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Editorial

## Why Ambitious and Just Climate Mitigation Needs Political Science

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### Abstract

A large-scale transformation of the energy system, which climate mitigation entails, is a global and highly politicized problem. This thematic issue brings together scholars who work with Integrated Assessment Models (IAMs)—which are used for Intergovernmental Panel on Climate Change (IPCC) reports and other key analyses of future climate trajectories—and social scientists working on climate and energy issues to highlight how the two strands of research could benefit from combining insights across different disciplines and methods. One of the key messages across almost all contributions is that the more technical perspectives could benefit from adjusting their assumptions to reflect the patterns observed in quantitative and qualitative social science. Combining different disciplines is methodologically challenging but promising to ensure that the mitigation strategies developed are considered technically and politically feasible, as well as just.

### Keywords

climate mitigation; Integrated Assessment Models; interdisciplinary

### Issue

This editorial is part of the issue “Exploring Climate Policy Ambition” edited by Elina Brutschin (International Institute for Applied Systems Analysis) and Marina Andrijevic (International Institute for Applied Systems Analysis).

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### 1. Introduction

The window to keep 1.5 °C alive is rapidly closing (Intergovernmental Panel on Climate Change [IPCC], 2022). Avoiding more serious impacts associated with raising temperature requires a substantial improvement in the level of the current policy ambition because the current national pledges still put the world on a trajectory to 2.1 °C global mean temperature above the preindustrial level (Climate Action Tracker, 2022). Global process-based Integrated Assessment Models (IAMs), a well-established and frequently used tool to derive long-term climate policy goals and recommendations, show that there are many different mitigation options and combinations of them that would get us to the 1.5 °C target (IPCC, 2022). Yet, many recent studies have questioned whether the rate of decarbonization assumed in the models is feasible from the socio-political perspective (Brutschin et al., 2021; Cherp et al., 2021; Vinichenko et al., 2021).

IAMs represent a set of stylized assumptions rooted in economic and technology diffusion theories. The core objective function (i.e., the main guiding principle to find optimal solutions given a set of constraints) in many IAMs is cost minimization (Żebrowski et al., 2022), implying that policymakers are assumed to rely on the most cost-efficient technologies and solutions. Because having a regional differentiation of the carbon price would be economically inefficient, most IAMs also assume a globally unified carbon price as the main mitigation lever. Given the core structure of the IAMs, it is thus not surprising that the outputs from scenarios that IAMs produce are often at odds with the patterns observed in empirical work and with justice principles that focus on equity of efforts. This could be unproblematic—as long as the model users are aware of the underlying assumptions—because the main purpose of models is not necessarily a representation of the world as it is. However, they are meant to be a useful tool to explore different options and what-if scenarios (i.e., what would happen if a more

ambitious approach to climate mitigation were taken). Yet, given the urgency to mitigate, the outputs of IAMs at the regional level are gaining more attention to either justify major policy targets (i.e., the year when net-zero CO<sub>2</sub> or greenhouse gas emissions should be reached) or to calculate ex-post based on global emissions output which effort allocation principles are more just (van den Berg et al., 2020). In this thematic issue, we want to highlight that for regional IAM outputs to be more meaningful, the insights from political science need to be taken into account in some of the core assumptions and in how the IAM results are communicated and interpreted.

Calls for better integration of different disciplines, especially of political science, when studying energy transitions and different climate mitigation options already exist (Geels et al., 2016; Peng et al., 2021), though within political science there is also a need for better integration of different streams and theories (Jordan et al., 2022). There are generally three core contention points that make interdisciplinary work particularly challenging: difference in terminology, difference in the levels of analysis, and difference in goals and methods. This thematic issue shows that while some major methodological challenges prevail, there are many entry points where insights from political science could inform IAMs in order to generate more policy-relevant scenarios and to make them more useful for policy-makers. Overall, the issue addresses the following questions: (a) What additional global and regional mitigation patterns should be explored in IAMs? (b) Which additional issues should be given more consideration? and (c) How should the insights be communicated?

## **2. What Additional Global and Regional Patterns of Mitigation Should Be Explored in Integrated Assessment Models?**

One way to bring in political science is to explore a set of scenarios that adds political rationale to the economic and technological constraints at the regional as well as the global levels. From a political science perspective on global governance, implementing a unified carbon price is very unlikely. In this issue, Hickmann et al. (2022) develop four global climate governance archetypes: (a) a revitalized top-down approach, (b) a hybrid approach with a strong joint commitment by national governments, (c) a hybrid approach with a weak joint commitment by national governments, and (d) a breakdown of international cooperation on climate change. Hickmann et al. (2022) find that in the current set of IAMs scenarios, such hybrid approaches, where governments have a common goal as well as effective coordination of effort-sharing, are not well represented. This is, for example, a call for more scenarios that implement a regionally differentiated carbon price.

There are countless examples where policymakers implement policies that do not seem to follow economic efficiency rationale, such as the deployment of nuclear

technology in certain countries (Brutschin et al., 2021) or persistent subsidies for coal mining in the European Union during periods when coal mining elsewhere was more cost-efficient. Yet, this does not mean that policy-makers are not rational in the classical economic sense: They simply optimize their prospects of staying in power rather than minimizing the overall costs of policies that they implement. In political science, it has been shown that this “logic of political survival” (Mesquita et al., 2005) can explain policy outputs across a wide range of political systems, but also that institutions (broadly defined) have a strong mediating role regarding which political behavior is incentivized and rewarded. For example, in a political system with a free press and democratic elections, policymakers are attentive to public opinion on key issues; in an authoritarian system, more attention is given to political elites that consolidate economic or military power. The main insight from this strand of research is that we need to focus more on key interest groups in a given region and on strategic state capacity (Meckling & Nahm, 2021), which proxies states’ ability to implement policies even against strong opposition from key interest groups.

A more general view of how to link political science and IAMs is presented in this issue by Pianta and Brutschin (2022). They identify variables that have been shown to affect climate policies and propose a new framework that shows how empirical political science insights could inform integrated assessment modeling to take into account regional heterogeneity, including state capacity, vested interests, and public opinion considerations. Additionally, the article demonstrates how to reconcile the methodological difficulties stemming from the differences in the level of analysis: Global IAMs operate based on regional data, while most political science analyses are conducted at country or individual levels of analysis. Nonetheless, even though certain nuances may be lost, individual and national level data can be aggregated to the regional level, and some of the insights gained through the analysis of national level data can be transferred to the regional level.

A possible concrete implementation of this logic is shown in this issue by Brutschin et al. (2022). They find a correlation between higher levels of state capacity and more ambitious levels of coal phase-out, and also trace specific strategies implemented by countries with higher levels of state capacity to prematurely retire coal power plants. This insight could be used to adjust some of the assumptions in IAMs regarding regional differences in the speed and scale of coal phase-out. In this context, the issue of correlation versus causation remains a methodological challenge, particularly in the domain of IAMs that social sciences are concerned with, given the ever-present endogeneity issues with variables such as GDP per capita and measures of institutional quality. However, Pianta and Brutschin (2022) argue that insights based on correlations can still be extremely useful if this means that regional differences in mitigation

capacity can be better proxied as compared to the original IAM assumptions.

### 3. Which Additional Issues Should Be Given More Consideration?

Another key area that has a long tradition in political science, but is rarely taken into account in IAMs, is the question of policy implementation. Public policy scholars generally tend to assess the effectiveness of different policy instruments, as the link between the stated policy goals and the final outcome is not straightforward and often depends on the type of political system (Knill et al., 2012; Knill & Tosun, 2020). In this issue, the importance of understanding the “implementation gap”—insufficient design or stringency of concrete policy instruments in place—is highlighted by Perino et al. (2022). Using Germany and the European Union, the authors show that there are substantial obstacles to the implementation of the announced pledges, even within highly ambitious political entities. Perino et al. (2022) suspect that among key obstacles are distributional conflicts that might be stronger during the implementation stage as compared to the goal-setting stage, and additionally emphasize the importance of a better understanding of the role of climate litigation for reducing the implementation gap.

To explore the links between stated goals, policy outputs, policy instruments, and policy outcomes, better coverage of existing climate policies at the national level is essential. As a way to measure the level of policy ambition through policy density in quantitative research, Schaub et al. (2022) discuss three climate policy databases that cover the period from 2000 to 2019: (a) the Climate Change Laws of the World Database (CCLW), produced by the Grantham Research Institute at the London School of Economics and Political Science; (b) the Climate Policy Database (CPD), published by the NewClimate Institute; and (c) the Policies and Measures Database (PMD), provided by the International Energy Agency (IEA) and the International Renewable Energy Agency (IRENA). Schaub et al. (2022) explore the usefulness of each data source for different types of research question and call for more effort to add more detailed data that would further improve the efforts to understand patterns in levels of climate ambition and implementation.

Finally, the article of Plaček et al. (2022) explores the possible gender-differentiated agency of policymakers that are relevant to environmental policy. Using a survey in the Czech Republic, they show that upper-level female bureaucrats are more likely to promote green public procurement. Overall, this calls for more exploration regarding what role gender equality could play in the speed and scale of future global mitigation. For example, a Shared Socio-Economic Pathway (SSP) narrative (Riahi et al., 2017) that assumes much faster convergence in gender equality could be developed and used to explore alternative mitigation pathways.

### 4. How Should Insights Be Communicated?

Given that policymakers are often the target audience of IAMs, it is essential to understand how they use insights from climate mitigation scenarios and communicate about climate ambition. In this issue, Kinski and Ripoll Servent (2022) discuss the results of quantitative analysis of debates in the European Parliament to trace how politicians discuss climate policy ambitions and whose interests they represent. Apart from a major methodological contribution on how to operationalize climate ambition in political debates, this article has a finding that is of high relevance for the work of climate scientists. Kinski and Ripoll Servent (2022) highlight that while many politicians are well informed about what needs to be done, certain concepts such as “justice” and “feasibility” might be politicized and used as a justification for delayed mitigation. This brings us back to the motivation behind this thematic issue of the *Politics and Governance* journal: Climate change mitigation scenarios should incorporate key feasibility and justice concerns and thereby avoid long-term scenarios being mis-used to delay urgent mitigation action.

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