CO-SUSTAIN

Pathways for CO-creation between local authorities and collective actions for a SUSTAINable transition

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Analysing best (and worst) practices to support and manage latent and manifest forms of political participation

Deliverable 2.3

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TABLE OF CONTENTS

1. PROJECT ABSTRACT 6
2. ABBREVIATIONS 6
3. INTRODUCTION 7
4. INTRODUCTION TO THE THEORETICAL FRAMEWORK 8
5. METHODOLOGY 10
5.1. Rationale for focusing on enabling and hindering factors 10
5.2 Data Collection and Analytical Tools 10
5.3. Comparative analysis approach: Most Similar Systems Designs vs Most Different System Designs 15
5.3.1 Alignment with CO-SUSTAIN theoretical Framework 18
5.4. Most similar systems design (MSSD): similar starting points, divergent outcomes 18
5.4.1 Most different systems design (MDSD): diverse starting points, similar outcomes 18
5.5 Applicability of MDSD to impact assessment (T1.4) and Policy Recommendations 18
5.6. Indicators developed at Niche Level 19
5.7. Indicators developed at Regime Level 23
5.8 Contextual diversity and analytical approach 24
6. MAIN RESULTS 26
6.1 Sample Description 26
6.2. Overall results 27
7. QUANTITATIVE ANALYSIS METHODOLOGY: HINDERING AND ENABLING FACTORS 61
7.1 Main Results at Regime Level 62
7.1.1 Enabling factors contributing to societal transformation and political participation at Regime Level 62
7.1.2 Hindering factors to societal transformation and political participation at Regime Level 63
7.2. Main Results at Niche Level 64
7.2.1 Enabling factors contributing to societal transformation and political participation at Niche Level 64
7.2.2. Hindering factors to societal transformation and political participation at Niche Level 69
8. QUALITATIVE ANALYSIS: HINDERING AND ENABLING FACTORS 71
8.1 Niche: enabling factors 72
8.2. Niche: hindering factors 79
8.3 Regime: enabling factors 84
8.4 Regime: hindering factors 89
9. CONCLUSIONS 94
9.1 Key enabling factors 95
9.2 Key hindering factors 99
10. REFERENCES 102
11. ANNEXES 105
ANNEX 1 – TEMPLATE FOR DATA COLLECTION 105
ANNEX 2 – BIVARIATE CORRELATION ANALYSIS AT THE REGIME LEVEL 105
ANNEX 3 – PRINCIPAL COMPONENT ANALYSIS (PCA) AT THE NICHE LEVEL 105
ANNEX 4 – CORRELATION ANALYSIS AT THE NICHE LEVEL 105
ANNEX 5 – QUALITATIVE FACTSHEETS 105

LIST OF FIGURES

Figure 1. A dynamic multi-level perspective on system innovations (Genus & Coles (2008), adapted from Geels, 2004) 9
Figure 2. Transformation capacity 27
Figure 3. Transition pathways 28
Figure 4. Typology of actors influencing the CAI 29
Figure 5. Types of innovations 30
Figure 6. Participation 32
Figure 7. Existence of free social spaces 33
Figure 8. Role of free social spaces 34
Figure 9. Internal rules of free social spaces – Community guidelines 35
Figure 10. Internal rules of free social spaces - Protection 35
Figure 11. Internal rules of free social spaces - Moderators 36
Figure 12. Internal rules of free social spaces - Responsibilities 37
Figure 13. Governance – Role of private sector 37
Figure 14. Governance – Role of public sector 38
Figure 15. Governance – Reflexivity 40
Figure 16. Agency 41
Figure 17. Civic participation 42
Figure 18. Gender inclusivity 43
Figure 19. Age inclusivity 43
Figure 20. Cultural diversity 44
Figure 21. Recognition 45
Figure 22. Types of methods used 45
Figure 23. Methods used (frequency) 46
Figure 24. Use of common symbols 46
Figure 25. Presentation in public space 47
Figure 26. Frequency of communication campaigns 47
Figure 27. Adaptability 48
Figure 28. Intra-regime pressures 50
Figure 29. External pressures 51
Figure 30. Regime stability 52
Figure 31. Protection of protests, demonstrations and gathering 53
Figure 32. Restrictions on media, censorship, or criminalization of dissent 53
Figure 33. Participation - Openness 54
Figure 34. Participation - Civil society groups 55
Figure 35. Trust in political institutions 56
Figure 36. Legal penalties 56
Figure 37. Access to funding 57
Figure 38. Political interest 58
Figure 39. Political awareness 58
Figure 40. Public access to information 59
Figure 41. Type of emergency 60

LIST OF TABLES

Table 1. List of abbreviations 6
Table 2. Indicators from Historical Examples: Niche and Regime Level 11
Table 3. Indicators from Historical Examples: Landscape Label 15
Table 4. Indicators from Historical Examples: Policy Outputs 15
Table 5. Niche Level Indicators for Political context: Free Social Spaces role 20

1. PROJECT ABSTRACT

In Western democracies, traditional institutional participation is on the decline while non-institutional participation has been increasing. Non-institutional participation for the climate transition often relies on a prefigurative approach, thus creating experimental spaces to incubate alternative ideas and novel forms of political participation (niches). Empowering these forms of political participation to encourage niche innovations will provoke the radical yet necessary changes in the socio-technical system for a climate transition. The CO-SUSTAIN project seeks to address this opportunity for a democratic climate transition, by defining and testing new democratic pathways enabling local policymakers to support various and novel forms of political participation and empowering citizens to act for a sustainable transition.

To develop a better understanding of political participation linked to environmental, political and societal imperatives, CO-SUSTAIN study 19 historic examples in 6 different European countries for each of the latent and manifest forms of political participation underlined by Ekman and Amnå (2012): involvement, civic engagement, formal political participation, and activism. It uses institutional ethnography and system mapping to understand the dynamics of participation and its management, thus delivering best practices to stimulate and support political participation around these imperatives. These best practices serve to define interventions for solution co-creation in 6 case studies, one for each form of political participation: involvement through Spanish energy communities, civic engagement through Food Solidarity in Turin (IT), manifest political participation through participatory processes promoted by the government in Northern Europe (EE, FI) and activism through the Westbahnpark.LIVE (AT). The outputs and outcomes of the deliberations will be assessed to draw conclusions for more democratic climate policymaking across Europe.

2. ABBREVIATIONS

Table 1. List of abbreviations

Abbreviation	Definition
CAI	Collective Action Initiatives
CO-SUSTAIN	Pathways for CO-creation between local authorities and collective actions for a SUSTAINable transition
CSO	Civil Society Organisation
ERDF	European Regional Development Fund
EU	European Union
EYES	Engaging Youth in Sustainable Energy Planning
FSS	Free Social Spaces
HEs	Historical Examples

MDSD	Most Different System Designs
MDSDO	Most Different With Same Outcomes
MLP	Multi-Level Perspective
MO	Multiple Options
MSSD	Most Similar System Designs
MSSDO	Most Similar Systems With Different Outcomes
NGO	Non-Governmental Organisation
IT	Information Technology
PAH	Platform for People Affected by Mortgages
PCA	Principal Component Analyses (statistical)
PV	Photovoltaics
REC	Renewable Energy Communities
SPSS	Statistical Package for Social Science
SDG	Sustainable Development Goals
WoOP	Window of Opportunity

3. INTRODUCTION

The main objective of this report was to identify key lessons, strategies, or factors that influence and shape political participation for a democratic climate transition. Special emphasis was placed on determining which factors were perceived as most and least influential in promoting political participation. The task also aimed to summarise general insights into the factors that support different modes of political engagement, assess how specific contextual features shaped participation, and illustrate these dynamics with qualitative evidence. Additionally, where relevant, extra indicators were considered based on the specifics and data availability of each case.

Methodologically, for the purpose of this task has adopted an inductive analytical approach alongside a dual comparative strategy, combining Most Similar Systems Design (MSSD) and Most Different Systems Design (MDSD). This enabled the integration of in-depth contextual analysis with the identification of generalisable patterns across diverse cases. A structured Excel-based tool was developed to capture data from each HE, organised across key Multi-Level Perspective (MLP) levels —Niche, Regime, and Landscape— along with policy outcomes. The tool facilitated the systematic examination of socio-technical, political, and cultural dimensions. Quantitative analysis using SPSS statistical software supported the identification of significant correlations, which were further interpreted through qualitative analysis of open-ended responses. This comprehensive approach

ensured a nuanced understanding of the enabling and hindering factors affecting political participation, grounded in theoretical rigour and contextual specificity.

4. INTRODUCTION TO THE THEORETICAL FRAMEWORK

The Multi-Level Perspective (MLP) is a key conceptual and guiding framework in CO-SUSTAIN, and offers a framework for understanding socio-technical transitions across three analytical levels:

Landscape Level

The landscape represents the broad, external context that shapes the socio-technical system to be analysed. The broader landscape of social and physical factors do not determine actions but provide a macro-level structuring (Geels & Schot, 2007). Landscape developments refer to (a) external shocks (e.g., wars, economic crises, political elections, nuclear disasters, pandemics such as Covid-19) that suddenly disrupt existing regimes, and (b) gradual, slow-changing developments (e.g., demographics, macro-economic trends, cultural repertoires and ideologies). By exerting stabilizing or destabilizing impacts on the regime level, landscape developments can either reinforce regime trajectories or generate a new window of opportunity for niche innovations to break through into the regime.

Regime Level

A socio-technical system is a compound, in general, of (dynamically) stable, interlinked regimes. Regimes in this regard represent a de facto form of governance that constitutes a highly institutionalized structuring and ordering of the interaction of material artefacts and social processes within the socio-technical system. Due to different lock-in mechanisms and rigidly stable patterns of ruling regimes, regime changes tend to be incremental and path-dependent (Geels, 2010; Smith et al., 2010). Principal lock-in mechanisms impeding transitional change in socio-technical systems and regimes are often rooted in techno-economic (e.g., lack of investments), social and cognitive (e.g., routines), and institutional and political factors (e.g., vested interests of traditional businesses or political coalitions) (Geels, 2019b).

In MLP analysis, the regime is broken down into different (sub)regimes to capture multiple facets of governance and change. For CO-SUSTAIN the following six (sub)regimes were defined for further analysis: science, technology, economy and markets, industry and infrastructure, policy and culture.

Niche Level

Niches are protected spaces where radical innovations, whether technological, organizational or behavioural (Geels, 2010), emerge. They are assumed to emerge outside the societal mainstream, at the periphery of the dominant existing systems, allowing experimentation and nurturing learning and development processes (Schot and Geels, 2008). In CO-SUSTAIN, the studied Collective Action

Initiatives (CAI) are embedded in this niche level and promote alternative solutions for identified problems within the socio-technical system.

Their path-breaking transition, which potentially affects regime structure and/or landscape imperatives, is linked to the Window of Opportunity (WoOp). The emergence of the WoOp refers to a specific temporary opening, in which a usually stable, institutionalized regime is receptive to change and innovation (Tongur & Engwall, 2017). Destabilizing impacts of regimes might be triggered by external landscape developments, or internal regime tensions and conflicts. are critical for enabling niche innovations to scale and influence broader system transformation.

Another fundamental concept within the MLP is the notion of Free Social Spaces - FSS. These are protected environments — whether physical, digital, or symbolic — where new radical social innovations, practices, identities, and collective action frames can emerge, develop, and gain legitimacy outside of dominant societal norms and structures. As conceptualised by Törnberg (2018), the MLP notion of niches is translated to FSS, offering three key functions: they shield individuals from mainstream societal pressures and repression; they nurture collective identities, alternative norms, and networks for action; and they empower individuals to either integrate into or transform existing political and social systems. These spaces often operate within public and private spheres, constituting areas of social interaction — such as cafés, churches, hidden discussions, or online forums — where individuals reinforce mutual solidarity and novel social practices can incubate, coordinate, and eventually expand into broader societal contexts (Törnberg 2018: 383).

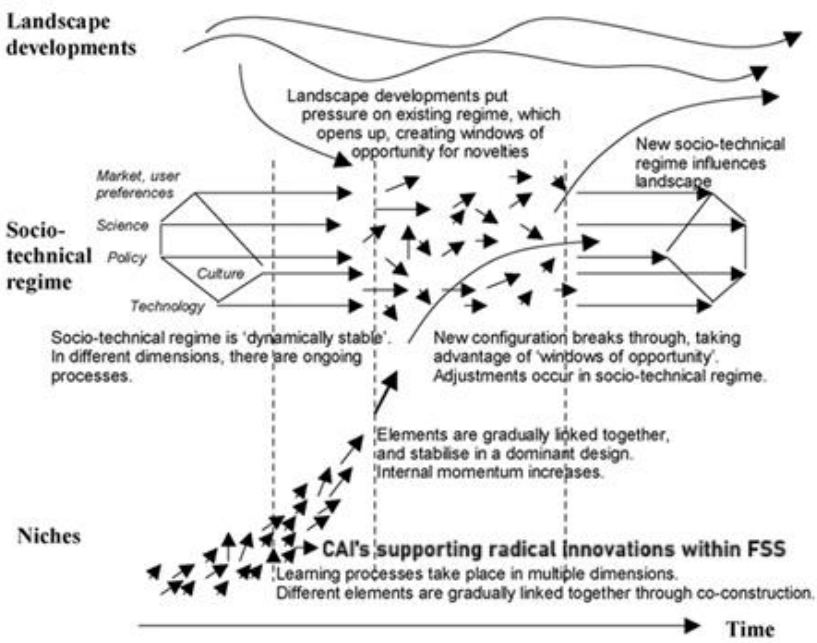

Figure 1. A dynamic multi-level perspective on system innovations (Genus & Coles (2008), adapted from Geels, 2004)

5. METHODOLOGY

5.1. Rationale for focusing on enabling and hindering factors

The shift from "best and worst practices" to "enabling and hindering factors" aims to refine the analysis of CAIs and their role in driving policy change at the regime level. This reframing highlights the complexity of systemic change, where success or failure is seldom attributable to specific practices alone, but rather to an ecosystem of contextual and systemic factors that interact dynamically. By focusing on enabling and hindering factors, we seek to emphasise the mechanisms that either facilitated or impeded the effectiveness of CAIs in promoting civic participation and influencing decision-making. This approach provides a more comprehensive and adaptable framework for understanding these processes. This focus aligns more closely with the theoretical foundations of the MLP and Ekman's (Ekman & Amnå, 2012) categorisation of participation forms, offering a nuanced understanding of these dynamics across different historical examples of HEs.

The MLP conceptualises change as occurring across three distinct domains: niches, regimes, and landscapes. Within this framework, the CAIs studied as HEs emerge as niche-level innovations with the aim of reshaping and altering the socio-political regime, which typically seeks to maintain the status quo.

The transition from the categorisation of HEs as either "best" or "worst" practices is indicative of a broader acknowledgement that what is effective in one context may not necessarily be applicable in another, given the presence of varying structural, socio-cultural, economic, and political conditions. In contrast, enabling and hindering factors provide a broader framework for understanding these contextual dynamics without oversimplifying them. This shift facilitates the identification of both context-specific insights and broader patterns that transcend individual cases, rendering the findings more generalizable or universal.

This reframing also better accommodates the mixed comparative approach of HEs we aim to employ in this task. According to Halperin and Heath (2020), comparative research serves to identify and explain similarities and differences between cases, aiming to test the applicability of theories across contexts

5.2 Data Collection and Analytical Tools

To analyse the factors that may have facilitated or hindered the consolidation of political participation, an Excel-based data collection tool was developed to compile information on each of the Historical Examples (HEs) **(Annex 1)**. An initial version of this document was shared with the other HE researchers and following feedback, the template was revised to incorporate the suggested modifications.

The structure of the Excel document is grounded in a set of indicators drawn from academic literature and integrates both qualitative and quantitative data. This methodological instrument was designed with two primary objectives:

1. To systematise the information from the 19 CAIs in a way that enables a mixed comparative analysis of the diverse practices and strategies employed across the case studies.

2. To explore potential correlations between organisational systems, mobilisation strategies, and their social impacts.

Table 2 synthesises the main indicators based on the literature review and created to explore different aspects of political participation from Historical Examples at Regime and Niche Level.

Table 2. Indicators from Historical Examples: Niche and Regime Level				
Categories	**Characteristics**	**Niche Level**	**Characteristics**	**Regime Level**
Socio-technical Context	Y (1) N (2) / Not applicable (0)	Transformation Capacity	Likert scale ranging from 1 (Low) to 5 (High)	Adaptability
	Multiple Options (MO)	Transition Pathways	Multiple Options (MO)	Intra-regime pressures challenging the current system
	MO*	Typology of actors influencing the CAI	MO*	External pressures
	MO*	Types of Innovation	Qualitative	Factors affecting the system
Political Context	Likert scale ranging from 1 (Low) to 5 (High)	Participation	Likert scale ranging from 1 (Low) to 5 (High)	Free Civil Society: Stability
	MO*	Free Social Spaces (Existence before the CAI foundation)	Y (1) N (2) / Not applicable (0)	Free Civil Society: Regime Pressures. Legal frameworks to protect peaceful protest
	MO*	Role of Free Social Spaces	Y (1) N (2) / Not applicable (0)	Free Civil Society: Restrictions on media or criminalization of dissent
	Y (1) N (2) / Not applicable (0)	Free Social Spaces: Internal Rule (community guidelines)	Likert scale ranging from 1 (Low) to 5 (High)	Participation: Openness to public participation

	Y (1) N (2) / Not applicable (0)	Free Social Spaces: Rules protecting from control by institutions	MO*	Participation: Civil society groups into political decision-making process
	Y (1) N (2) / Not applicable (0)	Free Social Spaces: existence of active moderators within the CAI	Y (1) N (2) / Not applicable (0)	Participation: Trust in political Institutions
	MO*	Free Social Spaces: Responsibilities distribution among participants	Y (1) N (2) / Not applicable (0)	Participation: Availability of funding
	MO*	Governance: role at level of private sector	N/A	N/A
	MO*	Governance: role at level of public sector	N/A	N/A
	Y (1) N (2) / Not applicable (0)	Reflexivity: critical self-assessment practices	N/A	N/A
Cultural Context	MO*	Agency	Likert scale ranging from 1 (Low) to 5 (High)	Political Involvement: Political Interest
	MO*	Civic Participation: Resources	Likert scale ranging from 1 (Low) to 5 (High)	Political Involvement: Political Awareness
	Y (1) N (2) / Not applicable (0)	Inclusivity in terms of gender,	Y (1) N (2) / Not applicable (0)	Transparency: Public access to information

		age, and diversity[1]		
	Y (1) N (2) / Not applicable (0)	Repertories of Contention (public recognition)	N/A	N/A
	MO*	Campaigns: Methods to promote collective action	N/A	N/A
	MO*	Campaigns: frequency	N/A	N/A
	Y (1) N (2) / Not applicable (0)	Unity: use of common symbols	N/A	N/A
	MO*	Unity: presentation at public space	N/A	N/A
	MO*	Frequency of communication campaigns	N/A	N/A
MO*: Multiple options, each tailored to the indicator, are available (see **Annex 1**)				

The Excel template is organised into several sections. The first sheet contains detailed instructions and explanatory notes to guide users on how to complete the document and understand its overall structure. This is followed by four thematic sheets: *Niche*, *Regime*, *Landscape*, and *Policy Outcomes*. The *Niche* and *Regime* sheets are structured around three analytical dimensions—socio-technical, political, and cultural contexts (see **Table 2**). The *Landscape* sheet includes two open-ended qualitative questions that build on earlier tasks, such as context analysis and system mapping[2], focusing on the role of significant events and structural pressures in triggering mobilisation or transitions (see **Table 3**). The *Policy Outcomes* sheet contains qualitative questions that identify key enabling and constraining factors that influenced each CAI's ability to achieve its objectives (see **Table 4**). The primary objective is to obtain initial insights into how the analysed information can later be transformed into actionable policy recommendations as the project progresses.

[1] For practical purposes, in this document each category of the "Inclusivity" indicator has been grouped together. In the original Excel file, these categories were listed in separate cells **(Annex 1)**.
[2] Results reported in Deliverables 1.2 and 2.2.

This division of content is intended, first, to align the analysis with the theoretical framework of the Multi-Level Perspective (MLP), and second, to ensure coherence and coordination across different analytical levels. This structure allows the observation of interactions and interdependencies between niche, regime, and landscape levels, offering insights into how innovations relate to broader systemic changes and regime pressures.

From an ontological perspective, the researchers approached the task through an interpretative lens, recognizing that reality is socially constructed and context-dependent. Epistemologically, the analysis of each historical case will adopt a deductive approach, wherein the CO-SUSTAIN established theoretical framework will be applied to specific criteria. This dual perspective ensures both methodological rigour within the task and alignment with the broader methodological framework, while preserving the contextual individuality and specificity of each historical example and researcher approach to analysis.

The task necessitates a critical reflection on the outcomes of the comprehensive analysis of the historical examples (HE). This reflection will be carried out through the integration of multiple dimensions, including contextual analysis, social network analysis, MLP, and textual analysis. Such an approach ensures that the enabling and hindering factors can be grounded in both the theoretical framework, the deductive reasoning and the understanding of the specific historical, cultural, and socio-political contexts of each case.

The indicators used vary across levels, reflecting the specific characteristics of the phenomena being analysed. A detailed explanation of the selected indicators and the underlying literature is provided in Section 5.6. To support interpretation, each sheet concludes with a glossary that defines and explains the indicators included. **Table 2** synthesises the nature of the indicators, the type of questions posed (e.g., binary, multiple choice and Likert scale ranging from 1 to 5), and distinguishes between those that pertain directly to the HE's and those concerning the stakeholders interacting with them.

Once data collection for all HEs was completed, a quantitative analysis of the compiled data was conducted. In the first stage, all case-specific data were consolidated into a single archive using Python, which facilitated the integration and standardisation of variables across cases. Following this consolidation, a correlation analysis was carried out to explore potential relationships between selected indicators. For this purpose, the software **SPSS (Statistical Package for the Social Sciences)** was employed, as it offers robust capabilities for statistical testing, including correlation matrices and significance levels of associations among variables.

Using SPSS, Pearson correlation coefficients were calculated for pairs of quantitative variables, while Spearman's rank correlation was applied where ordinal data were involved. The strength and direction of the correlations were interpreted following conventional thresholds (i.e., 0.1–0.3 = weak; 0.3–0.5 = moderate; 0.5 and above = strong). Significance levels were set at $p < 0.05$ to ensure statistical reliability.

While the correlation analysis offered insights into potential statistical relationships between variables, it was necessary to complement these findings with qualitative analysis to capture the

contextual and interpretative dimensions of each CAI. Therefore, a qualitative review of the answers to the open questions and narrative data was conducted to understand the underlying mechanisms behind the observed correlations. This approach enabled a deeper exploration of causal pathways, strategic decisions, and contextual constraints that could not be fully captured through quantitative metrics alone. The integration of both data types ensured a more comprehensive understanding of the dynamics influencing political participation and social impact across the case studies.

Table 3. Indicators from Historical Examples: Landscape Label				
Category	**The role of significant events initiating the transitions**	**Main factors affecting the CAI**	**Landscape imperatives**	**Timeline / Period**
Socio-Technical context	Qualitative	Qualitative	Qualitative	Qualitative
Political Context	Qualitative	Qualitative	Qualitative	Qualitative
Cultural Context	Qualitative	Qualitative	Qualitative	Qualitative

Table 4. Indicators from Historical Examples: Policy Outputs	
Question	**Answer**
Type of emergency related to the HE	Multiple Options
Main Enabling Factors for the CAIs' ability to achieve their goals	Qualitative
Main Hindering Factors for the CAI to achieve their goals	Qualitative
Key Lessons learnt	Qualitative
Success stories	Qualitative
Window of Opportunity	Qualitative
Main Archetype identified	Qualitative
Key recommendations for policymakers	Qualitative

5.3. Comparative analysis approach: Most Similar Systems Designs vs Most Different System Designs

The selection of comparative methods in this study was guided by a critical reflection on the alignment between methodological tools and the research objectives. In this sense, Anckar (2008) explore the application of Most Similar Systems Design (MSSD) and Most Different Systems Design

(MDSD) in comparative studies and identifies three critical dimensions for assessing its suitability: (1) the level of analysis, distinguishing between systemic and sub-systemic interactions; (2) the research strategy, whether deductive or inductive; and (3) the nature of the dependent variable, whether held constant or allowed to vary. The interplay among these dimensions provides essential guidance for how MSSD and MDSD can be effectively operationalised within comparative research frameworks.

A strict application of a MSSD, would require it to choose countries that are similar in several specified variables (the control variables) and different regarding only one aspect (the independent variable under study. In this sense, the **Most Similar Systems Design (MSSD)** approach could enable the examination of cases where Collective Action Initiatives (CAIs) operate within similar socio-political regimes but yield divergent outcomes. By focusing on structurally or contextually comparable cases, MSSD helps isolate the variables that account for variations in success—such as why certain CAIs effectively influence policy while others do not—despite broadly analogous conditions. This is particularly relevant when analysing CAIs within specific forms of political participation, such as those defined by Ekmann. The ambition of the use of MSSD is to test the effect of an independent variable on the dependent variable, while keeping extraneous variance constant. In other words: MSSD aims at testing theories.

MSSD is particularly effective for exploring the contextual factors that disrupt or enhance CAIs in systems that otherwise share similar characteristics. This approach is ideal for identifying the conditions under which CAIs succeed or fail within comparable settings, such as democratic regimes or regions with similar socio-political infrastructures. It provides an opportunity to examine how differences in variables like institutional openness, cultural norms, or stakeholder alignment led to divergent outcomes.

While MSSD could work for identifying context-specific factors, it is less effective at isolating universally applicable practices or drivers. For **impact assessment**, focusing exclusively on similar contexts might limit the generalizability of findings, making this approach better suited for detailed, system-specific analyses rather than broad, cross-contextual insights.

Conversely, the application of **Most Different Systems Design (MDSD)** facilitates the identification of common factors that contribute to the success or failure of CAIs across diverse socio-political contexts. By comparing cases with differing background conditions but similar outcomes, MDSD offers insights into generalisable drivers or inhibitors, thus contributing to the development of broader explanatory frameworks. By comparing cases with differing background conditions but similar outcomes, MDSD offers insights into generalisable drivers or inhibitors, thus contributing to the development of broader explanatory frameworks (Anckar, 2008). This makes it ideal for identifying principles that transcend contextual differences. This comparative lens allows us to evaluate how best to adapt successful approaches to new contexts or identify systemic obstacles that consistently impede CAIs.

However, the singular application of MSSD or MDSD in comparative research has drawn several methodological critiques. Regarding MSSD, a primary concern lies in the risk of *over-controlling contextual variables*, potentially excluding system-level factors that may significantly influence the

outcome. This focus on similarity can lead to findings that are highly *context-dependent*, thereby limiting the *external validity and generalisability* of the results. Furthermore, MSSD may fail to detect *interactions between variables* that only become evident when broader contextual diversity is present. In the case of MDSD, the critics are for its tendency to *causal oversimplification*. By emphasising similarities in outcomes across diverse cases, it may obscure *context-specific causal mechanisms* and mistakenly infer uniformity where causal heterogeneity exists. Additionally, the substantial variation across cases poses *analytical control challenges*, increasing the difficulty of isolating the effect of individual variables and raising the risk of *false equivalence*.

To break through these limitations, Anckar (2008, p. 391) argues that in comparative studies, "regression models using multi-level techniques should be built according to the logical foundations of a most different systems approach". Regression models use statistical techniques that could allow the control variable to be measured at a level different from the two variables that are tested. One of the main benefits of multi-level modelling is its flexibility in navigating between levels of analysis, allowing researchers to examine variables at both the subsystem and system levels simultaneously. But the inclusion of many system-level variables could make the regression models unstable resulting in a multicollinearity at systemic level, Anckar (2008) highlights the need to apply the principle of falsification that the MDSD is built on. That means excluding as many system-level variables as possible from the regression models.

Following this conceptual orientation, this task adopts an inductive analysis and a dual comparative strategy to explore the conditions shaping political participation and social innovation activities. Through the integrated application of Most Similar Systems Design (MSSD) and Most Different Systems Design (MDSD), it investigates both the shared and divergent factors influencing citizen mobilisation initiatives and engagement initiatives, particularly in the context of sustainable transitions. By situating these initiatives within historical cases of socio-political transformation, this approach leverages the strengths of both MSSD and MDSD to balance in depth contextual analysis with the identification of broader, potentially generalisable drivers and patterns.

The dual ambition to explore context-specific practices and extract generalisable lessons supports the integrated use of MSSD and MDSD, capitalising on their respective strengths. In this sense, theory-testing is pursued in line with the Multi-Level Perspective (MLP), while policy evaluation is envisioned for the later stages, particularly for the formulation of actionable recommendations.

This methodological framework builds upon a well-established scholarly tradition in comparative political research, wherein MSSD and MDSD have been combined to enhance analytical depth and cross-case validity. Different studies focused on the conditions for survival or breakdown of democracy in interwar Europe (e.g., Collier & Collier, 1991; De Meur & Berg-Schlosser, 1994, 1996), have combined these two research designs, comparing systems that are *Most Different with Same Outcomes* (MDSO) and systems that are *Most Similar with Different Outcomes* (MSDO). In doing so, they also developed a Boolean measure to assess systematically the degree of similarity and difference across units of analysis, thereby contributing to methodological rigour and precision in comparative case study research (Anckar, 2008; De Meur & Berg-Schlosser, 1994; Collier & Collier, 1991; Linz & Stepan, 1996)

5.3.1 Alignment with CO-SUSTAIN theoretical Framework

MSSD aligns closely with the MLP and related theoretical inquiries into how socio-technical regimes shape and are shaped by CAIs. For example, MSSD complements Geels' focus on regime-level dynamics by **allowing researchers to examine how similar regimes produce varying outcomes in terms of innovation or mobilization**. This alignment supports the exploration of context-specific pathways and interactions between CAIs and their socio-political environments. Furthermore, MSSD provides a strong foundation for addressing theoretical questions about how regimes or contexts uniquely influence CAIs. It allows for an in-depth investigation into the factors that account for differences in outcomes, helping to refine theoretical understandings of political participation and collective action within comparable systems.

5.4. Most similar systems design (MSSD): similar starting points, divergent outcomes

To structure the **Most Similar Systems Design (MSSD)** approach for the comparative analysis of the 19 historical examples (HEs) or collective action initiatives (CAIs), the forms of political participation have been categorized into Manifest and Latent forms. This categorization provides a similar basis for comparison, allowing an in-depth exploration of the enabling and hindering factors that influence outcomes within each form of participation.

5.4.1 Most different systems design (MDSD): diverse starting points, similar outcomes

The MDSD approach will focus on understanding how similar outcomes, such as the formation and success of CAIs, arise in cases with widely differing initial conditions. This would help to emphasize the identification of patterns and causal factors that drive comparable results across diverse socio-political, cultural, or economic contexts.

Key strengths:

MDSD excels at uncovering common pathways that lead to successful CAIs, regardless of contextual variations. By analysing cases from contrasting settings, this approach highlights common dynamics and universal drivers of participation. It is particularly valuable for understanding grassroots dynamics that may transcend specific contexts, influenced by broader pressures such as cultural shifts, economic challenges, or political instability.

5.5 Applicability of MDSD to impact assessment (T1.4) and Policy Recommendations

MDSD is particularly well-suited for conducting impact assessments. It enables researchers to pinpoint common factors that contribute to the effectiveness or ineffectiveness of CAIs, without focusing specifically on their originating context. This aligns with the pre- and post-assessment framework outlined, where the case studies' outputs and impacts need to be measured within shared conditions. MDSD identifies criteria that can be translated into variables (e.g., political stability, institutional openness) that explain variations in success under otherwise comparable conditions.

The ability to connect findings from diverse scenarios directly supports policy recommendations and contributes to policy evaluation and intervention design.

By focusing on shared elements across contexts, MDSD identifies enabling and hindering factors consistently associated with the formation and impact of CAIs. This includes analysing patterns of success or failure that are independent of regime type, historical period, or geographic location. These insights are essential for understanding how specific practices or mechanisms can be generalized and applied to other cases. Variables and Indicators according to different levels of analysis.

5.6. Indicators developed at Niche Level

The following indicators selected for this study are grounded in the Multi-Level Perspective (MLP) framework (Geels & Schot, 2007; Geels, 2002), which conceptualises socio-technical transitions as the result of interactions across three analytical levels: niche, regime, and landscape. Within this framework, the indicators developed for the niche level serve to capture the internal dynamics of the 19 HE's, focusing on dimensions that influence their transformative potential in political participation.

At Niche Level, the **Socio-Technical context** indicators from the typology of Transition pathways were included to describe how transitions unfold depending on the nature of landscape pressures, and the response of the existing regime (Geels & Schot, 2007); and to assess the extent to which each CAI can enact or contribute to systemic change. These indicators draw upon recent literature in sustainability transitions (Geels & Schot, 2007; Hölscher et al., 2018), which highlights the relevance of experimentation, learning processes, and institutional adaptability in niche-level innovations.

1) Transformation path or incremental change that occurs when landscape pressures are moderate, and the existing regime adjusts without a complete overhaul. (E.g: *the utilities integrating renewables into fossil-based systems without radical market structures*).

2) Reconfiguration path that happens when niche innovations are adopted within the existing regime and leads to significant changes. In this sense, innovations are incorporated into the system, reshaping its structure without full disruption. (*E.g: the rise of hybrid vehicles within the automotive industry, which paved the way for full electrification*).

3) Technological Substitution path or disruptive change. It occurs when landscape pressure is high, and niche innovations are well-developed. In this case, the old regime is gradually replaced as new technologies outcompete the incumbents.

4) De-alignment and re-alignment path (radical breakdown and rebuilding). It happens when landscape pressures are so intense that the regime collapses, creating a period of uncertainty. In this sense, multiple competing innovations emerge before a new dominant system is established. (*e.g.: the decline of centralized energy utilities and the emergence of decentralized energy systems*) (Geels & Schot, 2007).

To describe the participation and the type of actors involved in the transition pathways, we follow the categories created for the social network analysis. That means: 1) Institutions, 2) Business and industry; 3) Public services; 4) Intermediate bodies; 5) Research; 6) Professionals; 7) Citizens; 8) NGOs; 9) Civil Society Organizations; 10) Media and 11) Politicians. For the main objectives of this

task, researchers were asked to describe who these actors were (*e.g. social movements, social entities, business sector, lobbies and public sector*).

For the **Political context at Niche Level**, we included **Free Social Spaces - FSS** as an indicator to better understand the role **(Table 5)** of these "areas of social interactions in which individuals reinforce mutual solidarity and experiment with alternative world views and social practices, partly protected from the gaze of the powerful" (Törnberg, 2018, p. 383).

Table 5. Niche Level Indicators for Political context: Free Social Spaces role		
Indicator	Role	Explanations
Free Social Spaces (Törnberg, 2018)	1. Shielding	Refers to processes that hold at bay parts of the pressures from mainstream society that allow the innovation to grow; serve as a shelter against both political repression and the hegemonic ideologies of mainstream society.
	2. Nurturing	Refers to processes that support the development of radical innovation. It includes two different processes: 1) the development of collective identities, shared cultural values and collective-action frames, which affect how we perceive both new and existing problems and their causes and consequences. 2) enabling a build-up of social networks among actors.
	3. Empowerment	Expressed in two forms: 1) empowerment to fit and make innovation competitive with mainstream social and political practices (transform the innovation to fit into mainstream structures) and 2) empowerment to stretch and transform: undermine incumbent regimes and transmit bottom-up derived social innovations into regimes (i.e. to adapt mainstream society to the radical innovation)
	4. Education *(developed specifically for this study)*	A dynamic process through which individuals acquire, share, and co-construct knowledge, skills, and values within collective environments, shaping both personal development and societal transformation
	5. Other *(developed specifically for this study)*	

To explore the existence of internal rules into the free social spaces, questions with Y/N options were developed to explore how such rules allow for the development of alternative ideas and practices shielded from dominant societal forces:

1. Were there free social spaces within the niche before the CAI foundation that may have influenced the appearance of the CAI? This question could be relevant to understand in which sense the previous existence of these spaces may help the emergence or even the consolidation of the CAI.
2. Are there specific rules that protect the CAI from control by institutions of the regime?
3. Are there any explicit community guidelines in place within the CAI?
4. Are there moderators, within the CAI, who facilitate discussions, maintain a respectful and productive environment, stimulate discussions and keep discussions on track?

Finally, to analyse how responsibilities were distributed internally within the CAI among participants, we included two general options:

1) Horizontal, understood as a community-based decision-making. Multiple relations rather than hierarchical levels across different scales. Social practices as the outcome of actors who combine and reproduce different elements.

2) Vertical or hierarchical relations. Vertical power arises when external actors impose conditions that shape innovations (e.g. private investors setting funding requirements), reflecting a top-down influence on the niche. On the other hand, hierarchical power refers to internal dominance within the niche where certain actors (e.g. the predominant role of technical experts) control decisions and may marginalize users' perspective in co-creation processes.

Another indicator created to explore the political context at a niche level is **Participation**. Specifically developed for this study, the main goal was to show how open the system is to public participation and input. In this sense, a Likert scale from 1 (Low) to 5 (Very High) was created to evaluate the 'Openness' level defined as a decentralized, inclusive and emergent process where multiple actors contribute to decision-making, innovation and societal change. Based on the Sustainable Governance Indicators published by the Bertelsmann Stiftung (2017), Glass and Newig (2019) developed a comparative analysis of 41 EU countries to test the explanatory power of different aspects of governance for sustainable development. For this task, and related with the Political Context at niche level, it includes **Governance** as an indicator defined as a multifaceted framework essential for the effective implementation of the Sustainable Development Goals (SDGs). To evaluate this indicator, the following questions were developed:

1) Reflexivity in terms of "critical self-awareness" practices, monitoring performance and adapting existing institutions or rules (Y/N).

It includes “the consideration and scrutinizing of potential long-term repercussions of the strategies chosen” that can create “public spaces to foster deliberation and transdisciplinary knowledge exchange between different actors” (Glass & Newig, 2019, p. 4).

2) The role at the niche level of public and private sector in enabling or hindering innovations evaluated through such characteristics as: 1) Cooperative, 2) Neutral, 3) Conflictual; and 4) Missing.

For the **Cultural context** at **Niche level,** it included **Agency** (Geels & Schoot, 2007) as an indicator to explore the actions and interactions of actors within the three levels of the MLP and how transitions are contested. It is included as part of “cultural context” to emphasize how cultural meanings empower or constrain actors’ capacities to drive change. Actors’ capacities to influence transitions are shaped by shared values, meanings, cultural norms and discourses which influence how they innovate, collaborate and contest dominant socio-technical regimes.

Specifically, to explore agency and multi-level contestation, it included:

1) Rational-action or rule using, defined as decision-making processes where actors make strategic choices based on utility maximization, efficiency, and risk rather than social norms. In this case, actors make decisions based on cost-benefit analysis and economic performance. This entails rule-using, cost-benefit calculations

2) Interpretations, defined as negotiated change of shared meanings. It involves rule-using (e.g. Cognitive frames), rule-creation and rule-alteration, as well as cognitive processes, cultural norms, and shared meanings shaping decision-making in socio-technical change.

3) Traditional power approach, characterized by formal rule-alterations such as changes in laws. It is produced through lobbying and institutional entrepreneurship from collective actors, such as professional societies, industry, associations and social movements. Changes in institutional frameworks imposed by powerful actors (governments, industries or large institutions) to shape socio-technical transitions.

To describe the **range of activities** developed by the different forms of political participation to challenge public decision, including broader contentious performances and innovations, we introduced the concept of “repertories of contention” as a factor developed by Tilly and Tarrow (2006). This book, as well as the article published by Glass and Newig (2019) share the common feature of serving as a practical application model for comparative analysis of dozens of case studies on political participation in the European Union. This was one of the main reasons for selecting these authors.

According to Tilly’s theoretical framework, “repertoires of contention” encompass the “whole set of means (a group) has for making claims of different types on different individuals” and refers to “claim-making routines that apply to the same claimant-object pairs: bosses and workers, peasants and landlords, rival nationalist factions and many more” (Tilly & Tarrow 2006, p. 16). In this sense, the indicators developed were:

1) Repertories of contentions or the methods used by the CAI to promote collective action. These methods are dynamic, shaped by historical experience and institutional opportunity structures, and evolve over time as actors adapt to changing political and social environments.

To better explore this indicator, these examples were provided: 1) Public Campaigns awareness; 2) Online campaigns awareness; 3) Online petitions; 4) Strikes; 5) Protest in public spaces; 6) Performative use of public spaces; 7) Other. But also, how frequently are those methods (public campaigns, etc) developed to promote collective action?

2) Campaigns sustained, organized efforts involving multiple performances aimed at specific goals. The frequency of campaigns was included in evaluating this indicator: 1) Weekly; 2) Semester; 3) Monthly; 4) Other.

3) Unity, defined as the different strategies developed to demonstrate solidarity and coherence among participants. To evaluate this indicator, the question proposed to different team researchers was how the CAI present themselves in public space to raise claims and/or demands. The options provided in Excel files were: 1) Song; 2) Slogans; 3) Common symbols such as similar colours, flags, etc; 4) Other.

Finally, regarding Cultural context at niche level, "Public Recognition" has been introduced to explore if the CAI has been recognized through funding, awards, change in regulations or organizational policies.

Additionally, the option to include any qualitative information or analysis from the researcher perspective was provided for each indicator.

5.7. Indicators developed at Regime Level

The section dedicated to the **Regime Level** follows the same structure as the Niche Level. However, while parallels can be drawn between the indicators, they are not exactly the same due to their main objective: to highlight broader aspects of the Regime, focusing on how the way a society is structured—both politically and culturally—either facilitates or hinders political participation.

In this sense, and following the same structure as in Niche level, the indicators developed come from academic literature. In the first place, to analyse the **Socio-technical context** at regime level, it is included the indicator Adaptability (Geels & Schot, 2007) to explore the capacity of institutions and actors to adjust policies, strategies, and actions in response to changing circumstances, new information, and evolving challenges. A Likert scale to evaluate from Low (1) to Very high (5) was provided in order to evaluate the flexibility, resilience and transformative capacity of institutions at regime level. Following this, questions related to establishing what kind of intra-regime pressures are challenging or destabilizing the current system were included. We provided as examples the following options, mirroring the regime dimensions used for the MLP description of the HEs: 1) Cultural; 2) Economic; 3) Political; 4) Scientific; 5) Technological; 6) Infrastructural and 7) Other.

Regarding the **Political context**, the indicator "Free civil society" extracted from Bertelsmann Stiftung (2017) was developed to explore how the system maintains its structures, rules, and

practices over time through established rules and institutional frameworks that guide actors' behaviours. Formal and informal rules create a shared understanding of how the system operates. To evaluate this criterion, we introduced the variable “Adaptability” ranked from Low (1) to Very High (5) to explore resilience, predictability, and continuity in governance; how regular, peaceful, and predictable the power transitions are.

To explore the regime pressures, the following questions were proposed:

1. Do legal frameworks protect peaceful protests, demonstrations, and gathering? (Y/N)
2. Are there restrictions on media, censorship, or criminalization of dissent? (Y/N/Changing over time).

Finally, to explore “Participation” (Glass & Newig, 2019) in the sense of decentralized, inclusive and emergent process where multiple actors contribute to decision-making, innovation and societal change at regime level. We explore how open the Participation process is by a Likert Scale, ranking from Low (1) to Very High (5) to determine how social, technological and institutional networks facilitate engagement and provide support to community initiatives.

1. Which civil society groups can participate in the political decision-making process?
2. Do people trust political institutions?
3. Do individuals face legal penalties for organizing peacefully?
4. Can organizations receive and use funding (including from international sources) without excessive bureaucracy or legal barriers?

To further explore citizens’ voluntary participation in the political system to better explore how individuals interact with the institutional structures, participatory channels and processes that shape opportunities for involvement. In this sense, we have included the variable “Political Involvement” as described by Becerik (2015). This variable is analysed through the following indicators: 1) Political Interest defined by Verba et al. (1995) as the level of engagement over time: individual’s curiosity, concern, or attention toward political matters. It functions alongside other factors like resources (time, money, civic skills) and recruitment networks (being asked or encouraged to participate). Involve: think about, discuss and seek information about politics. And 2) Political Awareness (Verba et al., 1995) defined as the knowledge and understanding of political processes, events, actors, and institutions. It represents the cognitive dimension of political engagement—how much an individual knows about politics and how attuned they are to political developments. Both indicators are analysed through ranking from Low (1) to Very High (5).

Finally, “Transparency” (Glass & Newig, 2019) is incorporated into **Cultural Context** to explore the existence of public access to information about government policies, public budgets, and decision-making processes for citizens and residents (Y/N/Changing over time).

5.8 Contextual diversity and analytical approach

The studied HEs are embedded in highly diverse contexts—political, cultural, socio-technical, among others—which poses significant challenges for meaningful comparison. To address this complexity,

we have adopted a layered analytical framework that segments and examines these contextual dimensions systematically. This approach enables us to conduct a cross-case analysis through differentiated layers of context.

The contextual layers considered in the cross-analysis include:

- **Multi-Level Perspective (MLP) levels**: niche, regime, and landscape.
- **Contextual dimensions** at both the niche and regime levels: socio-technical, political, and cultural contexts.
- **Political participation categories**, as defined throughout the project: engagement, activism, formal political participation, and involvement.

To further structure our comparative analysis, we employ the dual approach combining the Most Similar Systems Design (MSSD) and the Most Different Systems Design (MDSD) described above. Through this dual lens, we aim to identify:

- **Commonalities across diverse contexts**: general features shared by the HEs and recurrent correlations observed across cases and contextual layers.
- **Divergent pathways leading to similar outcomes**: different contextual and institutional elements that at the end lead to the same result. In this analysis, we define *similar outcomes* as:
    - The **declared transformation capacity** (yes/no) of the CAI; and
    - The **type of socio-technical transition achieved** (i.e., transformation, reconfiguration, technological substitution, or de-alignment and re-alignment).

This structured approach allows us to account for contextual diversity while identifying both patterns and unique pathways within the transformative potential of CAIs.

Once every team researching the respective HE filled the template, the ECO team performed the comparative analysis following this scheme:

Comparative insights and lessons learnt from the HE	**Comparison**	Key similarities and differences with other cases within manifest or latent forms of participation.
	Key context factors	Unique variables shaping the outcome in this case
	Emergent patterns	Broader trends or insights.
Theoretical implications	**Alignment with theoretical frameworks**	Relation to multi-level perspective; support or challenge to the main assumptions

Policy Recommendations (D4.3) (to be developed later on, by Month 36)	**For future CAIs**	Recommendations for similar initiatives
	For policy and practice	Actionable insights for policymakers and stakeholders.

6. MAIN RESULTS

6.1 Sample Description

This section presents an overview of the sample used for this research, which consists of 19 historical examples of CAI drawn from six European countries. These cases have been systematically categorized based on two key dimensions: the nature of political participation (distinguishing between latent and manifest forms) and their typology (encompassing involvement, civic engagement, formal political participation, and activism). While these classifications provide a useful analytical framework, the focus of this section is to outline the overall characteristics or trends of the sample using quantitative data and complemented with some qualitative data to provide examples on specific elements. This data was collected through a standardized Excel template comprising closed-ended questions, including binary (yes/no) items and Likert-scale responses. The responses were provided by the responsible researchers of each HE and answered according to their own interpretation after a research process that involved the following four different methodologies: Context analysis, Stakeholder Network Analysis, Textual Analysis, System Mapping.

The resulting dataset offers a structured basis for understanding the common features and patterns across the diverse cases examined.

For the characterisation of the sample, the following aspects are analysed on a quantitative basis:

NICHE LEVEL

- **SOCIO-TECHNICAL CONTEXT**
  - Transformation capacity
  - Transition pathways
  - Typology of actors influencing the CAI
  - Types of innovations
- **POLITICAL CONTEXT**
  - Participation
  - Existence, role and internal rules of free social spaces
  - Governance
- **CULTURAL CONTEXT**
  - Agency
  - Civic participation
  - Inclusivity
  - Repertoires of contention

REGIME LEVEL

- **SOCIO-TECHNICAL CONTEXT**
  - Adaptability
  - Pressures
- **POLITICAL CONTEXT**
  - Regime stability
  - Regime pressures
  - Participation
- **CULTURAL CONTEXT**
  - Political Involvement
  - Transparency

OTHER ELEMENTS

- Type of emergency they respond to
- Window of opportunity for the CAI
- Main archetype (System mapping)

6.2. Overall results

NICHE LEVEL INDICATORS

SOCIO-TECHNICAL CONTEXT OF THE STUDIED COLLECTIVE ACTIONS

A) Transformation capacity

Question: **Did the CAI achieve a system innovation or societal transformation? Y/N**

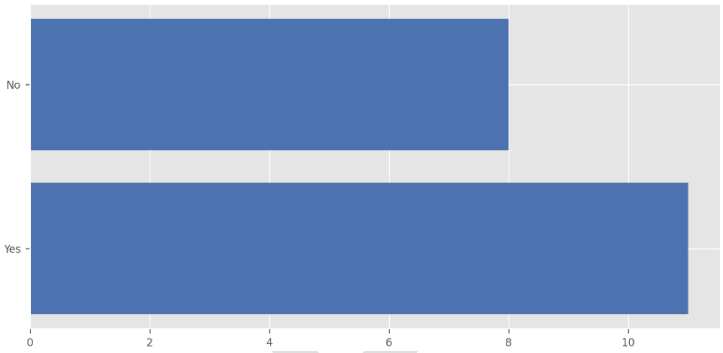

Figure 2. Transformation capacity

The answers reveal that a majority (11 out of 19 cases) successfully contributed to significant changes in existing systems. In contrast, 8 cases did not result in system-level change, suggesting that while they may have had localized or short-term impacts, they fell short of triggering broader societal transformation.

The key barriers preventing these initiatives from driving system innovation include their limited structural influence, fragmented institutional backing, and a policy context that tends to be reactive rather than proactive. In some instances, institutional inertia and weak connections to formal policymaking processes have constrained grassroots initiatives from scaling up substantial reforms. As a result, their impact has remained confined to local improvements without broader systemic implications. In some contexts, significant policy changes were not directly attributable to the CAI but rather emerged as regime-level responses to external crises.

This distribution points out to the potential of CAIs to act as catalysts for systemic change, underscoring the importance of contextual and structural factors that can either enable or constrain their transformative capacity.

B) Transition pathways

Question: **How socio-technical transitions unfold depending on the nature of landscape pressures and the response of the existing regime? MULTIPLE CHOICE**

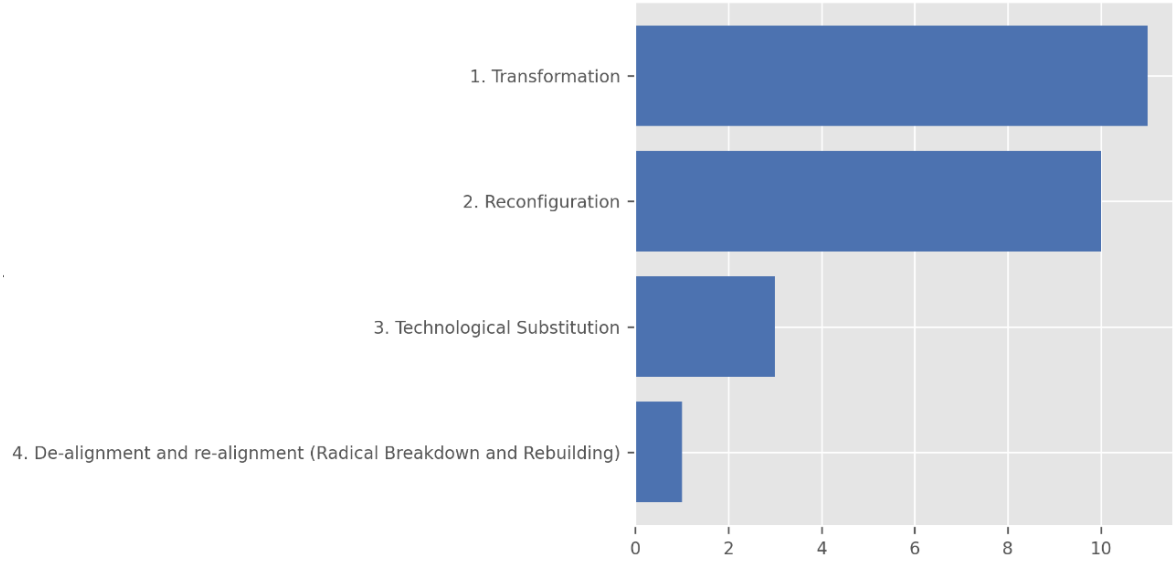

Figure 3. Transition pathways

The findings related to the dynamics of socio-technical transitions indicate a variety of transition pathways across the sample. Most of the historical CAIs (11 out of 19) led to transformations, reflecting deep structural changes in socio-technical systems. These transformations were achieved through their adaptive responses to broader landscape pressures such as the climate crisis, energy affordability, and evolving EU environmental mandates.

Ten historical CAIs resulted in reconfiguration, where existing systems were adapted without being completely replaced, suggesting incremental forms of change. In cases like the Przylesie HE, it has led to policy adjustments in housing support programmes. Other examples include Vienna's participatory budgeting and Kraków's air quality initiative (Krakow Smog Alert), where innovations triggered new forms of collaboration among niche actors, learning within administrative structures, and public engagement, all while remaining within the bounds of existing legal and governance systems. These shifts align with broader landscape trends, such as climate mandates and increasing environmental awareness, but the core systems remain intact. This indicates a reconfiguration pathway, where the regime adapts and evolves by selectively integrating niche elements rather than being fundamentally replaced.

Three initiatives followed a technological substitution pathway, marked by the replacement of existing technologies without significant institutional or systemic transformation. For example, in the flood in Genoa HE, a flood protection project based on raising river barriers and adding

underground spillways was carried out. However, the intervention reflects a conservative adaptation, a technical fix reinforcing the current system rather than transforming it. Despite their goals to change values and behaviour, OurPower in Austria, to date, has mainly contributed to the gradual replacement of fossil fuels with renewables, representing also a case of technological substitution, where the core technology changes but the underlying system (governance, market structures, stakeholder roles) remains largely intact.

One case achieved a partial de-alignment and re-alignment transition. The adoption of Catalonia's Law 24/2015, driven by the Energy Poverty Alliance, illustrates how grassroots actors leveraged the political instability following Spain's 2008 crisis and the different overlapping crises this first crisis unfolded (a moment of partial regime de-alignment) to push for transformative change. This law marked a radical shift in the treatment of vulnerable households by enshrining the right to energy, prohibiting disconnections and introducing the Precautionary Principle, challenging the dominant logic of the energy regime. While it did not lead to a full systemic re-alignment (the Law is only applicable in the Catalonia region while the energy system is mainly regulated through central policies and laws) it represents a case of niche innovation gaining traction during a period of weakened regime institutions.

This distribution of outcomes illustrates the diverse ways in which collective action initiatives can influence socio-technical transitions, with transformation emerging as the most common trajectory in the sample.

C) Typology of actors influencing the CAI

Question: **What kind of actors were involved in the transition pathways? MULTIPLE CHOICE**

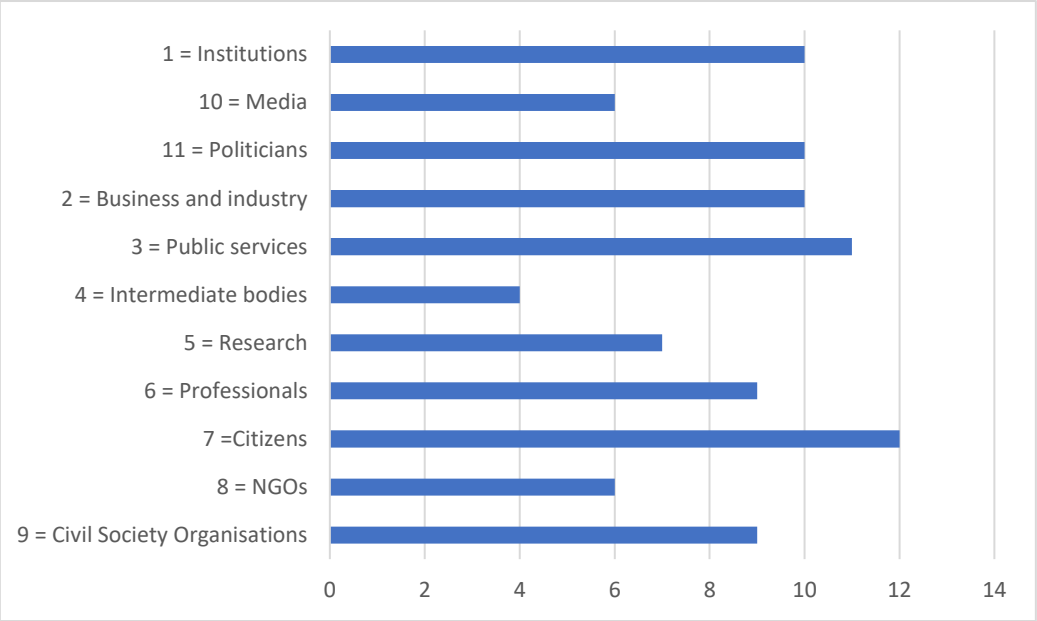

Figure 4. Typology of actors influencing the CAI

The analysis of actor involvement in the transition pathways reveals a broad and diverse set of stakeholders contributing to the CAIs. Public services were prominently featured (11 cases), indicating the importance of institutional collaboration in supporting or implementing transitions.

Institutions, politicians, and business and industry actors each played a role in 10 cases, suggesting that systemic change often requires cooperation across both public and private sectors, as well as alignment with political will and institutional support. Professionals (9 cases) and civil society organisations (9 cases) were also well represented, underlining the relevance of expert knowledge and organised civic advocacy in shaping and sustaining transition processes.

Research institutions contributed to 7 of the studied CAIs, showing a moderate but meaningful involvement in generating evidence and informing action. NGOs and media were each involved in 6 cases, pointing to their supportive yet somewhat peripheral roles in the sample, potentially amplifying or legitimizing CAI efforts rather than directly initiating change. Intermediate bodies were the least involved (4 cases), possibly reflecting their more specialized or context-dependent contributions.

Overall, the findings suggest that transition pathways are typically multi-actor processes involving coordination among citizens, public institutions, professionals, and both formal and informal civic structures. The prominent role of citizens and public services suggests that bottom-up pressure combined with public sector engagement is a key driver of transformation in many of the historical examples studied.

D) Types of innovations

Question: **Indicate innovation typology. MULTIPLE CHOICE**

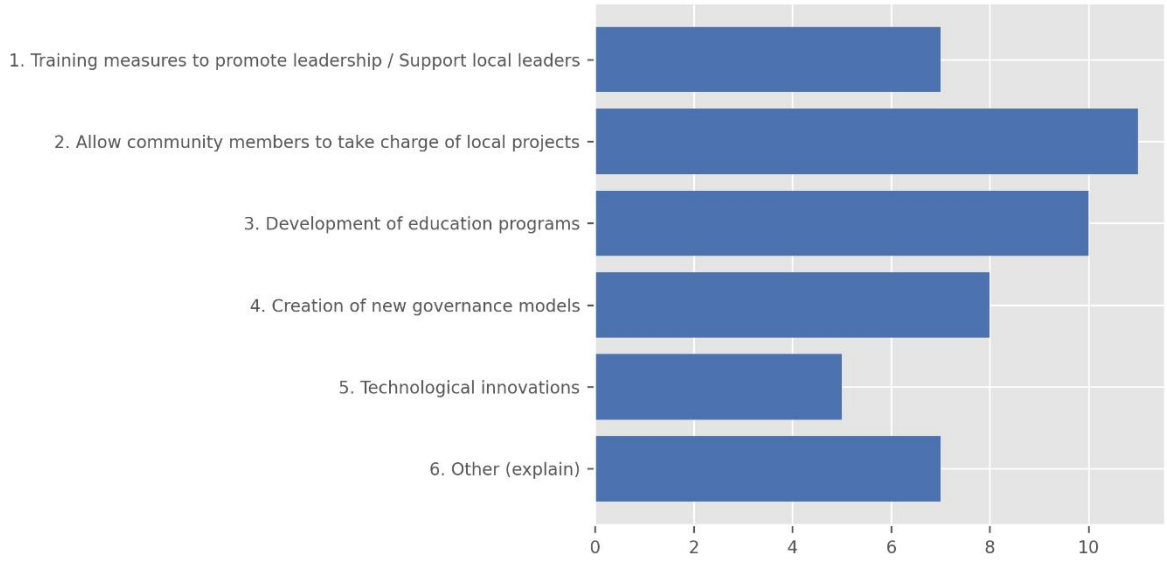

Figure 5. Types of innovations

The analysis of the innovation typologies highlights a strong emphasis on social and governance-related innovations over purely technological ones. The most frequently reported innovation was the empowerment of community members to take charge of local projects (11 cases), underscoring

the importance of bottom-up leadership and community agency in driving transformative change. Closely following these were the development of education programmes (10 cases), reflecting the critical role of knowledge-building and capacity development in supporting long-term transition processes.

New governance models were introduced in 8 cases, suggesting that rethinking institutional structures and decision-making processes is a key mechanism through which CAIs can effect broader systemic change. Training measures aimed at promoting leadership and supporting local leaders were cited in 7 HEs, further reinforcing the importance of investing in human capital and leadership development within communities. Technological innovations were identified in only 5 cases, indicating that while technology plays a role in socio-technical transition pathways, it was not the dominant driver in most of the HEs studied.

Additionally, 7 cases included innovations categorised as "Other," likely reflecting context-specific elements. One notable form is the fostering of a protest culture, exemplified by the Anti-nuclear movement in Austria, which is considered the first post-war initiative of this type, and which introduced civic resistance as a legitimate political strategy. Several initiatives highlighted spontaneous community mobilisation as a form of innovation, where citizens organised mutual aid during crises, such as power outages, showcasing self-organised resilience. Others emphasised self-education within the framework of participatory governance schemes, with citizens learning how to influence large-scale infrastructure projects, such as nuclear power developments. Innovative participatory governance models were also observed, including the citizen-led budgeting processes in Vienna, which introduced new deliberative structures that empowered residents to make decisions about public spending. Although limited in implementation roles, these initiatives significantly boosted civic knowledge and awareness on the thematic area of the CAI. In the field of social innovation, some historic CAIs implemented collective support mechanisms for vulnerable households, particularly to empower vulnerable households in their energy rights, while driving legislative innovation by leveraging broad-based alliances across diverse civil society sectors.

Overall, these findings suggest that CAIs tend to rely more on social, educational, and governance innovations than on technological solutions. This emphasises the value of participatory approaches, learning processes, and institutional adaptation in achieving impactful and sustainable socio-technical transitions.

POLITICAL CONTEXT OF THE STUDIED COLLECTIVE ACTIONS

A) Participation

Question: **How open is the CAI to public participation and input?**

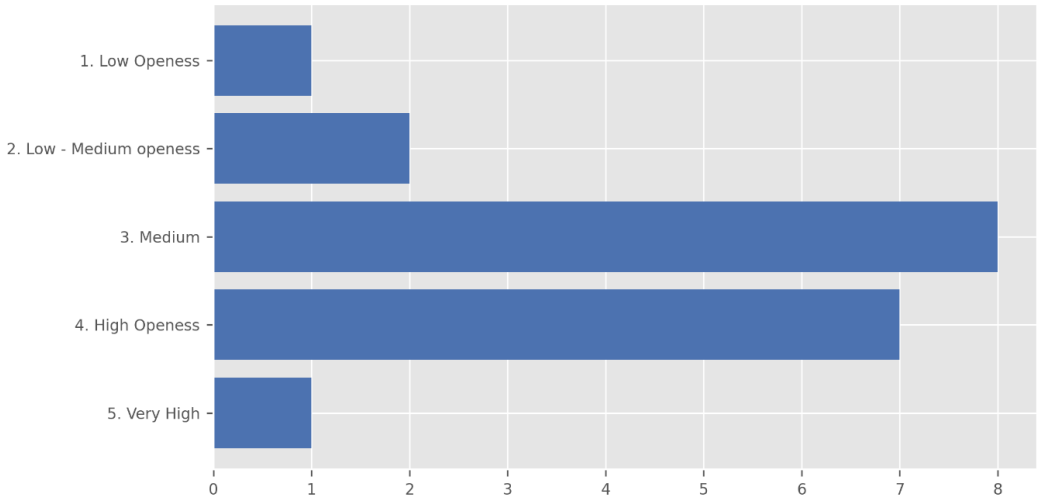

Figure 6. Participation

The assessment of how open the CAIs were to public participation and input reveals a generally moderate to high level of openness across the sample. The most common response was “Medium” openness, reported in 8 of the 19 cases. This suggests that while public engagement was present, and responded to adaptive and emergent pattern where participation evolves as actor responds to crisis and innovations.

A significant portion of the initiatives (7 cases) exhibited “High Openness,” indicating a strong commitment to inclusive participation and active community input in decision-making processes. One case was rated as having “Very High” openness, reflecting an exceptional level of participatory integration. On the other end of the spectrum, only 3 initiatives (the Przylesie Housing Energy Community, the Clean Transport Zones in Kraków and the REC in Naples HE) were identified as having low or low-to-medium openness.

These results highlight the generally participatory nature of the CAIs, with most initiatives making considerable efforts to involve the public. The predominance of medium to high levels of openness aligns with the broader emphasis on community-led approaches and governance innovation observed in the sample, reinforcing the role of participation as a cornerstone of effective and transformative collective action.

B) Existence of free social spaces

Question: **Were there free social spaces within the niche before the CAI foundation that may have influenced the appearance of the CAI?**

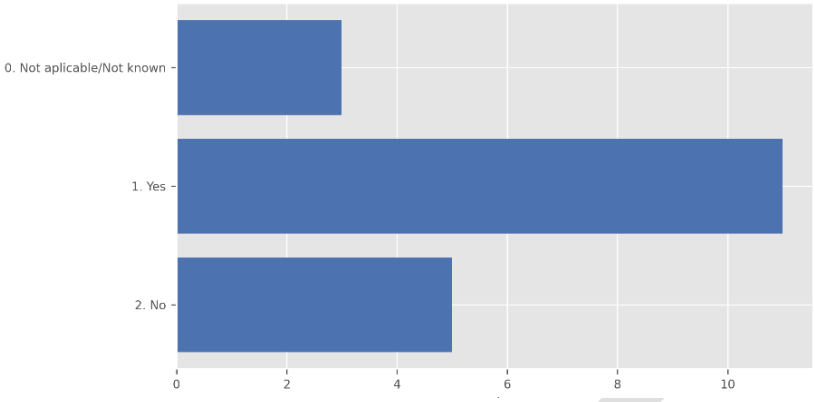

Figure 7. Existence of free social spaces

The responses to whether Free Social Spaces - FSS existed within the niche prior to the foundation of the CAI (potentially influencing their emergence) indicate that such spaces could have played an important enabling role in many cases. In 11 out of 19 CAIs, the presence of FSS prior to the initiative was reported. These spaces, which can be informal or semi-formal settings that encourage community interaction, dialogue, and grassroots organizing, appear to have created fertile ground for collective action.

In contrast, 5 cases reported that no such spaces existed beforehand, suggesting that the CAIs emerged under more constrained social conditions. For 3 cases, the information was either not applicable or not known, reflecting some uncertainty or contextual ambiguity.

Overall, the findings suggest that the existence of FSS can be a significant factor in the emergence of CAIs. These spaces would act as incubators for civic engagement, providing a platform for community members to connect, identify shared concerns, and organize.

C) Role of free social spaces

Question: **What was the role of these social spaces?**

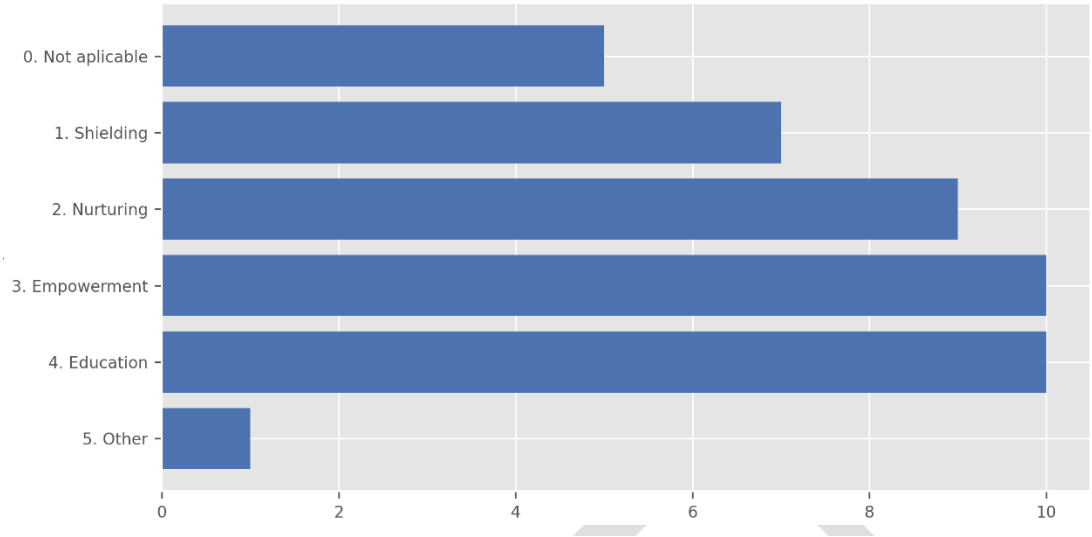

Figure 8. Role of free social spaces

The findings on the role of social spaces in the emergence and/or development of CAIs reveal a multifaceted contribution to socio-technical transitions. Among the 14 cases where social spaces were applicable, their most frequently reported roles were empowerment and education, each cited in 10 cases. This suggests that these spaces were instrumental in building individual and collective capacities, fostering critical awareness, and enabling communities to take meaningful action. Nurturing was identified in 9 cases, highlighting how social spaces provided supportive environments for experimentation, dialogue, and trust-building. Additionally, 7 cases noted the role of shielding, indicating that these spaces helped protect emerging initiatives from external pressures or dominant regime influences. Only the Finnish HE of Local self-help movement in the Kainuu region reported an "Other" function. In that case, existing free social spaces played a role in fostering a culture of preparedness and resilience by strengthening the networks of small village communities in this rural region. In conclusion, social spaces in the studied CAIs played a crucial enabling role, acting not just as physical or symbolic arenas for gathering, but as foundational platforms for learning, empowerment, and sustained engagement.

D) Internal rules of free social spaces

Question: **Are there any explicit community guidelines in place within the CAI?**

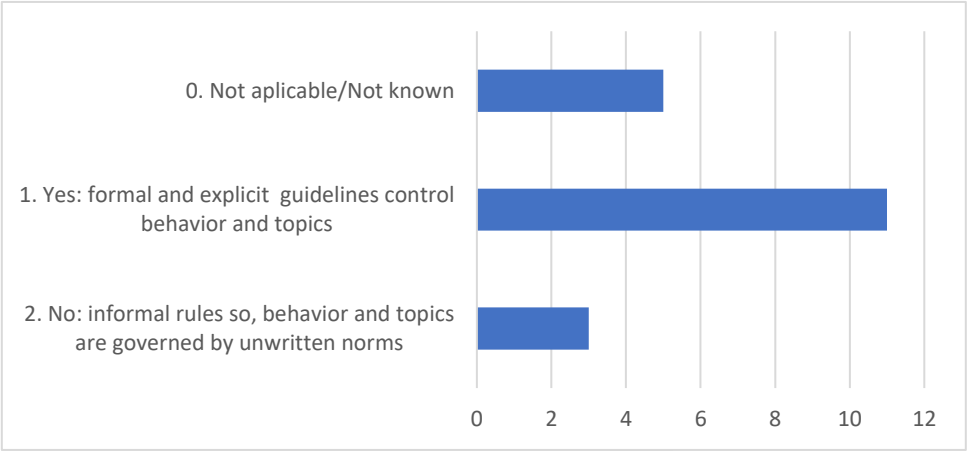

Figure 9. Internal rules of free social spaces – Community guidelines

The responses reveal a strong tendency toward formalised governance structures across the sample. In 11 out of 19 cases, CAIs had established formal and explicit guidelines to regulate behaviour and guide interactions, suggesting a trend to establish clarity, accountability, and structure within the CAI. In contrast, 3 cases reported the absence of formalised rules, instead relying on informal, often unwritten norms to guide behaviour.

These findings suggest that while informal social dynamics exist, and play an important role, a majority of the studied CAIs opted to codify community guidelines. This suggests potential benefits of consistent frameworks to sustain collaboration within CAIs.

Question: **Are there specific rules that protect the CAI from control by institutions of the regime?**

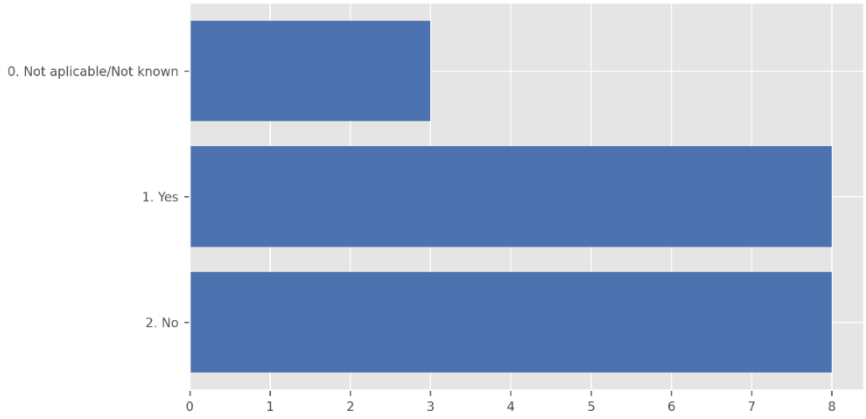

Figure 10. Internal rules of free social spaces - Protection

The responses to the question regarding the existence of specific rules that protect CAIs from control by regime institutions show a balanced division within the sample. Out of the 19 historical examples, 8 CAIs had established such protective rules, suggesting an intentional effort to preserve autonomy and maintain independence from dominant political, institutional, or economic structures. This approach likely reflects a strategic stance to safeguard grassroots priorities and resist co-optation by established regime actors. Conversely, 8 CAIs reported that no such protective rules were in place, indicating a greater openness to institutional

involvement. This may also reflect variations in political context, organisational capacity, or the nature of collaboration between CAIs and institutional actors. The remaining 3 cases were marked as not applicable or not known, highlighting some uncertainty or contextual specificity.

Overall, the even split in responses suggests that while many CAIs actively pursue mechanisms to retain their independence, others operate within more open frameworks with regime institutions.

Question: **Are there moderators, within the CAI, who facilitate discussions, to maintain a respectful and productive environment, stimulate discussions and keep discussions on track?**

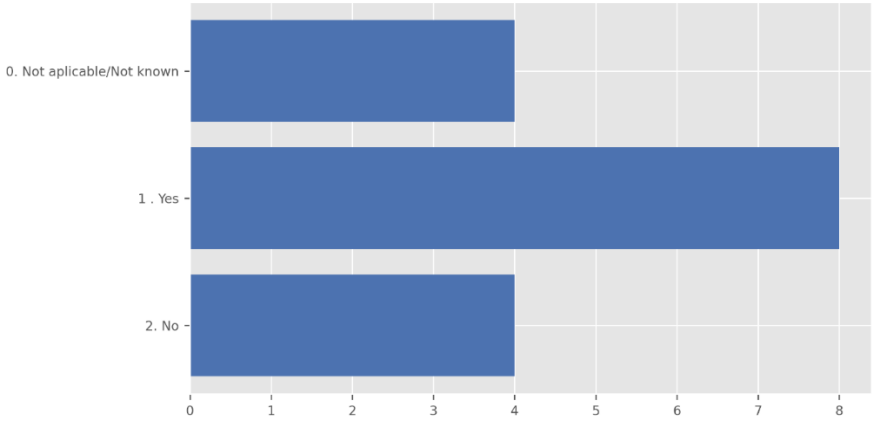

Figure 11. Internal rules of free social spaces - Moderators

The findings on the presence of moderators highlight the varying approaches to internal coordination and facilitation. Out of the 19 cases, 8 reported the presence of moderators who played a key role in guiding discussions, fostering a respectful and productive environment, and ensuring conversations stay focused and inclusive. This suggests a structured approach to deliberation, in line with the existence of community guidelines discussed above, and likely contributing to more effective communication, conflict resolution, and consensus-building processes within the initiative. In contrast, 4 CAIs indicated that they did not have moderators and relied on self-organisation, shared norms, or informal leadership to manage group dynamics.

Overall, the presence of moderators in nearly half the sample, points to their perceived value in maintaining inclusive, orderly, and goal-oriented participation. However, the lack of such roles in some CAIs also underscores that facilitation structures can vary depending on the context, size, and culture of each initiative.

Question: **How are responsibilities distributed internally within the CAI among participants?**

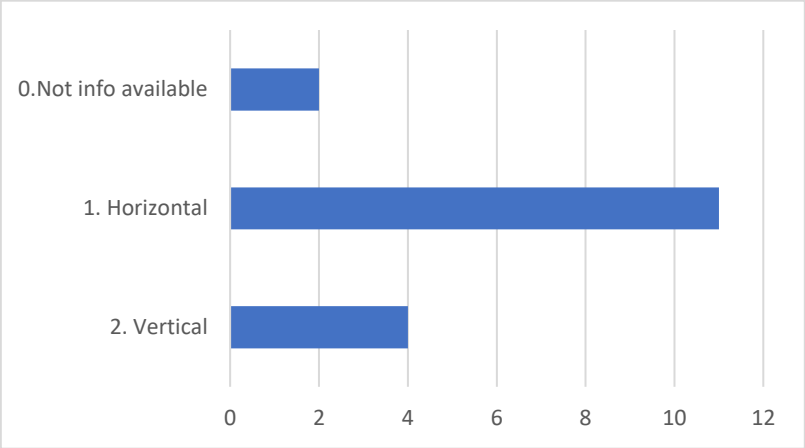

Figure 12. Internal rules of free social spaces - Responsibilities

The distribution of responsibilities within the CAI sample reveals a strong preference for horizontal organisational structures. Out of the 19 cases, 11 indicated that responsibilities were shared horizontally among participants, reflecting a commitment to egalitarian principles, participatory decision-making, and collective ownership. In contrast, 4 cases reported a vertical distribution of responsibilities, where leadership and decision-making roles are more centralised or hierarchical. These 4 cases belong to 3 of the typologies of political participation (involvement, formal political participation, and activism). Only 2 cases lacked sufficient information to determine the internal structure.

Overall, the predominance of horizontal responsibility-sharing underscores the democratic ethos guiding many CAIs, while also highlighting that some flexibility exists depending on the initiative's goals, context, and scale.

E) Governance

Question: **What is the role at niche level of private sector in enabling or hindering innovations?**

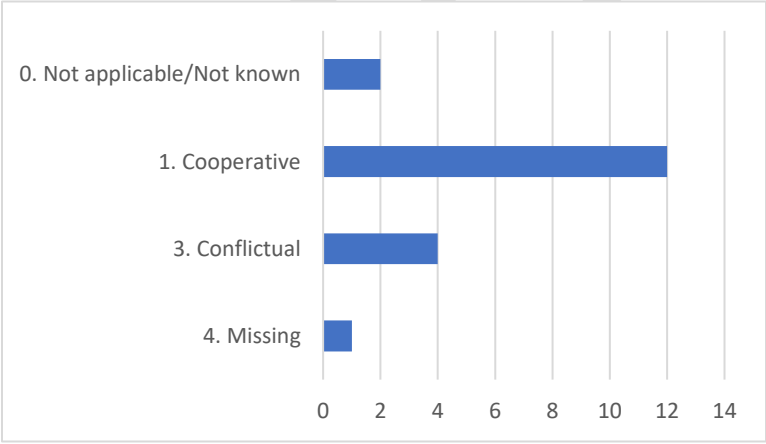

Figure 13. Governance – Role of private sector

The role of the private sector at the niche level appears predominantly cooperative within the sample. In 12 out of the 19 historical examples, the private sector was reported to have played a supportive or enabling role, suggesting that these actors often contributed with resources, partnerships, or expertise that facilitated innovation and helped CAIs to scale or stabilise. This indicates a potential alignment of interests in many cases, where private sector involvement did not obstruct but rather enhanced niche-level transformations.

However, in 4 cases the relationship was described as conflictual (Anti-nuclear movement in Austria, the Flood in Genoa in 2011 in Italy, the Kraków Clean Transport Zones In Poland, and the Energy Poverty Alliance in Spain) highlighting tensions between CAIs and private entities. These conflicts

arise from clashing or competing values, interests, or power relations, especially when CAIs confront dominant norms or push for systemic changes that disrupt established power dynamics between nich and regime actors.

Overall, the findings suggest that while collaboration with the private sector is common, significant challenges and oppositional dynamics also arise, particularly where transformative ambitions of CAIs confront entrenched economic interests.

Question: **What is the role at the niche level of the public sector in enabling or hindering innovations?**

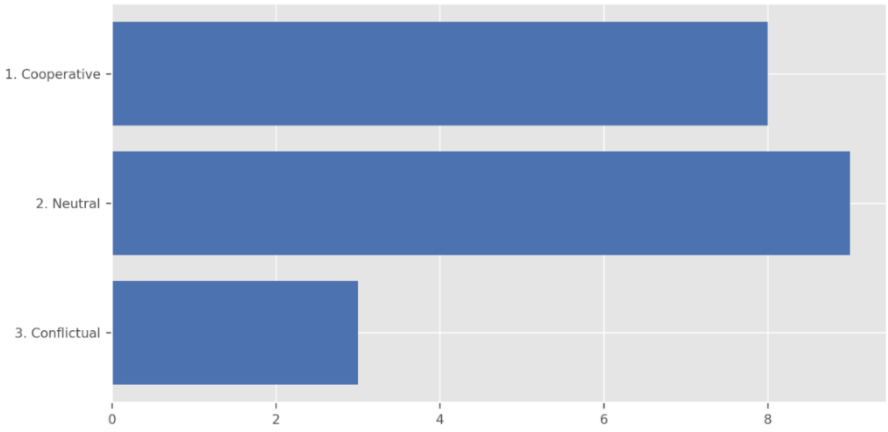

Figure 14. Governance – Role of public sector

The public sector's role at the niche level in enabling or hindering innovation shows a more mixed pattern compared to the private sector. Out of the 19 historical CAIs, 8 identified the public sector as cooperative, indicating that public institutions often provided support (e.g. through policy alignment, resources, facilitation, or institutional recognition) that enabled CAIs to develop and pursue their goals.

In municipalities like Monachil and Przylesie, public sector institutions played a facilitative role, offering political support, logistical assistance, and financial or regulatory resources that aligned with broader energy and sustainability agendas. These are examples of active cooperation, where public bodies act as active partners, creating favourable conditions for CAIs to thrive. Similarly, in Kainuu, collaboration emerged around emergency response, reflecting a situational cooperation model where the public sector and the CAI jointly addressed urgent local needs, although sometimes strained by differing perceptions of the situation. Other cases highlight conditional or ambivalent cooperation. In the Northern District Granada and Kraków HEs, support from public institutions coexisted with tensions over representation, control, or inconsistent political backing. In Kraków HE concerning the clean transport zone, while niche-level collaboration among the public sector and the Public Transport Authority was strong, the City Council introduced, to a certain extent, political uncertainties through their political diversity. Meanwhile, in Tartu County, the public sector led the developments but was not always aligned with grassroots innovation, indicating a more top-down, directive cooperation model that may lack responsiveness to local initiatives. These varied patterns reflect how cooperation between CAIs and public actors is shaped by governance structures, institutional agendas, and the evolving balance of power.

The most frequent response, with 9 cases, was that the public sector maintained a neutral stance, consequently neither actively supporting nor obstructing the CAIs' goals and means. The neutral role of the public sector across the studied CAIs often reflects a mix of passive endorsement, limited engagement, or structural ambivalence. In Tartu's Urban Gardening Communities, public institutions maintain a detached neutrality, offering neither active resistance nor meaningful support, and failing to acknowledge the tangible social and environmental benefits the gardens provide. In L'Aquila, the initial enabling role of educational institutions contrasts sharply with the long-term inertia in public reconstruction efforts, suggesting a limited or inconsistent public commitment over time.

In other cases, neutrality manifested through policy ambivalence or internal fragmentation. For example, in the Austrian OurPower initiative, while national policies rhetorically support renewables and citizen participation, systemic structures continue to favour incumbent actors (e.g. established energy providers and electricity grid operators), putting smaller initiatives at a disadvantage. Similarly, in the Vienna Climate Team and Pro Hanhikivi cases, the neutrality of the public sector is not uniform but fractured, shaped by individual institutional attitudes and political divides. In the Kraków Smog Alert case, public sector actors remained within legal boundaries, responding positively but for most of the time without proactively driving change. Such neutrality then reflects bureaucratic inertia, institutional distance or fragmentation, or a lack of clear policy frameworks to engage with bottom-up innovations.

Conflictual relationships with the public sector were reported in 3 cases. The conflictual relationships between CAIs and public sector actors in these cases reveal tensions rooted in power imbalances, contested narratives, and institutional resistance to bottom-up initiatives. In the Austrian anti-nuclear movement, most public institutions positioned themselves in opposition to the CAI, reflecting a structural conflictual dynamic where state actors resisted challenges to dominant pro-nuclear, technology-led narratives. Nevertheless, a partial opening existed through public universities, which played a mediating role by offering spaces for dialogue and public debate, highlighting that even in predominantly adversarial contexts, institutional diversity allows for limited cooperation. In Genoa's flood-related CAI and the Northern District of Granada case, conflicts stemmed less from outright opposition and more from institutional neglect or control struggles. In the flood in Genoa, although the CAI frequently engaged with public authorities to influence policies and investments, the sustained dismissal of its proposals by institutional actors contributed to a persistently negative relationship. Similarly, in the Northern District of Granada, while public sector support was present, tensions emerged around issues of control, representation, and institutional framing. These cases illustrate how formal engagement does not always equate to alignment, and conflict often arises when CAIs seek to challenge established governance logics or claim greater agency.

Overall, while cooperation with public institutions plays a key enabling role in some CAIs, the high number of neutral and some conflictual relationships points to a cautious or reactive public sector presence.

Question: **Reflexivity: Does the CAI have critical self-assessment practices to evaluate their actions and strategies? (e.g. Internal assessments that can be used to re-shape their future strategies, etc)**

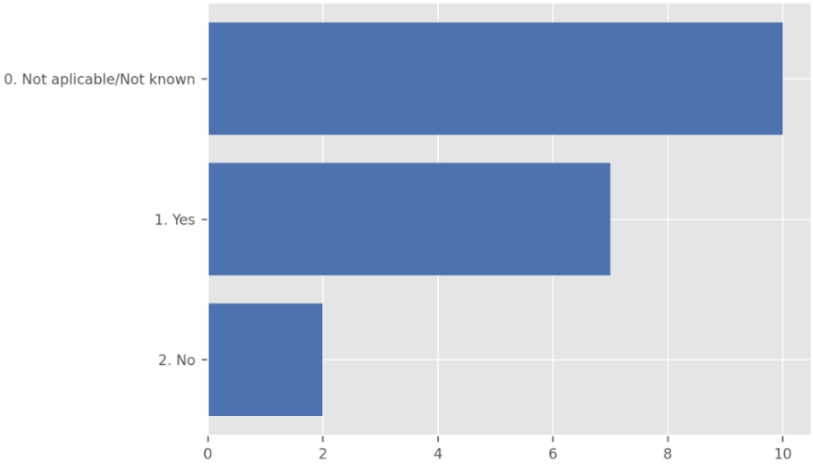

Figure 15. Governance – Reflexivity

The presence of reflexive practices, defined as critical self-assessment mechanisms, is only moderately evident across the sample. Out of 19 cases, 7 reported having such internal evaluation practices in place. These initiatives actively engaged in self-assessment, allowing them to critically reflect on their actions, adapt strategies, and potentially improve their impact over time. This indicates a certain degree of organisational maturity and a commitment to learning and continuous improvement. However, a significant portion of the sample (10 cases) marked this question as not applicable or data not known, suggesting a notable gap in available information or a lack of formalised practices in this area. Only 2 cases explicitly reported not having any such practices, meaning they did not engage in formal or informal mechanisms for critical reflection or strategic re-evaluation.

These findings indicate that while some CAIs in the sample demonstrate a strong reflexive capacity, many may either lack such practices or have not made them explicit. Given the importance of reflexivity in navigating complex transition processes, this could be an area for further development and support.

CULTURAL CONTEXT

A) Agency

Question: **How are the decision-making processes within the CAI for shaping transitions within socio-technical systems?**

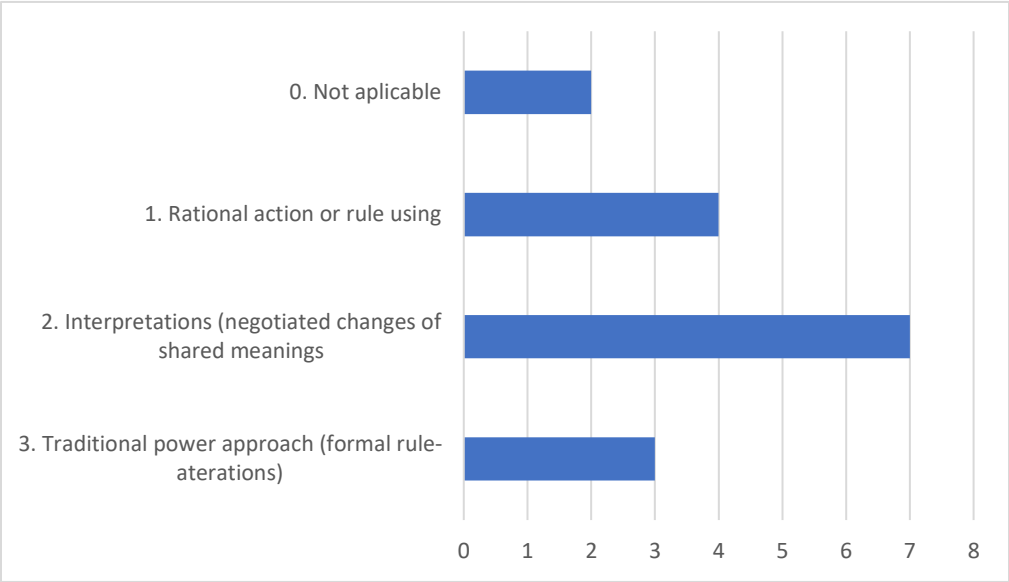

Figure 16. Agency

The decision-making processes reflect a diverse range of approaches, with a clear inclination towards deliberative and interpretive models. Among the 19 cases, the most common approach (reported in 7 initiatives) involved decision-making based on interpretations and the negotiated change of shared meanings. This reflects the importance of collective sense-making, dialogue, and the co-construction of understanding in driving systemic change. Four cases reported a rational action or rule-using approach, where decisions are made through predefined procedures, strategic planning, or logical evaluation of options. This suggests a more structured and perhaps efficiency-driven decision-making model.

Three CAIs were found to use a traditional power approach, two of them belonging to the "Formal political participation" typology of HEs. In these two, the Kraków Clean Transport Zone and in the case of the Resource-wise municipality in Ii (Finland), decision-making had already been embedded in existing governmental structures, where actors from public administration or political institutions led or influenced the process through official channels. In the case of the Kraków Smog Alert, although operating outside of formal institutions, the CAI used a strategic advocacy approach, targeting elected officials and administrative bodies to push for legal and regulatory change. Across these cases, influence is exerted through recognised procedures, hierarchies, and institutional negotiations, rather than through disruptive or radically horizontal means. This reliance on traditional power structures reflects a strategic alignment with formal institutions, whether internally (as institutional actors) or externally (as advocates), suggesting that even bottom-up initiatives sometimes work within the prevailing logics of governance to achieve legitimacy, continuity, and policy impact.

Overall, the findings suggest that while CAIs vary in their internal governance models, many prioritise negotiation, meaning-making, and participatory deliberation over rigid hierarchies or

solely procedural logic. This reinforces the view of CAIs as dynamic spaces of experimentation and shared learning within broader transition processes.

B) Civic participation

Question: **What kind of resources does the CAI have?**

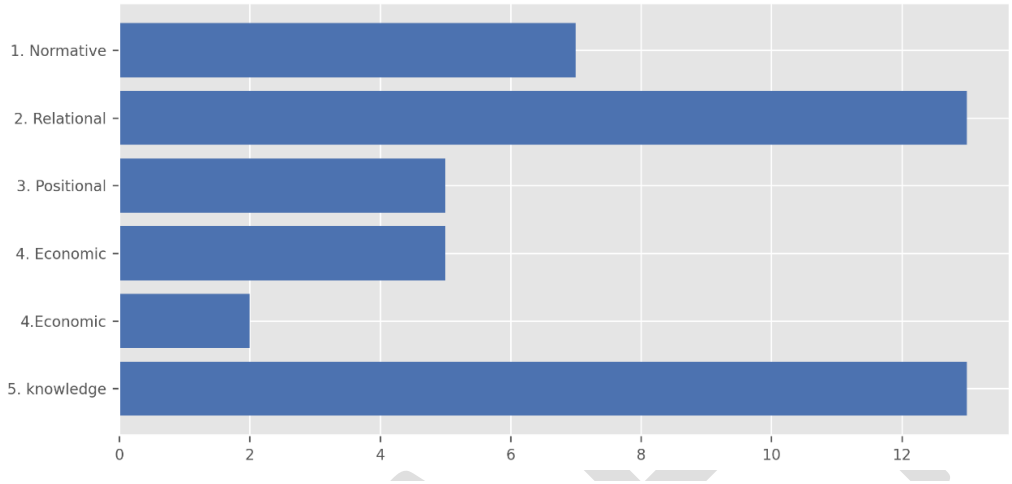

Figure 17. Civic participation

The types of resources available provide insight into their capacities and strategic positioning in boosting socio-technical transitions. The most reported resources were relational and knowledge-based, each identified in 13 out of 19 cases. This indicates that strong networks, partnerships, and access to relevant expertise and information are central assets for the majority of the studied CAIs. These forms of capital are crucial for collaboration, and legitimacy-building. Normative resources, such as shared values, cultural legitimacy, and moral authority, were present in 7 cases, underscoring the importance of value-driven motivation in sustaining collective efforts and mobilising community support. Positional and economic resources were less frequently cited, each mentioned in 5 cases. This suggests that while some CAIs benefit from favourable positions or financial support, these are not widespread strengths across the sample.

In conclusion, the data reveals that the studied CAIs are primarily driven by social, cognitive, and moral assets, rather than material or institutional power. Their strength lies in their ability to connect actors, produce and share knowledge, as well as align around shared values.

C) Inclusivity

Question: **Does the CAI have inclusivity in terms of gender?**

The findings on gender inclusivity show a strong overall commitment to inclusive practices. Out of the 19 cases, 13 initiatives reported explicitly having gender inclusivity. This suggests a recognition of the importance of diverse perspectives and equitable representation in shaping more just and resilient socio-technical transitions. Only 1 case explicitly reported a lack of gender inclusivity

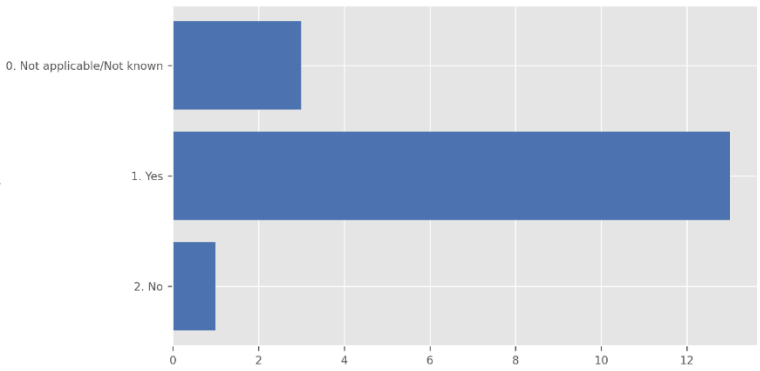

Figure 18. Gender inclusivity

(OurPower in Austria, where most members are at present male, but they are currently making a concerted effort to involve more women in their activities).

In summary, the data suggest that gender inclusivity is widely embraced among CAIs, aligning with broader values of social justice and participatory governance that underpin many grassroots and community-led efforts.

Question: **Does the CAI have inclusivity in terms of age?**

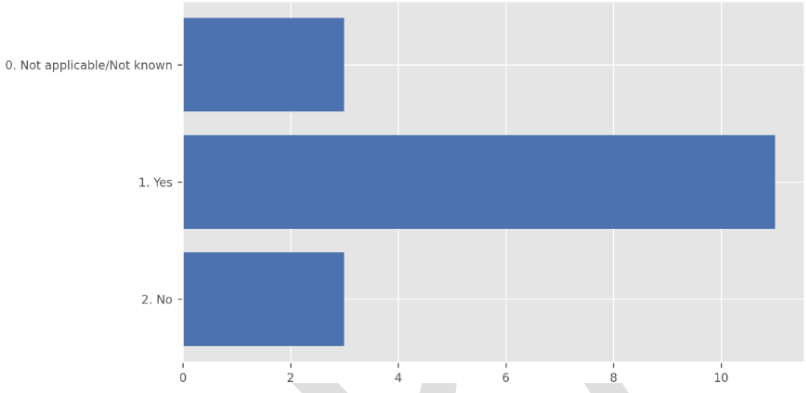

Figure 19. Age inclusivity

The results on age inclusivity reveal a generally positive trend. Out of the 19 historical examples, 11 CAIs were deemed inclusive in terms of age, suggesting efforts to engage participants across generations in their activities and decision-making processes. This suggests a recognition of the value of intergenerational dialogue and diverse life experiences in shaping transition processes.

However, 3 cases indicated a lack of age inclusivity, implying that certain age groups have been underrepresented or excluded from meaningful participation. Naturally, one of them is the Youth group of the EYES initiative, as the project specifically targets people from ages 15 to 20. In OurPower the majority of members are older than 50 years, with efforts being made to include younger demographics. And in the flood in Genoa, the majority of participants were around 40-50 years old.

Question: **Does the CAI have inclusivity in terms of cultural diversity?**

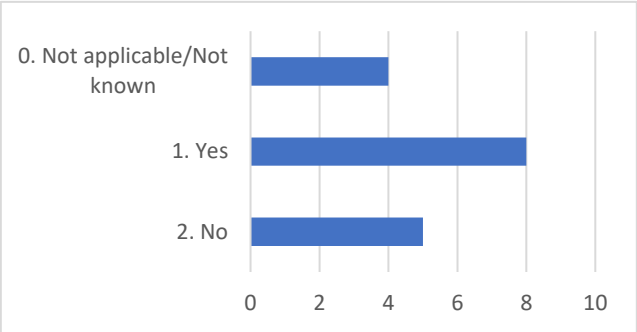

Figure 20. Cultural diversity

The findings on inclusivity in terms of cultural diversity show a more divided picture compared to gender or age. Out of the 19 cases, 8 CAIs reported having cultural diversity. However, 5 cases reported a lack of cultural diversity inclusivity, suggesting that these initiatives may face challenges in engaging diverse communities, or that their composition remains homogenous, whether due to structural, contextual, or internal limitations.

One pointed example is the case of the Northern District of Granada. Although the District is characterised by significant cultural and ethnic diversity, including a large Roma population and residents of migrant origin, the CAI has not articulated an explicit strategy of cultural inclusion. The focus of the movement has been on addressing urgent structural issues, particularly the chronic energy crisis. Given the severity of the situation and the limited resources available, residents have concentrated their efforts on defending basic rights rather than integrating transversal approaches such as intercultural mediation or religious sensitivity. Participation in the movement reflects the district's demographic composition, but this inclusivity is pragmatic and situational, not the result of targeted actions or policies.

In summary, while nearly half of the initiatives show cultural diversity, the significant number of cases that do not have a clear cultural diversity inclusion strategy, underscores a need for greater attention to diversity in CAIs.

D) Repertoires of contention

Question: **Has the CAI been recognized through funding, awards, change in regulations or organisational policies?**

The data indicates a strong level of external validation and support of the studied CAIs. Out of the 19 cases, 14 initiatives reported having received some form of recognition, whether through financial backing, public awards, changes in regulations, or adaptations in organisational policies. This suggests that the majority of CAIs were not only impactful within their own niches but also managed to gain legitimacy and influence at broader system levels. Recognition through such mechanisms can reflect success, credibility, and/or alignment with wider institutional or policy goals. It can also provide crucial resources and visibility, further strengthening the initiative's capacity for growth and influence. Only 3 CAIs reported not having received any form of recognition (Northern District of Granada, Clean Transport Zone in Kraków and Local Self-Help movement in Kainuu region), primarily due to contextual factors. The Clean Transport Zone , as part formal political participation, was already formally embedded within municipal structures and therefore funded through the city's budget. The other two CAIs receiving no resources in terms of funds,

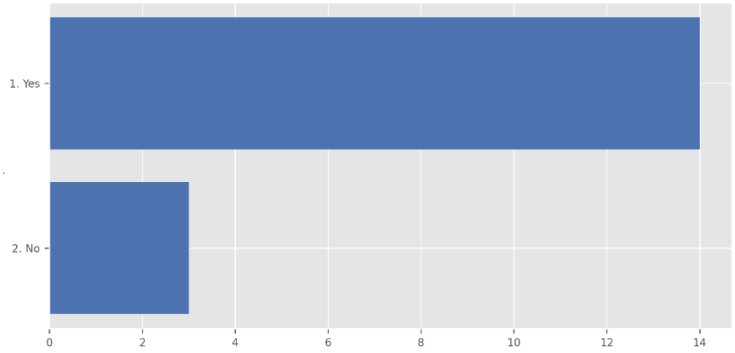

Figure 21. Recognition

awards or regulatory changes did not achieve any system innovation or societal transformation, suggesting external recognition could be tied to some extent to transformation capacity.

Overall, the findings show that recognition could be a key enabler for many CAIs, reinforcing their transformative potential and embedding their innovations into wider socio-political systems.

Question: **What are the principal methods used by the CAI to promote collective action?**

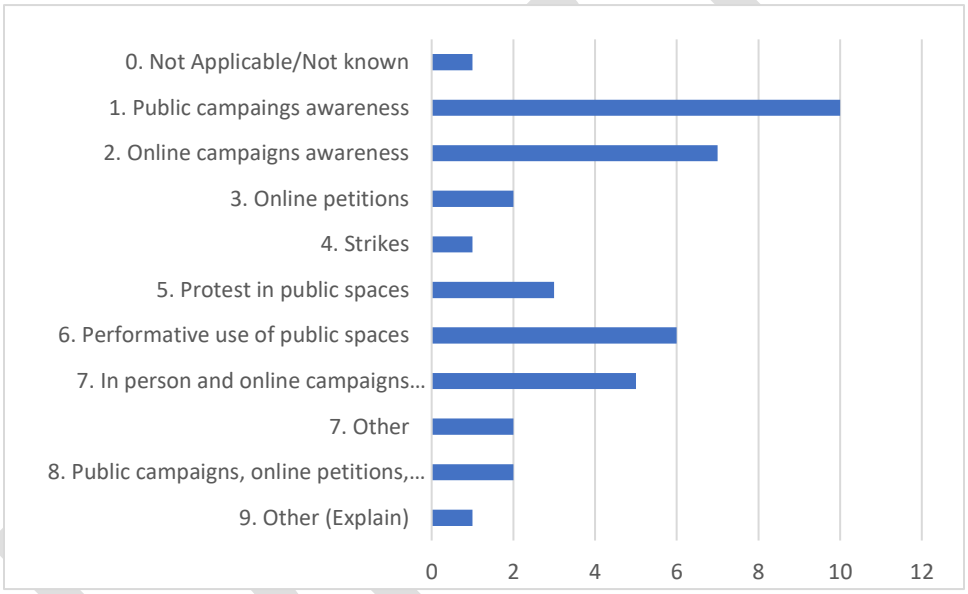

Figure 22. Types of methods used

The findings on the principal methods used by CAIs to promote collective action reveal a strong emphasis on awareness-raising strategies, both in-person and online. The most frequently reported method was public campaigns for awareness, used by 10 CAIs, demonstrating the importance of direct engagement with communities to build visibility and mobilise support. Along the same lines, 7 initiatives employed online campaigns, highlighting the role of digital platforms in expanding reach and enabling wider participation. Five initiatives used a combination of in-person and online campaigns. Beyond awareness-raising, performative use of public spaces was reported in 6 cases, pointing to creative and symbolic actions that reclaim public space as a site of expression and resistance. Less frequent methods included strikes (1 HE), as well as various forms of "other" actions (3 total, from the Renewable Energy Community in Naples, Clean Transport Zones in Kraków and OurPower Austria HEs), which encompass activities such as public workshops, informational

sessions, or public consultations. These efforts are sometimes supported by coordinated communication strategies.

Question: **How frequently are those methods used (public campaigns, etc) to promote collective action?**

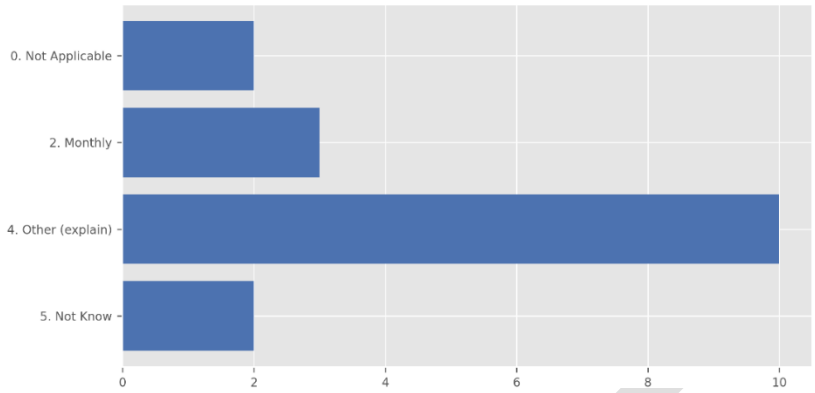

Figure 23. Methods used (frequency)

The frequency with which the CAIs employ their methods, such as public campaigns, online actions, or protests, varies significantly across the sample, with a predominant trend toward non-standardised or context-dependent use. Out of 19 cases, 10 initiatives selected "Other," indicating that their use of methods does not follow a fixed schedule but instead adapts to opportunities, needs, available resources or external events.

These findings suggest that most CAIs adopt flexible, ad hoc approaches to promoting collective action, responding to evolving contexts rather than operating on fixed schedules.

Question: **Do the CAI use common symbols to promote unity?**

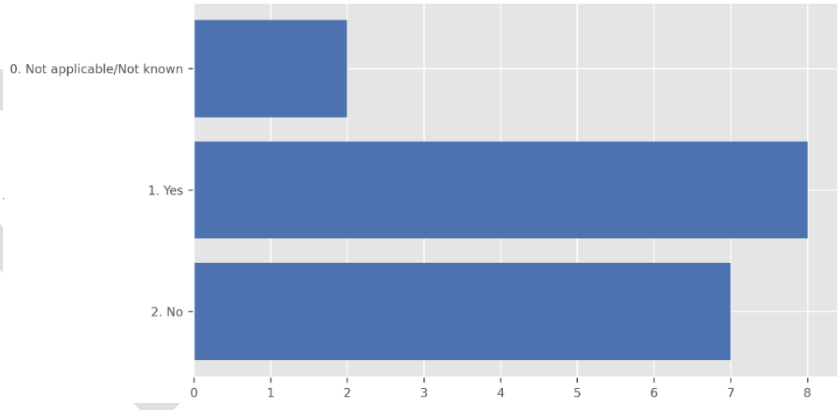

Figure 24. Use of common symbols

Out of 19 cases, 8 CAIs reported using common symbols, such as logos, slogans, colours, or shared visual imagery. This indicates that for many initiatives, symbolic representation plays a meaningful role in creating a sense of collective identity, strengthening internal cohesion, and enhancing visibility in the public sphere. However, 7 initiatives reported not using common symbols, suggesting that symbolic branding is not universally adopted across this sample of CAIs. This may be due to a preference for informal organisation, grassroots spontaneity, a lack of resources, or contexts where symbolic strategies are less culturally relevant or strategically prioritised.

Overall, while a significant portion of CAIs leverage symbolic tools to foster unity and recognition, many still operate without them. The variation suggests that the use of symbols is a strategic choice rather than a defining feature of all CAIs, influenced by their goals, scale, and sociocultural contexts.

Question: **How do the CAI present themselves in public space to claim demands?**

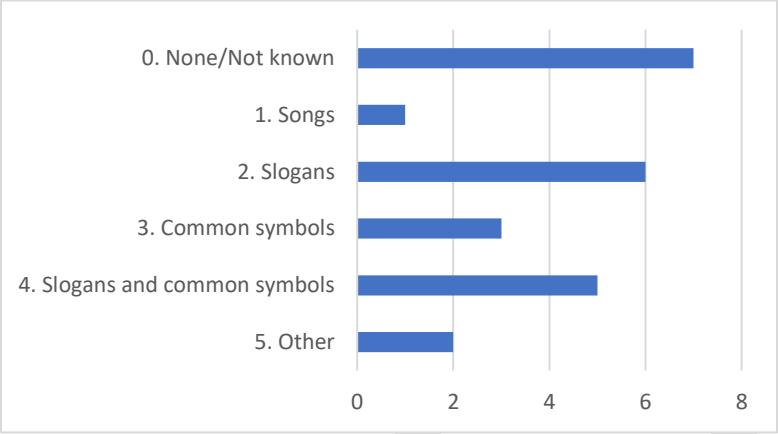

Figure 25. Presentation in public space

The findings show a variety of approaches, with a strong emphasis on slogans and symbolic representation, but also a notable portion with limited or unknown visibility strategies.

In summary, while more than half of the CAIs utilise some form of public expression to assert their demands, a substantial minority do not or remain unclear. This may reflect differences in strategic orientation, political context, or the degree to which public visibility is central to their mode of action.

Question: **How frequently are the CAI's communication campaigns implemented?**

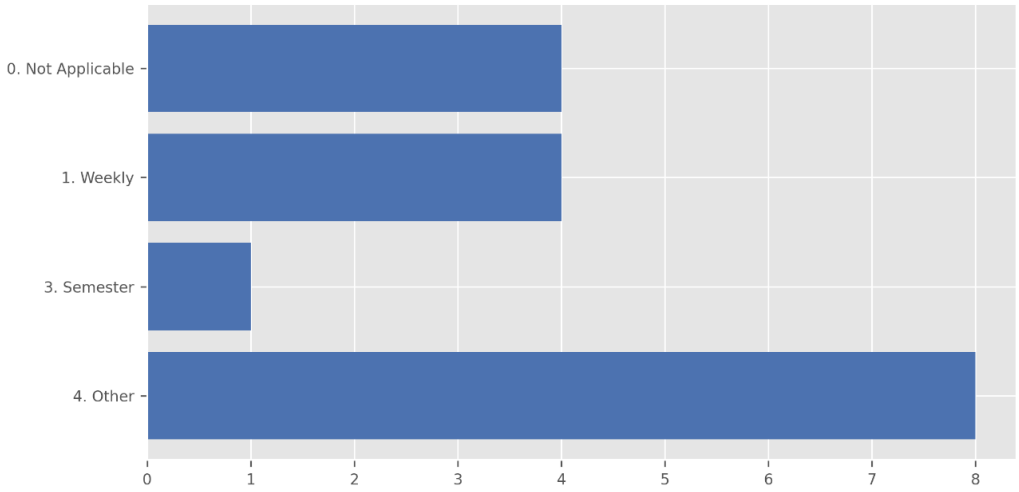

Figure 26. Frequency of communication campaigns

The responses indicate a diverse and flexible approach to outreach and engagement. In summary, while some CAIs maintain regular communication efforts**,** the dominant pattern across the sample

is one of adaptive, context-specific outreach, often outside of fixed schemes. This reflects the grassroots and responsive nature of many initiatives, although it may also suggest challenges in sustaining ongoing public engagement or developing long-term strategic communication frameworks.

REGIME LEVEL INDICATORS

SOCIO-TECHNICAL CONTEXT

A) Adaptability

Question: **How adaptable is the system to change?**

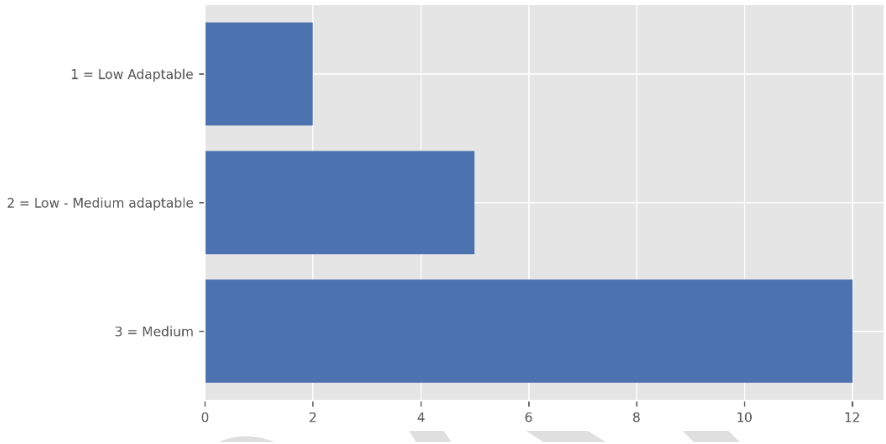

Figure 27. Adaptability

The findings on the adaptability of the systems within which the CAIs operate suggest a generally moderate adaptability.

Out of the 19 cases, 12 initiatives rated the system as having a medium level of adaptability. This suggests that the CAIs were working within environments that may be partially open to innovation and transformation but still faced structural or institutional inertia. In the Anti-nuclear movement in Austria, despite the rigidity of its system, a decisive shift toward a nuclear-free future demonstrated that real adaptation is possible, particularly when backed by strong public support, as seen in the national referendum. Similarly, in the Urban Gardening communities in the city of Tartu, the city has shown signs of institutional adaptation, but the true power still lies in the hands of the economic elite, and civil society remains relatively weak due to financial and political limitations. In the case of the Energy Community in Monachil (Spain), the regime presents a case where adaptation is partially enabled by external pressures, especially those coming from the European Union. The push for energy transition and climate targets has spurred some institutional responses, but the centralised nature of the energy policy and slow pace of structural reform continue to act as barriers. Despite this existing framework, initiatives such as Monachil Unidas have managed to bring about changes at the regulatory level, such as extending the distance for energy sharing to 5 km and removing the requirement for permits for grid connection in installations of less than 500 kW. In Finland, the grassroots organization Pro Hanhikivi struggled to impact nuclear policy directly due to its limited size and funding. Yet, it succeeded in raising public awareness and creating

visibility around critical energy debates, proving that even small actors can nudge the system toward reflection. The Kraków Smog Alert (KSA) in Poland adds another layer to this picture. Following the 2008 financial crisis, the country maintained stability at the cost of increased debt and strong resistance to change, especially from the powerful fossil fuel sector. Nevertheless, the massive public protests in 2012 showed that widespread social pressure could force political retreat. This success inspired local movements like KSA, which found local and regional authorities more open to engagement than the national government. Here, the adaptability of the regime was more visible at the lower levels of governance, suggesting that while central transformation is slow, local activism can be a meaningful force for change.

Five cases assessed the system of low to medium adaptability, pointing to more constrained environments where change is slower or more difficult to achieve. These HE's narratives highlight that meaningful change within regimes is often blocked by deeply rooted structural barriers. While formal mechanisms for participation may exist, actual transformation is limited by institutional reluctance to challenge powerful interests, reliance on short-term technical fixes, and a lack of political will for systemic reform.

Two initiatives (L'Aquila earthquake and the Genoa flood) characterized their systems of low adaptability, reflecting strong systemic resistance to transformation in response to environmental and infrastructural crises. In Genoa, although technical interventions were implemented, such as the construction of one of two planned spillways and debated modifications to various waterways, the regime consistently resisted more transformative solutions. Cementing over at-risk zones continued despite public protests, reflecting a preference for conventional, surface-level fixes rather than systemic reform. Forward-thinking proposals like reopening buried waterways, widening riverbeds, or building artificial basins and upstream laminations were sidelined or ignored altogether. This pattern reveals a structural rigidity: while the regime demonstrates a capacity for intervention, it lacks adaptability in altering its foundational logic and embracing innovative, sustainable change.

In conclusion, most of the studied CAIs operate in moderately adaptable systems, where transformation is neither impossible nor easy. Altogether, these narratives reveal that adaptation within regimes is not linear or guaranteed, it is shaped by the interplay of institutional inertia, civil society pressure, economic interests, and the level of governance being targeted.

B) Pressures

Question: **What intra-regime pressures are challenging or destabilizing the current system?**

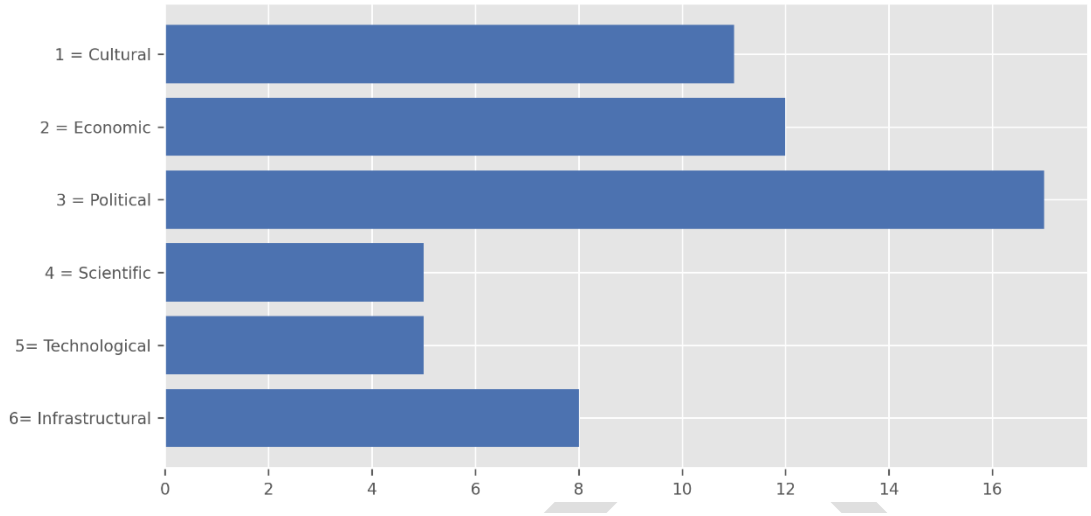

Figure 28. Intra-regime pressures

The findings on intra-regime pressures that challenge or destabilize the current system highlight a complex and multi-dimensional set of factors influencing the space in which CAIs operate. The data suggest that political pressures are the most significant, with 17 out of 19 initiatives identifying them as a key destabilizing force. This reflects how shifting political agendas, governance challenges, or policy disputes often open opportunities or create barriers for transformation within socio-technical systems.

Economic pressures were also highly prevalent, identified in 12 CAIs, indicating that financial instability, inequality, or resource distribution challenges play a central role in weakening the existing regime and catalysing the need for change.

Cultural pressures were identified by 11 initiatives, pointing to evolving societal values, norms, or public expectations that may be misaligned with the current system. This suggests that changes in public perception or identity are actively reshaping the conditions for systemic transformation.

Infrastructural pressures, pointed out by 8 CAIs, reflect how outdated or inadequate physical systems can limit the regime's functionality or responsiveness.

Scientific pressures (5 cases) and technological pressures (5 cases), indicate that advancements in knowledge or emerging technologies are, in some cases, creating tensions with established practices or institutions.

The HE's narratives paint a picture of how socio-technical regimes across different contexts are being challenged by a convergence of pressures (economic, political, technological, infrastructural, scientific, and cultural). While formal governance structures often remain rigid, crises like the COVID-19 pandemic and environmental disasters have exposed systemic weaknesses and prompted some regulatory shifts. Yet, institutional responses frequently lean toward short-term fixes rather than structural transformation.

Economic instability, rising energy costs, and the demand for more affordable and sustainable solutions are straining existing models. Politically, obligations to align with international and EU targets alongside growing citizen demands are pushing regimes, though actual responsiveness varies. Technological innovations, in this case in renewable energy, are challenging centralised, fossil-fuel-based systems but face infrastructural bottlenecks and outdated grids that limit their implementation.

Culturally, there's increasing public awareness of health, environmental degradation, and the need for greener cities. However, CAIs can clash with dominant economic interests and stigmatising media narratives. Scientific evidence, for example on public health impacts of pollution, has become harder to ignore, helping to legitimize grassroots activism and influence policy discourse.

Overall, the results reveal that CAIs are emerging and acting in systems under significant internal strain, particularly from political, economic, and cultural dynamics. The presence of pressures across all categories further suggests that systemic change is not driven by a single factor, but by the interplay of diverse internal disruptions.

Question: **External pressures destabilizing the current systems**

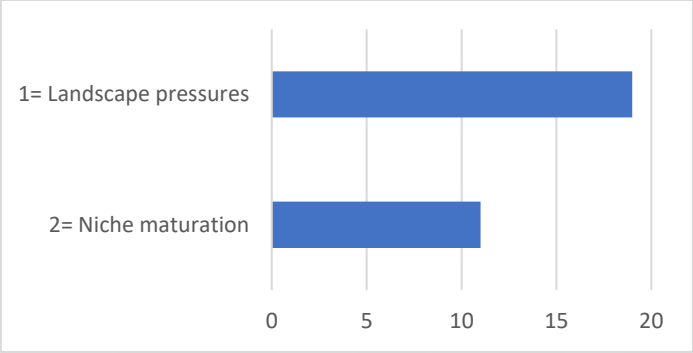

Figure 29. External pressures

The findings on external pressures destabilising current systems show that all 19 CAIs identified landscape pressures as a significant factor. Landscape pressures are macro-level forces that operate beyond the immediate control of regime or niche actors but have substantial influence in destabilising established systems. The unanimous selection of this factor indicates that CAIs are deeply embedded in and responding to larger systemic crises and disruptions.

In addition, 11 CAIs also pointed to niche maturation as an external pressure, pointing to increasing organisation, coordination, and influence of alternative practices or technologies that originated in protected innovation spaces, which begin to exert transformative pressure on the regime.

The studied CAIs illustrate how their socio-technical regimes are shaped by the dynamic interplay between broad, external landscape pressures and emerging niche innovations. On the one hand, global challenges (such as the climate crisis, EU climate targets, energy market volatility, and geopolitical instability) are forcing regimes to adapt, often by reshaping policies or shifting strategic priorities. At the same time, bottom-up forces would have gained traction, influencing institutional agendas. In many contexts, external pressures, such as EU directives or climate-related shocks, are more impactful in catalysing regime change than the slower process of niche maturation.

In conclusion, the data underscores that both top-down or external (landscape) and bottom-up (niche) forces are shaping the environment in which the studied CAIs operate. Together, these

dynamics suggest that CAIs are not only reactive to external disruption but also active participants in building and scaling new socio-technical configurations. Ultimately, transformation in these cases is not driven by one force alone but emerges from the interaction between top-down pressures and bottom-up innovation, each shaping the regime's capacity to respond to ecological and social imperatives.

POLITICAL CONTEXT

A) Regime stability

Question: **How stable is the political system during the period of the Window of Opportunity?**

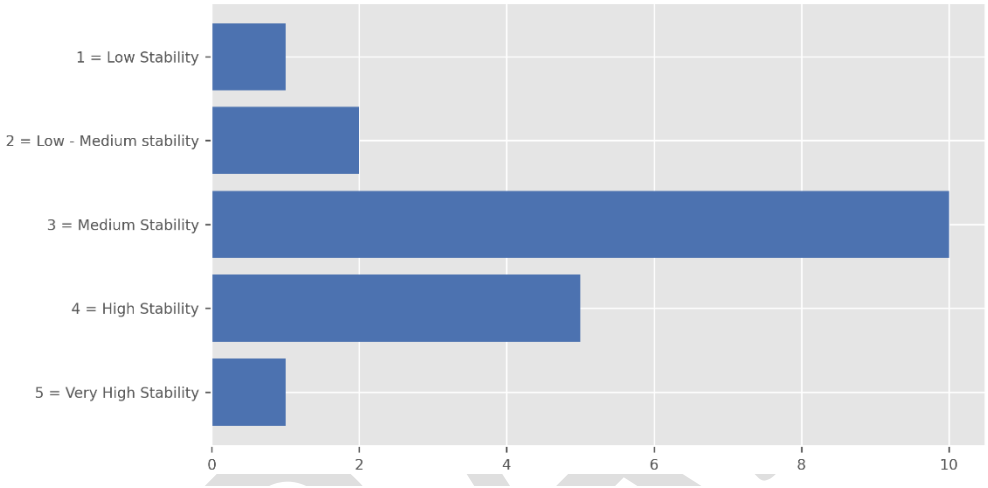

Figure 30. Regime stability

The responses reveal that most CAIs operated within environments of moderate political stability. Specifically, 10 out of 19 cases reported medium stability, suggesting that while the political context was not entirely volatile, it was not fully stable either, potentially allowing for incremental change and negotiation, but also requiring some degree of navigation through political uncertainty.

Additionally, 5 initiatives experienced high stability, indicating that some CAIs emerged or acted within relatively predictable and orderly political systems. Only 1 case (Local self-help movement in Kainuu region) reported very high political stability, highlighting the rarity of completely stable political environments among the sample.

On the other end of the spectrum, 2 initiatives (Genoa flood and Anti-nuclear movement in Austria) rated the political system of low to medium stability, and 1 CAI described it as having low stability (Energy Poverty Alliance HE in Spain), indicating a more fragile or turbulent setting that could foster both obstacles and openings for transformation.

In summary, the findings suggest that the studied CAIs emerged and operated in moderately stable political conditions, where there is enough structure to support coordinated action, but also enough flux to enable new initiatives to challenge or reshape existing systems.

B) Regime pressures

Question: **Do legal frameworks protect peaceful protests, demonstrations, and gathering?**

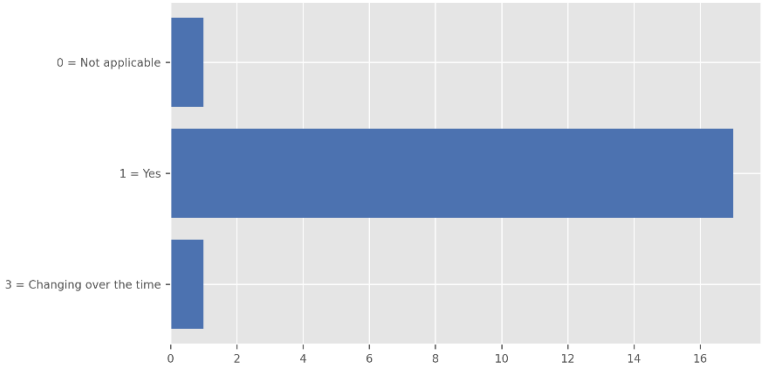

Figure 31. Protection of protests, demonstrations and gathering

The findings indicate that the vast majority of the studied CAIs operate in contexts where such rights are formally recognised and protected. Specifically, 17 out of 19 cases affirmed that their legal environments support the freedom of assembly and protest. In addition, 1 case noted that the legal protections were "changing over time", indicating a dynamic or uncertain legal context. This reflects evolving legislation, political shifts, or inconsistent enforcement, which may affect the security and effectiveness of protest-based strategies.

In conclusion, the data shows that most CAIs benefit from institutional protections for peaceful assembly, which facilitates their capacity to claim public space, express dissent, and mobilise support.

Question: **Are there restrictions on media, censorship, or criminalization of dissent?**

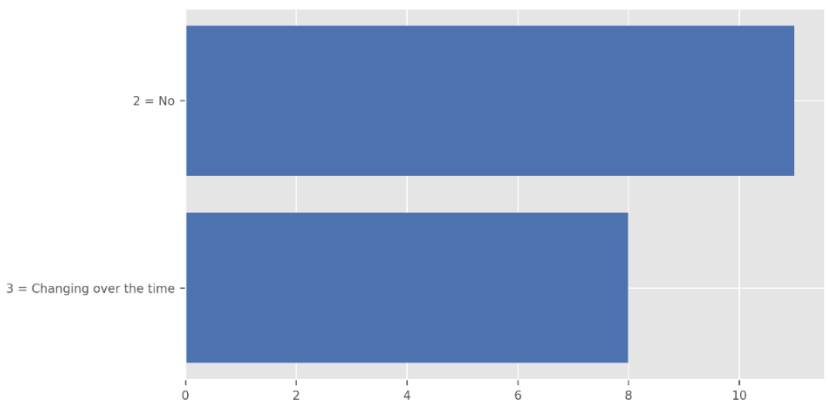

Figure 32. Restrictions on media, censorship, or criminalization of dissent

The findings reveal a mixed but overall cautiously optimistic picture regarding freedom of expression within the environments where CAIs operate. 11 out of 19 initiatives reported no restrictions, indicating that in the majority of cases, media freedom is upheld, dissent is tolerated, and activists can operate without facing state-imposed censorship or legal repression. This is a positive indicator for the ability of CAIs to communicate, organise, and advocate publicly. However, 8 CAIs noted that the situation is "changing over time," pointing to instability, uncertainty, or a gradual erosion or tightening of civic freedoms. This suggests that while these CAIs could have had space to act, they operated in fragile or fluctuating media environments that could become more restrictive. This volatility may compel

CAIs to adapt their strategies, rely on alternative channels, or increase caution in their public-facing activities.

In summary, while most of the studied CAIs functioned in contexts without repression or censorship, a significant portion indicate evolving political and legal climates. These changing conditions highlight the need for resilience and adaptability as an enabler of collective action.

C) Participation

Question: **How open is the political system to public participation and input?**

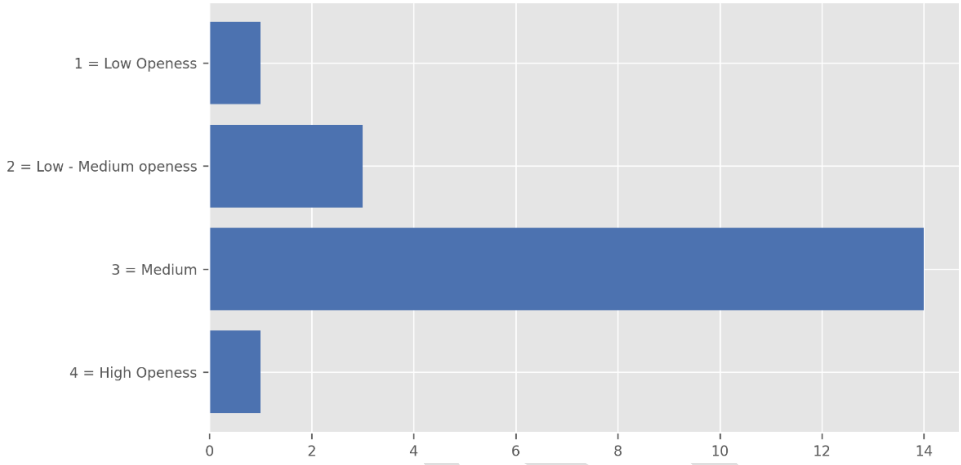

Figure 33. Participation - Openness

The results show moderate levels of political openness. Specifically, 14 out of 19 cases reported medium openness, suggesting that while avenues for citizen involvement exist, they may be limited, selective, or subject to institutional constraints. Additionally, 1 case indicated high openness (Monachil Energy Community HE), showing that in at least one context, the political system is actively inclusive and responsive to public engagement. On the other end, 3 initiatives rated the system as having low to medium openness, and 1 case as having low openness, indicating restricted access to political processes and potentially greater barriers to influence and participation for CAIs.

Overall, the findings suggest that moderately open political systems dominate the sample, providing some room for civil society engagement but also underscoring the need for CAIs to navigate limited or conditional opportunities for input.

Question: **Which civil society groups can participate in the political decision-making process?**

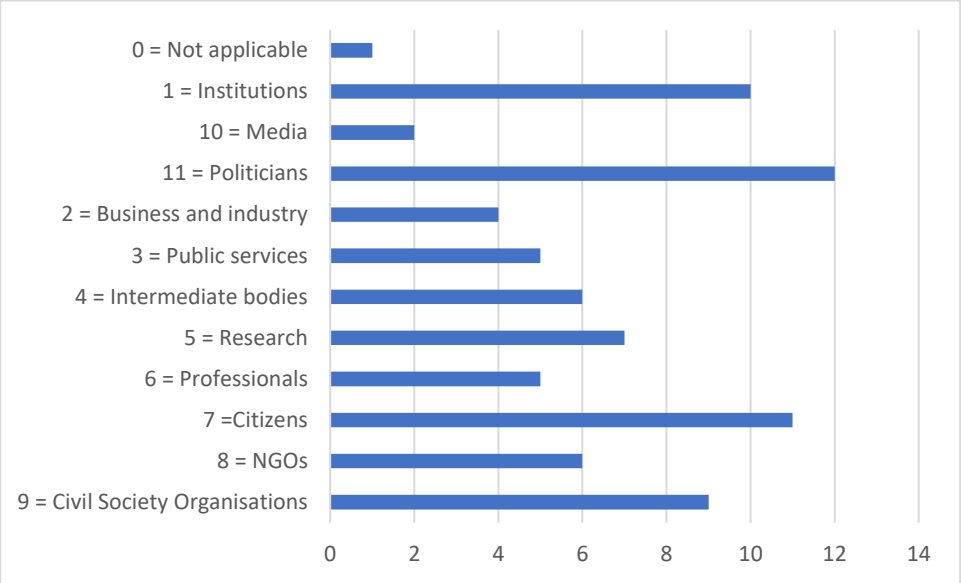

Figure 34. Participation - Civil society groups

The findings reflect a broad but uneven pattern of participation, with a variety of actors being recognised as participants in governance or policy shaping. The most frequently mentioned groups were politicians (12 cases) and citizens (11 cases), suggesting that both formal political actors and the general public are widely considered to have roles in decision-making processes. Institutions (10 cases) and Civil Society Organisations (9 cases) also play a significant role, indicating the importance of structured, organised, and potentially long-standing groups in accessing and influencing political arenas. Research institutions (7 cases) and intermediate bodies (6 cases), such as trade unions, professional associations, or federations, are moderately represented, pointing to a role for expertise and mediating structures in policy dialogues. NGOs (6), public services (5), professionals (5), and business and industry (4) appear somewhat less frequently, suggesting that while these groups are involved, their participation may be more limited or context dependent. Media (2 cases) round out the responses, implying that media are less formally involved in decision-making, despite their influential role in public discourse.

In summary, the data show that civil society participation in political decision-making is multi-actor and pluralistic, though it tends to favour institutionalised and political stakeholders, with citizens and CSOs playing meaningful, but sometimes peripheral, roles. This reflects a semi-open system in which access is possible but likely mediated by existing power structures, organisational capacity, and political opportunity.

Question: **Do people trust political institutions?**

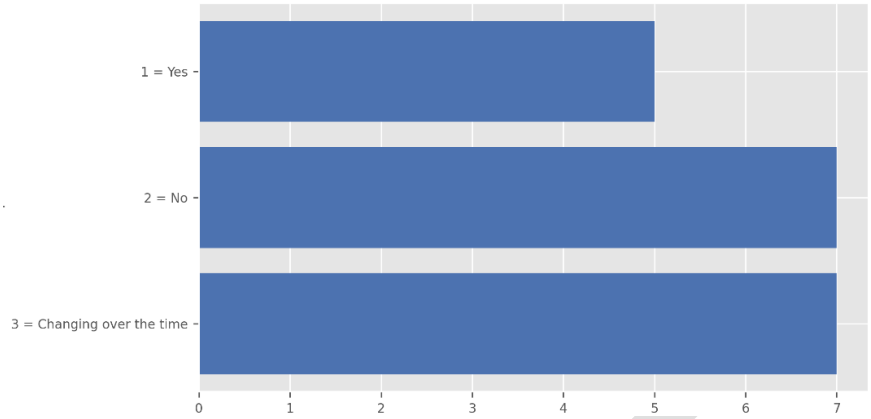

Figure 35. Trust in political institutions

The findings reveal a predominantly critical or fluctuating perception of institutional trust within the contexts of the CAIs studied.

Only 5 out of 19 cases indicated “Yes”, showing trust in political institutions. This minority suggests that in just a few settings, the institutional framework is perceived as legitimate, accountable, and responsive. 7 cases reported a lack of trust, reflecting disillusionment or scepticism toward political institutions. Another 7 cases described trust as “changing over time,” pointing to instability or uncertainty in institutional legitimacy. In such cases, trust may rise or fall depending on political leadership, reforms, policy decisions, or broader socio-political developments. This dynamic trust requires CAIs to continually adapt their strategies and assess their relationships with state actors.

In conclusion, the data suggest that mistrust or conditional trust in political institutions is more common than trust across the sample, reflecting a critical stance that may both hinder collaboration and drive innovation outside traditional frameworks.

Question: **Do individuals face legal penalties for organising peacefully?**

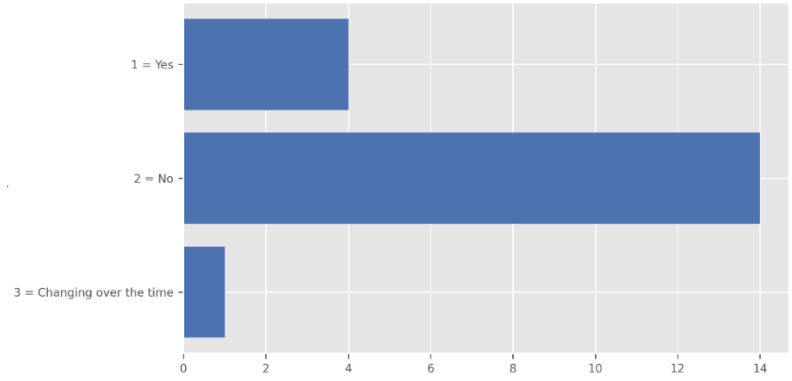

Figure 36. Legal penalties

The results suggest that in most of the cases studied, the legal environment is supportive of peaceful assembly and organizing.

14 out of 19 cases reported no legal penalties, indicating that in the majority of contexts, individuals can organize collective actions without fear of legal repercussions. This suggests a favourable environment for civic engagement and mobilisation. 4 cases, however, reported that legal penalties do exist, pointing to restrictive or repressive conditions where organizing can lead to legal consequences. In some of these cases, penalties may be applied if protesters fail to formally notify the authorities in advance of a demonstration, meaning that spontaneous protests can be subject to punishment. Another case is the one on the Covid makers, which reflects the temporary restrictions on gatherings during the lockdown period. Such situations likely present significant barriers for collective actions, forcing them to operate more cautiously or find alternative, less visible forms of activism. 1 case noted that the situation is “changing over time,” reflecting shifting legal-political dynamics.

Question: **Can organisations receive and use funding (including from international sources) without excessive bureaucracy or legal barriers?**

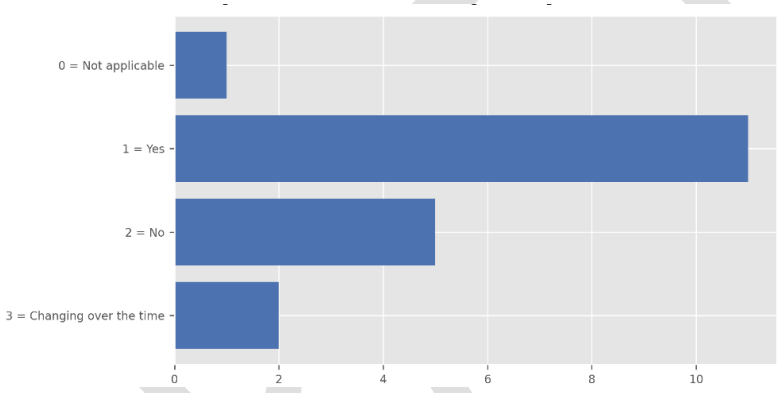

Figure 37. Access to funding

The majority of CAIs (11) indicated "Yes," suggesting that most organisations can receive and use funding without facing excessive bureaucracy or legal barriers. This points to a generally favourable environment for organisational funding, at least in the contexts represented by the sample.

However, 5 responses were "No," indicating that in a notable subset of situations, organisations did face excessive bureaucracy or legal barriers when accessing funding. This highlights that, while the overall environment may be positive, there are still considerable obstacles in certain contexts or for specific types of organisations.

Two responses marked the situation as "changing over time," suggesting that legal and bureaucratic conditions are not static in some areas.

While the general trend is positive regarding organisational access to funding without excessive bureaucracy or legal barriers, there remain significant exceptions and evolving circumstances.

CULTURAL CONTEXT

A) Political Involvement

Question: : **Political Interest**

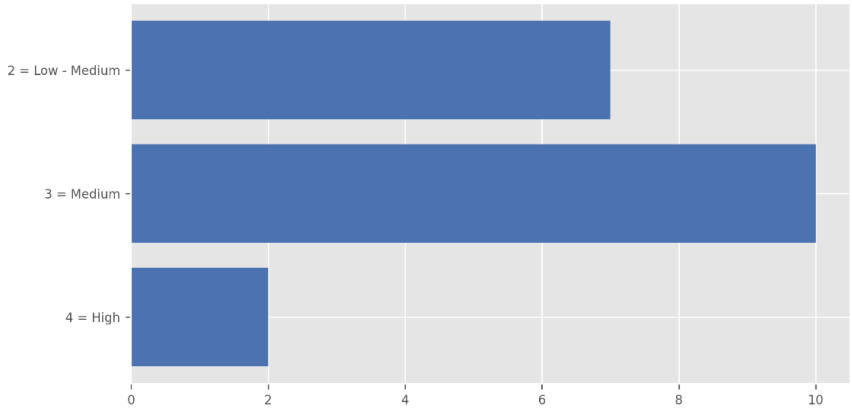

Figure 38. Political interest

Regarding political interest in the regime context where CAIs operate, the data show a moderate level across most HEs. 10 out of 19 cases reported a medium level of political interest, indicating a balanced interest, 7 cases fell into the low to medium category, suggesting limited or inconsistent interest in politics. Only 2 cases reported high political interest (Covidmakers and Energy Poverty Alliance, both Spanish cases), where participants were strongly motivated by political concerns and regularly followed developments. This can be due to the exceptionality of the historical moments in both cases: the pandemic in the Covidmakers case, and the overlapping economic, social and territorial crises that converged in the analysed timeframe for the Energy Poverty Alliance case.

In summary, the findings indicate that while political interest exists across the regime context of most CAIs, only a few exhibit strong political engagement, and this is largely driven by exceptional historical circumstances. The widespread presence of at least moderate political interest suggests a potential foundation for deeper political engagement, especially if opportunities for meaningful participation improve.

Question: **Political Awareness**

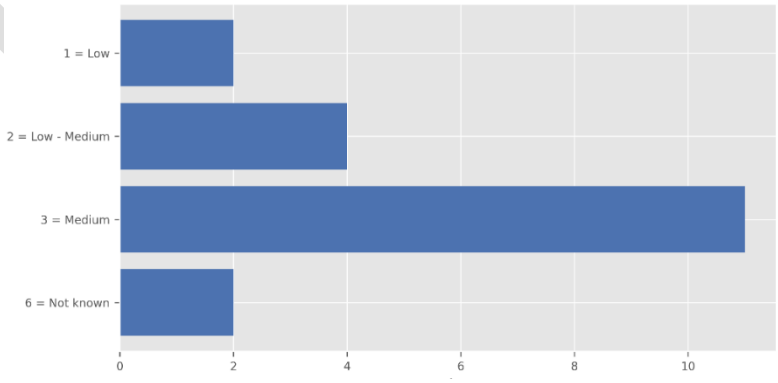

Figure 39. Political awareness

The findings related to political awareness indicate a general trend toward moderate understanding of political dynamics, though there is some variation across cases. The level of political awareness

can influence CAIs' capacities for strategic decision-making, alliance-building, and effective advocacy. The majority (11 out of 19 HEs) reported medium political awareness. 4 cases indicated low to medium awareness, and 2 cases showed low awareness, highlighting that in some contexts, citizens may have limited understanding of the broader political landscape. This can pose challenges for navigating institutional frameworks or pushing for systemic change.

Overall, these results suggest that enhancing political education and contextual understanding could strengthen collective action's impact and strategic capabilities in fostering transformation.

B) Transparency

Question: **Is there public access to information about government policies, public budgets, and decision-making processes?**

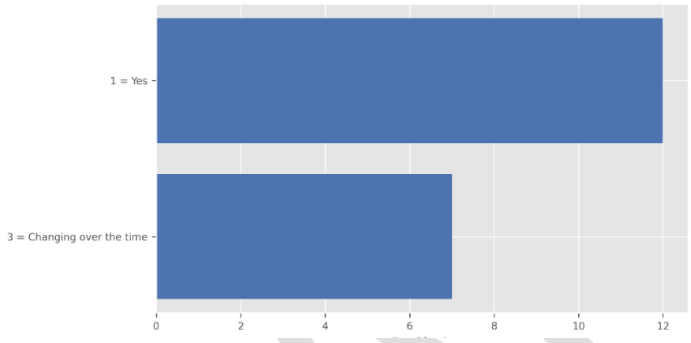

Figure 40. Public access to information

The responses suggest that transparency is relatively strong across most of the contexts in which the CAIs operate. In 12 out of 19 cases, respondents indicated "Yes", confirming that the public has access to relevant governmental information. This level of transparency is a crucial enabler for informed civic participation, accountability, and the legitimacy of both state institutions and collective action efforts. In the remaining 7 cases, access to information was reported as "changing over time," indicating fluctuations in transparency. These dynamics may be tied to shifting political contexts, reforms, or leadership changes that either expand or restrict access to public information. This variability can create uncertainty for CAIs trying to engage with or influence institutional processes. Overall**,** the findings reflect a generally positive environment for information access but also point to the importance of institutional stability and consistency in ensuring transparency.

OTHER ELEMENTS

A) Type of emergency they respond to

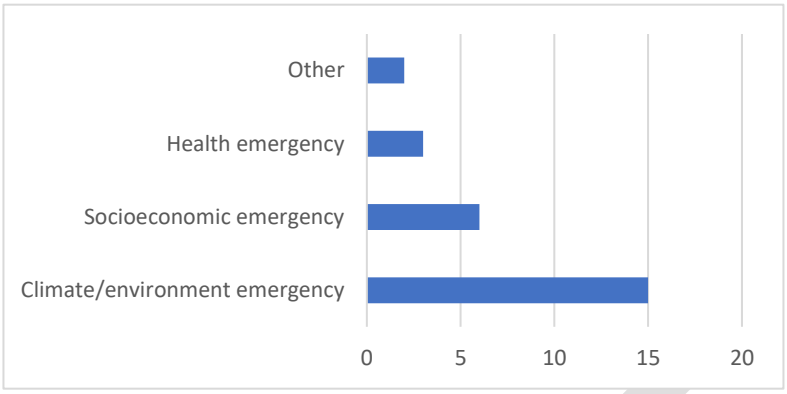

Figure 41. Type of emergency

The majority of the studied CAIs responded primarily to climate and environmental emergencies, with 15 cases directly addressing issues such as pollution, biodiversity loss, energy transition, and disaster resilience. These initiatives often emerged as grassroots responses to the failures or gaps in institutional governance. In addition, socioeconomic emergencies motivated 6 CAIs, focusing on challenges like energy poverty, inequality, or housing insecurity. A smaller number (3 cases) respond to health-related emergencies, either directly or as part of broader crises, such as pandemics or the long-term health effects of environmental degradation. Two CAIs (Anti-nuclear movement in Austria and Vienna Climate Team) also address other non-specified types of emergencies.

Overall, this distribution underscores the interlinked nature of environmental, social, and health vulnerabilities.

B) Windows of opportunity for the CAI

Across the various CAIs, windows of opportunity (WoOp) emerged from the interplay of landscape pressures, regime instabilities, and niche maturity. In some cases, political and policy regime instabilities, like in the case of the Anti-nuclear movement in Austria or the Energy Poverty Alliance in Spain, opened new spaces for citizen engagement and bottom-up influence (referenda in the first case, citizen assemblies in the second). Similarly, moments of socio-political crisis, such as the 2011 Genoa flood or the 2009 earthquake in L'Aquila, acted as catalysts for civic mobilisation, revealing systemic failures. However, such openings were often short-lived or structurally limited, as seen in Genoa, where despite early momentum, entrenched urban planning logics and political-economic resistance eventually closed the window. Some of these cases highlight that while crisis moments can disrupt regimes and invite civic input, their long-term impact often hinges on political responsiveness and institutional openness.

In contrast, other WoOps were driven more by structural shifts at the European or national regulatory levels, particularly in the energy and environmental sectors. EU directives (e.g., Green Deal, Clean Energy Package) created formal openings for citizen-led energy communities by mandating member states to adopt supportive legislation. These legal shifts, when aligned with local capacities and motivations, as in Monachil Energy Community or OurPower in Austria, enabled CAIs to implement or inspire renewable energy models and influence the discourse. Indeed, European

directives afford member states considerable regulatory freedom for context-specific adaptation. Initiatives such as Monachil's have succeeded in bringing about changes in state legislation that address the needs identified by the states themselves, enabling them to operate in the market. Additionally, funding mechanisms (e.g., ERDF, Erasmus+) and new planning frameworks further facilitated CAI engagement in urban and environmental transformation (e.g. in the EYES case). However, the actual scale and durability of influence often depended on the presence of cohesive community organizing, local political alignment, and continued public support.

Even when WoOps did not yield immediate policy transformation, they often conferred symbolic legitimacy to some CAIs' demands, access to dialogue, and momentum for future action, laying the groundwork for incremental change within resistant regimes.

C) Main archetypes identified (System mapping)

The results of the system mapping exercise for the studied CAIs revealed a diverse range of system archetypes, though they should be interpreted with caution, as some CAIs identified multiple archetypes while others did not identify any. The most frequently observed archetype was "Limits to Growth" (7 HEs), suggesting that many initiatives encounter constraints, such as limited resources, organizational capacity, or regulatory barriers, that hinder long-term scaling or impact. "Shifting the Burden" (6 HE) was also common, reflecting a tendency among CAIs to adopt short-term solutions that may not directly address more structural, long-term changes. "Success to the Successful" (4 HE) indicates that some CAIs benefit from reinforcing advantages that amplify their progress. Less frequently observed archetypes were "Fixes that Fail" (2), "Escalation" (1), and "Tragedy of the Commons" (1). In four cases, no clear archetype was identified, highlighting the complexity or ambiguity of systemic patterns in some initiatives. Overall, the distribution of archetypes underscores the varied systemic challenges CAIs face and the need for context-sensitive interpretation.

7. QUANTITATIVE ANALYSIS METHODOLOGY: HINDERING AND ENABLING FACTORS

The indicators used to evaluate the different mechanisms developed by the 19 HEs studied were analysed quantitatively as follows:

The first stage involved using the 'Regime Level' indicators as a reference point. The aim was to identify, at a general level (MSSD), which factors encourage or hinder political participation. Therefore, the aim was to explore common elements, regardless of the local differences observed and addressed in more detail in the qualitative analysis.

Secondly, the statistical analysis was based on quantitative information collected at both the Regime and Niche Levels. The statistical analysis did not include the information collected on the Landscape Level and policy outputs because it was qualitative data. In this sense, the qualitative information will be used to delve deeper into the particularities of the different HEs and the context in which they emerge.

The structure of this section is as follows: the first part presents the results observed at the Regime Level. The second part focuses on the factors that enable or hinder this process at the level of the niche. Each subsection focuses exclusively on the indicators that demonstrated a statistical association or significant correlation, while excluding those that did not.

7.1 Main Results at Regime Level

A bivariate correlation analysis based on Pearson's coefficient was first performed at the statistical level to quantify the strength and direction of the relationship between a total of 17 indicators at the regime level (see Annex 2 for more details):

- Political interest level (Y/N)
- Political awareness level (Y/N)
- Access to resources and facilities (Y/N)
- Access to public information (Y/N)
- Trust in political institutions (Y/N/changing)
- Legal penalties for organisations
- Openness of political system, regime stability, adaptability level (low, medium, or high)
- External pressures on niche maturation
- Cultural, economic, political, scientific, technological and infrastructural regime pressures

The objective of this test is to statistically identify which factors are positively or negatively associated with the CAI's capacity for social transformation at the regime level. To this end, positive cases of 'transformation capacity' (1 = 'yes'; 0 = 'no') were taken as a starting point and related to a total of 17 variables studied at the regime level.

The most relevant associations are presented below.

7.1.1 Enabling factors contributing to societal transformation and political participation at Regime Level

1) Clear legal frameworks increase political interest.

Statistical analysis reveals a positive association (r= 0.650) between both indicators—absence of legal penalties and political interest— **(Annex 2)** suggesting that the existence of transparent, stable legal frameworks, as well as the absence of legal penalties for peaceful mobilisation, promote political interest at the social level and, therefore, reinforce trust in the legal system.

2) Openness of political system and regime stability build political organisation.

The positive association between both indicators (r = 0.683) **(Annex 2)** highlights that political systems with greater openness and institutional stability generate a more reliable social environment for political action.

This result suggests that more decentralised political contexts with greater flexibility on the part of institutions to adjust policies, strategies, and actions in response to changing circumstances generate greater stability at the institutional level. The system maintains its transformative capacity while the presence of institutional frameworks created strengthens its stability.

3) **Economic regime pressures activate levels of political interest.**

The positive correlation between these indicators (r = 0.418) **(Annex 2)** suggests that economic pressures, such as budget deficits, financial crises, and distributive demands, encourage political participation. However, we should interpret this result with caution: rather than an 'enabling factor', we could also interpret economic regime pressures as especially potent triggers for windows of opportunity or as triggers for participation and social action, by raising public awareness of collective problems.

4) **Scientific, and technological regime pressures influence niche maturation.**

Among the different intra-regime pressures that challenge or destabilise the current systems, the scientific one emerged as the most significant for niche maturation (r=0.463) **(Annex 2)**. Thus, scientific, and technical demands would be key to promoting specialised spaces for citizen participation, especially when it comes to addressing complex issues that may challenge the system.

5) **Access to public information and infrastructure regime pressures promote collective participation.**

The creation and promotion of infrastructure projects influences social transformation, promotes collective participation, and trust in public institutions (r= 0.481) if accompanied by transparent and public access to information (r= 0.607) **(Annex 2)**. This result underscores the importance of developing public policies that incorporate mechanisms for citizen participation in the implementation of transformative projects at the technological and/or structural level.

7.1.2 Hindering factors to societal transformation and political participation at Regime Level

6) **Excessive contextual adaptability**

The 'level of adaptability' is the ability of institutions and actors to adjust their policies, strategies, and actions when faced with changing circumstances. In this sense, 'high adaptability' is defined by dynamic change in response to evolving political, economic, and social conditions and coordination between distinct levels of governance.

However, statistical correlation showed a negative association between 'high levels' of adaptability and 'political interest' (r = -0.549) **(Annex 2)**, suggesting that the more flexible the regime, the less political interest there is at the individual level. This suggests that an environment which is extremely flexible and quickly readjusts to social demands without channelling them through formal structures can discourage political interest and participation, as people perceive less need for mobilisation.

7) **Cultural rigidity reduces political awareness**

There is a negative association between significant values in 'cultural regime pressures' and 'regime stability' (r= -0.603), which shows that tensions and conflicts surrounding cultural values and norms destabilise regime structures. At the same time, very rigid social norms, traditions, and customs could act as barriers to change by reducing the predisposition to knowledge, understanding of political processes and political awareness (r = -0.467) **(Annex 2)**.

8) **Lack of transparency and legal penalties for peaceful political organisation**

The absence of transparency, restricted access to public information and the presence of a regulatory framework for political organisation that is restrictive are all associated with negative outcomes (r= -0.239) **(Annex 2)**. This value underscores that the interplay of these elements leads to a decline in social engagement and the emergence of a more punitive approach.

7.2. Main Results at Niche Level

A Principal Component Analysis (PCA), or multifactorial analysis, was first conducted to reduce the dimensionality of the 34 Niche Level indicators (**Annex 3**). The aim of this test was to identify underlying patterns that function as either enabling or inhibiting factors for political participation. Eight components were extracted, with only positive cases being retained in the CAI's achievement of a system innovation or societal transformation analysis phase (1= Yes; 0= No), ensuring consistency in the analysis phase. This indicator was correlated with the other Niche Level variables, which were also analysed.

Eight components were extracted from a set of 34 variables related to the political, social, and economic spheres, explaining a high percentage of the total variance of the data set (**Annex 3**). This report presents the results of this analysis, highlighting the key factors.

Secondly, in addition to the PCA, a correlation, and binary logistic regression analysis was performed to address the analysis of certain indicators.

The results are divided into two sections, as in the previous section. The first section outlines the main enabling factors at the Niche Level. The second section describes the main hindering factors, which show statistical significance. Both sections integrate the results of the various statistical tests performed.

7.2.1 Enabling factors contributing to societal transformation and political participation at Niche Level

The principal component method allowed the 34 variables to be condensed into eight key factors that condense 98.4% of the information or total variance (**Annex 3)**. This high percentage suggests that the eight factors described below accurately represent the internal relationships between the different observed variables.

To facilitate the interpretation of the PCA results, each factor was defined based on the variables with the highest loadings. The eight factors identified as facilitators or inhibitors of political participation are described below. For clarity, the findings presented combine insights from both the correlation analysis and the PCA. They are numbered sequentially (1, 2, 3…) for organizational purposes. This numbering is **independent** of the actual PCA component labels.

1) **The empowering role of the free social spaces**

This element refers to the existence and strengthening of forums, community centres or independent citizen platforms where people can meet, debate and make collective decisions without external interference. When these spaces are well-structured and have sufficient resources,

they facilitate the exchange of ideas, mutual learning, and the building of support networks. In this way, participants feel more confident to express their opinions and engage in civic activities, as they perceive that their voice has an effective channel to influence local decisions.

This result is in line with the high level of positive correlation observed between the educational and empowerment capacities of free social spaces (r = 0.689; p = 0.001) **(Annex 4)**. This suggests that, as people gain access to more educational resources, these spaces develop more robustly as places for learning, community debate and social empowerment.

2) Educational programmes facilitate disruptive change

The role of educational programmes in facilitating disruptive change is a subject that has been the focus of much recent research. Pearson's chi-square test and a logistic regression analysis revealed a direct correlation between the development of educational programmes at the level of innovation deployed by the CAI and the type of transition pathway observed.

Initially, 'Transition Pathway' was defined as a dependent variable and assigned three numerical values: 1= Incremental (transformation); 2= Semi-incremental (Reconfiguration), and 3= Radical (Technological Substitution and De-alignment). Subsequently, a chi-square test was performed to evaluate a possible association between the transition pathway and the type of innovation of social movements **(Annex 4)**.

Statistical analysis revealed that only one of the innovation types demonstrated statistical significance: namely, the 'Development of education programmes'. When this category is considered exclusively, the likelihood ratio yields a value of p = 0.03 **(Annex 4)**. This finding suggests the presence of an orderly pattern, whereby as the transition pathway becomes more disruptive, there is an increase in the presence of educational innovation. Utilising a 2x2 analysis (incremental vs. radical), Fisher's test revealed marginal significance (p = 0.045), though with broad confidence limits attributed to the modest sample size **(Annex 4)**.

Following the observation of these results, and in consideration of the limited sample size and the presence of variability in responses, a binary logistic regression analysis was conducted. This analysis yielded a value of Exp(B) = 7 and a p-value of 0.037.

These results indicate that as the transition pathway context evolves from incremental to radical, there is a sevenfold increase in the probability of educational innovations emerging.

When the model is reversed (with transition pathway level designated as the independent variable and educational programmes as the dependent variable), the level of significance increases considerably. Indeed, those who implement educational programmes are shown to be eight times more likely to generate disruptive changes (Exp(B) = 8). In summary, the evidence suggests that HEs that implement educational innovation programmes are up to 80% more likely to generate disruptive changes than those that do not. Consequently, the potential exists for educational innovation to be associated with more disruptive change strategies.

However, the value of p=0.050 is at the threshold of statistical significance, and therefore no direct causality can be inferred. A key constraint pertains to the sample size, necessitating the consideration of additional factors that might elucidate this association.

3) **Local leadership or the community's capacity to lead local projects (allow community members to take charge of political projects)**

This variable is intended to measure the extent to which local community members take direct responsibility for planning, implementing and evaluating local initiatives such as energy communities, urban gardens, cultural festivals, etc.

This suggests that when community members acquire management skills such as coordinating teams, fundraising, or planning activities, there is a concomitant rise in their sense of belonging and their motivation to engage with public affairs. This finding serves to reinforce the notion that social change is not solely dependent on the actions of authoritative entities; rather, it is also contingent on collective action that is organised from the grassroots level.

4) **Public campaigns increase awareness when they are frequent**

The increased frequency of public campaigns has been demonstrated to be an effective strategy for enhancing awareness.

The component's existence is further substantiated by the correlation test, which reveals a moderate yet statistically significant association between the variables 'Empowerment' and 'Public Campaign Awareness' ($r = 0.456$; $p = 0.049$) **(Annex 3)**. Furthermore, a positive correlation ($r = 0.411$) was identified between the variables 'Education role of social spaces' and 'Public campaign awareness', which is close to the significance threshold ($p = 0.081$).

The results indicate that public campaigns, both online and physical, deployed by the CAI as a method to promote collective action tend to generate a higher level of empowerment and social awareness. Secondly, it is suggested that when free social spaces function effectively as educational spaces, public campaigns are more likely to have a greater social impact or social reach.

Nevertheless, the mere existence of 'public awareness campaigns' is insufficient. The regular repetition of messages and preventive activities is also of key importance, as it serves as a mechanism to reinforce commitment and maintain the social debate.

Consequently, the recurrent implementation of such campaigns underscores the CAI's capacity to formulate lucid, accessible, and pertinent messages that tackle matters of social concern. Effective communication has been shown to facilitate greater access to information and to raise awareness of issues of common interest.

The variables that were found to be significant in this study included the role of empowerment and education in free social spaces, leadership of community members, public campaigns and frequency. These variables accounted for 29.19% of the variance explained through PCA **(Annex 3)**. The results of the study indicated that empowerment, in conjunction with the CAI's organisational capacities, was the primary factor driving interest, promoting mobilisation and political participation.

5) **The CAI's openness to political participation**

This point pertains to the capacity of the CAI to engage in political participation. This variable has been identified as a key enabling factor: when the CAI facilitates clear mechanisms for dialogue and feedback, it promotes greater citizen involvement in decision-making processes.

6) **Generation of horizontal and open governance models**

Another aspect to consider is the generation of horizontal and open governance models. This variable underscores the notion that the establishment of enhanced horizontal, flexible and adaptive collaboration schemes is a catalyst for participation, as it fosters a sense of shared responsibility and more symmetrical relationships between CAI members.

7) **Effective cooperation between the public sector and the CAI**

Effective cooperation between the public sector and the CAI is imperative. This indicator underscores the notion that a favourable relationship with the public sector augments the capacity of the CAI—as well as that of institutions—to establish strategic alliances, optimise resources, and achieve common objectives.

The three indicators constituting component 2, as identified by the PCA, are as follows: horizontal governance models, the cooperative role of the public sector and participation openness inside the CAI account for 18.4% of the variable explained in the PCA test **(Annex 3)**. This finding indicates that the interaction between these three variables facilitates the CAI's actions in its pursuit of strategic alliances, the achievement of objectives, and the consolidation of political participation.

8) **The existence of cooperation networks with political actors, civil society organisations and the attainment of public recognition**

The existence of networks of cooperation with political actors and civil society organisations, as well as the attainment of public recognition, is a key factor in this area.

The three variables under consideration form component 3 (PCA analysis) and collectively account for 13.81% of the total variance, thereby underscoring their significance and the intricate interrelationships that exist among them **(Annex 3)**. On the one hand, if political representatives maintain a cooperative relationship with the CAI, there is greater visibility of participatory processes and mutual trust is strengthened. A similar phenomenon occurs in the context of participation and the establishment of positive relationships with other civil society organisations. The alliance between these organisations and the CAI provides technical expertise, networks of contacts and facilitates access to a greater diversity of people.

Finally, public recognition, including financial resources and awards, has been demonstrated to reinforce the sense of belonging among CAI members, generate greater visibility for its objectives, and encourage continued political participation, thereby consolidating the group.

9) **Economic and knowledge resources**

The eighth component extracted from the PCA analysis explains 10.52% of the total variance **(Annex 3)** and highlights two essential mechanisms for political participation: access to economic resources

that allow individuals to organise multiple activities, as well as cover operational costs (rent, travel to discussion forums, etc.), the materialisation of objectives and the possibility of reaching broader sectors of society.

Conversely, the provision of access to training resources and the facilitation of knowledge and experience exchange empowers citizens by equipping them with the conceptual tools necessary to design effective strategies for participation and the achievement of objectives. The promotion of participation is facilitated by environments that facilitate the establishment of collaborative platforms and the creation of resources for the dissemination of knowledge.

In summary, the combination of financial and cognitive resources engenders an environment conducive to planning political action, sustaining projects over time, and adapting to unforeseen changes and challenges. Consequently, the capacity of citizen mobilisation to influence the public sphere is contingent upon the constructive interaction between economic resources and access to knowledge.

10) **External pressure niche maturation, External landscape pressures and Technological regime pressures**.

These variables constitute the fifth component, accounting for 9.23% of the total variance **(Annex 3)**. The model delineates three categories of external pressures that could function as either facilitators or inhibitors of political participation, contingent on their intensity and direction.

On the one hand, if niche groups have the time and resources to consolidate, they can offer safer spaces for developing new forms of mobilisation and governance. Conversely, if their maturation occurs in isolation or in a rigid manner, there is a risk of disconnection from the community and a lack of social impact.

Conversely, pressures from the landscape have the potential to engender a climate of urgency, thereby prompting citizens to mobilise. However, these pressures could also overload local actors with complex problems, thereby impeding grassroots initiatives. Finally, when the technological regime is obsolete, closed or monopolised, it hinders innovation and inclusive participation.

Consequently, the aggregate effect of these external pressures is to function as a political mobilisation thermostat, whereby action is driven when opportunities and manageable challenges are presented but is restricted if the external pressures become too extreme or disconnected from local needs. Therefore, to design effective strategies that maximise its enabling effects and minimise its inhibitors, it is essential to understand its nature and interaction.

11) **The use of common symbols to promote unity and social cohesion**

The utilisation of shared symbols is a strategic method employed to foster a sense of unity and social cohesion within a given community.

This component, which accounts for 5% of the total variance **(Annex 3)**, highlights the power of symbols of unity—such as shared mottos, slogans, or emblems—to consolidate a collective identity. The adoption of a distinctive and easily identifiable slogan by a group fosters a sense of collective identity and a shared purpose among its members. The establishment of this symbolic link has been

demonstrated to facilitate the coordination of efforts, reinforce solidarity in times of challenge, and motivate joint action. The strategic deployment of these symbols functions as a catalyst for social cohesion and political mobilisation, thereby transforming abstract concepts into concrete messages that are universally comprehensible.

12) Protective rules and horizontal distribution of responsibilities within the CAI

This component accounts for 3.81% of the total variance **(Annex 3)** and groups together three essential variables: The existence of protective rules or formal regulations is imperative in order to guarantee legal certainty and to prevent the misuse of participatory mechanisms. The distribution of responsibilities, otherwise known as the clear assignment of tasks and roles, is to be distributed or assigned among the various actors involved (citizens, organisations and authorities). The existence of guidelines and operating manuals is imperative for the facilitation of the participation process. These documents serve to establish a structured framework of steps and criteria for action, thereby ensuring the systematic and effective execution of tasks.

The combination of these three dimensions creates a stable and reliable framework for political participation. Protective rules instil confidence by protecting participants from arbitrariness; the transparent distribution of responsibilities avoids overlaps and ensures that each actor knows their role; and operational guidelines facilitate understanding of the process and reduce uncertainty. Collectively, these measures empower citizens and organisations to comprehend the modalities of intervention, thereby legitimising the participatory system and fostering more sustained and orderly engagement.

Key elements identified

Principal component analysis has facilitated the identification of the key factors that facilitate and inhibit political participation in contexts with transformative capacity. The enabling factors include citizen empowerment, political openness, access to resources, and the use of symbols of unity. In contrast, the inhibiting factors are related to private sector pressures, restrictive regulations, and lack of transparency. These findings provide a solid basis for the design of public policies that promote political participation in contexts of change.

7.2.2. Hindering factors to societal transformation and political participation at Niche Level

1) Pressures from the private sector and political regime

- Variance explained: 8,46%
- Key Variables: Influence of the private sector; availability of economic resources and pressures from political Regime.

This component reflects how pressures exerted by the private sector—particularly concerning control over economic resources and access to knowledge—and normative pressures stemming from the prevailing political regime may function as hindering factors in participatory contexts. In systems where these actors exert dominant influence, the inclusion of alternative stakeholders and the emergence of participatory niches are constrained. This finding aligns with the literature on innovation systems, which highlights how dominant actors tend to reproduce power structures that inhibit transformative change (Geels, 2002; Smith & Stirling, 2010).

2) **Restrictive cultural and normative pressures**
   - Variance explained: 9,23%
   - Key Variables: Niche Maturation, External Landscape Pressures and Technological Regime Pressures.

This component indicates that external pressures—such as cultural, technological, and environmental transformations—act ambivalently. Depending on their direction and magnitude, they may either enable or hinder participatory processes. Landscape pressures, such as the climate crisis or global cultural shifts, may open up opportunities for new forms of participation; however, they may also intensify institutional or cultural resistance. Thus, this component highlights the importance of the macro-context in shaping opportunities for change (Rip & Kemp, 1998; Köhler et al., 2019).

3) **Absence of a protective regulatory framework**
   - Explained Variance: 3,81%
   - Key Variables: Protective norms, Distribution of responsibilities, Guidelines and Directives

The limited presence of clear and protective regulatory frameworks may weaken the institutional structures required to foster meaningful participation. This component underscores the importance of establishing clear rules, well-defined responsibilities, and specific guidelines to facilitate systemic stability and ensure that participatory processes are equitable and sustainable over time. Literature on adaptive governance and citizen participation emphasises this aspect as fundamental to the legitimacy and effectiveness of such processes (Ostrom, 1990; Meadowcroft, 2009).

4) **Conflictual relationship between media and political actors**
   - Media (-0,375)
   - Politicians (-0,354)

The negative association of media and politicians suggests that the presence of polarised media or delegitimised political actors may hinder empowerment and active political participation. This occurs because citizens may perceive that the media does not provide objective information, or that politicians are disconnected from societal needs.

5) **Governance constraints and high private sector influence**

The analysis reveals a critical dynamic between public governance and the constraints faced by civil society. Negative loadings were identified in two key variables:

   - Responsibilities Distribution (-0,803)
   - Role of Private sector (-0,527)

These negative loadings suggest that both an inequitable distribution of political responsibilities and excessive influence from the private sector can act as structural barriers to civic participation. In contexts where responsibilities are concentrated in specific actors—whether in governmental bodies or private corporations—access by civil society to decision-making processes is restricted. This concentration of power undermines the principles of participatory governance and weakens

democratic accountability mechanisms, potentially leading to a significant reduction in citizens' capacity to influence public affairs. This finding is consistent with previous studies warning about the risks of institutional capture and asymmetric governance (Jessop, 2002; Fung, 2006).

6) Lack of agency and access to resources

The sixth component of the analysis reveals a significant pattern concerning agency (-0,739) and resource availability (-0,628) **(Annex 3)**. These negative loadings observed indicate that the absence of agency—the perception of lacking control or capacity to influence political processes—and the lack of economic, informational, or material resources represent significant obstacles to active political participation. When individuals do not feel empowered or lack the necessary means to participate, their engagement in democratic spaces is notably diminished. This limitation not only restricts present participation but also perpetuates structural inequalities over the long term. Previous studies in democratic theory and citizen empowerment have shown that both agency and resources are fundamental conditions for meaningful participation (Gaventa, 2006; Verba et al., 1995).

Key elements identified

The principal component analysis has enabled the identification of a series of contextual factors that function as structural barriers to active political participation. These hindering factors reflect social, institutional, and cultural conditions that limit opportunities for civic engagement:

1. Polarised media and delegitimised political actors, which erode public trust and reduce interest in political matters (Component 1).
2. Governance constraints and limited institutional spaces, which hinder political openness and obstruct public deliberation (Component 2).
3. Concentration of power and private sector influence, which diminish citizens' agency and restrict access to decision-making (Component 3).
4. Lack of agency and limited resources, which compromise individual autonomy and reduce citizens' capacity to engage (Component 6).

These findings provide a robust empirical foundation for understanding the barriers faced by citizens in their attempts to participate politically. Identifying these factors is essential for designing public policies and institutional strategies aimed at promoting more inclusive, equitable, and sustainable political participation in complex democratic contexts.

8. QUALITATIVE ANALYSIS: HINDERING AND ENABLING FACTORS

This section presents the findings of the qualitative analysis, focusing on the key enabling and hindering factors that influenced the trajectory and impact of the HEs studied. Through in-depth examination of each case, the analysis sheds light on the factors that either facilitated or constrained political participation and socio-technical innovation. By identifying patterns across diverse cases, this section aims to provide a nuanced understanding of how different factors shaped the

emergence, consolidation, and transformative potential of CAIs in varied socio-political landscapes. In line with the inductive approach that underpins this research, the categories utilised in this analysis were predominantly constructed through a systematic qualitative comparison among the diverse HEs studied. This method enabled the identification of patterns and themes that emerged intrinsically from the qualitative data.

8.1 Niche: enabling factors

1) **Strong internal capacities: Knowledge, leadership, and social networks as main resources.**

Strong internal capacities are essential for the success of the historical examples analysed, as they provide the organisational structure, expertise, and motivation necessary to achieve long-term objectives. These capacities include the organisational structure, expertise, and motivation necessary to achieve long-term objectives.

Historical examples such as the OurPower Energy Cooperative, illustrate how connections with individuals possessing diverse expertise in the energy sector, combined with strong motivation and engagement from core team members, lay a solid foundation for the initiative's success. Furthermore, the Covid-makers movement serves to highlight the role of knowledge and collective intelligence in facilitating collective action. The core team members hail from a background in IT and engineering and utilised their proficiency in digital fabrication and rapid prototyping to address critical shortages in medical supplies. The core strength of these HEs was their capacity to transform complex, specialised knowledge into pragmatic, decentralised medical supplies production.

Similarly, the Energy Community in the Rural Municipality of Monachil exemplifies how community ties founded on ethical principles and trust can foster collective action and ensure sustainability. In the case of the Przylesie Housing Community, decisive and goal-oriented leadership was a critical factor in transforming a cooperative into a successful, long-term project, proving that effective leadership can be a powerful catalyst for change.

The importance of strong internal capacities extends beyond organisational structures; it also encompasses motivation, shared values, and community cohesion. This is evident in movements such as the anti-nuclear movement in Austria and the energy poverty initiatives in Spain. The success of the anti-nuclear movement arose from its ability to unite diverse citizen groups and NGOs across political, socio-economic, and generational lines. In contrast, energy poverty initiatives, like the Residents' Movement in the Northern District of Granada, relied on mutual trust and informal solidarity networks.

Additionally, movements such as the Solidarity and Renewable Energy Community of Napoli Est and the Urban Gardening Communities in Tartu illustrate how motivated and passionate leadership, fuelled by a shared commitment to environmental causes, can inspire grassroots action and collective transformation. These examples demonstrate that strong internal capacities—encompassing skilled leadership, diverse expertise, and deep community trust—are essential for sustaining and advancing collective action initiatives.

2) **Horizontal governance and decision-making process**

Horizontal governance plays a crucial role in enhancing the transformative capacity of CAIs by fostering inclusivity, accountability, and shared decision-making. A key aspect of horizontal governance is the adoption of a cooperative model, which promotes democratic decision-making, as exemplified by the OurPower Energy Cooperative. This cooperative operates with a one-member-one-vote system, ensuring that all members, regardless of their stake, have an equal say in major decisions. The cooperative framework not only strengthens inclusivity by involving everyone in governance but also ensures accountability, as all members must agree on important actions, such as selling successful ventures to regime actors. Similarly, the Energy Community in the Rural Municipality of Monachil benefits from horizontal governance through its adoption of statutes and agreements that protect community autonomy. By establishing a horizontal, consensus-based decision-making model, this initiative avoids institutional or corporate capture, reinforcing its commitment to collective control over local energy resources.

The Covid-Makers were also distinguished by their adoption of a horizontal governance model, characterised by the absence of clear hierarchies between their members and decision-making process rooted in collective deliberation. Organisational dynamics were strongly influenced by the legacy of the 15M movement, from which the Covid-Makers inherited a structure based on working commissions and sub-groups. These internal bodies were responsible for distributing tasks, defining functional roles, and collectively shaping the movement's roadmap.

In the case of the Przylesie Housing Community, the use of cooperative law and formal channels for public participation further illustrates the value of horizontal governance. The board of directors may initiate investment decisions, but the cooperative's governance structure ensures that these decisions are subject to member input and approval. This inclusive model fosters greater engagement and allows for collective ownership of long-term transformations, particularly when addressing renewable energy investments. Likewise, the Residents' Movement in the Northern District of Granada illustrates how a horizontal decision-making structure focused on dialogue and consensus empowers neighbourhood collectives and associations. While consensus is prioritized, voting is also employed when necessary, ensuring that all voices are heard and respected. By adopting horizontal governance models, these historical examples demonstrate how CAIs can ensure equitable participation, safeguard autonomy, and support long-term transformation through democratic and inclusive decision-making processes.

3) Civic networks and interconnected social agents

Civic networks and interconnected social agents are pivotal for the success of CAIs. For example, the OurPower Energy Cooperative relied on established local and regional groups that promoted renewable energy. These practice partners, including citizen groups and professionals, played a crucial role in forming the regional networks necessary for the CAI's development. Their cooperation, along with support from NGOs and grassroots organisations, created an environment that was conducive to collective action.

The Energy Community in the Rural Municipality of Monachil benefited from pre-existing neighbourhood associations and environmental groups focused on sustainability. Public sector support, including legal frameworks and access to resources, along with technical expertise from

the Municipal Energy Office and a non-profit cooperative specialising in energy issues, aligned the initiative with national and EU energy transition agendas, facilitating its growth.

Prior local activism and networks are also vital for quickly mobilising CAIs. The Residents' Movement in Granada, for instance, successfully leveraged local networks, such as religious communities and cultural associations, to support Energy Poverty Movements. These networks established trust, enabling rapid and effective mobilisation. The Energy Poverty Alliance in Spain, drawing support from the PAH (Platform for People Affected by Mortgages) and other social movements from diverse sectors, has created a strong foundation for collective action.

Similarly, bridge-building actors, including NGOs and academics, play a crucial role in connecting grassroots initiatives to public institutions. They help ensure that CAIs gain visibility and facilitate collaboration. In the Solidarity and Renewable Energy Community of Napoli Est, partnerships with NGOs provided necessary funding and expertise, while public sector support established a framework for self-directed energy production. On the other hand, the Anti-nuclear movement in Austria succeeded by fostering strong relationships with various citizen groups and NGOs, leading to increased resource mobilisation and a shift in public perspectives. Likewise, in Kraków, the Smog Alert initiative thrived through collaboration among social activists and NGOs, with support from both the private sector and public authorities. These connections underscore the importance of cohesive social agents in promoting effective collective action.

Civic networks and interconnected social agents were equally fundamental to the success of the Covid-Makers movement, which was embedded within a broad constellation of civic, professional, and institutional actors that facilitated the rapid mobilisation of resources and knowledge. The movement drew on pre-existing relationships within the Maker community, including collaborations with universities, Fab Labs, engineering associations, taxi companies and healthcare professionals. These alliances enabled the swift identification of needs, such as shortages in medical equipment, and the coordinated development of appropriate technical responses. In particular, the integration of health sector actors provided essential feedback loops to ensure that the designs produced met hospital standards. Furthermore, the role of public institutions in granting access to facilities, disseminating information, and legitimising the initiative strengthened the network's impact. Digital platforms also served as critical nodes in this civic ecosystem, enabling distributed coordination, pooling expertise, and facilitating the real-time adaptation of solutions.

The case of the flood in Genoa serves as an example of how specific contextual factors, particularly pre-existing informal collaborations among various local stakeholders, can foster political participation. Although these networks were not formally established or durable over the long term, they played a vital role in coordinating early civic responses. By sharing local knowledge and articulating counter-narratives, this group helped politicise the discourse surrounding hydrogeological risk and spatial planning. While the Genoa case did not lead to a consolidated civic infrastructure, these occasional engagements and collaborations laid the foundation for repeated civic mobilisation in subsequent crises, such as the collapse of the Morandi Bridge and the COVID-19 pandemic. Therefore, the Genoa case demonstrates how informal, issue-driven collaborations

and local knowledge activism can act as enabling factors for political participation in the absence of formal civic networks.

4) Public recognition and legitimization

Public recognition and legitimisation by social agents and the media are crucial for the success of CAIs. Such recognition builds credibility, attracts support, and mobilises resources, creating narratives that frame the CAI's objectives in alignment with societal values.

For instance, the OurPower Energy Cooperative leveraged niche initiatives to establish alternative identities focused on renewable energy, self-provisioning, and regional development. This approach helped garner public support and positioned the cooperative as a legitimate player in the energy sector. Similarly, the Energy Community in the Rural Municipality of Monachil emphasised shared values, such as energy as a common good and environmental justice, reinforcing its legitimacy in both community discussions and policy debates. Consequently, public support enhances the credibility of CAIs, contributing to their long-term sustainability.

Funding and awards significantly boost the legitimacy and visibility of CAIs. The Przylesie Housing Community earned recognition for its innovative investment activities in the field of renewable energy, enhancing its reputation in the property management sector. Furthermore, the anti-nuclear movement in Austria gained legitimacy by involving experts in public debates, ultimately leading to a referendum on nuclear energy.

Recognition has also been crucial for the Energy Poverty Movement in Spain, particularly in the Residents' Movement in the Northern District of Granada, which has successfully shifted public narratives to acknowledge its legitimacy. The Energy Poverty Alliance has benefited from regulatory changes and increased funding. Initiatives like the Pro Hanhikivi Association and Kraków Smog Alert demonstrate how media attention and awards can help CAIs expand their influence, attract resources, and drive policy change at both local and national levels.

5) Existence of free social spaces

Free Social Spaces - FSS are crucial for CAIs, as they foster political awareness and participation among community members. These informal settings allow individuals to gather, discuss issues, and understand the challenges they face.

In the Energy Community of the Rural Municipality of Monachil, FSS facilitated the development of new governance models and local ownership of renewable energy projects. Community members organised assemblies and working groups to engage in inclusive and democratic decision-making, supported by municipal staff and trained facilitators. Similarly, urban gardening communities in Tartu also emphasised collaboration through discussions and shared expertise, enabling individuals to shape their urban environment actively.

In Barcelona, the Fab Labs, particularly the “Ateneus Network,” played a key role in providing a free and accessible social space that fostered the emergence of the Covid-Makers movement. Many of these labs are situated in repurposed 19th-century industrial buildings, showcasing a historical continuity in the use of urban spaces for production and experimentation. During the Covid-19 crisis,

these Fab Labs, along with Makerspaces in various Spanish cities, became essential hubs where citizens could come together, collaborate, and quickly produce medical supplies. Equipped with computer-controlled tools, 3D printers, laser cutters, and other advanced technologies, these Makerspaces enable individuals to create, prototype, and transform digital designs into physical objects. Additionally, they served as venues for discussions on strategies to pursue, designs to prioritise, and the coordination of team efforts.

The existence of these physical spaces has been made possible in large part through public funding, underscoring the pivotal role of institutional actors in supporting infrastructures for civic innovation. Moreover, the Covid-Makers expanded the notion of FSS into the digital realm by developing and utilising open-source platforms that facilitated knowledge exchange, collaborative design, and decentralised coordination. These digital environments mirrored the inclusive and participatory ethos of the physical spaces, enabling a distributed yet cohesive response rooted in shared access to tools, information, and decision-making processes.

Free social spaces play a vital role in consolidating CAIs by fostering trust, building social capital, and cultivating a sense of collective ownership. For instance, the anti-nuclear movement in Austria organised meetings to share information and coordinate efforts, which strengthened participants' political engagement. Similarly, the Residents' Movement in the Northern District of Granada benefited from local neighbourhood associations that coordinated actions and established a Platform Against Power Cuts to advocate for community demands and rights. These social spaces helped protect residents from neglect and stigma, empowering them to take collective action against these issues. Furthermore, the Kraków Smog Alert initiative enabled community members to take charge of local environmental projects, such as the creation of the Coalition of Doctors and Scientists for Healthy Air, Smogathons, and other initiative groups, highlighting the importance of FSS in promoting civic engagement and sustaining CAIs. Overall, these spaces are crucial for fostering dialogue and promoting collective action.

6) Local community leadership (bottom-up grounded leadership)

Local community leadership and grassroots involvement are crucial for the success of CAIs, as they foster a sense of ownership, responsibility, and ongoing engagement within the community. In the Energy Community of the Rural Municipality of Monachil, citizens took charge of the process from the outset, ensuring that the initiative was aligned with local needs and desires. Similarly, in Tartu's urban gardening communities, strong leadership is demonstrated by two individuals managing the gardens, who create a cohesive team for smooth operations and decision-making.

The HE of floods in Genoa exemplifies collective leadership through a network of associations rooted in a shared working-class identity, fostering mutual trust and horizontal coordination. This collaboration has enabled continuous dialogue and influence over urban planning and environmental decisions, as exemplified by their success in opposing harmful developments and shaping the redevelopment of Piazza Adriatico. Their partnership with groups like the *Comitato di Piazza Adriatico* demonstrates a robust civic infrastructure that encourages ongoing democratic engagement. Additionally, their previous success in stopping a hotel and shopping centre through collaboration with experts highlights a proactive approach to urban planning, aligning social and

ecological sustainability. The CAI's work exemplifies embedded civic leadership, where local actors build legitimacy through consistent advocacy, knowledge sharing, and effective navigation of political processes, thereby securing meaningful influence in public decision-making.

Likewise, the Residents' Movement in the Northern District of Granada emphasises the importance of grassroots leadership, particularly highlighting the roles of women and young people in initiating and sustaining community actions. Informal networks rooted in everyday solidarity have supported leadership at the community level, with key individuals emerging as influential voices through regular public engagement. This combination of strong core teams, local facilitators, and collective learning fosters a leadership model that is deeply embedded in the community and essential for the long-term success of CAIs.

7) Innovation in educational programmes

Education is key to enabling CAIs and driving societal change. Workshops, training sessions, and public events help build awareness, knowledge, and skills that are essential for mobilising communities. For example, the OurPower Energy Cooperative created programmes to raise awareness of renewable energy, fostering a more informed citizenry. The Energy Community in the Rural Municipality of Monachil offered workshops for community members and educational programmes for schools to promote sustainability and democratic participation.

In Tartu, urban gardens served as educational spaces where community members learned about sustainable agriculture. In the same degree, the Pro Hanhikivi Association focused on educating citizens to influence national projects and enhance their role in decision-making. The Kraków Smog Alert initiative provided information on the health impacts of smog, thereby boosting advocacy efforts. Overall, these educational innovations empower people with the knowledge to challenge the status quo and advocate for sustainable solutions, strengthening the effectiveness of CAI activities.

Similarly, in Spain, Covid-Makers focused on educational initiatives that spread technical knowledge and encouraged civic empowerment. They offered open-access tutorials, webinars, and workshops on topics like 3D printing and medical device assembly. This peer-to-peer learning culture helped disseminate technical skills across diverse communities, promoting broader public involvement. In the same manner, within the HE of the Energy Poverty Alliance, the CAI conducts collective training and knowledge-sharing activities in various districts of Barcelona to empower individuals affected by energy poverty.

8) Reflexivity: adaptive and resilient collective actions, and tactical innovation capacities

Adaptive and resilient collective actions are crucial for the success of CAIs. They enable movements to respond effectively to challenges and opportunities. One key element is tactical innovation, which encompasses the use of protest culture, collective support systems, legal advocacy, and educational campaigns.

For instance, the residents' movement in the Northern District of Granada shifted from traditional protests to symbolic engagement through banners and videos, making their campaign more

inclusive. This approach aligned with the community's values of sustainability and participatory democracy. In Tartu's urban gardening communities, promoting innovative leadership while adhering to organisational agreements enabled both flexibility and structure. These examples illustrate that innovative tactics are essential for adapting to changing circumstances.

Tactical innovation also involves building collective support mechanisms to strengthen the resilience of CAIs. The Anti-nuclear movement in Austria succeeded by creating a robust protest culture and organising events and media campaigns to challenge nuclear development. Targeting political stakeholders and the media helped influence public opinion and policy. Similarly, the Residents' Movement in the Northern District of Granada cultivated local expertise, allowing residents to lead small-scale energy projects and respond effectively to energy poverty.

Ultimately, the Kraków Smog Alert initiative demonstrated the effectiveness of data-driven advocacy. By addressing health concerns and offering practical solutions for smog, this initiative established clear goals, strategic partnerships, and strong community support. Overall, adaptive actions rooted in local knowledge and tactical innovation are vital for the success of CAIs.

9) Repertories of contention: public campaigns

Public campaigns play a crucial role in promoting Community-Based Initiatives (CAIs). They help solidify the presence of these movements, raise political awareness, and enhance their legitimacy. By strategically utilising symbolism, communication, and media efforts, CAIs can strengthen their identity and cohesion, making them more visible and impactful. A notable example of this is the OurPower Energy Cooperative, which successfully combined business-style marketing with NGO-style campaigning to promote its mission. The cooperative actively communicated with its audience through its website, social media platforms, and email newsletters, effectively establishing a clear identity and fostering community engagement.

In the same way, the analysis of the Anti-nuclear movement of Austria highlights the role of public awareness campaigns about the risk of nuclear energy. Led by scientists, professionals, civil society organizations, artists and citizens, these played a crucial role informing the public and catalysing engagement of citizenship. Those efforts took multiple forms, including public forums and educational events hosted in universities, community centres, and town halls; large-scale demonstrations and rallies; and widespread use of public media platforms such as newspapers, radio, and television. Grassroots anti-nuclear groups and citizens' initiatives further expanded the campaigns' reach by distributing leaflets, pamphlets, and educational materials nationwide. Through these multifaceted strategies, public campaigns transformed information dissemination into a participatory process, creating spaces for dialogue and collective action, and ultimately empowering citizens to engage actively in political decision-making.

In Spain's Energy Poverty Movements, campaigns utilised shared storytelling and local narratives to rally support and raise awareness about energy issues. This approach reinforced the movement's legitimacy and built solidarity among participants. Similarly, the Kraków Smog Alert initiative implemented a targeted communication strategy, emphasising the fight against smog through

factual arguments, data, and media outreach. By avoiding broader discussions on climate change, they delivered a clear, actionable message that resonated more effectively with the public.

In the case of the floods in Genoa, large-scale institutional campaigns were notably absent. However, grassroots initiatives, such as the Amici del Ponte Carrega, conducted localised awareness-raising efforts that functioned as micro-scale public campaigns. Through community meetings, exhibitions, and digital communications, they highlighted issues related to hydrological risks and failures in urban governance. These efforts created spaces for public engagement and challenged dominant narratives, thus fostering civic participation despite the lack of formal structures.

In these various cases, public campaigns serve as an essential tool for enhancing CAIs, promoting a sense of shared purpose, and embedding collective action within the public sphere. In general, these campaigns, with their focused messaging and strategic use of media, are crucial for amplifying the reach of CAIs. They foster a sense of shared purpose and strengthen the movements' positions within public discourse.

10) The use of common symbols

Standard symbols are important for CAIs as they enhance public recognition, foster a sense of belonging, and promote unity. Logos, colour palettes, and shared aesthetics create a visual identity that unifies participants and communicates the movement's values to the public. The Energy Community in the Rural Municipality of Monachil serves as a reference of how adopting a shared logo and slogans can strengthen community ties and create a unified initiative. This visual consistency effectively communicates their message and reinforces their identity.

Likewise, the Solidarity and Renewable Energy Community of Napoli Est utilised symbols that linked the movement to an important local landmark, promoting solidarity among its members. The Pro Hanhikivi Association also adopted a logo to strengthen its public communications. Finally, the Kraków Smog Alert initiative created a logo designed by a local artist, which raised awareness about smog issues and further solidified its identity. These symbols serve a purpose beyond mere identification of a group; they actively cultivate a shared identity that strengthens unity and enhances public recognition.

8.2. Niche: hindering factors

1) Power limitations in accessing policymakers and decision-makers

Power limitations in accessing policymakers and influencing their decisions are significant barriers for CAIs. These limitations often result in a lack of formal institutional recognition, which hinders the achievement of systemic change. To illustrate this kind of limitation, the OurPower Energy Cooperative, as a niche actor, encountered challenges in influencing the national policy process. This significantly restricted its ability to implement broader regulatory changes or receive support from higher levels of government.

Similarly, the Energy Community in the Rural Municipality of Monachil did not disrupt the existing political and legal framework. Consequently, its impact remained primarily local and did not affect

national or regional energy policies. This case illustrates a common challenge faced by CAIs, where limited access to policymaking spaces prevents these initiatives from driving institutional reform or integrating their solutions into mainstream governance. In the same manner, the Przylesie Housing Community utilised a top-down communication approach, which, while effective at the community level, was still influenced by the narratives of the public sector and cooperative leadership. This approach limited its ability to challenge or alter dominant institutional structures.

These power limitations also appear in the inability of CAIs to influence formal institutional frameworks. The Residents' Movement in the Northern District of Granada, which began as fragmented and unstructured, faced significant barriers to full participation in decision-making. Formal institutional frameworks presented substantial obstacles to shared governance, and bureaucratic inertia, combined with limited coordination among public services, stifled progress. Additionally, political turnover at the municipal level created discontinuities in institutional support, making it challenging to sustain initiatives amid shifting political agendas.

On the other hand, the Energy Poverty Alliance similarly struggled to overcome regulatory constraints that limited the powers of both regional and national governments, preventing it from scaling its efforts. In the case of the Clean Transport Zone in Krakow, the initiative faced resistance from both residents and local policymakers due to economic and social barriers, with decision-makers hesitant to act for fear of public dissatisfaction and potential economic hardship.

These examples highlight how power limitations in accessing policymakers hinder CAIs from achieving formal recognition and influence, thereby preventing them from effecting meaningful, systemic change in public policy.

2) Limited access to funding

Limited access to funding significantly hinders many CAIs, as financial constraints can restrict their ability to scale, disrupt existing systems, or sustain operations over the long term. For instance, the OurPower Energy Cooperative faced challenges as a small and grassroots initiative, often struggling against detailed policy programmes that favour established, larger players in the industry sector, creating an uneven playing field. This issue highlights how innovative CAIs struggle to secure the necessary financial resources for growth and expansion.

Obstacles in accessing public funds were faced by the Energy Community in the Rural Municipality of Monachil, as the CAI mentioned that the allocation criteria typically prioritise economic indicators over social, environmental, and democratic considerations. Additionally, the complex administrative processes involved in managing and distributing European funds at national and regional levels pose further barriers, limiting grassroots initiatives' ability to obtain financial support and hindering their capacity to disrupt established systems.

The administrative burden associated with securing funding also restricts the disruptive potential of CAIs. Often, the resources needed to navigate bureaucratic processes exceed the benefits obtained. For example, Urban Gardening communities in Tartu faced significant challenges when interacting with city officials, as the infrastructure requirements for community projects were treated the same way as those for large-scale property developments. This bureaucratic complexity places additional

strain on community organisers, limiting their responsiveness to opportunities or the expansion of their initiatives.

Similarly, the Residents' Movement in the Northern District of Granada has not received formal recognition through public funding, awards, or regulatory changes, primarily due to insufficient financial resources. Without funding or the ability to navigate the necessary administrative systems, many CAIs are unable to realise their potential fully. This limitation hinders their ability to drive systemic change and maintain momentum. Consequently, financial barriers remain a key constraint on the capacity of CAIs to disrupt existing structures and promote meaningful, lasting transformations.

3) Limited access to infrastructural resources

Limited access to infrastructural resources is a significant barrier for many CAIs, as the lack of essential tools and resources limits their capacity to grow, organise, and sustain long-term efforts. For example, the Energy Community in the Rural Municipality of Monachil, despite its focus on critical self-assessment, lacked formal tools for implementing structured reflexivity within the initiative. The absence of formal infrastructural support for internal evaluation can hinder the community's ability to refine its strategies, learn from experiences, and adapt its practices to achieve its goals better. Specifically, despite having a logo and a sense of belonging within the energy community, extending the initiative in Monachil is challenging, mainly due to the presence of individuals with varying mindsets and educational levels, which makes it difficult to engage everyone in the initiative.

Similarly, while the OurPower Energy Cooperative had a logo for its corporate identity, it did not use it in the same way that activist movements leverage symbols to foster a collective identity or gain widespread recognition. This deficiency in symbolic infrastructure could hinder the cooperative's ability to mobilise support from broader communities.

Moreover, inadequate infrastructure can result in administrative and management burdens that distract from the core objectives of a CAI. For instance, urban gardening communities in Tartu struggled with complex administrative processes that divert time and energy away from their primary goals. These management challenges can create bottlenecks in decision-making, slowing the community's ability to innovate and expand.

In the case of the Residents' Movement in the Northern District of Granada, the movement has primarily relied on informal networks and adaptive practices rather than formalised structures, which limits the scalability and impact of its actions. The lack of consistent self-assessment practices and structured mechanisms for evaluating strategies further weakens the movement's ability to adapt and strengthen its initiatives. The Pro Hanhikivi Association also faced similar challenges, with limited financial resources hindering its capacity to consistently mobilise and promote collective action through communication campaigns.

In general, the lack of access to key infrastructural resources — including formal evaluation tools, management structures, and symbolic infrastructure — significantly limits the effectiveness and sustainability of CAIs.

4) Institutional and sectoral tensions

Institutional and sectoral tensions significantly hinder the disruptive capacity of CAIs by creating obstacles in forming productive relationships with public and private actors. The OurPower Energy Cooperative dealt with challenges due to the dominance of established energy providers and semi-public entities, such as electricity grid operators, which have more influence over the policy process than niche initiatives. These actors, including the Austrian national government, hold substantial power in shaping energy policy and securing support, leaving the cooperative with limited capacity to challenge or disrupt the established energy system.

Similarly, the Energy Community in the Rural Municipality of Monachil encountered tensions with key actors, like Endesa and certain public institutions, which often implemented short-term, reactive measures rather than addressing systemic issues. While these partial solutions temporarily eased the pressure, they failed to foster the long-term, transformative changes necessary for sustainable energy practices. The lack of support for systemic transformation from powerful sectoral actors undermines the CAI's potential for broader impact and lasting change. However, the Río Monachil Energy Community (CERM), along with other pioneering initiatives at the state level, have successfully implemented structural changes in legislation, extending the distance for sharing renewable electrical energy and facilitating access to the electrical grid.

Urban gardening communities in Tartu also faced institutional and sectoral tensions, as the public sector did not sufficiently recognise or value the contributions these initiatives make, particularly in terms of resources and urban sustainability. Ongoing pressure on land use within the city, along with diverging interests among various stakeholders, complicated efforts to expand urban gardening initiatives. This lack of institutional recognition and support from public authorities limits the CAI's ability to influence urban planning and policies that could better accommodate community-driven projects.

Similarly, the Energy Poverty Movements in Spain, particularly the Residents' Movement in the Northern District of Granada, struggled with public institutions that are often reluctant to confront powerful actors like Endesa. Despite evidence of rights violations and widespread protests, public institutions have consistently shown an unwillingness to address structural issues through policy changes or meaningful engagement. The private sector has also been notably absent in collaborating or investing in solutions to the district's problems, further entrenching the power imbalances that undermine the CAI's capacity for systemic change. The Energy Poverty Alliance experienced similar institutional and sectoral tensions, as large energy corporations wield significant power and influence, making it difficult for grassroots movements to gain traction in the policy sphere. The lack of support from mainstream media further weakened the public visibility of the movement, reinforcing the dominance of corporate interests in shaping the discourse around energy poverty.

The Pro Hanhikivi association received attention in mainstream media (Vehkalahti 2017, 106, 114, 134) but the nuclear power company Fennovoima tried to promote the acceptability of its nuclear power plant project thus acting in ways hindering the CAI's progress. Additionally, the Kraków Smog

Alert initiative has encountered resistance from parts of the central government and powerful industry lobbies, such as the mining sector and business associations, which opposed anti-smog measures. These tensions with institutional and sectoral actors create significant barriers to progress, limiting the capacity of CAIs to drive the systemic changes necessary to address environmental, social, and economic challenges.

5) Complexity of the energy system

The complexity of the energy system presents a significant barrier to CAIs, as the technical language, legal intricacies, and multifaceted nature of energy-related issues can hinder understanding and engagement, particularly among broader segments of the population. In the HE of the OurPower Energy Cooperative, energy topics were often perceived as inaccessible, especially by women, due to their complex technical details and specialised jargon. This complexity made it challenging to encourage widespread participation, thereby limiting the ability to engage diverse community members who may lack the necessary expertise to navigate the nuances of energy policy, technology, or markets.

Similarly, the Energy Poverty Alliance in Spain faced challenges in communicating the complexities of the energy sector to the general public. Many people struggled to understand the legal and technical aspects of energy poverty, which further impeded the development of meaningful and impactful actions.

These cases emphasise the effects on individuals who feel disconnected from energy-related issues, making them less likely to engage or advocate for change. As a result, the complexity of the energy system not only restricts access to information but also hinders the potential for broader engagement and effective mobilisation of community action initiatives related to energy.

6) Internal tensions and the lack of capacities to deal with internal conflicts and dissent

Internal tensions and the inability to effectively manage conflicts and dissent within CAIs frequently constitute substantial obstacles to their success. This challenge is particularly pronounced when decision-making processes are predominantly top-down and when there is a considerable absence of reflexivity.

In the case of OurPower Energy Cooperative, although the cooperative was founded on democratic principles, day-to-day operations and key decisions were primarily influenced by the core team and management board. This structure can limit broader participation and feedback, concentrating decision-making power within a small group and reducing the collective's capacity to adapt and reflect on internal issues.

As analysed in the Przylesie Housing Community, the residents' active participation was often limited to legitimising or delegitimising actions taken by the board, which initiated most investment processes with insufficient involvement from residents. Internal divisions, particularly between "old" and "new" residents, over modernising efforts exacerbated tensions. Additionally, the lack of inclusive, reflexive practices within leadership deepened these conflicts, marginalising dissenting

voices and hindering the initiative's ability to address underlying issues and engage the entire community.

Moreover, the absence of reflexivity and democratic engagement in the decision-making processes of CAIs frequently leads to disengagement and fragmented efforts. This was evident in historical examples, such as the Solidarity and Renewable Energy Community of Napoli Est, where limited democratic participation and a lack of collective discussions on allocating public funds fostered growing scepticism and division within the community. Decisions were often influenced by the socioeconomic conditions of the district's residents, further complicating unity.

In Spain, particularly within the Northern District of Granada's Residents' Movement, internal divisions have been exacerbated by the fragmented application of partial solutions in specific areas. This resulted in challenges to sustaining long-term engagement, as emotional investment and the complexity of the struggle led to burnout and disillusionment among members. Likewise, the Pro Hanhikivi Association, where much of the work was carried out by only the president and vice president of the association, illustrates the dangers of centralising power in a few individuals.

These examples demonstrate that top-down decision-making and an inability to engage in reflexive processes can lead to a lack of cohesion, marginalisation of dissenting voices, and fragmentation of efforts. All these factors hinder the long-term effectiveness and transformative capacity of collective action initiatives.

Observed challenge: enhancing inclusivity within the CAIs

Inclusivity seems to pose a significant challenge for CAIs, particularly in terms of cultural diversity and engaging marginalised groups. For instance, the OurPower Energy Cooperative displayed a noticeable lack of diversity, as the majority of its members, electricity producers, and consumers were male, and most of the founding members were over 50 years old. Additionally, the members typically came from higher socioeconomic backgrounds, possessed higher levels of education, and were primarily from non-migrant backgrounds. This lack of diversity limited the cooperative's ability to engage a broader range of voices, especially those of younger individuals, women, and low-income or migrant communities.

In the Residents' Movement in the Northern District of Granada, also, age inclusivity and cultural diversity have not been explicitly prioritised. Although young people contributed significantly to cultural expressions and neighbourhood identity, their involvement in decision-making processes was minimal, and the movement has not developed a strategy to encourage cultural inclusion.

This emphasis on fundamental rights, rather than on integrating diverse perspectives, restricts the CAI's potential to be genuinely representative and inclusive. Consequently, this limitation affects its long-term effectiveness and relevance in addressing the needs of all community members.

8.3 Regime: enabling factors

1) Higher system openness and adaptability

Higher system openness and adaptability at the regime level are crucial enabling factors for CAIs, as they foster political interest, awareness, and civic engagement by creating an environment

conducive to change. In this regard, the OurPower Energy Cooperative benefited from technical innovations in renewable energy, including cost-competitive technologies and advancements in digitalisation. These innovations have allowed the cooperative to align more closely with broader energy transition goals. Not only did they make renewable energy more viable, but they also supported the cooperative's innovative peer-to-peer marketplace, which facilitated decentralised energy exchange.

At the regime level, a shift toward supporting renewables and the energy transition has provided a favourable backdrop for initiatives to thrive. The Energy Community in the Rural Municipality of Monachil, for instance, has benefited from a growing political consensus on the need for energy transition, enjoying strong backing from across the political spectrum. Indeed, Monachil HE has operated within the framework of EU directives on energy communities, but, together with other pioneering energy communities, has successfully brought about legislative changes at the national level.

Moreover, the adaptability of political systems can significantly enhance the visibility and legitimacy of CAIs. In Spain, the energy poverty movements have experienced a shift in public and institutional narratives, leading to local institutions recognising the movement's legitimacy. This has been accompanied by greater media openness and a more supportive framing of the movement, which has contributed to a broader societal understanding of the issue. The movement's visibility at the European level has opened new avenues for advocacy and institutional dialogue, allowing it to influence policy more effectively.

Similarly, the Kraków Smog Alert initiative has benefited from broad political support at the local level, which has helped secure public and institutional recognition for its efforts. This gradual yet significant opening of the political system at the local level enhanced the movement's capacity to further engage and mobilise support, demonstrating how regime-level adaptability can amplify the impact of CAIs and promote deeper civic involvement in critical societal issues.

2) Existence of a clear regulatory framework

A clear regulatory framework is essential for the success of CAIs because it provides legal recognition and supports citizen participation. In the case of the OurPower Energy Cooperative, identified benefits have been found from EU policies, such as the European Green Deal and the EU Climate Law, which legitimise energy initiatives at the national level. EU directives from 2018 and 2019 established a legal framework for energy communities, enabling initiatives like OurPower to secure funding, collaborate with stakeholders, and garner public support.

In the same manner, the Energy Community in the Rural Municipality of Monachil thrives due to the window of opportunity provided by EU directives. The Spanish legal framework had not transposed them and made it difficult to implement this type of initiative, but the Río Monachil Energy Community (CERM), together with other similar pioneering initiatives, managed to bring about regulatory changes and specifications at the state level in order to operate with a minimum of guarantees in the electricity system and have greater flexibility to incorporate new members by extending the distances for sharing energy to a 5 km radius.

Other CAIs, such as the Solidarity and Renewable Energy Community of Napoli Est and the Energy Poverty Movements in Spain, demonstrate that legal frameworks from the EU and national regulations can enhance citizen engagement. Italy introduced Renewable Energy Communities (RECs) regulations in 2020 following EU directives, which laid the groundwork for these initiatives. Essentially, EU frameworks encourage local responses to energy poverty, creating political pressure for territorial inclusion. This regulatory clarity not only legitimises CAIs but also boosts citizen involvement, promoting a more inclusive environment for collective action. With robust regulatory support, these initiatives are better equipped to achieve long-term success and broader societal impact.

3) Transparent access to information

Transparent access to information at the regime level is essential for enabling CAIs. It fosters trust, accountability, and informed citizen participation. In the case of the Energy Community in the Rural Municipality of Monachil, transparency and participatory practices have been crucial in building local trust. The initiative actively shares details about the CAI with citizens through participatory formats, ensuring that the community remains informed and engaged in decision-making processes.

Similarly, the Urban Gardening communities in Tartu benefited from readily available information, enabling community members to make informed decisions and participate effectively in the initiative. In the Energy Poverty Movements in Spain, particularly in the Northern District of Granada, some municipal actors have worked to improve access to information and enhance institutional responsiveness. By ensuring that citizens have access to accurate and timely information, these initiatives are better positioned to mobilize support, address community concerns, and foster greater civic engagement. Ultimately, transparent access to information not only empowers citizens but also strengthens the legitimacy and impact of CAIs by ensuring that decisions are made based on shared knowledge and collective input.

4) Presence of political, economic, and cultural internal tensions

Internal political, economic, and cultural tensions at the regime level can either facilitate or hinder CAIs, depending on the specific context. For example, the OurPower Energy Cooperative was presented with a unique opportunity due to the push for decarbonising the energy system and increasing citizen participation, alongside the political commitment to achieve 100% renewable electricity by 2040. The political and scientific sub-regimes advocating for decarbonisation created a supportive environment for initiatives like OurPower to drive the energy transition. However, economic factors, such as fluctuations in electricity prices and the availability of subsidies for various energy sources, pose challenges, as these financial issues can threaten the economic viability of community-driven projects. Thus, the internal regime tensions reveal how much the broader political, economic, and cultural landscape influences whether these tensions create opportunities or pose significant obstacles.

In a similar vein, the Przylesie Housing Community faced issues due to changing legislation (the need to regulate the prosumer RES energy market) that reflected evolving policy priorities at both local and national levels. These changes challenged traditional energy distribution models, necessitating

an adaptation by the community. While regulatory shifts can open new avenues for energy innovation and decentralisation, they can also generate uncertainty and resistance as existing stakeholders navigate the new political and economic dynamics. The struggle between preserving established systems and embracing necessary changes represents a significant barrier to effective collective action, potentially slowing down initiatives that depend on legal and institutional support. This phenomenon is common among CAIs, where internal tensions among political, economic, and cultural forces can either foster or impede progress based on how these tensions are managed.

Additionally, in the case of the Energy Poverty Movements in Spain, internal tensions within political and economic sub-regimes have significantly influenced grassroots initiatives. Long-standing infrastructural issues and stigmatising narratives have paradoxically spurred grassroots innovation and encouraged community-based solutions. This tension between systemic discrimination and community resilience has given rise to a counter-narrative focused on dignity and identity, enhancing the movement's visibility and support. Economic and political crises, including financial austerity policies and the territorial conflict related to the Spanish-Catalan issue, have intensified these tensions in the case of the Energy Poverty Alliance. Nevertheless, they have also fostered greater solidarity and action among affected communities.

Similarly, the Kraków Smog Alert initiative gained momentum as public awareness of health concerns grew, and local authorities, pressured by declining air quality and public sentiment, became more willing to address the activists' demands. This interplay of internal tensions — economic, political, and cultural— has created both challenges and opportunities, ultimately enabling CAIs to mobilise more effectively and advocate for systemic change. These examples highlight how internal tensions within the regime can serve as catalysts for the growth of CAIs, provided they align with broader social and political movements.

5) External landscape pressures

External pressures at the regime level can significantly enable CAIs by destabilising existing systems and creating opportunities for innovation. In this regard, the Russo-Ukrainian war has enabled initiatives like OurPower to advocate for a more equitable energy transition, as governments become more receptive to grassroots solutions. Indeed, the conflict has driven Austria to accelerate its transition to renewable energy due to its increased reliance on Russian gas, and this crisis has reshaped political discourse, creating opportunities for support of this CAI. In Finland, political support for the Fennovoima nuclear power plant project, which was based on cooperation with the Russian company Rosatom, was lost due to the war and the project was terminated in May 2022.

Similarly, global events, such as the war in Ukraine and energy price volatility, have heightened the urgency for energy transition initiatives while revealing challenges in their implementation. The Energy Community in Monachil has responded to these pressures by seeking sustainable, locally controlled energy solutions. Such disruptions can empower community-driven initiatives, promoting greater control over energy production and distribution, as the COVID-19 have also spurred new civic engagement forms. Urban gardening communities in Tartu, for instance, emerged in response to the need for safe interaction spaces during the pandemic. Additionally, the Solidarity

and Renewable Energy Community of Napoli Est has seen regulatory bodies become more proactive about renewable energy in response to these crises. Overall, these pressures create new opportunities for CAIs to drive systemic change.

6) Legal protections for assembly, protest, and freedom of expression

Legal protections for assembly, protest, and freedom of expression are vital for the success of CAIs, as they provide a framework for public participation. In the Rural Municipality of Monachil, the Energy Community benefited from a supportive legal environment at the European level that enabled it to participate in national initiatives. By utilising legal and participatory channels, the initiative successfully pressured the distribution company Endesa, resulting in legislative changes that improved grid access equity. Supportive press coverage and local government deliberative spaces further enhanced its engagement with civil society. Nonetheless, these European directives have not been transposed at the National level until now, despite citizen movements such as Monachil submitting allegations and coordinating requests for more beneficial and precise regulations from the state that would enable them to develop and operate in the electricity market.

Likewise, the legal right to protest is essential for gaining public support and driving institutional change. The anti-nuclear movement in Austria exemplified this, as citizens could peacefully express their opposition without fear of repression and received acknowledgement from the authorities. In Spain, the Residents' Movement in Granada benefited from protections for peaceful demonstrations, resulting in well-organised protests against energy poverty. And in Poland, the Kraków Smog Alert initiative took advantage of legal rights for public protests, requiring no formal permission to organise. Overall, these examples underscore the critical role legal protections play in enabling CAIs to mobilise support and influence decision-making processes.

7) Available funding for CAIs

Funding at the regime level is crucial for CAIs, as it provides the necessary financial resources to support their objectives. In the case of the OurPower Energy Cooperative, the initiative has gained legitimacy and expanded its reach through participation in EU research projects that offered both funding and valuable knowledge. Equally, the Energy Community in the Rural Municipality of Monachil utilised EU funds, such as from the NextGenerationEU programme, to promote local energy transition models in line with broader EU sustainability goals. Access to these resources helped CAIs build momentum for systemic change in energy policy.

Funding from national and regional authorities also plays a vital role. The Przylesie Housing Community, for instance, accessed financing and subsidies for renewable energy, which strengthened its credibility and public support. In Spain, the Residents' Movement in the Northern District of Granada benefited from funds to implement local inclusion plans. Meanwhile, Poland's accession to the EU in 2004 opened up funding for air quality improvement, supporting initiatives such as Kraków Smog Alert. In summary, the provided examples illustrate how access to funding empowers CAIs to attain their objectives and effectuate sustainable change.

8) Medium stability of the regime

A moderate level of stability within the political regime can facilitate CAIs by fostering a political environment that allows consensus to emerge while still providing space for protest and dissent from niche groups. For instance, the Energy Community in the Rural Municipality of Monachil thrived during a period of political stability. This stability was supported by long-term planning at both the national and European Union levels, providing a favourable backdrop for the initiative's growth. As a result, coordinated actions and policy alignment were possible while still accommodating grassroots initiatives.

In an analogous context, the Przylesie Housing Community benefited from a relatively stable local political system, despite grappling with an unstable legal and institutional environment, which facilitated smoother decision-making processes and greater engagement with public authorities. In the case of the Energy Poverty Movements in Spain, especially in the Northern District of Granada, the overall stability and functionality of the political system have enabled ongoing grassroots mobilisation, ensuring that residents' voices are heard without facing severe political repression. Additionally, the Solidarity and Renewable Energy Community of Napoli Est found that a stable political context helped build trust in political institutions, as this trust enabled the CAI to operate and negotiate more effectively. In general, this moderate level of stability strikes a balance, fostering political consensus and cooperation while still providing sufficient space for CAIs to challenge and influence policy when necessary.

8.4 Regime: hindering factors

1) **Systemic rigidity, fragmentation, and institutional inertia, along with a high administrative burden**

Systemic rigidity, fragmentation, and institutional inertia, along with high administrative burdens, significantly hinder CAIs by creating substantial barriers to effective implementation and scalability. For example, in Tartu, urban gardening communities faced high administrative burdens, and complicated interactions with city officials hindered progress. Although funding was available, it was often small-scale and short-term, limiting the initiative's long-term sustainability. Additionally, the community infrastructure required the same bureaucratic processes as significant property developments, resulting in time-consuming and complex negotiations with officials.

As an outstanding aspect of this hindering factor, the Energy Community in the Rural Municipality of Monachil encountered slow structural reforms and a largely centralised energy policy, which complicated the CAI's ability to navigate the complex legal and procedural frameworks in place. While there was potential for adaptability, the process was constrained by these challenges, illustrating how entrenched institutional systems can limit the flexibility of CAIs and delay necessary changes.

Likewise, the Energy Poverty Movements in Spain, particularly in the Northern District of Granada, also dealt with institutional fragmentation across local, regional, and national levels. This fragmentation weakened accountability mechanisms and complicated the implementation of shared governance models. In general, the intricate legal and policy frameworks exacerbate these

issues, making it difficult for CAIs to navigate convoluted funding application processes and leading to delayed disbursement of financial resources.

In Kraków, the Smog Alert initiative (at the first stages of activity) encountered political resistance and administrative barriers that hindered efforts to address air pollution. This highlights how systemic rigidity and bureaucratic inertia can undermine the effectiveness of CAIs, even when there is considerable public support for their objectives. In essence, these examples demonstrate that institutional fragmentation, legal complexities, and administrative burdens are key obstacles that CAIs must overcome to effectively challenge entrenched systems and foster meaningful change.

2) Issues regarding public sector neutrality and potential conflicts with public agents

Issues of public sector neutrality or conflict at the regime level can serve as significant hindrances to CAIs, as they undermine the effectiveness of CAIs by either weakening support or creating direct opposition. In the case of the Energy Community in the Rural Municipality of Monachil, the public sector's partial and reactive measures weakened the initiative's collective momentum, diverting attention away from a more transformative and systemic approach to energy policy. Likewise, in Tartu, the Urban Gardening communities struggled due to the lack of active support from the city government, which failed to address issues related to public sector neutrality or conflicts at the regime level, thereby significantly hindering and undermining effectiveness of the initiatives. This lack of acknowledgement from the public sector limited the CAIs' potential for growth and their integration into broader urban planning strategies.

In Spain, the Residents' Movement in the Northern District of Granada encountered tensions with public institutions regarding control, representation, and the framing of bottom-up actions. Regional and national political actors have often been disengaged or hesitant to act due to the political costs and the influence of powerful energy companies, such as Endesa. This conflict of interests further constrained the movement's ability to advocate for reforms addressing energy poverty. On the other hand, in Kraków, the Smog Alert initiative faced marginalisation and a lack of awareness about air quality issues among local authorities, which obstructed efforts to combat pollution.

These examples illustrate how the absence of neutrality or the presence of active conflict within public institutions can impede CAIs, especially when political or economic interests support maintaining the status quo. This lack of acknowledgement from the public sector limited the CAI's potential for growth and integration into broader urban planning strategies, as it did not recognise or value the contributions these initiatives made to the urban environment and community well-being.

3) Misaligned incentives among different regime actors

Misaligned incentives among different actors at the regime level can significantly hinder the responsiveness of CAIs and limit opportunities for participation. In the case of the Energy Community in the Rural Municipality of Monachil, institutional fragmentation across various government levels — local, regional, and national — created gaps in support and coordination,

which complicated efforts for grassroots energy initiatives. While public funding, particularly from EU programmes, is available, the complex access procedures, including bureaucratic burdens, co-financing requirements, and limited technical capacity, make it difficult for small municipalities and citizen-led projects to fully benefit. Indeed, the main obstacle to accessing public funding is that economic requirements take precedence over other, more social objectives, which means that large companies obtain subsidies through subsidiaries they have created to promote solar communities. This misalignment between the goals of central authorities and the needs of local communities often results in a slow, inefficient response, undermining the potential for real community-driven change in the energy sector. These barriers create significant hurdles for CAIs that rely on institutional support to scale and succeed, highlighting the detrimental impact of misaligned incentives at the regime level.

Similarly, in the context of energy poverty movements in Spain, misaligned incentives resulted in bureaucratic inefficacy and policy neglect. Programs designed to support vulnerable areas often suffer from administrative burdens, short-term logic, and inflexible implementation rules that limit their effectiveness. These regulatory gaps and inefficiencies deepen distrust toward public authorities, which further erodes opportunities for meaningful participation and collaboration. Additionally, the EU's failure to establish direct operational mechanisms to address structural energy poverty in specific local contexts exacerbates the challenge, as energy policy remains a national competence. The misalignment between the EU's broader energy policies and local needs has left many communities without the tools they need to address energy poverty effectively. Likewise, the Energy Poverty Alliance faces a highly volatile energy market, with limited mechanisms to protect vulnerable groups from price fluctuations or help them fully engage in the energy transition. These examples demonstrate how misaligned incentives among different actors within the regime can limit CAIs' ability to influence meaningful policy change and hinder the engagement of marginalized communities.

4) Changes in legal frameworks that impact political trust and public mobilisation

Changes in legal frameworks at the regime level can significantly hinder the effectiveness of CAIs by eroding political trust and complicating public mobilisation. In the case of the Energy Community in the Rural Municipality of Monachil, the implementation of national regulations regarding community energy has revealed to be unclear and overly complex for small municipalities to navigate. The slow and sometimes obstructive transposition of EU directives on energy communities into national law has created additional barriers for grassroots initiatives, making it difficult for local actors to align with national energy policies or access available support.

This uncertainty in legal frameworks can erode public confidence in political processes as citizens and community organisations struggle to understand how to engage with evolving policies that are often not tailored to their specific needs. In this regard, the Residents' Movement in the Northern District of Granada faced significant bureaucratic constraints while trying to implement regional frameworks. The short timelines and limited integration of community voices in the process hindered effective participation and undermined the legitimacy of policy changes. These challenges underscore how shifting legal frameworks, if not carefully designed and inclusive, can hinder CAIs'

ability to mobilise support, erode political trust, and make it more difficult for communities to sustain long-term efforts for systemic change.

5) Establishment of power asymmetries

Power imbalances at the regime level significantly obstruct CAIs. These disparities result in unequal access to resources, policy influence, and decision-making. Established entities in the energy sector, such as major energy providers and government bodies, have significantly greater influence over the policy process compared to grassroots initiatives like the OurPower Energy Cooperative. This dominance makes it difficult for initiatives to assert themselves, as they receive less support from the policy regime, limiting their political traction and ability to effect change.

As demonstrated by the case of the Energy Community in Monachil, which struggled against centralised energy structures, local initiatives encounter challenges from centralised control over distribution grids and limited opportunities for local energy sharing. The dominance of private companies captures a significant portion of the available funding, undermining community autonomy and creating tensions between public policy goals for citizen participation and the profit-driven motives of private entities.

In Spain, power asymmetries also affect energy poverty movements, and public institutions often hesitate to confront influential players, such as Endesa, which makes it challenging for groups like the Residents' Movement in Granada to gain momentum. The Energy Poverty Alliance faced similar issues, as large energy corporations hinder efforts for policy reform and community engagement, prioritising corporate interests over the needs of vulnerable communities.

This issue also extends to the Pro Hanhikivi Association, where influential institutions prioritised the construction of a new nuclear power plant, disregarding critical comments from the local level regarding the Hanhikivi peninsula. Overall, the concentration of power among a few actors restricts CAIs' ability to create meaningful change, as they often lack the necessary resources and political leverage to challenge entrenched interests.

6) Scientific and technological advancements not aligned with public policies

The misalignment between scientific and technological advancements and public policies at the regime level can significantly hinder CAIs, as this often leads to mistrust and a sense of disempowerment among communities. For instance, the anti-nuclear movement in Austria illustrates how the push for advancements in nuclear energy, driven by economic and scientific goals in post-war Europe, often overshadowed public concerns and environmental considerations. Overall, this created a disconnect between technological progress and public interests.

The case of the Energy Community of the Rural Municipality of Monachil exposes that, although technological solutions like solar photovoltaics (PV) and smart grids are available, the regulatory and infrastructural systems are rigid and slow to adapt. Indeed, grid management remains largely centralised, and barriers to self-consumption persist. This disconnection between available technology and policy frameworks limits innovation, as it prevents communities from fully leveraging modern solutions to address their energy challenges.

The Residents' Movement in the Northern District of Granada encountered similar challenges. Many EU operational mechanisms aimed at addressing structural energy poverty take a technocratic approach, prioritising measurable outcomes over context-sensitive, community-led processes. This often alienates local communities, making them feel excluded from decision-making and distrustful of solutions imposed by external actors. Consequently, many cases examined illustrate how the disconnect between scientific advancements and public policy can undermine both trust and empowerment within CAIs.

7) Formal but ineffective participation methods

Formal but ineffective participation methods at the regime level often serve as significant hindrances to the success of CAIs, as they create an illusion of engagement without providing real opportunities for influence or change. For example, in the case of the OurPower Energy Cooperative, the formal pathways for citizen participation were limited by a lack of accessible knowledge, time, and resources, as well as entrenched societal norms that hinder widespread engagement in the energy sector. Although public consultations and legal frameworks allow for participation, these mechanisms often fail to yield binding commitments or substantive action, making it difficult for CAIs to have a meaningful impact on policy. The formal avenues for participation in the energy sector are dominated by elite actors and institutions, which limit the influence of grassroots initiatives like OurPower, reinforcing the status quo rather than fostering the inclusive decision-making needed for systemic change.

Similarly, the Przylesie Housing Community in Poland faced difficulties in engaging with informal groups due to the low levels of social and political trust, which are among the lowest in Europe. The community's attempts to conduct non-standard activities or propose alternative solutions were hindered by the limitations of formal governance structures, such as the cooperative law, which restricted their full engagement in decision-making processes. These institutional barriers compelled the community to rely on informal channels to communicate with higher-level officials or politicians, highlighting how formal participation mechanisms can be ineffective if they are not designed to empower grassroots actors genuinely. This disconnection between legal frameworks and meaningful engagement underscores the limitations of formal participation methods, as they frequently fail to incorporate the voices of marginalised groups and those seeking innovative solutions that challenge established power structures.

The Energy Poverty Movements in Spain offer another example of how formal, but ineffective participation methods can hinder collective action. In the Northern District of Granada, public institutions often prioritise data-driven or infrastructural responses over community-based, participatory approaches. The bureaucratic rigidity and fragmented responsibilities within institutional mechanisms for participation prevent the development of comprehensive, inclusive, and context-sensitive approaches to addressing energy poverty.

In the case of the Energy Poverty Alliance, while there were some formal channels that invited civil society organisations to participate, these spaces were not decision-making platforms and thus fail to provide real influence over policy. This lack of binding commitment in participatory frameworks

leads to frustration and disillusionment within communities, as they are left without the power to affect meaningful change. Similarly, in the Pro Hanhikivi Association, while citizens can participate in public life, they are primarily limited to representative democracy mechanisms, which often marginalise direct engagement with policymakers. The examples presented illustrate how ineffective formal participation processes, which do not provide genuine decision-making authority, can hinder the progress of CAIs. This lack of effective participation can create significant challenges in their ability to confront established systems and fulfil their objectives.

9. CONCLUSIONS

This report synthesises findings from a multi-method investigation into the conditions that enable or constrain political participation within socio-technical transitions. By examining a range of CAIs across diverse European contexts, the study explores how political systems, civic networks, and institutional structures interact to shape citizen engagement. Drawing on both quantitative and qualitative data, the research identifies key enablers and barriers to participation. The findings are situated within the Multi-Level Perspective on transitions, which offers a useful lens for understanding how niche-level innovations emerge and interact with regime and landscape-level pressures.

The conclusions presented here are organised around several interconnected themes that have emerged from the data as key enabling factors: the importance of political openness and institutional alignment; the enabling role of free social spaces and niche-level innovation; the function of civic networks and multi-scalar coordination; the impact of internal capacities such as leadership and reflexivity; and the broader systemic pressures that influence participatory dynamics. Together, these insights highlight the complex and layered nature of political participation in transition contexts and point to the need for supportive policy environments and robust civic ecosystems capable of sustaining transformative action over time.

At a methodological level, the analysis of enabling and hindering factors that promote political participation encountered several challenges that required careful consideration. The first difficulty arose from the need to address the particularities of context, organisation, and impact of each HE studied without resorting to reductionism. Determining the most suitable comparative method to explain the key factors facilitating political participation proved to be particularly complex, as the diversity at both niche and regime levels, combined with uneven availability of information and differing research approaches, posed significant constraints.

Further complexity was introduced by the volume and heterogeneity of data collected across the 19 HEs. To systematically observe factors at both regime and niche levels, an Excel table was developed to compile qualitative and quantitative information. The design of this tool was also challenging because its main objective was to allow the simultaneous application of both methodological perspectives while facilitating analysis within a MLP framework. Concepts derived from academic literature on political participation were incorporated as indicators, embedding findings within the analytical logic of previous research. Establishing a shared understanding of

these concepts required additional methodological reflection, resulting in the creation of a guideline and a training session for the research teams.

The study employed Anckar's comparative logic through the Most Similar Systems Design (MSSD) and Most Different Systems Design (MDSD). While MSSD allowed exploration of specific, similar contextual conditions, its reliance on similarity limited external validity and risked overlooking interactions between variables. In contrast, MDSD facilitated the identification of generalisable drivers by comparing divergent cases with similar outcomes, yet its exclusive application risked omitting system-level factors influencing results. To mitigate these limitations, the research integrated both methodologies, enabling a balance between in-depth contextual analysis and the identification of broader patterns across cases.

Despite this integrative effort, challenges persisted. The use of 19 HE increased the complexity of data harmonisation, and the heterogeneous nature of sources occasionally limited comparability. Additionally, while the combined use of MSSD and MDSD enhances explanatory potential, it does not fully eliminate the tension between contextual specificity and generalisability.

The diversity of cases also made the identification of enabling factors to appear unstable and open-ended. Drawing on Anckar (2008), the study adopted a multi-level analytical perspective, using regression models to bridge subsystem and system-level variables while avoiding instability caused by excessive controls. This approach combined quantitative analysis, using SPSS to identify patterns across HEs, with qualitative analysis to preserve contextual depth. Although the database initially contained 93 variables, only results that best captured the observed variability were incorporated, ensuring analytical robustness.

Overall, the methodological strategy evolved as an iterative process that combined multiple approaches to balance contextual richness with cross-case comparability, ultimately enhancing the validity and depth of the study's findings.

9.1 Key enabling factors

The key enabling factors identified through the study are the following:

Openness and institutional alignment

At the Regime level, higher levels of openness of the political system and regime stability build political participation. Openness – conceptualised in this study as a decentralised, inclusive, and emergent process, characterised by diverse actors engaging in fluid interactions and exercising collective agency – demonstrated stronger alignment with the transformative dynamics, particularly in fostering bottom-up innovation within socio-technical transitions.

Quantitative findings revealed that moderate levels of political openness characterised the majority of the cases, with 14 out of 19 initiatives reporting medium levels. Only one case (Monachil) reported high openness, while several Italian cases reflected low or selective access to participatory processes. This is the case of Genoa, in which citizens' associations are audited or can audit the decision-making sessions of the local government but are not involved in a participatory process

toward the elaboration of innovative political proposals. This suggests that while citizen engagement is possible, it often operates within selective or institutionally constrained frameworks. These findings align with the MLP's view of regimes as relatively stable, yet susceptible to incremental pressures, and suggest that political participation often unfolds within institutionally constrained arenas that require strategic navigation.

The quantitative analysis also revealed that access to public information and infrastructure-related regime pressures enhance collective participation and trust, emphasising the need for public policies that ensure transparency and actively integrate citizens in the implementation of transformative socio-technical projects. In contrast, low trust in institutions and the absence of structured governance often coincided with reduced impact or fragmentation. This finding emphasises that having clear legal frameworks can increase political interest ($r = 0.650$). Additionally, the absence of legal penalties for peaceful mobilisation serves as another enabling factor that fosters political interest at the social level and, consequently, strengthens trust in institutions.

The enabling role of free social spaces and niche-level innovation

At the Niche Level, the inductive analysis illuminated the central role of Free Social Spaces - FSS, conceptualised by Törnberg (2018) as autonomous, decentralised, and emergent civic platforms that facilitate collective sense-making and innovation. They underscore the significance of well-resourced, autonomous civic spaces – such as community centres, forums, and citizen platforms – in fostering political participation and social empowerment. These spaces can take the form of physical locations or be protected areas defined by language codes, and they can also exist beyond physical locations, such as on social media platforms and online forums. Additionally, FSS — whether informal or formal – enable community members to engage in democratic deliberation, develop socio-technical knowledge, cultivate mutual trust, and engage in local decision-making processes.

Statistical evidence strongly supports this dynamic, with a notable correlation between empowerment and educational capacities within FSS ($r = 0.689$; $p = 0.001$). Qualitative examples, such as Monachil, Tartu's urban gardening communities, and Barcelona's Fab Labs, illustrate how such spaces function as incubators of participatory governance and grassroots innovation. Even the Italian HE described as a "low openness system at the regime level," emphasize the importance of investing in socio-technical learning. The Genoa case serves as an example of how the CAI was transformed into a space for socio-technical learning. This transformation led to the development of innovative solutions, the establishment of credibility, and the CAI becoming a reference point for both civil and local associations.

The capacity of CAI to become a niche of innovation hinged on its ability to blend civic participation with cultural and technical interventions. In this sense, HEs such as l'Aquila illustrate how a community initiative can gain influence by embedding itself through learning, inclusivity and creative engagement. One of the main findings from the statistical analysis is the strong positive correlation ($r=0.689$; $p=0.001$) observed between the educational and empowerment capacities of these social spaces. The development of educational programmes within the CAIs was found to be

significantly linked to a more challenging transition pathway, indicating that access to educational resources strengthens their role as centres for civic learning and collective agency.

FSS are not only physical infrastructures, but socio-political ecosystems supported by diverse regime-level actors. Public institutions often play a foundational role by providing funding, political legitimacy, and access to facilities, as demonstrated by Monachil's energy transition initiatives and the Covid-Makers' rapid prototyping hubs. Technical professionals and private sector actors contribute with specialised knowledge, particularly in high-stakes or emergency contexts. NGOs and academics frequently serve as bridging agents, linking grassroots movements to institutional frameworks and policy agendas, as demonstrated in Napoli Est and Kraków.

Civic networks and multi-scalar coordination

The success of CAIs is further bolstered by robust civic networks and interconnected social agents. These networks – comprising neighbourhood associations, religious and cultural groups, and digital communities – enable rapid mobilisation, sustained advocacy, and alignment with broader political shifts. Bridge-building actors facilitate vertical integration, ensuring grassroots initiatives gain visibility, funding, and policy influence. Initiatives such as OurPower, Monachil's Energy Community, and the Residents' Movement in Granada benefited from pre-existing local associations, environmental groups, and social movements. These networks allowed for quick mobilization, sustained engagement, and alignment with broader political agendas. Moreover, historical cases such as Genoa's flood and the subsequent civic responses to the Morandi Bridge collapse illustrate how even informal and episodic collaborations can catalyse political participation when embedded in context-specific knowledge and local legitimacy. Similarly, the Covid-Makers exemplified how distributed networks of professionals, institutions, and digital platforms can coalesce in crisis contexts to enact agile, citizen-led solutions.

In synthesis, these local civic groups and grassroots organizations are foundational and often serve as the first responder to emerging challenges, providing trust, resources, and coordination needed for effective mobilization.

Strong internal capacities: leadership, knowledge, governance and reflexivity

The qualitative analysis also reveals strong internal capacities – comprising leadership, specialised knowledge, and cohesive social networks – as a key enabling factor for political participation at the Niche Level. These capacities provide organizational foundation, expertise, and motivational drive necessary for sustaining and scaling collective action. Cases such as the OurPower Energy Cooperative and the Covid-Makers movement illustrate how technical proficiency, and collective intelligence can be effectively mobilized for public interest. Equally, trust-based community ties, as seen in Monachil and Granada, and value-driven leadership, as in Tartu and Napoli Est, enable the consolidation of civic agency and coordinated mobilisation. Ultimately, the combination of strategic leadership, shared values, and embedded social networks strengthens CAIs' ability to meaningfully participate in socio-political processes and advocate for systemic change.

Findings reveal that political participation is most effectively enabled when internal organisational strengths – such as distributed leadership, shared values, and participatory governance – are

supported by external enablers, including public recognition, collaborative policy environments, and social infrastructures (like Fab Labs or digital platforms). Additionally, the results indicate that political participation thrives when grassroots initiatives are embedded within supportive civic ecosystems and receive institutional recognition. Historical examples demonstrate that connections with individuals possessing diverse expertise in the energy sector, combined with strong motivation and engagement from core team members, lay a solid foundation for the initiative's success. Successful HEs tend to combine internal cohesion – expressed through horizontal leadership, shared norms, and participatory structures – with enabling external conditions, such as access to infrastructure, public cooperation, and legitimacy in public discourse.

The availability of knowledge resources is not just a supporting element, but it is the key mechanism through which civic action takes place. This demonstrates how cognitive and technical skills can turn grassroots initiatives into effective, solution-oriented movements. Equally important are supportive public policies, collaborative relationships with institutional actors, and the mobilisation of local knowledge and networks. Conversely, fragmented resources, exclusionary institutional dynamics, and low inclusivity can hinder broader systemic influence.

Systemic pressures and multi-level dynamics

Regime and landscape-level pressures – including political, scientific, economic, and infrastructural shifts – acted as destabilising forces that opened windows of opportunity for CAI engagement. Political pressures, cited in 17 of 19 cases, were the most prominent, followed by economic pressures (12 cases), cultural pressures (11 cases), and infrastructural or scientific pressures. These pressures reveal tensions between outdated institutional systems and emerging societal expectations, reinforcing the MLP's notion that regime destabilisation often precedes or enables niche expansion.

Depending on their direction and magnitude, these systemic pressures may enable or hinder political participation. Cultural rigidity and restrictive normative frameworks can hinder political participation by entrenching exclusionary norms, reducing the predisposition to knowledge, understanding of the political process, and political awareness. At the same time, climate, economic, and/or global cultural crises (e.g., pandemics, environmental disasters) could be windows of opportunity for new forms of participation. Institutional responses, however, often remained short-term and reactive, limiting transformative potential. Several HEs analysed reported that the rigidity at the regime level prevented the achievement of their objectives. Facing a traditionally trained political class made it impossible to impose their agenda or even penetrate the logic and political spaces responsible for choosing the socio-technical orientation of municipal policies (e.g., the Genoa case).

Repertories of contentions: public campaigns

Public campaigns emerged as one of the most frequently used strategies to promote collective action, especially when flexibly adapted to local contexts. In this sense, public campaigns have become powerful tools for raising awareness, building legitimacy, and catalysing participation, mainly when driven by clear messaging, scientific credibility, and inclusive storytelling. Collective

leadership—rooted in trust, collaboration, and distributed responsibilities—proved essential in sustaining long-term civic engagement and facilitating access to decision-making arenas. However, their effectiveness markedly increased when paired with digital outreach, civic education, and symbolic strategies that reinforced collective identity.

The analysis also identified ongoing challenges, including institutional inertia, fragmented support structures, and inadequate mechanisms for long-term engagement. Additionally, the findings revealed that the lack of institutional recognition, reliance on short-term funding models, and unequal access to technical knowledge or public platforms are significant obstacles. In many cases, CAIs face conditions that restrict their scale, continuity, and systemic impact due to insufficient structural support for long-term resilience.

To address these limitations, a multi-level governance approach is essential, as one that actively supports grassroots agency, fosters collaborative policy environments, and invests in the social infrastructures necessary for inclusive democratic engagement. Only through such integrated and reflexive frameworks can political participation become a resilient and transformative force within socio-technical transitions.

9.2 Key hindering factors

On the other hand, the key hindering factors identified through the study are the following:

Limited access to funding and infrastructure resources

Financial constraints often limited the ability to scale initiatives, disrupted existing systems, and hindered long-term operations. Many initiatives struggled to secure resources, primarily when competing against larger, established players in the sector or when facing funding criteria that prioritised economic factors over social, environmental, and democratic considerations. The complex and bureaucratic nature of public funding processes, including those involving European funds, further restricted access and created additional administrative burdens that depleted resources and reduced responsiveness to initiatives. This financial barrier, combined with a lack of formal recognition and support, prevented many CAIs from realising their full potential, hindering their ability to drive systemic change and lasting transformations.

Moreover, the absence of essential tools and support structures restricted organisations' capacity to grow, organise, and sustain long-term efforts. In some contexts, the lack of formal evaluation tools, management structures, and necessary infrastructure hampered the ability to refine strategies, mobilise support, and engage a broad community. Without consistent internal evaluation or well-developed administrative support, increased management burdens distracted from core objectives, slowed down decision-making, and limited innovation and expansion. Additionally, relying on informal networks instead of formal structures further restricted scalability and adaptability, weakening the overall impact and sustainability of the initiatives.

Internal and external tensions among stakeholders: power asymmetries and misaligned incentives

When institutional and sectoral tensions were present in the analysed cases, various obstacles hindered the establishment of productive relationships with both public and private sector actors. In many instances, initiatives faced challenges from powerful, established entities, such as energy providers and certain public institutions, which dominate policy processes and resist systemic changes. These tensions manifested in several ways, including public authorities' reluctance to address structural issues, the adoption of short-term solutions that failed to promote long-term transformation, and a lack of support from key sectors or corporations. This absence of institutional recognition and sectoral cooperation limited the ability to influence policy, expand initiatives, or drive the systemic changes necessary to tackle complex environmental, social, and economic challenges.

Conversely, internal tensions and the inability to effectively manage conflicts and dissent posed significant challenges for many initiatives. When decision-making processes were predominantly top-down and not reflective, it often resulted in limited participation, power concentration, and a diminished capacity for adaptation. Internal divisions, such as disagreements among different community groups or the marginalisation of dissenting voices, occasionally escalated conflicts and alienated members' participation. This lack of democratic engagement and reflective practices frequently led to fragmented efforts and disillusionment, which hindered the initiatives' ability to address underlying issues and maintain long-term cohesion.

System rigidity and the absence of collaboration with the public sector

Barriers related to limited access to policymakers and decision-makers significantly hindered the achievement of formal recognition and systemic change. These barriers often limited the influence of various initiatives on national or regional policies, confining their impact primarily to local levels. Factors such as restricted access to policymaking spaces, bureaucratic inertia, fragmented participation, and political turnover further impeded the efforts of some CAIs to drive institutional reform and integrate their solutions into mainstream governance.

Additionally, regulatory constraints and resistance from policymakers, often driven by economic and social concerns, prevented many initiatives from scaling their efforts, undermining their potential to enable broader and meaningful change in public policy. Issues regarding public sector neutrality and conflicts involving public agents significantly weakened support for these initiatives and, in some cases, even created direct opposition.

When the public sector adopted a partial, reactive, or disengaged approach, it diverted attention from more transformative goals and obstructed the incorporation of CAIs' objectives into broader strategies. Conflicts with public institutions, often driven by political or economic interests, marginalised or prevented proposals from addressing critical issues, such as energy poverty or environmental concerns. Furthermore, the lack of active support or recognition from public authorities limited the growth and impact of some CAIs, preventing them from reaching their full potential in fostering systemic change and enhancing community well-being.

Adverse effects of changes to the legal framework, along with misalignment with advancements in scientific and technological fields

When regulatory frameworks were unclear or overly complex, particularly regarding community energy initiatives, it became difficult for local governments and grassroots organisations to navigate and align with evolving policies. The slow and conflicting transposition of EU directives into local contexts exacerbated these challenges, limiting access to support and creating barriers for local stakeholders. This uncertainty in legal frameworks eroded public confidence in many cases, as citizens struggled to engage with policies that failed to address their specific needs, leading to decreased participation. Moreover, when community voices were not adequately included in legal processes, it weakened the legitimacy of policy changes and hampered the ability of initiatives to maintain long-term efforts for systemic change.

Additionally, misaligned incentives among various actors at the regime level posed significant hindrances by restricting responsiveness and opportunities for participation. Institutional fragmentation across multiple levels of government often resulted in gaps in support and coordination, complicating efforts for grassroots initiatives. Economic priorities frequently overshadowed social objectives, creating barriers for smaller, community-driven projects seeking access to public funding, which tended to favour larger companies. This misalignment led to slow and inefficient responses from authorities, undermining the potential for systemic change. Furthermore, bureaucratic inefficiencies and short-term policy approaches in programs aimed at supporting vulnerable communities recurrently exacerbated distrust in public institutions, making it even more challenging for CAIs to engage marginalised groups and drive meaningful policy change.

Similarly, the disconnection between scientific and technological advancements and public policies often fostered distrust and disempowerment within communities. While technological innovations such as solar photovoltaics and smart grids were available, rigid regulatory and infrastructural systems prevented their effective implementation. This disconnection limited communities' ability to utilise modern solutions, particularly in energy sectors where centralised grid management restricted self-consumption. Additionally, technocratic approaches in public policies that prioritised measurable outcomes over community-driven processes alienated local groups, eroding trust and undermining participation. Consequently, the gap between scientific progress and policy frameworks stifled innovation and hindered CAIs from effectively addressing their challenges.

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11. ANNEXES

ANNEX 1 – TEMPLATE FOR DATA COLLECTION

ANNEX 2 – BIVARIATE CORRELATION ANALYSIS AT THE REGIME LEVEL

ANNEX 3 – PRINCIPAL COMPONENT ANALYSIS (PCA) AT THE NICHE LEVEL

ANNEX 4 – CORRELATION ANALYSIS AT THE NICHE LEVEL

ANNEX 5 – QUALITATIVE FACTSHEETS