Karen Pittel

The Intertemporal Distribution of Climate Policy Burdens and the Decision of the German Constitutional Court

Germany has recently raised its climate targets. Greenhouse gas emissions are to be reduced by at least 65 percent by 2030 compared with 1990 levels, and climate neutrality is to be accomplished by 2045. The decision to increase Germany's climate ambitions was triggered by the EU's strengthening of its targets as well as the ruling by the German Constitutional Court on the partial unconstitutionality of Germany's Climate Protection Act - a law that was passed not even two years prior. This article discusses fundamental issues on sharing the burden of climate policy over successive generations and addresses implications of the Constitutional Court ruling and the subsequent reform of Germany's Climate Protection Act on the effectiveness of climate protection.

It was with the yellow vest movement in France and the introduction of national CO_2 pricing that the distributional effects of climate policies have come increasingly to the fore in Germany. The focus of this debate has primarily been on the repercussions of today's energy policies on the burden of various societal groups. However, climate and energy policies not only concern people living today, but they will also affect the prosperity of tomorrow's generations. In the political debate, though, these so-called intertemporal distributional effects have for a long time been accorded only secondary importance.

Yet, the decision of the German Federal Constitutional Court (BVG 2021a) regarding the partial unconstitutionality of the German climate law (the so-called Climate Protection Act) together with the ruling of a Dutch court on the climate protection obligations of the Royal Shell Group (De Rechtspraak 2021) have now brought the intertemporal component of the distribution discussion into increased focus. Both courts emphasize that the obligation to protect the climate follows from the protection of the civil rights and freedoms of future generations.

The decision of the Constitutional Court is thus not only remarkable for granting climate protection a rank that is quasi-constitutional, but also because it explicitly called for a fair intertemporal distribution of climate protection costs. Given the German climate law from 2019, the BVG saw the danger that the burdens of climate protection that will be placed on future generations could become so high that they would restrict their civil rights.

In the following, we first discuss the repercussions that the temperature target approach on which the BVG based its decision has on the temporal distribution of climate protection costs as compared to mitigation pathways that do not assume an explicit temperature target. We then go on to discuss the implications of the BVG decision and its planned implementation.

Karen Pittel

is Director of the Center for Energy, Climate and Resources at the ifo Institute and Professor of Economics at the University of Munich.

HOW ARE INTERTEMPORAL EMISSION REDUCTIONS DETERMINED?

One of the reasons why intergenerational distributional effects have received relatively scant attention in the political and economic debate so far are different perceptions of what the ultimate goal of climate protection is supposed to be. One can, roughly, distinguish two different (but related) approaches: Minimizing the expected costs of climate change (labelled "expected value perspective" in the following) and limiting climate change to an upper boundary of temperature increase (labelled the "target perspective").

The "Expected Value" Perspective

From an economic perspective, climate policy is primarily about taking environmental and climate damages from greenhouse gas emissions into account in production, consumption and investment decisions. Policies are optimal from an economic perspective (i.e., lead to the highest welfare) if the price paid for an additional ton of emissions is equal to the monetized damages that are caused by this emission today and in the future.

Of course, determining the exact level of damages from climate change is subject to high methodological challenges and uncertainty. Much of the damage occurs in ecosystems whose value to humans is not determined by markets. Without having market prices to refer to, estimating the costs of ecosystem deterioration is difficult. Moreover, damages from climate change will accrue not merely in the next few years, but over the next centuries. Assessing inferred costs depends on a lot of determinants (e.g., economic and population development, both of which depend on climate change). Moreover, the value of future damage from today's perspective also depends on how these damage are weighted compared to today's (i.e., whether and how they are discounted).

Estimates of damages therefore vary widely. In a review study, Tol (2009) found damage estimates from different models, ranging from \$8/tCO_2 to \$1,500/tCO_2, with a mean of \$151/tCO_2. Even when only using one model but assuming different weights for future damage, Nordhaus (2019) arrived at estimates per ton of CO_2 ranging from \$23 (discount rate of 5 percent) to \$970 (discount rate of 0.1 percent). Depending on the level and development of damages used in policy making, different emission and temperature pathways can be optimal from an economic perspective (see Figure 1).

This approach does not necessarily lead to a fixed maximal temperature increase – even if climate damages could potentially become catastrophic. As long as the occurrence of such a catastrophic outcome is merely possible, but not certain, it would increase the expected value of damages but not institute an upper limit to climate change.[1] If there is no predetermined temperature target, however, there is also no fixed ex ante quantity of emissions that is still permissible. Accordingly, low emission reductions today would not have to be compensated 1:1 by increased emission reductions in the future. So, the link between emission reduction costs today and emission reduction costs in the future is much less obvious if climate policy is developed in accordance with the "expected value" logic instead of a "temperature target" logic (see below).

However, despite being not so obvious, the link between emission reduction today and the burden placed on future generations is of course also presented when policy follows the expected value approach. Based on the findings of sixteen studies, the Council of Economic Advisors to the US President concluded that delaying policies to achieve a given global emission reduction goal by a decade could increase the cost of achieving this goal by an average of 40 percent from today's perspective (Council of Economic Advisors 2014). The cost increase of such a delay would naturally be borne in particular by future generations.

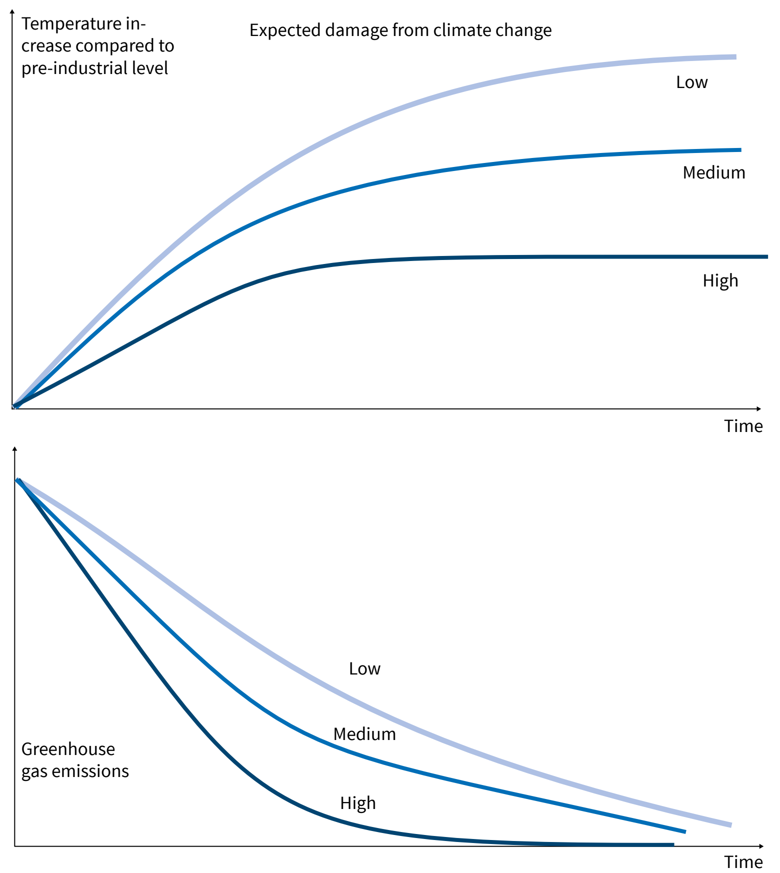
The "Target" Perspective

In contrast to the typical economic approach, the Paris Climate Agreement (UNFCCC 2015) and the BVG decision both follow a target logic. Both (implicitly and explicitly) specify maximum temperature increases that are not to be exceeded. Following this logic, only a certain amount of greenhouse gases may be released into the atmosphere until this target is reached and, once this global "emissions budget" has been used up, no more emissions are allowed.[2]

Behind the specification of fixed temperature targets are the so-called *planetary boundaries*. According to Rockström et al. (2009), exceeding these boundaries could have harmful or even catastrophic consequences for mankind.[3] From this follows the call to limit the increase in the average global temperature to 2° Celsius compared to pre-industrial times (*safe operating space for humanity*). In the negotiation of the Paris Agreement, this science-based temperature target was further tightened under pressure from small and particularly vulnerable island states. The agreement aims at "holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change" (Art. 2, UNFCCC 2015).

With regard to the distributional effects of climate policy decisions, the target perspective implies that failures in climate policy today always implies a direct increase of the burden of later generations. Whatever is additionally emitted today has to be emitted less in the future. This means that in the simplified representation shown in Figure 2, the area under

Figure 1
Achieving Long-term Temperature Targets[a]
Depending on the Amount of Expected Damage



[a] This figure demonstrates alternative temperature and emission reduction pathways depending on the level of expected damage.
Source: Author's compilation.
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[1] Basically, this is comparable to a person who engages in an activity in which there is a certain probability that he will be killed. As long as the benefits of the activity outweigh the expected costs, the activity will generally not be abandoned.

[2] This is, of course, a gross oversimplification of the physics of climate. For a detailed account (IPCC 2013).

[3] Planetary boundaries are defined not only for climate change, but also for other ecosystems and processes, including biodiversity loss and ocean acidification, as well as a change in the use of land as a resource (Rockström et al. 2009).

the emission curve must be the same for all emission paths, i.e., the sum of future emissions has to be the same and in accordance with the remaining emission budget.[4] Depending on how emission reductions are spread over time, the costs of climate protection will differ for different generations.

Implications of the Two Perspectives?

The difference between the two perspectives lies primarily in the way they address very large risks. Should temperature increases beyond a certain level be prevented if they have potentially catastrophic consequences, but it is not certain that these consequences will arise? The consequence of this would be that extremely high climate protection costs would be justified, since the catastrophic outcome must be ruled out no matter what. Or should certain risks be accepted if avoiding them could lead to high welfare losses if the catastrophe does not arise after all? Trying to answer these question by simply referring to traditional cost-benefit analysis is of little use, since this type of analysis is not well suited to problems involving potentially infinite damage with a small but not negligible probability of occurrence (Weitzman 2011).

Of course, the optimal design of climate policies under the "expected value" as well as the "target" approach are both subject to uncertainty. It will neither be possible to precisely determine the optimal level of emission reduction from using expected damages to price CO_2-emissions. Nor will it be possible to precisely design emission trajectories to achieve specific temperature targets. For policymakers, however, uncertainty about damages proves particularly problematic when aiming to justify specific climate policies by referring to concrete (but very uncertain) damage estimates. Using deceptively simple (but ultimately also uncertain) temperature targets as a foundation for climate policy is seemingly easier to accept.

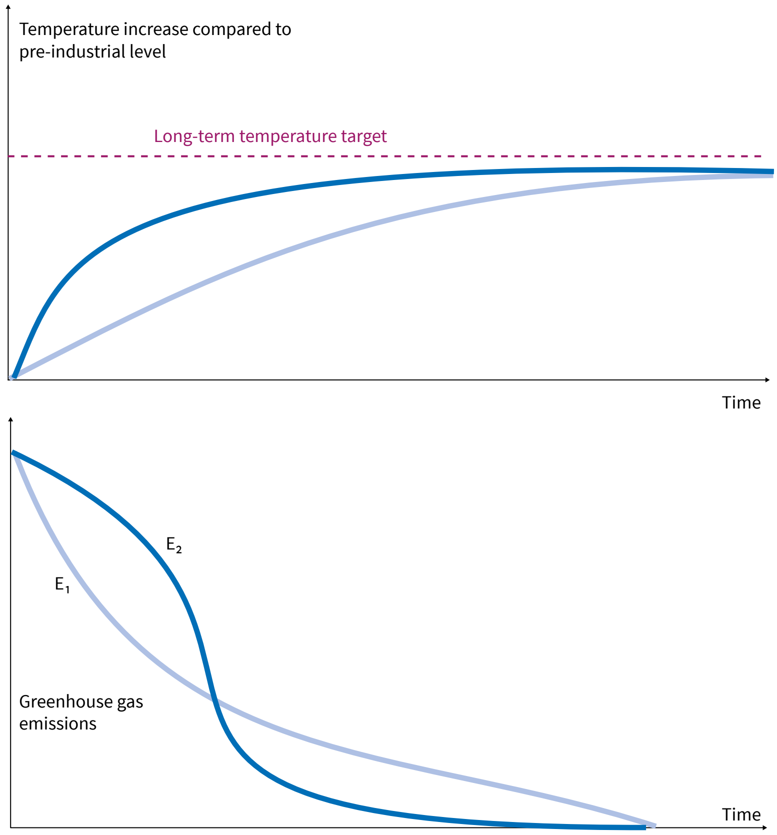
The uncertainty of damage estimates is probably one of the most important reasons why they are rarely used in the political process to determine the strength of climate policies. Accordingly, the climate policy discussion today is primarily based on temperature targets and thus emission budgets. Discussions about the level of CO_2 prices are therefore rarely based on damage estimates, but on intended emission reductions.

THE RULING OF THE GERMAN CONSTITUTIONAL COURT

In its ruling, the German Constitutional Court, BVG, also adopts the "target" perspective. To this end, a

Figure 2

Achieving a Long-term Temperature Target[a]
through Alternative Temperature and Emission Reduction Pathways



[a] The two lines in each graph represent two alternative emission path ways leading to the same temperature target.
Source: Author's compilation.

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maximum number of emissions permissible for Germany is derived from the global emission budget. In this approach, it follows the German Advisory Council on the Environment (SRU 2020): "The constitutionally relevant temperature threshold of well below 2°C and preferably 1.5°C can in principle be converted into a remaining global CO_2 budget, which can then be allocated to states" (BVG 2021b). This method of allocating the global budget to individual states is by no means uncontroversial, as the budgets available in the future also depend on the emissions trends in the rest of the world. The fact remains, however, that the BVG has followed this approach.

Following the implicit logic of the budget approach that it is the overall number of emissions that matters rather than the specific timing of emission reductions, the BVG does not require the legislator to ensure that emissions in Germany reach net zero in a specific year. However, even if more time is allotted until climate neutrality is supposed to be reached, this does not imply more leeway for climate policy if the emission budget is taken seriously. It basically implies moving from a curve like E_2 in Figure 2 to a curve like E_1. So, while emissions do not have to go to net zero as fast, emissions have to decline at a higher rate initially to avoid emitting more overall.

[4] Figure 2 shows so-called net emissions, i.e., emissions from the use and combustion of fossil resources minus CO_2 emissions taken out of the atmosphere, i.e., negative emissions. Regarding the problem of negative emissions, see WBGU (2020) or Geden and Schenuit (2020).

The BVG does not call into question the German policy target of reaching climate neutrality by 2050. It does, however, stress that it matters along which path climate neutrality is reached (i.e., which curve in Figure 2 is chosen). It explicitly requires that emission reduction paths must adhere to some fundamental notion of intergenerational equity. This is interpreted as a distribution of burdens from climate protection that does not endanger the freedom or civil rights of any generation. Still, in contrast to an almost simultaneous court ruling in the Netherlands, in which the Royal Shell Group was given specific climate targets (a 45 percent-reduction in CO_2 emissions compared to 2019), the BVG leaves the legislator some flexibility to set its own emissions pathways.

In the 2019 version of the German climate law not much was said about the emission reduction trajectory. A target for 2030 (– 55 percent) was included but beyond that, no specific targets were laid out. The only provision with respect to future goals was made by requiring the federal government to establish annually decreasing emission levels by statutory order for further periods after 2030 (KSG 2019). While the Court did not rule the 2030 target as unconstitutional and did not prescribe specific interim targets, it requested more transparency on the reduction path from 2031 to 2050.

From an economic perspective, the ruling addresses an important point: a transformation with too little information about future reduction targets leads to higher transition risks. These risks increase due to unexpected, rapid changes in the framework conditions for companies and can thus be reduced by a policy framework that is reliable in the long term. Therefore, the argumentation of the Federal Constitutional Court that a failure to set concrete targets beyond 2030 can imply a higher and unpredictable burden for future generations is sensible. In defining future targets, however, a compromise must be found between setting more concrete targets and taking uncertainties about future mitigation options into account.

REFORM OF THE GERMAN CLIMATE LAW

The BVG gave the legislature until the end of 2022 to conduct the necessary reforms to the climate law. This would have opened up the possibility – in line with the BVG decision – of transparently evaluating the restructuring of the interim targets leading to the achievement of climate neutrality. Model calculations, for example, could have contrasted the targets and the required measures (and thus the costs incurred by different generations). From an economic perspective, a flatter emissions reduction path (i.e., higher abatement in the coming years followed by a smaller level later on), could well have increased the intertemporal cost-effectiveness of emissions abatement (Gollier 2021).

Unfortunately, however, the opportunity of a well-founded reform was not seized, as an adapted climate law was presented just a few days after the ruling was published. Then, this new law was hastily passed at the end of June 2021. It raised the climate target for 2030 to 65 percent which is roughly in line with what the Expert Council on Climate Issues considers necessary for translating the EU target level to the national level (Expertenrat für Klimafragen 2021). For other targets, however, such clear rationale was not given. This applies to bringing forward climate neutrality to 2045, to setting new annual reduction targets for the years 2031 to 2040, and also to the adjustment of sectoral targets until 2030. The implications with respect to measures and instruments required to reach these targets remain, however, unclear. Consequently also the distribution of burdens between different generations cannot be assessed. In this sense, the new law falls short of the intentions of the Constitutional Court.

HOW (IN)FLEXIBLE SHOULD TARGETS BE?

The German climate law of 2019 does not only specify an overall emission reduction target for 2030, but it also specified yearly targets on a sectoral level (e.g., for energy, industry, buildings, etc.). These targets were amended but not abolished in the reform. Also, in 2024 new yearly sectoral targets are to be set for 2031 to 2040. Hagen and Pittel (2021) argue that these targets can increase the costs of emission reduction for the economy as a whole, as there is less room to react to dynamic technology developments.

It will not always be clear from the outset which emission reduction technologies will prevail, nor when they will prevail. Just one example: hydrogen and synthetic fuels will foreseeably play a major role in energy-intensive industry (e.g., steel production) and transportation (especially heavy-goods and air traffic). However, it can neither be predicted – especially on an annual basis – how quickly the required amounts of hydrogen will become available nor when industries will shift to the new technologies at a large scale.

The current (and future) law does not account for this uncertainty, which is inherent in any innovation process. It does, however, mandate that policy has to react within three months to deviations from the predefined reduction path. Given technological and behavioral uncertainties as well as potential exogenous shocks that affect emissions, such a myopic, discretionary approach to climate policy is less likely to provide long-term incentives for innovation and to initiate necessary and timely structural change. Costs of reaching the climate goals might therefore increase substantially.

However, given the immense cumulative costs of achieving even a 90-95 percent emission reduction by 2050 (960 billion to 3,354 billion euros , see Energiesysteme der Zukunft et al. 2019), it is particularly important that climate protection is implemented as cost-effectively as possible, not least from a distributional perspective.

CONCLUSION

By focusing on specific temperature targets as well as on national emissions budgets derived from them, politicians and the public alike are becoming increasingly aware of the question of intergenerational equity in the distribution of the burdens of climate protection. Both the setting of targets and their translation into concrete policies are going to be crucial for the level and distribution of burdens. Policies that are too short-term can significantly increase the costs of achieving long-term climate goals. Formulating year-by-year targets for emissions reductions further encourages such incremental thinking and can negatively impact business expectations and innovation. In Germany, the opportunity for a comprehensive reform of the climate law that would have fostered long-term planning was unfortunately not taken.

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