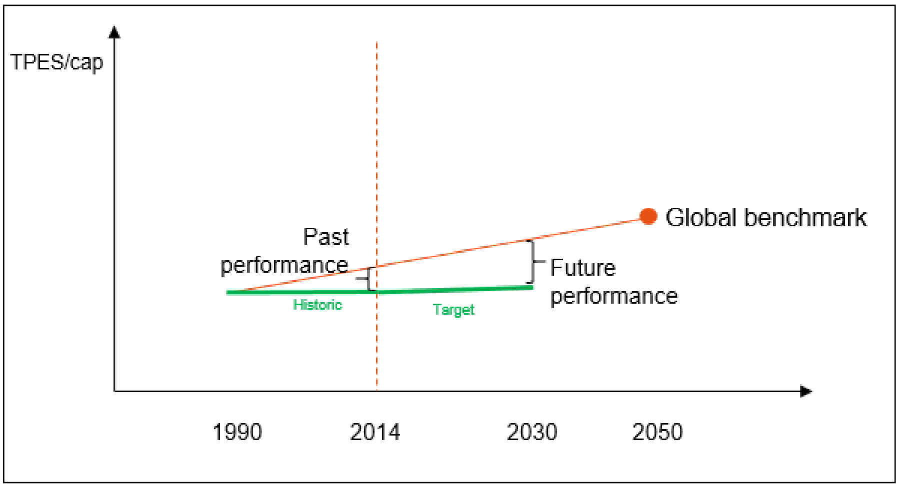
From the available scenarios, we observe that the total amount of global energy use in 2050 has to be roughly the same level or a bit higher than it is today, with a margin of uncertainty. At the same time population will grow slightly between today and 2050. We therefore pragmatically chose the benchmark to be "same energy use per capita in 2050 as the current global average", which is 80 gigajoules per capita in Total Primary Energy Supply.

Current energy use per capita is very diverse. At the present time, the value for India is only a third of the global average, while for the USA it is more than three times higher than the global average. Consequently, the chosen benchmark would allow India to increase its energy use per capita threefold by 2050, while absolute energy demand can grow even further due to growing population. The USA would need to cut per-capita energy use to a third 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.

[16] Clarke, L.et al. (2014)

Figure 8: Energy Use pathway



2.3.4 Future Energy Use Target compared to well-below-2°C compatible Benchmark

The CCPI also evaluates the distance between the country's future energy targets for 2030 along the country's pathway to the 2050 benchmark.

Energy efficiency and energy use targets are not formulated in standardized units and therefore lack comparability. Some countries indicate these targets as efficiency gains compared to a certain baseline scenario, whereas others announce reduction targets for the energy intensity of their domestic economy.

We gathered information and combined various data sources to transform all targets expressed in different units into a targeted future per-capita energy use.

For this purpose, we rely on population projections by the United Nations[17] and, where necessary, on OECD projections for the gross domestic product (GDP).[18]

Where no explicit economy-wide target was available, we based our analysis on projections that incorporate current and new sectoral or federal policies such as the IEA World Energy Outlook 2016.[19] Whenever a target is indicated for a year other than 2030, we interpolate or extrapolate the result linearly to obtain a value for 2030. The list below specifies the approach we chose for each individual country. All historical data on TPES are taken from the IEA energy balances.[20]

[17] UN (2017)
[18] OECD (2017)
[19] IEA (annually updated-b)
[20] IEA (annually updated-c)

2.4 Climate Policy (20% of Overall Rating)

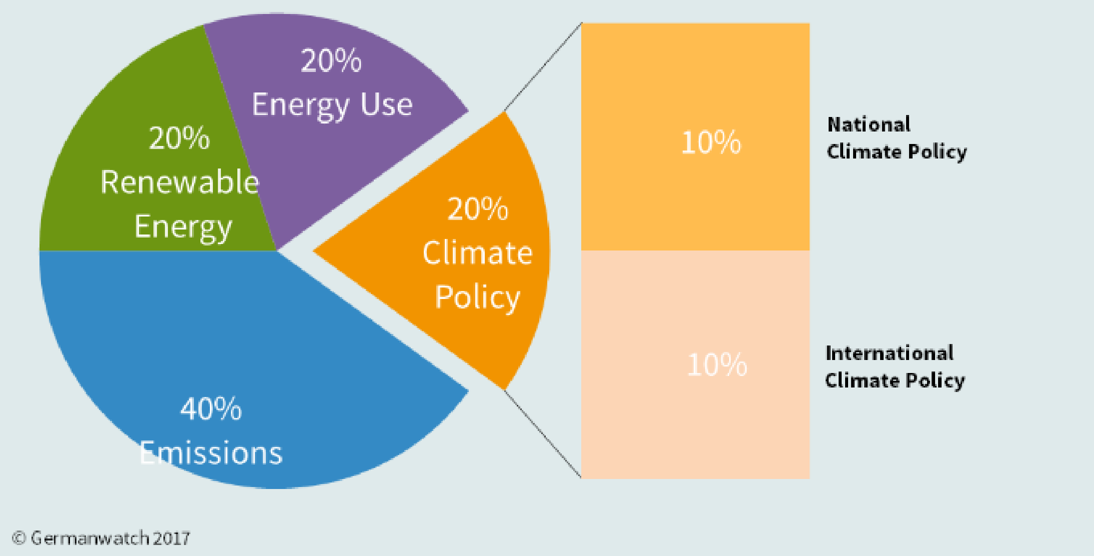
The climate policy category in the CCPI considers the fact that measures taken by governments to reduce greenhouse gases often take several years to show their effect on the emissions, energy use and renewable energy categories. On top of this, the most current greenhouse gas emissions data enumerated 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 indicator “climate policy” is assessed annually in a comprehensive research study. Its basis is the performance rating by climate change experts from non-governmental organisations within the countries that are evaluated. In a questionnaire, they give a judgement and “rating” on the most important measures of their governments. The questionnaire covers 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, and 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, and national peat land protection.

In line with the Paris Agreement, experts also evaluate 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. The performance at UNFCCC conferences and other international conferences and multilateral agreements is also evaluated. Thus, both the national and international efforts and impulses of climate policies are scored. 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. About 300 national climate experts contributed to the evaluation of the 56 countries of the CCPI 2018. They each evaluated their own country’s national and international policy. The latter is also rated by climate policy experts that 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 “sluggish” categories of “Emissions”, “Renewable Energies” 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 protection – the policy therefore plays a decisive role for future scores within the CCPI.

Figure 9: Weighting of Climate Policy Indicators



3 Calculation and Results

The current evaluation method sets zero as the bottom cut off, and 100 points are the maximum that can be achieved. A country that was best in one indicator receives full points (in that indicator). The best possible overall score is therefore 100 points. Important for interpretation is the following: 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)

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 2018, one can see that the highest-ranking country Sweden was not at the top in all indicators, let alone have they 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.germanwatch.org/en/ccpi

Development and Prospects

The CCPI was first introduced to a professional audience at the COP 11 – Montreal Climate Conference in 2005. The growing media/press response in the countries surveyed confirms the ever-increasing relevance of the Index, and encourages us in our work.

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

Following a methodological evaluation of the 7th 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 this year.

With a second methodological revision this year, we are now able to assess all GHG emissions arising across all sectors. The Index for the first time also includes assessments of the countries' current performance and own future targets in relation to their country-specific well-below-2°C pathway.

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5 Annex

GHG table

Country	Target
Algeria	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
Argentina	Quantification of NDC based on Climate Action Tracker 2017
Australia	Quantification of NDC based on Climate Action Tracker 2017
Austria	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
Belarus	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
Belgium	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
Brazil	Quantification of NDC based on Climate Action Tracker 2017
Bulgaria	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
Canada	Quantification of NDC based on Climate Action Tracker 2017
China	Quantification of NDC based on Climate Action Tracker 2017
Chinese Taipei	Target of 50% below BAU by 2030 (214 MtCO2e) was normalised to 2015 emissions (295 MtCO2e)
Croatia	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
Cyprus	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
Czech Republic	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
Denmark	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
Egypt	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
Estonia	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
EU28	Quantification of NDC based on Climate Action Tracker 2017
Finland	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
France	Applied the national target of 40% reduction below 1990 in 2030
Germany	Applied the national target of 55% reduction below 1990 in 2030

Greece	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
Hungary	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
India	Quantification of NDC based on Climate Action Tracker 2017
Indonesia	Quantification of NDC based on Climate Action Tracker 2016
Ireland	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
Islamic Republic of Iran	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
Italy	Applied the per capita level of the 2020 target also for 2030
Japan	Quantification of NDC based on Climate Action Tracker 2017
Kazakhstan	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
Republic Korea	Target of domestic emission reductions of 25.7% below BAU of 850.6 MtCO2e in 2030. The stronger target of reducing emissions also using offsets by 37% would result in 10.5t CO2/cap
Latvia	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
Lithuania	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
Luxembourg	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
Malaysia	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
Malta	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
Mexico	Quantification of NDC based on Climate Action Tracker 2016
Morocco	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
Netherlands	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
New Zealand	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
Norway	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
Poland	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf

Portugal	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
Romania	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
Russian Federation	Quantification of NDC based on Climate Action Tracker 2017
Saudi Arabia	Quantification of NDC based on Climate Action Tracker 2016
Slovak Republic	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
Slovenia	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
South Africa	Quantification of NDC based on Climate Action Tracker 2016
Republic of Korea	Target of domestic emission reductions of 25.7% below BAU of 850.6 $MtCO_2e$ in 2030. The stronger target of reducing emissions also using offsets by 37% would result in 10.5 tCO_2/cap
Spain	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
Sweden	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
Switzerland	The target of reducing domestic emissions by at least -30% by 2030 below 1990 was applied to per capita emissions in 1990
Thailand	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
Turkey	Quantification of NDC based on Climate Action Tracker 2017
Ukraine	Applied the average per capita growth (excl. LULUCF) from the NDC interpretation of Climate & Energy College factsheets (SAR) to 2010 per capita levels (with LULUCF) http://climatecollege.unimelb.edu.au/files/site1/docs/11/All_NDCFactsheets_UoM-PRIMAP_GWPSAR.pdf
United Kingdom	Applied the national target of 57% reduction below 1990 in 2030
USA	Assumed not to have a GHG target. The Trump administration announced its intent to cease any implementation of the NDC.

EE table

Country	**Target**
Algeria	No target. Trend from 2010 to 2015 was extrapolated to 2030 and used as proxy for a target.
Argentina	No target or scenario was available
Australia	Australia sets out a target of a 40% increase in energy productivity from 2015 to 2030. Combined with population and GDP forecasts and the 2015 energy productivity this yields a future energy use per capita. Source of the target: http://www.coagenergycouncil.gov.au/publications/national-energy-productivity-plan-2015-2030
Austria	EU's target is a reduction of 30% below the 2007 baseline by 2030. We applied the percentage reduction from 2013 to 2030 required at the EU level to the per capita energy use of each individual member states.
Belarus	No target. Trend from 2010 to 2015 was extrapolated to 2030 and used as proxy for a target.
Belgium	EU's target is a reduction of 30% below the 2007 baseline by 2030. We applied the percentage reduction from 2013 to 2030 required at the EU level to the per capita energy use of each individual member states.

Brazil	For Brazil, no explicit economy wide target was available. Therefore, WEO projections for the total energy demand were combined with population forecasts to calculate the future energy use per capita.
Bulgaria	EU's target is a reduction of 30% below the 2007 baseline by 2030. We applied the percentage reduction from 2013 to 2030 required at the EU level to the per capita energy use of each individual member states.
Canada	Canada has no national target regarding the energy use per capita. However, there are several policies that promote energy efficiency and some subnational targets. We decided to rely our evaluation on a projection provided by the Canadian National Energy Board which indicates a future energy demand. The projection from the National Energy Board is based on the policies implemented until mid-2016. As historic figures provided by the National Energy Board significantly deviate from IEA figures, we calculated a relative change in the energy use from 2014 to 2030 in the framework of the NEB data and then applied the relative change to the 2014 TPES from IEA data to derive a future energy use according to IEA definitions. Finally, dividing this future energy use by the forecasted population, yielded the future energy use per capita. Source: https://apps.neb-one.gc.ca/ftrppndc4/dflt.aspx?GoCTemplateCulture=en-CA [accessed on 26.6.2017]
China	China indicates a target of a 15% reduction in energy consumption per unit GDP from 2015 to 2020 in its twelfth 5 years plan. However, since Chinas energy use is presumed to evolve highly non-linear, we decided to rely our assessment on the WEO projections for 2030 rather than linearly extrapolating Chinas 2020 target. Sources of the target: http://en.ndrc.gov.cn/newsrelease/201612/P020161207645765233498.pdf [accessed: 27.06.2017] IEA, 2016
Chinese Taipei	The target of "Target of energy intensity decrease 50% from 2005 to 2025" was applied from 2006 assuming an average annual GDP growth of 2%, the resulting value was assumed to hold for 2030.
Croatia	EU's target is a reduction of 30% below the 2007 baseline by 2030. We applied the percentage reduction from 2013 to 2030 required at the EU level to the per capita energy use of each individual member states.
Cyprus	EU's target is a reduction of 30% below the 2007 baseline by 2030. We applied the percentage reduction from 2013 to 2030 required at the EU level to the per capita energy use of each individual member states.
Czech Republic	EU's target is a reduction of 30% below the 2007 baseline by 2030. We applied the percentage reduction from 2013 to 2030 required at the EU level to the per capita energy use of each individual member states.
Denmark	EU's target is a reduction of 30% below the 2007 baseline by 2030. We applied the percentage reduction from 2013 to 2030 required at the EU level to the per capita energy use of each individual member states.
Egypt	No target. Trend from 2010 to 2015 was extrapolated to 2030 and used as proxy for a target.
Estonia	EU's target is a reduction of 30% below the 2007 baseline by 2030. We applied the percentage reduction from 2013 to 2030 required at the EU level to the per capita energy use of each individual member states.
EU28	The EU formulates its energy efficiency target as at least 27% energy savings in 2030 with respect to a business as usual scenario. Since no further specification is made on the BAU, we use the usual PRIMES 2007 baseline as the reference scenario. Dividing the corresponding TPES by the forecasted population yields the target energy consumption per capita. Source of the target: https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/2030-energy-strategy [accessed: 27.06.2017]
Finland	EU's target is a reduction of 30% below the 2007 baseline by 2030. We applied the percentage reduction from 2013 to 2030 required at the EU level to the per capita energy use of each individual member states.
France	The French energy efficiency target is given as a reduction of the total final consumption by 50% in 2050 relative to the base year 2012. We assumed, that the efficiencies of transformation processes of primary energy into secondary energy for end use purpose from renewable and fossil energy sources do not change. However, we incorporated an improvement in the overall transformation efficiency caused by an increasing share of renewable energy in the TPES. Knowing the target TFC the corresponding target TPES was derived by dividing the target TFC by the average overall efficiency. The TPES per capita followed by dividing the result by the forecasted population. Source of the target: https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000031044385&categorieLien=id [accessed: 27.06.2017]
Germany	The German energy efficiency target is given as a reduction of the total final consumption by 50% from 2008 to 2050. We assumed, that the efficiencies of transformation processes of primary energy into secondary energy for end use purpose from renewable and fossil energy sources do not change. However, we incorporated an improvement in the overall transformation efficiency caused by an increasing share of renewable energy in the TPES. Knowing the target TFC the corresponding target TPES was derived by dividing the target TFC by the average overall efficiency. The TPES per capita followed by dividing the result by the forecasted population. Source of the target:

	http://www.bmwi.de/Redaktion/DE/Downloads/M-O/nationaler-energieeffizienz-aktionsplan-2014.pdf?__blob=publicationFile&v=1 [accessed: 27.06.2017]
Greece	EU's target is a reduction of 30% below the 2007 baseline by 2030. We applied the percentage reduction from 2013 to 2030 required at the EU level to the per capita energy use of each individual member states.
Hungary	EU's target is a reduction of 30% below the 2007 baseline by 2030. We applied the percentage reduction from 2013 to 2030 required at the EU level to the per capita energy use of each individual member states.
India	The Indian Twelfth Five Year Plan indicated a targeted TPES for 2021. Together with the population forecast this determines a future energy use per capita that we linearly extrapolated to 2030. Source of the target: http://planningcommission.gov.in/plans/planrel/12thplan/pdf/12fyp_vol2.pdf [accessed: 27.06.2017]
Indonesia	In the regulation of the government of the Republic of Indonesia number 79 year 2014, a targeted energy use per capita of 1.4 toe/capita is indicated for the year 2025. Source of the target: www.apbi-icma.org/wp-content/uploads/2014/12/PP-79-2014.pdf
Ireland	EU's target is a reduction of 30% below the 2007 baseline by 2030. We applied the percentage reduction from 2013 to 2030 required at the EU level to the per capita energy use of each individual member states.
Islamic Republic of Iran	No target. Trend from 2010 to 2015 was extrapolated to 2030 and used as proxy for a target.
Italy	Italy formulates its energy efficiency target as a reduction of the TPES by 17-26% by 2050 compared to 2010 TPES. For the index, we used the mean value of 23% reduction and supplemented the corresponding future TPES with population forecasts. Source of the target: http://www.sviluppoeconomico.gov.it/images/stories/documenti/SEN_EN_marzo2013.pdf [accessed: 27.06.2017]
Japan	Even though Japan provides information on targeted energy use, we decided to rely our assessment on the WEO projection, since data provided by the Japanese government on the current energy use significantly deviate from IEA statistics suggesting different underlying methodology of measurement. Sources of the target: http://www.meti.go.jp/english/press/2015/pdf/0716_01a.pdf [accessed: 27.06.2017] was not used, as differences in the base year and in the energy statistics could not be resolved
Kazakhstan	Target of reduction of energy intensity per GDP (vs. 2008 levels) 30% by 2030. Assumed an annual average GDP growth rate of 2% from 2010 to 2030.
Latvia	EU's target is a reduction of 30% below the 2007 baseline by 2030. We applied the percentage reduction from 2013 to 2030 required at the EU level to the per capita energy use of each individual member states.
Lithuania	EU's target is a reduction of 30% below the 2007 baseline by 2030. We applied the percentage reduction from 2013 to 2030 required at the EU level to the per capita energy use of each individual member states.
Luxembourg	EU's target is a reduction of 30% below the 2007 baseline by 2030. We applied the percentage reduction from 2013 to 2030 required at the EU level to the per capita energy use of each individual member states.
Malaysia	No target. Trend from 2010 to 2015 was extrapolated to 2030 and used as proxy for a target.
Malta	EU's target is a reduction of 30% below the 2007 baseline by 2030. We applied the percentage reduction from 2013 to 2030 required at the EU level to the per capita energy use of each individual member states.
Mexico	The Mexican target of keeping energy intensity constant from 2012 to 2018 was converted into an energy use per capita by combining it with GDP and population forecasts. We point out that the short period of time defining the slope of the linear extrapolation causes a high level of uncertainty regarding the 2030 target in the case of Mexico. Source of the target: http://www.gob.mx/cms/uploads/attachment/file/224/PRONASEpendt.pdf [accessed: 27.06.2017] (p.39)
Morocco	Target of "reducing energy consumption by 15% by 2030" could not be evaluated as unclear if below BAU or absolute. Trend from 2010 to 2015 extrapolated to 2030 and used as proxy for a target.
Netherlands	EU's target is a reduction of 30% below the 2007 baseline by 2030. We applied the percentage reduction from 2013 to 2030 required at the EU level to the per capita energy use of each individual member states.
New Zealand	No target. Trend from 2010 to 2015 was extrapolated to 2030 and used as proxy for a target.
Norway	No target. Trend from 2010 to 2015 was extrapolated to 2030 and used as proxy for a target.
Poland	EU's target is a reduction of 30% below the 2007 baseline by 2030. We applied the percentage reduction from 2013 to 2030 required at the EU level to the per capita energy use of each individual member states.

Portugal	EU's target is a reduction of 30% below the 2007 baseline by 2030. We applied the percentage reduction from 2013 to 2030 required at the EU level to the per capita energy use of each individual member states.
Romania	EU's target is a reduction of 30% below the 2007 baseline by 2030. We applied the percentage reduction from 2013 to 2030 required at the EU level to the per capita energy use of each individual member states.
Russian Federation	The Russian target to reduce energy intensity by 40% from 2007 to 2020 was converted into an energy use per capita by combining it with GDP forecasts and population forecasts. As the implementation status of this target is unclear, the TPES per capita value from 2020 was also used for 2030. The combination of an unrealistic target set out by the government and conservative economic growth projections provided by the OECD leads to a low future energy use per capita and therefore a high score in the index rating. Sources of the target: http://aperc.ieej.or.jp/file/2012/12/28/Russia_2011.pdf [accessed: 27.06.2017] http://www.energosovet.ru/dok/ensovmed.htm [accessed: 27.06.2017, in Russian]
Saudi Arabia	No energy efficiency target was found. Energy projections were taken from the CAT assessment based on a source which is presently not available anymore. Source: http://www.kaust.edu.sa/assets/downloads/kicp-annual-strategic-study-appraisal-and-evaluation-of-energy-utilization-and-efficiency-in-the-ksa%202014-volume1.pdf [not available anymore]
Slovak Republic	EU's target is a reduction of 30% below the 2007 baseline by 2030. We applied the percentage reduction from 2013 to 2030 required at the EU level to the per capita energy use of each individual member states.
Slovenia	EU's target is a reduction of 30% below the 2007 baseline by 2030. We applied the percentage reduction from 2013 to 2030 required at the EU level to the per capita energy use of each individual member states.
South Africa	For South Africa, no explicit economy wide target was available. Therefore, WEO projections for the total energy demand were combined with population forecasts to calculate the future energy use per capita.
Republic Korea	The South Korean energy efficiency target is given as a reduction of final energy consumption by 13% with respect to a scenario value by 2035. We calculated the target value from the scenario value and combined it with population forecasts in order to calculate the target energy use per capita. The historic energy data provided in the source document significantly deviate from IEA data. We therefore derived a relative change of the TPES per capita in the framework of the source data and applied the change to the corresponding IEA numbers. Source of the target: http://large.stanford.edu/courses/2016/ph240/hyman2/docs/korea_energy.pdf [accessed: 27.06.2017]
Spain	EU's target is a reduction of 30% below the 2007 baseline by 2030. We applied the percentage reduction from 2013 to 2030 required at the EU level to the per capita energy use of each individual member states.
Sweden	EU's target is a reduction of 30% below the 2007 baseline by 2030. We applied the percentage reduction from 2013 to 2030 required at the EU level to the per capita energy use of each individual member states.
Switzerland	No target. Trend from 2010 to 2015 was extrapolated to 2030 and used as proxi for a target.
Thailand	Target of "25% reduction in energy intensity (energy per unit GDP) by 2030, as compared to 2010" was applied assuming an annual growth rate of GDP of 2%.
Turkey	The Turkish target given as an energy intensity reduction of 20% from 2008 to 2023 was converted into an energy use per capita by combining it with GDP forecasts and population forecasts. The value for 2023 was extrpolated to 2030. Source of the target: www.ebrd.com/documents/comms-and-bis/turkey-national-renewable-energy-action-plan.pdf [accessed: 26.06.2017]
Ukraine	The target of "energy intensity reduction of 50% by 2030" was applied to 2013 assuming an average annual GDP growth of 2%.
United Kingdom	The British target of a TPES of 177.6 Mtoe was combined with population forecasts to calculate a future energy use per capita. The 2020 value was extrapolated to 2030. Source of the target: https://ec.europa.eu/energy/en/topics/energy-efficiency/energy-efficiency-directive [accessed: 27.06.2017]
USA	We assumed no energy efficiency target and used the WEOs current policy projection for the 2030 value. The US Department of Energy, under the Obama Administration, created a partnership to double energy productivity by 2030 (http://www.energy2030.org/wp-content/uploads/Executive-Summary.pdf). The Trump Administration issued a memorandum "Regulatory Freeze Pending Review", which affects the department of energy's energy efficiency rules (https://www.whitehouse.gov/the-press-office/2017/01/20/memorandum-heads-executive-departments-and-agencies). We interpret this Memorandum to mean that the earlier target is no longer in place.

RE table

Country	Method
Algeria	Target of 27% share of 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 one to two (approximately 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh).
Argentina	The Argentinian target is defined as a share of 20% renewable energy in the total final consumption of electricity in 2025, where hydropower is not considered as renewable. Assuming the share of hydropower to remain constant at 21.8% this yields a target of 41.8% of electricity in the final consumption to originate from sources that this index refers to as renewable. To convert this target into a share of renewable energy in the TPES the following assumption have been made: a), b), c) and d) Under these assumptions the target share of renewable energy in the total final consumption of electricity together with present shares determines all other future shares in the TPES and therefore a corresponding share of renewable in TPES can be calculated. Source of the target: http://servicios.infoleg.gob.ar/infolegInternet/anexos/250000-254999/253626/norma.htm [accessed: 26.06.2017]
Australia	The Australian renewable energy target given as a share of 23.5% of renewable energy in electricity generation in 2020 was converted into a share of renewable energy in the TPES under the following assumptions: a), b), c), d) and e). Under these assumptions the target share of renewable energy in the total final consumption of electricity together with present shares determines all other future shares in the TPES and therefore a corresponding share of renewable in TPES can be calculated. Source of the target: https://www.environment.gov.au/climate-change/renewable-energy-target-scheme [accessed: 26.06.2017]
Austria	The EU's target is 27% in gross final energy demand, which is 10 percentage points above the 2015 level. We applied this 10 percentage points increase to each member state's 2014 level.
Belarus	No quantifiable target
Belgium	The EU's target is 27% in gross final energy demand, which is 10 percentage points above the 2015 level. We applied this 10 percentage points increase to each member state's 2014 level.
Brazil	The Brazilian renewable energy target for 2030 is formulated as a "share of renewable in the energy mix". For a lack of information on the precise definition of "the energy mix" we extracted the share of renewable energy in 2030 from WEO projections. Sources of the target: http://www4.unfccc.int/ndcregistry/PublishedDocuments/Brazil%20First/BRAZIL%20iNDC%20english%20FINAL.pdf [accessed: 26.06.2017]
Bulgaria	The EU's target is 27% in gross final energy demand, which is 10 percentage points above the 2015 level. We applied this 10 percentage points increase to each member state's 2014 level.
Canada	Canada has no national target for the use of renewable energy. However, there are plenty policies that promote renewable energy and some subnational targets. We decided to rely our evaluation on a projection for 2030 provided by the Canadian National Energy Board available on their website (see below). The projections are based on the policies implemented until mid-2016 and are discussed in the Canada's Energy Future2016 Update report (National Energy Board, 2016). Still, it is unclear whether the underlying definitions are in accordance to our definitions. Source of the target: https://apps.neb-one.gc.ca/ftrppndc4/dflt.aspx?GoCTemplateCulture=en-CA [accessed on 26.6.2017]
China	Due to a lack of information on the underlying definitions for the Chinese target, we extracted the future share of renewable energy from WEO projections for 2030. Sources of the target: http://www4.unfccc.int/ndcregistry/PublishedDocuments/China%20First/China's%20First%20NDC%20Submission.pdf [accessed: 26.06.2017]
Chinese Taipei	Target of 20% share of renewable electricity by 2025 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 (approximately 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh).
Croatia	The EU's target is 27% in gross final energy demand, which is 10 percentage points above the 2015 level. We applied this 10 percentage points increase to each member state's 2014 level.
Cyprus	The EU's target is 27% in gross final energy demand, which is 10 percentage points above the 2015 level. We applied this 10 percentage points increase to each member state's 2014 level.
Czech Republic	The EU's target is 27% in gross final energy demand, which is 10 percentage points above the 2015 level. We applied this 10 percentage points increase to each member state's 2014 level.
Denmark	The EU's target is 27% in gross final energy demand, which is 10 percentage points above the 2015 level. We applied this 10 percentage points increase to each member state's 2014 level.

Egypt	Target of 20% share of renewable electricity by 2020 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 (approximately 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh).
Estonia	The EU's target is 27% in gross final energy demand, which is 10 percentage points above the 2015 level. We applied this 10 percent-age points increase to each member state's 2014 level.
EU28	The renewable energy target of the EU for 2030 is formulated in a share in the total final consumption. Hence, we decided to rely on the WEO projection for the share of renewables in TPES instead of converting the target ourselves. Sources of the target: https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/2030-energy-strategy [accessed: 26.06.2017]
Finland	The EU's target is 27% in gross final energy demand, which is 10 percentage points above the 2015 level. We applied this 10 percent-age points increase to each member state's 2014 level.
France	In order to convert the French target defined as a share of 32% renewable energy in the gross final consumption in 2030 the following assumption was made: b) The target shares for renewable and fossil energy in the TPES then follow by dividing the shares in the GFC by the average efficiencies for either renewable or fossil energy and normalizing the result. Source of the target: https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000031044385&categorieLien=id [accessed: 26.06.2017]
Germany	In order to convert the German target given as a share of 60% renewable energy in the gross final consumption in 2050 the following assumption was made: b) The target shares for renewable and fossil energy in the TPES then follow by dividing the shares in the GFC by the average efficiencies for either renewable or fossil energy and normalizing the result. Source of the target: http://www.bmwi.de/Redaktion/DE/Downloads/E/energiekonzept-2010.pdf?__blob=publicationFile&v=3 [accessed: 26.06.2017]
Greece	The EU's target is 27% in gross final energy demand, which is 10 percentage points above the 2015 level. We applied this 10 percent-age points increase to each member state's 2014 level.
Hungary	The EU's target is 27% in gross final energy demand, which is 10 percentage points above the 2015 level. We applied this 10 percent-age points increase to each member state's 2014 level.
India	We used the Indian draft energy plan as a basis which states that by 2027 54.2% of the electricity generation capacity will be renewable. Supplementing the capacity targets of the plan with load factors assumed in the WEO2016 allowed to calculate the future generated electricity by source. A linear interpolation of the capacity additions yields a target share of 36.8% of the electricity originating from renewable sources in 2030. This share was than translated into a share of the TPES under the following assumptions: a), b), c) and d) Under these assumptions the target share of renewable energy in the total final consumption of electricity together with present shares determines all other future shares in the TPES and therefore a corresponding share of renewable in TPES can be calculated. Sources of the target: http://www.cea.nic.in/reports/committee/nep/nep_dec.pdf [accessed: 26.06.2017]
Indonesia	Indonesia has formulated its target as a share of 23% new and renewable in the TPES in 2025. We could not find information on how much energy will be produced from "new" but not renewable sources. Therefore, we took the 23% in the TPES as the renewable energy target, knowing that this overestimates the Indonesian target. Source of the target: http://www4.unfccc.int/ndcregistry/PublishedDocuments/Indonesia First/First NDC Indonesia_submitted to UNFCCC Set_November 2016.pdf [accessed: 26.06.2017]
Ireland	The EU's target is 27% in gross final energy demand, which is 10 percentage points above the 2015 level. We applied this 10 percent-age points increase to each member state's 2014 level.
Islamic Republic of Iran	Target of 5GW renewable power (excl. hydro) installed by 2020 is translated into 8% renewable 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 one to two (approximately 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh).
Italy	In order to convert the Italian target given as a share of 60% renewable energy in the gross final consumption in 2050 the following assumption was made: b) The target shares for renewable and fossil energy in the TPES then follow by dividing the shares in the GFC by the average efficiencies for either renewable or fossil energy and normalizing the result. Source of the target: http://www.sviluppoeconomico.gov.it/images/stories/documenti/SEN_EN_marzo2013.pdf [accessed: 26.06.2017]

Japan	The future share of renewable energy in Japan's TPES was extracted from WEO projections.
Kazakhstan	Target of 30% share of 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 one to two (approximately 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh).
Latvia	The EU's target is 27% in gross final energy demand, which is 10 percentage points above the 2015 level. We applied this 10 percentage points increase to each member state's 2014 level.
Lithuania	The EU's target is 27% in gross final energy demand, which is 10 percentage points above the 2015 level. We applied this 10 percentage points increase to each member state's 2014 level.
Luxembourg	The EU's target is 27% in gross final energy demand, which is 10 percentage points above the 2015 level. We applied this 10 percentage points increase to each member state's 2014 level.
Malaysia	Target of 11% share of 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 one to two (approximately 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh).
Malta	The EU's target is 27% in gross final energy demand, which is 10 percentage points above the 2015 level. We applied this 10 percentage points increase to each member state's 2014 level.
Mexico	Mexico aims to achieve a share 35% of "clean energy" in the electricity generation by 2024. It is likely that fossil based cogeneration and nuclear electricity generation, which are both considered as clean by the Mexican government, will make a contribution of approximately 10% in the electricity generatio. Hence, we subtract these 10% from the original target. The resulting target of 25% of renewable energy in the electricity generation was converted into a corresponding target in TPES under the following assumptions: a), b), c), d) and e). Under these assumptions the target share of renewable energy in the total final consumption of electricity together with present shares determines all other future shares in the TPES and therefore a corresponding share of renewable in TPES can be calculated. Source of the target: http://www.diputados.gob.mx/LeyesBiblio/pdf/LTE.pdf https://www.iea.org/media/workshops/2015/15thghgtradingworkshop/SpecialClimateChangeProgram20142018Englishversion.pdf (p.50)
Morocco	Target of 52 % of installed electricity production capacity from renewable sources by 2030 was translated into 35% share of renewables assuming factor 1.5 for capacity of the renewables 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 (approximately 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh).
Netherlands	The EU's target is 27% in gross final energy demand, which is 10 percentage points above the 2015 level. We applied this 10 percentage points increase to each member state's 2014 level.
New Zealand	Target of 90% share of renewable electricity by 2025 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 (approximately 1kWh from renewables instead of 1kWh coal (produced with efficiency 1 to 3) reduces TPES by (-3+1) kWh).
Norway	Target of 67.5% share of renewable in gross final energy consumption in 2020 was assumed to apply for TPES
Poland	The EU's target is 27% in gross final energy demand, which is 10 percentage points above the 2015 level. We applied this 10 percentage points increase to each member state's 2014 level.
Portugal	The EU's target is 27% in gross final energy demand, which is 10 percentage points above the 2015 level. We applied this 10 percentage points increase to each member state's 2014 level.
Romania	The EU's target is 27% in gross final energy demand, which is 10 percentage points above the 2015 level. We applied this 10 percentage points increase to each member state's 2014 level.
Russian Federation	The future share of renewable energy in Russia's TPES was extracted from WEO projections.
Saudi Arabia	The original target of 9.5GW renewable electric capacity in 2023 corresponds to a share of 5% renewable energy in the electricity generation. This was converted into TPES under the following assumptions: a), b), c), d) and e) Under these assumptions the target share of renewable energy in the total final consumption of electricity together with present shares determines all other future shares in the TPES and therefore a corresponding share of renewable in TPES can be calculated. Source of the target: https://www.apricum-group.com/saudi-arabia-announces-9-5-gw-renewable-energy-target-new-king-salman-renewable-energy-initiative/ [accessed: 26.06.2017]
Slovak Republic	The EU's target is 27% in gross final energy demand, which is 10 percentage points above the 2015 level. We applied this 10 percentage points increase to each member state's 2014 level.

Slovenia	The EU's target is 27% in gross final energy demand, which is 10 percentage points above the 2015 level. We applied this 10 percentage points increase to each member state's 2014 level.
South Africa	The future share of renewable energy in the TPES of South Africa was extracted from WEO projections.
South Korea	South Korea formulated its target for 2035 in TPES, no conversion was required. However, it is not certain that definition underlying the South Korean target formulation are in accordance with our definitions. Source of the target: http://large.stanford.edu/courses/2016/ph240/hyman2/docs/korea_energy.pdf [accessed: 26.06.2017]
Spain	The EU's target is 27% in gross final energy demand, which is 10 percentage points above the 2015 level. We applied this 10 percentage points increase to each member state's 2014 level.
Sweden	The EU's target is 27% in gross final energy demand, which is 10 percentage points above the 2015 level. We applied this 10 percentage points increase to each member state's 2014 level.
Switzerland	Target of increasing share of renewables in final consumption from 16.2% in 2008 to 24% in 2020 was applied as increase in renewables share in TPES of 8 percentage points between 2010 to 2030
Thailand	The target of 30% renewables in total final energy consumption by 2036 assumed to apply to renewables in TPES, linearly interpolated from 2014 to 2030
Turkey	In order to convert the Turkish target given as a share of 20.5% renewable energy in the gross final consumption in 2023 the following assumption was made: b) The target shares for renewable and fossil energy in the TPES then follow by dividing the shares in the GFC by the average efficiencies for either renewable or fossil energy and normalizing the result. Source of the target: www.ebrd.com/documents/comms-and-bis/turkey-national-renewable-energy-action-plan.pdf [accessed: 26.06.2017]
Ukraine	Target of 11% share of renewables in total final energy consumption by 2020 applied as percentage of renewables in TPES in 2030
United Kingdom	In order to convert the British target defined as a share of 15% renewable energy in the gross final consumption in 2020 the following assumption was made: b) The target shares for renewable and fossil energy in the TPES then follow by dividing the shares in the GFC by the average efficiencies for either renewable or fossil energy and normalizing the result. Source of the target: http://ec.europa.eu/energy/en/topics/renewable-energy/national-action-plans [accessed: 26.06.2017]
USA	The future share of renewable energy in the US American TPES was extracted from WEO projections.

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 the in 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.

Germanwatch

Following the motto "Observing, Analysing, Acting", Germanwatch has been actively promoting global equity and the preservation of livelihoods since 1991. In doing so, we focus on the politics and economics of the North and their worldwide consequences. The situation of marginalised people in the South is the starting point of our work. Together with our members and supporters as well as with other actors in civil society, we intend to represent a strong lobby for sustainable development. We attempt to approach our goals by advocating for the prevention of dangerous climate change, for food security, and compliance of companies with human rights.

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