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RECEIVED 05 August 2025

ACCEPTED 30 October 2025

PUBLISHED 19 November 2025

CITATION

Skarzauskiene A, Mačiulienė M, Kovaitė K,
Šūmakaris P, Kotrikla A-M, Gulevičiūtė G,
Fameli K-M, Polydoropoulou A and
Balkė R (2025) Assessing the effectiveness of
climate assemblies: framework for measuring
deliberative impact.
Front. Clim. 7:1680125.
doi: 10.3389/fclim.2025.1680125

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Assessing the effectiveness of climate assemblies: framework for measuring deliberative impact

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Introduction: Climate assemblies have gained attention as participatory governance instruments designed to address complex climate challenges through inclusive deliberation. However, despite their growing prominence, systematic approaches for assessing their performance and impact remain scarce. This study responds to that gap by proposing a structured evaluation framework to measure the deliberative effectiveness of climate assemblies within the broader context of democratic climate governance.

Methods: An iterative, multi-stakeholder design process guided the development of the framework. It drew upon best-practice reviews, stakeholder consultations, and collaborative workshops. The resulting structure integrates input, process, and outcome dimensions, each associated with two key objectives: policy legitimacy, rooted in inclusive and trusted participation, and policy effectiveness, reflected in the influence of assembly recommendations on climate policy. The framework was piloted in two European climate assemblies to test its applicability and robustness.

Results: The pilot evaluations demonstrated that applying a systematic assessment framework enhanced transparency and accountability within deliberative processes. It enabled a clearer understanding of how well assemblies fulfilled their aims of inclusion, deliberative quality, and policy relevance. Findings also revealed that consistent evaluation helps identify design strengths and weaknesses, supporting more evidence-based improvements in future assemblies.

Discussion: The study shows that structured evaluation is not merely a reporting exercise but a mechanism to strengthen democratic legitimacy and practical effectiveness. By offering standardized criteria and measurable indicators, the framework assists policymakers, organizers, and researchers in assessing whether climate assemblies translate citizen participation into tangible climate action. It contributes a practical and theoretically grounded tool for advancing deliberative democratic practices in climate governance.

KEYWORDS

climate assemblies, deliberative democracy, performance monitoring, policy impact, citizen engagement, climate governance

1 Introduction

Climate change is widely recognised as one of the most pressing governance challenges of the twenty-first century, demanding approaches that extend beyond traditional state-led policymaking. Scholars and policy organizations increasingly stress that citizen participation is essential for effective climate governance. Research highlights that engaging citizen enhances democratic

legitimacy (Bäckstrand and Lövbrand, 2019; Willis et al., 2022), supports knowledge coproduction and locally grounded adaptation strategies (Wamsler, 2017; Devaney et al., 2020), and strengthens the robustness and acceptance of climate policies (Boswell et al., 2023). International institutions such as the OECD (2020, 2021) also argue that deliberative processes involving citizens build trust and improve decision quality in complex policy areas, including climate change. Cities and local governments play an important role in addressing climate change, particularly in adapting, yet municipalities often struggle to move beyond tokenistic consultation toward genuine power sharing in decision making (Wamsler, 2016). Within this context, Climate Assemblies (CA) have emerged as promising participatory governance tools that bring together randomly selected citizens to deliberate on climate policies and make recommendations to policymakers (Kuntze and Fesenfeld, 2021). These deliberative forums aim to enhance democratic legitimacy, build public consensus, and generate innovative policy solutions that reflect diverse societal perspectives (Howarth et al., 2025).

Despite their growing popularity across Europe and globally (Boswell et al., 2023), a significant challenge remains to systematically assess the effectiveness, inclusivity, and impact on policy of CAs. According to the Good Practice Principles for Deliberative Processes for Public Decisions (2021), timely and thorough evaluations build trust among policymakers, the public, and stakeholders, particularly those not directly involved in the deliberative process. However, current assessment approaches tend to be *ad hoc*, focusing primarily on participant satisfaction rather than systematically evaluating deliberative quality and policy influence (Elstub et al., 2021). Questions remain about the actual impact of their recommendations on public policy (Thorman and Capstick, 2022). Without robust evaluation frameworks, it becomes difficult to determine whether these deliberative processes are achieving their intended objectives or to identify areas for improvement.

This study addresses this gap by presenting a validated monitoring framework explicitly designed for climate assemblies. While applicable across governance contexts, its structure responds to the distinctive challenges of climate governance. Alongside general deliberative indicators, it incorporates measures of climate-related knowledge (e.g., awareness of local risks such as flooding, heat stress, or biodiversity loss), attitudes toward adaptation and mitigation strategies (e.g., perceived effectiveness of renewable energy or nature-based solutions), and climate efficacy (e.g., belief that collective action can reduce risks). The framework also tracks whether assembly recommendations are integrated into climate action plans, adaptation strategies, or municipal policies, thus addressing the “implementation gap” between planning and action (Patterson and Huitema, 2019). Recognising that effective adaptation depends on local conditions rather than generic models (Woodruff, 2018), it enables evaluators to identify how contextual factors such as political commitment, institutional capacity, and public trust shape deliberative outcomes and policy impact.

The following sections are structured accordingly. Section 2 presents the investigation context, highlighting the limitations of conventional policymaking and the emergence of CAs as participatory governance tools; Section 3 outlines the iterative design approach used to develop the methodological framework, including review of the literature, stakeholder participation, and piloting; Section 4 details the results, including the development of the Climate Assembly Performance Monitoring framework and its piloting; and Section 5 provides a discussion of the results, addressing challenges such as stakeholder diversity, data limitations, and the need for tailored evaluation approaches.

2 Theoretical background for evaluating climate assemblies

Contemporary policymaking mechanisms face structural limits in addressing the urgency and complexity of climate change mitigation and adaptation (Bäckstrand and Lövbrand, 2019). Short electoral cycles hinder the pursuit of long-term strategies (Bernauer and Gampfer, 2013), decision making remains fragmented across governance levels (Tallberg et al., 2018), and building broad societal consensus on transformative action is difficult (Dryzek and Niemeyer, 2024). These challenges highlight the need for more inclusive and participatory forms of citizen participation.

Climate Assemblies (CAs) have emerged as democratic innovations designed to address these shortcomings. By bringing together a demographically representative sample of citizens to deliberate on climate policy, CAs aim to enhance legitimacy, inclusiveness, and epistemic quality in environmental governance (Devaney et al., 2020; Escobar and Elstub, 2017). In theoretical terms, they embody the deliberative turn in democratic theory (Cohen, 1989; Chambers, 2003), translating principles of equality, reason-giving, and reflexivity into practice.

The decision-making environment around CAs is complex and involves multiple actors with different expectations. Government entities at the local, regional, and national levels, often commissioning and funding assemblies, seek evidence of effectiveness, legitimacy, and policy relevance (Elstub et al., 2021; OECD, 2020). Funders, public or private, require proof of cost-effectiveness and alignment with strategic objectives (Stevenson and Dryzek, 2014). Policy officials depend on evaluations to understand how recommendations can be integrated into governance processes (Newig and Fritsch, 2009). Organizers, such as NGOs and academic institutions, use evaluations to refine facilitation, ensure that goals are met, and improve future design (Escobar and Elstub, 2017; Fishkin, 2018). Civil society and the wider public expect transparency and accountability, seeking assurance that citizen voices influence decision-making (Dryzek and Niemeyer, 2019; Hammond, 2020). The researchers value detailed data for comparative analysis and theoretical advancement in participatory democracy (Curato et al., 2017; Dryzek et al., 2019). Acknowledging this plurality is critical: any evaluation framework must balance methodological rigor with practical utility, producing meaningful insights across these diverse audiences.

At the same time, CAs are embedded in broader governance contexts. In Europe, they align with initiatives such as the EU Mission on Adaptation to Climate Change, which aims to foster resilience in at least 150 regions by 2030 through citizen participation (Whyte et al., 2024). At the global level, experiments such as the Global Citizens' Assembly on the Climate and Ecological Crisis demonstrate their potential in shaping international agendas (Global Assembly Team, 2022). These developments underscore that CAs are not isolated experiments, but part of an evolving governance architecture where participatory processes complement representative institutions. Evaluations therefore require sensitivity to multilevel governance dynamics and transnational learning (Dryzek et al., 2019).

Climate and citizen assemblies do not work in isolation but in a broader public sphere and political system (Caluwaerts and Reuchamps, 2023). According to KNOCA (Demski and Capstick, 2022), approaches to assessing climate deliberation tend to concentrate on procedural aspects (e.g., the engagement level of assembly

members and the quality of their discussions) and offer only a limited exploration of the impacts. In cases where impacts are considered, they are measured against broad or nonspecific criteria, such as changes in the attitudes of assembly members. Demski and Capstick (2022) suggest that, for CAs to effectively contribute to climate change solutions, it is essential to understand their influence on climate governance, public participation in climate-related issues, and the ability of civil society to drive climate action. This requires vigilant data collection to assess the impacts through which these impacts occur in the realm of climate change. Therefore, in evaluating the output dimension of a CA, it is crucial to consider tangible outcomes, impacts on participants, and broader societal and political consequences, that is, both immediate and lasting effects of the assembly's activities.

Despite the proliferation of CAs, existing evaluations remain limited. They often focus on procedural aspects, such as representativeness and deliberative quality, while giving less attention to substantive outcomes or long-term impacts (Elstubb et al., 2021; OECD, 2020). Systematic tracking of recommendations into policy change is rare (Demski and Capstick, 2022; Stevenson and Dryzek, 2014), and little attention is paid to indirect social impacts, such as changes in media discourse, civic engagement, or community mobilization (Dryzek and Niemeyer, 2019; Hammond, 2020). The lack of CA-specific standardized evaluation frameworks further hinders comparability between cases and the accumulation of knowledge (Curato et al., 2023).

Taken together, these gaps point to the need for a framework that (1) integrates input, process, output, and outcome dimensions; (2) captures both immediate results and long-term systemic impacts; (3) enables replication and cross-case comparison; and (4) incorporates participatory approaches into evaluation itself.

3 Advancing a framework for evaluating climate assemblies

Existing assessments of Climate Assemblies (CAs) have advanced understanding of their design and operation, yet several important gaps persist. Many studies focus on immediate outputs, such as recommendations or final reports, with less attention to whether they feed into long-term policy adoption and institutional change (Demski and Capstick, 2022; Stevenson and Dryzek, 2014). Procedural

integrity—representativeness, deliberative quality, facilitation—has been widely examined, but substantive outcomes and their alignment with climate objectives are assessed far less systematically (Elstubb et al., 2021; OECD, 2020). A further challenge lies in the lack of standardized, CA-specific frameworks, which makes it difficult to compare cases, identify best practices, and accumulate findings across contexts (Curato et al., 2023; Newig and Rose, 2020). Evidence of wider societal effects is also limited. Research on minipublics suggests that deliberation can shape legitimacy, discourse, and civic engagement, but the picture remains fragmented, with few comparative or longitudinal studies tracing these ‘spillover effects’ (Jacquet and van der Does, 2021; van der Does and Jacquet, 2023). Politics-related impacts, such as shifts in the strategic behavior of political actors, are rarely assessed, despite recent work that highlights their significance for understanding how deliberative processes interact with existing power dynamics (Pfeffer and Newig, 2025). Finally, evaluation itself is rarely participatory, meaning that the democratic ethos underpinning assemblies is not reflected in how their effectiveness is assessed (Dryzek and Niemeyer, 2019; Hammond, 2020).

The Climate Assemblies Performance Monitoring Framework set out here responds to these challenges (see Figure 1). It does so by bringing together several innovations that distinguish it from existing approaches. One contribution is to link *inputs, processes, outcomes and impacts* in a single evaluative structure, connecting procedural quality to substantive results and ensuring that influence pathways are systematically traced over time. Another advance is the *climate-specific design* of the framework. Unlike generic models such as the OECD guidelines, which are issue-agnostic, or the conceptual scheme of Demski and Capstick (2022), which highlights impact dimensions without operationalization, our framework embeds indicators that capture climate-related knowledge, attitudes, and policy uptake. These include changes in the understanding of local risks by participants, evaluations of adaptation and mitigation strategies, and the extent to which recommendations are integrated into climate action plans. The third innovation lies in its *operational tools*. By offering survey instruments, coding templates, and document analysis protocols, the framework makes replication and cross-case comparison feasible, thus contributing to cumulative knowledge in line with calls from environmental governance research (Newig and Rose, 2020). The framework also *incorporates participatory elements into the evaluation*, involving participants, facilitators, and policymakers in data collection

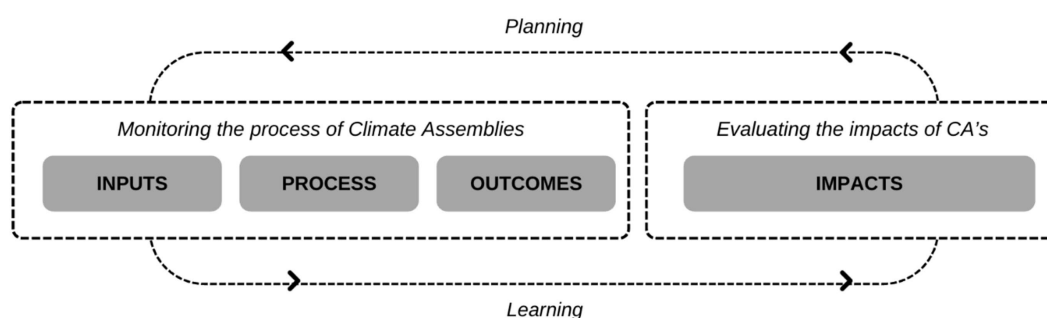


FIGURE 1
Conceptual framework for CA performance monitoring.

and interpretation. This ensures that the assessment itself reflects the democratic ethos of assemblies, rather than being imposed externally. Finally, attention is given to *indirect and systemic impacts*. Drawing on recent reviews of minipublics, which stress the neglect of such dimensions (Jacquet and van der Does, 2021; van der Does and Jacquet, 2023), the framework specifies indicators for shifts in media discourse, civic mobilization, and perceptions of legitimacy among non-participants. By including these dimensions, it addresses calls for more comprehensive assessments of deliberative consequences (Elstub et al., 2025). Taken together, these innovations advance evaluation practice beyond existing models. Although the OECD guidelines provide high-level criteria and Demske and Capstick (2022) conceptualize broad categories of impact, our framework offers a *comprehensive, climate-specific, operationalized, and piloted methodology*. This allows municipalities, policymakers, and researchers to assess not only the democratic quality of climate assemblies, but also their substantive contributions to climate governance.

This framework evaluates citizens' assemblies through two overarching objectives: legitimacy and policy effectiveness. Legitimacy refers to public acceptance, perceived fairness, and shared ownership of policy processes, which depend on inclusive representation and transparent decision rules (Perlaviciute et al., 2024). Policy effectiveness concerns the extent to which assemblies produce knowledge, recommendations, and commitments that lead to tangible climate outcomes and institutional learning (Wells et al., 2021; Labrador and Zografos, 2023). The three analytical dimensions—input, process, and outcome—trace how each contributes to these objectives. Inclusive recruitment and clear mandates strengthen legitimacy, deliberative quality and mutual learning enhance both legitimacy and effectiveness, and the uptake of assembly recommendations into formal policy instruments signals effectiveness in practice. Framing the framework around these two goals clarifies its purpose and connects procedural evaluation to democratic and policy results.

4 Methodology

The development of the Climate Assembly Performance Monitoring framework adhered to the iterative design approach proposed by Simonsen and Hertzum (2012), which promotes a participatory design process involving multiple stakeholders and iterative refinements. This methodology has been proven to be effective in complex evaluation contexts and was considered ideal for the multifaceted nature of CA (Björvinsson et al., 2012). The initial phase of the framework development comprised a *comprehensive review of international and national best practices* in evaluating participatory democratic processes, with a specific emphasis on CAs. This systematic synthesis of existing practices facilitated the identification of relevant evaluation strategies and illuminated areas necessitating further methodological innovation (Arksey and O'Malley, 2005; Levac et al., 2010). The review process involved a rigorous desk study designed to identify and analyze pertinent literature related to CA evaluation. This investigation focused on the systematic identification, mapping, and comparative analysis of (a) theoretical frameworks for quantifying and evaluating CA and (b) operational assessment frameworks implemented by

organizations with established CA experience. After an initial filter, only resources that provided significant insights into CA evaluation continued to the next stages of analysis. The research team distilled relevant categories such as definitions, impact mechanics, evaluative methods, indicators, data sources, and noted overlaps. This process highlighted recurring themes and constructs that were instrumental in building a broader evaluative framework for CAs. In total, 12 distinctive approaches were selected for deeper analysis to develop the framework. The identified approaches can be grouped into two main categories: *conceptual approaches and functioning assessment arrangements*. *Conceptual approaches* focus on understanding and analysing the theoretical foundations, frameworks, and underlying principles related to the evaluation of tools for deliberative democracy, specifically CAs. This category includes the Digital Co-Creation Index Skaržauskienė and Mačiulienė (2019), the De Gruyter Handbook of Citizens' Assemblies (Caluwaerts and Reuchamps, 2023), and the Evaluation Framework for Sustainability Transition Experiments (Williams and Robinson, 2020). The Digital Co-Creation Index provides a useful framework for exploring digital co-creation initiatives, identifying potential areas of improvement, and comparing case studies. The De Gruyter Handbook of Citizens' Assemblies offers a multidisciplinary perspective on the latest theoretical, empirical, and methodological developments in the study of CAs, including a dedicated section on evaluation criteria, methods, and tools. The Evaluation Framework for Sustainability Transition Experiments presents a three-part framework to assess the process, societal effects, and impacts of sustainability transition, with a particular emphasis on longer-term sustainability impacts.

The *functioning assessment* approaches focus on evaluating the actual performance, functionality, or effectiveness of CAs. This category includes the Climate Assembly UK Evaluation (Elstub et al., 2021), the Citizens' Assembly Evaluation on the Inquiry of Long-Term Funding of Adult Social Care (Elstub and Carrick (2019), the Citizens' Assembly for Northern Ireland (Pow and Garry, 2019), and the Evaluating Deliberative Democratic Designs: Theory of Change and Citizen Assembly Pilot in Lebanon (Tan, 2021), the Scotland Climate Assembly—Process, Impact and Assembly Member Experience (Andrews et al., 2022), the OECD Evaluation Guidelines for Representative Deliberative Processes (OECD, 2021), the Evaluation Report of the Austrian Climate Citizens' Assembly (Buzogány et al., 2022) and the Impact Evaluation Framework for Climate Assemblies (Demske and Capstick, 2022). These approaches employ a variety of evaluation methods, including surveys of assembly members, interviews with key stakeholders, content analysis of discussion transcripts, nonparticipant observations, and population surveys. The evaluation dimensions commonly assessed include the assembly process, the experience of assembly members, the impact on policy and public debate, and the overall effectiveness and legitimacy of the CAs.

For example, the Climate Assembly UK evaluation evaluated the extent to which the assembly promoted norms of deliberative democracy and met established standards, using a range of methods such as surveys, interviews, and content analysis. The Evaluation of the Citizens' Assembly on the Inquiry of Long-Term Funding of Adult Social Care focused on the benefits and limitations of the assembly for the parliamentary inquiry, as well as the participants' perceptions of the process. The OECD Evaluation Guidelines for Representative Deliberative Processes provide a framework for

evaluating the integrity of the process design, the deliberative experience, and the pathways to impact of such processes, using a combination of member surveys, public surveys, and other evaluation methods. The Impact Evaluation Framework for Climate Assemblies (Demski and Capstick, 2022) recognises the diverse forms of impact that CAs can have, distinguishing between policy, social, and systemic impacts, as well as instrumental, conceptual, and capacity-building types of impact.

The analysis of current approaches used to understand and evaluate the impact of CAs allowed us to identify a total of 94 evaluation criteria/indicators. These can be broadly attributed to 3 broad dimensions. The input dimension evaluates how CAs are constructed and organised, focusing on representativeness, selection processes, agenda setting, and evidence provision, and is featured in approaches by Andrews et al. (2022), Elstub and Carrick (2019), and the OECD's (2021) evaluation guidelines. Key indicators include the diversity of participants (ensuring demographic representation across age, gender, education, and socioeconomic status), transparency in recruitment methods, clarity of mandate and goals, and the quality and balance of evidence presented to assembly members. Evaluation methods primarily involve document analysis to understand the assembly's structure, participant surveys to assess representativeness, and interviews with organisers to examine planning decisions. The process dimension examines the quality and integrity of the deliberative experience within CAs, focusing on how participants engage, learn and make decisions collectively, and is central to in Caluwaerts and Reuchamps' (2023) deliberative assessment framework, Skarzauskiene and Mačiulienė's (2019) technology-focused evaluation approach, and Demski and Capstick's (2022) participant experience assessment. This dimension evaluates facilitation techniques, participant interactions, decision-making procedures, and the use of technology to support deliberation. Key indicators include facilitation quality (ensuring equal participation opportunities), depth of deliberation (measured through discourse analysis), participant satisfaction with the process, learning outcomes, and the effectiveness of online or hybrid formats. Evaluation methods typically involve observational data to assess group dynamics, participant surveys and interviews to gauge experiences, and discourse analysis to evaluate the quality of deliberations. The impact dimension assesses the tangible results and broader societal effects of CAs, measuring their influence on policy, public discourse, and participant transformation. This dimension evaluates both immediate impact (such as recommendations and reports) and longer-term impacts on governance, climate action, and democratic processes. Buzogány et al.'s (2022) impact assessment framework, Elstub et al.'s (2021) pathways to impact approach, and Pow and Garry's (2019) policy influence evaluation all contribute significantly to understanding this dimension, with particular emphasis on distinguishing between instrumental impacts (direct policy changes) and systemic impacts (shifts in democratic culture and climate discourse). Key indicators include policy adoption (to the extent that authorities implement recommendations), media coverage and public awareness, changes in participants' knowledge and attitudes, and impacts on broader climate policy debates. Evaluation methods include document analysis to track the implementation of recommendations, media analysis to assess changes in public discourse, surveys of various stakeholders (participants, policymakers, and the general public), and policy analysis to determine legislative or regulatory impacts.

During the design check phase, the framework was critically evaluated, including a major review at the Horizon Europe CLIMAS consortium meeting in Vienna in December 2023 with scientists and practitioners in climate deliberations, citizen engagement, and participatory governance. The meeting provided space to present the methodology and debate possible improvements, strengthening the evaluation design (Fraser et al., 2006). Following the review, the research team prepared and structured the monitoring framework by defining its scope and objectives through discussions with stakeholders. The selection of criteria was based on a review of existing evaluation frameworks combined with feedback from practitioners, with the aim of balancing feasibility of measurement and relevance to climate assemblies (see Tables 1–6).

5 Results: the climate assemblies performance monitoring framework

Building on this co-design process and iterative refinement, the research moved from framework development to framework presentation. The modeling phase developed the intervention logic, indicators, and assessment methods through iterative evaluations and workshops, ensuring their suitability for assessing Climate Assemblies. This process produced a preliminary framework outlining the main components, relationships, and boundaries of the Climate Assemblies Performance Monitoring framework. Monitoring and evaluation in the framework are interconnected, forming a continuum that influences the planning and learning processes of CA. Monitoring systematically collects relevant data and insights using a suite of methods, tools, and indicators to capture key aspects of CA operations, participant experiences, and outcomes. Evaluation then analyzes the collected information, providing insight that assesses progress towards achieving the defined goals.

The framework now follows four dimensions—input, process, outcome, and impact—to better capture both the procedural and substantive performance of citizens' assemblies. Inputs and processes reflect the foundations of legitimacy by focusing on inclusiveness, transparency, and deliberative quality that foster public trust and ownership. Outcomes represent immediate expressions of policy effectiveness, such as the uptake of recommendations or institutional responses. The addition of the impact dimension extends the framework beyond short-term results to include longer-term transformations in governance, social attitudes, and climate policy performance. Incorporating impact therefore connects the procedural legitimacy of assemblies to their sustained effectiveness in addressing climate challenges. The impact dimension was added to extend the framework beyond the immediate outcomes of citizens' assemblies and to capture their longer-term influence. While inputs, processes, and outcomes describe how assemblies are designed, conducted, and translated into policy outputs, they do not fully account for enduring changes such as institutional learning, shifts in public attitudes, or measurable progress in climate action. Including an impact dimension allows the framework to assess whether assemblies generate sustained legitimacy and policy effectiveness over time, rather than only short-term results.

Inputs and processes reflect the foundations of legitimacy by focusing on inclusiveness, transparency, and deliberative quality that foster public trust and ownership. Outcomes represent immediate

TABLE 1 Comparative features of deliberative evaluation frameworks.

Aspect	OECD (2020, 2021) guidelines	Demski and Capstick (2022)	Our climate assemblies performance monitoring framework
Overall orientation	Broad, designed to be applicable to all forms of deliberation, regardless of topic	Analytical model developed with climate assemblies in mind but still conceptual	Specifically tailored to climate governance, with indicators grounded in adaptation and mitigation contexts
What they do well	Provide a widely recognised set of principles for good deliberation (e.g., fairness, inclusivity, transparency)	Highlight the importance of evaluating impact in multiple dimensions (policy, social, systemic)	Integrate both these concerns while embedding climate-related measures and local governance context
Where they fall short	Stay at the level of general principles; little guidance for operational measurement	Do not provide concrete instruments, making replication across cases difficult	Offer survey items, coding protocols, and document analysis tools that allow systematic, comparable evaluation
Climate relevance	None, as climate is not their focus	Climate assemblies are the case study, but indicators remain generic to deliberation	Indicators explicitly track climate knowledge, attitudes, risk perceptions, and integration into climate strategies
Cumulative learning	Encourage good practice but give no systematic way to build comparative evidence	Stress impact but without standardised metrics	Designed for comparability across assemblies, supporting cumulation of evidence (cf. Newig and Rose, 2020)
Systemic and indirect impacts	Not addressed beyond immediate outcomes	Acknowledged conceptually but rarely operationalised	Include indicators for legitimacy, media discourse, and

expressions of policy effectiveness, such as the uptake of recommendations or institutional responses. The addition of the impact dimension extends the framework beyond short-term results to include longer-term transformations in governance, social attitudes, and climate policy performance. Incorporating impact therefore connects the procedural legitimacy of assemblies to their sustained effectiveness in addressing climate challenges.

The monitoring process tracks the inputs, process, and outcomes of the CAs to assess both the adherence to the deliberative principles and the delivery of the intended impacts. By deliberative principles, we mean inclusive participation, fair treatment of all voices, informed

TABLE 2 Input indicators.

Criteria	Indicators	Methods
Financial and human resources	<i>Quantity:</i> Budget allocation and staff engagement levels. <i>Quality:</i> Adequacy and effectiveness of resources to support the assembly process.	Documentary review (financial reporting and staff activity logs to track resource allocation and use). Organizer/Facilitator/Expert Interview (understanding whether the resources assigned to the process were sufficient).
Preparatory material provided to participants	<i>Quantity:</i> Visible support from political entities (statements, endorsements, policy engagement). <i>Quality:</i> Depth and credibility of commitment (e.g., willingness to consider or act on recommendations).	Documentary review (analysis of the quality of the preparatory materials' quality) Participant survey and/or interviews (evaluating how well the participants understand the materials and how effectively they informed the discussions).
Political commitment	<i>Quantity:</i> Visible support from political entities (statements, endorsements, policy engagement). <i>Quality:</i> Depth and credibility of commitment (e.g., willingness to consider or act on recommendations).	Documentary review (follow-up of policy commitments, statements of support, and any endorsements from political figures or bodies). Organizer/Facilitator/Expert interview (understanding the nature of political feasibility).
Facilitator preparation and training	<i>Quantity:</i> Number and scope of training sessions completed. <i>Quality:</i> Perceived effectiveness of training in preparing facilitators for inclusive, neutral and competent practice.	Organizer/Facilitator/Expert interview (evaluations of training programs; understanding what could be done better to prepare the facilitators for the CA process). Participant survey and/or interviews (assessments of facilitator performance during the assemblies).

discussion based on balanced evidence, and reasoned exchange between participants (Dryzek, 2010; Bächtiger et al., 2018). A focused set of practical indicators was developed using insights from various evaluation methods. Data collection combines qualitative and quantitative approaches: participant surveys capture members'

TABLE 3 Process indicators.

Criteria	Indicator	Methods
Inclusivity and diversity of engagement (convening phase)	<i>Quantity:</i> The proportion of participant characteristics (e.g., demographics and attitudes) mirroring the broader population. <i>Quality:</i> Fairness and transparency of the recruitment and selection process.	Documentary review (analysis of participant registration data). Participant survey (conduct surveys to ensure the assembly's composition mirrors societal diversity).
Depth of participant learning (learning phase)	<i>Quantity:</i> Measurable change in the understanding of participants of climate issues before and after assembly. <i>Quality:</i> Relevance, clarity, and accessibility of the information provided.	Participant survey or interviews (measure the educational impact of assembly materials and discussions).
Quality of deliberation (deliberation phase)	<i>Quantity:</i> Participant satisfaction with the quality of discussion and decision making. <i>Quality:</i> level of compliance with democratic deliberative principles such as fairness, equal voice, and giving reason.	Participant survey or interviews (capture participants' perceived quality of the deliberative process). Organizer/Facilitator/Expert Interview (understanding what could be improved in the process of deliberation).
Diversity of perspectives and solutions explored (reporting phase)	<i>Quantity:</i> Number and variety of policy options and perspectives discussed. <i>Quality:</i> Balance of perspectives considered, including how well minority views were integrated.	Participant survey (participant feedback to assess the range of ideas considered). Content analysis.
Depth of mutual learning	<i>Quantity:</i> Observable changes in understanding among both participants <i>and</i> facilitators/experts regarding climate issues, values, and lived experiences shared during the assembly. <i>Quality:</i> Extent to which participants' experiential and local knowledge informed evidence presentation, discussion framing, and group understanding.	Participant survey and interviews (track shifts in understanding and confidence in contributing knowledge). Facilitator/expert reflections (capture how participant perspectives influenced facilitation and evidence framing).
Facilitation effectiveness	<i>Quantity:</i> Participant ratings of facilitator performance, neutrality, and responsiveness to participant knowledge. <i>Quality:</i> Ability of facilitators to manage power asymmetries, enable balanced participation, and integrate experiential insights into deliberation.	Participant survey (evaluating facilitation quality and inclusiveness). Facilitator and expert interviews (identifying examples of learning from participants).
Independence and power balance	<i>Quantity:</i> Evidence of institutional safeguards ensuring the assembly's autonomy from political or sponsor influence (e.g., independent funding sources, transparent facilitation arrangements). <i>Quality:</i> Degree to which facilitation and decision-making processes prevent domination by experts or officials, promote equal participation, and maintain participant autonomy.	Documentary review (assessment of funding sources, governance arrangements, and rules of procedure). Participant and facilitator interviews (perceptions of independence, influence, and power dynamics during deliberation).

experiences and perceptions; interviews with facilitators and organizers provide insight into process design and implementation; and review of documents of reports, minutes, and supporting materials assess representativeness, transparency, and design. Together, these methods provide a balanced view of CA performance and deliberative quality.

5.1 Monitoring input

Input indicators set the stage for all subsequent activities, outcomes, and impacts, offering a baseline from which the project progress can be measured.

Financial and human resources are the lifeblood of any project, providing the necessary fuel for activities to be carried out. A CA's budget is a direct indicator of financial resources dedicated to organising deliberative events. Meanwhile, staff engagement levels signify the commitment and involvement of the human capital that drives the project.

The significance of providing *well-developed preparatory materials* to participants is well documented by Agger and Löfgren (2006) and Fishkin and Luskin (2005). These materials are the backbone of

participant learning, arming individuals with the knowledge required to engage in discussions and achieve a level of 'epistemic completeness,' a term used by Caluwaerts and Reuchamps (2023) to describe the state of being adequately informed about the issues at hand. According to the Guidelines of the CLIMAS project for inclusive facilitation and inclusive climate assemblies (2023), it is essential to include principles that ensure that materials are accessible and inclusive for participants, especially for those with specific needs related to disabilities and ethnicity. In practice, this means that accessibility and inclusion must be built into every stage of a climate assembly. Materials should be provided in clear, jargon-free language, with translations, summaries, or alternative formats such as large-print, Braille, captioning, or audio versions when needed. Attention should also be paid to cultural and ethnic sensitivity by ensuring that examples and case studies are inclusive and that interpreters are available when required. Support during assembly can involve mobility assistance, hearing loops, or quiet spaces for participants who need them. Equally important is the role of facilitators, who should actively encourage contributions from all participants and manage discussions so that no voices dominate. Together, these practices ensure that all members, regardless of ability or background, can participate fully and meaningfully in the deliberative process.

TABLE 4 Outcome indicators.

Criteria	Indicator	Methods
Publication of reports and recommendations	<i>Quantity</i> : Number and timeliness of reports, presentations, and recommendations produced. <i>Quality</i> : Clarity, accessibility, and balance of materials.	Documentary review (reviews to ensure that recommendations are distributed to relevant stakeholders in a timely manner).
Changes policy or initiation of policy discussions influenced by the Assemblies	The number of policy initiatives or legislative actions that reference assembly outcomes within a certain period after publication. <i>Quality</i> : Degree of alignment with assembly recommendations; whether references are substantive or symbolic.	Documentary review (identify references to assembly outcomes in policy documents, legislative actions, and government debates, using text analysis software, where possible).
Updates to tools and guidelines post-assembly.	<i>Quantity</i> : Number of tools and guidelines that are revised to incorporate assembly recommendations within a defined period after the assembly and the extent to which these revisions are substantive (e.g., adding new procedures, improving inclusiveness or transparency) rather than only symbolic. <i>Quality</i> : Depth of revision (minor edits vs. substantive changes) and practical usability.	Documentary review (compare versions of tools and guidelines before and after assembly to log both the number and depth of changes). Supplement with interviews with facilitators or organizers to assess how useful these updates are in practice and what additional support may be needed.
Participant experience documentation	<i>Quantity</i> : Evidence of how participants articulate and record their experience at the end of the assembly, including perceived learning, attitudinal change, and sense of empowerment. <i>Quality</i> : Depth and authenticity of reflections (e.g., whether participants describe concrete changes in understanding, confidence, or civic engagement).	Post-assembly surveys and reflective interviews (collecting both quantitative measures of change and qualitative narratives of participant experiences).

TABLE 5 Criteria for impacts evaluation.

Criteria	Indicator	Methods
Increased public engagement and awareness of climate issues	<i>Quantity</i> : Frequency and reach of climate-related discussions in the media, community events, and online forums after the assembly. <i>Quality</i> : Depth and deliberative character of discussions (e.g., reasoned exchange vs. polarized debate).	Media analysis of coverage of the assembly and its recommendations; tracking references to the assembly in public debates; surveys of nonparticipants to assess changes in awareness of the assembly and climate issues.
Policies and initiatives influenced or directly derived from assemblies' recommendations	<i>Quantity</i> : Adoption rate of recommendations; number of policies or initiatives that refer to assembly outcomes. <i>Quality</i> : Substantive alignment of adopted policies with assembly recommendations; degree of implementation resources allocated.	Documentary review of climate action plans, policy strategies, or municipal/regional legislation; interviews with policymakers on how they used assembly recommendations; coding of official responses to assembly outcomes.
Enhanced quality, inclusivity, and efficacy of climate governance processes.	<i>Quantity</i> : Measurable changes in organizational procedures and learning after the assembly (new facilitation guidelines, recruitment strategies, participation protocols). <i>Quality</i> : The extent to which changes make assemblies more inclusive, transparent, and deliberative.	Comparison of organiser documentation before and after assemblies (e.g., facilitation manuals, recruitment strategies); interviews with organisers/facilitators on lessons learned; participant feedback surveys on perceived improvements in inclusivity and design.
Participants who are more informed, engaged, and empowered to contribute to climate discourse and action.	<i>Quantity</i> : Measurable changes in participants' climate knowledge, political effectiveness, and civic engagement. <i>Quality</i> : Sustainability of changes over time and evidence that empowerment translates into meaningful civic or political action.	Pre- and post-assembly participant surveys; follow-up surveys months after assembly; interviews with participants about continued participation in climate initiatives; observation of participant-led activities or advocacy emerging from the assembly.

Political commitment is an essential aspect of the potential impact of CA. It is evaluated by examining the governance structure of the CA and its alignment with public decision-making authorities. The political commitment to the CA is crucial as it indicates the likelihood of the CA's recommendations being taken seriously and the potential for substantial policy influence. Tracking policy engagements and statements of support can offer insights into the likelihood of the assembly's recommendations being translated into tangible climate actions.

Facilitator training is another crucial input indicator that directly affects the inclusion and equality of the deliberative process. Training

ensures that facilitators can effectively manage the deliberative space, fostering a setting where all participants feel equally empowered to contribute. As noted by Agger and Löfgren (2008), facilitators wield considerable influence over the direction and dynamics of dialogue within CAs. We focus on training at the input stage because it is a factor that can be planned, resourced and monitored before and during the assembly, whereas facilitation quality is better assessed at the activity stage, when deliberation actually takes place. In this way, the framework captures both aspects: training is treated as a necessary condition for inclusive practice, and facilitation quality is evaluated

TABLE 6 Application of the climate assemblies performance monitoring framework in three pilot cases.

Assembly	Scope and focus	Inputs (resources, recruitment, political support)	Process (learning, deliberation, facilitation)	Outcomes (recommendations, participant experiences)	Impact/insights
Catalonia (Spain)	Regional assembly addressing long-term climate scenarios and strategic policy pathways	Diverse recruitment through stratified random sampling; multilingual preparatory materials; high level of institutional coordination	Participants received extensive preparatory and in-session materials, judged accessible and informative; expert presentations supported informed debate; deliberation was structured across multiple phases, though limited time constrained deeper argumentation; facilitators upheld neutrality and inclusivity throughout	Comprehensive recommendations with wide policy relevance; participants reported gains in climate knowledge, deliberative confidence, and civic responsibility; experts highlighted constructive interactions with citizens	High potential for regional policy uptake given institutional anchoring; resource-intensive process; time limits reduced opportunities for thorough debate and consideration of counter-arguments
Edermünde (Germany)	Municipal assembly focusing on concrete local adaptation measures	Small-scale setting enabled close interaction; representativeness harder to achieve; limited political visibility	Structured sessions combined expert input with local knowledge; participants valued clarity of discussions and inclusiveness of the process; facilitators supported balanced participation; training for facilitators was considered effective, though additional exposure to practices from other CAs was requested	Recommendations directly connected to local adaptation measures; participants emphasised local relevance and inclusivity; reflections documented in surveys and interviews	Clearer and faster link to municipal policy decisions; strong sense of ownership among participants; weaker representativeness and modest political visibility limited broader legitimacy
Riga (Latvia)	Urban assembly centred on flooding risks and climate resilience in city planning	Recruitment ensured participant diversity; political support was uneven; strong reliance on technical expertise	Learning phase was highly valued, with expert inputs central to discussions; time pressures meant complex material was sometimes compressed; facilitation successfully balanced expert authority with citizen input; deliberation produced a range of perspectives despite technical focus	Recommendations balanced technical evidence with citizen concerns; observers judged the assembly inclusive and well organised; participants highlighted improved understanding of urban climate risks	Showed how assemblies can inform city-level resilience planning; strong participant engagement; recurring challenges included limited deliberation time and insufficient clarity about how recommendations would shape municipal policy

later through indicators of process performance such as balance, fairness, and participant perceptions.

5.2 Monitoring process criteria

When monitoring CA process, the goal is to examine how well participants actually engage with each other: listening, exchanging reasons, and considering different perspectives—as this is the core of the deliberative process. The indicators developed from these principles serve as a barometer for the effectiveness of the assemblies and are critical for validating the integrity of the deliberation process. By connecting the criteria and indicators with the convening, learning,

deliberating, and reporting phases, a structured approach was developed to ensure that each step reflects a commitment to integrity in design, equity in participation, and clarity in communication.

Inclusivity and diversity of engagement (convocation phase). In the CA convening phase, ensuring participant diversity is crucial. An indicator for this phase is the proportion of participant demographics that mirror the broader population using registration data and surveys (Elstub et al., 2022). Therefore, recruitment strategies must be designed to overcome biases and promote a wide range of views, which enriches the deliberative process.

Depth of learning of participants (learning phase). During the learning phase, the depth of understanding of the participants is crucial. As Roberts et al. (2020) suggest, the legitimacy of CAs is

contingent upon participants becoming more knowledgeable about the topics discussed. This is measured through changes in participants' understanding of climate issues before and after the assembly.

Quality of deliberation (deliberation phase). The quality of the deliberative process is assessed during the deliberation phase, capturing the qualitative aspects of the participants' experiences. This involves evaluating whether the environment promoted thoughtful reflection, respectful exchange of ideas, and collaborative problem solving. Carson (2020) notes the importance of maintaining diversity and ensuring that power inequalities do not hinder inclusive discussions. This is further supported by Gerber (2015), who emphasises the need for equal inclusion in discussions, particularly for women.

Diversity of perspectives and solutions explored (Reporting phase): In the reporting phase, the diversity of perspectives and solutions is crucial. This is monitored using content analysis and participant feedback to assess the number and variety of policy options discussed, ensuring that a wide range of ideas are considered.

Depth of mutual learning (learning phase): The learning phase has been reframed to reflect mutual, rather than one-way, learning between participants, facilitators, and experts. This criterion examines how participants' local knowledge, experiences, and values inform the discussion and how experts and facilitators adapt their input in response. Mutual learning is a marker of transformative deliberation, as it recognises participants as knowledge holders, not only recipients of information. van Beek et al. (2024) highlights that when participants' experiential knowledge shapes the framing of issues and evidence, assemblies gain legitimacy and foster shared ownership of decisions. This criterion is assessed through participant surveys, interviews, and facilitator reflections that capture how understanding evolves among all parties involved.

Facilitation effectiveness (across all stages): Effective facilitation is essential to ensuring mutual learning, inclusion, and balanced participation throughout all phases of the assembly. It involves managing power asymmetries, preventing dominance by experts or vocal participants, and encouraging the integration of diverse viewpoints. Facilitators should create conditions where participants' lived experiences are treated as legitimate sources of insight, supporting both fairness and deliberative depth. Participant surveys and follow-up interviews are used to evaluate facilitator performance and neutrality, while facilitator reflections and observer notes identify strategies that enabled or constrained inclusive dialogue.

In line with recent research emphasising the role of *independence and power balance* in deliberative quality (Wells et al., 2021; Labrador and Zografos, 2023), a new criterion has been added to assess whether citizens' assemblies are designed and conducted as genuinely autonomous and egalitarian spaces. The framework now includes indicators assessing the independence of facilitation, transparency of sponsorship, and safeguards ensuring participants' autonomy in decision-making. These additions strengthen the assessment of process legitimacy and ensure that citizens' assemblies are evaluated not only for inclusiveness and quality of discussion, but also for their institutional integrity and protection from external control.

This criterion is crucial for all phases of the assembly. It is gauged by participant ratings of facilitator performance and neutrality, with post-assembly feedback forms and follow-up interviews used as methods. Facilitation should ensure inclusion, equal access to speaking opportunities, and balance in discussion formats.

5.3 Monitoring outcome criteria

Outcomes such as citizen recommendations are central in gauging the efficacy of CAs, ensuring accountability, and preserving the control of participants over outcomes (OECD, 2021). In addition to counting outcomes such as policy changes or updated guidelines, it is equally important to assess their *quality and relevance*. Our framework therefore not only records whether such outcomes exist, but also evaluates their depth and significance, for example, the extent to which new policies reflect assembly recommendations, whether guidelines are substantively revised rather than only symbolically updated, and how inclusive or evidence-based these changes are. Quality is assessed at multiple stages of the framework: in process (quality of deliberation), in outcomes (quality of recommendations and tools), and in impacts (quality of implementation). This layered approach ensures that quality is not reduced to a single dimension, but is evaluated throughout the process.

Publishing reports and recommendations captures collective input, shaping policy debates, and supporting climate transitions while raising public awareness (European Climate Foundation, 2021). The results focus on the influence of recommendations on policy, the revisions of tools and guidelines, and the learning and attitudinal changes of the participants. These reflect both the practical application of assembly outcomes and the transformation of participants' knowledge and participation. Transparent communication, as highlighted in the CLIMAS Consortium (2023), is essential for maintaining integrity by showing how contributions are used.

5.4 Monitoring of impact criteria

Impact evaluation measures whether deliberative processes achieve desired changes, including influence on policy, institutions, or individual engagement (Rowe and Frewer, 2000). To assess the multifaceted impact of Climate Assemblies (CA), four criteria were established: public participation, policy adoption, process quality, and participant empowerment. These criteria acknowledge the indirect, time-dependent nature of impact and the complexities of linking recommendations to concrete policy changes (Caluwaerts and Reuchamps, 2023). At the same time, impacts also encompass participant learning and empowerment, as deliberative involvement has been shown to increase political efficacy, interest, and knowledge (Gastil and Dillard, 1999; Fournier, 2011; Setälä et al., 2010). Process evaluation, informed by feedback loops, is necessary to improve inclusion, methodology, and long-term efficacy. Methodologically, the evaluation of the results requires mixed approaches. Public surveys capture awareness and endorsement beyond participants, while media analysis assesses visibility and discourse framing. Policy analysis examines the alignment and adoption of recommendations, complemented by interviews with policymakers, facilitators, and participants. Longitudinal designs and statistical analysis allow for tracing effects over time. Triangulation strengthens validity by integrating surveys, interviews, and documentary analysis, balancing depth and breadth, and ensuring that diverse perspectives are reflected.

Increased public engagement and awareness is a key criterion of CA effectiveness, as assemblies can shape debate and inform policy. Their legitimacy depends on visibility beyond the participants, which requires communication resources and adequate media exposure.

Public perception of recommendations can be measured through surveys and discourse analysis (Goodin and Dryzek, 2006; Elstub et al., 2025). The influence of recommendations on policy reflects democratic responsiveness, with policymakers' uptake validating citizens' efforts and reinforcing trust in representative institutions (OECD, 2021). Participation in CAs has been shown to improve political confidence, interest, and policy understanding, fostering long-term engagement (Fournier, 2011; Setälä et al., 2010). CAs also serve as transformative spaces where citizens shift perspectives on climate change. Finally, continuous organisational learning is crucial: incorporating feedback from previous assemblies improves inclusivity, methodology, and effectiveness, ensuring that future processes evolve toward more robust and actionable climate policies.

5.5 Climate-related indicators

To strengthen the climate-specific character of the framework, we incorporated indicators that capture knowledge, attitudes, and policy dynamics unique to climate governance. In addition to the general deliberative indicators described in Sections 5.1–5.5, the framework introduces a set of climate-specific measures. These indicators are embedded within the same structure of Inputs, Process, Outcomes, and Impacts but are tailored to the distinctive objectives of climate assemblies. The Inputs framework (Section 4.1) recommends to assess preparatory materials not only for accessibility and neutrality but also for their capacity to convey climate science and local risk information. Indicators include the quality and comprehensibility of climate evidence provided to participants, such as local projections of flooding, heat stress, or biodiversity loss (Fishkin and Luskin, 2005; Caluwaerts and Reuchamps, 2023). The learning phase in the Process framework includes climate-related knowledge acquisition, measured through pre- and post-assembly surveys on understanding of local climate risks and mitigation/adaptation strategies. Example items: “How likely are heat waves going to increase in your region in the next 20 years?” or “How effective are nature-based solutions in addressing urban flooding?” The deliberation phase can be evaluated for the diversity of climate policy options considered, such as renewable energy, energy efficiency, or land-use adaptation. Beyond generic measures of report publication, the Outcomes framework (Section 4.3) includes recommendations specific to climate adaptation and mitigation. Indicators track the scope and variety of climate measures proposed (e.g., infrastructure versus behavioral) and the extent to which assemblies address trade-offs between mitigation, adaptation, and social equity (Andrews et al., 2022). Climate-specific outcome indicators trace whether recommendations are taken up in municipal or regional climate strategies, adaptation plans, or budget allocations. They also include changes in participants' climate attitudes, such as increased climate efficacy (“I feel that collective action can reduce climate risks”) and trust in institutions to deliver fair climate policies (Demski and Capstick, 2022; Boswell et al., 2023). On the policy side, the framework tracks references to assembly recommendations in municipal or regional climate strategies, integration into adaptation plans, and influence on resource allocation for climate initiatives. By embedding these climate-specific indicators alongside general deliberative measures, the framework ensures that evaluation captures both the democratic integrity of the assemblies and their substantive contribution to advance climate action.

5.6 Methods for evaluation

The evaluation of CAs requires a combination of methods to capture the impacts on participants, policymakers, and the general public. Public surveys are central to measuring awareness, perceptions, and attitudes, as shown in the Climate Assembly UK, where repeated surveys tracked changes in knowledge and climate views. Media analysis complements this by assessing visibility, framing, and the extent of debate stimulated by assemblies, as in the Austrian Climate Citizens' Assembly, which was evaluated through both quantitative and qualitative analyses of coverage. Policy analysis is used to examine the acceptance of recommendations and their alignment with existing agendas, while open-ended interviews with facilitators, stakeholders and commissioning bodies provide information on motivations, implementation and effectiveness.

To strengthen validity, evaluations should employ triangulation by combining different sources and approaches. Surveys provide reach but limited depth, whereas interviews add nuance but cover fewer perspectives. Integrating these methods balances their strengths and limitations, creating a more robust understanding of CA results. Longitudinal studies and advanced statistical tools further allow tracking of trends and long-term influence. Finally, including a wide range of perspectives—participants, policymakers, civil society actors, and neutral observers—ensures that evaluations capture the complexity of climate governance and produce balanced conclusions about the role and impact of CAs.

6 Piloting and contextual validation of the evaluation framework

The evaluation framework pilot was conducted within the CLIMAS project through three climate assemblies held in *Catalonia (Spain)*, *Edermünde (Germany)*, and *Riga (Latvia)* in the period 2024–2025. These pilots served as critical testing grounds to assess the applicability of the framework in diverse political, cultural, and institutional contexts. By embedding the framework into assemblies with different designs, participant groups, and governance settings, the pilot phase provided valuable evidence on both the robustness and adaptability of the methodology. Although all three assemblies shared the overarching aim of fostering citizen deliberation on climate adaptation, they differed in scope, scale, and institutional anchoring. The *Catalonia assembly* engaged citizens at the regional level, focusing on long-term climate scenarios and policy paths. In contrast, the *Edermünde assembly* was implemented on a municipal scale, testing the framework in a smaller community where deliberation was focused on concrete local adaptation measures. The *Riga assembly* represented an urban context, with discussions oriented toward city-level planning challenges such as flooding and climate resilience. These differences influenced recruitment strategies, facilitation needs, and the types of recommendations produced. Together, the three pilots allowed the framework to be tested under various conditions, highlighting its flexibility while also revealing context-specific challenges. Comparative evidence underscores how differences in governance levels, assembly design, and political commitment shape both the evaluation process and the results of citizen deliberation.

The pilot phase produced critical evidence on the applicability of the framework and revealed areas for refinement. Adjustments to

survey instruments and data collection protocols enhanced adaptability and strengthened the framework's capacity to evaluate future Climate Assemblies (CAs). Feedback was systematically collected from participants, facilitators, experts, organizers, and observers through role-specific surveys, ensuring inclusivity while allowing comparability between actor groups. Organisers highlighted that recruitment employed stratified random sampling to secure demographic and attitudinal diversity, while resources were strategically allocated to support multilingual accessibility and multidisciplinary input. Political commitment varied, though in several cases, authorities engaged directly with recommendations, signaling responsiveness. Structured, multiphased deliberations—supported by preparatory and in-session materials—were considered effective in fostering informed dialogue and consensus, with facilitators central to maintaining neutrality and balance. The participants described preparatory materials as accessible and useful to clarify the objectives of the assembly. The learning phase was valued for supporting knowledge acquisition and deliberative readiness, with expert input particularly appreciated. Suggested improvements focused on extended time for reflection and deliberation, greater balance of content, and stronger attention to neutrality and counter-arguments. Deliberation was widely perceived as clear and inclusive, and participants emphasised gains in understanding climate governance and civic responsibility. Facilitators reported that democratic principles were upheld, but were limited by limited time for further argumentation. Training was considered effective, although additional exposure to international CA practices would have strengthened adaptation. They observed participants becoming more receptive to diverse perspectives, though the drafting of recommendations remained compressed. Experts expressed satisfaction with their participation, noting constructive interactions with participants. They found logistic arrangements adequate but recommended clearer communication of assembly objectives and expert roles. Time limitations complicated the presentation of complex material, though overall engagement was high and willingness to participate in future assemblies was strong. Observers evaluated the assemblies as well organized, inclusive, and effectively facilitated, while recommending longer deliberation periods, stronger representativeness, and clearer communication of how recommendations would inform policy.

Together, the three pilots demonstrated both the strengths and limitations of the framework when applied in different contexts. In *Catalonia*, the regional scope enabled wide policy relevance, but required extensive preparatory materials and coordination with multiple institutions. In *Edermünde*, the smaller municipal scale facilitated closer interaction among participants and clearer links to local decision-making, yet it also exposed challenges in maintaining representativeness and securing sufficient political visibility. The *Riga assembly* highlighted the opportunities and constraints of urban governance, where climate risks such as flooding demanded technical expertise and strong facilitation to balance expert input with citizen perspectives. In all settings, participants valued inclusivity and expert participation, while recurring challenges included time constraints, resource limitations, and ensuring follow-up from policymakers. These cross-case insights confirm the adaptability of the framework and underline the importance of tailoring evaluation and design strategies to the institutional and cultural contexts in which Climate Assemblies are implemented.

7 Discussion

The development and application of our evaluation framework for CAs reveal several important insights about the role of deliberative democracy in the challenge of climate change. Our findings contribute to both the theoretical understanding and practical implementation of citizen participation in climate governance.

7.1 Theoretical implications

The new developed framework bridges a critical gap in the literature by providing a systematic approach to evaluating the deliberative impact of CAs. While previous research has emphasised the importance of citizen participation in climate governance (Bäckstrand and Lövbrand, 2019), there has been limited attention to how such participation can be systematically assessed. By integrating principles from deliberative democratic theory (Chambers, 2003) with practical evaluation methodologies (Rowe and Frewer, 2000), our framework offers a theoretically grounded approach to understanding the multifaceted impacts of CAs. The multidimensional structure of our framework (i.e., input, process, outcomes, and impacts) aligns with established approaches in policy evaluation while addressing the unique characteristics of deliberative processes. This structure acknowledges that the success of CAs depends not only on their tangible policy outcomes, but also on the quality of the deliberative experience and the inclusion of the process. This holistic approach responds to calls for a more comprehensive evaluation of democratic innovations (Caluwaerts and Reuchamps, 2018).

7.2 Practical implications

Our framework provides practitioners, policymakers, and researchers with a practical tool to improve the transparency, accountability, and effectiveness of CAs. By establishing clear indicators in all three dimensions, the framework allows a systematic assessment of whether CAs achieve their intended objectives of inclusive participation, quality deliberation, and meaningful policy impact. The mixed-method approach embedded in our framework acknowledges the complexity of evaluating deliberative processes and the need for both quantitative and qualitative data. This methodological pluralism allows for a more nuanced understanding of the diverse forms of impact that CAs can have, from individual-level transformations to broader societal changes (Thorman and Capstick, 2022). Our findings also highlight the importance of contextual responsiveness in assessing CAs. The framework's flexibility allows for adaptation to different political, cultural, and institutional contexts, recognizing that the effectiveness of deliberative processes is shaped by the specific conditions in which they operate. Framing the evaluation through legitimacy and policy effectiveness helps connect procedural quality to real policy influence, showing whether citizens' assemblies can deliver both democratic trust and measurable climate results.

As part of the Horizon Europe CLIMAS project, the evaluation methodology is being consolidated and shared through an open

online platform dedicated to Climate Assembly.¹ The platform already hosts a selection of survey instruments and templates in German, English, and Latvian and will be expanded by the end of 2025 with the full collection of questionnaires, interview guides, and coding materials for all stakeholder groups. These resources will be published as part of CLIMAS Deliverable 5.2, ensuring that the complete toolkit becomes openly available to organizers, practitioners, and researchers. Because each stage of evaluation requires distinct instruments tailored to participants, facilitators, experts, organizers, and observers, it is not possible to reproduce the entire set in this document. Instead, this article presents the methodology for evaluating climate assemblies and demonstrates its application, while the forthcoming CLIMAS deliverable will provide the complete suite of measurement instruments for future use.

7.3 Challenges and limitations

Despite its comprehensive nature, our framework faces several challenges in its implementation. First, the complexity of balancing various stakeholder requirements can create tensions in the evaluation process. Different stakeholders (from policy makers to participants to civil society organisations) may have varying expectations and priorities for CAs, making it difficult to establish consensus on evaluation criteria. Second, limited data availability poses a significant challenge, particularly in assessing long-term impacts. The time lag between an CA and its potential policy influence can make it difficult to establish causal relationships, while resource constraints can limit the scope and duration of evaluation efforts. Third, securing adequate funding for comprehensive monitoring and evaluation remains a persistent challenge. As [Bamberger and Mabry \(2019\)](#) note, real-world evaluation often operates under budget, time, and data constraints, requiring pragmatic compromises in evaluation design.

One of the enduring challenges in evaluating Climate Assemblies (CAs) lies in assessing their long-term influence on policy and governance. The framework addresses this by differentiating between *outcomes* (e.g., recommendations and reports, formal responses from authorities, references in strategic documents or procedural revisions), and *longer-term impacts* (e.g., adoption of recommendations in laws or budgets, shifts in governance practices, and enhanced democratic legitimacy). Although the immediate focus is on outcomes and participant experiences, the framework embeds tools that allow evaluators to extend analysis beyond the assembly itself. These include systematic policy tracking, discourse and media analysis, and follow-up interviews with policymakers and stakeholders at regular intervals. Together, these strategies provide a practical pathway for operationalising the assessment of long-term effects, even if definitive conclusions require sustained observation over time.

Although the framework was developed in the context of climate adaptation assemblies, it can be readily expanded to other areas of climate policy. The four dimensions—input, process, outcome, and impact—are designed to be conceptually flexible, allowing for variation in indicators according to policy focus. In mitigation contexts, emphasis could shift toward deliberation on

emission pathways, technological transitions, and distributive fairness, while adaptation settings require attention to local vulnerability, equity, and resilience. Mixed-policy assemblies that address both mitigation and adaptation could combine these emphases. This adaptability allows the framework to remain consistent in structure while sensitive to the specific challenges and policy logics of different climate domains.

8 Conclusion

Our evaluation framework for CAs represents a significant contribution to the fields of deliberative democracy and climate governance. By providing a systematic approach to assessing the deliberative impact of CAs, the framework enhances transparency, accountability, and effectiveness in citizen participation processes. The multidimensional structure offers a comprehensive lens for understanding the complex and multifaceted nature of CAs. This approach recognises that the success of deliberative processes depends not only on their tangible policy outcomes but also on the quality of the deliberative experience and the inclusivity of the process. The framework's mixed-method approach and contextual responsiveness make it adaptable to diverse political, cultural, and institutional contexts, enhancing its practical utility for policymakers, organisers, and researchers. By establishing standardised evaluation criteria while allowing for contextual adaptation, the framework strikes a balance between comparability and specificity.

As climate change continues to pose unprecedented challenges to societies worldwide, the role of citizen participation in developing effective and legitimate responses becomes increasingly important. Our evaluation framework contributes to this effort by providing a tool to ensure that CAs fulfill their potential as vehicles for inclusive, informed and impactful climate governance. Although challenges remain in implementing a comprehensive assessment of CAs, the framework offers a foundation for addressing these challenges and advancing the practice of deliberative democracy in climate governance. By fostering a culture of systematic evaluation and continuous improvement, we can enhance the contribution of citizen deliberation to addressing one of the most pressing challenges of our time.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Author contributions

AS: Conceptualization, Writing – review & editing. MM: Writing – original draft, Writing – review & editing. KK: Conceptualization, Investigation, Project administration, Validation, Writing – original draft. PŠ: Conceptualization, Data curation, Formal analysis, Investigation, Writing – review & editing. A-MK: Conceptualization, Data curation, Investigation, Methodology, Writing – review & editing. GG: Data curation, Methodology,

¹ <https://citizen-assembly.com/survey-list>

Supervision, Writing – review & editing. K-MF: Data curation, Methodology, Supervision, Writing – review & editing. AP: Data curation, Methodology, Supervision, Writing – review & editing. RB: Data curation, Investigation, Writing – review & editing.

Funding

The author(s) declare that financial support was received for the research and/or publication of this article. This research received funding from the European Union's Horizon Europe research and innovation programme (Grant No. 101094021) and Center of Excellence Project Civil Engineering Research Center" (Grant No. S-A-UEI-23-5, ŠMSM).

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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