



Strengthening Democratic Governance
for Climate Transitions

D4.3 – THE EU KNOWLEDGE REGIME FOR CLIMATE CHANGE

WP4 – Non-Majoritarian Institutions



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Grant Agreement #	101132661	Acronym		RETOOL
Full Title	Strengthening Democratic Governance for Climate Transitions			
Topic	HORIZON-CL2-2023-DEMOCRACY-05			
Funding Scheme	HORIZON EUROPE – Research and Innovation Action (REA)			
Start Date	February 2024	Duration		36 Months
Project URL	https://retoolproject.eu			
EU Project Advisor	Samuela Caramanica			
Project Coordinator	Dublin City University – DCU			
Deliverable	D4.3 – The EU knowledge regime for climate change			
Work Package	WP4 – Non-majoritarian institutions			
Date of Delivery	Contractual	31/07/2026	Actual	31/07/2026
Type of Deliverable	Report	Dissemination Level		Public
Lead Beneficiary	Vrije Universiteit Brussel			
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Keywords	European Union, climate policy, knowledge regime, policy advisory system, knowledge utilisation			

EC Summary Requirements

1. Changes with respect to the DoA

This report uses methods that differ in two respects from those presented in the methodology section of the Description of Action. First, the DoA states our original plan to incorporate findings from ten interviews focused solely on the European Scientific Advisory Board on Climate Change (ESABCC). However, early analysis of the broader knowledge regime/policy advisory system led us to conclude that these interviews should focus both on the ESABCC and other knowledge provider organisations given the ESABCC's embedded role in this wider landscape and the objective to capture less formal aspects of the broader regime and possible interactions between organisations. We therefore drew on eleven interviews with various organisations, including the ESABCC, in our analysis. We continued to place special emphasis on the ESABCC, drawing on both interviews and documentary analysis (see, e.g., Section 5.4.1).

Second, Section 6 studies the European Commission's utilisation of knowledge and the sources that are cited in impact assessments and policy proposals in two case studies: the 2040 EU greenhouse gas target and the 2023 Emissions Trading System Directive. The methodology section of the DoA states that we would do so using existing literature, documentary analysis, and interviews. However, after initial analysis, the complexity of the cases being studied, and the need to choose a feasible empirical scope, we decided to focus on an in-depth bibliographic analysis of these two policies (as reported in Section 6) and did not incorporate interviews in this part of the task.

2. Dissemination and uptake

This deliverable will be disseminated to the public and will also be used within the project consortium for, e.g., synthesis and policy recommendations.

3. Short summary of results (<250 words)

Knowledge, expertise, and policy advice play a key role in European Union climate policymaking due to the regulatory nature of EU law and the multifaceted challenges posed by climate change. In this report, we seek to map the EU organisational landscape for knowledge provision and policy advice related to climate change. We examine the EU knowledge regime, the broad system of organisations, processes, and actors that generates policy-oriented research, data, ideas, and policy advice. Within this wider knowledge regime, we pay particular attention to the policy advisory system (PAS), the sub-system of the knowledge regime that focuses on generating policy-relevant advice. Drawing on documentary analysis and interviews, we outline the main features of the climate-related knowledge regime surrounding the European Commission, the European Parliament, and the Council of the European Union. We also examine cross-cutting organisations oriented toward multiple EU institutions (e.g., the European Scientific Advisory Board on Climate Change). We find a complex, evolving regime with complicated patterns of advice creation and use. We then examine the European Commission's use of expertise in the legislative proposals and impact assessments related to the revision of the Emissions Trading System (ETS) Directive as part of the Fit-for-55 package and the setting of the EU's greenhouse gas reduction target for 2040. Our analysis finds a strong focus on internal citations to Commission research and the Joint Research Centre. Documents related to the 2040 target also draw on knowledge from external EU bodies (European Scientific Advisory Board on Climate Change, European Environment Agency) and international organisations (the IPCC, the International Energy Agency) to a much greater extent than the ETS impact assessment.

4. Evidence of accomplishment

This report.

Preface

The overall goal of the RETOOL project is to advance our understanding of how to address the twin challenges of responding to the climate imperative while strengthening and reinvigorating democratic governance. The project has four overarching objectives: (i) To deepen our understanding of the relationship between democratic governance and the climate imperative by developing a novel analytical framework and creating new empirical underpinnings, including important new open-access datasets; (ii) To understand how a variety of democratic institutions across Europe are responding to the climate challenge, including learning lessons from history and studying new and innovative democratic practices; (iii) To contribute to reinvigorating democratic governance in Europe by developing and synthesising new knowledge and insights on climate democracy, and presenting them in a range of high-impact formats; and (iv) To serve as a bridge between academic research on climate democracy innovations and policymakers and practitioners, as well as civil society and the wider public. RETOOL brings together an international and interdisciplinary consortium, with partners from Western Europe (Ireland, UK, Belgium, Austria), Northern Europe (Finland), Eastern Europe (Estonia), and Southern Europe (Italy, Greece), combining expertise in political science, political sociology, deliberative democracy, environmental law, European studies, and public administration. The consortium includes a democracy practitioner foundation (Praxis), and all partners are closely associated with practitioner and civil society networks and involved in hands-on activities. RETOOL will be undertaken by a mature, settled consortium that has significant experience of working together, with six of our nine partners core members of the EU-funded Jean Monnet Network GreenDeal-NET.

Consortium Partner	Acronym	Country	Logo
Dublin City University	DCU	IR	
Vrije Universiteit Brussel	VUB	BE	
Università degli studi di Trento	UNITN	IT	
Universiteit Gent	UGent	BE	
Universität für Bodenkultur Wien	BOKU	AT	
University of Eastern Finland	UEF	FI	
HOLISTIC S.A.	HOL	EL	
Praxis Think Tank	PRAXIS	EE	
London School of Economics and Political Science	LSE	UK	

Executive Summary

Knowledge and expertise play a crucial role in climate change policymaking, an issue which is itself heavily intertwined with technical, scientific, and political knowledge. As a crucial site of climate governance, the European Union (EU) has created extensive structures and processes for knowledge creation and expert advice in this area. As a result, the academic literature has placed increasing focus on the role of knowledge and advisory institutions in EU climate policymaking. However, the existing literature has paid limited attention to the overall landscape of knowledge provision in EU climate policy. In addition, there has been little focus on how policymakers, including the EU institutions, draw on different sources of knowledge in individual EU policy processes.

To help fill this gap, this report examines the landscape for knowledge provision and policy advice related to climate change in the EU. To do so, we examine the EU knowledge regime, the broad system of organisations, processes, and actors that generates policy-oriented research, data, ideas, and policy advice. Within this wider knowledge regime, we also examine the policy advisory system (PAS), the sub-system of the knowledge regime that focuses on generating policy-relevant advice. We first map key EU knowledge organisations and explain their most important features, drawing on documentary analysis and semi-structured interviews. Second, we examine how the European Commission utilises climate-related knowledge in practice by analysing which sources were cited in two recent policymaking processes under the European Green Deal: the 2040 greenhouse gas target and the 2023 Emissions Trading System Directive. We undertake a bibliometric analysis of the legislative proposals and impact assessments related to these topics, exploring the landscape of knowledge-producing institutions which the European Commission cites in these documents.

Our mapping of the EU knowledge regime centres on the three main EU policymaking institutions: the European Commission, the European Parliament, and the Council of the European Union. The Commission sits at the centre of a complex system of knowledge and expertise provision and can draw on information from its policy-focused Directorates-General, its internal knowledge provider, the Joint Research Centre (JRC), as well as mechanisms for bringing in external expertise, such as the various climate-related expert groups. The European Parliament also draws on the knowledge of MEPs themselves, their staff, and committee secretariats. The European Parliamentary Research Service (EPRS) provides technical and policy knowledge to policymakers in the European Parliament through both an on-demand service and broader reviews. The Council, while its EU-level system of technical knowledge provision is not as extensive as the other two institutions, plays host to analysis from individual Member States during policymaking processes.

The knowledge regime also contains more independent, cross-cutting organisations. Most prominently, these include the European Scientific Advisory Board on Climate Change (ESABCC), the Scientific Advice Mechanism (SAM), and the European Environment Agency (EEA). The ESABCC and SAM hold explicit advisory roles. The ESABCC has so far played the most prominent role in the setting of the European Union's greenhouse gas target for 2040. In parallel, the EEA has evolved from a data provider into a broader knowledge provider despite not having an explicit advisory mandate.

Our more detailed analysis of the sources of knowledge that the European Commission utilised in preparing its proposals on the EU 2040 target and the 2023 Emissions Trading System (ETS) Directive finds that, in both cases, the Commission draws heavily on its own resources and, specifically in the case of the 2040 target, on the Joint Research Centre. The 2040 target documents also commonly cite the EEA and the ESABCC at the EU level, as well as international organisations such as the Intergovernmental Panel on Climate Change (IPCC), the International Energy Agency (IEA), and the World Meteorological Organisation (WMO). In contrast, the ETS-related documents draw much less information from EU-level organisations outside the Commission and international organisations. In neither case does the Commission draw heavily on national-level knowledge sources or those from the European Parliament, the Council of the European Union, or the European Council. In both cases, about a third of the citations are to academic or research sources. In the 2040 target case, these are much more likely to be peer-reviewed articles and books in the academic literature. In contrast, in the ETS case most research-related citations are to research reports outside of the academic literature, especially those commissioned specifically by the Commission for this policy process.

Together, these two approaches map a complex and evolving landscape of knowledge provision and policy advice in the EU in relation to climate change that policy actors draw on in different ways depending on the specific issues at hand. Our research also highlights that this knowledge regime is deeply embedded in international networks of research, knowledge, and expertise, and often draws heavily on them when designing and justifying policy choices. Given the breadth and complexity of this system, future academic and policy-oriented research holds strong potential to further explore the contours of this landscape and how it operates in practice as climate policy continues to develop over the coming decades. Given the importance of knowledge and expertise in climate policy, as well as its increasingly contested nature both at the EU level and in other contexts, it is crucial that this system be better understood to improve both the use of knowledge and the design of climate policy.

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Acknowledgements

We gratefully acknowledge our interviewees for taking the time to speak to us and providing their viewpoints on knowledge and climate change policy in the European Union. We received thoughtful, detailed feedback on our research at two academic workshops in 2026. A draft of the mapping of the EU’s knowledge regime (Section 5) was presented at “Making Europe Green Again: Implementation of the European Green Deal in Turbulent Times”, organised at the 2026 European Consortium for Political Research Joint Sessions held in Innsbruck, Austria (April 2026). The case study analysis of knowledge utilisation (Section 6) was presented at “On Shaky Ground? EU Climate Neutrality and Democracy in Turbulent Times”, organised at the 2026 Nordic Environmental Social Science Conference in Uppsala, Sweden (June 2026). We would especially like to thank Jana Gheuens, Diarmuid Torney, and Matilda Miljand for acting as convenors for these workshops. Finally, we would like to thank the members of the 3E Centre at the Brussels School of Governance, members of the RETOOL consortium, and Alina Averchenkova (LSE) for their helpful comments at various stages of the research process.

1. Introduction

Knowledge and expertise play a crucial role in climate change policymaking, an issue which is itself heavily intertwined with technical, scientific, and political knowledge (Abazi et al., 2021; Dupont, Rosamond, et al., 2024). Climate change is a 'super wicked' policy problem with long time horizons, high urgency, and the need for deep, widespread changes in the way society operates (Levin et al., 2012; Bocquillon, 2024). As a crucial site of climate governance, the European Union (EU) has created an extensive climate policy mix (Dupont, Moore, et al., 2024; Oberthür & von Homeyer, 2023), as well as structures and processes for knowledge creation and expert advice in this issue area (Dupont, Rosamond, et al., 2024; Zaki et al., 2024). These structures are especially important given that EU climate policy is both high profile and has always been deeply intertwined with questions of expertise, the role of science, and how they interact with day-to-day political processes. At the same time, the past decade has seen rising contestation surrounding knowledge and expertise in the EU (Abazi et al., 2021) as well as an increasingly prominent backlash to climate policy from government, businesses, and the public (Patterson, 2023; Bocquillon, 2024). Therefore, it is crucial to better understand the structures and processes surrounding climate-related knowledge and expertise in the EU.

In this context, the academic literature has placed increasing focus on the role of knowledge and advisory institutions in EU climate policymaking (Zaki & Dupont, 2024), including specific organisations such as the European Scientific Advisory Board on Climate Change (Seibicke, 2025). There are many qualitative studies of individual policy processes (for a review see Dupont, Moore, et al., 2024), with a relatively small number of these studies placing emphasis on the role of expertise. Dreger (2014) examines the role of expertise in the creation and revision of the EU Emissions Trading System. Others highlight the importance of in-house expertise in the Commission for Emissions Trading System (ETS) policymaking (Skjærseth & Wettestad, 2010; see also Jordan & Moore, 2020). Recent studies have also examined the dynamics within specific expert groups related to sustainable finance and the controversies that surrounded the inclusion of gas and nuclear in the EU sustainable taxonomy (Esposto & Nupieri, 2025; Fontan, 2025).

More recently there are studies that examine the role of scientific expertise in EU policymaking more broadly and over a longer time horizon (Dupont, Rosamond, et al., 2024; Zaki & Dupont, 2024), including related to the European Green Deal (Zaki et al., 2024). While some studies put the role of expertise at the centre of their analysis, this is a relatively rare approach. Most studies of climate policy instead discuss these issues as a small part of a larger picture, e.g., looking at the relative influence of the Commission, the Parliament and the Council on policy outcomes (Skjærseth & Wettestad, 2010). The existing literature has paid limited attention to the overall landscape of knowledge provision in EU climate policy. In addition, there has been little focus on how policymakers, including the EU institutions, draw on different sources of knowledge in individual EU policy processes.

To help fill this gap, this report examines the landscape for knowledge provision and policy advice related to climate change in the EU. To do so, we proceed in two stages. First, we examine the EU's evolving knowledge system for climate change. Using documentary analysis and drawing on semi-structured interviews, we map key EU knowledge organisations and explain their most important features. We focus on the organisations that are most closely connected to the core EU policymaking and decision-making institutions: the European Commission, the European Parliament, and the Council of the European Union (hereafter the Council).

Second, we examine how the European Commission utilises climate-related knowledge in practice by analysing which sources were cited in two recent policymaking processes under the European Green Deal: the 2040 greenhouse gas target and the 2023 Emissions Trading System Directive. We undertake a bibliometric analysis of the legislative proposals and impact assessments related to these two legislative processes, exploring how and when the Commission cites organisations across the EU's landscape of knowledge-producing institutions.

The remainder of the report is organised as follows. Section 2 reviews the existing literature on expertise, policy advice, and climate change governance in the EU. Section 3 presents the overall analytical framework and the operationalisation of the concepts of knowledge regimes and policy advisory systems. Section 4 presents our methodological approach. Section 5 presents the results of our examination of the EU's climate-related knowledge regime and Section 6 presents our findings on the 2040 target and emissions trading.

Section 7 then discusses the implications of our research, presents remaining research puzzles, and outlines priorities for future research.

2. Knowledge, expertise, and EU climate governance

Although terminology differs, the existing literature on EU knowledge and expertise generally distinguishes between several types of knowledge. In this report, we focus on two such knowledge types. First, *technical knowledge* is knowledge that is directly related to the issue which policy addresses (e.g., scientific knowledge on climate change, low-carbon technology, or technological feasibility). This type of knowledge is referred to by a variety of names in the literature, including subject-matter expertise (Blom, 2021), policy expertise (Elomäki & Haapala, 2024), and content knowledge (Dijkstra, 2010). Second, *policymaking knowledge* focuses on the policymaking process, the political feasibility of policy options, and other procedural aspects (Alexander, 2022; see also Blom, 2021). These two types of knowledge are deeply intertwined with each other in the political process (Elomäki & Haapala, 2024). Different institutions and actors may have different strengths in technical versus policymaking knowledge. For example, within the Council of the European Union, the legal services have clear expertise on legal and policymaking issues and, especially in the past, a significant amount of technical knowledge related to foreign policy (Christiansen & Vanhoonacker, 2025; Dijkstra, 2010).

The European Union has an extensive system to solicit expertise, policy advice, and stakeholder input when preparing legislation (Abazi et al., 2021; Christensen & Gornitzka, 2022). The academic literature has addressed this topic from a variety of angles including law, administrative studies, and political science. There has also been a notable increase in academic attention to the organisations, actors, and processes of expertise provision in the EU (Christensen & Gornitzka, 2022; Dupont, Rosamond, et al., 2024), focused on Commission expert groups (Metz, 2015) and seconded experts from Member States (Murdoch et al., 2016). Past studies have especially focused on the European Commission, the EU's executive arm that plays a key role as the initiator of most policy proposals and as an actor in the wider European expertise ecosystem (Christensen & Gornitzka, 2022). Other work has also expanded the literature's focus to include the other EU policymaking institutions, including the European Parliament (Elomäki & Haapala, 2024) and the Council (Christiansen & Vanhoonacker, 2025; Dijkstra, 2010).

Much of this existing research focuses on a single part of the knowledge regime (e.g., European Commission expert groups) and examining how they differ across a wide range of policy areas. For example, Binderkrantz et al. (2021) examine all EU legislative files between 2011 and 2016 to map the types of stakeholder consultation that the European Commission carried out during that time. In a similar vein, other authors have studied Commission expert group composition across the range of EU policies (Gornitzka & Sverdrup, 2008, 2011). These contributions are valuable for understanding broad patterns within the EU knowledge landscape. Given their wide scope, they necessarily do not examine the detailed dynamics of expertise in individual cases (e.g., Binderkrantz et al.'s consultation database includes 368 Commission proposals). They are joined by studies that look at specific cases of the use of expertise. For example, Metz examines Commission expert groups and the way they were utilised during the formulation of specific EU innovation policies (Metz, 2015; see also: Klika, 2015; Rimkutė, 2015). Similar studies focus on expertise in EU emissions trading (Dreger, 2014), and the role of expert groups in the creation of the EU green taxonomy for sustainable activities (Esposito & Nupieri, 2025; Fontan, 2025).

Much of this academic attention has focused on the European Commission. The Commission is a rather unique executive body which holds the right of initiative for policy proposals, strong in-house expertise in a variety of areas (Dreger, 2014), and an extensive, long-standing system of soliciting external policy advice through expert groups, committees, and stakeholder consultation (Binderkrantz et al., 2021). Therefore, it is a natural place for these literatures to focus. Other literature has looked at the construction of expertise in the European Parliament, how it is understood by policymakers, as well as the role of content expertise in the choice of MEPs as rapporteurs or shadow rapporteurs during policy processes (Elomäki & Haapala, 2024; Hermansen, 2018).

As noted in Section 1, knowledge and policy advice have also been studied in EU climate governance. Studies of the EU Emissions Trading System have emphasized the importance of the Commission's own expertise in

strengthening its role as a policy entrepreneur in this policy area, as well as the key roles played by a variety of related non-governmental actors (Dreger, 2014; Skjærseth & Wettstad, 2010). Studies in this field use a variety of theoretical/conceptual approaches, including policy learning, political learning, knowledge utilisation, evidence cultures, and the science-policy interface (Borie et al., 2021; Geddes, 2024; Zaki et al., 2024; Zaki & Dupont, 2024).

3. Knowledge regimes, policy advisory systems, and knowledge utilisation

To examine the broader knowledge landscape in EU climate policy, we draw on two key concepts: knowledge regimes (Campbell & Pedersen, 2014) and policy advisory systems (Capano et al., 2026). Campbell and Pedersen define knowledge regimes as the “organisational and institutional machinery that generates data, research, policy recommendations, and other ideas that influence public debate and policymaking” (Campbell & Pedersen, 2014, p. 3).¹ Campbell and Pedersen’s original formulation of this concept focused on think tanks and research institutes, but we follow Christiansen and Gornitzka (2022) in defining a knowledge regime more broadly to include a range of organisations (including formalised advisory bodies and other actor types such as NGOs).

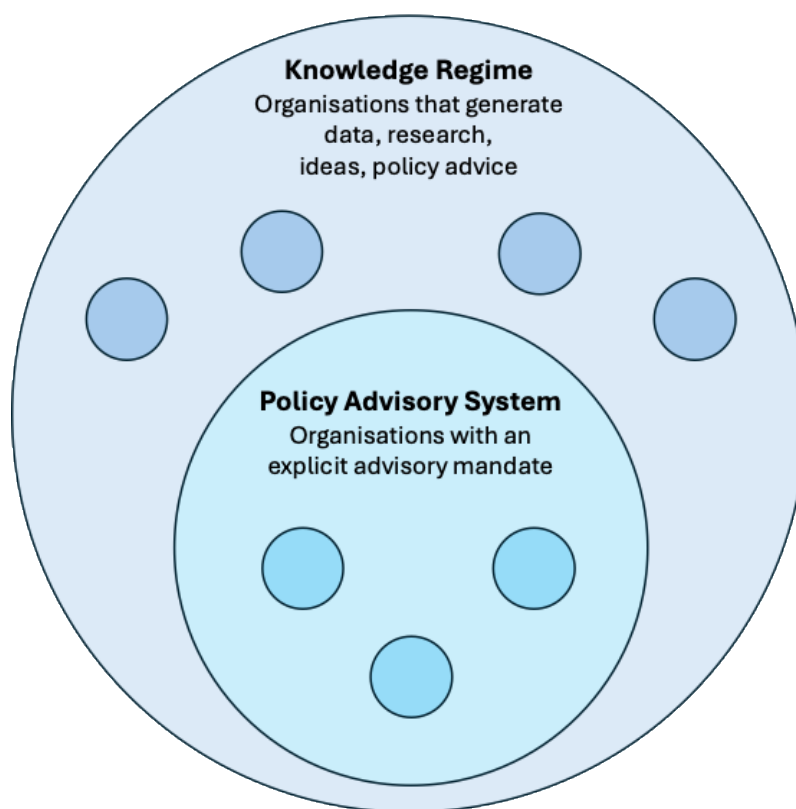


Figure 1. The knowledge regime and the policy advisory system

Policy advisory systems are defined as “the assemblage of formal and informal advisory units and practices, inside and outside of government, that exist at a given time and with which governments and other actors engage for policymaking purposes” (Capano et al., 2026, p. 1). We conceptualise a policy advisory system as

¹ This definition of a knowledge regime is distinct from the concept of the same name in Science & Technology Studies, which places greater emphasis on the role of shared ideologies, shared beliefs, and values (Felt et al., 2016; Vienni-Baptista & Pohl, 2024).

a sub-system of a wider knowledge regime, that is made up of organisations specifically focused on policy advice (Figure 1). Organisations can be thought of as existing on a spectrum depending on the extent to which they have an explicit mandate to provide *advice* as opposed to more general knowledge dissemination or production. As their names suggest, the European Scientific Advisory Board on Climate Change and the EU Scientific Advice Mechanism would be placed on the ‘advisory’ end of this spectrum and make up an important part of the EU’s policy advisory system on climate change. In contrast, an organisation such as the European Parliamentary Research Service, which is required to refrain from explicit advice to MEPs, would fall squarely on the knowledge provision side of this spectrum (see Section 5 for more details about these organisations).

The literatures on knowledge regimes and policy advisory systems both examine broad-based, interconnected systems of knowledge and expertise, with a strong focus on the relationships between the parts of that system as well as how they develop over time. However, they do not meaningfully engage with each other and there are few cross-citations between them. Although Christiansen and Gornitzka (2022) employ the knowledge regime concept while referring to key PAS publications, they do not explicitly refer to the advisory system concept.

The existing PAS literature has largely been used to examine policy advice in national political systems, especially in Anglo-Saxon countries (Capano et al., 2026; Craft & Halligan, 2020). Existing reviews of this literature have highlighted the relatively narrow geographical focus of existing research on national PAS in OECD countries, especially in Anglo-Saxon countries such as the UK, Canada, and the United States (Howlett, 2019). Additionally, there is limited use of these concepts when examining governance systems outside of the national level. Studies of international and United Nations level governance such as the UN Framework Convention on Climate Change and the Intergovernmental Panel on Climate Change use concepts such as the science-policy interface and boundary work/organisations (Borie et al., 2021; Hansson et al., 2021). Similarly, the knowledge regime concept was originally used to compare four national contexts (Campbell & Pedersen, 2014). The policy advisory system concept has, however, been used to examine EU policymaking. In one study, the advisory system focused on a specific piece of legislation and a small set of Commission expert groups (Esposito & Nupieri, 2025). In a related vein, Rogacheva (2019) examined the increasingly central role of political advisors in the European Commission, placing focus on one of the key trends in the PAS literature: the increased political nature of advice.

Given the complexity of these broad systems, and the exploratory nature of this research, we focused on key aspects of the knowledge regime and advisory system. For this we drew on the PAS literature, which is more conceptually developed in this area. The existing PAS literature has looked at many dimensions of advisory systems, including actors, organisations, processes, ideas, and outcomes (Capano et al., 2026, p. 5; Craft & Halligan, 2020). In this report, we focus on the organisational aspects of the knowledge regime/advisory system, what Capano et al. (2026) refer to as the “structural/institutional” dimension. We expand this approach to examine not only advisory systems but also the wider knowledge regime.

As noted above, the existing literature makes clear that the EU plays host to a complex and expanding landscape of knowledge and expertise in climate policy (Dupont, Rosamond, et al., 2024; Zaki et al., 2024; Zaki & Dupont, 2024). However, this leaves open the question of whether and how this knowledge is used within the policy process. There are several approaches to exploring these questions, ranging from qualitative case studies that examine the extent to which specific knowledge and evidence have impacted particular policies (Dreger, 2014; Fontan, 2025), to broader studies analysing which information is cited by policymakers, stakeholders, and others (Christensen & Hesstvedt, 2024a).

The knowledge utilisation literature addresses questions concerning both the use and non-use of knowledge (Christensen, 2021; Dudley et al., 2026; Weiss, 1986). Some of this literature adopts an organisation-focused approach, examining whether and how policymakers use knowledge from specific organisations. Dudley and colleagues study the UK government’s use of recommendations from the UK Climate Change Committee, an independent expert body (Dudley et al., 2022, 2026). Similarly, Averchenkova et al. (2021) examine how these recommendations are discussed in the UK Parliament.

Another approach considers how a specific policymaking institution uses knowledge from multiple sources, such as Christiansen’s study of Norwegian advisory councils across a wide range of policy areas (Christensen

& Hesstvedt, 2024a, see also: 2024b) and research on the impact assessments of Brexit-related legislation in both the European Union and the United Kingdom (Pattyn et al., 2021; see also Rosén & Tørnblad, 2020).

Like Pattyn et al. (2021), we focus on impact assessments as well as legislative proposals. Commission impact assessments have gained increasing importance in the EU policymaking process (Pattyn et al., 2021; Udrea & Bauer, 2023). The increasing influence of the Commission presidency on policymaking through the process of presidentialization (Kassim et al., 2017) has also empowered the Commission’s Regulatory Scrutiny Board and increased the importance of impact assessments for the successful publication of policy proposals. In the second part of our study, we therefore build on this approach by analysing the sources of knowledge which the Commission draws on when explaining and justifying its policy proposals.

4. Methods

4.1 Mapping the EU knowledge regime for climate change

Our analysis of the EU knowledge regime for climate change draws on document analysis, semi-structured interviews, and the existing academic literature. We examine primary documents from the EU institutions and other organisations operating in the knowledge regime, including advisory organisations, EU agencies, and expert groups. To supplement our findings from this document analysis, and to analyse processes that may not be captured in these documents, we draw on eleven interviews with actors throughout the knowledge regime, including officials in the EU institutions, independent advisory bodies, and EU agencies (see Annex A for a list of interviewees). As part of our analysis of the European Scientific Advisory Board on Climate Change (ESABCC) in Section 5.4.1, we examine the extent to which stakeholder groups referred to the ESABCC in their responses to the European Commission’s consultation on a proposed regulation to include a 2040 GHG target in the European Climate Law (COM/2025/524, see Table 1).

4.2 Knowledge utilisation and the European Commission

For our analysis of knowledge utilisation by the Commission, we focus on two policy processes: the formulation of the 2040 greenhouse gas target for the European Union and the 2023 EU Emissions Trading System Directive. These two cases are prominent examples of policy under the European Green Deal, the European Climate Law, and the Fit-for-55 package.

Table 1. Documents analysed

Document	Document #	Footnotes	Unique references
2040 target			
Commission Communication	COM/2024/63	36	36
Impact Assessment	SWD/2024/63	1,163	1,194
Legislative Proposal	COM/2025/524	36	44
Total (2040 target)		1,235	1,274
Emissions Trading Directive			
Legislative Proposal	COM/2021/551	74	75
Impact Assessment	SWD/2021/601	423	437
Total (ETS)		497	512
Total (overall)		1,732	1,786

Table 2. Classification scheme for footnotes

Footnote Type	Description	Example from 2040 Impact Assessment
Institutional Citation	Citation to a source created by a policymaking institution or a governmental knowledge institution.	ESABCC (2023). Scientific advice for the determination of an EU-wide 2040 climate target and a greenhouse gas budget for 2030–2050. DOI: 10.2800/609405.
Legal Citation	Citation to an EU law or a law from another jurisdiction.	European Climate Law, Article 4(4).
Academic/ Research Citation	Citation to a peer-reviewed, academic document or a document created by a research-oriented non-academic organisation.	See Rockström J. et al., Planetary boundaries: Exploring the safe operating space for humanity. Ecol. Soc. 14, 32 (2009).
Stakeholder Citation	Citation to a source created by a non-governmental stakeholder (excluding research organisations).	61% of the position papers analysed, commented on carbon removals, with many of them indicating removals would be instrumental to reach climate neutrality, if complementary to GHG emission reduction at source.
News Citation	Citation to source created by a news organisation.	Adomaitis, N., Kartit, D., 'Factbox: Carbon capture and storage projects across Europe', Reuters, 2023.
Further information	A discussion or further elaboration of the body text.	The approach of first agreeing the ambition level and then the policy framework to implement the target was also used in previous cycles to set the 2020 and 2030 climate and energy targets.
Error	An error or missing reference.	[Placeholder for GST conclusions]

We focus on the European Commission, given its central role in the policy formulation process and the fact that it publishes a relatively large amount of publicly accessible assessments on which legislation is based. Our analysis draws on documentary evidence, namely the legislative proposals and their impact assessments related to our two cases.² We examine five documents: 1) the Commission's Communication on the 2040 target; 2) that Communication's impact assessment; 3) the proposal to amend the European Climate Law to include the 2040 target; 4) the ETS Fit-for-55 proposal; and 5) the ETS F55 impact assessment (Table 1).

Footnotes were extracted from the documents using a Python script created by Claude Sonnet 4.6. The script extracted each footnote, the section/sub-section where it was located, as well as the body text to which the footnote referred. The resulting data was then manually checked for accuracy before coding commenced. Each reference was then classified according to authorship (institutional (government/advisory bodies), academic/research, news, or stakeholders). The analysis also classified references to legal material, footnotes used to convey further information, and errors. See Table 2 for more details.

² For the 2040 target: COM/2024/63, SWD/2024/63, and COM/2025/524. For the ETS Directive: COM/2021/551 and SWD/2021/601.

5. The EU knowledge regime for climate change

The European Commission, European Parliament, and the Council of the European Union play the central role in EU climate governance, given that almost all climate-relevant legislation is adopted through the Ordinary Legislative Procedure (OLP). In this procedure, the Commission proposes legislation, after which the European Parliament and Council negotiate modifications to the proposal and adopt (or fail to adopt) it as EU law. Therefore, we organise our mapping of the knowledge regime around these three main institutions. Each of the following subsections further details knowledge providers and advisory organisations which are oriented toward one of these EU institutions, followed by an examination of cross-cutting organisations which provide knowledge and advice to multiple audiences (see also Figure 2).

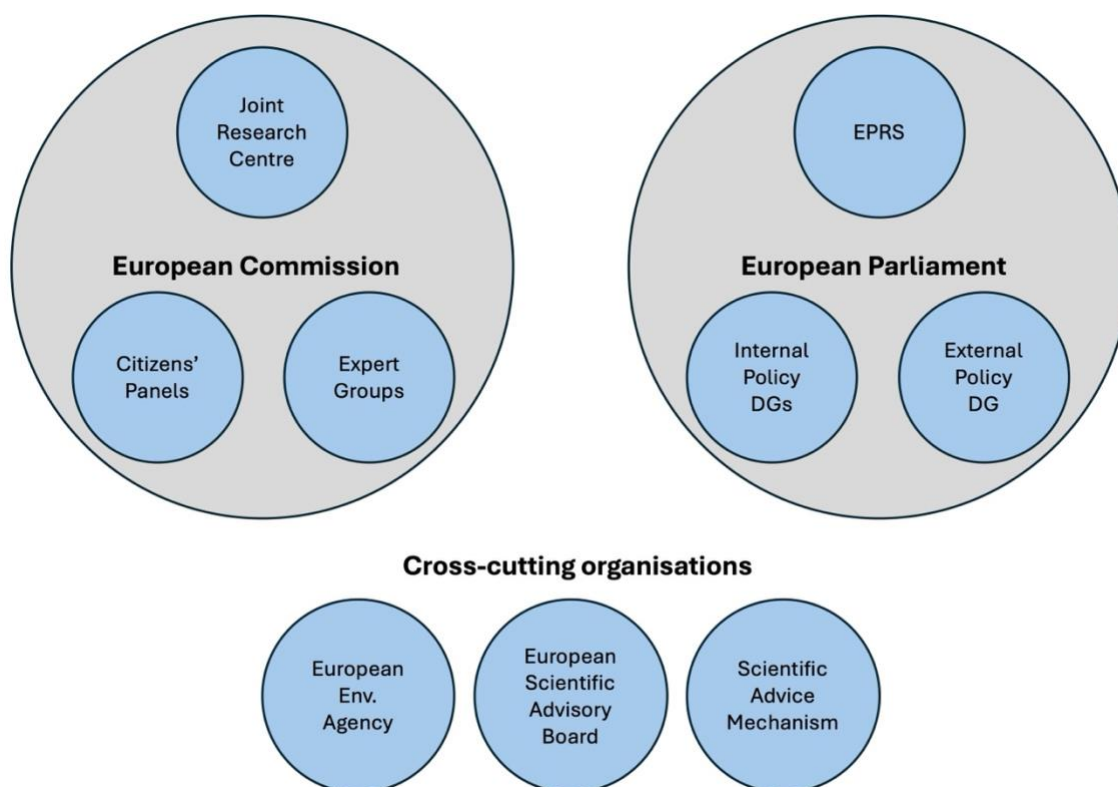


Figure 2. Key organisations in the EU knowledge regime for climate change

5.1 The European Commission

The Commission holds a central place in the EU policy process as the EU's executive arm: it prepares legislative proposals and is central to policy implementation and monitoring. As such it is also the most prominent audience for policy advice within the EU policymaking system, sitting at the centre of what Gornitzka and Holst (2015) refer to as the "EU expert-executive nexus". The Commission receives information through a variety of channels, including bilateral meetings, informal contacts, and a large number of policy-oriented events and publications organised in Brussels (see e.g. Dupont, Rosamond, et al., 2024). Knowledge and policy advice can also arrive indirectly through public consultations. Although these consultations are largely seen as a forum for stakeholder input (Binderkrantz et al., 2021), they can also serve as a route for new knowledge and policy advice to enter the policymaking process. Examples include the European Climate Change Programme in the early 2000s and the design of specific policy ideas which have their origin in these consultations (Jevnaker & Wettestad, 2017; Jordan & Moore, 2020).

Although these informal and alternative routes of knowledge provision can undoubtedly be important, given the methodological difficulties in studying them, we focus here on the formal, organisational aspects of the knowledge regime. We start with the policy-oriented Commission Directorates-General (DGs), such as DG CLIMA, which can draw on internal sources of knowledge, expertise, and advice. Desk officers who lead on specific policy files build up a mixture of technical and policymaking knowledge in that area (Dreger, 2014; Interviewee COM-1). The longer that a policy instrument or law is in place in the EU climate policy mix, the more this type of knowledge often builds up within the responsible DG. This process is visible, for example, in the case of the EU Emissions Trading System, where DG Environment, and later DG CLIMA after 2010, steadily built up both technical and policymaking knowledge related to the ETS, starting from a relatively low base in the late 1990s (Dreger, 2014; Skjærseth & Wetttestad, 2010; Interviewee COM-1). By the time of the revisions examined in this study, this type of knowledge was seen as a key resource for the Commission in policy negotiations (Skjærseth & Wetttestad, 2010). The Commission also has dedicated units related to some types of knowledge provision, for example the DG CLIMA Unit on Foresight, Economic Analysis & Modelling, which led the impact assessment of the Commission’s 2040 target communication (European Commission, 2024, Part 1, p. 87).

In addition to being a primary audience for knowledge and policy advice, the Commission also serves a second role as a knowledge *provider* to, among others, the Council and the European Parliament. This advisory role can take place in many parts of the policy system and at various stages of the policy process, for example directly in political negotiations in the Council and Parliament, during trilogue negotiations, and in the complex system of comitology that is related to the implementation of EU legislation (e.g., Marshall, 2012).

5.1.1 Joint Research Centre

The Joint Research Centre (JRC) is the European Commission’s internal scientific research centre and knowledge provider. Its main purpose is to carry out primary research that delivers underpinning evidence for EU policies. It provides scientific evidence for the preparation of impact assessments, and provides support in monitoring the implementation of policies, for example by establishing monitoring methodologies and identifying measurement indicators (Šucha et al., 2015).

The JRC also carries out primary research and generates new scientific knowledge for the rest of the Commission. It is organised across 25 portfolios that include natural, life and social sciences research on a range of policy-relevant issues, such as artificial intelligence, climate neutrality, demography, nuclear safeguards, and democracy. This primary research role may also lead to the identification of issues in need of a policy response.

Overall, the JRC is designed to provide the knowledge and scientific evidence in support of the development of EU policies: a scientific policy advice role that the JRC actively pursues (Topp et al., 2018). Interviewees in the JRC working on preparing climate policy advice mentioned that even with the JRC’s explicit mandate and internal role as provider of evidence for policy, it was not always easy to bring its advice before relevant policymakers. As one interviewee remarked, any policy advice had to be aligned with the Commission’s overall political priorities at any one time to be heard (Interviewee JRC-1). This confirms previous research suggesting that the policy advice role of the JRC is a work in progress (Topp et al., 2018).

5.1.2 Expert groups

The Commission sets up expert groups to advise it on policy issues (Gornitzka & Sverdrup, 2008; Metz, 2015). The Commission enjoys wide latitude to determine the membership of these groups, as illustrated by the reorganisation of sustainable finance groups after their strong opposition to the inclusion of natural gas and nuclear in the ‘green taxonomy’ of sustainable activities (Esposito & Nupieri, 2025; Fontan, 2025). Metz (2015) identifies three main roles of these groups: problem-solving, political substantiation (gaining expert support for an existing position), and consensus-building. The Commission maintains a register of these groups, which included 1,009 active groups.³ This register lists 20 active groups related to climate change, ranging from those with a broad focus (e.g., the Expert Group on Climate Change Policy) to those with a narrower remit on

³ As of 8 July 2026.

issues such as the Innovation Fund or geological carbon removals. Groups differ greatly in their size and composition; some include both Member State representations and a broad range of stakeholders, while others are limited only to government representatives.

Expert groups have a formal scrutiny role in the adoption of EU secondary legislation related to climate change. For example, of the 74 EU delegated acts (which amend non-essential aspects of legislation) proposed by the Commission in the first von der Leyen Commission and up to mid-2025, 60 were connected to an expert group. However, formal meetings of the group were held in only 20 cases (Rosamond et al., 2025, p. 16).

5.1.3 European Citizens' Panels

European Citizens' Panels are deliberative bodies composed of a random selection of EU citizens that are designed to provide policy recommendations on topics chosen by the Commission. For example, a 2024 panel focused on energy efficiency brought together 150 EU citizens to deliberate and provide recommendations to the Commission on energy efficiency policy (European Citizens' Panel on Energy Efficiency, 2024). The panels therefore hold an interesting position in the wider knowledge regime, in that they focus on randomly selected individuals (rather than subject-area experts) but also have a clear role providing policy advice.

5.2 The European Parliament

The European Parliament's knowledge organisations include the European Parliamentary Research Service, committee secretariats, and other bodies, e.g., the Directorate-General for External Policies of the Union that can tender for external expert reports (Marshall, 2012; Elomäki & Haapala, 2024; Interviewees EP-1, EP-2). This DG is joined by others focused on EU internal policy. This knowledge architecture is seen as an important requirement for the EP's role scrutinizing and amending Commission proposals as well as negotiations with the Council (Interviewee EP-1).

Both MEPs themselves, their staff, and political groups have important expertise spanning the technical/policymaking divide (Alexander, 2022; Hermansen, 2018; Interviewees EP-2, FOUNDATION-1). The secretariats of individual committees such as the environment committee also play a role advising MEPs, e.g. when drafting texts within the committee or in trilogues. They check the quality of expertise and are lobbied in turn by interest groups as well as the European Commission (Marshall, 2012). MEPs can also draw on broader, strategic studies from affiliated political foundations that are funded by the Parliament (Interviewee FOUNDATION-1).

The European Parliamentary Research Service (EPRS) has two roles in the European Parliament (Interviewees EP-1, EP-2). One role is as a knowledge provider and fact checker, especially for individual MEPs. The second is to provide broader, think tank style reports on issues such as technological innovation (for an illustration, see Reillon, 2016). The EPRS is not called on to give explicit policy advice, as it is required to be politically neutral (Interviewees EP-1, EP-2). This can significantly limit the information it provides, since it must be acceptable across the Parliament's political spectrum (Interviewee EP-1).

5.3 Council of the European Union

The Council of the European Union appears to have a relatively limited EU-level architecture for knowledge provision and policy advice when compared with the European Parliament and especially the European Commission. The Council Secretariat provides policymaking knowledge, e.g., on legal aspects of proposals, and in certain subject areas and time periods has also held significant technical expertise, such as in foreign policy, particularly prior to the Lisbon Treaty and the creation of the European External Action Service (Christiansen & Vanhoonacker, 2025).

In general, Council policymaking documentation makes limited reference to specific outside sources of information and focuses largely on political positions within negotiations, both within the Council itself and in trilogue negotiations with the European Parliament. Prominent cases of substantive technical knowledge being mobilized in Council negotiations on climate policy often originate either with the European Commission or with departmental expertise in a Member State. Within negotiations on climate-related legislation, specific Member States or coalitions of Member States bring forward opinions or evidence within the process (Moore,

2023). This is also often a role carried out by the Commission as a source of information for the Member States as they negotiate (Leenders et al., 2024).

To use an illustration from negotiations surrounding the Emissions Trading System, in 2018 it was agreed to invalidate a certain number of allowances from the Market Stability Reserve to raise carbon prices. This proposal was supported by a coalition of Member States that included the UK. The UK government circulated a non-paper in support of the proposal, which drew heavily on UK government analysis (Moore, 2023; see also: French Government & UK Government, 2016). Another illustration is the negotiations on the Emissions Trading System for buildings, road transport, and other industry (ETS2), which were highly contentious within the Council. A Commission non-paper circulated in 2022 was influential in shifting the debate and making way for passage of this controversial instrument (European Commission, 2022; Leenders et al., 2024). Because of this overall context, knowledge-based interactions with other EU institutions, such as the European Parliament, often tend to be with individual Member States rather than with the Council as a whole (Interviewee EP-2).

5.4 Cross-cutting organisations

Aside from the organisations oriented toward a specific EU institution, there are several climate-related organisations in the knowledge regime that have multiple policymaking audiences. Of those covered here, two have a clear advisory mandate (ESABCC and SAM) while the third is more clearly categorised as a knowledge provider (EEA).

5.4.1 European Scientific Advisory Board on Climate Change

The European Scientific Advisory Board on Climate Change (ESABCC) was created by the 2021 European Climate Law, with a mandate to advise the EU (and, in practice, the Commission in particular) on climate change issues. The ESABCC was first proposed by the European Parliament during political negotiations on the European Climate Law and its creation did not initially enjoy support from the Commission (Seibicke, 2025; Interviewees ESAB-1, ESAB-2). It is made up of 15 external academics appointed to four-year terms, with a secretariat hosted by (but operating independently from) the European Environment Agency. The central role of academics is notable given that they generally play a relatively marginal role in other areas of the EU knowledge regime, including in expert groups (Gornitzka & Sverdrup, 2011) and public consultations. For example, out of 20 consultations related to emissions trading, only 14 of 1,391 organisations responding were classified as academic.

The ESABCC's first four-year term ran between 2022 and 2026, with the second beginning in March 2026 and running until 2030. Nine of the fifteen board members for the second term were returning for a second mandate (individuals are limited to two mandates; see ESABCC, 2025b). Many of the board members had also been involved in other bodies including the Intergovernmental Panel on Climate Change and national climate advisory bodies (e.g., from Sweden and Finland during the second ESABCC mandate).

As an independent body, the ESABCC is tasked with setting its own agenda and since 2022 has published an annual work programme presenting its priorities for the coming year. The European Climate Law did, however, call on the board to produce advice on the EU's 2040 greenhouse gas target. It also required the Commission to take this advice into account when formulating its proposals. Following the guidance set out in the ECL, in 2023 the Advisory Board produced two reports related to the 2040 target. The first report focused on its recommendations related to the process that the Commission should follow in setting the target (ESABCC, 2023a). The second report set out its advice on what that target should be (ESABCC, 2023b), considering the EU's commitments under the Paris Agreement and its stated objective of contributing to limiting the global average temperature increase to below 1.5 degrees Celsius. In that second report, the ESABCC recommended a 2040 target of a domestic reduction of GHG emissions between 90 and 95% below 1990 levels (ESABCC, 2023b, p. 10). The second advisory document was heavily cited by the Commission in the impact assessment for its 2040 target proposal (European Commission, 2025; see Section 6) and has been credited with playing an important role in the Commission's decision to propose a 90% reduction target (Seibicke, 2025, p. 8; Interviewees ESAB-1, ESAB-2). In 2025, the Advisory Board released a follow-up report on amending the European Climate Law and explicitly stated its opposition to using international credits as part of the 2040 target (ESABCC, 2025a, pp. 6–7). Despite this position, in its July 2025 policy proposal the Commission

suggested a possible use of those credits to meet 3% of the 90% target, a figure which was raised to 5% in interinstitutional negotiations (see Regulation (EU) 2026/667).

Although its three reports focusing on advice for the 2040 target have so far been its most prominent intervention in EU climate policymaking, the ESABCC published a total of eleven reports between November 2022 and March 2026. These reports focus on several topics, including energy infrastructure, carbon removals, climate adaptation, the agricultural sector, and a broader progress report on the EU's climate policy.

Since its formation, the Advisory Board's advice has been used by policymakers and stakeholders within the EU policy process in several ways. Its advice has been used directly by policymaking institutions including the European Commission, especially in the case of the EU 2040 GHG target. Section 6.1 of this report presents a detailed analysis of the sources of knowledge that the Commission cited during the policy process for the 2040 target, including its 2040 communication, the underlying impact assessment, and the proposal for revising the European Climate Law to include a 2040 target (see especially Table 5). Here we briefly focus on how the Advisory Board fits into that citation landscape. Overall, the ESABCC holds a relatively modest position in terms of the number of times it was cited in these documents, similar to the citations of the European Environment Agency and much less than those to the European Commission, the Joint Research Centre, and international organisations as a group (especially the Intergovernmental Panel on Climate Change). On the other hand, the ESABCC was referred to much more than the other independent advisory organisation, the Scientific Advice Mechanism, largely because the Commission explicitly referred to the Advisory Board's recommendations when setting its 90% target.

Another route of influence is more indirect, through the use of ESABCC recommendations by stakeholder groups. To explore this issue, we examined the stakeholder responses to the European Commission's consultation on the 2040 target legislative proposal which ran from July to September 2025. Consultation responses were analysed to see whether they cited the ESABCC, the nature of those citations, and each stakeholder's policy positions related to support for a 2040 target of at least 90% and the use of international credits to reach that target (Table 3).

Table 3. References to the ESABCC during the 2040 target public consultation

	Category	Cites ESABCC (n=58)	Does not cite ESABCC (n=183)	% of category citing ESABCC
Organisation type	Business	20	147	12%
	NGO	34	13	72%
	Other	4	23	15%
Support for 2040 GHG target of at least 90%	Support	55	75	42%
	Oppose	0	32	0%
	Unclear/Not Addressed	3	76	4%
Support for the use of international credits to reach 2040 target	Support	11	66	14%
	Oppose	37	16	70%
	Unclear/Not Addressed	10	101	9%

There were 241 valid responses to the consultation. Approximately one-quarter of these responses referred explicitly to the ESABCC. In percentage terms, NGOs were much more likely to refer to the Advisory Board than business organisations. None of the organisations which referred to the ESABCC opposed a 2040 target

of at least 90%. Many of them cited the 2040 recommendations to either underline their support for a 90% target (e.g., Statkraft) or to argue that the target should be higher than 90% (e.g., WWF), given that the ESABCC had recommended between 90% and 95%. ESABCC recommendations were also heavily cited by organisations opposing the use of international credits to reach the 2040 target (e.g., Climate Action Network), given that the Advisory Board had also recommended against this approach, e.g., in its 2025 report (ESABCC, 2025a). Organisations also cited ESABCC advice on carbon removals to push for three separate targets (on greenhouse gas reductions, temporary land-based removals, and permanent removals), as well as to support the overall importance of carbon dioxide removal (e.g., the European Biogas Association).

5.4.2 Scientific Advice Mechanism

The EU Scientific Advice Mechanism (SAM) traces its roots to the Chief Scientific Advisor to the Commission President, a role which was created in 2012 and modelled on similar roles in several EU Member States (Alemanno, 2014; Tsui, 2021). Following controversy surrounding the advice given by the first such advisor on topics including Genetically Modified Organisms, the advisor role was discontinued and the SAM was created. It includes a seven-member Group of Chief Scientific Advisors and the Science Advice for Policy by European Academies (SAPEA) network (Tsui, 2021).

The SAM advises on the priorities of the Commission, Council, and Parliament (although requests continue to be made by the College of Commissioners). Therefore, in contrast to the ESABCC, the SAM responds to specific requests from the Commission rather than setting its own advisory agenda. Its reports address a wide range of policy issues: among its 22 advisory reports since 2016, 7 are related to climate policy, including on climate adaptation, sustainable food production, solar radiation management, and carbon capture and utilisation. Some reports are narrow and technically oriented, such as advice on how to more effectively measure carbon dioxide emissions from light duty vehicles that was published after the Dieselgate scandal (High Level Group of Scientific Advisors, 2016). Others are broader in scope, such as SAM advice on taking a systematic approach to the energy transition, including an evidence report coordinated by SAPEA (SAPEA, 2021) and recommendations by the chief scientific advisors (Group of Chief Scientific Advisors, 2021).

5.4.3 European Environment Agency

The EEA was founded in 1994 to monitor the EU's progress on implementing environmental legislation. It is headquartered in Copenhagen and is one part of EU 'agency' system that includes more than 30 decentralised agencies covering a wide variety of topics, thereby sitting inside the EU system, but at a distance from the policymaking institutions (Dupont, Rosamond, et al., 2024; Zito, 2015). The EEA's work on climate change includes preparing annual reports on progress towards overarching climate targets and projections of future pathways (see, e.g., European Environment Agency, 2025). The Agency's initial mission was focused on establishing and managing data flows and providing data analysis on the environment and climate. Over the years, however, it has built up a body of knowledge that is relevant for climate policy objectives and long-term policymaking.

In its 2015 report on the State and Outlook of Europe's Environment, the Agency highlighted its broader knowledge base and its potential contribution to understanding and implementing sustainability transitions (European Environment Agency, 2015). The EEA has continued to build its body of knowledge since then and has taken concerted efforts to ensure its knowledge reaches policymakers. Interviews with staff at the EEA suggest that these efforts included several strands: formal meetings with policymakers in the Commission, Council and Parliament; early consultations with policy officers in the Commission on forthcoming reports; and informal conversations based on professional relationships (Interviewees EEA-1, EEA-2).

Evidence of the impact of the EEA's policy advice is seen, e.g., in the reference to its 2020 State and Outlook report in the European Commission's communication on the European Green Deal (European Commission, 2019). As such, even without an explicit role as policy adviser, the EEA has expanded from a data provider to a knowledge provider, specifically focused on environmental and climate policy issues (Dupont, Rosamond et al., 2024).

6. Commission knowledge utilisation in climate policy

6.1 The 2040 greenhouse gas target

6.1.1 Policy context

The EU's 2040 greenhouse gas reduction target was adopted as a revision to the European Climate Law (see Regulation (EU) 2026/667). The regulation sets a goal of a 90% overall reduction in emissions relative to 1990 by 2040, with the possibility of using up to 5% international credits to meet this target. The minimum 'domestic' reduction target was therefore set at 85%. The 2040 target sits within a long history of greenhouse gas target setting by the European Union stretching back to the early 1990s. The 2040 target also sits within the important context of the two GHG targets that precede and follow it, namely the 2030 55% GHG target and the 2050 climate neutrality target. The 55% target for 2030 was a surprise proposal by the von der Leyen Commission in 2019, later framed in the context of the European Green Deal. This 55% target significantly increased the original 40% reduction target set by the European Council in 2014 as part of the 2030 Climate and Energy Framework (European Council, 2014).

The process to set the 2040 target differs from its predecessors in important ways. The European Climate Law explicitly mandated a process for the Commission to set the 2040 target, including a specific timeline and several requirements for the Commission, including that the 2040 target be adopted as an amendment to the ECL (Article 4). This approach was a departure from most past EU GHG targets, which had been decided by the Council of the European Union or the European Council but had not been formally set in EU law. This also implied a role for the Ordinary Legislative Procedure, including for the Council of the European Union and the European Parliament, compared to earlier targets, which had been set largely within the context of negotiations in the European Council (see e.g., Fitch-Roy & Fairbrass, 2018).

In contextual terms, the 2040 target was proposed and adopted in an atmosphere of strong contentiousness and climate backlash. The second von der Leyen Commission had shifted from a primary focus on the European Green Deal towards a stronger emphasis on competitiveness, including a high-profile simplification drive under the so-called omnibus packages, alongside a more challenging political balance in the European Parliament.

6.1.2 Knowledge utilisation and the 2040 target

The documents we analysed related to the 2040 target contained 1,094 citations. Almost all of these were contained in the impact assessment that accompanied the 2024 Commission Communication on the 2040 target (SWD/2024/63). Most of these references were institutional citations and academic/research citations, with the remainder largely focused on EU law and a much smaller amount on stakeholders and newspaper reports (see Table 4 below). Within the institutional references (Figure 3), the largest category was EU-level organisations, but there were also a significant number of references to international organisations such as the Intergovernmental Panel on Climate Change (IPCC), the World Meteorological Organisation (WMO), and the International Energy Agency (IEA). There were only a few references to national-level organisations (mostly in the EU).

Within the institutional category (Table 5), by far the most cited organisation was the European Commission itself (nearly half of institutional citations), with a significant number of references to the Joint Research Centre. There were no references to the European Parliament, the Council, or the European Council. There were notable citations of the European Environment Agency and the European Scientific Advisory Board, with a very small number for the Scientific Advice Mechanism. These three organisations, which sit within the European knowledge regime but outside of the European Commission, together garnered fewer citations than the Joint Research Centre. Many of the references to the ESABCC referred to its recommendation that the EU adopt a target for 2040 within the range of 90-95% (which the Commission proposal fell within). References to the Scientific Advice Mechanism were focused on its sustainable food report and made broad references to the need for a shift in dietary behaviour and the need for policy support (European Commission, 2024, Part 1, fn. 148). There were also many citations of international organisations, most prominently the IPCC, followed

by the IEA and the WMO, with nine references to the Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES).

Table 4. Overview of citation types (percentage of total citations in parentheses).⁴

Citation Type	2040 Target	ETS
Academic/Research	307 (28%)	113 (28%)
Institutional	604 (55%)	161 (40%)
Legal	142 (13%)	99 (25%)
News	10 (1%)	6 (1%)
Stakeholder	31 (3%)	23 (6%)

In the academic/research category, the 2040 target documentation cites approximately 200 peer-reviewed academic books and articles and another 100 grey literature research publications (from think tanks, consultancies, and academic assessments outside of the published literature). Much of the peer-reviewed literature addresses the impacts of climate change, options for climate mitigation, future GHG projections, and the impacts of different policy options for the 2040 target.

6.2 The 2023 ETS Directive

6.2.1 Policy context

The Commission proposed the 2023 ETS Directive in 2021 to implement the EU's 55% GHG target for 2030 within the ETS and to create a new system, the ETS2, for buildings, road transport, and small industry. Although, as part of the European Green Deal, the 2023 Directive was outside the regular ETS revision process, it drew on a long history of policy changes to the ETS1, which began operation in 2005 and had already been subject to several major legislative revisions prior to the European Green Deal (Wettestad & Moore, forthcoming).

Some parts of the 2023 Directive were in line with previous policymaking on the topic, in that they modified the ETS1 in line with the new 55% target while following the approach used in previous revisions linked to changes in EU greenhouse gas reduction targets. This was the case, for example, with the increase of the ETS emissions reduction target for 2030 to a 62% cut compared to 2005 levels. Other aspects were more novel, involving the creation of new instruments or the expansion of the existing ETS1. These included the extension of emissions trading to maritime emissions, the phase-out of free allocation to industry in conjunction with the introduction of the Carbon Border Adjustment Mechanism, and, most prominently, the creation of the ETS2 and the related Social Climate Fund.

6.2.2 Knowledge utilisation and the ETS Directive

The ETS-related documents we analysed contained 402 citations. About four-fifths were made in the impact assessment (SWD/2021/601) with the remainder coming from the legislative proposal itself (COM/2021/551).

⁴ These figures exclude footnotes coded as "further information" or "error".

Most of these references were institutional citations and academic/research citations, with an additional, notable focus on legal citations (25%) (see Table 4 above). Within the institutional references (Figure 3), almost all citations (90%) were to EU-level organisations, with minimal reference to international or national organisations.

Within the institutional category (Table 5), by far the most cited organisation was the European Commission itself (116, 70% of institutional citations). Outside of Commission citations, no single organisation was cited more than five times (a level met by the EEA). There were four references to the European Parliament and four to the European Council. In the academic/research category, almost all of the citations were to grey literature (85%), especially a study prepared by outside research organisations related to the revision of the ETS Directive (ICF et al., 2020). The peer-reviewed literature cited often analysed the EU ETS and especially its Market Stability Reserve.

Table 5. Most frequent organisations referenced in institutional citations by the Commission

Organisation	2040 target	ETS	Total
EU institutions			
European Commission	272	116	388
Of which: Joint Research Centre	76	6	82
European Parliament	0	4	4
Council/European Council	0	4	4
External EU-level organisations			
European Environment Agency	23	5	28
European Scientific Advisory Board	35	0	35
Scientific Advice Mechanism	2	0	2
National organisations			
Member state ministries/agencies	11	2	13
International organisations			
IPCC	89	1	90
World Meteorological Organisation	20	0	20
International Energy Agency	29	2	31
IPBES	9	0	9

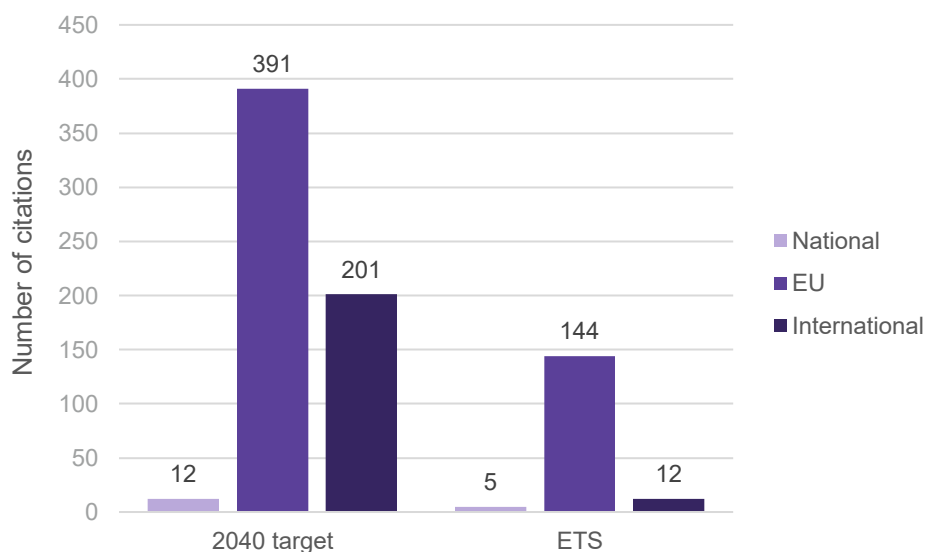


Figure 3. Governance level of institutions cited by European Commission

7. Discussion and conclusions

Our findings have revealed a broad, complex, and growing knowledge regime for climate change in the European Union. It is a landscape with many different sources of and audiences for knowledge and expertise. The regime has a strong Commission focus, as expected from the existing literature, but with a strong and increasingly prominent role for cross-cutting organisations (such as the EEA and ESABCC). Some organisations are long-standing (the JRC and EEA), while others are more recent (the ESABCC and European Citizens’ Panels). In some cases (EEA and ESABCC), the Commission initially resisted the organisation’s creation or the expansion of its scope (Seibicke, 2025; Zito, 2015). The scope of individual organisations is influenced by the overall landscape; e.g. the EEA oversees some data/monitoring tasks that are handled by independent advisory bodies like the ESABCC at national level.

The analysis of the Commission’s utilisation of knowledge in policy proposals and impact assessments has reinforced the findings of the existing literature that it can draw on a wide range of information sources when formulating and justifying its policy proposals. It also clearly shows that some parts of the knowledge landscape can be drawn on much more than others. It is notable that several of the organisations that we discussed in our mapping in Section 5, including the Scientific Advice Mechanism, Commission expert groups, and European Parliament organisations such as the EPRS, were rarely or never cited in the two cases we studied. Other organisations, such as the EEA, ESABCC, and especially the JRC, were much more prominent. This is likely due in part to the cases we chose to study and it might look very different if we had chosen other policy topics. But it serves to highlight the complexity both of the landscape itself and how it is utilised in practice by key policy actors. These findings also suggest that we should conceptualise the EU climate-related knowledge landscape as multi-level and embedded in a wider global network of knowledge production and utilisation.

Indeed, understanding the broader landscape is crucial (and the existing literature has been Commission focused and/or focused on a single part of that landscape). In the context of the necessity to strengthen democracy and implement the climate transition, all types of knowledge need to flow to the centres of policymaking in a transparent manner (Brawley-Chesworth et al., 2024). It is clear that an organisation’s influence on policymaking in part depends on the specific legislation involved; e.g., the ESABCC played a prominent role in the debate on the 2040 greenhouse gas target (where the European Climate Law set its advisory role), whereas in other policy processes it has not been as prominent. The independence of such advisory bodies is key to ensuring the perceived legitimacy of their role as advisor and knowledge provider.

These organisations can play a key role in increasing accountability within the policymaking system, a role that the ESABCC has increasingly stepped into with its clear position that the 2040 GHG target should be a domestic target without the use of international credits (ESABCC, 2025a), the publication of progress reports on EU climate mitigation policy (ESABCC, 2024), and critiques of the EU’s approach to climate adaptation (ESABCC, 2026). We have also shown that recent innovations in the knowledge regime, such as the integration of the European Citizens’ Panels, have incorporated nascent participatory and deliberative institutions into what remains a highly technical, expert-oriented process.

Our findings also suggest potential priority areas for future research. Our mapping of the climate-related knowledge regime suggests a need for future research on individual parts of that landscape that have not yet received sufficient attention in the literature, especially those related to the European Parliament. The present study is also designed as a snapshot in time and could therefore be usefully expanded by undertaking a historical study of the development of the knowledge regime and how it has changed since climate change first appeared on the EU policy agenda in the 1980s. To build on the knowledge utilisation analysis, one approach for future research would be to expand and deepen the analysis to focus on a single policy process, such as the 2040 target, across multiple policymaking institutions such as the European Parliament to see how knowledge utilisation differs between policy actors. Another potentially interesting avenue to explore would be the extent to which, in the 2040 target case, the ESABCC’s advice and the European Commission’s impact assessment share citations. Relatedly, the exploratory nature of our two case studies and the clear differences related to cited sources raises questions about how these patterns of knowledge utilisation differ across the broader landscape of legislation related to the European Green Deal, the Fit-for-55 package and the implementation of policy changes related to the 2040 target (such as the proposal to revise the ETS1 released in July 2026). Future research could therefore expand the scope to look at a larger number of legislative proposals to compare their approach to knowledge utilisation and the extent that shared bodies of knowledge exist within EU policymaking.

Overall, our study has highlighted the breadth and complexity of the knowledge regime for climate change in the EU. The importance of this regime is only likely to increase in the coming years as Europe moves closer to climate neutrality and faces the increasing technical, economic, and political challenges to successful climate mitigation and, increasingly, climate adaptation. Given the importance of, and contestation around, various types of knowledge related to climate policymaking, it will be important for policymakers, stakeholders, and the public at large to continue to examine and engage with the topics that we have discussed here. In this context, researchers should continue to explore questions related to this topic to contribute to a more effective system of science-policy interaction, advice, and the use of knowledge in EU climate policy.

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Annex A: List of Interviewees

#	In-text label	Organisation	Date of interview(s)
1	ESAB-1	European Scientific Advisory Board on Climate Change	27 June 2025
2	ESAB-2	European Scientific Advisory Board on Climate Change	27 June 2025
3	EP-1	European Parliament	7 July 2025
4	EP-2	European Parliament	24 June 2026
5	FOUNDATION-1	European political foundation	29 August 2025
6	JRC-1	Joint Research Centre	5 February 2020
7	EEA-1	European Environment Agency	25 May 2022
8	EEA-2	European Environment Agency	16 June 2022
9	COM-1	European Commission	20 May 2016
10	PERMREP-1	Member State Permanent Representation	7 April 2016
11	PERMREP-2	Member State Permanent Representation	23 March 2017