



# Participatory Energy Transitions as Boundary Objects: The Case of Chile's Energía2050

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This paper analyzes the use of “participatory futures” within the context of energy transition, paying special attention to the case of Chile’s long-term energy policy. Our main aim is to question the role of “participation” in such a context and particularly, to decouple the operative function of participation from its normative function. Structurally, we argue that the construction of a joint vision of desired energy futures must be understood as a deliberate attempt at governing the energy transition by way of governing the expectations of the actors and systems involved in it. Participatory approaches can promote the co-construction of such energy futures in the form of a boundary-object, able to resonate with and provide a common reference to the actors participating in its creation. On the other hand, participatory approaches can also be a way to make transitions more democratic, subjecting it to a broader influence and control from the citizenship. These two functions of “participation” are always potentially at odds with one another. Democratizing the transition, in fact, would require producing plural, dynamical imaginaries that are responsive and accountable to the public. On the contrary, the need to make transitions governable may close-up such imaginaries and narrow-down the participatory efforts to foster their normalization and acceptability on the part of the most influential actors in the self-government of the transition. To refine and exemplify our proposal, we perform a qualitative, exploratory case study of Chile’s E2050 energy policy. Our findings show that “participation” may indeed have been used in the case to align partially conflicting expectations around a collectively-defined boundary object which may then act as a form of contextual, anticipatory and polycentric governance of the transition. However, from a democratic perspective, E2050 appears as a tokenization of the public in support of a pre-eminently technical and monolithic vision enacted by the Energy Ministry and the Consultative Committee. Within this context, the actual influence of the public on the policy and the possibility for political contestation are much more questionable.

**Keywords:** energy transitions, public participation, Energía2050, polycentric governance, deliberative democracy, boundary object, Chile

## INTRODUCTION

In recent years, energy policy has drawn increased relevance as a pathway to achieve more sustainable and climate-sensitive futures. Although energy was not one of the Millennium Development Goals launched at Johannesburg's Earth Summit in 2002, it was soon acknowledged that energy played a central and transversal role in the accomplishment of most, if not all, such goals (UN-Energy, 2005).

In particular, three key challenges emerged regarding energy development: guaranteeing safe, constant and sufficient energy supply for the economic development of each country, overcoming the problem of energy poverty, and making energy more environmentally benign (AGECC, 2010). The latter, in particular, stressed the interlink between energy policy and the global fight for climate change due to the leading weight of the energy sector on global greenhouse gas emissions (IPCC, 2012). Clean and affordable energy was then made one of the Sustainable Development Goals approved in New York in 2015.

The "transition" of local and regional energy systems toward more reliable, affordable and environmentally-friendly "energy futures" has consistently become the leading focus of international efforts in energy development (International Energy Agency, 2016; World Energy Council, 2016), spawning a number of initiatives that were oriented toward achieving such "transitions" all over the world (Wiseman, 2018).

This paper focuses on one of these initiatives, Chile's long term energy policy "Energía2050" [E2050 in what follows], put into force on December 31st, 2015<sup>1</sup> as the result of a relatively major and novel (for Chile) "participative" process. Aiming at "moving forward sustainable energy in all its dimensions," the process of designing E2050 articulated politicians, public officers, private companies, academics, NGOs, and the public opinion between August 2014 and December 2015.

More particularly, this paper explores two features that E2050 shares with other long-term energy policies such as: New Zealand's Energy Development Strategy, Uruguay's 2005–2030 Energy Policy, Germany's energy transition process, Australia's Green Paper and White Paper on energy, and/or the European Union's Energy Roadmap 2050. All of these are explicitly signaled as relevant antecedents for Chile's E2050 (Ministerio de Energía, 2015b, 35).

Such features include, firstly, the emphasis these initiatives give to the construction of the "future(s)" as a form of governing the energy systems, usually under the form of an "agenda," "transition," "pathway," "vision" or "roadmap" (Dixon, 2011); secondly, the adoption of "participatory" methods for the generation and legitimation of said "future(s)."

The key aim of this paper is to propose and discuss a systems-theoretical analytical framework to understand the role of "participation" within the scope of energy transitions. We are particularly concerned with decoupling normative expectations related to the possible function of participation as a pathway to democratize energy policy and governance, from the operative

role such participation plays as a tool to enhance the governability of energy transitions.

From a constructivist standpoint (Åkerström-Andersen, 2003), "participation" is not to be regarded as an independent and "objective" fact of life, but rather, as embedded in communicative-discursive operations performed both by parties and stakeholders involved in the participative effort, and by other observers (including scholars). Within this light, any attempt at observing "participation" can adopt either of two approaches: on the one hand, it may aim at describing it "as it is" i.e., by identifying its form and function it plays within its communicative-discursive context -in our case, energy policy and governance. On the other, it may compare such form and function to what participation "should be" according to some (explicit) normative expectation. Each approach would lead to a different analysis and each has a blind spot embedded in the very way it frames that analysis. In our view, thus, these approaches are not to be regarded as alternative, but complementary.

More precisely, our claim is that, because energy transitions are "wicked," "messy" and non-linear problems, participatory futures such as the one contained in E2050 are a form of contextually intervening in the different systems and actors involved in energy transitions, governing them by governing their expectations. In this context, "participation" may be used as a form of enhancing the governability of the energy transition, by way of creating a normalized boundary-object, co-constructed together with key actors and thus able to articulate, coordinate and resonate with the different perspectives and rationalities carried by such actors. Depending on how the boundary-object-making process is carried out, such an operative function of ensuring governability can conflict with the normative aim of increasing the influence of the stakeholders and the wider public in the transitions' governance, and the responsivity of the latter to their plural and dynamic perspectives. In other words, it may clash with the democratic standing of the energy transition.

The paper proceeds as follows. In section Participatory energy transitions as boundary-object-making, we introduce a systemic-constructivist theoretical framework to the study of energy transitions, on which base we propose to observe participatory energy futures as a form of "anticipatory" governance of such transitions. Next, we discuss the dual role of "participation" understood as boundary-object-making: as a strategy for enhancing the governability of the transition, or as a pathway to improve its democratic tenure. We also discuss the possible tensions between both aims. Section Case study: E2050 as a boundary object in-the-making exemplifies such a framework based on a qualitative and exploratory case study of Chile's E2050: rather than pretending to provide a full depiction or assessment of the Chilean experience, our study merely seeks to refine and grant plausibility to our theoretical insights. Section Discussion and Conclusions: E2050's boundary-object-making, between governance and democracy offers a reflection on the two roles of participation within energy transitions: on the one hand, it observes its potential in terms of advancing toward a polycentric form of governing energy transitions; on the other, it assesses the democratic tenure of such governance arrangements,

<sup>1</sup>Decree 148, Energy Ministry.

identifying some possible pitfalls exemplified through the E2050 case.

## PARTICIPATORY ENERGY TRANSITIONS AS BOUNDARY-OBJECT-MAKING

Sustainability is about finding and promoting transformative solutions for real-life problems (Weinstein, 2010; Spangenberg, 2011). Likewise, long-term energy policies such as E2050 are not a mere statement of intentions with respect to the evolutionary trajectory of energy systems. Rather, they mean to act as a deliberate attempt at intervening such a trajectory (or “momentum”) in the pursuit of specific and collectively desirable goals (Shove and Walker, 2007).

However, energy transitions are “messy” problem-situations, where it may not be clear exactly what the problem is, what kind of actors it involves, and who is responsible for it (Müller et al., 2012). Often, actors may not even be aware that they are engaged in a problem-situation, and even if they are, they can count only on a limited perspective about the whole transition and a reduced capacity to influence it (Smith and Stirling, 2007). Directionality and coordination of the transition are emergent, i.e., they result from a complex array and interactions among different actors and processes composing the energy system (Kemp et al., 2007). Thus, they cannot be steered at will by public authorities (Verbong and Geels, 2007). In fact, any directive attempt may result in perverse effects and become itself part of the problem it is meant to solve (Beck, 2006).

The governance of any energy transition faces a dilemma: on the one hand, it must acknowledge the diversity, complexity and inherent adaptability of the system it strives to govern; on the other hand, it requires to achieve coordination, close down contingency, and fix long-term goals (Voss et al., 2009, 8). All socio-technical transitions imply to strike a balance between stability and change, confidence and surprise (Büscher and Sumpf, 2015); or in more general terms, autonomy and coherence (Willke, 2006).

Ultimately, because of their inherent complexity and self-referentiality, all attempts at regulating these systems must happen by inducing them to self-steer themselves (Luhmann, 2016), that is, by contextually intervening their relevant environment in hopes of making them resonate with the objectives of the intervention (Mascareño, 2011). One way to achieve this is by developing “socio-technical imaginaries” (Jasanoff and Kim, 2009) such as “experiments” and “visions” (Voss et al., 2009; Loorbach, 2010): these are attempts at projecting a path into the future, essentially illusionary, but productive in motivating action (Rip, 2006) and equipping actors with a common anchor to try and influence the system they are part of toward -or away from- such projected path (Shove, 2010). To govern these imaginaries means to govern the transition: it is a “governance of and by expectations” (Konrad and Alvia Palavicino, 2017), or in short, an “anticipatory” governance (Rip, 2012):

From the constructivist standpoint described in the introduction, we may distinguish a two-folded role of

“participation” concerning such governance: on the one hand, participatory approaches may lead to legitimized and commonly acceptable expectations, which may foster the governability of the transition; on the other hand, participatory approaches may be interpreted as a way to improve the democratic tenure of such transitions. As we will discuss promptly, a tension may separate both functions of “participation.”

## Participation and the Governance of Energy Transitions

In the lack of a clearly defined external authority which may solve the potential conflict in framing and expectations, participatory mechanisms may offer a way-out. Participation may operate either by “aggregation” or “deliberation.” Aggregation aims at producing the most representative depiction of the participants’ perspectives, understood as prior and independent from the aggregative process. Deliberation, on the contrary, aims to open up such perspectives to the whole diversity of views expressed by the participants in order to transform them into general and commonly acceptable principles (Miller, 1992).

While such deliberation may tend toward consensus, more often it limits itself to balancing competing perspectives in order to reach some relatively stable compromise around a shared goal (Mascareño, 2010). Mostly, the participatory exercise can be described as a performative controversy aimed at progressively normalizing meanings, identities, interests and reciprocal relations among the different actors involved around jointly constructed frames which are always at risk of being “overflowed” and opened up to further controversy (Callon et al., 2009). Similarly, sometimes participants may recur to some general principle of justification to find a pacific solution to the controversy, such as efficiency and innovation, price and convenience, adherence to the collective will, trust and/or tradition etc. (Boltanski and Chiapello, 2018).

However, when participants carry wholly different rationalities (e.g., when some of them advocate in favor of one of such principles and/or framings while others firmly stick to another) and when they lack a joint background which may help reduce the uncertainty and facilitate collaboration (Balland et al., 2015), the dialogue gets charged with the task of creating a common language and bridging upon different forms of signification (Spangenberg, 2011; Van Stigt et al., 2015), of knowledge (Edelenbos et al., 2011) and the validity criteria associated to them (Hegger et al., 2012).

In this case, one possible solution may be the emergence or deliberate construction of a “boundary object,” an object “both plastic enough to adapt to local needs and constraints of the several parties employing them, yet robust enough to keep a common identity across sites” (Star and Griesemer, 1989, 393). Initially introduced to describe scientific constructs employed to promote collaboration among academic communities, the notion of boundary object has increasingly been applied to identify jointly-shaped products used to facilitate reciprocal understanding within heterogenous groups of actors and to promote the collaboration among the different domains they come from (Hegger et al., 2012; Lang et al., 2012).

In the case of energy transitions, the collective construction of boundary objects such as visions, agendas or roadmaps may serve as a mean to articulate and coordinate different perspectives and rationalities carried by the key actors involved within such transitions. Therefore, they may allow for an indirect governance of such transitions by way of governing expectations related to its future(s). To that aim, however, it is essential that such boundary objects are the result of a reflexive and collaborative exercise of co-construction in the context of a deliberative space involving the participation of influential people and representatives of each of the key actors in the transition (Urquiza et al., 2018).

Precisely because these exercises are meant to foster collaboration and joint action, they may tend to privilege consensus above a broader diversity of views or give pre-eminence to key actors rather than to the general public, all of which may become problematic from a democratic perspective. This is the object of the next section.

## Participation and the Democracy of Energy Transitions

Governing transitions by governing their expectations is all but normatively neutral. Despite their cosmopolitan and universalistic pretensions, sustainable (energy) transitions are always deeply politically and ethically-laden (Shove and Walker, 2007; Delina and Janetos, 2018; Roberts et al., 2018): they involve a plurality of ways to “frame” the transition—and coincidentally, different forms of ordering and prioritizing the interests of distinct actors— (Meadowcroft, 2009) and a multiplicity of different, controversial, and sometimes incommensurable perspectives (Smith and Stirling, 2007; Delina and Janetos, 2018). Within this context, scholars have been paying increasing attention to the conditions and challenges of democratizing energy governance, especially by increasing public participation and influence in energy-related decision-making (Schaube et al., 2018; van Veelen and van der Horst, 2018).

Public participation has the potential to enhance at once the legitimacy, quality and democratic standing of decisions—including those related to energy policies and transitions (Glucker et al., 2013; Renn et al., 2014). However, the excessive stress put on the creation of consensus by many participatory and deliberative approaches has been accused of inducing a depoliticization of the issue (Swyngedouw, 2010; Barry and Ellis, 2011; Mouffe, 2013) or exclude “unreasonable” opinions and practices (Young, 2011; Urbinati, 2014), reducing the chance for a really pluralistic and democratic interchange of opinions.

In this context, the use of collectively constructed “visions” and imaginaries, especially in the form of flexible and dynamical boundary objects, may offer a viable alternative to a strict and irreflexive reliance on consensus. After all, the aim of such visions and imaginaries is to act as a form of “collective” deconstruction, oriented to intervene and transform current regimes of development and “reconstruct” them in more desirable configurations (Avelino and Grin, 2017).

However, such a conclusion depends on the actual configuration of the participatory exercise and, more particularly, on the degree of inclusivity and empowerment it grants to public

perspectives. Public participation can vary a lot on this matter: depending on its form, participation may just as well serve as a form of power redistribution, as a “tokenized” way to garner legitimacy, or even as a tool for public manipulation (Arnstein, 1969). Similarly, scholars have distinguished between different kinds and levels of participation depending on the degree of engagement of the public, whether such public is understood in individual or collective terms, and the directionality in the flow of information between the public and the decision-makers (Rowe and Frewer, 2005; Edelenbos et al., 2011; Wright, 2012; Pieczka and Escobar, 2013).

Poorly designed, or insufficiently transparent, representative or effective forms of participation may ultimately prevent public perspectives to exert a significant influence on the decision-making process (Cotton and Devine-Wright, 2012) and may even end up further eroding the legitimacy of such processes and the institutions they occur in (Cuppen et al., 2012; Ngar-Yin Mah and Hills, 2014; Knudsen et al., 2015).

As can be expected, the decision about who, how and what is to be included in a participatory effort depends on the specific goals, rationales and systems of beliefs on which the participation process relies (Reed, 2008; Wesselink et al., 2011; Barnett et al., 2012; Mielke et al., 2016).

More pointedly, democratizing energy transitions would require producing plural “imaginaries,” resulting from and dynamically adapting to the diversity and changeability of perspectives and opinions of the public. Conversely, the need to make transitions governable may close-up such imaginaries and narrow-down the participatory efforts to only include or give pre-eminence to those key actors which would in effect be influential in the self-government of the transition. Although “superficially” the two goals of governability and democratization may be rhetorically conflated in the recourse to participatory approaches for the construction of energy futures, the actual focus of the participatory exercise may only be put on the former, while its democratic standing may remain at least dubious. To some extent, that is what seems to have happened in the case of Chile's E2050, as we will show in the next sections.

## CASE STUDY: E2050 AS A BOUNDARY OBJECT IN-THE-MAKING

Chile makes for a very interesting case study due to a variety of reasons. Firstly, it is a late-development country whose economy has gone through a radical revolution and a fast neo-liberal imprint at times called “the Chilean miracle” (Richards, 1997). The country has enjoyed an average economic growth rate of 5% per year for the last 25 years (equivalent to an increase of 250% in the average per capita income) and it has been able to reduce the poverty rate to a quarter of what it was at the beginning of the 1990's. Nonetheless, during all this period the degree of inequality has remained unchanged (Repetto, 2016). Even though Chile's achievements have allowed the country to be the first Latin-American country to join the Organization for Cooperation and Economic Development (OECD, 2009) in 2010 and be in 38th place in terms of human development (ranked first within Latin

America) such a status is significantly reduced when adjusting the index for inequality (UNDP, 2016).

Since 2010, the country has been a candidate for admission to the International Energy Agency –one of the main institutions for international cooperation for promoting more sustainable, egalitarian and reliable energy systems. This agency has recently published a report praising the country's most important advancements on energy issues, with a special emphasis on the relevance of E2050 (IEA 2018). Moreover, as discussed in the coming sections, the process represented a break, firstly regarding the traditional subsidiary role played by the Chilean State in the energy sector development, favoring a much more hands-on approach and secondly, regarding the space acknowledged to citizens' participation in public policy design.

Our approach to the case revolves around three interconnected questions, relevant as much for the specific Chilean experience as for other similar instances around the globe. Why do energy transition initiatives such as E2050 endeavor to construct “participatory futures” for the energy system? What form does such participation take? And, what role does it play in relation to the stated attempts for advancing toward sustainability?

To answer such questions, we employed a qualitative approach mixing document analysis, participant observation and semi-structured interviews with key informants, all having played a meaningful part in the construction of the E2050 policy. More precisely, all our informants had participated (either as members or technical advisors) in the Consultative Committee's activities; as will be explained in 3.2, the Committee took on the main responsibilities for the deliberation and construction of the Energy 2050 policy. The interviewee choice aimed at including a wide diversity of actors among those that took part in the Committee (Table 1).

To gain the most salient information from our informants, we adopted a semi-structured interview script (Saldaña, 2017): that is, we drafted a general outline with questions regarding the conditions which made E2050 possible, the form taken by participatory spaces within it, and E2050's overall function and effects on future sector developments and its energy transition. During the interview, such questions were adapted, integrated and reordered according to how the conversation was proceeding, with the aim of facilitating the informant to provide his own unbiased point of view on the process and its interpretation. In accepting to take part in the research, the interviewees requested not to be linked directly with any of their

statements. Therefore, in our analysis, we do not provide direct references to the interview process. In fact, the main role played by such interviews was to help in contextualizing, interpreting and complementing the document analysis. Similarly, the process of contextualization and interpretation of the primary and secondary data could also count on participant observation, owing to one of the authors having provided technical assistance during the E2050 process.

Documental sources include scientific and “gray” literature on the energy sector and the public participation (particularly employed in section The context of participation: growing demands and conflicting expectations to describe E2050's historical background) and in a more specific way, documents generated during the very process of design of the E2050 policy (Table 2). Some of those documents were publicly accessible through the political institutional website. Complementary documents were obtained from the Energy Undersecretary's Office through transparency regulations regarding public information access or through the interviewees themselves. Among these documents, the Energy Agenda, the Consultative Committee Minutes, Results from the Deliberative Surveys, Results from Public Consultation, Road Maps, and the Energy 2050 Policy final document were carefully investigated given the key role the latter played in the process.

Both the primary and secondary sources underwent qualitative content analysis (Guest et al., 2013) a research method for the interpretation of meaning from the content of text data, through the systematic classification process of coding

TABLE 1 | Interviewees by typology.

Typology	Civil Society/ Private Sector	Academics	Total
Members of the Consultative Committee	2	2	4
Technical advisors	2	1	3
Total	4	3	7

TABLE 2 | Secondary sources by typology.

Source Typology	Description: Spanish original (English translation)
Minutes	Actas del Comité Consultivo (Minutes of the Consultative Committee), Actas de las mesas técnicas (Minutes of the Technical Boards), Actas de la política energética regional Magallanes (Minutes of Magallanes regional energy policy)
Published material	Política Energía 2050 (Energía 2050 policy document), Hoja de Ruta (Energy Roadmap), Agenda Energía (Energy Agenda), Estrategia Educativa 2017-2020 (Educational Strategy 2017-2020), Guía de Estándares de Participación (Participation Standards Guidebook), Hoja de Ruta y Política Energética Aysén (Roadmap and Energy Policy for the Aysén region), Ruta Energética 2018-2022 (Energy Pathway 2018-2022)
Working Papers	Anteproyecto Energía 2050 (Energía 2050 draft policy document -for Public Consultation-), Respuestas a la Consulta Pública (Answers to Public Consultation), Resultados Encuestas Deliberativas (Final results of the Deliberative Polls), Resultados Mesas Técnicas (Final results of the Technical Boards)
Assessments and other	Sector Energético en Chile (Study: Energy Sector in Chile) [Deloitte], Informe de seguimiento Energía 2050 (Energía 2050 follow-up report), Análisis de experiencias de participación en políticas de cambio climático y energía en Chile (Analysis of participation experiences in climate change and energy policy in Chile) [4E/GIZ/Energy Ministry]

and identifying themes or patterns. Initial codes can be derived either directly from the text data, they can be theory-guided, or even emerge as a mixture or both approaches. In any case, during the analysis the codes are recursively linked and compared among themselves until an interpretable structure of meaning emerges. In our case, we adopted a mixed codification matrix partially taken from the analytical frame shown before, and partially emerging from the data (see **Table 3**).

This methodological approach was appropriate, since our goal was not to assess the policy itself or its design (that is, we were not trying to affirm if it was performed well or poorly), but rather, to provide plausibility and specification to the analytical framework presented in section Participatory energy transitions as boundary-object-making, regarding the symbolic role played by participation within energy transition and its implications for the governance of sustainability and its democratic character. In other words, we were trying to perform a second-order observation (Luhmann, 2007) of how “participation” and “energy futures” were understood within the context of the E2050 process.

Second-order observation is a notion proposed by Niklas Luhmann as an analytical tool adequate within a constructivist epistemological paradigm. At its core, it aims to identify, observe and critically analyze the key distinctions employed by other observers; thus, it is somewhat akin to Jacques Derrida’s linguistic deconstruction (Luhmann, 1993). More specifically, second-order observation can be used to observe linguistic forms, semantics, sequences of communicative operations, social structures, symbolic functions of both social and semantic

structures, the differentiation of social systems etc. The validity of such an observation approach relies on the specification of the observer’s point of view (i.e., the “distinction” or perspective from which he observes the research object) as well as the conditions of observation (i.e., what sources were employed and how they were approached Åkerström-Andersen, 2003; Urquiza et al., 2017).

Our paper provides both specifications, which grant scientific validity to its method and transparency with regards to the limitations and blind spots of its perspective. Specifically, the choice of the notion of “boundary object” as analytical distinction allows us to observe the conditions of possibility, form, and performance of the notion of “participation” as they were understood within the process that led to the enactment of E2050 and from the perspective of those actors who had key roles in such process.

That could best be achieved by combining the analysis of those documents in which such perspectives are registered, complemented by the views related by those observers that had direct access to the process by which those perspectives were translated to the final E2050 policy -the boundary object.

To ensure a clearer articulation between our results and our research questions, such results were divided in three sub-sections, each focused on one question.

### The Context of Participation: Growing Demands and Conflicting Expectations

The participatory process of E2050 cannot be fully understood without considering the growing trend which emerged during

**TABLE 3** | Codification matrix.

Category	Sub-category	Description
Boundary conditions	National and international expectations and controversies on energy policy	Historical trends, demands and concerns manifested by diverse actors with respect to changes in the energy matrix, participation and the role of the State
	Institutionality and role of the State	The Energy Ministry’s and Chilean Government’s Attributions with respect to their role and influence on market actors (based both on regulations and self-descriptions)
	Skills and experiences on public participation	Practices, knowledges, networks etc. that were formed during the years prior to E2050, or thanks to participation in E2050 itself
	Political trends and semantics	Key discourses and concepts used by political parties in talking about energy policy (before, during and after E2050)
Form of participation	Timeline and types of participation	Types of participatory mechanisms employed within E2050, their timing and interconnections
	Mandate and composition of the Consultative Committee	Scope of action, role and goals of the Consultative Committee; its members, relative roles and previous expertise, as well as their relative heterogeneity
	Decision-making of the Consultative Committee	Discourses, practices and norms leading decision-making, consensus-building and the construction of the Energy Roadmap within the Consultative Committee
	Influence of the Committee and other actors on the E2050 policy	Relative perceived and observable importance of different processes and actors in the final form and contents of the E2050 policy
Performance	Outcomes and aftermath of E2050	Final structure and contents of the E2050 policy document; sequels by-products
	Political performance	Perceived political legitimacy of the E2050 document; regulations, policies, and other tools enacted in its context; reception after the change of government; appreciations of the process and its results by scientific interviewees and political expectations engendered in its wake
	Scientific and economic performance	Appreciations of the process and its results by scientific interviewees, research opportunities engendered by E2050
	Performance for energy transition	Appreciations of the process and its results by economic actors, business opportunities engendered by E2050

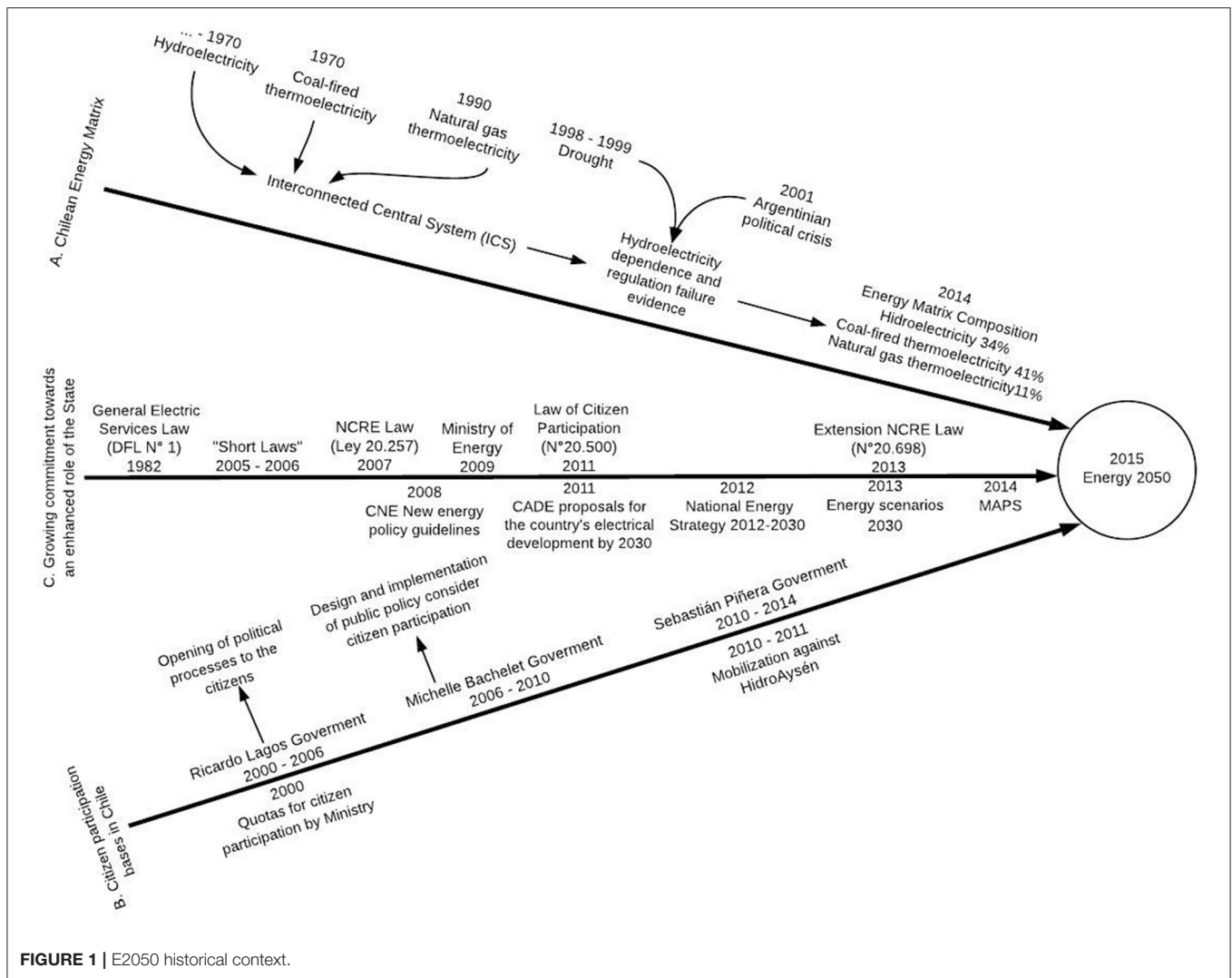


FIGURE 1 | E2050 historical context.

previous years toward a substantial transformation of the energy system and assigning of the State the new role of facilitator of such transformation (Figure 1).

On the one hand (timeline A), the country's historical reliance on hydropower as the key component of its energy matrix had gradually been complemented first with the installation of coal-fired thermal plants and then starting in the 90s, with gas-fueled combined cycle technology which could take advantage of Argentina's large natural gas deposits (Bauer, 2010). By 2014, coal, gas and hydroelectricity jointly represented 86% of the country's electrical matrix while non-conventional renewable energy sources (NCRE)<sup>2</sup> accounted for little more than 3% (Ministerio de Energía, 2015b, 22). The cumulative effect of the 2001 Argentinian political crisis (with the consequent restrictions on natural gas exports) and the droughts experienced by Chile

between 1998 and 1999 (seriously affecting hydroelectricity generation) showcased the fragility of Chile's energy supply and raised concerns especially for reducing the country's dependency on imported fossil fuels (Díaz et al., 2010). Concurrently, increasing energy demand (especially led by the mining industry Nasirov and Silva, 2014), an international context increasingly sensitive to the reduction of greenhouse gases (Estenssoro, 2010) and the interest in reducing energy prices (among the highest in the region Corbo and Hurtado, 2015) pushed demands for promoting NCRE development. NCREs, however, faced important obstacles: namely, the scarce clarity of the institutional-regulatory frame, weaknesses in the electrical infrastructure, persistent information gaps about available resources and difficulties in getting necessary financing partly because of these investments were perceived as high risk and also to some extent due to a conservative and immature financing market (Nasirov et al., 2015a,b).

At the same time (timeline B), the country faced an increasing burst of environmental conflicts led by local and

<sup>2</sup>Non-Conventional Renewable Energy sources. Chile's Law 20.257 of 2007 defines these as: biomass, mini-hydroelectricity, geothermal, photovoltaic, wind and tidal power.

indigenous communities opposing the installation of energy projects affecting both conventional as well as “clean” technology ones (Fuenzalida and Quiroz, 2012). Such conflicts seemed to be mainly spurred on from a generalized public mistrust in the project promoters (often associated to foreign capital), and in local and national institutions, as well as regarding the degree which affected interests would be considered in the decision-making process (Agostini et al., 2015; Garrido et al., 2015; Arrese and Wells, 2016).

The need for a greater political process opening to the citizenry aiming at widening the bases of State legitimacy had been acknowledged in the country since the 2000s (Gentes, 2006). However, it was not until the center-left government led by Michelle Bachelet (2006–2010) that the recourse to participatory advisory committees and other instances of public consultation began playing a recognizable role in policy-making (Aguilera, 2009). Her successor, the center-right party leader Sebastián Piñera (2010–2014) continued along these lines by enacting Law 20.500, which required all State administrative organs to set formal pathways for public participation, to provide an annual public management report and to ensure transparency in all relevant policy aspects. However, it was precisely during Piñera's leadership when the most salient contention against an energy project broke out: in 2010–2011, massive mobilizations in the country southernmost regions managed to paralyze and ultimately prevent the HydroAysén hydroelectric mega-project which had been a key asset for the country's energy development (Astorga, 2013).

At the eve of Michelle Bachelet's second presidential period (2014–2018), the country was in the grip of a particularly tense controversy regarding the country's energy future(s): different actors such as the economic sector, academics, the civil society and international institutions were demanding a stronger clarity in energy planning, a more significant role for public participation, and a more decided commitment toward a sustainability-oriented energy transition (Billi et al., 2017). The State had to increasingly take on the responsibility of mediating such demands and answering the expectations related to the country's energy development. This, in turn, required it to seize a stronger social license and a more active and influential role than had hitherto been the case. Coherent with Pinochet's regime and the general neoliberal orientation of the country, the energy sector had been restructured since the General Electric Services Law of 1982 along a market coordination scheme. While this endowed supervisory institutions a more empowered role than was the case in other economic sectors (such as water resources), it still limited them to predominantly regulatory and subsidiary attributions (Bauer, 2010).

Since the 2000s, such structure was gradually reformed both aiming at offering greater security and incentives to investors and preparing the entrance of new ERNC technology (timeline C). The creation of the Energy Ministry in 2009 represented an inflection point making the first step toward the creation of a stronger energy institution capable of supervising, coordinating and leading energy development in the country. The HydroAysén imposed a new urgency to this goal, spurring conflicting proposals for the country's future electrical development.

President Piñera's attempt at combining a new impulse of NCRE sources with a revitalization of existing projects, including the contested Hidroaysén mega-dams (Gobierno de Chile, 2012), was opposed by the alternative vision fostered by a Technical-Parliamentary Citizen Commission (CCTP): the latter involved Chile's energy system transition toward a sustainable energy future and a greater public engagement in the definition of such future (CCTP, 2011).

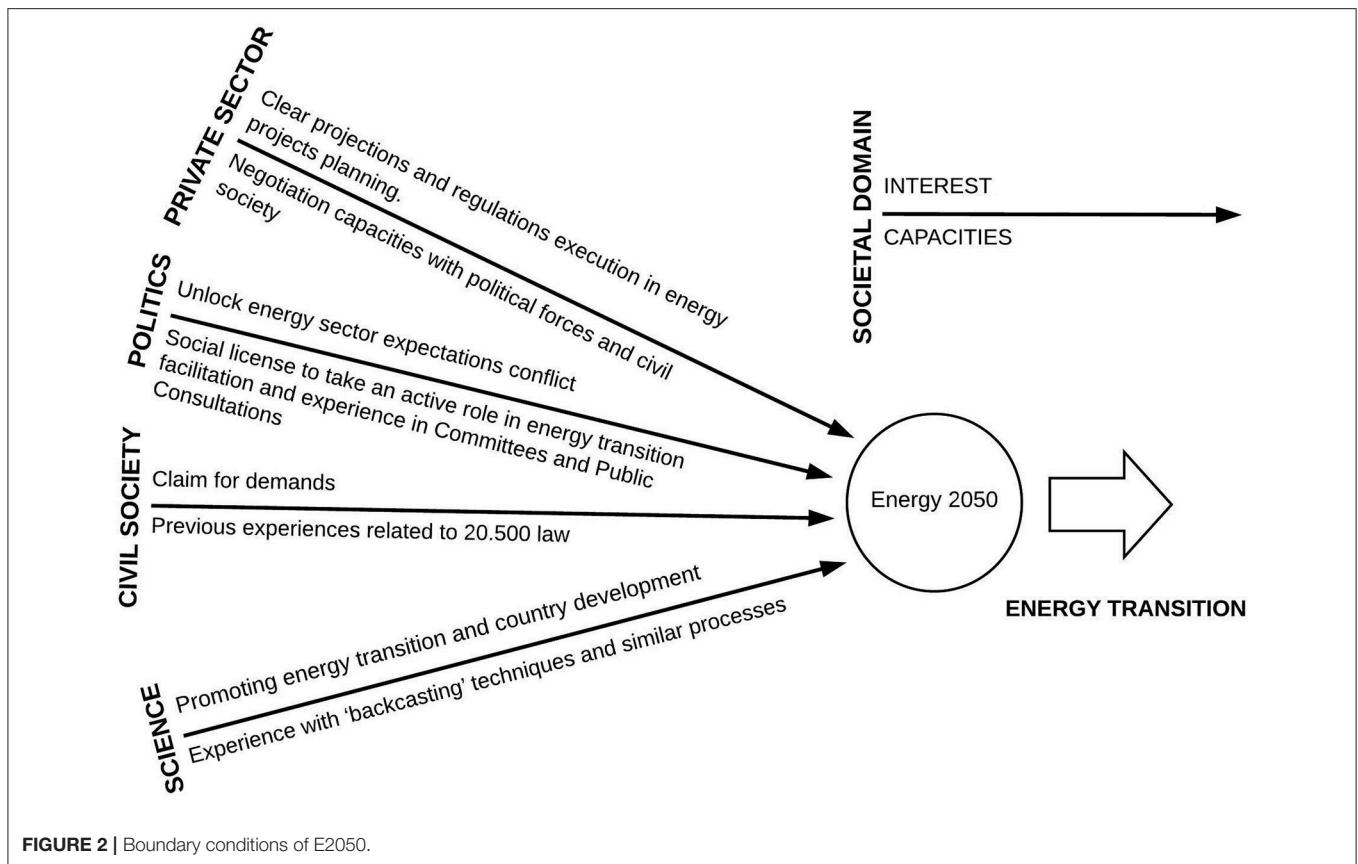
Meanwhile, a policy dialogue denominated “Energy Scenarios–Chile2030” (ES2030), had been going on since 2009 involving the participation of several renowned academics and representatives of the private sector and the civil society, and a Consultative Committee composed by the main institutions of relevance to the energy domain in the country. ES2030's final report (Chile2030, 2013), launched in 2013, contains many relevant insights which would be recovered by E2050. Moreover, it also showed the efficacy of a participatory mode of governance for futures-building. This resonated with the semantics maintained both by governmental and extra-governmental actors during the last years and contributed to building up skills and experiences which would prove crucial for the realization of E2050.

Likewise, another essential antecedent to E2050 was the MAPS-Chile program, an internationally-supported initiative aimed at participatively constructing scenarios for a climate change mitigation process to inform Chile's tentative contribution on occasion of the XXI Conference on the Parts of UNFCCC in Paris (MAPS Chile, 2014). MAPS-Chile and ES2030 represented key lessons for E2050 although the latter ultimately surpassed both in terms of ambition and scope.

In short, the three trajectories described above resulted in a clash of interests on the part of political, scientific, economical and civil society actors, which, however, converged on the need for a clearer and more representative energy agenda. At the same time, recent contestatory and participatory experiences provided these actors with the skills and experiences necessary to take part in the creation of such an agenda. **Figure 2** depicts this convergence, both in terms of the interests, and capacities of the different groups which would be involved in E2050.

In this context, E2050 can be interpreted as a way of unraveling and aligning these contrasting interests toward a common goal: the energy transition. To provide governability to the transition, such a goal must be both broad enough to accommodate the plurality of expectations and understandings surrounding the energy futures and construed in a way that would be considered legitimate from those perspectives. Both the Energy Agenda (Ministerio de Energía, 2014) and the final E2050 policy (Ministerio de Energía, 2015b) appear to understand the E2050 process precisely in these terms, particularly stressing the need for such a shared vision as a way of giving the State a new social license necessary to perform its role as a guarantor of the long-term energy policy coherence and continuity. This understanding, however, rhetorically conflates the aim of governing the energy sector/transition and of governing it in a democratic way. To throw more light on this tension, we now proceed to observe how “participation” was configured within E2050.





## The Form of Participation: E2050 In-the-making

The E2050 process saw the articulation of a variety of participative mechanisms along four phases. It should be noted that, although the E2050 final policy document depicts these phases as linearly following each other, they were in fact largely super-imposed (Figure 3).

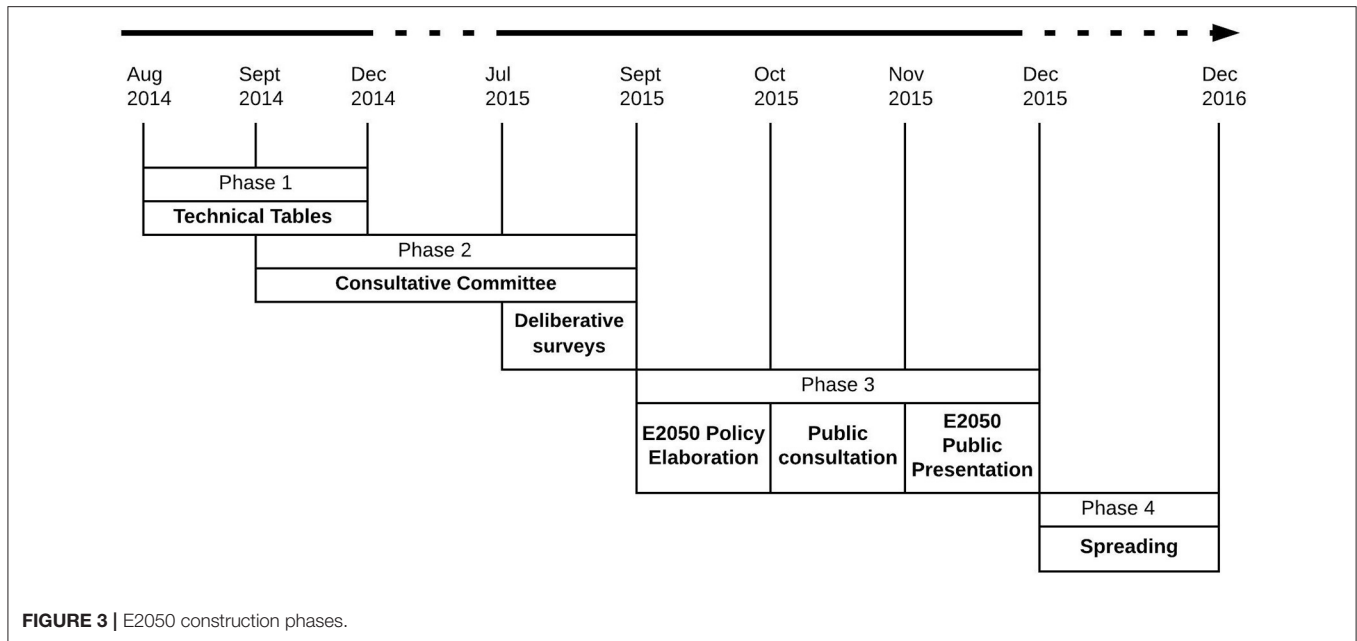
Firstly, the Technical Boards were deliberative spaces set up in different regions of the country under the direction of the Energy Ministry, with the purpose of generating participative diagnostics and identifying areas of improvement related to key issues of energy policy. Secondly, the Deliberative Polls combined a deliberative forum with two opinion surveys (respectively taking place before and after the deliberation), aiming at characterizing public perceptions on the different strategic axes of the energy policy. Thirdly, an online-based Public Consultation enabling any citizen to provide feedback on a preliminary version of the final policy document.

Without any doubt, however, the most influential mechanism within the E2050 process was the Consultative Committee: a team of 27 members hand-picked by the President of the Republic and Energy Ministry and tasked with writing a Roadmap summing up the main priorities and guidelines for energy policy (Ministerio de Energía, 2015c). Originally, the E2050 policy was meant to step up from a combinations of the Committee's Roadmap and the "citizen visions" that emerged as

a result of the other three mechanisms (Ministerio de Energía, 2014, 2015a). In fact, that was precisely the reason why all of these were designed to be executed in parallel, since it was hoped they could interact and influence one another.

In fact, that seems to have been partially the case with the Technical Boards, whose key insights were formally presented to the Committee during four predefined dates and often signaled as one of the main inputs for the its deliberations, allowing access to prevailing public perceptions (Ministerio de Energía, 2015a). Nevertheless, not all the Technical Boards were dealt with in the same way; rather, as our interviewees explained, preference was given to "the most delicate issues" or "those requiring major discussion"; the NCRE table received the most attention by far. Moreover, some issues were identified because of the different groups' capacity (especially those lacking specifically-allocated human and financial resources) to effectively take part in all the relevant Technical Boards given their tight and overlapping schedules.

The need to strengthen citizens' participation in the process was strongly felt throughout the duration of the Committee's discussion, to avoid the risk that the Technical Boards could become dominated by specific interest groups. This derived in increasing concerns for ensuring the creation of Deliberative Polls which were seen by the Committee as "the only space where the committee's work is externalized" (Ministerio de Energía, 2015a). Unfortunately, due to technical issues, their



results became available only shortly before the Committee’s closing session (**Figure 4**) thus limiting their influence on the final composition of the Roadmap.

Whichever the case, the Consultative Committee largely relied on self-governance mechanisms and on the expertise of its members to guide decisions and build the Roadmap. At the Technical Board level, the debate often got trapped in controversies involving different (and partially irreconcilable) ways of framing the issue (Ureta, 2017). On the contrary, the Consultative Committee enjoyed a common acceptance of “expertise” as a common validity criteria which was able to cut across the divide that tends to exist between political relevance, scientific rigor, and economic profitability (Pinilla, 2012). In a way, expertise acted as a symbolic “medium” aligning different forms of judgment and orders of worth. In fact, the Committee was more prominently a technical than a political body and although its members were meant to represent different societal groups, most featured a long experience in being involved in similar instances, such as MAPS-Chile or ES2030.

The common acceptance of “expertise,” in turn, favored a framing of the goal of a sustainable energy future, less as a radical transformation of the existing sector than as an attempt to promote incremental change while ensuring its viability under present conditions. Following the “backcasting” methodology” (Quist et al., 2006; Doyle and Davies, 2013), which had already been successfully employed in previous experiences such as MAPS Chile, the Committee started by agreeing on a common commitment to broadly define sustainable future goals and principles. On that basis, it then went on to explore different possible pathways which could lead to said future. This involved assessing different potential scenarios and identifying key actors, gaps and possible strategies to achieve the desired sustainable outcomes.

As evidenced in official minutes (Ministerio de Energía, 2015a), the Committee worked a total of 30 full-day sessions and approximately an equal number of informal meetings. Most of them included an exploration phase where possible pathways and scenarios were discussed within smaller and roughly sector-based sub-commissions and a feedback phase where each commission presented and defended advances to the plenary. Decision-making promoted deliberation and collective learning, and it aimed at reaching as broad a consensus as possible. Facilitators from the Consensus Building Institute played a key role here often making those in disagreement reassess their position and let slide minor issues, to focus on what was most important for the “broader goal” of reaching a consensus on one sustainable energy future. Majority voting was sometimes employed. Likewise, the most salient minority positions were explicitly acknowledged within the Roadmap, consolidating its claim of being inclusive with respect to a diverse array of perspectives. This notwithstanding, minority positions ultimately disappeared from the final policy document.

The ever-present priority was to generate building blocks for the Roadmap: these were collected in the form of summaries and minutes curated by the Energy Ministry’s executive secretary. Within the summaries and minutes, key agreements were recorded and even sometimes re-submitted to the Committee. During the final meetings, these were consolidated into a consistent document: again, the executive secretary took the lead in drafting and editing the document, while the Committee members mostly limited themselves to validate or amend its proposals.

The Energy Ministry’s central role within the process was also evident in the extreme efficiency it showed in translating the Roadmap, completed on September 30th, into a preliminary version of the E2050 policy, which was delivered to Public

Consultation on November 4th. Moreover, the E2050 policy is also very similar to the Roadmap in structure and content, with the E2050 Policy structuring itself around four pillars (see section The performance of participation: E2050 after E2050), mirroring closely the Consultative Committee's final strategic guidelines. The Public Consultation, on the other hand, had little effect on the document since the Ministry adopted a somewhat defensive stance, highlighting the robustness of the draft, rather than effectively implementing any suggested modifications. The E2050 document pre- and post-Consultation only displays minor changes.

Finally, and partly despite its broad participatory aspirations, the E2050 policy was mainly born from two bodies. On the one hand, from the Consultative Committee, a bounded deliberation space consisting of a mildly heterogenous group of actors united by: the joint acceptance of a broadly defined notion of "sustainability," "energy transition," and "participation" as a problem frame; the shared relevance attributed to "expertise" as a cross-cutting validity criteria; and the clear definition of a concrete product (the Roadmap) as the primary task to which each member had explicitly agreed to commit. On the other hand, from the Energy Ministry's executive secretary, who was chiefly responsible for defining the agenda and priorities for the Committee's work, for recording, shaping and formalizing

any agreements that the Committee was able to reach; and for translating the Roadmap into a final policy document, dropping the most controversial aspects while still retaining most of the former's structure and contents.

### The Performance of Participation: E2050 After E2050

The final E2050 policy document was officially enacted by President Michelle Bachelet on December 30th, 2015.

Following the "backcasting" scheme guiding the Committee's work, the document starts by defining four principles of the envisioned sustainable energy future: reliability, inclusiveness, environmental sustainability and competitiveness (Figure 5). Interestingly, all such principles were already stated in the opening pages of the Energy Agenda of 2014. The first three resonate in a direct way with the internationally recognized "pillars" of sustainable development: environmental, social and economic. However, the insertion of "competitiveness," by duplicating the weight given to the economic dimension of the energy transition, suggests a dominant understanding of energy as the country's development engine; an idea that was already central within the Energy Agenda, in 2014.

After stating the future the country is striving for, the document describes the four pillars through which it aims to

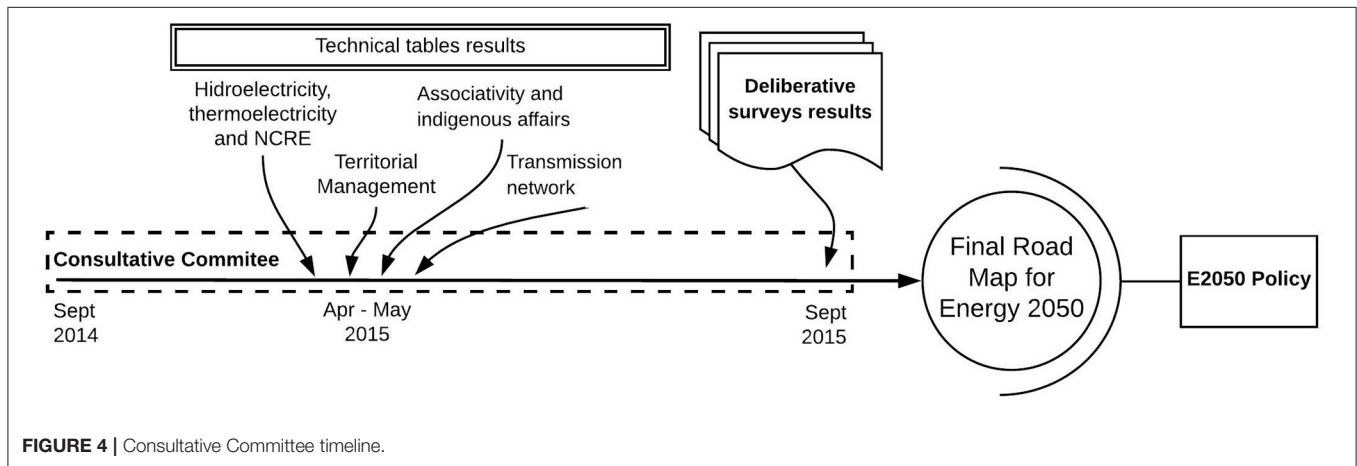


FIGURE 4 | Consultative Committee timeline.

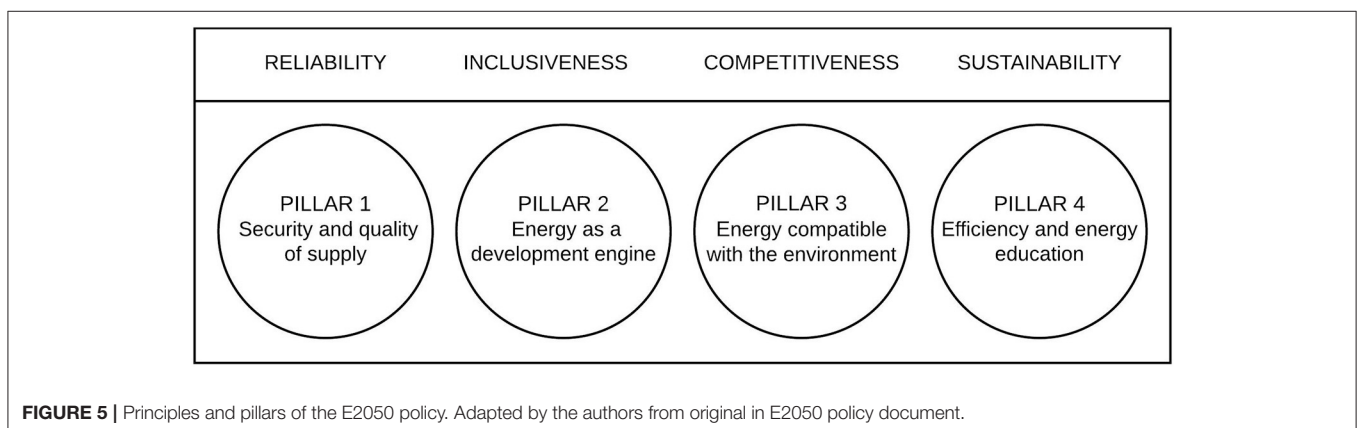


FIGURE 5 | Principles and pillars of the E2050 policy. Adapted by the authors from original in E2050 policy document.

achieve such a future: security and quality of supply; energy as a development engine; compatibility with the environment; and efficiency and energy education. Within each of these, the document provides a baseline characterizing the present conditions, identifies the main gaps between the baseline and the goal, proposes possible strategies and policy measures to overcome such gaps, and sets intermediate goals and measurable indicators for the mid- (2035) and long-term (2050), thus making it possible to monitor the transition.

None of these goals and indicators are meant to be mandatory, and in fact, E2050 defines a 5-years time span after which all the scenarios, projections and related indicators must be updated. Thus, in principle, even if E2050's commitments were to be interpreted as binding, the regular update would allow them to be constantly shifted and changed according to perceived feasibility and/or convenience at any given time. The apparent weakness of the E2050 policy is also evident in the concern expressed by many of the Consultative Committee participants: without clear continuity in terms of institutions, financing and leadership, E2050 might be a very fragile outcome, constantly at risk of falling into oblivion.

Yet, so far E2050 has demonstrated that it can transcend the process that created it and even survive the presidential changeover of 2018 which led to a return to the center-right party of Sebastián Piñera. At the time of writing this, the Ministry published an Energy Pathway 2018-2022 (Ministerio de Energía, 2018). Such document came out of a participative process spiritually akin to E2050, though of significantly lesser ambition. Despite being endowed with the signature and leadership of the current government, the new pathway largely recovers the principles, guidelines and strategies contained in E2050, thus continuing along the energy transition pathway that this experience had started. Similarly, many interviewees noticed an increased inclusion of broader participation bases in policy-making, although it may be a few years before the favorable conditions that made E2050 possible mature in other fields of public policy, allowing projects with a similar degree of ambition to be attempted.

The Energy Ministry's follow-up to E2050's enactment also included the deployment of an extensive array of communication and sensibilization strategies. In 2016, the Ministry published a guidebook containing standards and procedures for public and community participation in the environmental approval of energy projects. In 2017, it launched an educational strategy aimed at informing and promoting energy awareness in the country. While in 2018, a preliminary guideline was published on how to tackle energy poverty in the country. Also, between 2017 and 2018 specific energy policy was approved for the southernmost regions of Aysén and Magallanes and for Chilean Antarctica.

To conclude, while E2050 lacked regulatory and coercive power, it was able to set up and legitimize a general framework for the collaborative action of a wide variety of groups featuring diverse perspectives, orders of worth and expectations regarding the energy future(s) of the country. The specific performance of E2050 may be interpreted precisely as providing a boundary object i.e., a bridge and a common reference for most of these

expectations and perspectives, indirectly aligning and steering them toward an emerging common goal: the energy transition (Figure 6).

## DISCUSSION AND CONCLUSIONS: E2050'S BOUNDARY-OBJECT-MAKING, BETWEEN GOVERNANCE AND DEMOCRACY

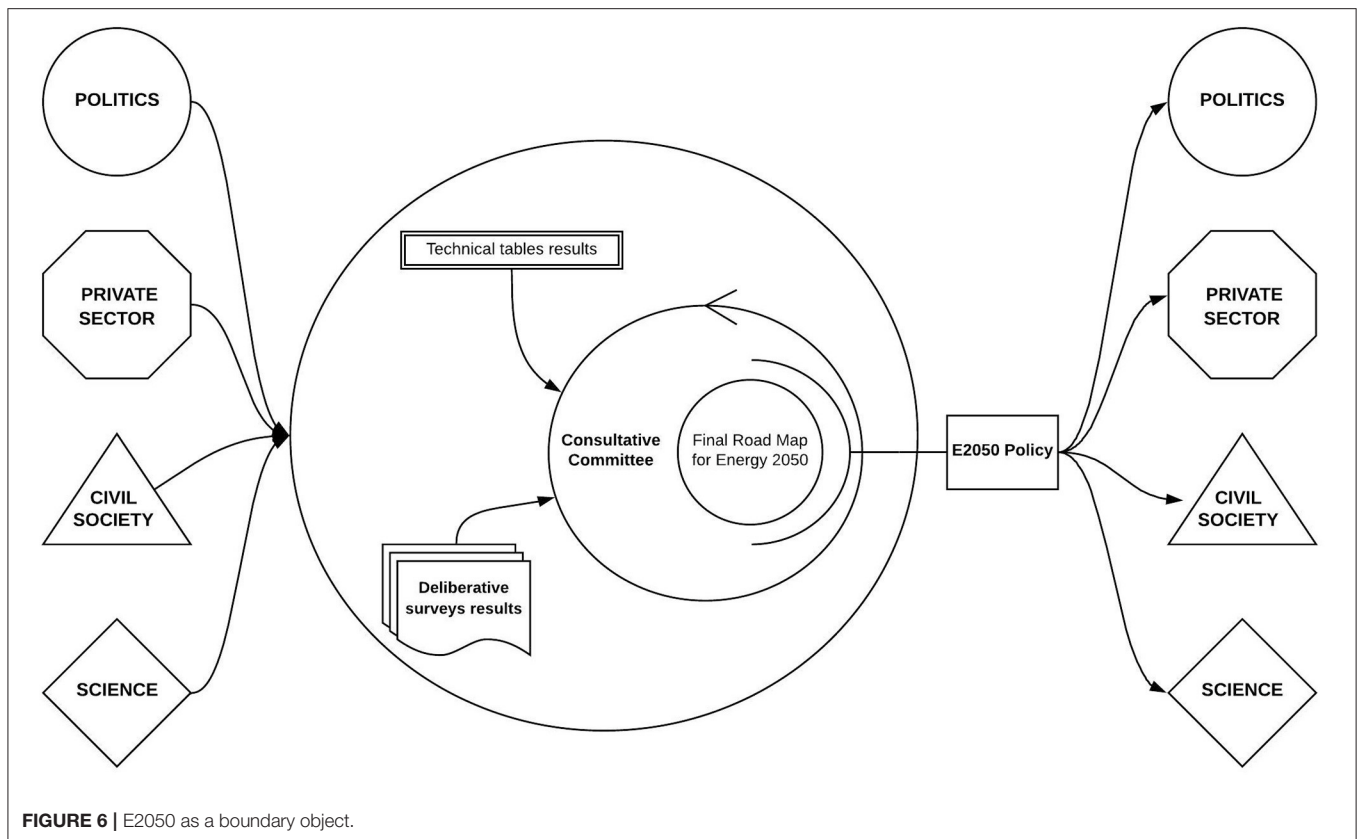
Even though our analysis only provided a broad brush on one specific case (Chile's E2050) it serves the purpose of exploring the context, form and performance of the adoption of "participatory" approaches for the construction of energy futures and agendas, in the context of energy transition. As proposed above, participation plays two distinct (and potentially conflicting) roles within such agendas, respectively related to enhancing their governability and improving their democratic tenure.

From a governability perspective, the use of participatory energy agendas may act as a form of anticipatory governance of energy transitions. Energy futures such as E2050's provide a common reference for the different systems and actors involved in the transition and may thus contextually intervene and govern the self-referential trajectories of such systems and actors. As we will discuss shortly, this plays a heightened role within the context of Chile's strongly neoliberal framework.

Firms and businesses within the energy sector may find within E2050 a more reliable overlook on likely trends in the sector, setting a robust base to define their investment strategies. Academics are offered a new, highly transcendent field of study in which they can set themselves up in a privileged position. Civil society and the citizenry can, at least potentially, anchor in the E2050 agenda future demands for more inclusive, equitable and sustainable energy systems, and for enhanced participation opportunities within energy-related decision-making.

As we summarized, previously to E2050, Chile's was stuck in between growing concerns and clashing expectations about the country's energy future(s). Within this context, participatory mechanisms (especially dialogic-based and consensus-oriented ones) were employed to construct a "boundary object" in which different perspectives may feel represented despite not coinciding in full with the whole extent of interpretative possibilities the object opened. To ensure its legitimacy and intelligibility, boundary objects have to include semantics and "visions" able to resonate with a broad array of actors and the general public (although this does not necessarily mean that the latter are able to play a substantive role in determining the contents and structure of said objects).

Participatorily-constructed boundary objects, therefore, may offer a powerful tool for political attempts at striking a balance between two very extreme pitfalls. On the one hand, a purely decentralized self-steering, where each actor and system is left to operate on their own according to what they think is right regardless of consequences on other systems, actors and rationales. On the other hand, the adoption of a single framing or rationale as a unique and centralized "planning" of the transition, which would reduce the freedom of each system and actor to



select the most appropriate approach to each case and thus require a costly and inefficient imposition from “above” of all solutions.

This ability to balance itself between autonomy and coherence may turn these mechanism in effective forms of coordination within modern complex and polycentric societies (Mascareño, 2010; Willke, 2016). In the face of global and wicked menaces such as climate change, the State cannot act either as an authoritarian planner or as a mere subsidiary regulator for the market. Rather, it has to embrace the new role as a catalyzing force for integrated innovations coming from different sectors and social domains (Giddens, 2009). To achieve that role it is necessary to navigate the energy transitions trilemma (energy security, equity and sustainability), especially in the case of developing countries (La Viña et al., 2018).

In this sense, the participatory construction of energy futures as boundary objects to guide energy transition may be seen as a form of polycentric governance in the sense proposed by Nobel-prize winner Elinor Ostrom (2009), one able to get the best of bottom-up and top-down approaches while fostering self-organization, coordination, shared learning and trust at multiple scales (Prieto Barboza, 2013). In that case, however, the notion of “polycentricity” should not be limited (as is somewhat the case for Ostrom), to political and/or juridical institutions and communities with different geographical jurisdictions. Rather, it should also be extended to the existence of different systems of justification or orders of worth, such as scientific communities

(and the various disciplinary/epistemic sub-communities within it), economic markets (with their different sectors and forms of organization), juridical rules and procedures, and others.

In the end, probably one of E2050’s key governance performances is precisely having set the foundations for a new role of the State in the energy sector, providing at once: a common vision of one energy future (and thus enhanced clarity about the directionality of the energy transition); a stronger legitimacy and social license for the Government and the Energy Ministry; and trust and collaboration networks, generated or strengthened among the actors and groups that took part in the initiative.

Precisely because of Chile’s radically neoliberal stance (evident in the predominantly subsidiary role and weak attributions given to State institutions in the management of the energy sector), the adoption of a polycentric, anticipatory-based form of governing the energy transition was less a choice than a necessity in Chile’s contemporary context. Growing pressures to modify the energy matrix and to ensure stability and governability to the sector in the face of increasing conflicts demanded that the State adopt a more hands-on approach than it was accustomed to. Among other things, this was necessary for ensuring a reliable and competitive outlook to national and international investors, in the context of a national economy that is increasingly dependent on energy as a “development engine.”

Decentralized and market-based arrangements no longer seemed up to this challenge. But the lack of directive authority on the part of the State, coupled with the non-linearity, complexity

and unpredictability inherent in all energy transitions, ruled out standard planning approaches, leaving reflexive, anticipatory governance as the preferred option. The requirement that the agenda was submitted to constant revision served both as a form of constantly updating it in the face of shifting trends and scenarios, and as a way of flexibilizing and relativizing commitments, making them always modifiable. As is the case with many forms of “soft law” (Abbott and Snidal, 2000), E2050's lack of precision and enforceability, as well as its non-binding nature, do not prevent it from working as a form of “contract” or “credible commitment,” articulating the reciprocal expectations and interactions of the parties that took part in its design.

From a democratic perspective the results are bleaker. Our results show, first of all, that E2050's “participatory” approach was all but captured by one dominant mechanism: the Consultative Committee. Despite the Energy Ministry's initial declaration about the Committee's Roadmap being only one of the components of the final E2050 policy, the influence of the former seems to have been crucial both on the form and contents of the latter. While the Technical Boards did have some influence on the E2050 policy, this was rather indirect. Not only it was mediated by the Energy Ministry's framing of such Boards in the name of the “common good” of the Nation, ignoring and hiding competing framings that were dominant in some parts of the citizenry (Ureta, 2017); it was also filtered by the very deliberations that took place within the Consultative Committee. Thus, despite their alleged deliberative nature, their actual influence in the E2050 process was more prominently aggregative (Miller, 1992): they were treated as pre-existing and frozen perspectives to be “represented” through aggregation. Moreover, instead of ensuring transparency and objectivity, the aggregatory process was largely entrusted to the Ministry's and Committee's decisions.

Other participatory instances were even less influential. The Deliberative Polls may have had a greater role if their results had not arrived so late: as it is, their influence was likely very reduced. Finally, the Public Consultation seemed to have little or no effect on the final E2050 policy. This should make us pause, considering it was the only instrument formally open to the general public -albeit in fact accessible only by more-than-averagely educated and informed citizens, because of the high degree of technicality of its contents.

The Committee itself was only slightly heterogenous and somewhat elite, composed as it was by intellectuals and advisors with considerable experience in high-level decision-making forums, and with a common reliance on a technical and expertise-based rationality. From the start, this Committee fully embraced an incremental understanding of change, leaving aside a radical/transformational interpretation of the energy transition which may have been preferred by other groups. Similarly, the urgency to reach consensus was clear in the Committee's work, so that divergent or conflictive positions were carefully deactivated: they were either called back to the need to achieve consensus for “the common good”; or they were submitted to vote with the promise that minority positions would find representation in the Roadmap (although, such positions ultimately did not make the final policy document).

Overall, more than an actual form of power redistribution, the E2050 participatory process was more a form of “tokenization” of public opinion (Arnstein, 1969): through E2050, conflicts were placated and legitimacy was created, but whether the public had actually any influence on the final E2050 policy remains more dubious. In the end, the long-term energy policy was mostly the product of two actors: the Energy Ministry and the Consultative Committee. And while it may be argued that the former is a somewhat politically legitimized authority (being the fruit of an electoral procedure), the second was a mainly technical body, hand-picked from the Ministry itself and chiefly accountable to said Ministry and to the different stakeholders its members were expected to represent.

For some political theorists, such as Philip Pettit (2012), the use of such depoliticized instances of technical decision may be necessary to ensure a consistent decision-making process, especially in the face of knowledge-intensive and potentially controversial issues such as the futures of energy policy. However, in that case, it should be ensured that the members of such technical bodies are both individually and collectively accountable and subject to public review, so that they remain sensitive and responsive to the values and principles resulting from public opinion's ongoing deliberation. This is hardly the case for E2050's Consultative Committee, whose members answer to authorities (their respective employers and the scientific community) diverse and independent from the general public. While their positions as “experts” makes them especially suitable for the knowledge-intensive decisions involved in planning energy futures, it may also produce a gap in terms of democratic legitimacy and public influence in decision-making.

Likewise, E2050 presented a rather monolithic vision of one energy future which, precisely by being displayed as the fruit of collective judgment, somewhat disarmed the possibility of a really contentious, plural and “political” debate (Mouffe, 2013). Precisely because it incorporates an epistemic drive toward defining the one “best” or most collectively desirable goal for the energy transitions, it plays out the necessarily plural character of energy futures, and thus, the political and conflictive character of democracy as “government by opinion” (Urbinate, 2014). At the same time, it also runs the risk of hiding behind the neutral and seemingly objective façade of epistemic and technical knowledge and the very subjective and power-laden interest of a few (Flyvbjerg, 2004).

Subsequent research should investigate to what degree these tensions are idiosyncratic to the Chilean case, or whether they are a more constant feature of the use of participatory agendas to enact sustainable (energy) futures, especially within neoliberal States.

## AUTHOR CONTRIBUTIONS

AU coordinated the work, provided first-hand experience to guide field research and analysis, and participated in interpreting results and authoring of the paper, especially in the Results and Discussion sections. MB oversaw the Introduction and

Theory and Methods sections and co-authored the Results and Discussion sections. PE performed the field work and analysis and co-authored the Results section. CA provided transversal support for all activities, helped coordinate the field work, and authored all the tables and figures. All authors participated in the final editing of the manuscript and all agree to be accountable for the content of the work.

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