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Article

EU ETS cap must and can be reduced more quickly

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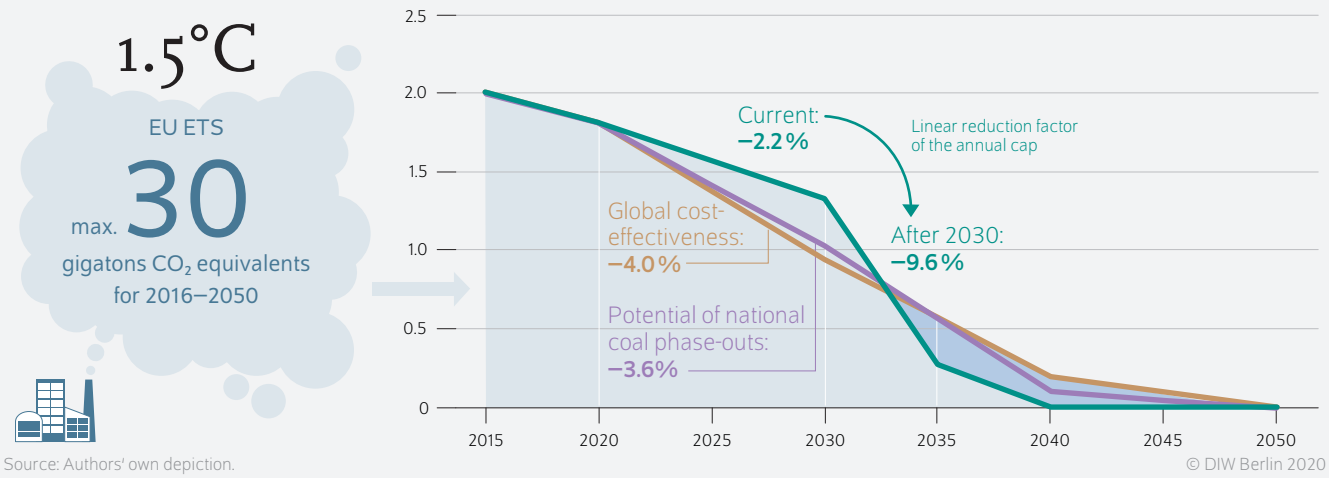
AT A GLANCE

EU ETS Cap Must and Can be Reduced More Quickly

By Aleksandar Zaklan, Vicki Duscha, Claudia Gibis, Jakob Wachsmuth, Jan Weiß, and Claudia Kemfert

- Emissions budgets compatible with the Paris Agreement can provide some orientation to define minimum requirements for emission reductions
- A globally cost-effective emissions budget for the EU Emissions Trading System (EU ETS) compatible with the 1.5 degree limit is 30 gigatons of CO_2 equivalents for 2016–2050
- To limit cumulative emissions, the annual emission cap should be lowered much more rapidly than planned by 2030
- For a globally cost-effective emission pathway, the linear reduction factor (LRF) for 2021–2030 must be increased from 2.2 percent to at least four percent
- LRF of 3.6 percent for 2021–2030 is possible when accounting for EU targets for renewable energy and energy efficiency as well as national coal phase-outs

The EU ETS must be urgently adjusted to ensure the minimum contribution to limiting global warming by 1.5 degrees while avoiding drastic abatement measures after 2030
Annual cap in the EU ETS in gigatons of CO2 equivalents



Source: Authors' own depiction.

FROM THE AUTHORS

The EU's ambitions regarding renewable energy, energy efficiency, and phasing out coal offers the opportunity to define the emission cap in the EU Emissions Trading System in compliance with the 1.5 degree Celsius target.
— Aleksandar Zaklan —

MEDIA

Audio Interview with Aleksandar Zaklan (in German)
www.diw.de/mediathek

EU ETS Cap Must and Can be Reduced More Quickly

By Aleksandar Zaklan, Vicki Duscha, Claudia Gibis, Jakob Wachsmuth, Jan Weiß, and Claudia Kemfert

ABSTRACT

Currently, the European Commission intends to increase the EU's 2030 climate target. Instead of a 40 percent target, greenhouse gas emissions would be reduced by 50 to 55 percent compared to 1990 levels; the European Parliament is even considering a 65-percent reduction. The European Emissions Trading System (EU ETS) sectors should make an appropriate contribution to this reduction. However, decisive for limiting global warming to 1.5 degrees Celsius, as in accordance with the Paris Agreement, is compliance with a consistent emissions budget, the total amount of cumulative greenhouse gas emissions. For the EU ETS, compliance with an emissions budget requires adjusting the emission cap. This Weekly Report derives the minimum requirement for emission reductions in the EU ETS sectors in line with a globally cost-effective emissions budget. The results show the cap must be urgently adjusted to ensure the minimum European contribution to limiting global warming to 1.5 degrees Celsius. Otherwise, beginning in 2030, drastic measures will be necessary to reduce emissions. At the same time, national coal phase-out plans and a more ambitious European energy policy make it possible to approximate the cost-effective pathway by adjusting the cap, without additional reduction requirements for the EU ETS sectors.

As a part of its European Green Deal, the EU Commission intends to propose increasing the European climate target in September 2020.[1] Compared to 1990 levels, greenhouse gas emissions should be reduced by 50 to 55 percent by 2030 instead of the current target of only 40 percent.[2] Some actors are even discussing a reduction of up to 65 percent.[3] This issue also addresses the question of what contributions the EU Emissions Trading System (EU ETS) sectors should and can make to reducing emissions (Box 1). The EU Commission's long-term strategy includes achieving climate neutrality for the EU by 2050 at the latest, as laid out in their strategic vision.[4]

In addition to focusing on emissions per individual target years, it is essential to observe the cumulative emissions over time, as the amount of cumulative emissions determines whether or not global warming can be limited to 1.5 degrees Celsius,[5] as is compatible with the Paris Agreement.[6] In the EU ETS, the emissions budget is determined by the annual cap (the upper limit for total emissions from all EU ETS sectors) and its development over time. Adjusting the cap

1 The opinions expressed in this Weekly Report are solely those of the authors. They do not necessarily reflect the position of the *Umweltbundesamt* or the Fraunhofer Institute for Systems and Innovation Research ISI. This Weekly Report is based on a paper by Aleksandar Zaklan, Jakob Wachsmuth, and Vicki Duscha, *EU ETS up to 2030: Adjusting the Cap in light of the IPCC1.5°C Special Report and the Paris Agreement* (Umweltbundestamt: 2020). (available online).

2 Cf. European Commission, *Annexes to the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of Regions: Adjusted Commission Work Programme 2020* (Brussels: 2020) (available online); accessed on June 12, 2020. This applies to all other online sources in this report unless stated otherwise).

3 Cf. for example the draft report by Jytte Guteland: European Parliament, *I DRAFT REPORT on the proposal for a regulation of the European Parliament and of the Council establishing the framework for achieving climate neutrality and amending Regulation (EU) 2018/1999 (European Climate Law) (COM(2020)0080 – C9-0077/2020 – 2020/0036(COD))* (April 2020) (available online).

4 Cf. European Commission, *Communication from the Commission to the European Parliament, the European Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank: A Clean Planet for all – A European Strategic Long–Term Vision for a Prosperous, Modern, Competitive and Climate Neutral Economy* (Brussels: 2018) (available online).

5 The phrases "compatible with the Paris Agreement" and "compatible with the 1.5 degree target" are used interchangeably.

6 Cf. for example German Advisory Council on the Environment (SRU), *Eine Entschlossene Umweltpolitik in Deutschland, Umweltgutachten 2020* (2020) (available online); Ilaria Perissi et al., "Potential European Emissions Trajectories within the Global Carbon Budget," *Sustainability* 10, no. 11 (available online); Detlef P. van Vuuren et al., *The Implications of the Paris Climate Agreement for the Dutch Climate Policy Objectives* (Den Haag: 2017) (available online).

DOI: https://doi.org/10.18723/diw_dwr:2020-27-1

accordingly would achieve an increase in ambition, ensuring the European contribution to the 1.5 degree target in the EU ETS would be met.

Using the global cost-effectiveness criterion, this Weekly Report derives an emissions budget for the EU ETS sectors that is compatible with the Paris Agreement. This budget is derived using the global cost-effectiveness criterion. The use of this criterion leads to a comparatively high emissions budget for the EU, which can be viewed as the limit for the EU ETS's required minimum contribution. This Weekly Report does not attempt a derivation of a fair or appropriate contribution towards fulfilling the Paris Agreement.

Using this data, it is analyzed to what extent the cumulative emissions in the scenarios developed for the European long-term strategy are compatible with this maximum emissions budget. For this purpose, emission pathways for the EU ETS sectors are derived in a scenario analysis. In addition to the global cost-effective scenarios, pathways are developed that account for the current European and national energy and climate policies and at the same time adhere to emissions budgets compatible with the Paris Agreement. Finally, the globally cost-effective pathway is compared with possible cap adjustments, which are possible thanks to existing and planned European and national energy policies.

Cumulative emissions must be reduced to comply with the Paris Agreement

Climate science research has proven that the determining factor for climate change is cumulative greenhouse gas emissions over prolonged periods of time, as greenhouse gases are very long-lived in the atmosphere.[7] By distributing the remaining emissions in various ways, national emissions budgets that are compatible with achieving certain temperature targets at a certain probability can be determined.[8] However, deriving emissions budgets, and in particular how they should be distributed regionally, is associated with significant uncertainties and normative decisions.

If the cost-effectiveness criterion for global effort-sharing is applied to reduce emissions, an emissions budget for the EU ETS for 2016 to 2050 that is compatible with limiting the rise in temperature to 1.5 degrees Celsius is around 30 gigatons of CO_2 equivalents.[9] Data from the techno-economic POLES-Enerdata model was used to calculate this budget (Box 2). When applying the cost-effectiveness criterion, the global emissions budget shares are distributed among different countries in such a way that the global marginal costs of reducing emissions are minimized at all times. This means that further emissions are avoided worldwide wherever it can be done at the lowest cost. Using this criterion results in developed economies, such as the EU, having higher shares of the global emissions budget. Other effort-sharing approaches take further factors into consideration, such as population shares, economic capacities, or historical emissions. This would substantially decrease the EU's share of the total emissions budget. Therefore, the emissions budget based on the cost-effectiveness criterion for the EU ETS sectors depicts the maximum budget for these sectors that is still compatible with the 1.5 degree target. This should not be interpreted as a "fair share" or "an adequate contribution of EU ETS to the Paris Agreement" and therefore can only be one part of a European contribution to international climate change mitigation.[10]

In 2018, the EU Commission published their Strategic Vision for 2050, developed with the goal of aligning the European emission pathway with the Paris Agreement requirements.[11] It is assumed that this requires net-zero greenhouse gas emissions by 2050.[12] Calculating cumulative emissions using the 1.5 degree scenario in the strategic vision results in an emissions budget of about 33 gigatons of CO_2 equivalents in the EU ETS sectors for 2016 to 2050. This budget is about ten percent higher than the cost-effective budget derived in this analysis and is therefore not in compliance with the Paris Agreement under the assumptions made here.

Box 1

The European Emissions Trading System (EU ETS)

The European Emissions Trading System (EU ETS) currently encompasses the emissions from around 11,000 installations in the energy sector and energy-intensive industries in 31 countries (EU 27, United Kingdom, Norway, Lichtenstein, and Iceland). Overall, around 40 percent of European CO_2 emissions are covered by the EU ETS. Since 2012, intra-European aviation has also been subject to emissions trading. The EU ETS functions according to the cap-and-trade principle: the total emissions of the included installations are limited by an emission ceiling (the cap). This is reduced annually by a defined amount, determined by the linear reduction factor (LRF). By April of each year, each operator must submit emission allowances for the total amount of the installation's greenhouse gas emissions from the previous year. The emission allowances may be traded between firms, thereby creating a market price for greenhouse gas emissions. This ensures that the emission reductions in the sectors included are achieved where the abatement costs are lowest.

7 Cf. for example IPCC, *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge, UK and New York, USA: 2013) (available online).

8 Cf. for example Perissi et al., "Potential European Emissions Trajectories," and van Vuuren et al., *The Implications of the Paris Climate Agreement.*

9 CO_2 equivalents include not only carbon dioxide (CO_2) but other greenhouse gases as well and convert their climate impact to that of CO_2. One gigaton equals a billion tons.

10 Cf. Umweltbundesamt, *Re-Aligning European Union's Climate Policy to the Paris Agreement Short-term Implications of the IPCC Special Report "Global Warming of 1.5°C"* (Dessau-Rosslau: 2018) (available online).

11 European Commission, *Communication from the Commission to the European Parliament.*

12 Net-zero emissions mean that any emissions left over in a year must be offset by removing greenhouse gases from the atmosphere.

Box 2

Methodology

The purpose of the methodology used is to develop different emission reduction pathways for the EU ETS up to 2050 while keeping cumulative emissions fixed. The cap in 2030 is used as the central parameter for varying the reduction pathways.

The key issue is to derive a limit for the cumulative total emissions for the EU ETS for 2016–2050 that is in accordance with limiting global warming to 1.5 degrees Celsius compared to the pre-industrial age. As a starting point, the most ambitious global emission pathways described in the special report of the Intergovernmental Panel on Climate Change (IPCC) were used, which exceed a warming of 1.5 degrees with a less than 50 percent probability. For these pathways, their median of the energy and process-related CO_2 emissions was determined from the associated database in five-year steps. Further greenhouse gas emissions were added across the board based on their current share, which, however, is of little consequence for the results due to their small share within the EU ETS.

The global budgets calculated this way are shared among countries and regions according to the global cost-effectiveness criterion. That means emission reductions are distributed at all times based on the lowest marginal costs, the specific costs per additional ton of CO_2 equivalents avoided. Fairness-based approaches are based on different criteria and therefore result in different distributions across countries and regions.

To determine a cost-effective distribution, marginal costs from the techno-economic model POLES-Enerdata were used and the necessary reductions in the EU over the period to 2050 were determined.[1] The same data were also used to determine a cost-effective share of ETS sectors. For the years following 2030, even if reduction potentials with maximum marginal costs need to be used (assumed in the model at 1,200 euros per ton of CO_2), these are not quite sufficient to meet the global budget. Therefore, it was assumed that the additional reductions would be achieved by what is known as a backstop technology (for example, by CO_2 direct air capture). These additional reductions were distributed among countries and sectors in proportion to the determined cost-effective reductions. Using a pathway calculated in this manner, an overall emissions budget for the EU ETS until 2050 was calculated.

This emissions budget was subsequently used to determine the EU ETS reduction pathway after 2030 for various caps. To this end, it was assumed that the linear reduction factors (LRFs) for the EU ETS are always determined for periods of at least five years. If a higher cap (that is, a lower emission reduction) was assumed for 2030, a correspondingly steeper reduction pathway was derived after 2030 in accordance with the overall budget. Cap adjustments before 2030, in 2021, or in 2026, are used as the basis for pathways. As one option to determine a different cap for 2030, the impact assessment of the EU long-term strategy was evaluated.[2] As a second option, a cap for 2030 was calculated using figures on the planned coal phase-outs of the EU Member States, assuming a corresponding increase in renewable electricity generation.

1 More information on the model can be found here.

2 Cf. European Commission, *In-Depth analysis in support of the Commission Communication COM(2018) 773—A Clean Planet for all—A European Strategic Long-Term Vision for a Prosperous, Modern, Competitive and Climate Neutral Economy* (Brussels: 2018) (available online).

Adjust cap early on to avoid extreme abatement measures from 2030

Using the POLES-Enerdata model (Box 2), emission pathways that reflect the annual course of the cap until 2050 are calculated for the distribution of the globally cost-effective emissions budget of approximately 30 gigatons of CO_2 equivalents for the EU ETS sectors in 2016–2050 over time. The necessary linear reduction factor (LRF) is determined for various periods. As the main variable in this analysis, the LRF determines the annual cap reduction. Currently, the LRF for 2021 to 2030 is 2.2 percent of the 2010 value, resulting in an annual cap reduction of approximately 48 million tons of CO_2 equivalents.

Three scenarios show the differences in how emissions develop depending on when the switch to a cost-effective emission pathway is made (Figure 1). The baseline scenario illustrates the EU ETS emission pathway when the LRF, and thus the cap, remain unchanged until 2030. In two further scenarios, the emission target for 2030 is chosen based on a globally cost-effective distribution of emissions.[13] All three scenarios adhere to the emissions budget of 30 gigatons of CO_2 equivalents between 2016 and 2050.

1. In the baseline scenario, the LRF remains unchanged at 2.2 percent until 2030. In this scenario, the cumulative emissions budget of the EU ETS for 2016–2030 is 25.3 gigatons of CO_2 equivalents, resulting in approximately five extra gigatons of CO_2 equivalents for the years after 2030. Compliance with the emissions budget after 2030 requires an LRF of 9.6 percent for 2031–2035, 2.5 percent for 2036–2040, and achieving net-zero emissions by 2040.

2. The Cost-Effective-2026 scenario assumes the LRF remains at 2.2 percent for 2021–2025 and can be changed in 2026. For the period after 2026, a reduction pathway with early

13 Changing the LRF assumes that this change can only be made at the beginning of each of the five-year ETS allocation periods in 2021, 2026, 2031, 2036, and 2041.

reduction is calculated to achieve the necessary emission reduction by 2050 at the lowest possible cost. Thus, by 2030, emissions in the ETS sectors will be reduced by 61 percent compared to 2005 emission levels. This corresponds to LRFs of 5.8 percent for 2026–2030, 3.8 percent for 2031–2040, 0.4 percent for 2041–2050, and net-zero emissions in 2050.

3. The Cost-Effective-2021 scenario assumes the LRF can be changed in 2021. Here, too, a reduction pathway with early reduction is calculated. The cost-effective emission pathway in this scenario yields an LRF of 4.0 percent for 2021–2030, 3.4 percent for 2031–2040, and 0.9 percent for 2041–2050. Net-zero emissions are achieved in 2050.

Maintaining the current LRF of 2.2 percent until 2030 while complying with the 30 gigatons of CO_2 equivalents emissions budget, as assumed in the baseline scenario, will require drastic abatement action after 2030. An LRF of almost 10 percent in 2031–2035 would result in a cap reduction from approximately 1.3 billion tons of CO_2 equivalents in 2030 to approximately 240 million tons of CO_2 equivalents within five years. Furthermore, net-zero greenhouse gas emissions would be necessary by 2040. Such a drastic increase beginning in 2030 seems implausible economically, technically, and politically.

In the Cost-Effective-2021 scenario, which assumes the LRF will be changed in 2021, the cap would be reduced from 1.8 billion tons of CO_2 equivalents in 2021 to approximately 930 million tons of CO_2 equivalents in 2030, which corresponds to an annual reduction of approximately 90 million tons of CO_2 equivalents or an LRF of approximately four percent. If a cap adjustment is not possible until 2026, as is assumed in the Cost-Effective-2026 scenario, the LRF from 2026 to 2030 must be almost six percent to stay within the budget. There is additional leeway for emissions between 2040 and 2050 in both Cost-Effective scenarios; in contrast, in the baseline scenario, net-zero emissions must be achieved by 2040.

The earlier ambitious goals are set by increasing the LRF, the more evenly a reduction in greenhouse gas emissions can be implemented in the EU ETS. This increases the credibility of a transformation pathway and also adheres to a Paris-compatible emissions budget.

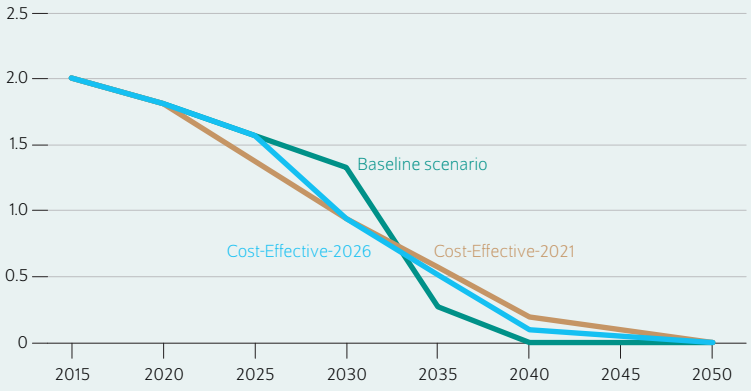
Cap adjustment must consider current political developments

When adjusting the reduction pathway in the EU ETS, it is important to consider political measures at European and national levels. If the cap does not take additional emission reductions in ETS sectors into account—for example, due to higher renewable and efficiency targets—these emission reductions are offset by emission increases elsewhere.[14] To avoid this, the cap should consider how cap reductions affect European and national climate and energy policies. The cap adjustment necessary to achieve this also offers the potential to achieve a credible emission pathway, as in the baseline scenario. As illustrated in the following sections, the current energy policy conditions already offer considerable potential for emission reductions in the EU ETS. This also offers the opportunity to align the EU ETS cap more closely with the Paris Agreement targets.

Figure 1

EU ETS cap for the baseline scenario and two alternative scenarios for 2015–2050 while adhering to a budget of 30 gigatons (Gt) of CO_2 equivalents

In billion tons of CO_2 equivalents



Source: Zaklan, Wachsmuth, and Duscha (2020), *EU ETS up to 2030.*

If emissions are only abated moderately until 2030, as in the baseline scenario, drastic measures will be required after 2030 to remain within a cost-effective emissions budget.

Two significant factors determine emission reductions in the ETS sectors until 2030 that are not considered in the current LRF of 2.2 percent. First, more stringent energy policy targets for 2030 were agreed upon at a European level in 2018.[15] For example, the target for the share of renewable energy of European gross final consumption of energy was increased from 27 to 32 percent and the target for energy efficiency from 27 to 32.5 percent compared to a defined baseline scenario. Second, several EU Member States are planning to phase out coal-powered electricity by 2030.

Current EU ETS data show that the current reduction targets are not very ambitious in light of recent emission developments: in 2019, emissions were 36 percent below the 2005 levels, clearly exceeding the reduction target of 21 percent for 2020. The current reduction target for 2030 is already within reach.[16]

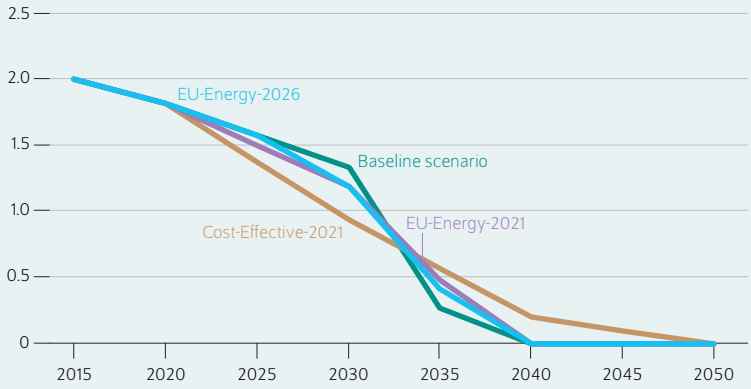
14 This is also known as the waterbed effect. Cf. for example Grischa Perino, "New EU ETS Phase 4 rules temporarily puncture waterbed," *Nature Climate Change* 8 (2018): 262–264 (available online); Knut E. Rosendahl, "EU ETS and the Waterbed Effect," *Nature Climate Change* 9 (2019): 734–735 (available online).

15 Cf. European Commission, *Clean energy for all Europeans* (Brussels: 2019) (available online).

16 Cf. Deutsche Emissionshandelsstelle (at the German Environment Agency), *Treibhausgasemissionen 2019 – Emissionshandelspflichtige stationäre Anlagen und Luftverkehr in Deutschland* (Dessau-Rosslau: VET Report 2019) (in German; available online).

Figure 2

EU ETS cap in scenarios accounting for the EU energy policy targets adopted in 2018
In billion tons of CO_2 equivalents



Source: Zaklan, Wachsmuth, and Duscha (2020), *EU ETS up to 2030*.

Incorporating current EU-level energy policy targets makes it possible to move toward the cost-effective scenario.

Modifying the EU ETS to fit current European energy policies gets closer to the 1.5 degree pathway

In its projections, the EU Commission assumes that a complete implementation of energy policy targets decided at a European level will lead to a reduction of European greenhouse gas emissions by 2030 by at least 45 percent compared to 1990 levels.[17] In the stationary EU ETS, this would lead to an emission reduction of around 50 percent in 2030 compared to 2005 levels,[18] while the current emission reduction target would only lead to a reduction by 43 percent.

Therefore, in the following, the baseline scenario and the Cost-Effective-2021 scenario are compared with two scenarios that reflect the 2018 energy policy targets (Figure 2). As previously, all scenarios adhere to the emissions budget of approximately 30 gigatons of CO_2 equivalents for 2016–2050.

1. In the EU-Energy-2026 scenario, the LRF is chosen to achieve an emission reduction of around 50 percent in EU ETS sectors by 2030 compared to 2005 levels. Presumably, the LRF cannot be changed before 2026 in this scenario. This results in an LRF of 2.2 percent for 2021–2025, 3.5 percent for 2026–2030, 7.0 percent for 2031–2035, 3.8 percent for 2036–2040, and net-zero emissions by 2040.

2. The EU-Energy-2021 scenario essentially satisfies the same parameters as the EU-Energy-2026 scenario. However, in the 2021 scenario, it is assumed that the LRF can be changed in 2021. In this scenario, the LRF is 2.9 percent for 2021–2030, 6.3 percent for 2031–2035, 4.5 percent for 2036–2040, and net-zero emissions will be achieved by 2040.

Including the 2018 energy policy targets somewhat mitigates the need for a drastic increase in emission reduction after 2030 compared to the baseline scenario. Nevertheless, the EU-Energy-2026 scenario would still require a cap reduction of 780 million tons of CO_2 equivalents within only five years (corresponding to an LRF of about seven percent between 2031 and 2035) and net-zero emissions by 2040. The EU-Energy-2021 scenario requires a cap reduction of 710 million tons of CO_2 equivalents (an LRF of 6.5 percent) between 2031 and 2035 and net-zero emissions by 2040 as well. Both scenarios would require much more drastic emission reduction measures following 2030 compared to the Cost-Effective-2021 scenario, which would result in a remaining emission budget for 2041 to 2050.

Moreover, a reduction by 50 percent in EU ETS sectors would not be a sufficient contribution to the European Commission's overall climate target of a 50 to 55 percent reduction in emissions compared to 1990 levels.[19] Due to their lower abatement costs, ETS sectors would have to reduce disproportionately more to achieve cost effectiveness.

National coal phase-outs require adjusting the cap by 2030

National climate and energy policies must be taken into account when adjusting the cap for 2030 and beyond. Many EU Member States are currently planning measures to gradually phase out coal-fired electricity. Such national policy measures lead to greater emission reductions in EU ETS sectors by 2030 than foreseen in the current policy framework. Like the more ambitious renewable energy and energy efficiency targets at a European level, national measures offer short-term potential for adjusting the EU ETS cap to close the gap between the current EU ETS budget and a reduction pathway compatible with the 1.5 degree target.

Multiple Member States plan to completely phase out coal by 2030. Germany is planning to shut down a part of its coal-powered capacity before 2030 and the remaining capacity by 2038 at the latest. According to current plans as of the end of 2019, it can be assumed that by 2030, there will be a decrease of around 316 terawatt hours (TWh) of annual coal-fired electricity EU-wide compared to 2018.[20] Assuming a mean carbon intensity of 1142 grams per kilowatt-hour for lignite and 815 grams per kilowatt-hour for hard coal plants[21]

17 Cf. European Commission, *Clean energy for all Europeans* and European Commission, *Communication from the Commission to the European Parliament.*

18 European Commission, *Technical Note – Results of the EUCO3232.5 scenario on Member States* (Brussels: 2019) (available online).

19 Cf. European Commission, *Communication from the Commission to the European Parliament, the European Council, the European Economic and Social Committee and the Committee of the Regions: The European Green Deal, COM(2019) 640 final* (Brussels: 2019) (available online).

20 Cf. Zaklan, Wachsmuth, and Duscha, *EU ETS up to 2030.*

21 Cf. Petra Icha, Geschäftsstelle der AGEE Stat, and Gunter Kuhs, "Entwicklung der spezifischen Kohlendioxid-Emissionen des deutschen Strommix in den Jahren 1990 – 2018," *Climate Change* 10 (Umweltbundesamt: 2019) (in German; available online).

Table

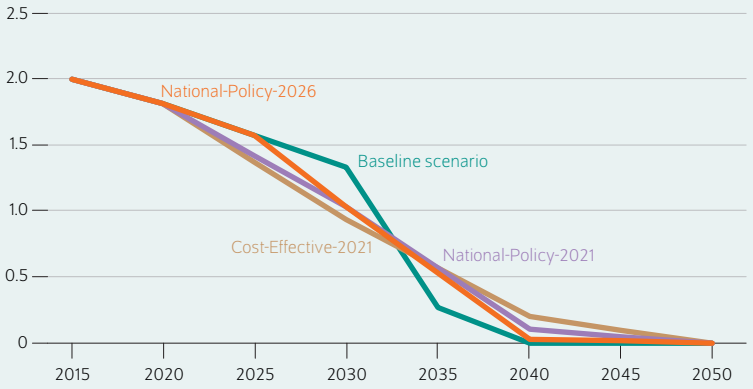
Potential emission reductions in 2030 compared to 2018 due to currently planned national phase-outs of coal-fired power generation
In million tons of CO_2 equivalents

	Lignite	Hard coal	Total
Phase-out before 2030	124	176	300
Full phase-out by 2025	3	49	52
(AT, BE, FR, IE, IT, SE, SK, UK)			
Full phase-out by 2030	29	81	110
(DK, EL, ES, FI, HU, NL, PT)			
Partial phase-out by 2030 (DE)	92	46	138

Sources: Zaklan, Wachsmuth, and Duscha (2020), *EU ETS up to 2030*; Icha, AGEE, and Kuhs, "Entwicklung der spezifischen Kohlendioxid-Emissionen,"; Agora Energiewende und Sandbag, *The European Power Sector in 2018* (Berlin: January 2019) (in German; available online)

Figure 3

EU ETS cap in scenarios accounting for national coal phase-outs by 2030
In billion tons of CO_2 equivalents



Source: Zaklan, Wachsmuth, and Duscha (2020), *EU ETS up to 2030*.

If potentials from national coal phase-outs are fully incorporated, the abatement path comes close to the cost-effective scenario.

(and full substitution by renewable energy), there will be emission reductions of about 300 megatons of CO_2 in 2030 compared to 2018 levels (Table). The greatest potential for reducing emissions is Germany's phase-out, as it comprises almost half of the calculated reduction potential by 2030.

Therefore, in the following, the baseline scenario and the Cost-Effective-2021 scenario are compared with two scenarios that account for the potential for additional emission reduction in EU ETS sectors in 2030 due to domestic coal phase-outs (Figure 3). The scenarios assume that the emission reduction of 300 megatons of CO_2 equivalents by 2030 will be achieved through coal phase-outs in addition to the annual cap reduction of 2.2 percent. Therefore, 300 megatons of CO_2 equivalents will be deducted from the current EU ETS cap in 2030. All scenarios remain within the emissions budget of 30 gigatons of CO_2 equivalents for 2016 to 2050.

1. In the National-Policy-2026 scenario, it is assumed that the emission savings of 300 megatons of CO_2 equivalents from phasing out coal-fired power are fully realized by 2030. This leads to an emission reduction of about 57 percent in the EU ETS sectors by 2030 compared to 2005 levels. It is assumed that the LRF can first be changed in 2026. Thus, this results in an LRF of 2.2 percent for 2021–2025, 5.0 percent for 2026–2030, 4.5 percent for 2031–2040, 0.2 percent for 2041–2050, and net-zero emissions by 2050.

2. The National-Policy-2021 scenario uses the same assumptions as the National-Policy-2026 scenario, except it assumes the EU ETS cap can be changed in 2021. In this scenario, there is an LRF of 3.6 percent for 2021–2030, 4.1 percent for 2031–2040, 0.5 percent for 2041–2050, and net-zero emissions by 2050.

Assuming that the LRF can be changed as early as 2021, a scenario that fully accounts for the potential effects of national coal phase-out policies until 2030 is close to the cost-effective solution. The emission pathway in the National-Policy-2021 scenario is similar to that of the Cost-Effective-2021 scenario. The decrease in EU ETS emissions by 57 percent by 2030 is significantly higher than the reduction in the EU-Energy scenarios, which is estimated at 50 percent. It also comes close to the 61 percent reduction in EU ETS emissions by 2030 that is achieved in the Cost-Effective scenarios. However, if the LRF cannot be changed until 2026, emissions must be significantly reduced following 2026 and net-zero emissions must be reached by 2040 to remain within the cost-effective budget.

Even if the national coal phase-out policies cannot be fully implemented as currently planned or if coal-based power is not fully substituted by renewable energy, accounting for national policies offers significant potential for adjusting the EU ETS cap.

Conclusion: Cap adjustment necessary and possible for the EU ETS to comply with long-term European climate targets

The analysis in this Weekly Report shows that the annual reduction of the EU ETS cap, implemented by the LRF, currently deviates considerably from the minimum requirements to adhere to climate policy targets.

First, the LRF is too low to reach a cost-effective pathway for limiting global warming to 1.5 degrees Celsius. Maintaining the current LRF of 2.2 percent during the entire period of 2021–2030 would require drastic and unrealistic measures following 2030 to remain in line with an emissions budget based on cost-effective international effort sharing. If fairness criteria, such as economic output, population, and historical

emissions, were accounted for in the European emissions budget, the required reduction would be even greater.

Second, the current LRF of 2.2 percent annually no longer reflects a changed climate and energy policy framework at European and national levels. At the European level, stricter targets for renewable energy and energy efficiency were set in 2018, while several EU Member States plan to phase out coal-fired power generation. Maintaining the current LRF thus diminishes the scarcity signal of the EU ETS and threatens its effectiveness. This is especially applicable for long-term price expectations and thus investment incentives. At the same time, the energy policy framework offers considerable potential for defining the EU ETS cap much more ambitiously.

An appropriate increase in the LRF can therefore realign the EU ETS to ensure emissions trading is effective and to ensure its compatibility with the Paris Agreement. Increasing the LRF to 2.9 percent for 2021–2030 is the minimum increase required for the EU ETS to comply with the 2018 renewable energy and energy efficiency targets. Increasing the LRF to 3.6 percent for 2021–2030 would reflect the potential for national coal phase-outs. According to the model calculations in this report, the LRF must be increased to at least four percent between 2021 and 2030 in order to adhere to the globally cost-effective 1.5 degree reduction pathway. This would put the EU ETS on a more credible long-term course, and, moreover, an LRF of at least four percent would make a significant contribution to raising the economy-wide emission reduction target for 2030.

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