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Publication date
2019

Document Version
Final published version

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Link to publication

Citation for published version (APA):
Rangoni, B., & Zeitlin, J. (2019). *Is Experimentalist Governance Self-Limiting or Self-Reinforcing? Strategic Uncertainty and Recursive Rulemaking in EU Electricity Regulation*. (SSRN Research Paper; No. 2019/07). Amsterdam Centre for European Studies. https://ssrn.com/abstract=3481138

The Amsterdam Centre for European Studies

SSRN Research Paper 2019/07

Is Experimentalist Governance Self-Limiting or Self-Reinforcing? Strategic Uncertainty and Recursive Rulemaking in EU Electricity Regulation

By Bernardo Rangoni & Jonathan Zeitlin

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Amsterdam Centre for European Studies Research Paper 2019/07

Acknowledgments: We acknowledge the support provided by funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 822304 for the project on "Integrating Diversity in the European Union (InDivEU). Bernardo Rangoni warmly thanks his interviewees for their generous cooperation.

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Abstract

Is experimentalist governance (XG) self-limiting or self-reinforcing by virtue of its relationship to strategic uncertainty as an essential scope condition? This paper tackles this important but understudied question by elaborating a series of ideal-typical pathways for the temporal evolution of XG in specific policy domains, ranging from reversion to hierarchical governance through endogenous reduction of strategic uncertainty at one extreme to institutionalization of experimentalism as a multi-purpose governance architecture at the other. It then goes on to test the empirical validity of these contrasting theoretical expectations about the long-term relationship between XG and strategic uncertainty through a process-tracing analysis of electricity regulation in the European Union (EU) over a series of policy cycles since the 1990s. Building on and extending previous research in this domain, the paper shows how in a key problem area (cross-border network pricing) considered to exemplify reversion to hierarchical governance through endogenous reduction of strategic uncertainty, XG has in fact never withered away. In another key problem area (cross-border network access), the paper finds that, thanks to XG, policy actors came to identify successive solutions as nested inside one another, while never considering any one solution as definitive. Finally, the paper shows how policy actors, recognizing the pervasiveness of strategic uncertainty across the whole domain of electricity regulation, have come to institutionalize XG as a multi-purpose governance architecture. Following the Bayesian logic of theory-testing process tracing, the analysis thus strengthens empirical confidence in the theoretical expectation that XG is self-reinforcing, while diminishing confidence in the claim that it is self-limiting. The paper concludes by discussing how far these findings may travel to other policy fields within and beyond the EU.

Keywords: experimentalist governance, strategic uncertainty, European Union, regulation, electricity, process tracing

1. Experimentalist Governance and Strategic Uncertainty

Is experimentalist governance (XG) self-limiting or self-reinforcing by virtue of its relationship to strategic uncertainty as an essential scope condition? This paper tackles this important but understudied question by elaborating four ideal-typical pathways for the temporal evolution of XG in specific policy domains, ranging from reversion to hierarchical governance through endogenous reduction of strategic uncertainty at one extreme to institutionalization of experimentalism as a multi-purpose governance architecture at the other. It then goes on to test the empirical validity of these contrasting theoretical expectations about the long-term relationship between XG and strategic uncertainty through a process-tracing analysis of electricity regulation in the European Union (EU) over a series of policy cycles since the 1990s, building on and extending previous research in this domain.

Over the past two decades, a growing body of research has drawn attention to the proliferation of new forms of experimentalist governance across multiple levels and policy domains within and beyond the EU. Their defining feature is a recursive process of provisional goal setting and revision based on learning from comparative review of implementation experience in different local contexts. In the EU, well-documented examples include: regulation of competition, finance, and network industries; food, drug, chemical, and maritime safety; environmental protection; justice and security; data privacy and anti-discrimination rights (Sabel & Zeitlin 2008, 2010; Zeitlin 2015, 2016; Mathieu & Rangoni 2019; Rangoni 2019). In the United States and other developed democracies, similar forms of XG have been identified at national and sub-national levels in the regulation of public health and safety risks, such as nuclear power, aviation, and offshore oil and gas; and the provision of public services, such as education, health care, and child welfare (Sabel & Simon 2011; Sabel & Zeitlin 2012a; Sabel et al. 2018). At the global or transnational level, too, robust examples of XG have been analyzed across a variety of policy domains from environmental sustainability and food safety to data privacy and human rights (de Búrca et al. 2013, 2014; Zeitlin 2015; de Búrca 2017; Overdevest & Zeitlin 2018).

In its most developed form, XG involves a multi-level architecture, whose four elements are linked in an iterative cycle. First, broad, open-ended goals and metrics for assessing their advancement are established jointly by some combination of "central" and "lower-level" actors (in the EU, the European institutions and the member states), in consultation with relevant civil society stakeholders. In regulatory domains, these goals are typically elaborated into framework rules and standards, some of which may be incorporated into legislation and made legally binding. Second, "lower-level" actors (like national ministries and regulatory authorities) are given substantial discretion to pursue these goals in ways adapted to their local contexts, and to propose changes to the rules themselves in cases of serious misfit. But in return for this autonomy, these units must report regularly on their performance, and participate in a peer review in which their results are compared with those of others pursuing different approaches to the same general ends. Where lower-level units are not making good progress towards the agreed goals, they are expected to take corrective measures, informed by the experience of their peers. The goals, rules, metrics, and decision-making procedures are then periodically revised in response to the problems and possibilities revealed by the review process, and the cycle repeats (Sabel & Zeitlin 2008, 2010, 2012a; for a diagram, see Zeitlin 2015: 2).

In many (though not all) cases, XG architectures are underpinned by "penalty defaults": destabilization mechanisms that induce reluctant parties to cooperate in framework rule making and respect its outcomes, while stimulating them to propose plausible and superior alternatives, typically by threatening to reduce control over their own fate. In the EU context, such penalty defaults frequently involve court judgments or (threats of) Commission decisions, which oblige member states and/or private actors to explore how to pursue their own preferred goals in ways compatible with the fundamental principles of European law, but without imposing specific hierarchical solutions (Sabel & Zeitlin 2008: 305-8; 2010: 13-16; 2012b: 413-14; Zeitlin 2016: 3-4; Gerstenberg 2019). In this sense, experimentalist penalty defaults diverge fundamentally from the "shadow of hierarchy", as defined by scholars like Adrienne Héritier, whose exercise explicitly depends on the ability of public "principals" to take over regulatory functions delegated to private and/or lower-level "agents" in case of their sustained misuse (Héritier 2002: 194; cf. Bartolini 2011: 8). Moreover, while penalty defaults often rely on formal public authority, they can also be generated informally in some contexts by non-state actors, for example by organizing an effective consumer boycott of non-conforming products or firms in transnational governance (de Búrca et al. 2014: 479, 484).

Such experimentalist architectures are said to have a number of beneficial features, which help to explain their proliferation in contemporary governance. First, they accommodate diversity by adapting shared goals to varied contexts, rather than trying to impose "one-size-fits all" solutions. Second, they foster coordinated learning from local experimentation through disciplined comparison of alternative approaches to common overarching objectives. Third, the same processes of mutual monitoring, peer review, and joint evaluation that support learning from diverse experience also provide dynamic, non-hierarchical mechanisms for holding both central and lower-level actors accountable for their actions in pursuit of agreed goals. Fourth, because both the goals themselves and the means for achieving them are explicitly conceived as provisional and subject to revision in light of experience, problems identified in one phase of implementation can be corrected in the next (de Búrca et al. 2014: 483-5; Overdevest & Zeitlin 2018: 66).

The scope conditions for XG are closely aligned with these beneficial features. The first and most essential of these conditions is strategic uncertainty, in which key policy actors cannot precisely define their goals or how best to achieve them in advance, but must instead discover both in the course of problem-solving. Such strategic uncertainty is a widespread product of turbulent, volatile environments, such as those associated with globalization and rapid technological innovation, which subvert actors' ability to estimate reliably the probability of future states of the world. Uncertainty in this Knightian sense likewise makes it more difficult for actors to assess the implications of proposed solutions for their predefined interests, thereby increasing their potential willingness to engage in experimentalist joint exploration. But strategic uncertainty can also arise from long periods of inconclusive debate and policy failure, which reduce actors' confidence in their familiar policy dispositions (such as more state or more market), and enhance their openness to coordinated efforts to learn from local experimentation (Sabel & Simon 2011: 56, 78, 82; Sabel & Zeitlin 2012a: 174-5; Sabel &

Zeitlin 2012b: 411-12; de Búrca et al. 2014: 479, 483; Sabel et al. 2017: 371-2). Other complementary scope conditions discussed in the XG literature include a polyarchic or multi-polar distribution of power, in which no single hegemonic actor can impose their preferred solution without taking into account the views of others; a high level of diversity, which increases the difficulty of adopting and enforcing uniform rules; and complex interdependence, which motivates actors to collaborate in seeking joint solutions, rather than merely learning from each other's separate efforts to address similar problems (Sabel & Zeitlin 2008: 175-6; Sabel & Zeitlin 2012a: 175-6; de Búrca et al. 2013: 725-6, 743; Overdevest & Zeitlin 2014: 26, 43-4; Zeitlin 2016: 18-19).

Given the centrality of strategic uncertainty among the scope conditions for XG, it follows logically that differences in its intensity may also play a crucial role in the emergence and development of XG in specific policy domains. Thus de Búrca, Keohane, and Sabel have argued that the incidence of experimentalism in global governance depends on variations in "actors' beliefs regarding the degree of uncertainty they face: whether they have sufficient knowledge of the issue area to have clearly defined preferences over policies rather than simply over outcomes." Where "there is too much formal or…informal agreement on cause-effect relationships and desirable strategies" (i.e. where strategic uncertainty is too low), they conclude, XG "is unlikely to take hold" (de Búrca et al. 2013: 742-3, 777-8, 781).[1]

From there, it is a short step to the idea that variations in the level of strategic uncertainty may shape not only the prospects for XG across different policy domains, but also its temporal evolution within a particular domain. One possible evolutionary pathway is that the operations of XG, by producing workable solutions to initially open problems, might itself contribute to a reduction in strategic uncertainty in that specific

[1] As an empirical example, the authors cite the Poverty Strategy Reduction Program (PSRP) of the International Financial Institutions (IFIs), where despite the formal establishment of an experimentalist architecture, "the central actors—IFI officials and experts—were convinced that they knew the appropriate solution to the problem of poverty, and practices at the country-level were dominated by like-minded finance ministries, without effective participation by other stakeholders who might have challenged the consensus. Hence the 'center' was not much interested in 'local' or country-level input, and did little or nothing to facilitate it; and aware of this, the participation of the 'local' or country level was *pro forma*" (de Búrca et al. 2013: 777-8).

domain. As strategic uncertainty diminishes, actors may become better able to calculate the consequences of proposed solutions for their own interests, leading to the re-emergence of distributive conflict between winners and losers. Under these conditions, where the actors have clearly defined preferences over policies as well as outcomes, while public authorities believe themselves able to "formulate a comprehensive set of rules and effectively monitor compliance with them" (de Búrca et al. 2014: 483), the result is likely to be a reversion to conventional hierarchical forms of governance focused on enforcement of established uniform rules rather than on their further elaboration through experimentalist methods (cf. Eberlein 2010, discussed further below). In this pathway (1), XG can be considered as self-limiting through endogenous reduction of strategic uncertainty.

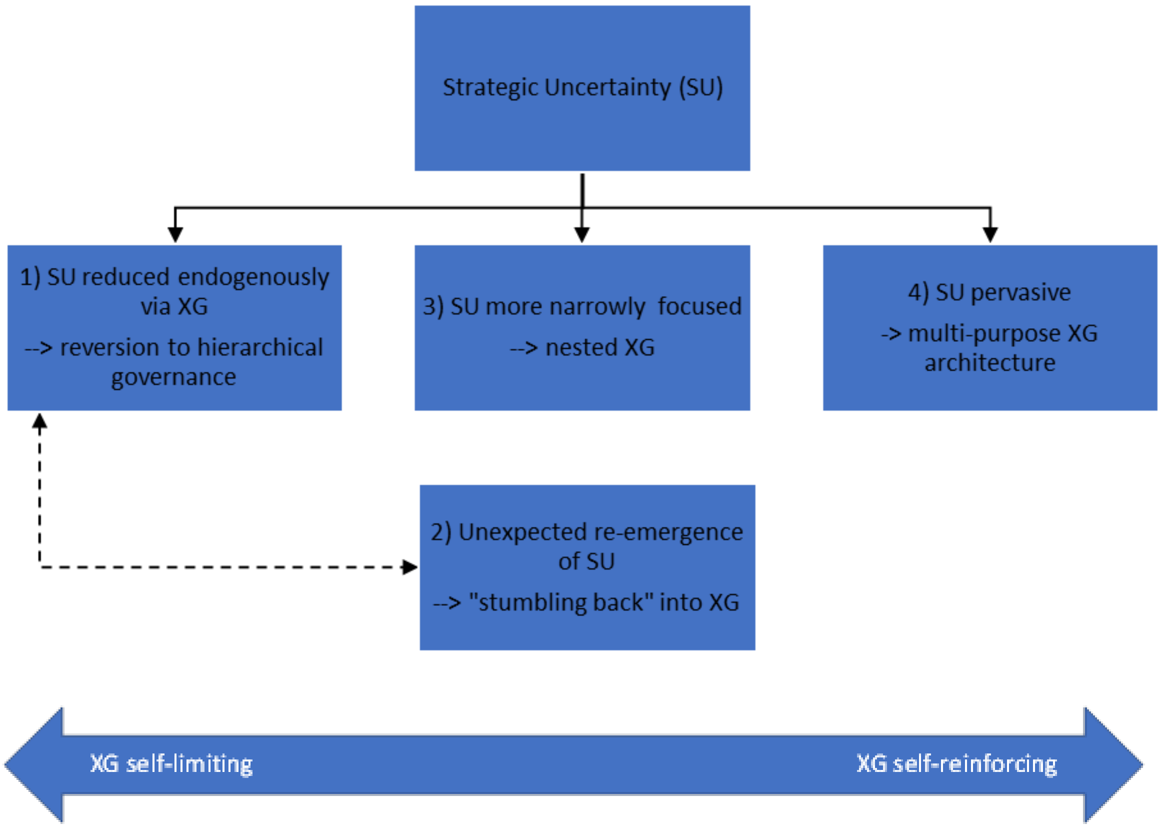
But other pathways, leading to different outcomes, are also conceivable. In a second variant of the first pathway, actors might initially consider that policy solutions reached through XG methods had sufficiently reduced strategic uncertainty in that domain to favor a reversion to conventional hierarchical governance. But where the actors subsequently discover unforeseen problems with these solutions, either because of their unintended consequences or because of the emergence of new policy challenges, they may find themselves once again in a state of strategic uncertainty, thereby reviving their attraction to experimentalist processes of joint exploration and recursive review of implementation experience. Pathway (2) can be termed "stumbling back" into XG, by analogy with de Búrca's work on "stumbling into experimentalism" in EU anti-discrimination policy as an emergent effect of actors' growing recourse to experimentalist practices within governance arrangements originally designed along more conventional lines (de Búrca 2010; cf. also de Búrca 2017: 283).

In a third pathway, by contrast, policy actors realize from the outset that provisional solutions arrived at through XG processes may need further elaboration through ongoing monitoring and comparative review of local implementation. In such cases, specific policy solutions emerging from one phase of experimentalist joint exploration become the point of departure for a new phase of monitoring, review, and revision in an iterative cycle. Hence pathway (3) can be termed nested experimentalism. While strategic uncertainty becomes more narrowly focused in this pathway, it should not be assumed that the actors will eventually reach a solution they consider as definitive, hence returning to Pathway (1), though this is one possible outcome.

In a fourth pathway, finally, actors come to believe that strategic uncertainty is a pervasive feature of the policy domain as a whole, which is unlikely to disappear even if relatively stable, workable solutions may be found for specific problems. In such cases, which may themselves emerge out of Pathways (2) and (3), the actors deliberately institutionalize arrangements for experimentalism as an overarching, multi-purpose governance architecture. Pathway (4) can thus be termed experimentalism as a multi-purpose governance architecture.

Whereas in Pathway (1) the relationship between XG and strategic uncertainty is self-limiting and in Pathways (2) and (3) indeterminate, in Pathway (4) it is self-reinforcing, leading to very different consequences for the long-term sustainability of experimentalist forms of governance (see Figure 1). While contrasting views of the intensity and pervasiveness of strategic uncertainty in contemporary governance may yield different theoretical expectations as to the likely balance among these four ideal-typical pathways, which of them will in fact materialize in any given policy domain is ultimately an empirical question.

Figure 1. Experimentalist governance and strategic uncertainty: four pathways



2. EU Electricity Regulation as an Empirical Test Case

Although the question of whether XG is self-limiting or self-reinforcing by virtue of its relationship to strategic uncertainty arises logically from the scope conditions for this form of governance, there has been little sustained empirical investigation of how these countervailing theoretical possibilities and pathways play out in specific policy domains. The major exception is Burkhard Eberlein's work on XG in EU electricity regulation (Eberlein 2010). Eberlein's analysis focuses on the EU's efforts to build an integrated European electricity market through liberalization and interconnection of previously closed national markets. He argues that workable regulatory solutions to key problems of cross-border network pricing ("tarification") and access ("capacity allocation and congestion management") were identified and elaborated during the late 1990s and early 2000s through experimentalist processes of iterated deliberation, comparison of local experiences, and peer review within the Florence Electricity Forum (FEF), an informal body of public and private stakeholders convened by the European Commission. These solutions developed through the FEF were then codified into EU law in 2003 by a new Regulation on conditions for access to the network for cross-border exchanges in electricity, which empowered the Commission to elaborate further binding rules through a comitology procedure (Eberlein 2010: 66-9, 70-71; cf. also Eberlein 2003; 2005: 65-79, 83-5; 2008: 78-80, 85-6; 2012: 158).

Based on this analysis, Eberlein concludes that the successful application of XG methods may indeed lead over time to a reduction of strategic uncertainty, and thus to a decline in their importance relative to more conventional hierarchical governance. "Evidence from the electricity sector", he argues,

> suggests that experimentalist techniques were most important at the very beginning of the process of market creation, in a technically complex and new policy domain, when strategic uncertainty and dependence on functional expertise by industry and regulatory actors were at their highest level….As technically complex issues are better understood and regulatory solutions have been formalized to some extent in legal roles, experimentalist techniques decline in importance (Eberlein 2010: 72-3).

Concomitantly, as strategic uncertainty diminishes, "the distributive implications of regulatory solutions may become more apparent", leading to the emergence of zero-sum conflicts among the actors, which in turn restrict the effectiveness of experimentalist methods of deliberation and joint problem solving (ibid.: 73). Under these conditions, Eberlein concludes, the center of gravity in EU sectoral governance can be expected to shift from experimentalist *rule development* to distributive *rule enforcement,* requiring the use of more conventional hierarchical governance mechanisms such as codified legislation and competition law (ibid.: 70-71).

At the same time, however, Eberlein rejects the idea that "experimentalist techniques should be viewed as a transitory phenomenon", or that "they could simply be replaced by hierarchy in the form of some putatively definitive rule-set". "Progress towards the construction of a unified energy market", he acknowledges, "may be expected to generate new regulatory challenges", such as how to link up emerging regional markets and how to manage decentralized flows of renewables. Eberlein likewise recognizes that

EU legislation "can obviously not address all current and future regulatory contingencies and needs, especially in a technically complex policy area and across 27 heterogeneous jurisdictions." Similarly, in his view, "competition law is even less able to substitute for detailed, recursive rule development, as it is a case-based, negative control instrument…though it can have important signaling effects and refine the area of legitimate agreement", as well as threatening "to make opportunistic parties worse off than a compromise reached under experimentalist arrangements" by "credibly remov[ing] the status quo option" and replacing it with a "default option that is less desirable" (ibid: 73-4, 71, 75-6).[2]

But despite Eberlein's acknowledgement of the limitations of hierarchical governance through legislative codification and competition law enforcement, he nonetheless insists that the role of XG can be expected to diminish over the course of the policy process as strategic uncertainty decreases. The policy actors, he observes, do not confront new challenges that may arise within the energy sector "with the same level of strategic uncertainty as at the beginning of the market-creation process", insofar as they can draw on "broad frameworks and guiding principles" developed previously, which give them "a clearer idea of where to look for solutions" and the available "palette of regulatory options". Hence, he concludes, "the need for recursive processes of collective rule development and coordination" through XG methods "can be expected to persist, but their relative importance for overall sector governance may vary across issue areas, and decline over time with a reduction in strategic uncertainty…." (ibid.: 74).

Eberlein's analysis of the evolutionary trajectory of XG in EU electricity regulation thus combines elements from several of the ideal-typical pathways presented in the previous section, but gives a clear priority to the first: self-limitation through endogenous

[2] Eberlein interprets the Commission's threatened use of its competition law powers to induce reluctant parties "to deliberate and cooperate in good faith" as an instance of the shadow of hierarchy. But as the citations above suggest, Eberlein's interpretation is actually much closer to that of an experimentalist penalty default than to the shadow of hierarchy à la Héritier, especially since he explicitly rejects the idea that EU authorities could "practically take over the functional role of 'network manager' for the entire European grid system" (Eberlein 2010: 74-76; cf. Sabel & Zeitlin 2010: 14-16). For his earlier criticisms of the standard shadow of hierarchy concept as based on revocable delegation of authority by governmental actors, see also Eberlein 2008: 88-9).

reduction of strategic uncertainty. Eberlein's own empirical research focused on the mid-1990s through the late 2000s, covering the period between the enactment of the first energy legislative package in 1996 and the third legislative package in 2009. Since then, there have been a number of major institutional and policy developments, including the creation of the Agency for the Cooperation of Energy Regulators (ACER) and the regulatory procedure for producing framework guidelines and binding network codes (which Eberlein noted but did not follow into the implementation phase), as well as the enactment of a fourth legislative package in 2019. This temporal arc, comprising multiple policy and legislative cycles over a period of two decades, offers an outstanding empirical test case for assessing contending theoretical expectations about the self-limiting or self-reinforcing relationship between XG and strategic uncertainty by revisiting and extending Eberlein's analysis. Moreover, Eberlein's empirical research focused primarily on tarification. While this is undoubtedly a key problem, it does not exhaust the electricity governance domain. These limitations of Eberlein's research call for an extension of the analysis of EU electricity regulation to other problems and a longer time period.

As a policy domain characterized by high levels of politicization and distributive conflict as well as by a high (initial) level of strategic uncertainty, the case of EU electricity regulation is well-suited to test the resilience of XG under conditions which a variety of scholars (including Eberlein himself) have argued would be unfavorable to its sustained flourishing (cf. Börzel & Eckert 2012; Börzel 2012). The analysis in this paper follows the Bayesian logic of theory-testing process tracing, where positive evidence that a hypothesized causal mechanism (such as the relationships between strategic uncertainty and XG underlying the different pathways outlined above) is present and functioned as expected in a specific case reinforces confidence in the empirical validity of the theoretical approach from which it is derived, while negative evidence decreases such confidence (Beach & Pedersen 2013; Bennett & Checkel 2015).

The next section briefly surveys the evolution of XG in EU electricity regulation from the beginning of market liberalization and integration in the late 1990s to the most recent developments. The purpose is to introduce the reader to the key sectoral legislation, actors and rulemaking procedures, while explaining what makes the latter experimentalist. Appendix 1 contains a timeline and glossary. Section 4 analyzes the unfolding relationship between XG and strategic uncertainty within these arrangements, by looking at three key problems. The first is tarification, on which Eberlein primarily focused. By re-examining this problem and extending the analysis over time, however, we do not find it to be an instance of Pathway (1), in which experimentalism limits itself through reduction of strategic uncertainty and a resulting emergence of irreconcilable distributive conflicts. Instead, we show that, far from having led to a reversion to hierarchical governance, experimentalism in this area has never withered away. We then go on to look at another key problem, namely the management of scarce cross-border network capacity (i.e. interconnections between national grids). We show how such regulation exemplifies Pathway (3), whereby thanks to experimentalist processes policy actors came to identify successive solutions as nested inside one another, while never perceiving any one as final. Finally, our analysis shows that policy actors went even further. Recognizing the pervasiveness of strategic uncertainty in the sector as a whole, they established multi-purpose experimentalist arrangements for monitoring and amendment of network codes and guidelines, precisely the scenario hypothesized in Pathway (4).

The analysis is largely based on primary sources. These include publicly available policy documents such as legislative proposals from the European Commission, legislation adopted by the European Parliament and the Council, guidelines and recommendations, reports by the European Commission and regulatory authorities, consultancy studies, position papers of various industry associations, and minutes of meetings of the FEF and other multi-stakeholder bodies. These publicly available documents were cross-checked and complemented as appropriate through 25 interviews. Interviewees were selected for their expertise and experience with the problems under analysis. Equally, representativeness was sought across a number of dimensions, such as a balance between public authorities and market participants as well as between EU and national authorities, and between generators or traders and system operators). Although all interviewees were offered anonymity, only one chose that option. Details on the procedures followed and a full list of interviews by names, functions, affiliations, date and place can be found in Appendix 2.

3. Experimentalist Arrangements in EU Electricity Regulation

Over the past 25 years, EU electricity regulation witnessed a proliferation of experimentalist arrangements, developed in line with the successive "legislative packages" aimed at liberalizing and re-regulating the sector. Following the adoption of the first Electricity Directive in 1996, the European Commission organized the FEF, whose key task is to provide a "neutral and informal framework for discussion of issues and exchange of experiences concerning the implementation of EU legislation and the creation of the internal market", by bringing together bi-annually the Commission, National Regulatory Authorities (NRAs), and a variety of market participants ranging from Transmission System Operators (TSOs) and exchanges through traders to generators and suppliers, large consumers and academic experts.[3]

The second legislative package, adopted in 2003, gave the Commission additional powers to elaborate and implement EU legislation, subject to a comitology procedure (Regulation (EC) 1228/2003: art.13). This procedure in turn offers opportunities for deliberation and experiential learning by bringing together EU and national authorities, whilst giving no single actor hierarchical power to impose their own preferred solution. At the same time, the Commission established the European Regulators Group for Electricity and Gas (ERGEG) as a formal advisory network of national regulators (Commission Decision 2003/796/EC).

In 2009, ERGEG was dissolved and replaced by ACER, just as the previous association of European Transmission System Operators (ETSO) was wound up and transformed into the formal European Network of Transmission System Operators for Electricity (ENTSO-E). Without withdrawing the Commission's power to adopt binding rules via comitology, the third legislative package gave ACER and ENTSO-E, in consultation with

3 https://ec.europa.eu/info/events/meeting-european-electricity-regulatory-forum-florence-2019-jun-17_en (Accessed September 2019).

other stakeholders, key roles in the development of network codes through a strongly inclusive and polyarchic procedure. Based on annual priorities set by the Commission, ACER develops non-binding framework guidelines establishing the principles for the relevant network codes, which are then drafted by ENTSO-E and finally submitted by the Commission to the comitology committee for adoption. Additional features that make this procedure experimentalist are the explicit possibility for any interested actor to propose draft amendments to network codes; ACER's mandate to monitor, analyze, and report on their implementation; and the Commission's duty to monitor the implementation of the third legislative package more generally, report on its success, and if necessary propose revisions (Regulation (EC) 714/2009: arts. 6, 7, 9, 24).

While paving the way for a "new generation" of network codes and rules, the fourth legislative package adopted in 2019 left the existing procedures for adopting network codes and guidelines largely unaltered.[4] But this new legislative package mandated the creation of an organization of European distribution system operators (EU DSO), analogous to ENTSO-E but focused on local electricity distribution, which has become increasingly important for renewables and other decarbonization solutions, to participate in the development of network codes concerning its members (Regulation (EU) 2019/943: arts.52-57). As revised by the fourth legislative package, the institutional arrangements for regulating the EU electricity market have thus become at once more polyarchic, through the organized involvement of European DSOs, and more experimentalist, through the reinforcement of provisions for monitoring implementation experience and proposing revisions to existing rules and procedures. An example of the latter is the establishment of Regional Coordination Centers (RCCs) to monitor and report regularly on the functioning and potential shortcomings of regional cooperation among TSOs (Regulation (EU) 2019/943: art. 46; cf. arts. 32, 60, 69).

[4] In addition to adapting these procedures to the provisions for adopting delegated and implementing acts introduced by the Treaty of Lisbon, other refinements include that the preparation of draft network codes is now supported by a drafting committee consisting of representatives of ACER, ENTSO-E, where appropriate EU DSO, and a limited number of main affected stakeholders; and that ACER can now directly amend the draft network code received by ENTSO-E and submit it to the Commission, rather than having to send it back to ENTSO-E with a request for amendment (Regulation (EU) 2019/943: arts. 58-59, 61, 67-68; Vlachou 2018).

4. XG and Strategic Uncertainty in EU Electricity Regulation

Against the backdrop of these institutional arrangements, this section goes on to analyze the unfolding relationship between XG and strategic uncertainty by looking at three key problems: regulation of cross-border tarification; allocation and management of scarce interconnection capacity; and monitoring of implementation and amendment of network codes.

4.1 Cross-Border Tarification: A Reversion to Hierarchical Governance?

At first sight, EU regulation of cross-border tarification might seem to instantiate Pathway (1), whereby the use of experimentalist techniques leads to the identification of solutions which decrease strategic uncertainty and favor the emergence of distributive conflicts. These developments, in turn, might be expected to provoke a shift away from experimentalist governance towards conventional hierarchical governance. Eberlein (2003, 2005, 2008, 2010) documented how the experimentalist arrangement of the FEF, through deliberation and comparisons from the late 1990s to the early 2000s, generated consensus among multiple public authorities and regulated players on the need to compensate TSOs for the costs incurred in hosting on their networks cross-border electricity flows, which were gradually increasing as a result of market liberalization and integration. This was important because it removed transit fees on cross-border flows, which, together with administrative methods for cross-border capacity allocation and the priority access granted to historical contracts (discussed in the following sub-section), are considered to have represented the main obstacles to the development of an internal electricity market (ACER 2013a). However, the development of agreement on an Inter-TSO Compensation (ITC) mechanism was fraught with difficulties, due to a number of overlapping conflicts: between vertically integrated incumbents owning networks and new entrants depending on access to them, between hosting countries interested in cost recovery and trading countries favoring cost minimization, and between EU harmonization and national discretion (Eberlein 2008: 80). The impasse was overcome only by the initiation of legislation by the European Commission (2001), even though, in substantive terms, such legislation merely codified the voluntary agreement reached in the FEF (Regulation (EC) 1228/2003). As indicated in Section 2, it is from this empirical evidence that Eberlein (2010: 70-73) concluded that experimentalist governance may endogenously reduce strategic uncertainty and lead to the emergence of distributive conflicts which together favor a return to prominence of hierarchical governance.

Yet Eberlein overlooked the fact that the 2003 legislation also provided for the Commission to monitor implementation and submit to the European Parliament and Council, no more than three years later, a report on the experience gained, if necessary accompanied by proposals for revision (Regulation 1228/2003: art. 14). These provisions were reinforced in 2010, when ACER was tasked with overseeing the implementation of the ITC mechanism and reporting on it annually, as well as carrying out a technical and economic assessment within two years and providing an opinion to the Commission (Commission Regulation 838/2010: Annex Part A, 1.4, 5). Similarly, in 2012 the FEF asked ACER to determine whether the current ITC mechanism needed enhancement (FEF 2012). The mere existence of these provisions is already at odds with the alleged reduction in strategic uncertainty, since it is hard to understand why policy actors should have established them if they were convinced to have already reached a definitive solution.

Furthermore, these experimentalist arrangements were not only established on paper, but also actively used in practice. While the monitoring reports consistently found the implementation of the ITC mechanism and fund to be in line with legislation,[5] the assessment, building on a consultancy report and a public consultation, concluded that a new regulatory framework should be developed (ACER 2013a). With the support of the NRAs composing its board, ACER thus recommended to the Commission in 2013 that "the new regulatory framework should better reflect all the on-going developments" (ACER 2013b: 2). Besides technical refinements to the existing ITC mechanism,[6] ACER's

[5] All ITC monitoring reports (2012-1018) are available at: https://www.acer.europa.eu/en/Electricity/Infrastructure_and_network%20development/Pages/Inter-TSO-compensation-mechanism-and-transmission-charging.aspx (Accessed August 2019).

[6] These include the recommendations of shifting away from the long-run average incremental costs (LRAIC) methodology used thus far for assessing the costs of making infrastructures available for

Recommendation pointed to the need to address two major recent developments. One concerned the costs caused by loop flows: unscheduled flows of electricity resulting from trade within given bidding zones, which can result in the use of adjacent networks without contributing to the underlying costs – a growing problem in recent years as European electricity systems have gradually become more interconnected. The other concerned the need to go beyond the compensation of TSOs for costs incurred in hosting cross-border flows on their networks, by positively incentivizing them to develop the latter for the benefit of the single market (ACER 2013b).

Although to date the European Commission has not actively followed up ACER's Recommendation to amend the ITC mechanism, this is not primarily due to unresolved conflicts hindering the further development of EU regulation of tarification, as Eberlein (2003, 2005, 2008, 2010) would have expected and Sandra Eckert (2019: 206) has more recently suggested. In fact, the two major problems flagged by ACER are being addressed despite their significant redistributive implications, but through other regulatory initiatives. The reconfiguration of the geographical areas within which market participants can trade energy without having to buy transport capacity is a politically very sensitive issue, as bidding zones mostly correspond to national boundaries and ensure uniform prices within member states. But asymmetries between physical reality and political boundaries in countries like Germany are creating evident problems for the internal market – insofar as transport capacity is used to solve internal congestion at the expenses of that available for cross-border trade. As anticipated, the guideline on capacity allocation and congestion management has thus introduced provisions for regularly reviewing and possibly reconfiguring bidding zones (Commission Regulation 1222/2015: arts. 32-34). Furthermore, perhaps because some have judged this first phase of bidding-zone review as largely inconclusive (EFET 2019), these provisions, which exhibit marked experimentalist traits, were not only further specified but also given "more teeth" by the fourth legislative package. They consist of reports on structural congestions and proposed methodologies for addressing them,

hosting cross-border flows of electricity, and that the ITC infrastructure compensation should be limited to existing infrastructures (ACER 2013b: 1-2).

which ENTSO-E and ACER must produce every three years together, as a basis for "affected stakeholders from all relevant member states" to consider alternative bidding zone configurations (Regulation (EU) 2019/943: art.14). And while member states with identified structural congestion are asked to develop action plans within four years and the relevant TSOs to submit proposals for methodologies to be used by NRAs, the new legislation also empowers the European Commission and ACER to take binding decisions if member states or NRAs respectively fail to reach unanimous decisions (Regulation (EU) 2019/943: arts.14-15).[7]

Similarly to the reconfiguration of bidding zones, the development of new interconnectors has important redistributive consequences, in the billions of euros. TSOs see them as an investment which would increase their regulated revenues and hence are generally favorable. But if TSOs belong to a vertically integrated company active in generation, then their preferences also depend on whether the interconnector would allow electricity exports to higher-priced areas, or would instead translate into increased exposure to competition from cheap foreign generators. Finally, NRAs and ministries tend to favor the interests of national consumers, and hence to favor or resist new interconnectors depending on their implications for domestic prices (Supponen 2012a, 2012b). Despite these high stakes and potentially conflicting preferences, however, ACER has been collectively empowered to advise on selection of projects of common interest for expedited permitting and EU funding, as well as to take decisions on cross-border cost allocations if the relevant NRAs do not reach agreement (Regulation (EU) 347/2013).

What these counter-examples suggest, then, is that the main reason why EU tarification regulation has not yet been reformed is unrelated to distributive conflicts. In fact, the amounts involved in inter-TSO compensation (around €200 mln per year) are not very significant. Instead, tarification regulation has not yet been revised, on the one hand, because it is considered to be working reasonably well, without creating evident distortions of the internal market. On the other hand, there are other more urgent

[7] BUS7.

problems, such as reconfiguring bidding zones and promoting trans-European energy infrastructures.[8]

Revisiting and extending previous research, this subsection shows that, far from exemplifying a return to hierarchical governance through endogenous reduction of strategic uncertainty, the key problem area of cross-border network pricing has in fact never witnessed a decline of XG. The paper now further extends existing research by examining another key problem area, cross-border network access.

4.2 Congestion Management: Nested Experimentalism

EU regulation of cross-border network access embodies the nested experimentalism depicted in Pathway (3): a sequence of regulatory choices in which at no stage did key policy actors perceive themselves having reached a final, definitive solution, as evidenced by the provisions they regularly set up to monitor implementation and propose possible revisions. The main choices in EU regulation of access to cross-border networks from the beginning of market liberalization and integration in the late 1990s to the present day were threefold. Prompted by strong uncertainty on how to create new rules for allocating scarce interconnection capacity (European Commission 1999; Eberlein 2010; Rangoni 2019), the first major choice actors faced was between the then-dominant administered methods, such as pro-rata, first-come first-served, and long-term contracts on the one hand, and market-based auctions on the other. The latter were advocated by a pro-competitive "Nordic bloc" comprising the Commission, the European Federation of Energy Traders (EFET), and the countries most advanced in terms of liberalization and integration, such as the United Kingdom (UK), Spain, Norway, Sweden, Denmark and Finland. However, this proposal met with resistance from most other countries, including France, Italy and especially Germany, whose governments were hesitant about a move towards market-based solutions, because their incumbent companies, mostly publicly owned and vertically integrated, had much to lose from abandoning long-term contracts and the other administrative methods, which

[8] EUI1c.

privileged them vis-à-vis new entrants (Hancher 1997, 2000; Knops et al. 2001).[9] Nevertheless, through deliberation and comparisons in the FEF during the late 1990s, and by referring explicitly to the pioneering auctions being set up at the Spanish-French border (FEF 1999), a wide variety of public authorities and regulated players, including the German government and companies, came to agree voluntarily that network access should be managed through market-based auctions (FEF 2000: 4-8). This agreement was then given binding force through legislation in 2003.

But the 2003 legislation anticipated that the Commission would amend the rules "so as to include detailed guidelines on all capacity allocation methodologies applied in practice and to ensure that congestion management mechanisms evolve in a manner compatible with the objectives of the internal market" (Regulation (EC) 1228/2003: art.8.4). Equally, it mandated the Commission to monitor implementation and submit to the European Parliament and the Council no more than three years later a report on the experience gained, examining to what extent the rules had been successful in ensuring non-discriminatory network access, while if necessary making appropriate proposals and/or recommendations for revision (Regulation (EC) 1228/2003: art.14).

As anticipated, a new problem indeed arose shortly thereafter, namely what type of market-based auctions should be used. In the early 2000s, explicit auctions where energy and transport capacity are traded separately was the most popular option in Europe, not least because it was simpler than its main alternative and could work despite significant differences between national systems. Explicit auctions were applied, for instance, on the German and Belgian borders of the Netherlands, on the interconnector between France and England, and on the Danish-German border (Knops et al. 2001: 18). These were the predominant method (FEF 2005; ERGEG 2007a), favored also by the European associations of generators and suppliers (Eurelectric 2005) and of traders.[10] By contrast, Spain and the Nordics preferred the solution they were already using, namely implicit auctions where energy and transport capacity are

9 BUS6b; EUI1c.

10 EUI3a; BUS1.

traded jointly, a more complex solution demanding greater cross-national uniformity (Knops et al. 2001: 21). In principle, this was also the favorite option of the Commission, which however doubted its feasibility in the short term (European Commission 2001). The key problem was that both the Spanish and the Nordic (Nord Pool) markets were managed by a single electricity exchange. However, national electricity exchanges strenuously opposed the creation of a single European exchange, which would have threatened their very existence.[11] The crucial question thus was to what extent and how this theoretical superior alternative could be implemented despite the absence of a single electricity exchange – a question to which no one had a clear answer (Consentec & Frontier Economics 2004; ETSO & EuroPEX 2004).[12]

With the support of the European network of NRAs it had created (ERGEG), the Commission organized a series of mini-fora and then regional initiatives. These were explicitly intended to foster testing of solutions on a voluntary basis, by bringing together NRAs, TSOs, electricity exchanges and other stakeholders in different macro-European regions. By building on these experiences, and often making explicit reference to them, in 2005-2007 several actors came to publicly support and implement implicit auctions. Thus for example Eurelectric reversed its previous view, observing that "it is now appropriate to restate our position as regards the preferred solution and the way forward" (Eurelectric 2005: 7). The Commission modified its previously ambivalent position by confidently supporting implicit auctions (European Commission 2007a: 186, 2007b: 5). Most regions were proceeding towards implicit auctions. This was not only the case for the Trilateral Market Coupling (TMC) between France, Belgium and the Netherlands, whose pioneering experience had provided much inspiration (ERGEG 2007c: 10; FEF 2007).[13] The Iberian market (Mibel) formed by Spain and Portugal, and the integration of the Nord Pool with continental Europe via the Kontek interconnector between Denmark and East Germany all adopted plans for introducing implicit auctions (ERGEG 2007d: 15). Indeed, the "growing consensus in terms of target congestion

[11] EUI3a; BUS1; BUS2a.

[12] BUS2a.

[13] EUI1a.

management methods" (ERGEG 2007d: 13) was "undoubtedly the main achievement reached under the regional initiatives" (ERGEG 2008a: 20).[14]

Again, however, the agreement that implicit auctions should be the target mechanism for all regions (ERGEG 2007d: 22, 2008a: 3) was not perceived as a definitive solution. Instead, once consensus on implicit auctions had emerged, new questions arose as to the detailed arrangements needed to implement them. The FEF noted that progress was taking place "at different paces and in different directions" (FEF 2007: 3). The French NRA expressed concerns about inter-regional compatibility and coherence (CRE 2008). ERGEG began producing "coherence and convergence" reports which focused attention on the detailed design of implicit auctions in order to ensure regions' compatibility (ERGEG 2008b). The main source of uncertainty was that, until then, implicit auctions had either been introduced to replace previously used explicit auctions (e.g., TMC, Mibel), or to couple regions using implicit auctions with others using explicit ones (Nord Pool and Germany) (ERGEG 2008a: 8). By contrast, there was no experience with integrating different regions that were all using or preparing to use implicit auctions. Since implicit auctions by definition trade transport capacity and energy in one "bundle", the coexistence of different arrangements requires a high degree of compatibility across borders, for instance in terms of gate closure times, algorithms and products (ERGEG 2008b: 13). For these reasons, it was considered that "the most challenging case seems to be the coexistence between two different methods of implicit auctions in adjacent or overlapping regions" (ERGEG 2007b: 22).

The two main alternatives were "volume coupling" and "price coupling", the key difference being the amount of information to be shared: while the former method calculates only the amount of energy flows but leaves the calculation of prices in the hands of national exchanges, the latter calculates through a single algorithm both energy flows and prices across all borders at the same time (ERGEG 2007b: 23). The strongest supporter of the less harmonized solution was once again Germany, while the key advocates of the more harmonized solution were, once more, the Nordics, because

14 EUI1a.

this was the solution they were already employing.[15] The FEF invited the ERGEG to create a group of experts with representatives from the Commission, ministries and NRAs, TSOs, exchanges, traders, and generators and suppliers, tasked with "developing a practical and achievable model to harmonize interregional and then EU-wide coordinated congestion management, and proposing a roadmap with concrete measures and a detailed timeframe, taking into account progress achieved in the ERGEG Regional Initiatives" (FEF 2008: 2). The German-Danish approach proved to be a spectacular failure, which failed to launch twice and then delivered economically incoherent results. But until then, many thought it was a plausible alternative (ERGEG 2008b: 12-14).[16] It was, according to an interviewee, really a case of "learning from experience",[17] which "made clear to everybody that price-based coupling was the only approach able to guarantee consistency between market prices and cross-border flows" (Pototschnig 2019: 26). The expert group therefore concluded that "price coupling should be agreed, i.e. a single common algorithm used by all markets" (PCG 2009a: 4). Since then, the issue has not been reopened and ACER estimates that, by significantly increasing the utilization of cross-border transport capacity, this solution has delivered annual benefits of ca. €1 bn (Pototschnig 2019: 26).

But once again, the target model based on pan-European price coupling proposed by the expert group and endorsed by the FEF in 2009 anticipated that "the design prerequisites for price coupling can be partly identified/foreseen currently; however, this identification is not comprehensive since the technical challenges naturally emerge as markets are gradually coupled. The algorithm can [thus] be updated / reviewed from time to time according to market needs/ requirements/extensions" (PCG 2009b: 15-16). Hence the Regulation codifying and giving binding power to the target model established a number of provisions for monitoring progress and potential problems with the implementation of price coupling, producing a biennial report, and assessing the efficiency of bidding zones configurations every three years as well as the effectiveness

[15] EUI3a; BUS6a; EUI1b.

[16] EUI3a.

[17] EUI3b.

of the operation of the price coupling algorithm every second year (Commission Regulation 1222/2015: art. 82, see also arts.11, 31-34, 37). Even more strikingly, it became apparent to policy actors that this supposedly readily implementable network code would actually require further substantive and procedural rules. Legal teams thus suggested transforming this network code into a binding guideline, which provides for the elaboration of further rules,[18] a legal strategy which was then rapidly applied to a number of additional problems in the electricity sector. Thus the 2015 Regulation establishing a binding guideline on capacity allocation and congestion management foresees that "given the exceptionally high degree of complexity and detail of the terms and conditions or methodologies needed to fully apply [...] price coupling, certain detailed terms and conditions or methodologies should be developed" (Commission Regulation 1222/2015: rec.30). It includes a long list of new problems calling for solutions to be proposed by TSOs and in some cases electricity exchanges, and to be approved by NRAs or ACER (Commission Regulation 1222/2015: art.9). The many terms, conditions, and methodologies foreseen for the next few years suggest that, in the key problem area of cross-border network access, on the one hand policy actors still do not believe themselves to have reached a definitive solution, and on the other that a new cycle of experimentalism is on the horizon. After having looked at capacity allocation and congestion management, the paper now moves to analyse the binding network codes and guidelines that have been produced across several problem areas since the beginning of the 2010s.

4.3 Monitoring and Amendment of Network Codes and Guidelines: Experimentalism as a Multi-Purpose Governance Architecture

A recent exemplification of Pathway (4), whereby actors' recognition of the pervasiveness of strategic uncertainty leads to the institutionalization of experimentalism as a multi-purpose governance architecture, can be seen in the various groups, platforms and committees which have recently been created to monitor the implementation of and propose revisions to the binding network codes and guidelines

[18] EUI3b; EUI1b.

produced since 2011. As explained by ENTSO-E, the drafting and approval of such rules is "just the start". Each of these rules requires a series of further steps, including cross-national and national decisions, regional agreements, and elaboration of common detailed methodologies and terms and conditions, as well as coordinated application. The success of this project is thus considered to require "efficient and intensive sharing of views and information by all interested parties throughout the process as a whole", with stakeholders being "kept abreast of developments and be provided with a forum to express their views and feedback" (ACER & ENTSO-E 2015: 3).

Based on this acknowledgment of widespread strategic uncertainty, following the entry into force of the first network codes and a public consultation, between 2015 and 2017 ACER and ENTSO-E co-organized three European Stakeholder Committees, one for each "family" of codes (i.e., market, operational, connection). Similarly to the FEF, which may be considered a precursor of experimentalism as a multi-purpose governance architecture, these committees did not directly derive from EU legislation. Nor do they aim to replace the legal obligations of stakeholder consultation and information foreseen in the network codes for the implementation period. Instead, their terms of reference were approved by stakeholders themselves at their first meeting, following joint proposals from ACER and ENTSO-E. ACER chairs each committee, with the Commission invited as observer and ENTSO-E providing secretarial services. Members were nominated through formal calls open to any association representing pan-European views or interests, with the total number of members kept below 25. Each committee meets approximately four times a year, and can create ad hoc subgroups focusing on specific problems (ACER & ENTSO-E 2015: 5-7). These arrangements are designed to provide stakeholders with a forum to receive early information and share input on implementation projects; to offer ACER and NRAs a platform for identifying gaps, inconsistencies, overlaps and inefficiencies, as well as a responsive mechanism for monitoring the operation of processes and procedures; and to give ENTSO-E, electricity exchanges and other parties responsible for the implementation of network codes opportunities to report on implementation projects, especially lessons learned and problems encountered, present early drafts of the terms and conditions and methodologies they are developing, and receive feedback, thus supporting more informed decision-making and better quality projects (ACER & ENTSO-E 2015: 4).

In 2017, these committees were complemented by the Network Code Implementation and Monitoring Group (NC-IMG), which focuses distinctively on strategic issues related to the implementation of network codes and guidelines which may have an impact on the integration of European energy markets. Its tasks include taking stock and discussing implementation progress; issuing non-binding implementation guidance; and reflecting on the future development and/or amendment of network codes, alongside the applicable legislative procedures (European Commission et al. 2017: 4). The NC-IMG is chaired by the Commission and composed of high-level representatives of ACER, ENTSO-E (and ENTSO-G for gas). Stakeholders may address questions to the committees, and be involved via consultations and workshops (European Commission et al. 2017: 4-5).

Although the extremely recent establishment of this governance architecture makes an assessment of its operation necessarily very preliminary, the NC-IMG has already actively exchanged views on possible amendments. For example, it has discussed whether the network code on requirements for generators needs to be altered, which has led to the conclusion that, for the moment, such an amendment is not required (NC-IMG 2017: 1). Although there have not yet been any amendments to the network codes, ACER's Director suggests this is primarily because their implementation is fairly recent and it would be unwise to rush. A first stream of issues, however, is emerging, and policy actors have decided to wait until they have accumulated a "critical mass" before proposing a number of amendments jointly, rather than one by one.[19]

While substantive revisions are still pending, in 2019 the NC-IMG produced an informal guidance document on the network code and guideline amendment process, aimed at ensuring an efficient and robust preparatory stage, centered on proposals from the European Commission to be adopted through comitology (NC-IMG 2019: 1). The guidance document exhibits clear experimentalist traits, specifying for example that

[19] EUI3b.

ACER "will review the proposals submitted on a more flexible basis rather than with a specific periodicity. This means the assessment will be performed either when a need arises following implementation monitoring or on the basis of the requests submitted, their priority and urgency" (NC-IMG 2019: 6). It also explains, in equally experimentalist fashion, that ACER will consider how far a given amendment proposal "relates to new arguments or facts not known at the stage of the preparation and adoption" (NC-IMG 2019: 6). Having shown how policy actors, recognizing widespread strategic uncertainty across the whole EU electricity regulation, have institutionalized XG as an architecture to deal with various problem areas, the paper now concludes by discussing the broader implications of these sectoral findings for the long-term relationship between XG and strategic uncertainty.

5. Conclusion

Returning to the four ideal-typical pathways for the temporal evolution of XG set out in section 1, what can we conclude from this empirical process-tracing analysis of EU electricity regulation? First, the analysis of cross-border tarification shows that contrary to Eberlein's (2010) claims, there has been no reversion to hierarchical governance, resulting from an endogenous reduction of strategic uncertainty through the application of XG methods and the ensuing resurgence of distributive conflict (Pathway 1). In addition to codifying the solutions to this problem agreed in the FEF, EU legislation introduced provisions for regularly monitoring and reporting on their implementation, and for assessing the possible need for revisions. The analysis also shows that although the Commission has not thus far taken up ACER's recommendation to introduce some changes to the tarification arrangements, this is primarily due to the common perception that the current solutions are working reasonably well rather than to any intractable deadlocks. This finding is further corroborated by the observation that the distributive consequences of tarification solutions may be considered "small money" by sectoral standards, while the most urgent—and clearly distributive—problems mentioned in ACER's 2013 Recommendation are being addressed through other current regulatory initiatives. Since the process-tracing analysis of policy development on this problem finds no evidence of a reversion to hierarchical governance (Pathway 1), it also does not find evidence of policy actors “stumbling back into experimentalism” as a result of a subsequent re-emergence of strategic uncertainty (Pathway 2).

Second, on the problem of access to cross-border networks, the analysis shows that through reflection on implementation experiences in the FEF, public authorities and market players came first to agree on the shift from “administered” methods such as pro-rata or first-come/first-served to market-based auctions, which however raised new questions, namely what type of auctions to use. The subsequent choice in favor of a certain type of auction over its main alternative, in turn, raised yet another question, this time concerning even more specific implementation arrangements. Crucially, at no point in this sequence did policy actors come to believe that they had found the definitive solution, a possibility which would have led back to Pathway (1). On the contrary, at each step in the sequence, they established nested experimentalist provisions for monitoring experience with the implementation of the new solution and proposing further specifications, as hypothesized in Pathway (3).

Finally, the analysis shows that since 2009 the key policy actors (the Commission, ACER, and ENTSO-E), in consultation with other stakeholders, have developed a multi-purpose XG governance architecture for adopting, implementing, monitoring, and revising network codes and guidelines across the full range of problems covered by EU electricity regulation in response to the pervasiveness of strategic uncertainty in this sector. The analysis further shows that despite the recent institutionalization of this multi-purpose experimentalist architecture (Pathway 4), the NC-IMG and European Stakeholder Committees associated with have already stimulated considerable discussion on possible revisions to specific network codes, while producing informal guidance aimed at facilitating the formal amendment process for the first stream of issues currently arising.

Following the Bayesian logic of theory-testing process tracing, this analysis of the development of EU electricity regulation since the late 1990s strengthens empirical confidence in the theoretical expectation that XG is self-reinforcing, both through nested experimentalism in the sequential exploration of new problems arising from previous provisional solutions (Pathway 3) and through the institutionalization of XG as a multi-purpose governance architecture in response to actors' recognition of pervasive strategic uncertainty (Pathway 4). Conversely, the analysis diminishes confidence in the theoretical claim that XG is self-limiting because the solutions it produces to initially open problems endogenously reduce strategic uncertainty, paving the way for the re-emergence of distributive conflict among policy actors and the reversion to hierarchical forms of governance (Pathway 1).

This analysis of EU electricity regulation does not and cannot prove definitely that XG is always self-reinforcing, nor that it is never self-limiting. Extending the generalizability of its findings would require further process-tracing analyses at a similar level of granularity across other policy domains within and beyond the EU. As we have seen, however, electricity regulation is characterized not only by features that might be thought to favor XG, such as technical complexity, but also by others that are widely considered inimical to it, such as high levels of politicization and distributive conflict. Hence there is no a priori reason to believe that this paper's findings concerning the self-reinforcing relationship between XG and strategic uncertainty should not travel more widely.

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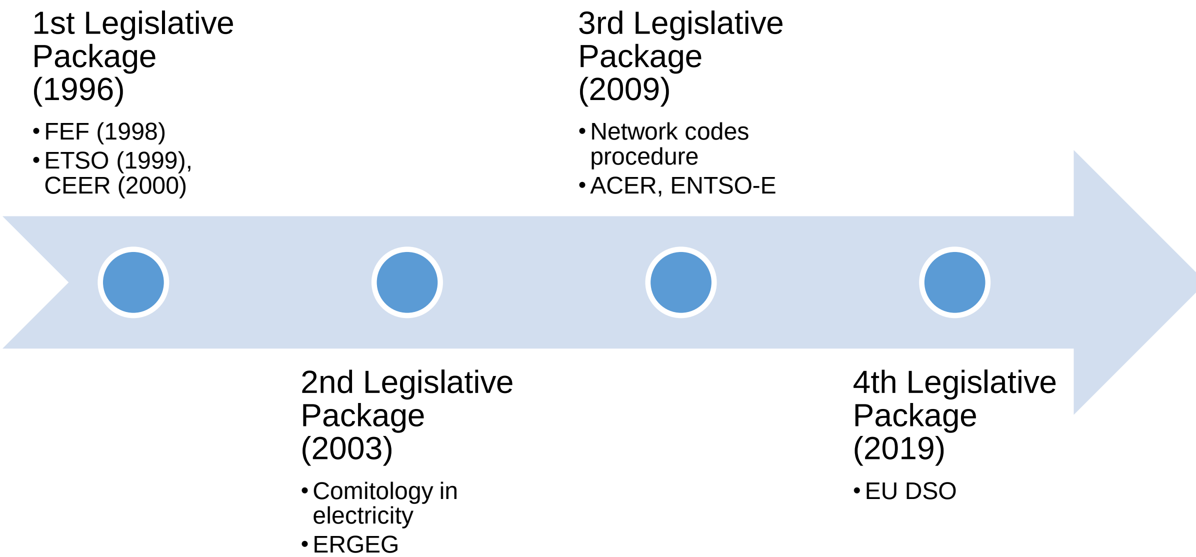
Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity.

Appendix 1: Key legislative measures, rulemaking arrangements and policy actors in EU electricity regulation

Figure 1. Timeline of key legislation, arrangements and actors in EU electricity regulation



Glossary of key legislation, arrangements and actors in EU electricity regulation

2003/796/EC – Commission Decision establishing ERGEG; adopted at the same time as the second legislative package

ACER (Agency for the Cooperation of Energy Regulators) – formal EU agency established by Regulation (EC) No 713/2009; it plays a key role in the development of network codes

CEER (Council of European Energy Regulators) – informal European network of national regulatory authorities created voluntarily in 2000 through a memorandum of understanding

Comitology in electricity – set of long-standing procedures which, since 2003, were introduced also in the electricity sector, giving the European Commission the power to adopt, with the assistance of committees composed of member states representatives, delegated acts to implement EU legislation

Directive 96/92/EC – first Directive concerning common rules for the internal market in electricity; it was rapidly followed by, though it did not directly create, the FEF as well as ETSO and CEER

ENTSO-E (European Network of Transmission System Operators for Electricity) – formal European network of transmission system operators established by Regulation (EC) No 714/2009; it replaced ETSO and plays a key role in the development of network codes

ERGEG (European Regulators' Group for Electricity and Gas) – formal European network of national regulatory authorities created by Commission Decision 2003/796/EC as its advisory body; replaced by ACER
ETSO (European Transmission System Operators) – association of transmission system operators created voluntarily in 1999; dissolved in 2009 when replaced by ENTSO-E
EU DSO (European Entity for Distribution System Operators) – formal entity created by Regulation (EU) 2019/943; it is analogous to ENTSO-E but focuses on local distribution rather than long-distance transmission networks, and plays a key role in the development of relevant network codes
FEF (Florence Electricity Forum) – informal forum created by the European Commission in 1998 right after first Directive to facilitate discussion and exchange of views on the creation of the internal market
Network codes procedure – arrangement established by Regulation (EC) No 714/2009 to develop EU-wide, detailed rules with the involvement of the European Commission, ACER, ENTSO-E and, since 2019, also EU DSO where relevant; these rules are eventually made binding through adoption via comitology
Regulation (EC) No 1228/2003 – first Regulation on conditions for access to the network for cross-border exchanges in electricity; together with Directive 2003/54/EC, which repealed Directive 96/92/EC, it formed the second legislative package
Regulation (EC) No 713/2009 – Regulation establishing ACER; it formed part of the third legislative package
Regulation (EC) No 714/2009 – second Regulation on conditions for access to the network for cross-border exchanges in electricity; it repealed Regulation (EC) No 1228/2003 and formed part of the third legislative package; it established ENTSO-E, and introduced the network codes procedure, giving the European Commission, ACER and ENTSO-E key tasks therein
Regulation (EU) 2019/943 – Regulation on the internal market for electricity; it repeals Regulation (EC) No 714/2009 and forms part of the fourth legislative package; it establishes EU DSO entity and gives it a role in the development of the relevant network codes

Appendix 2: Interviews

In addition to existing academic literature and publicly available regulatory policy documents (e.g., minutes of meetings of the FEF, progress reports, consultancy studies, position papers by trade associations, legislative proposals from the European Commission, legislation adopted by the European Parliament and Council, network codes), this article is based on interviews, which were conducted to both integrate and cross-check the information from the other two sources of evidence.
Between 2015 and 2019, Bernardo Rangoni conducted 25 interviews with 16 experts on EU electricity regulation. Many of these interviews were conducted in person, notably in Brussels (where most EU institutions and trade associations are located), in Ljubljana (where the EU regulatory agency ACER is based) and in Florence (where the FEF takes place). Six people were interviewed more than once. While all interviewees were offered the possibility of benefiting from anonymity or confidentiality, only one chose that

option. The interviews cited in the text are referred to by a unique code explained below, along with a complete list of interviews by date and place, institutional affiliation(s) of interviewees during the period analyzed, and their brief profiles.

Interviewees were selected to ensure representative sampling as well as expertise and experience. Key experts were identified by building on the network of contacts that Rangoni had developed by working on EU electricity regulation as a practitioner. Representativeness was ensured by selecting interviewees from representatives of businesses and EU-level trade associations on the one hand, and national regulatory authorities and European regulatory networks, plus officials of European institutions such as the European Commission and regulatory agency as a third category, on the other hand.

Interviews were semi-structured, but at the same time contextualized to the specific position and expertise of each interviewee; moreover, the semi-structured guide to the interview was continuously revised in the light of the emerging findings. Once Rangoni had conducted initial interviews with these experts, he asked them to suggest other potential interviewees, so that he could expand his initial network of contacts. In addition, in some cases Rangoni conducted follow-up interviews to further discuss and clarify important issues that had emerged; indeed, in these cases discrete interviews became more akin to continuous conversations, but since this happened across different target groups, the views remain representative.

Interview list and key

Key

BUS = Businesses (companies and trade associations)

REG = Regulators (national authorities and their European networks)

EUI = EU Institutions (European Commission and regulatory agency)

Table 1. List of interviews

Number	Name	Institution(s)/Organization(s)	Date & place of interview	Interview Code
1	Dr. Guido Cervigni	Head of Market Development at Italian power exchange	Email exchanges 7/4/2015	BUS1
2	Dr. Juan José Alba Rios	Vice-President for regulatory affairs at Endesa and Chairman Markets Committee of Eurelectric	Brussels 17/5/2016	BUS2a
3			Florence 1/7/2019	BUS2b
4			Email exchanges 1-5/8/2019	BUS2c
5	Marco Foresti	Market Advisor at ENTSO-E	Brussels 18/5/2016	BUS3
6	Dr. Matti Supponen	Policy Coordinator for Wholesale Markets at DG for Energy of the European Commission	Brussels 19/5/2016	EUI1a
7			Phone 2/7/2019	EUI1b
8			Phone 2/8/2019	EUI1c
9	Edith Hofer	Assistant to the Director General for Energy of the European Commission	Brussels 19/5/2016	EUI2

10	Stephen Rose	Head of Gas Market Design at RWE and Chairman Gas to Power Working Group at Eurelectric	London 25/5/2016	BUS4
11	Prof. Pippo Ranci Ortigosa	President of Italian regulatory authority and Vice President of CEER	Email exchanges 26/5/2016	REG1a
12			Email exchanges 20/6/2019	REG1b
13	Alberto Pototschnig	Director of ACER	Ljubljana 9/6/2016	EUI3a
14			Florence 1/7/2019	EUI3b
15	Dr. Martin Povh	Officer for framework guidelines at ACER	Ljubljana 9/6/2016	EUI4
16	Dr. Annegret Groebel	Director of International Relations at German regulatory authority and Vice-President of CEER	Phone 10/6/2016	REG2a
17			Phone 15/7/2019	REG2b
18			Email exchanges 24-25/7/2019	REG2c
19	Fernando Lasheras Garcia	Director of Brussels representative office of Iberdrola	London 23/6/2016	BUS5
20	Mark Copley	Associate Partner for wholesale markets at British regulatory authority and Vice-Chair Electricity Working Group of ACER	London 24/6/2016	REG3
21	Peter Styles	Chairman Electricity Committee of EFET	London 28/7/2016	BUS6a
22			Phone 9/7/2019	BUS6b
23	Jérôme Le Page	Director for European electricity markets at EFET	Phone 24/09/2019	BUS7
24	Interviewee Anonymous	Head of a European company	Amsterdam 7/10/2019	BUS8
25	Maria Popova	Manager for market supervision and renewable electricity at EFET	Phone 17/10/2019	BUS9