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**Title : Performativity struggles in the design of the electricity market: framing and overflowing Demand-Side Response in France**

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## Abstract

This paper examines the roles of political authorities and independent regulatory authority in the design of the French electricity market. The electricity sector is concerned with a liberalization process involving the performativity of a market model and executed by a specific environmental and industrial policy, implying different market devices. In order to understand how these two dynamics are intertwined in the market design, we conducted a comprehensive analysis of the trajectory of new rules concerning the integration of demand side response services in the wholesale market. This analysis reveals that the performativity of economics and the politicization of markets are embedded in an institutional configuration where the power is distributed between the political authorities and the independent regulatory authorities. These authorities are competing for legitimacy in the area of market design, but they are also dependent on each other. Our paper contributes to the debate about the institutional condition of the performativity of economics.

## Introduction

Over the last 20 years, the energy sector has faced two public policies that encompass economization: the first policy is associated with the liberalization of the sector, the construction of a competitive European market, and the marketization of energy services (Reverdy, 2014). The second is associated with environmental issues and the promotion of energy efficiency, renewable energy, and climate change mitigation (Voß, 2007, Block, 2011). All energy activities are simultaneously concerned with these two policies.

These two policies have been studied by the economic sociology within the research agenda of the performativity of economics. The notion of performativity is associated with how particular economics helps perform, configure, and shape the economy (Callon 1998). The electricity sector is a good

illustration of the performativity of economics: first, the electricity market has been designed with the help of economic experts who have identified market failures and tried to solve them (Breslau, 2010). Second, the energy transition has made great use of market devices like quota and tariffs (Mackenzie, 2009).

The performativity of economics (Caliskan, Callon 2009; 2010) can be related to two different theses about the relationship between the economy and society. The first thesis deals with the economization through the delegation of the regulation of social and economic life to experts and market devices. This delegation can be a strategy for avoiding political debates by relying on the legitimacy of the “technical” expertise of economists. The second thesis addresses the politicization of economic life enabled by the design and diffusion of new market devices associated with societal or environmental issues (Callon 2009). Economic expertise and such devices contribute to a political engineering of markets. Market devices are becoming a means to achieve political goals.

Callon (2009) suggest that the market design activities should be analyzed through the same lenses of the sociology of technics and the sociology of expertise, which could lead to a normative proposition, that society should develop a dialogic democracy around market devices, implying the participation of concerned actors, economic actors, states, and NGOs. The performativity approach makes it possible to analyze the intertwining of economic expertise and political decision into the design of the market. More precisely, the notion of performativity struggles(Callon, 2007) suggest the dynamic by which an economic theory be realized, “the cooperation it triggers, the oppositions and controversies that it generates”, until “the end of the tests to which it is put”(p. 330).

This paper contributes to the debate on the performativity of economics by developing and illustrating the notion of performativity struggles and by describing the institutions in which and procedures by which it takes place. It also provides an opportunity to overcome the conflict between economization and politicization by tracking different contributions from economic actors, politicians, administrations, experts, and academics and by analyzing the struggles of influences in market design.

The energy sector seems to be a privileged arena for the study of performativity struggle. Neither liberalization policy nor energy transition policy has witnessed the univocal performativity of economics. Both policies were controversial, provoking major disputes about theoretical and practical orientations. Political issues are numerous: support for the electro-intensive industry, modernization of the network, risks of supply, financing renewable-energy development, and electricity demand-side management. Political authorities have accepted the competitive logic but intend to intervene whenever they detect

that the market is playing against political objectives. Elected political authorities did not abandon market regulation to independent authorities (Reverdy 2014) even if they pretended to. Inside the academic community, the design of the electricity market remains controversial. Some academics are in support of the Energy Only Market whereas others defend complementary mechanisms like a capacity market for supply reliability.

Inside the energy sector, the valuation of Demand-Side Response (DSR) is a good opportunity to analyze the performativity struggle. DSR concerns the adaptation of the electricity consumption and is one of the methods currently proposed to balance the electricity network to cope with intermittent renewable energy production and consumption peaks. This flexibility involves consumers' changing their practices and agreeing to reduce or to postpone their consumption. This is a key element of the energy transition scheme, avoiding the use of polluting power plants. Since they can help balance the network, DSR services have an economic value. The question for market actors and politicians is how these new activities should be valued. Should they be valued only by suppliers in their supply strategy? Should they be valued for the direct subsidies justified by the energy transition policy? Should they be valued in the energy market by a specific kind of bid? As this innovative activity can be associated with different existing economic frames, its value will depend on the economic reasoning that will be used to qualify economic value and set the market for these new services.

In order to answer these questions, I analyzed the procedures by which and institutions in which the performativity struggle takes place. In order to be performative, economic models and theories must be institutionalized by way of rules from institutions such as parliaments, governments, and independent regulation authorities. The choice between competing forms of economic reasoning transpires in a regulation activity that is shared by these institutions. The organization of these institutions has an effect on form of economic reasoning that is chosen and the way it is translated into economic practices (Fourcade, 2011). This institutional context is characterized by a large tendency to delegate economic regulation to independent regulatory authorities (Coen and Thatcher 2008). This delegation is justified by the hypothesis that political issues and the activity of economic expertise should be separated between political authorities and independent regulatory authorities. In this institutional project, the political authorities' intervention in the economy should be limited as possible. The legitimacy of independent regulatory authorities relies on their technical expertise and on their independence from political institutions (Gilardi, Maggetti, 2011).

The analysis of the performativity struggle questions the hypothesis of this separation between the definition of political issues and the technical activity of market design. It deals with the relation of interdependency between political authorities and “independent” regulatory authorities. Rather than defending the separation between political issues and market design, we should accept that political issues and technical issues are intertwined.

## Economics performativity in market design

### 1. Competition policy and the performativity of economics

In Europe, the liberalization of different network industries was based on a doctrine and an expertise developed in Anglo-Saxon countries. If the action of the Commission can be qualified as political - it aimed to revive a halting European integration (Jabko, 2006) - it is impossible to deny that it obtained its legitimacy from economic expertise and prevailing competition rules. The Commission could also rely on European legislation, with the support of the Court of Justice of the European Communities, to extend the rules of the single market to network industries (Schmidt 1998, Schmidt 2000, Woll, 2009). Once these sectors had been liberalized, economic activities were subject to the same requirements as other economic activities in terms of competition. Regulation of these sectors found a legal foundation already well established at European level, applied to almost all economic sectors and includes the rules against cartel, concentrations and state aid (Cini 2001; Cini and McGowan 1998; Fligstein and Sweet 2002).

The competition regulation has been reinforced by the strengthening of the Directorate General for Competition and other independent regulatory authorities, such as the Competition Authority in France (Djelic and Kleiner 2006). These authorities rely on law to arbitrate in disputes concerning the organization of markets. They also use economic expertise and borrow to academic knowledge its definition of an efficient market, with the equilibrium mechanism of supply and demand as the main method for achieving collective wealth (Veljanovski 2010). Thus, by limiting the regulation of the economy to the organization of competition, the equilibrium mechanism of supply and demand through prices has gained a strong normativity.

The electricity market is a good illustration of regulatory capitalism (Levi-Faur, 2005). The definition by the economic expertise of the conditions of market efficiency has become the main reference that guides the work of independent regulatory authorities. It also provides tools and concepts in order to identify market failures (neoclassical economics, new institutional economics, game theory). Numerous market failures have been documented by academic economists and have encouraged the regulation of

markets by independent regulatory authorities (Coen, Thatcher, 2008, 2005, Martino, Gilardi. 2011). Network industries need regulation in particular to facilitate third party access to the network, but also to encourage new entrants. Furthermore, electricity has the characteristic of being a non-storable good, for which the production and consumption must fit precisely in real time. The market must achieve the balance of production and consumption through the formation of a price. Market design and price control involve economists' expertise (Breslau 2013), such as in telecom regulation (Mirowski, Nik-Khah, 2007) or competition regulation (Dumez, Jeunemaître 1998). Regulatory authorities seek academic economists support to clarify the operating procedures of these markets, adapted in a way they respect the requirements of economic efficiency rationality (Breslau, 2011). The European competition policy had recently grounded its legitimacy on economics. This use of economics is more pronounced in the electricity sector where they were requested to define market rules in order to avoid the "market failures" that they could identify.

However, it is not clear whether some political influences remain into the market design process, especially when there isn't a consensus between economic experts. The question remains, whether the room for maneuver for political influence is limited to constraints sphere of decision with reduced consequences, or if the political influence have major outcome in terms of economic revenues or economic activities. It is important to make explicit on which basis Independent Regulatory Authority or Judicial Authority make their arbitrage in a context of ambiguity or uncertainties (Mirowski, Nik-Khah, 2007, Dumez, Jeunemaître, 1998)

Recent papers have focused on the way markets have been redesigned with clear political projects like natural resources protection (Holm, 2009, Overdevest, 2011), climate change mitigation (Voß, 2007, Callon, 2010, MacKenzie, 2010, Block 2011), and renewable energy development (Deboureau, 2011, Pallesen, Karnoe).

The enthusiastic thesis of "market civilization" supported the idea that market design could be an opportunity to integrate political issues into economic life by introducing new frames for action, new incentives, or new knowledge. The creation of the European Emission Trading Scheme and the Clean Development Mechanism in the Kyoto Protocol provide powerful supports for this thesis. Michel Callon suggested that the mobilization of NGOs, scientists, and economics create a favorable context for a new problematization, a network of problems and solutions, which could lead to an exploratory market design.

However, the accumulation of criticism of these new instruments has deeply invalidated hopes for the success of the politicization of economic life. These experimentations have been reinterpreted as attempts to marketize environmental issues, which created new forms of economic domination. While market instruments can open a large space for innovation and initiatives, they also create a large space for opportunistic behavior and the exploitation of all sorts of organizational failures and windfall profits.

The design of the articulation of DSR services in the electricity market has been seen as an opportunity to integrate some political issues into the market such as the balance of the network, the integration of renewable energy, consumption reduction, or consumer empowerment. Like the CDM, support for the DSR remains questionable, with strong criticism about the fact that the marketization can create new opportunistic behaviors. How are different kinds of political issues intertwined with economic expertise in the design of this new market? How is reflexivity about the different effects of the first experimentation organized? How have concerned parties participated in the evaluation of the breach and the redesign of the mechanism? Did some economic expertise constrain the design of the mechanism in a way that major political issues were forgotten? How is it possible to democratize the marketization of political issues?

## Empirical case and methodology

Since the start of the liberalization of the electricity sector, the balance between electricity production and consumption is managed through a market mechanism, responsible for setting a price that reflects the scarcity of electricity or, on the contrary, its abundance, and which therefore naturally encourages economic actors to adjust their production or consumption (Karnoe, 2010). Market design aimed to translate the technical balance into a market equilibrium. Into this market thinking, the demand-side flexibility is crucial for the functioning of the electricity market as it develops the demand's sensitivity to the market price and should be valued through the market mechanism.

Since 2000, France has gradually opened the production and commercialization of electricity to competition. The electricity market establishes an equilibrium in real-time (electricity is not stored) between variable consumption, which depends on consumers' activities and weather conditions, and an offer, which is also variable, due to equipment failures or the intermittent production. With the growth of intermittent renewable energies the need for flexible demand-side management is going to increase. The first, most accessible solution consists in developing the shedding of large electricity consumers, stopping their activity can free up significant power on the network. But this flexible management can

also target the final consumer. The French company Voltalis, created in 2006, developed distributed load shedding services for private individuals. This services consist in reducing electricity consumption at certain times, by remotely controlling particular consumer appliances. Using an electronic box installed in consumers' homes or small businesses, Voltalis can curtail the supply of electrical devices for short periods of time. By installing its box in many consumers' homes, the company thus releases up electricity in sufficiently large quantities to be taken into account by the French Transmission System Operator, Réseau de Transport de l'Electricité (RTE). This activity requires initial investment in automation infrastructure in private homes. The benefits result from the valorization of load shedding by the network or by the electricity market.

Our analysis starts with the struggle between experts on the question of the financial transfers generated by the activation of load shedding. The Energy Regulatory Commission (ERC) published a resolution on 9 July 2009. After a large political mobilization, the decision of the ERC has been broken by the Council of State in 2011. This decision has been followed by a decision from the Competition Authority, three laws (in 2004, 2013, and 2015) and a decision from the Constitutional Council (in 2014), before the mechanism of financing distributed load shedding has been stabilized.

A seminal investigation collected all products of public documents: research papers, experts' reports, Parliamentary reports, Parliamentary debates, legal decisions, technical documents from the independent regulatory authority, and the European Commission's decisions regarding these issues. A systematic investigation of the decision allowed the identification of the different economic rationales mobilized in regulation (Fourcade, 2011, Ehrenstein, Muniesa, 2013, Hirschman and Berman 2014). We examined how these arguments were constructed, simplified and translated from one instance to the other (MacKenzie 2011) in the technical areas of experimentation, media public space, political instances (Parliament or government), and institutions such as the Council of State or the Constitutional Council.

In thesecond phase, we conducted interviews with some contributors and asked for comments on decisions. Interviews focused on certain breaks in the dynamic of the exploration. We empirically reconstructed the trajectory of the regulation, the unexpected paths different from usualtrajectories. For example, regarding the issue of the integration of demand-response managers into the wholesale electricity market. Each of these decisions produced different rules from the previous ones, with very significant effects on the profitability of demand-response management.

Energy	Regulatory	9/7/2009	Deliberation on integration of distributed load
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Commission (ERC)		shedding in adjustment mechanism
Council of State	3/5/2011	Cancellation of the ERC decision
Competition Authority.	20/7/2012	Decision n° 12-A-19
Parliament	16/4/2013	Brottes Law
Parliament	10/10/2014	Amendment of the energy transition law
Gouvernement	11/1/2015	Premium level announce
Council of State	1/2015	UFC-Que Choisir (Consumer association) submitting a complaint against the premium
Gouvernement	2/2015	Premium withdrawal
Parliament	18/02/2015	Amendment of the energy transition law
Parliament	26/5/2015	New article (n°46)

### Experimentations

The last step of the analysis is based on two fundamentals. First, we considered every decision, taking into account the institutional mandate of the authority, its legitimacy requirements (Maggetti 2012), and its knowledge frame. Thus, the legitimacy of an Energy Regulatory Commission originates from a mandate from Parliament and the fulfilment of economic-efficiency reasoning. Its main challenge is to work in line with the network of European regulators and the European Commission. Then, we analyzed interdependencies between political and independent authorities: each one knows that its intervention can be eventually invalidated by another authority that is superior in terms of formal institutional hierarchy. For example, judicial authority, requested by actors in the market, will consult economic actors, academics, parliamentarians, and independent regulatory authorities, among others.

### Results

Even if the legitimacy of independent regulatory authority is associated with economics whereas the intervention of political authority are justified by political issues, their contributions are intertwined into

the design of the market rules. The activity of regulation result from the tension between these two legitimacy. The activity is taken in charge by these different authorities, it remainsdispersed and fragmented. Because it is impossible to separate the “technical” fromthe “political” dimensions inside the market design activity, the different authorities are also closely interdependent.

#### 1. A technical controversy in market design

Economic actors take an essential role in theexploration dynamic of new rules. The process of regulationresults from demands expressed by actors to solve what they consider “market failures” that limit the development of their activity. Their strategy consists of identifying the authority that is most sensitive to the issues they can associate with their request and whose intervention could be the most profitable for their project. Solicitations are dependent on possibilities of influencing the political, judicial or regulatory authority.

Voltalis asked for having load shedding recognized by the TSO in the framework of the adjustment mechanism, one of the mechanisms used to balance production and consumption in the network in real time. The adjustment mechanism is leveraged in real time by the TSO when a supplier is unable to meet its customers’ demand. Each supplier is responsible for the real-time balance between what they inject into the network (what they produce or what they buy on the wholesale market) and what their customers consume. They are required to forecast consumption to supply the adequate quantity. If these customers consume more and the supplier is unable to meet their demand, the TSO takes over and uses producers or load shedding operators involved in the adjustment mechanism.

During the year 2008, the experts failed to agree on the question of the financial transfers generated by the activation of load shedding offers. The suppliers considered that the load shedding aggregator had to reimburse the balance responsible entity (ie the supplier of the customer who was shed) for the electricity that this supplier “injected into the network”. The Voltalis CEO, Pierre Bivas, disputed this argument and maintained that the load shedding aggregator should not have to pay for the supply of electricity when the consumers had been shed. In the absence of consensus, the TSO appealed to the ERC to clarify the rules. The ERC published a resolution on 9 July 2009, in which it clarified and justified the existence of a payment to the supplier shed by the load shedding aggregator.

#### 2. Logical trial of the economic reasoning involved in market definition

To clarify the struggle and set a reliable rule, the ERC asked for the help of Claude Crampes, a neoclassical economist at Toulouse School of Economics. This discussion helped to define the role of load

shedding in the adjustment mechanism. The reasoning of the ERC is formalized in its resolution. The reasoning was built on the postulate that the adjustment mechanism is based on a market mechanism. This mechanism is used by the TSO when one of the market actors is unable either to produce the electricity that it has committed to producing or to satisfy the consumers that it has committed to satisfying. The TSO then chooses between the offers, on the adjustment market, of producers (additional capacities) and those of load shedding operators to restore the balance. The TSO not only purchases a service which contributes to restoring the network balance, it also buys electricity which is sold to the supplier that defaulted and needs it for its own consumers. The only way for the load shedding aggregator to participate in the network balance is therefore to integrate this adjustment mechanism, and therefore to sell electricity on this market. However, the load shedding operator does not produce this electricity: it obtains it from a supplier, which had committed to supplying it to its customers (as a “Balance Responsible Entity”), who then did not consume it. It is able to supply this electricity to the adjustment mechanism because the supplier of the customers shed honored its supply commitments. It is therefore logical for the load shedding aggregator to remunerate the supplier for this electricity which the latter injected, at least at the price of the supply (what the customers would have paid had they not been shed).

*According to the ERC: Value of load shedding = Energy Market price – Furniture tariff*

Based on this organization of the adjustment market, it was possible to make explicit the rule of “economic precedence” between production and load shedding formalized in the French Energy Code. Respecting the order of economic precedence involved ranking offers according to their economic contribution to “social surplus”. In other words, it had to be possible, on the market, to orient actors towards an economic solution that was optimal for all concerned. By clarifying the adjustment mechanism, the ERC demonstrated that the optimization of “social surplus” entailed paying the price of the energy shed to the supplier that injected it.

Volta's argumentation was based on a simple formalization of the imbalance and adjustment problem. It considered that, in a situation of imbalance, TSO's alternative was to use additional production infrastructure or to resort to consumer load shedding. From the perspective of the network balance, the two solutions were equivalent: hence load shedding had to be remunerated at the same level as peak production. This reasoning had the merit of being simple. It did not involve the abstractions of the adjustment market, the Balance Responsible Entity, consumption profiles, etc. It distinguished the problem of the network balance, which was the responsibility of the TSO, from the transactions between

suppliers. Thus, in response to the ERC's argument, Voltalis proposed that supplier, which needed the adjustment, remunerate the other supplier, for the energy that the latter injected but that their customers did not consume.

*According to Voltalis: Value of load shedding = Energy Market price*

From the vision of ERC and suppliers, the rules defended by Voltalis create an important asymmetry between the Demand-Side Responses services developed by a supplier for their own clients and the same services provided by an independent aggregator like Voltalis. These activities should be remunerated the same level whether they are integrated by the energy supplier offer or introduced by an independent actor.

### 3. Politicization of economic reasoning

The innovative start-up in electric-demand management Voltalis intervened with Parliamentarians to circumvent the rules defined by the ERC. Faced with the ERC's technical argument, Pierre Bivas, the founder of Voltalis, tried to shift the debate to a political level, first by directly appealing to the government and then by turning to the media. Pierre Bivas's ability to take the debate to political bodies stemmed from his personal legitimacy and his own background and career. Bivas was not really an outsider: he was a graduate from the École Polytechnique and the École des Mines. In 1995, he was a technical advisor to the cabinet of Mr Hervé Gaymard, Secretary of Health and Social Security at the time, and in 1996 he was an advisor to Mr Jacques Barrot, in charge of Labour and Social Affairs. He therefore had social markers that lent him legitimacy in the eyes of the institutions and actors in the field. Voltalis also benefited from the support of the group MOMA ("MOdélisation Mesure et Application", "modelling, measurement and application"), led by several members of the Corps des Mines with experience in ministry cabinets or as leaders of French corporations.

Receptiveness to Voltalis's arguments was connected to their political relevance. On the eve of the ERC's decision, Voltalis sent a letter to Nicolas Sarkozy, President of the Republic, and to his ministers Jean-Louis Borloo and Christine Lagarde. This letter asked the President to take action to ensure that the ERC would "*fully recognize the value of the new business and therefore put an end to EDF's absurd constraints designed to destroy it barely after it has hatched, burdening it with a tax paid to EDF to compensate for the energy savings achieved*". In this letter, the ERC's economic authority and expertise were overshadowed, turning this controversy into a struggle between EDF and Voltalis (the ERC was cited only three times, whereas "EDF" appeared 19 times). Pierre Bivas denounced lobbying, which he attributed to EDF, claiming that it "*exacerbates its pressure on the ERC for it to decide to introduce a tax on energy*

*savings*". A few days later the title of the press release concerning the ERC's deliberation attested to this strategy of controversy: *"How EDF circumvented the ERC by making it adopt suppliers' point of view at the expense of consumers, therefore preferring ever greater production to energy savings and reinforcing EDF's dominant position in France"* (press release published in 2009). On many occasions, Voltalis presented itself as an innovative entrepreneur restricted by the historical monopoly. According to Voltalis, the ERC's opinion was the result of a *"corruption of minds"*. Its strategy was to weaken the representation of the adjustment mechanism conveyed by the ERC to influence the audience towards its own reasoning, built around the claim that, from a network balance perspective, electricity production and load shedding were equivalent solutions.

Voltalis drew also on environmental arguments, highlighting coherence with the *"Grenelle de l'Environnement"*, a large participatory political event in 2009 that shaped the French environmental policy. It aligned with a shared representation of load shedding as consumption reduction, an action with a positive political value. It declared that its infrastructure ensured that EDF did not have to use *"fossil fuel plants, which are expensive and polluting"*. This environmental argument, just like the figure of the innovator against the historical monopoly, was soon taken up by the Europe Écologie Les Verts party and by the NGO Sortir du Nucléaire, which denounced *"organized racketeering"*, an *"energy waste premium"*.

The success of Voltalis's argument in the media can be explained by the ambition that the company exemplified. For most politicians interested in energy issues, the need to develop the modulation of consumption had become obvious. This company, which was the only one to provide a concrete solution, therefore had a large audience. Moreover, this debate that enjoyed broad media coverage, secured its legitimacy in the political sphere, and Pierre Bivas was regularly asked to speak in parliamentary debates. The support of Jean Louis Borloo and Europe Écologie Les Verts gave Voltalis legitimacy that it did not have in the technical sphere of the elaboration of the adjustment mechanism where economic expertise prevailed.

The main result of this media coverage and this politicization of the debates was the involvement of political representatives. On 22 July 2009, Jean Louis Borloo, Minister of Ecology, Energy and Sustainable Development, denounced *"the existence of legal and financial obstacles to the development of innovative energy saving offers"*. He stated that he wished to remedy this situation and announced the creation of a working group to *"propose the necessary changes to the legal framework"*, with the primary objective of *"encouraging energy savings while respecting each of the stakeholders' interests"*.

The abstract reasoning used by the ERC to clarify the adjustment mechanism provided Voltalis with many opportunities to discredit it into political fields and media. Voltalis declared that the ERC *“adopted the perspective of the suppliers, who complain about the shortfall, and not the perspective of the consumers who benefit from the energy savings made”*. The term *“shortfall”* was somewhat ambiguous here. For a reader who had not understood the abstraction that is the adjustment market, the *“shortfall”* concerned electricity which consumers had not consumed, and therefore which had not been produced. This is how the expression *“shortfall”* was interpreted by the green party Europe Écologie les Verts and the NGO Sortir du Nucléaire, which claimed that it meant *“that if a number of EDF customers agree to reduce their consumption, EDF demands to be paid as though they had consumed!”* However, in the context of the adjustment market, this *“shortfall”* corresponded to electricity which the supplier had committed to supplying, which they had indeed produced and which had been valorized by the aggregator.

With this argument, Voltalis was able to disseminate doubt about the ERC. The company managed to convince quite a large proportion of the audience, including environmentalists and elected representatives from all sides, willing to believe that EDF, given its dominant position, was able to manipulate regulatory bodies and economic experts. This discourse was widely shared in the media and was particularly visible in the media and the political spheres. Throughout the summer of 2009, many media outlets reported and commented on the ERC’s decision. Each newspaper published a significant number of articles on the topic: Le Monde (seven articles), Le Figaro (seven), Le point (four), Libération (eight), Le Nouvel Observateur (four), Les échos (three), and L’usine nouvelle (six). These articles used the terms employed by Voltalis in its statements. Here are a few examples of titles: *“Why compensate EDF?”*; *“When EDF fights energy savings”*; *“When ‘energy savings’ clash with the electricity market”*.

#### 4. Uncertainties raised by economics

The difficulties encountered by the TSO and the ERC emanated from the novelty of the concept. The ERC was the first regulator to have ruled on the conditions of the integration of distributed load shedding on an electricity market. Elsewhere around the world, the debate was still ongoing. It was particularly intense in the United States. In 2010 the powerful Federal Energy Regulation Commission (FERC) lent its support to advocates of load shedding and demand response, ruling (Order 745 Demand Response Compensation in Organized Wholesale Energy Markets) that the electricity shed could be valued on spot markets with the same value as energy produced, despite opposition from the suppliers and from a part of the academics. The FERC was highly intent on developing demand response as it considered that the lack of demand elasticity in relation to the electricity price made very steep increases in producer prices

possible (it attributed the crisis in California to a lack of elasticity). It nevertheless recognized that this measure had to be re-evaluated according to a “*net benefit test*” to ensure that it still provided a greater overall economic benefit. It therefore provided for an economic evaluation a posteriori.

The FERC’s decision to value load shedding as equivalent with production created strong uncertainty in France regarding load shedding regulation. The fact that the counterpart authority in the United States, the precursor country in terms of energy regulation, had positioned itself in favor of the equivalence between load shedding and production, contributed to weakening the ERC’s credibility. Moreover, on 20 May 2010, two renowned economists, academics and consultants, Jean-Marie Chevalier and Fabien Roques, published a column in the newspaper *Les Échos*, drawing on the same reasoning as Voltalis to criticize the ERC’s decision: “(...) *the current regulatory framework does not allow for the development of demand shedding. The companies offering demanding shedding services (using smartboxes) are required to compensate producers for the electricity which the load shedding prevented them from selling. This appears to be contrary to the laws of market functioning, and breaks the symmetry between production and demand shedding.*”

#### 5. The autonomy of the Independent Regulatory Authority in question

In its 3 May 2011 a decision of the Council of State censured the ERC’s decision of 9 July 2009. The Council challenged the Commission’s right to establish new obligations based on this economic reasoning. The law did indeed state that distributed load shedding offers and peak production offers should be ranked by order of economic precedence. However, for the Council of State, no article indicated that the price of the energy shed had to be paid to the supplier that injected it to calculate this order of economic precedence. The Council of State considered that it was up to the law, and not the ERC, to rule on “*choices regarding the fairness and sustainability of the systems*”. It reminded the ERC that “*the law must be applied as it is and not as the regulator would like it to be.*”

It is very difficult to assess the impact of the political controversy and whether or not it influenced the decision of the Council of State, which gave its verdict based on legal and not technical arguments. This controversy and its political repercussions contributed to relativizing the ERC’s technical-economic reasoning and therefore to causing this technical decision to be seen in a new light, as a political decision. The Council of State expressed the need to organize a hearing of both Voltalis and the ERC. Voltalis called on several witnesses, including the economist David Spector and the former chairman of the ERC, Jean Syrota, who both put forward several critical arguments against the ERC’s decision: the failure to take into account energy savings, the reasoning upheld by the FERC, etc. Since the ERC’s

reasoning had been debated and had become potentially disputable, the Council of State considered that the ERC had not restricted itself to just applying the law on a technical level. Other forms of reasoning were possible and therefore other valuation of load shedding. To clarify the law, the ERC had ventured into producing law. This decision was also made in a context of rivalry between the ERC and Members of Parliament who felt that the ERC had become the spokesperson of the European competition policy and of a market model that went against the government's energy policy.

Regulatory complexity and technical controversies among academics provide opportunities for actors who want to weaken the authority of the ERC to spark an intervention by the government or the Parliamentarians. The strategy of weakening the technical arguments of the ERC leads to the displacement of the delimitation of what falls under the political authorities and what depends on independent authorities like the ERC. The focus on technical uncertainties is a strategy to demonstrate that the positioning of the ERC is not only justified by economic efficiency but by arbitrariness or orthodoxy. The decision falls within the jurisdiction of political authority.

#### 6. The clarification of the economic value

While the Council of State's decision seemed to side with Voltalis against the ERC and the TSO, the other load shedding aggregators who worked with industrial clients and whose business models were probably less threatened, dissociated themselves from Pierre Bivas and validated the ERC's reasoning. They agreed on the fact that, from the strict perspective of the sound functioning of the adjustment mechanism, the aggregator had to remunerate the supplier that had been shed.

The ERC called on renowned academic economists in the field of energy, who regularly advised the European Commission and regulators: J. M. Glachant, Y. Perrez, C. Crampes, T-O. Léautier and M. Rious. These researchers then published a few press articles and scientific studies. In their work, there was consensus around the remuneration of the supplier shed by the load shedding aggregator. Moreover, the FERC's decision was still fiercely challenged by US electricity suppliers and by renowned economists like W.W. Hogan, an economics professor at Harvard, followed by Richard J. Pierce, a law professor at George Washington University. Both stressed that the equation of "negawatts" with "megawatts" had to remain purely metaphorical. Pierce proposed that the value of load shedding be equal to the difference between the spot market price (the "marginal price" at Time t) and the selling price of the supply to the consumer.

$$\text{Load Shedding revenues} = \text{Energy price} - \text{Furniture tariff}$$



The debates surrounding the functioning of the electricity spot market highlighted uncertainty regarding its ability to properly remunerate peak power investment or, conversely, load shedding capacities serving the same purpose. Before 2010, suppliers and academics highlighted a market failure in the Energy Only Market model: the weak revenues for peak generation and load shedding, discouraging investment in capacity. The TSO obtained from Parliament a vote in favour of a Capacity Mechanism in 2010. Load shedding has been considered by the TSO from the beginning as a privileged solution for the capacity mechanism. In order to develop capacity, the TSO supported industrial and distributed load shedding through specific call of tenders for capacities. This choice was justified by the desire to develop this activity and associated technologies. With this system, the aggregator was remunerated for the load shedding capacity they made available to the TSO and not for the consumption shed. Over the course of the implementation of this policy, the TSO made room for the distributed load shedding offer by taking into account its specificities, while trying to find a framework as fair as possible to the other actors of the market. These technical rules were discussed by the committee of the Clients Utilisateurs du Réseau de Transport de l'Électricité (CURTE) made up of suppliers, producers, load shedding aggregators, etc. With the new capacity mechanism designed by the TSO, load shedding activities can get new revenues from the capacities call of tenders.

*Integrating Capacity :*

$$\text{Load Shedding revenues} = \text{Energy price} - \text{Furniture tariff} + \text{Capacity price}$$

7. Influences and rivalry between independent regulation authority and political authority

In 2013, the arguments of the ERC and academic economists gained currency in the administration and among government advisors. The administration wished to avoid the development of a speculative bubble around load shedding, similar to the one that had disorganized the photovoltaics industry, and understood the value of a rigorous conception of market rules. In the same period, the members of parliament were more involved in other issues like the redesign of the regulated tariff, in order to create a progressive tariffs producing strong incentives in favor of consumption reduction.

The Brottes law, published in the Journal Officiel on 16 April 2013, is reflecting the influence of the ERC and the administration and define “a system of payment by the load shedding operator to the electricity suppliers of the sites shed”. Given the risk of this payment reducing the load shedding operator’s

remuneration, the law provided for a premium, paid to load shedding operators, taking into account the benefits of load shedding for society. For the ERC and the TSO, this law had the merit of clarifying the market mechanism, on the one hand, and the subsidy on the other: this subsidy could thus be calculated and debated, based on the identified benefits of the system for society. This subsidy could potentially be challenged by the other actors if they saw it as unjustified.

But the major section of this law, the progressive tariff, had been cancelled by the Constitutional Court, because it introduced discrimination between consumers. Deputy François Brottes wanted to develop Demand-Side Response Services and became interested by load shedding: *“It’s a bit expensive to implement and promote, but load shedding generates real energy savings. It’s an awareness campaign for consumers to behave differently. The whole rise of energy savings involves a transition phase of funding the model. It’s to get it going. It’s a transition method to make actors emerge”* (Médiapart)

*According to Brottes law of 2013 : Load Shedding revenues =*

*Energy Market price – Furniture tariffs + Premium+ Capacity price*

In 2014, the economic context was less and less favorable to load shedding, with the overcapacities of electricity production, low peak prices, and low incentives to invest in peak-load capacities. There was a certain consensus between politicians, the administration and the cabinet of the Minister of Environment to find ways to support distributed load shedding despite the low remuneration of the electricity market, so as to anticipate the development of renewable energies. They were convinced that the market would not be able to send sufficient economic signals. They therefore opposed the ERC, accused of defending a dogmatic vision of the market.

The question of payment by the load shedding aggregator to the supplier to compensate for the supply of *“injected electricity”* was once again brought up for discussion in Parliament by François Brottes, in the form of an amendment (no. 16) in the framework of the debate on the energy transition law (on 10 October 2014). This amendment held that: *“The payment is made by the load shedding operator for the share of electricity consumption shed (...) that does not result in energy savings, and by all electricity suppliers for the electricity consumption shed (...) that does result in energy savings.”* The justification for this amendment was based on a definition of *“injected electricity”* fully coherent with Voltalis’s reasoning, very different from the initial reasoning of the 2013 Brottes law. This amendment provided a new definition of *“injected electricity”*, associating this notion with the additional electricity effectively injected through the *“postponement effect”*. The postponement effect refers to additional consumption after load shedding, linked to the fact that the heating or the boiler runs on full power after being

stopped to restore the setpoint temperature in the home. According to several participants in the discussions, Parliament's change of position can be explained as follows: after the 2013 Brottès law, Voltalis exerted significant influence on members of Parliament and the Minister Ségolène Royal. A political support in favor of the demand response management services could overcome the defeat of the progressive tariff. Furthermore, Brottès and other deputies did not understand the ERC reasoning requiring the aggregator to pay the supplier that was shed. The deputies did not understand the notion of "injected" electricity. There was a debate as to whether the electricity was saved or postponed. Some deputy understood it was postponed, others that it was saved. The deputies did not either understand why the supplier had to be paid for electricity saved.

*According to Amendment of 10 Oct. 2014: Load Shedding revenues = Energy Market price  
– Furniture tariff \* (Share of Postponed Electricity) + Premium + Capacity price*

The amendment, drafted by government advisors, provided for new financing for load shedding and, at the same time, closed the debate in Parliament: if consumption was postponed, a payment to the supplier seemed legitimate. If it was saved, and therefore not produced, the suppliers could finance it. This new presentation of the mechanism was more comprehensible to deputies than the original mechanism defended by the ERC, the TSO and the suppliers.

At the government's request, the ERC therefore calculated a premium that should reflect the socio-economic benefit of load shedding. All the socio-economic benefits were listed: capacity reserve, reduction of peak prices and of CO<sub>2</sub> emission. The ERC first identified which benefits should be taken into account or not, based on the electricity market rules and the other existing mechanisms. For example, the contribution to securing capacities was excluded from the premium as it was financed by the existing capacity mechanism (calls for tenders).

The ERC considered only the gains for society in terms of CO<sub>2</sub> emissions as being relevant for calculating the premium. It evaluated the volume of CO<sub>2</sub> avoided, based on data that still remained uncertain: the postponement effect. If it was null, the value of the CO<sub>2</sub> avoided would be €26/MWh shed, and if it was 50%, the value of the CO<sub>2</sub> avoided would be €13.5/MWh.

A first premium proposal by the Minister, Ségolène Royal, took into consideration the upper value, that is, the hypothesis of no postponement effect. This proposal was justified by the wish to provide significant economic support to launch the activity, knowing that the premium could quickly be reduced if it was too generous. It would always be possible to detail the calculation later, and to explain a lowering of its level. But this premium proposal faced strong resistance from the members of the *Conseil*

*Supérieur de l'Énergie*, a body made up of Members of Parliament, ministries, local authorities, suppliers, suppliers' employees, and consumers. The ERC gave an unfavourable opinion. The consumer rights association *UFC-Que Choisir* presented a complaint against the premium before the Council of State. Consumer associations saw Voltalis as an actor that just automatically cut heating installations for 20 minutes at the time when it seemed that consumers needed heating the most. In consumer's forums, Voltalis was accused of misleading consumers by arguing that their equipment would reduce consumption without consequences on the comfort, and by preventing the withdrawal of the "box" by costly intervention. Some consumers associations enlighten the fact that Voltalis install the equipment in low rent social houses with the complicity of some lenders, seduced by the concept and the possibility of energy bill control.

The controversy associated with the premium led the Senate to make a new proposal. Amendment no. 934, presented by Mr Poniatowski during the discussion of Article 46 bis at the Senate, on 18 February 2015, introduced a call for tender mechanism to replace the premium for load shedding operators. With a call for tender mechanism, the economic value of load shedding totally changed: it was determined no longer by an estimate of the socio-economic benefits it provided (through the premium, defined by a specific calculation) but by a sufficiently high price level to remunerate load-shedding actors. This call for tenders reversed the economic reasoning. Distributed load-shedding would switch from the status of market device to another status, similar to that of renewable energies, the financing of which was secured by subsidies. It would become protected from the uncertainties of the market, which at that point was unfavourable. The energy transition policy freed itself from the electricity market and would impose its own agenda.

The TSO and ERC experts nevertheless questioned the appropriateness of this new call for tender, which added to many existing frameworks. They felt that they had already done a lot to develop load shedding, particularly with the calls for tenders for load shedding capacity set up by the TSO, and they questioned the economic merits of additional support.

*According to Amendment 18 Feb. 2015: Load Shedding revenues = Energy prices – Furniture tariffs \* (Share of Postponed Elec.) + Specific call of tender + Capacity price*

## 8. The final clarification of the value of the load shedding activities

The load shedding issue was once again debated in Parliament in spring 2015. Several amendments supporting distributed load shedding were proposed by opposition deputies, who accused the government and majority deputies of supporting the strategy of large companies. Voltalis's influence was very clear in these statements. The opposition suspected the government of having changed the text between the Senate and the Assembly. Conversely, influenced by consumers associations, the Greens expressed doubts as to the actual energy savings achieved with distributed load shedding. In view of the virulence of the debates and the confusion they had caused, the deputy François Brottes organized a round table with the economic actors concerned (essentially EDF and Voltalis) for a more direct examination of the conflicting technical and economic arguments.

The bill ultimately passed by Parliament upon a new reading on 26 May 2015, shows quite a clear decline of Voltalis's influence on Parliament and the Minister. The doubts that had grown due to the virulence of the debates encouraged them to further rely on their administration, itself convinced of the need to be more cautious about providing economic support for distributed load shedding.

Thus, Article 46 bis concerning load shedding clarified the payment to the supplier by drawing on the ERC's technical argument of its first decision (Article L. 271-3). The law clarified the mechanism: the existing mechanism of calls for tenders for capacity would be tailored to distributed load shedding. There would be no coexisting calls for tenders. Moreover, the law did not allow for a combination of the benefits obtained on the grounds of energy savings (L. 271-3) with the remuneration obtained through the calls for tenders for capacity. The writers of the bill (deputy, administration and advisers) wished to avoid the uncontrolled accumulation of sources of financing for distributed load shedding as it has been the case for the photovoltaic panels installed at end-consumer house.

*According to Energy Transition Law (2015): Load Shedding revenues = Energy prices –  
Furniture tariffs + Max (Capacity price, Share of Saved Energy)*

## Discussion

Réintroduire performativité struggle. Développer cette notion...

This paper offers a realistic account of the politicization of the market design. First, it demonstrates that concerned parties are not simply unselfish participants in a dialogic democracy: they are also economic entrepreneurs that can exploit the vulnerability of such an uncertain regulation process. Second, it

illuminates the contribution of independent regulatory authorities to the clarification and formalisation of market mechanisms not only through its decisions and advice but also through its influence on parliamentarians and the central administration. Third, it elucidates the role and autonomy of political authorities in the market design processes.

1. The influence strategy of economic actors

An innovator can deploy different strategies to defend the value of its offering. The first strategy is to build a promise of different benefits associated with load shedding. Voltalis successfully facilitated the conviction in the public space about distributed load shedding's relevance and environmental, economic, and social benefits. This promise established its strength through its consistency with its projection of the future coherent with energy transition: energy savings, carbon-free electricity production, and development of an electricity sector disturbed by intermittent energy sources.

The second strategy was to highlight hindrances caused by existing regulations and uncertainties concerning economic mechanisms, undertaken in order to undermine authority regulators and to pretend that existing regulations were stalling innovation. Through its claims, Voltalis contributed to the search for adjustments to electricity market frameworks. Some of these adjustments were encouraged by the regulators insofar as they facilitated the integration of load shedding into existing mechanisms without betraying their rationale, such as calls for tenders for capacity and capacity markets. Voltalis went further, however: it challenged the economic reasoning of the TSO and the ERC and defended simplified reasoning or uncertainties in economic theory over the effectiveness of the market's organization. Voltalis skilfully propagated doubt about the need to remunerate the supplier the customers shed. This rhetorical strategy allowed Voltalis to weaken the ERC's legitimacy and to gain the sympathy of journalists, politicians, and environmental associations.

Voltalis's strategy helped politicize the debate and make distributed load shedding one of the techniques in the energetic mix. A number of political actors became convinced that this activity had to be supported by ensuring a certain volume of business, irrespective of the economic value reflected by the electricity market and by the integration of the (estimated) value of a ton of CO<sub>2</sub>. They were willing to grant distributed load shedding a special status in comparison to other demand management strategies, which currently do not receive the same support, such as variable rates. Like renewable energies, load shedding could thus be supported through measures overriding the market.

## 2. The clarification of market design by the independent regulatory authorities

The TSO and the ERC endeavoured to design rules to integrate distributed load shedding into the market based on rigorous economic reasoning. This clarification work was made necessary by Voltalis's entrepreneurial actions and was mainly concerned with isolating the value produced by the market compared to other forms of revenues such as subsidies. The aim was to prevent the market's complexity from concealing the level of subsidy granted to this technique and therefore to ensure that load shedding did not escape an informed public debate. The ERC remained faithful to the established market model, as it was required to be transparent and to justify its decisions.

The main weakness of the ERC's clarification was that it drew on counterintuitive abstractions, even though they were rigorously logical. It was difficult for those who did not understand the rules of the adjustment mechanism to understand why the aggregator had to remunerate the supplier that was shed. Voltalis was able to "reverse" the ERC's arguments by isolating pieces of its reasoning. It turned the ERC's sophisticated reasoning into the foundation of a formidable strategy of controversy. For the ERC's technical experts, this strategy was destabilizing: it produced greater dependence on economic and political actors' discourse. While the 2013 law adopted the ERC's reasoning, the parliamentary debates in 2014 show that this reasoning was still not accepted.

Thus, the performativity struggle produced an incomplete learning dynamic, only partially clarifying the objectives and the means to achieve them. The academic debate about market design was not stable. Rather, it evolved, and some arguments that might have initially been refuted became acceptable. It gained formalization. This learning process provided independent regulators with the opportunity to regain their influence by accumulating expert opinions in their favour.

The ERC's work to formalize and clarify the articulation between load shedding and the market, however, was largely informed by an important hypothesis: the possibility that the market could value load shedding. The ERC turned to microeconomics textbooks for defence and considered the spot market a virtuous mechanism. This approach was also supported by the Toulouse School of Economics (in France), which relied on the formalization and simulation of market mechanisms. The ERC's economic reasoning didn't account for some market failure and was confident in the market's ability to naturally tend toward equilibrium. The ERC's reasoning did not account for the obstacles faced by innovative offers in circumstances of technological transition and of domination by an historical actor. In some comparable situations, the authorities on competition have introduced asymmetrical regulation to support the new activities.

The ERC's autonomy must be understood in terms of its interdependencies with the political and legal authorities. It is bound by laws to define the precise rules that govern market organization. At the same time, its mission is also to contribute to the organization of an integrated European electricity market and, to do so, to draw on rigorous technical-economic models that are shared with other countries' regulatory authorities. Political decisions often conflict with this mission, however. This tension regularly results in decisions by the Council of State, which organizes confrontations between economic actors, the ERC, and elected representatives. However, the Council of State, which has a higher authority, proceeded essentially through invalidation, thus reopening the process of circulation between regulatory bodies rather than stopping it.

### 3. The limited independence of political authorities

Throughout the process of institutionalizing distributed load shedding, the political actors tried to preserve their decision-making autonomy from the independent authority. The uncertainties associated with the need for a capacity market, the dysfunctions of the CO<sub>2</sub> market, and the benefits of load shedding in terms of energy savings allowed them to justify the adjustments to the market design that were proposed by the ERC.

The political authorities have more room for manoeuvring in terms of the design of the electricity market. Parliamentarians are not subject to the same legitimacy constraints that the ERC are: they do not need to clarify reasoning or to apply a rigorous economic calculation. They can allow themselves approximations and reinterpretations when they better serve their objectives. Furthermore, they are more exposed to the influence of economic actors and can draw on their discourse and reasoning without the possibility of comparing them with each other or with those from the independent regulatory authority.

However, the political authorities were also aware of the risks of going too far with laws that were poorly designed from a technical standpoint or laws that could be challenged at an institutional level. As a result, they wished to leave technical tasks for the independent regulatory authorities. The members of the government and parliament knew that a legislative text inconsistent with the market model defended by the ERC might be submitted to the Council of State, the Constitutional Council, the Competition Authority, or the European Court of Justice. These higher administrative and judicial authorities would consult all parties and would probably refer to the arguments of the ERC if they were consistent. The ERC had also encouraged concerned actors to mobilize the economic doctrine against political decisions.



Thus, the ERC has the ability to defend its economic doctrine against political decisions; the ERC is not completely subordinate to political authority. However, interventions by the Council of State retain a significant degree of uncertainty, which can lead the ERC and the government to anticipate and work on acceptable compromises. Decisions with significant economic effects were delegated to the ERC. This agreed dependence on the ERC led to required collaboration between ERC experts, the administration, and ministry officials to finalize the drafting of laws and their terms of application.

## Conclusion

Michel Callon (2009) sought to identify procedures and institutions that would support a dialogic democracy for economic engineering. From this perspective, the “democratic” control of market design activities would probably be the cornerstone of the politicization of the economy. Modern and liberal economic institutions, based on the principle of the rule of law, encourage a separation between the definition of political issues and the technical definition of market rules and devices. According to academics such as Jean Tirole, this separation is necessary to avoid the acquisition of regulation by private interests.

Our results question the ability to maintain a clear and stabilized separation. The definition of issues and the definition of means are completely intertwined, due to the diversity of issues, uncertainty about efficiency, and the market’s sideeffects. The interdependency creates some overlap in competencies between independent authorities and political authorities, contributing to rivalries and antagonisms.

Two antagonistic movements contribute to the market design: the politicization of the market and the economization of political issues. In this case, the economization was mainly supported by the independent regulatory authority, which clarified the articulation between load shedding and the market. The politicization came from an alliance between innovative entrepreneurs and politicians around a seducing political project, regardless of how this activity would be articulated in the market. However, the delimitation of the competencies of political or technical issues were not fixed a priori; rather, they were recomposed throughout different confrontations. Given this distribution of roles between regulation authorities, it is therefore not surprising that the articulation between technical and political considerations involved long and uncertain circulation between several authorities. No individual entity was able to put an end to the controversy and stabilize the rules by focusing on its own logic. All entities had to acknowledge the logic of others in order to reach compromise.

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