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Varieties of Climate Governance: National Frameworks and Innovations in the EU and OECD

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This topical collection undertakes a comparative assessment of national climate policies and legal frameworks within the European Union (EU) and countries within the Organization for Economic Co-operation and Development (OECD), with a particular emphasis on understanding how these countries are working to achieve their climate commitments. We aim to identify good practices, common obstacles, and innovative solutions that can inform more effective climate governance.

A central methodological feature of this topical collection is our attention to both climate policies and climate laws, recognizing that these represent distinct yet complementary instruments of governance. Climate policies constitute the broader category within climate governance, encompassing not only formally enacted climate laws—that is, statutes, regulations, and legal frameworks adopted through constitutional processes that establish binding obligations, enforceable rights, and justiciable standards—but also a wider array of non-legislative instruments, such as governmental strategies, administrative guidelines, sectoral plans, and programmatic initiatives that shape climate governance and climate action.

This distinction is important for several reasons. First, laws generally provide greater durability and stability, as they are more difficult to revoke or modify and often survive changes in government[1]. They can establish long-term targets, create institutional mechanisms, and provide legal certainty for investors and stakeholders. Policies, while more flexible and adaptable to changing circumstances, may be more vulnerable to political shifts[2–4]. Second, the interplay between broader climate policies and the more specific laws and regulations associated with them reveals how countries structure their climate governance. Such governance can rely, for instance, on binding legal frameworks or flexible policy approaches; in hybrid form, it might center on softly formulated governance provisions embedded within binding legislation[5]. Understanding this balance illuminates the different political and legal cultures comprising it and their implications for climate action[6–9].

Moreover, comparing policies and laws across multiple jurisdictions offers insights that single-country studies cannot provide. Comparative analysis enables us to identify patterns of convergence and divergence, understand how similar challenges are addressed through different institutional arrangements, and assess the relative effectiveness of various governance models. It allows us to control for country-specific factors and isolate the impact of particular legal or policy choices[10].

For EU member states specifically, our analysis is structured around the following core research themes, which address different dimensions of climate governance:

1. Policy Implementation and Effectiveness: What national measures have EU member states established to comply with the EU's climate and energy obligations, what challenges do they face, and how can their effectiveness be enhanced? This line of research examines how member states translate EU directives and regulations[11] into domestic policy, identifying factors that facilitate or hinder successful implementation.
2. Role of National Climate Laws: Which member states have established a national climate law and what role do these laws play in furthering the development of additional national policies and laws to achieve the EU's climate ambition[12,13]? Here, we investigate whether dedicated climate legislation provides enhanced legal certainty, institutional coordination, and long-term policy stability.
3. Civil Society Engagement: How do member states engage civil society in their climate policies and regulatory decisions? This question explores the mechanisms for public participation, stakeholder consultation, and democratic accountability in climate policymaking processes[14,15].

Beyond the EU context, we extend our comparative analysis to the broader OECD world, assessing and comparing national climate policies and legal frameworks across these advanced economies.

4. Patterns of Climate Policy: What are the key features of climate policies in OECD countries and how can we explain their emergence[6,7,16,17]?

This wider lens enables us to identify divergent approaches to similar challenges and to understand how different political systems, economic structures, and societal contexts shape climate governance[18,19].

This topical collection provides insights helpful to/useful for both scholars and practitioners of climate policy and law. The contributions make use of diverse methodological approaches, including quantitative analyses of policy density and stringency[20] and qualitative examinations of legal and governance structures.

In the following, we highlight five key aspects of national climate policies and legal frameworks that the articles address in response to the guiding questions formulated above. The discussion of each aspect also includes suggestions for future research.

Measurement and comparison of national climate policies in the EU and the OECD

A fundamental challenge in climate governance research is to develop apt methods for comparing policies across different national contexts[8,21,22]. Countries vary significantly in their legal systems, political structures, institutional capacities, and socio-economic conditions, making direct comparisons methodologically complex. The articles in this collection address this challenge by exploring several innovative approaches that balance contextual sensitivity with analytical rigor, ranging from standardized quantitative metrics to interpretive frameworks that capture institutional nuances.

Jahn introduces a novel index of Gross Potential Impact that measures the combined potential impact of national, subnational, and supranational climate legislation across 21 EU member states and OECD countries[23]. Beyond considering the complex interrelationships between national, subnational, and supranational legislative levels, Jahn's contextualized comparison takes into account varying national conditions and circumstances, recognizing that policies may have different relevance and effectiveness depending on factors such as countries' specific greenhouse gas emission profiles, energy systems, and constitutional features.

Bellanca develops two new indices for policy evaluation[24]. First, the Emissions Coverage Indicator, which assesses how many policies at the supranational and member state levels address specific sectors, such as electricity, transport, and buildings. Second, the Policy Mix Thickness Index measures the complexity and layering of policy packages in terms of the range and types of instruments employed. These indicators move beyond simple policy counting to capture both the breadth of sectoral coverage and the depth of governance approaches, elucidating how climate policies interact and accumulate across different levels of government.

Schoenefeld et al. contribute to the development of comparative assessment methodologies by examining monitoring and reporting systems across multiple governance levels[25]. Drawing on existing literature, the authors identify key dimensions of effective climate policy monitoring. These include: clear specifications of what is to be monitored and how; a holistic understanding of policy mixes within specific policy domains; qualitative descriptions that situate policies in their institutional and political contexts; quantitative indicators to measure policy outputs and outcomes; and explicit consideration of policy interactions and interdependencies. The empirical analysis reveals an important tension: while monitoring systems have become more standardized and streamlined over time—facilitating data collection and reporting—persistent differences in national baselines, definitions, and metrics still complicate cross-country comparison and limit the potential for systematic comparative assessment.

Klagges demonstrates the importance of considering temporal dynamics in policy assessment, showing that standardized time lags—which assume uniform delays between political change and policy outcomes across all countries—often fail to capture the actual effects of partisan shifts on climate policy[26]. By employing country-specific time lags that account for national institutional and political variations, her analysis reveals that changes in government position affect carbon pricing intensity with an average delay of 2.3 years, though this varies considerably across countries. This finding highlights the need for more sophisticated analytical approaches that recognize the temporally contingent nature of policy change and the institutional factors that mediate the translation of political commitments into policy action.

While these studies offer important and novel insights into comparative climate policy assessment, they do not engage with how such methodological advances might improve existing legal frameworks for monitoring party performance under international climate treaties. A promising avenue for future research would be to investigate how measurement approaches could enhance or complement the monitoring mechanisms established under the Paris Agreement and the specific rules governing EU member states' climate performance. Interdisciplinary collaboration between political scientists and legal scholars could prove particularly valuable in this regard, helping to identify the strengths and limitations of current mandatory monitoring frameworks and proposing concrete pathways for their improvement. Such research could bridge the gap between methodological innovation in comparative policy analysis and the practical demands of international and supranational climate governance.

Effects of European climate legislation on national frameworks

The contributions to this topical collection reveal complex patterns in how the extensive EU climate legislative framework influences national strategies through diverse policy instruments, including market-based approaches such as the EU greenhouse gas emissions trading scheme and soft governance mechanisms established by the Regulation on the Governance of the Energy Union and Climate Action (Regulation (EU) 2018/1999). Bellanca's findings reveal a significant degree of independence between EU and member state policy processes[24]. Her analysis demonstrates that increases or decreases in the level of ambition of EU-level policies do not automatically trigger corresponding changes in member state policy adoption.

Instead, a pattern of functional complementarity emerges between the two governance levels. EU policies typically adopt a broader territorial and substantive scope—the climate neutrality target, for instance, covers the entire EU territory and encompasses multiple greenhouse gases—while emphasizing long-term strategic frameworks, such as the EU-wide emissions cap established under the greenhouse gas emissions trading scheme. EU legislation also addresses sectors where member state initiatives remain limited, such as agricultural greenhouse gas emissions. National policies, by contrast, concentrate on specific sectors requiring more immediate and context-sensitive implementation. Examples include heating systems, where local conditions and existing infrastructure necessitate tailored policy responses that reflect national and subnational circumstances.

The influence of EU legislation also varies considerably across EU member states, depending on how supranational requirements interact with existing national governance structures. Kastelein demonstrates that the requirement of the European Climate Law (Regulation (EU) 2021/1119) for multilevel climate and energy dialogue is interpreted and implemented differently across member states[27]. While all examined countries recognize local authorities as stakeholders in their climate acts and policies, the substantive depth and institutional character of this involvement vary significantly. Germany, for instance, does not make climate policy an essential component of local-level governance, whereas Ireland, the Netherlands, and Spain explicitly delegate climate-related tasks, competencies, and responsibilities to this level, embedding climate action within municipal governance frameworks. In this regard, Kastelein's study enriches the developing scholarship on the procedural dimensions of the European Climate Law within EU multilevel governance[28].

An important question for further research is to what extent the discretion afforded to EU member states enables adequate, context-specific solutions at the domestic level, or whether greater harmonization is necessary to ensure a level playing field across the internal market and to prevent a collective race to the bottom (i.e., progressive lowering of regulatory standards as a result of competitive pressure) that could undermine the effective achievement of the codified climate targets.

National measures established to comply with EU climate and energy obligations

The articles in this collection reveal significant diversity in how EU member states, within their discretionary powers, implement EU climate obligations. This variation reflects not only different national circumstances but also different governance philosophies and institutional arrangements.

What legal discretion do EU member states have when adopting national climate policies alongside EU-level regulations? Nysten examines this question in relation to the revised EU

Emissions Trading System Directive adopted in 2023, commonly known as EU ETS 2[29]. This revision creates a new emissions trading system covering carbon emissions from fuel combustion in buildings, road transport, and additional sectors. Nysten assesses whether member states can maintain or introduce supplementary carbon pricing instruments under the EU ETS 2 framework. She concludes that, from a legal perspective, the coexistence of national carbon pricing instruments alongside the EU ETS 2 is legally permissible, providing member states with room for policy innovation beyond the supranational baseline.

Kastelein sheds light on the role of local governments in EU member state climate governance[27]. In Ireland, local governments are given important roles across climate policy areas despite the country's centralized structure. In the Netherlands, provinces have certain competences for granting permits that concern carbon reduction measures by companies. Spain assigns climate responsibilities to local authorities across eighteen different areas. In contrast, Germany has traditionally been reticent about delegating climate-related tasks to local governments, with the German climate plan stating that climate policy is not an integral part of local public services. However, this broad characterization may no longer fully apply, as municipal heat planning has since become a legally mandatory responsibility for German municipalities[30].

Schoenefeld et al.'s analysis of national policy mixes in the building sector illustrates the substantial variation in how member states translate EU objectives into national policy measures[25]. Their research reveals that Finland reported more than three times as many policy instruments as Germany to the Policies and Measures Database, which the European Environment Agency manages. Moreover, the countries exhibit different instrument preferences: Finland relies on a diverse mix of information-based, regulatory, and economic instruments at the national level, whereas Germany's reported national-level measures concentrate primarily on economic and fiscal tools. These differences reflect divergent national contexts and starting points. Finland has progressed considerably further than Germany in decarbonizing energy use in buildings, which influences both the types and number of policy instruments deemed necessary to achieve further emissions reductions in this sector.

An important question for future research is how different national strategies across EU member states qualify as legally compliant with European climate legislation, given the significant variation in policy approaches, instrument choices, and implementation timelines. Article 2 of the European Climate Law mandates that member states adopt "necessary measures" to achieve climate objectives, but the legislation provides limited guidance on what constitutes a "necessary measure." This ambiguity becomes particularly acute when considering the additional normative criterium prescribed by the European Climate Law, namely "the importance of promoting both fairness and solidarity among member states and cost-effectiveness" (Article 2, European Climate Law). How should these potentially competing objectives be balanced in assessing compliance? Moreover, a reflexive question arises: does EU climate legislation itself adequately embody and operationalize these principles of fairness, solidarity, and cost-effectiveness in its own design and requirements?

The role of EU and national climate laws in furthering policy development

From the contributions to this topical collection, national climate acts emerge as important yet highly varied instruments for structuring domestic climate governance. The articles reveal both the potential and the limitations of national climate acts in advancing climate policy.

Kastelein's article demonstrates how national climate acts can create new spaces for climate action even within constrained governance structures[27]. The Irish Climate Act, for instance, legally obliges local authorities to develop climate action plans and establishes clear procedures for their formulation, thereby granting local governments greater autonomy than might be expected in a centralized state. Similarly, Spain's climate law provides detailed specifications for sustainable mobility measures that municipalities must adopt, operationalizing climate objectives at the local level (on this, see, for example, Enguer and Schaub[31]).

However, the contributions also highlight significant limitations. Honkonen finds that many national climate acts contain no provisions for public participation, effectively squandering opportunities to institutionalize inclusive and deliberative governance processes[32]. This gap raises questions about the democratic legitimacy and social robustness of climate governance frameworks.

Jahn's analysis provides important insights into how climate laws evolve in response to international commitments[23]. EU climate policy stringency increased notably following the adoption of the Kyoto Protocol and even more substantially after the Paris Agreement, suggesting that international climate agreements serve as crucial drivers of both EU-level and national climate ambition.

An important avenue for future research would be to examine the role of national courts in shaping climate governance[33]. Courts—at least in Germany and also the European Court on Human Rights in Strasbourg —have stressed the importance of a national carbon budget as part of climate policy; courts in Belgium and earlier in The Netherlands have set nationwide emission reduction targets even when there was no national legislation specifying such targets. Understanding this judicial dimension could elucidate how legal accountability mechanisms interact with legislative frameworks to advance or constrain climate action, and in what circumstances courts even complement legislative frameworks with specific emission reduction targets.

Engagement of civil society and interest groups in climate policies and laws

The involvement of civil society represents a critical yet understudied dimension of national climate governance[34]. The contributions to this collection reveal significant variation in how the EU member states approach public participation in climate policymaking, with important implications for both the democratic legitimacy and the practical effectiveness of climate policies.

Honkonen finds that about half of the national climate acts of EU member states contain provisions for public participation[32]. Three countries—Finland, Malta, and Portugal—view public participation as a general objective or guiding principle of their climate acts. Others limit participation to specific procedures, such as the preparation of climate plans. Some innovative mechanisms exist, too: Greece's online forum for stakeholder input, Luxembourg's Climate Platform for multi-stakeholder dialogue, and Spain's National Climate Change Citizen Assembly are perhaps the most notable ones.

Kastelein's findings on local government engagement reveal another dimension of civil society participation[27]. His analysis shows extensive climate collaborations at the local level in several countries. Ireland's Local Authority Climate Action Training program builds capacity for climate leadership. The Netherlands' Regional Energy Strategies bring local authorities together with social partners, businesses, and citizens in thirty regions. The Spanish policy emphasizes interdepartmental and intersectoral cooperation, including multiple partnership frameworks.

Significant gaps remain, however, in engaging vulnerable groups. Honkonen finds that most national climate acts do not provide for the participation of societal groups based on climate vulnerability. Nonetheless, there are noteworthy

exceptions, such as Spain's specific attention to youth participation and Finland's establishment of the Sámi Climate Council—a unique institution recognizing Indigenous rights in climate governance.

Mišić broadens the analytical perspective of this collection by examining the conditions under which industry actors influence climate policy adoption at the global level[35]. His analysis reveals that stronger green industry presence increases the likelihood of a country adopting climate policy. However, this relationship only holds in democratic political systems. Notably, EU member states are not significantly more likely to adopt climate policies than other democracies, suggesting that the EU's institutional framework may be less determinative than democratic governance structures in facilitating responsiveness to green industry pressures.

An important focus for future research would be to examine how civil society engagement contributes to—or potentially hinders—compliance with the EU climate neutrality target. Such research could explore the mechanisms through which public participation influences policy implementation, enforcement, and societal acceptance of climate measures. Another potentially fruitful research avenue would be to study the actual way in which provisions and mechanisms for public participation are put into practice in different countries. While climate laws and policies may formally include participatory mechanisms, significant gaps may exist between these de jure provisions and their de facto implementation[36]. Understanding these implementation gaps could reveal important insights into the conditions under which participatory governance contributes to climate action and democratic legitimacy.

Conclusion

The comparative analyses in this collection illuminate both the diverse strategies that EU member states employ and the obstacles they face in achieving climate neutrality. They also put the findings for the EU member states in perspective through comparison with other democracies.

The first key insight refers to the existence of measurement challenges. The development of new indices and comparative methods represents important progress, yet significant challenges remain in creating truly comparable assessments across diverse national contexts. Balancing standardization for comparison with sensitivity to contextual specificity requires continued methodological innovation.

Second, while hierarchical in a formal legal sense, the relationship between EU and national climate laws and policies operates as functionally complementary. This complementarity stems from the EU's use of a broad spectrum of governance instruments—from non-binding strategies to directives and fully binding regulations—which reflects an evolution often described as the "hardening" of previously softer governance[37]. The European Climate Law illustrates this development, setting overarching objectives and long-term targets, complemented by regulatory mechanisms such as the emissions trading system, which applies to major emitting industries and, from 2027 onwards, to the housing and transport sectors as well. EU member states and subnational authorities, in turn, implement and refine this framework through sector-specific instruments and laws, retaining discretion to pursue more ambitious measures than those required under EU climate law.

The substantial variation in national policies and laws is this collection's third crucial observation. This variation reflects not only different national contexts but also divergent governance philosophies and capacities as well as the impact of different actors, such as interest groups. This diversity may constitute a strength, enabling policy experimentation[38] and cross-national learning[39]; however, it also raises critical questions about whether such a fragmented patchwork of approaches can effectively and efficiently achieve collective EU climate goals and about the attribution of responsibilities regarding the success or failure of climate actions.

Fourth, climate acts[12] play varied roles in structuring domestic climate governance. While they can provide institutional stability and procedural clarity, their effectiveness depends significantly on how they interact with political dynamics, administrative capacities, and broader governance systems.

Finally, the limited attention paid to civil society engagement—particularly the involvement of vulnerable and marginalized groups—represents a significant deficit in current climate governance arrangements[40]. As climate impacts intensify and transitions accelerate, more inclusive and deliberative approaches will become essential for enhancing both the democratic legitimacy and the social robustness of climate policies. However, the precise effects of different modes of participation on policy outcomes remain insufficiently understood and warrant further investigation.

The articles in this collection suggest that achieving EU and national climate neutrality objectives requires not only a degree of regulatory harmonization but also careful attention to how different governance modes, policy mixes, and patterns of nonstate actor involvement interact across governance levels.

The comparative analyses presented here offer valuable insights for researchers, policymakers, and stakeholders seeking to strengthen national climate frameworks and for researchers examining the complex dynamics of multilevel environmental governance. Addressing the challenges identified in these studies—from methodological refinements in comparative assessment to closing participation gaps—will be essential for achieving climate goals in the EU and the OECD countries in ways that are effective, efficient, and equitable.

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Competing interests
All authors declare no financial or non-financial competing interests. For transparency, J.T. is the editor-in-chief of npj Climate Action, though this had no bearing on this piece since editorials are not subject to peer review.

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