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*The European Union's liberalisation of electricity markets since 1996:  
implementation and consequences in France.*

by

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## **Abstract**

This thesis explores the liberalisation of the French electricity market within the context of its European legislative framework, focusing on the alignment of liberal policy goals with the implemented directives. It investigates the manner in which France approached this regulatory shift and how it today reflects the goals which motivated the liberal policies in the first place. An examination of EU directives' translation into French law is conducted, revealing France's approach to liberalisation as minimalistic, prioritising its security of supply and the preservation of EDF's dominant position.

The research delves into the effects of this liberalisation process on France's electricity market. An analysis of key variables, namely the price levels and investment into production capacity, is carried out, as a way of verifying the matching of the French practice with the European liberal policy goals. Despite liberalisation's promise of market efficiency, this thesis' findings indicate that these outcomes were not achieved in the French electricity market. Notably, no significant decrease in price or increase in investment was observed post-liberalisation. On the contrary, the liberalisation has been extensively criticised for undermining French's security of supply and capacity to manage prices.

The thesis argues that the lack of complete adherence to EU directives from France and the inherent flexibility of these directives potentially contributed to the observed outcomes. Furthermore, it acknowledges the influence of the concurrent energy transition on policy-making, which necessitated a balance between competition and sustainability objectives, and may have led to incoherences.

## **Keyword**

Liberalisation, French electricity market, EU electricity directives, Investments, Price signals.

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## LIST OF ABBREVIATIONS

ACER	Agency for the Cooperation of Energy Regulator
ARENH	Regulated Access to Incumbent Nuclear Electricity
CRE	Committee for the Regulation of Electricity
CSPE	Contribution to the Public Electricity Service
DSO	Distribution System Operator
EC	European Commission
ECSC	European Coal and Steel Community
EDF	Electricité de France
ENTSO-E	European Network of Transmission System Operators for Electricity
ERDF	Electricité Réseau Distribution France
EU	European Union
EURATOM	European Atomic Energy Community
IEA	International Energy Agency
INSEE	Institut National de la Statistique et des Etudes Economiques
ISO	Independent System Operator
ITO	Independent Transmission Operator
LDC	Local Distribution Company
OECD	Organisation for the Economic Co-operation and Development
PPA	Power purchase Agreement
PWR	Pressurised Water Reactor
R&D	Research & Development
RTE	Réseaux de Transport d'Electricité
TFEU	Treaty of the Functioning of the European Union
TPA	Third-Party Access
TRV	Tariffs Régulés de Vente
TSO	Transmission System Operator
TURPE	Tarifs d'Utilisation des Réseaux Publics d'Electricité

# **Chapter 1. Introduction**

## **1.1. Background**

The unprecedented surge of electricity prices in Europe brought back to the forefront of the media and political scenes the interrelated questions of gas and electricity supplies. In France, as one tries to explain the influence of the price of gas on the one of electricity despite the very low proportion of gas used to produce electricity, accusing gazes are cast on the European electricity market. Bruno Le Maire, the French Minister for the Economy, who considers the latter as one of the reasons for the adverse price's situation, stated in the end of 2021 that "the European single market in electricity does not work" and "is an aberration"<sup>1</sup>. Discussions are ongoing at the European level to reform the European electricity market design, and France is determined to change the market mechanisms that link the gas and electricity prices.

The reason behind the anger is that the prices of electricity in France have been historically lower than in other European countries<sup>2</sup>. France indeed benefits from a very competitive electricity production fleet thanks to nuclear and hydro power, which respectively represents around 80% and 12% of its total production. As a result of the low cost of electricity, domestic heating through electrical appliances has been traditionally competitive in France and has raised the consumption of electricity while it has lowered the one of the gas. One can therefore understand that the French take issue with market mechanisms, imposed by EU legislation, which set the price of electricity on the one of gas, when it is only used marginally in France and costs much more than what the production of electricity does. This the result of the European 'merit order' mechanism, which set the price of electricity on the wholesale market on the basis of the 'marginal' production cost of the last MWh injected into the grid. When demand is high or nuclear plants are closed due to maintenance, thermal power plants are used to fill the gap of production, and the cost of electricity is based on the price of gas.

However, the French criticisms towards the European electricity market are much more diverse and profound. To understand the reason of the historical mistrust that the French have been demonstrating against the process of liberalisation of European electricity markets since the 1990s, one must go back at its original promise and implementation. This thesis proposes to reframe the debate surrounding the liberalisation of the French electricity market in its original theory, tracing back to its first implementation at European level in 1996 and at national level in the following years. It will explain how, concerned to comply with the European directives, the liberalisation of the French electricity market was carried out in a minimalist fashion. Put into perspective with the liberal logic underpinning the European liberalisation policies of the 2000s, the thesis will propose an evaluation of the results of the liberalisation process in France, by assessing its impacts on prices and investment signals.

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<sup>1</sup> Remarks made on 24 September 2021 on *Public Sénat* (BFM Business, 2021).

<sup>2</sup> In 2008, France was among the European countries where electricity was the cheapest (measured without taxes): third for companies and fifth for households (Commissariat Général au Développement Durable, 2009).

## **1.2. Research questions and hypothesis**

This thesis aims to put the liberalisation of the French electricity market into perspective with its European legal framework, and the liberal policy goals underlying the latter. Based upon that, the main research question addressed is:

To what extent did the implementation of the electricity market liberalisation directives in France matched the European liberal policy goals?

The following sub-questions can be defined:

Sub-question 1: What are the key policy goals and provisions outlined in the EU's electricity market liberalisation directives, and how do these directives provide flexibility for implementation by member states?

Sub-question 2: How did France implement the EU electricity market liberalisation directives?

Sub-question 3: What are the results of the French implementation of the Directives in terms of price and investment signals?

Sub-question 4: Do the results reflect the liberal policy-goals?

These research questions enable to emphasise on the evolution of the French legal framework within perspective of the European legal requirements underpinned by liberal motivations.

The hypothesis are that:

- 1) France implemented the EU directives in a minimalistic way, concerned about maintaining its security of supply and the dominant position of EDF.
- 2) Theory promises were not met in the French electricity market. The latter happens to be an inefficient market that fails at incentivising long-term investments and at lowering electricity prices.

## **1.3. Research design**

These research questions are answered through a qualitative and quantitative analysis detailed in three chapters (chapters 2, 3 and 4).

Chapter 2 looks at the European directives' requirements to liberalise the electricity markets of EU member states. An insight of Directives 96/92/EC, 2003/54/EC and 2009/72/EC will be given, highlighting key policies relevant for the French case. Directive (EU) 2019/944 on common rules for the internal market for electricity does not enter into the scope of this thesis, for its implementation is too recent to analyse its consequences. The chapter will emphasise on the flexibility measures offered by the directives by looking at the different options proposed, which aim to liberalise the market to a greater or lesser extent. By offering an insight of the key measures implemented at EU level, it will enable to analyse how uniquely France led the liberalisation of its electricity market in the next chapter.

Chapter 3 explains how France implemented those requirements over the years, by taking a minimal step. It analyses the way France took advantage of the flexibility given by the EU to Member States to translate the directives into French law. To do so, the main texts law translating the EU directives into French law are examined. They show the choice of France to implement the minimum conditions required by the directives, and the delaying of the implementation of the measures until the deadlines set by those. An evaluation is proposed, demonstrating the limited impact on competition of the measures chosen by France, due to the political wish to limit the extent of the liberalisation and the doubts expressed regarding its potential benefit for the country.

Chapter 4 assesses whether the French implementation of the EU electricity directives have led to market efficiency, as promised by liberal doctrine. To evaluate the efficiency of the French electricity market, this thesis will look at two variables: the level of prices and the level of investments into production capacity. The chapter first relates the promises made by the liberal theory regarding these two variables and analyse the state of these variables before the liberalisation process started. As the level of price has not decreased and the level of investment into production capacity has not increase or stabilise after the opening up to competition, the thesis shows that the French liberalised electricity market has been inefficient and has not lived up to the liberal promises.

#### **1.4. Theory**

This thesis will analyse the question of the liberalisation of electricity market through the prism of the economic liberal doctrine. Coming from the UK and the US east coast, the revival of economic liberalism largely dominated the European ideology spectrum and shaped the region's policy decisions as of the 1970s. From this influence emerged the European Commission's drive to integrate the markets and regulate member states' energy sectors. One will consider here economic liberalism in its modern but broad definition, as "based on the principles of individual freedom, private property, and limited government intervention" (Gissy, 2008). Liberalism, through the integration process, also aimed at freeing the community from national hurdles that could negatively affect the integration of the EU, and thus imposed transnational regulatory borders. Liberalisation also aimed at bringing down national border and state-centric approaches to regulations that favour nation-based discriminations, so as to support the free market. Although European decisions have been also influenced by derivatives such as ordoliberalism or neoliberalism, the thesis will focus on the general principles of liberalism that were put forward to justify the liberalisation of European electricity markets.

Liberalism gained great momentum after the economic crisis in the main industrialised capitalist countries, which for many reflected the failure of Keynesianism. The 1970s indeed saw a growth in the criticism of the public sector and its inefficiency. The criticism towards the role and action of the State was double folded. The first criticism lied on the capture of the state by economic interests (Reverdy, 2014). The state was considered weak and submitted to private cartels and big companies, who have a strong influence over its decision to regulate. The latter thus fails at serving public interest through its economic regulation and becomes inefficient and

unfair. Secondly, the intervention of the state is inconsistent due to structural political reasons (Reverdy, 2014). It is subject to the vagaries of political life and to political patronage, engendering instabilities in state decisions, which are detrimental to investors' interests. Through requirements of checks and balances, transparency in decision making, and public accountability for performance, liberalism hoped to "reduce the odds of capricious, reckless, or self-interested decisions by those in power" (Starr, 2007:1). The latter justifies the liberal argument claiming that economic regulation activities should be entrusted to independent authorities or other forms of auto-regulation. As state ownership is considered inherently inferior to private ownership, privatisations are also largely legitimised and supported. The integration of markets into a free trade regime could not tolerate discriminatory practices between nations.

From the American theorisation of market relations at the end of the 19<sup>th</sup> century was retained the idea that the market can only function, in its relationship with demand and supply of goods and services, if economic actors act autonomously (Canivet, 2020). A duty to autonomy was therefore imposed so as to protect the market, and gave birth to antitrust law. The latter encourages competition by limiting the market power of any particular firm. The idea that monopolies were less competitive and led to higher selling prices due to rents was very spread in the UK, and further gained other European countries, especially as soon as European integration gave to authorities the power to condemn state intervention.

The overall mainspring of the liberal doctrine was to maximise worldwide economic efficiency, as already described by Ricardo in its theory of comparative advantage. The liberalisation of markets, that is their opening to competition, should conduct in theory to the most efficient structure, namely a situation of allocative efficiency. Deregulation should enable to get as close as possible to a perfect market (i.e. theoretical market in which buyers and sellers are so numerous and well informed that monopoly is absent and market prices cannot be manipulated<sup>3</sup>). The latter has two essential functions: to align prices on the marginal costs and to minimise the marginal cost as much as possible (Amic *et al*, 2006). According to the liberal doctrine, an open market is the best way to reconcile those objectives. Through the strengthening of the regulator's investigative powers, it is possible to come close to a situation of perfect competition, with an equilibrium not too far from what an efficient market would produce (Amic *et al*, 2006).

In the electricity sectors, liberalised markets have two objectives. In the short term, the aim is to ensure the productive and allocative efficiency of the system: to guarantee, on the one hand, the supply-demand balance in real time by minimising the cost of production and, on the other hand, to achieve a situation in which the marginal benefit to consumers is equal to the marginal cost of production (Robin & Staropoli, 2013). In the long term, the markets must make it possible to remunerate the various players in the sector and to direct their investment in such a way as to maintain the security and safety of the electricity system (Robin & Staropoli, 2013).

Liberalisation reforms were expected to ensure gains in productive and allocative efficiency compared to the previous mode of vertical organisation. They should indeed permit the entry

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<sup>3</sup> Definition by Oxford Languages (n.d.).



of new competitors with innovative business models, which are likely to invest in new modes of production, to combine activities differently and to provide attractive and diversified solutions for consumers (Defeuilley, 2011). Moreover, decentralised modes of coordination should set a coherent set of price, which reflects satisfying planning and management requirements and reveals scarcity of resources (Joskow, 2007, cited in Defeuilley, 2011).

Therefore, two main benefits should emerge from the liberalisation of the electricity market. First, markets would produce the necessary signals to investors, making it possible to ensure the security of supply in the most efficient way possible (Audigier, 2011). Second, thanks to the pressure exerted on the incumbents and the dynamics of innovation, it should ensure a reduction in the prices paid by consumers and an enrichment of the offers available to them (Littlechild, 2000).

Yet, electricity has some specific features, which complexifies the opening of its industry to competition. First of all, electricity is a product that cannot be stored, meaning it must be used the instant it is generated, requiring demand and supply to be always matching so as to avoid cuts and blackouts (Heddenhausen, 2007). This has several implications. First, higher generation and transmission capacity is required to cope with peak demand. This capacity is raising costs for suppliers and will be partly unused in periods of low demands. A reserve capacity is also required “to allow suppliers to cope with random demand fluctuations or generation shortfalls” (IEA, 2001:19). Thirdly, a diversified portfolio of baseload and peaking power generating technologies is needed to deliver the different electricity loads at least cost. Another feature of electricity is that it is bound to a transmission network that is very costly and rigid. Because they can be duplicated only at a very high cost, competition is here not desirable. With large increasing returns, electricity transmission networks form indeed a natural monopoly. In the absence of opening up to competition, liberal theory recommends limiting the power of the monopoly market. A third feature of electricity lies in the inelasticity that characterises its short-term demand and supply, and the resulting highly volatile spot pricing<sup>4</sup>. Consumers’ behaviour is indeed on the short-term not very sensitive to the price of the electricity due to consumption’s habits and a lack of visibility of prices on a regular basis. Regarding supply, the inelasticity is due to the difficult storage of electricity and the strict capacity limit of production and transmission capacities: large spare production capacity is uneconomic in turn leading to congestion on infrastructure when the demand is high (Planbureau, 2006). Last but not least, electricity supply is “technically dependant upon highly specialised infrastructure” that are transmission and distribution grids, but also production plants, which are require a high degree of capital (Arentsen & Künneke, 1996). According to Debregéas & Plihon (2021), the latter requires a long-term planification to determine the level of investment necessary to the production (i.e. to guarantee that the installed production capacities will meet the planned consumption at all times and for all possible operating hazards) and the network sizing (i.e. to ensure that the network

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<sup>4</sup> Spot prices are the prices established on the wholesale electricity market by the exchanges on day D for the following day.

can transport the electricity, taking into account the place of production and consumption, and the damages that could affect the network).

From these specificities arise a number of key principles for competition to develop in electricity markets. First, monopolistic activities (e.g. operation of the transmission network) need to be effectively separated from the potentially competitive activities (e.g. generation). This is done through the instrument of unbundling, which comes in five different forms, from the lower degree to the higher: account unbundling, functional unbundling, legal unbundling, independent system operator (ISO) and ownership unbundling. These five versions of unbundling implement more or less strict rules to avoid discrimination in the competitive segments of the electricity supply industry. For instance, while account unbundling only obliges firms to separate the bookkeeping of their various activities, ownership unbundling hinders a firm owning and operating a network to be active in any competitive segment of the supply chain nor have an interest in any company involved in those activities (Carella, 2020).

Another key instrument for the competitive bidding of electricity markets is the third-party access to the network. Although transmission activities are considered as a natural monopoly, the network is considered to be an essential facility that must be made available to all potential users. A third-party access (TPA), as “a legally enforceable right to access and use various energy network facilities owned by other companies”, can therefore be granted in different ways (Kotlowski, 2007). The negotiated TPA is based on voluntary commercial agreements, while the regulated TPA, favoured by the liberals, is an access to transmission and distribution networks on the basis of published tariffs. In the single buyer system, short-term offers are centralised and selected by a single intermediary. If the single buyer is integrated, this intermediary is also the main production company, if it is not integrated, the intermediary is an independent agency (Mourre, 1995). Forcing owners of transmission network to share their infrastructure with rivals, even when they do not wish to, can look like a principle against the property rights that are so cherished by liberals. Yet, property rights alone would here prevent effective competition in electricity markets, for the owner of the infrastructure could “deny access to third parties to protect its market position allowing it to exert market power to extract supra-competitive rents” (Herrera, 2018:6). The granting of TPA to network infrastructure is therefore an exceptional rule, stemming from antitrust law as a way to deal with the abuse of dominant positions, which imposes an antitrust ‘duty to deal’ on firms to do business with their rivals (Herrera, 2018).

## **1.5. Scientific and social Relevance**

On the eve of the reform of the European electricity market design at EU level and the subsequent controversies rising at national levels, this thesis aims at recontextualising the debate surrounding the electricity market in its liberal and European settings. It will enable to understand the premises of the electricity market design through the prevailing priorities and theories of the 1990s. Today, new objectives have emerged, such as the energy transition and the cut from Russian gas. Market mechanisms therefore need to be reconsidered in light of these new

objectives. However, it is also crucial that new market mechanisms get to grips with their failures to meet the original objectives associated to liberal ideas that gave impetus to the liberalisation, in particular the level of price and the investment signals, for they remain crucial to also realise the new EU's objectives. This thesis will give a good overview of the different steps of the liberalisation process in France and will demonstrate how this process led to today's wish of rethinking the market. By looking at each step of the national and European policymaking process, this thesis allows to take a critical outlook on a paradoxical regulatory framework that mixed a radical theory with large leeway for reluctant member states. There are certainly conclusions to be drawn from the French case for the future of EU governance and policymaking in general. Reflecting a typical issue of the EU multi-level governance, the liberalisation policies have been very differently implemented by member states and have led to very different results. The conclusion of this thesis opens the discussion of how to better take into account each member states' specificities and concerns when legislating at the European level.

The implications of the liberalisation of the French electricity markets have attracted the interest of both researchers and public institutions. The French Court of Auditors and the Parliament have published several reports discussing this topic. The Parliament notably recently set up a committee of enquiry, at the request of deputies, to investigate on the reasons for the loss of energy sovereignty of France. A commission interviewed key actors of the energy sector in France, such as former Ministers and former EDF's presidents. From the latter have ensued a report (2023), in which the question of the European liberalisation is addressed in chapter II. It stressed upon the weaknesses of the NOME Law and the ARENH mechanism, which did not have enough obligation to develop new production capacity, resulting in a lack of investment from the alternative suppliers. The report shows that the European market design, based on the merit order mechanism, is not adapted to nuclear energy and has thus disadvantage the French electricity system primarily based on nuclear. The French Parliament, in a report dated from 2021, takes the liberalisation as responsible for the unstable prices of electricity, and their negative implications for consumers and medium-size companies. According to the report, the ARENH has penalised the French electricity production by financially weakening EDF whose capacity to invest in new infrastructures has diminished as a result. Frédéric Marty (2007) builds on Paul Joskow (2006), to argue that the reasons of the insufficient incentives to invest that the European liberalised electricity markets provide can be found in electricity market imperfections and in the feeling of legal insecurity weighing on market operators. Jacques Percebois (2019), who is also a prominent researcher in the topic, concludes that "competition has its limits in a sector that depends as much on infrastructure such as transport and distribution networks to market the product". According to him, the liberalisation has not led to convergence of retail prices for the final consumer and may have weakened the incumbents because of certain "stranded costs" that they have to bear. The "stranded costs" represent the fixed costs of conventional power plants, which can no longer be recovered by the revenues when negative prices appear on the wholesale markets. Pierre Bauby & Frédéric Varone (2007) have shown the paradoxes of the liberalisation of the French electricity market, notably pointing the divergence between the original aim to diminish state control of the electricity sector and stimulate

independent agencies supervising the fair implementation of established rules, and the real regulatory framework which, according to them, is significantly marked by the continued dominance of “the same technocratic elites and the prominent influence of national characteristics”. According to Cayla (2023), the current “artificially competitive” electricity market has led to unstable and high prices, benefiting players who provide no social value or who enjoy undue profits. Caramanis (1982) is one of the authors who have theorised the conditions for optimal investments in non-utility-owned electricity production, demonstrating that price signals in a competitive market provides incentives that motivates optimal investment. Finon & Glachant (2008) have worked on the abolition of regulated prices in France's electricity market, as a result of competitive reform, arguing that it will unavoidably lead to a price increase for consumers. For his part, Defeuilley (2011) examines the transformative role of consumers in energy markets following the gradual liberalisation of these markets in Europe since the mid-1990s, arguing that domestic consumers have gained the freedom to choose their electricity and gas supplier, which is yet raising concerns about consumers' ability to navigate complex contracts and tools. Audigier (2015) draws up a critical assessment of the European electricity market, pointing notably that the European Commission should recognise that the market is not suited to financing heavy investments.

## **Chapter 2. The evolution of the EU’s electricity legislative framework**

Chapter 2 aims to explore the evolution of the European Union's electricity legislative framework. It will thus answer the first sub-question: what are the key policy goals and provisions outlined in the EU's electricity market liberalisation directives, and how do these directives provide flexibility for implementation by member states? By examining the main directives enacted by the EU, one can understand the core liberalisation policy objectives they were designed to foster. This chapter will lay the groundwork for understanding how France navigated this legislative landscape during its implementation of market liberalisation directives. It is a critical step to comprehend to what extent the French implementation reflected the policy objectives that underpinned these directives. By analysing the legislation in its historical context, the nuances of their provisions, and the motivations driving them, this chapter forms the cornerstone of our understanding of the EU's market liberalisation goals and sets the stage for the subsequent exploration of France's response to these goals in the following chapters.

This chapter begins with the historical underpinnings of the EU's electricity legislative framework (2.1.). It then delves into the details of Directives 96/92/EC (2.2.), 2003/54/EC (2.3.), and 2009/72/EC (2.4), shedding light on the regulatory flexibility offered to member states. It then explores the role of EU Competition Law within this liberalisation narrative (2.5.). The chapter concludes with a comprehensive evaluation of the directives' implications on market liberalisation, setting the stage for the examination of France's implementation in the subsequent chapter (2.6.).

## **2.1. Historical background to the European regulation of electricity**

It is fair to say that EU history is rooted in energy issues, considering its foundation is laid in the 1951 Treaty establishing the European Coal and Steel Community (ECSC) that marked the beginning of the integration of Europe. Six years later was established the European Atomic Energy Community (EURATOM), which represented another early institution of European co-operation that was based on energy (Langsdorf, 2011). Yet, before the U.S. and the U.K.'s faith in market forces spread to Europe, energy was excluded from the process of European integration (Talus & Aalto, 2000). The political sensitivities surrounding the energy sector were such that member states demonstrated reluctance to giveaway power to the EU to legislate on it. Considered as a vital and sovereign sector, state control over the electricity and natural gas markets was deemed necessary. Accepting this mix of state and private actors in the energy sector across Europe, EU policy traditionally demonstrated "a neutral stance on ownership of industry" (Parker, 2002:20). The Treaty of Rome (1957:75), which runs the principle of free trade, reflected this aspect in Article 222 stating that the commitment to a market economy "shall in no way prejudice the rules in Member states governing the system of property ownership". But, in the late 1980s, the EU's approach to the energy branch radically changed, as it started advocating the benefits of free competition and the free market approach. The European Commission (EC) for instance declared in 1994 that "attention should be devoted to improving the competitive environment in which firms operated" and that "privatisation, to the extent that Member states judge it compatible with their objectives, could further the progress already made in this direction" (European Commission, 1994, cited in Parker, 2002:23). Article 130 was added to the Treaty during the Maastricht conference in 1991 and affirmed that measures related to industrial policy must adhere to a framework of open and competitive markets. All the more telling is the enactment of the Single European Act in 1986 through which the European Commission urged member states to open up to competition their utilities' markets (Parker, 2002:22). The liberal belief was that removing non-tariff barriers to cross-border trade and investment between the Community members would create a broad economic stimulus. Yet, there was still no specific legal framework for energy. Demonstrative of the lingering mistrust of member states was the failed attempt to include a separate energy chapter into the Treaty of Maastricht (Langsdorf, 2011). It was however not an issue, according to Talus and Aalto (2020), as the EU nevertheless managed to regulate the energy sector through the competences gained to enact laws on the internal market and the environment. The liberalisation directives for the electricity and gas were indeed based on the latter.

Parallely, the development of competition law, for which the EU possessed a shared competence, came as a crucial complement. Inherited from the American liberal tradition, EU competition law has been economically rationalised, i.e. "rewritten with reference to economic expertise" and claimed to be the "only legitimate means of assessing the collective benefit generated by the market" (Kovacic et Shapiro, 2000, cited in Reverdy, 2014). Independent authorities formed by the EC have progressively replaced legal principles by case-by-case assessment based on economic expertise. This institutional transformation born from competition law have

led mainstream economics to become the main source of market regulation, limiting state intervention within member states. The idea behind it remained to fight discriminatory practices and the reduction of consumers' well-being. In 2007, the Lisbon Treaty finally included energy as an area of shared competence but, as explains Langsdorf (2011:6), the Treaty nevertheless "maintained status quo of the internal market and environment regulations as sources for energy policies". The liberalisation of the electricity markets takes roots in three main directives (96/92/EC, 2003/54/EC, 2009/72/EC) that attempted to form a single market. The rationale of these directives was to enable the transformation of the wholesale and retail activities of these sectors from monopolies to commercial enterprises, ultimately leading to a single European electricity and gas market.

## **2.2. Directive 96/92/EC**

Directive 96/92/EC, known as the Electricity Directive, aimed to start the establishment of the single internal market for electricity by harmonising rules and regulations across member states, introducing competition, and improving the efficiency of the electricity sector. The main requirements of Directive 96/92/EC will be categorised, for the purpose of this thesis, into four main areas: production, transmission/distribution, supply, unbundling.

In terms of production, the directive required EU members to open the production of electricity to new entrants, either through tendering or authorisation. Under the tendering procedure, the electricity system is centrally planned through a competent official body that publishes the tender and selects the lowest bidder for award of the contract. Successful bidders are granted a Power Purchase Agreement (PPA) that offers guarantees on volumes and sales price, enabling it to finance the construction of the power plant. Under the authorisation's procedure, the state fixes criteria (i.e. safety or commercial credentials) to grant authorisation to build new plants in its territory. Anyone can thus build a power plant at any time and in any place, subject to compliance with planning legislation and criteria (Thomas, 2005).

In order to counter the risk of integrated companies exploiting their ownership of networks to give an unfair advantage to their own generation and/or supply activities, certain provisions of the Directive required the separation of network activities from generation/supply activities (Thomas, 2005). Transmission and distribution system operators (TSOs and DSOs) had to be designated to exploit, maintain and develop the network, and be independent from other activities linked to the distribution. Through account unbundling, network companies maintain separate accounts for their network, production, transmission/distribution activities, so as to avoid discrimination, cross subventions and competition distortions (Block *et al*, 2007:28).

For transmission and distribution activities, the Directive has created a framework of regulation for third-party access to the network, offering the three different ways mentioned earlier: regulated TPA, negotiated TPA and the single-buyer procedure.

As to supply, the Directive planned a gradual opening of supply markets to competition for large users and distributors. The directive stipulated that final consumers whose consumption

exceeds 40Gwh should be first eligible, corresponding to about 26% of the market. After three years, the eligibility threshold was to be lowered to 20GWh per year (28% of the markets), falling to 9GWh per year after six years (33% of the markets).

In summary, Directive 96/92/EC timidly set up the first phase of liberalisation of the European electricity market by introducing competition in the production sector, ensuring non-discriminatory access to transmission and distribution networks, and promoting transparency through the unbundling of vertically integrated electricity utilities. While the directive represented a significant step towards market liberalisation, its impact was limited by the flexibility granted to member states in implementing its provisions. This unambitious content reflected the political reality of the 1990s whereby member states had lingering doubts on the benefits that could provide the liberalisation of their electricity markets.

### **2.3. Directive 2003/54/EC**

The results of the previous directive were very limited: a weak harmonisation, unequal conditions to access the markets, and an almost non-existent integration into a single market (Block, 2007). Some member states opened their markets faster than other, thus distorting competition relations. Under this context, the European Council of Lisbon of 23-24 March 2000 called for the acceleration of market opening, the elimination of remaining obstacles to cross-border trade in electricity, and the strengthening of regulatory frameworks to ensure a level playing field and non-discriminatory access to networks for all market participants. Directive 2003/54/EC thus aimed to further liberalise the European Union's electricity market and address some of the shortcomings of Directive 96/92/EC. The directive introduced new requirements and provisions regarding production, supply, distribution and transmission, and unbundling.

The directive continued to support competition in electricity production. It maintained the authorisation and tendering procedures introduced by Directive 96/92/EC for granting access to new electricity producers. However, the primary method for constructing new capacities was intended to be the authorisation procedure, while the tendering method should only be employed if the authorisation procedure failed to yield adequate generating capacity (Serena, 2014).

The second electricity directive aim to frame and ameliorate the condition of access to transmission and distribution networks, by limiting the discretion of member state to choose among the three methods (Serena, 2014). Only regulated TPA remained as an option, with an access based on tariffs freely visible, which must be implemented objectively and without discrimination between users (Block, 2007). The tariffs or their computing method must be approved by the national regulation authority beforehand.

As to supply, the directive anticipated the review of the market opening required by Directive 96/92/EC by 2006. It required that all non-household consumers of gas and electricity be allowed to choose their suppliers by 2004 and that competition in the residential market be open by 2007 (Article 21).

One of the most significant aspects of Directive 2003/54/EC was the introduction of stricter unbundling requirements. The directive required member states to ensure the legal and functional separation of transmission and distribution activities from production and supply activities. Legal unbundling meant that TSOs and DSOs had to be separate legal entities from the companies involved in generation and supply, aiming at better separating the management of supply activities from transport activities. To ensure the independence of the network operators, the directive implements several independence criteria (Article 10§2 and 15§2). One of them for instance requested that the administrators of the new company did not simultaneously hold positions in the structures responsible for the production, distribution or supply of energy.

Only outlined in the first directive, national regulatory authorities have been granted larger prerogatives in Directive 2003/54/EC, embodying several control mechanisms to ensure fair competition and consumer protection. The authorities were to exercise a general market surveillance mission, a prior control over the conditions of access to the networks and distribution/transmission tariffs, and to intervene as a dispute settlement authority (Block, 2007).

#### **2.4. Directive 2009/72/EC**

Directive 2009/72/EC, also known as the Third Energy Package, was designed to further liberalise the European electricity market and enhance the integration of national markets, replacing Directive 2003/54/EC. It introduced additional requirements, especially regarding unbundling and transmission/distribution sectors.

One of the most important feature of the third directive is the new unbundling requirements. Estimating that legal and functional unbundling have not led to effective unbundling of the TSO's, the directive provided three new options for their unbundling: full ownership unbundling, independent system operator (ISO) and independent transmission operator (ITO). Full ownership unbundling meant that vertically integrated electricity companies should sell or legally separate their transmission assets from their generation and supply activities, ensuring that TSOs were independent legal entities with separate decision-making powers, management structures, and branding. In the independent system operator model, electricity companies were allowed to retain ownership of their transmission but had to transfer the operation, maintenance, and development of the transmission network to an ISO. Finally, under the independent transmission operator, electricity companies could maintain ownership of their transmission assets and continue to operate the transmission network through a subsidiary company. However, the subsidiary was required to have independent decision-making powers and management structures, and strict regulatory measures were put in place to prevent conflicts of interest and ensure the independence of the ITO. The TSO "must not have shared services with the parent company nor should it transfer confidential and sensitive information to the generation and supply branches of the integrated company" (Jakovac, 2011:328)

As to transmission and distribution, no substantial changes were made to the previous regime, but the directive strengthened and harmonised the competences and the independence of na-



tional regulatory authorities to ensure an effective and non-discriminatory access to the transmission networks (Jakovac, 2011). It established the Agency for the Cooperation of Energy Regulators (ACER), a body independent from EU institutions, national governments and companies, to facilitate cooperation between national regulatory authorities and ensure the consistent application of EU energy legislation. The directive also mandated the creation of the European Network of Transmission System Operators for Electricity (ENTSO-E) to promote the development of common network operation and strengthen the cooperation between national TSOs.

## **2.5. EU competition law**

EU Competition law applies to all sectors being liberalised, including the one of electricity, thus serving as an additional tool to enforce member states' opening of markets. The EU competition policy's promise was to "enable the proper functioning of the EU's internal market" (Bauer, 2023), but the ultimate goal displayed by the institutions was to protect consumer's welfare in this internal market. These two goals are in fact of a complementary nature, according to the European Commission (2009, quoted in Ezrachi, 2018), given that 'the creation and preservation of an open single market promotes an efficient allocation of resources throughout the Community for the benefit of consumers.' Albæk (2013:67) considers the "welfare standard" as the "dominant self-declared paradigm" in the EU, in which consumers play an important role. The EU competition policy may have created friction with the liberal economic theory, as controversy remained regarding what role economics should play in shaping competition enforcement and intervention (Ezrachi, 2018).

Competition law attempts to sanction the obstacles to the good functioning of the market (cartels), ensuring that companies do not recreate the barriers to entry that the legislative frameworks abolished (Block, 2007). It also aims to guarantee that modifications of the market conditions (mergers) and state interventions (state aid) do not undermine the good functioning of the market. Competition law is thus subdivided into three main areas: cartels and abuse of dominance, mergers and state aid (Parenti, 2022). The key legal instruments of EU Competition law that are applicable and relevant to the liberalisation of electricity markets will be addressed.

At the time of the liberalisation, provisions establishing the protection of competition were enshrined into the Treaty establishing the European Community (Articles 81 and 82). Its title is now the Treaty on the Functioning of the European Union (TFEU) and covers in substance the same provisions in Articles 101 and 102.

The TFEU prohibits agreements between undertakings that may prevent, restrict, or distort competition within the internal market (Article 101§1). In the electricity sector, this could involve collusion between electricity producers to fix prices, allocate customers or territories, or limit production to manipulate market prices. The prohibition applies not only to formal agreements but also to informal arrangements or concerted practices. Vertical agreements, such as exclusive supply or distribution contracts between electricity producers and suppliers, could also be scrutinised under Article 101 if they significantly restrict competition in the market.

However, not all agreements are deemed anti-competitive; certain agreements that generate economic efficiencies or promote innovation may be exempted under Article 101(3) TFEU, provided they meet specific criteria and do not eliminate competition. National competition authorities and the European Commission, which possesses wide investigation power, are responsible for enforcing Article 101 TFEU (Block et al, 2007). Infringements may result in significant fines and penalties.

Article 102 TFEU prohibits the abuse of a dominant position by an undertaking within the internal market. In the electricity sector, a company may hold a dominant position if it controls a significant share of electricity generation, transmission, or distribution. A dominant position is not prohibited per se, but the abuse of such a position is unlawful. Examples of abusive practices in the electricity sector include predatory pricing (i.e., pricing below cost to drive competitors out of the market), excessive pricing, refusal to grant access to essential facilities (such as transmission or distribution networks), and discriminatory treatment of customers or competitors. Article 102 also covers the exploitation of market power through vertical integration or the leveraging of a dominant position in one market segment (e.g., generation) to gain an unfair advantage in another segment (e.g., supply). The European Commission and national competition authorities enforce Article 102 TFEU. Companies found to have abused their dominant position may face substantial fines and be required to adopt remedies to restore competition in the market.

The EU Merger Regulation (Council Regulation (EC) No 139/2004) governs the control of concentrations between undertakings that may significantly impede effective competition in the internal market. In the electricity sector, this regulation is relevant for mergers, acquisitions, and joint ventures between electricity companies (Block *et al*, 2007). The Merger Regulation establishes a one-stop-shop system, whereby the European Commission reviews transactions exceeding certain turnover thresholds with an EU dimension. The purpose of this review is to assess whether a proposed concentration would lead to a substantial lessening of competition, particularly through the creation or strengthening of a dominant position. The European Commission may clear a proposed concentration unconditionally, subject it to remedies offered by the parties, or prohibit the transaction if it is deemed incompatible with the internal market. National competition authorities may also review concentrations that do not meet the EU dimension criteria under their respective national merger control rules.

## **2.6. Evaluation**

Through chapter 2, one has learned that liberal policy goals, including the reduction of electricity prices and optimised investment signals, involve in the context of the EU electricity market the creation of a competitive, efficient, and transparent market. They aim for the elimination of monopolies, the stimulation of competition, fair access to the market for new entrants, and more choices for consumers. This necessitates deregulation, privatisation, and unbundling processes in the electricity sector. This chapter has thus contributed to answering the research question, by demonstrating the policy expectations at EU level and their association to liberal purposes.

This chapter has answered the first sub-question by showing that the EU's electricity market liberalisation directives aimed to foster competition, increase transparency, and enhance consumer protection in electricity markets. Key provisions include the unbundling of vertically integrated utilities, non-discriminatory access to transmission and distribution networks, and fostering competition in power generation and supply. The EU competition law further serves as a tool to ensure fair competition and market access.

Flexibility is embedded in the directives, allowing Member States to adapt national laws to their specific contexts. They have discretion over implementation methods and timelines. The EU competition law further serves as a tool to ensure fair competition and market access. Overall, while the directives establish common goals and principles, they accommodate diversity in implementation across different national contexts. In that sense, the liberalisation is demonstrative of the general tendency of the EU to accept fragmented policies and standards across different member states. There is an inherent tension, especially in the energy sector, between the need for harmonisation at the European level and the desire of individual member states to maintain their sovereignty and protect their national interests.

As a result, member states have implemented these directives in varying ways. As next chapter will demonstrate, France has chosen to implement these directives in a minimalistic way, concerned about maintaining EDF's dominant position. Chapter 3 will build on the understanding of the EU's liberalisation directives and the policy flexibility granted to explain the French minimalistic implementation of the directives.

### **Chapter 3. The implementation of the European legal framework in France**

Chapter 3 shifts the focus to France, a country with a unique electricity market landscape, heavily influenced by the state-owned enterprise EDF. Given this singular context, the chapter aims to critically examine how France has responded to, and implemented, the EU electricity market liberalisation directives. The chapter will specifically address the thesis' second sub-question: how did France implement the EU electricity market liberalisation directives?

The chapter will first describe the state of the French electricity market, and its organisation, prior the liberalisation (3.1.). It will then dive into the national process of liberalisation of the electricity market (3.2.), by looking at the policies surrounding the price formation mechanism (3.2.1.), the transport and transmission networks (3.2.2.), and the electricity production (3.2.3.) and supply (3.2.4.). The chapter concludes with a comprehensive evaluation of the implementation of the European framework in France (3.3.).

#### **3.1. State and organisation of the French electricity market prior liberalisation**

Before its opening to competition, the French electricity market was characterised by a highly centralised, vertically integrated structure, dominated by a state-owned monopoly, *Électricité de France* (EDF).

The legal framework regulating the electricity sector in France takes its roots in the 1906 Law on the Distribution of Energy from Hydraulic Sources, which introduced a concession system over the construction and operation of electricity generation, transmission and distribution facilities. The law was primarily focused on the development and use of hydraulic energy, which was an important source of electricity at the time. However, its provisions also extended to other forms of energy production and distribution, such as coal. The system gave the concessionaires a natural monopoly, subject to specific conditions and obligations, with the state acting as a guarantor, controlling tariffs and guiding investments (Zobu, 2016). The concessions were granted for a limited period, typically 75 years, after which the assets were to be transferred to the public domain.

In the aftermath of World War II, a unification of electrical networks was imposed to increase the stability of the electricity supply. Before the war, local development of electricity networks managed to electrify 96% of the French population, but the actors, public and private, were very numerous – around 1400 – and the market not integrated (Pinon & Véron, 2015). In general, the modernisation of the economy in France was seen as “a national task that had to be coped with primarily by the state itself” (Heddendausen 2007:17). Industries such as the electricity were either nationalised or put to special state control, justified by the large investments required. The Nationalisation Law No. 46-628 of 8 April 1946 nationalised activities of production, transmission and distribution of electricity.

Following the entry into force of the law, all the various operators were brought together under the same organisation: EDF national service. The latter became the concessionaire of the State for hydroelectric generation and transmission and of local authorities for electricity distribution. The concession for the general supply network granted to EDF for a period of seventy-five years was the result of the merger of the concessions for distribution to public services and for transport transferred to EDF by the nationalisation law (Zobu, 2016). EDF's initial focus was on harnessing the country's hydroelectric potential, which led to the construction of numerous large-scale dams and hydroelectric power plants during this period. A few exceptions were nevertheless planned by Articles 8 and 23 of the nationalisation law, which gnawed on EDF monopoly in production and distribution of electricity. Local distribution companies (ELD) held distribution concessions covering the territory of 2800 communes, satisfying the demand of around 6% of French electricity consumption (Pinon & Véron, 2015). Among the exception to the production monopoly of EDF, there were also independent production utilities whose power is inferior to 8000 KVA and a few industrial auto producers managing hydroelectric and thermal plants.

The Nationalisation Law also established a system of regulated tariffs (TRV) for electricity supply, based on the principle of equalisation<sup>5</sup> and distinguished by colour (Territoire d'énergie Isère, 2020). The Blue tariff applied to consumers with an electrical capacity of 3 to 36Kva.

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<sup>5</sup> The principle of equalisation creates the same tariff for given categories (Territoires d'énergie Isère, 2020) <https://www.te38.fr/comprendre-la-fin-des-tarifs-reglementes-de-vente-delectricite-en-5-minutes/>

The Yellow tariff applied to consumers with an electrical capacity of 36 to 250 kVa. The Green tariff applied to consumers subscribing to an electrical capacity greater than 250 kVa. They aimed to ensure affordable and stable electricity prices for consumers while providing EDF with a reasonable rate of return on its investments. The tariffs were set by the government, based on a cost-plus approach, and were periodically revised to account for changes in EDF's costs and other factors.

In the 1960s, France embarked on an ambitious nuclear power program to reduce its dependence on imported fossil fuels and ensure energy security. EDF played a central role in this effort, being described as a “state within a state”, as it was responsible for the planning, construction, and operation of nuclear power plants (Bolton, 2021:157). The French nuclear program adopted a standardised design approach, which allowed for economies of scale and a faster deployment of nuclear capacity, counting a rate of 5/6 Pressurised Water Reactors (PWR) ordered per year from 1975 into the mid-1980 (Bolton, 2021). By 1990, nuclear power had become the dominant source of electricity generation in France, accounting for 75% of the primary energy used for electricity production (Origo, 2017). Parallely to its domestic activities, EDF pursued an international expansion strategy during the 1990s and early 2000s. The company acquired stakes in electricity utilities and generation assets in several countries, including the United Kingdom, Italy, Spain, and Belgium, as well as in emerging markets, such as Latin America, Africa, and Asia. This international expansion aimed to capitalise on the global trend towards electricity market liberalisation and to diversify EDF's revenue streams beyond its core French market.

## **3.2. The national process of liberalisation of the electricity market**

### **3.2.1. Price formation**

When referring to electricity markets, one must distinguish the wholesale market and the retail market. The first one represents the first meeting place between the producers and the sales companies, while the second one is where contracts are made between retailers, on the one hand, and households, manufacturers and businesses, on the other (Amic *et al*, 2006).

Price formation in the French retail market is affected by a number of factors. The retail price includes the costs associated with the transmission and distribution of electricity, covering the operation and maintenance of the grid, as well as investments in infrastructure. On average, the electricity bill of French consumers is made up of 46% of the Tarifs d'Utilisation des Réseaux Publics d'Électricité (TURPE), which represent the cost to transport electricity (Hellowatt, 2022). It is collected by the electricity suppliers and then paid back to the distribution and transport network (RTE, Enédis and LDCs). The retail price takes into account taxes and levies that the government imposes, such as taxes on energy consumption, levies to support renewable energy, and other policy-driven charges. The latter accounts for more than 30% - 34% in 2020 - of the final consumer's bill (Hellowatt, 2022). Suppliers also take a margin to cover their operating costs, serving their profit and increasing the retail price of electricity. Finally, the cost

of electricity in the wholesale market is a significant component of retail prices, so higher wholesale prices generally lead to higher retail prices for consumers.

In the wholesale market, prices are formed on the electricity exchanges, which are intended to replace tariffs regulated by the public authorities (Bernier, 2020). In France, the market company Powernext opened its electricity exchange in 2001, before the national markets were gradually integrated at European level. Epex Spot for instance is a European spot power exchange created in 2008 as a joint initiative between the French power exchange Powernext and the German European Energy Exchange (Martin, 2023).

Several types of contracts are put into circulation to cover suppliers' needs. "Forward" contracts allow for deferred delivery by the year, quarter, month or week for a price agreed in advance. They are primarily financial markets, with most contracts being settled financially rather than through physical delivery of electricity. "Spot" contracts are for next day or next few days' deliveries and real time purchases. Market participants submit their bids and offers for each hour of the day, indicating the quantity of electricity they are willing to buy or sell and the corresponding price. After the submission window closes, the exchange clears the market by matching supply and demand, resulting in a market-clearing price for each hour, known as the day-ahead price. Intraday contracts allow market participants to adjust their positions closer to real-time, as new information becomes available or to respond to unexpected changes in supply or demand. Intraday markets typically operate on a continuous basis, with trades being executed as soon as a matching bid and offer are found.

Electricity exchanges are optional and help to ensure transparent and public wholesale prices by matching supply and demand (Connaissances des énergies, n.d.). The logic of "merit order" prevails for the calling of power plants. It means that the plant selected will be the one with the lowest marginal production cost of this kilowatt-hour. This principle overlooks the fixed costs associated with a power generation technology. Therefore, power plants that continuously produce electricity at very low prices are the first to be called upon to supply power with power plants with higher marginal costs being subsequently added until demand is met (Next, n.d.). In practice in France, this means that renewable energies (wind, solar and hydraulic) are called first, then nuclear energy, and finally, during peak demands, coal, fuel oil and gas.

The Agency for the Cooperation of Energy Regulators (ACER) is in charge of monitoring independently all wholesale energy trades. It can request that national regulators - the Comité de régulation de l'énergie (CRE) in France - investigate when market abuse is suspected (European Commission, n.d).

### **3.2.2. Transport and transmission**

The public electricity transmission network is designed to transport large quantities of energy over long distances, whereas the public distribution network is designed to transport electricity in smaller quantities and over short distances (Tina, 2022). It is the distribution network that routes the electricity to the consumer. Both networks are natural monopolies, so they were not

per say opened to competition. However, the liberalisation brought a major change in their functioning, for it gave birth to the right of access under objective, transparent and non-discriminatory conditions for all network users. Before the liberalisation, EDF was managing all activities related to electricity, including its transport and transmission. To provide the access, a separation of the activities of production, supply and transport were needed.

Directive 96/92/EC was transposed into law by the Law of 10 February 2000 on the modernisation and development of the public electricity service. The law mandated the legal and functional unbundling of transmission and distribution activities from the production and supply of electricity. To comply with this mandate, the vertically integrated company EDF was required to separate its transmission and distribution activities from its core business. As a result, the management and operation of France's high-voltage electricity transmission network were transferred to a newly created entity, Réseau de Transport d'Électricité (RTE), which was functionally independent from EDF.

A few years later, according to Pinon and Véron (2015), the organisation of the transmission activity was reformed with the creation of the subsidiary of EDF, Electricité Réseau Distribution France (ERDF). The legal framework that facilitated the creation of ERDF can be found in the Law of 9 August 2004 on public electricity and gas service and on electricity and gas companies, which aimed to transpose Directive 2003/54/EC into French legislation. This law required the legal unbundling of distribution activities from the vertically integrated utilities, including EDF. Furthermore, the Decree of 30 January 2008 set the specific conditions for the establishment and operation of ERDF. This decree laid down the rules for ERDF's corporate governance, organisation, and the appointment of its management, ensuring its functional independence from EDF. Thus RTE and ERDF became companies independent of EDF, even though they were wholly-owned subsidiaries of the incumbent operator at the time.

However, Directive 2009/72 provided for the separation of assets networks, which meant that the incumbent operator could no longer hold 100% of a network's capital. France yet refused the system aimed at privatising the networks and, as an exception, benefited from the independent transmission operator (ITO) system (Percebois, 2019). The ITO system allows the former supplier to retain ownership of the transmission and distribution activities provided that they are strictly separated from a managerial, accounting and strategic point of view (Pinon & Véron, 2015). The two companies must sign a charter of "good conduct" and comply to detailed rules on their independency, autonomy and investments. In 2017, 49.9% of RTE's capital was opened up to the Caisse des Dépôts, so that EDF now holds only 50.1% of the transmission system operator's capital (Percebois, 2019). It is also required that the logos of the networks be clearly distinguished from those of EDF and that confusion of names be avoided, which will lead ERDF to change its name in 2016 to Enedis. The Energy Code, which transposes Directive 2009/72, requires, under the terms of its Article L. 111-61, that the transmission operator "ensures the operation maintenance and (...) the development of electricity distribution networks distribution networks in a manner that is independent of any interest in electricity production or supply

activities", in order to guarantee objective, transparent and non-discriminatory access to the public distribution networks.

### **3.2.3. Production**

France has decided to open progressively its electricity market to competition by allowing new players to enter the electricity production market, breaking the monopoly that EDF held. Freedom of establishment for energy producers is indeed one of the fundamental principles of the competitive electricity market (Pinon & Véron, 2015). An electricity producer's mission is to inject energy into the French grid, by transforming primary energy using different types of resources (Total Energies, 2023).

The Law of 3 January 2003 implemented a comprehensive licensing and authorisation framework for electricity production, aimed at facilitating the entry of new players in the market and promoting competition. This framework required new entrants to adhere to specific technical, financial, and environmental criteria, ensuring that the French electricity market remained reliable, efficient, and sustainable. New entrants had to apply for a production license from the Ministry of Energy (Article 7). The licensing process required applicants to provide detailed information on the proposed generation facilities, such as location, capacity, technology, and environmental impact (Article 9). Additionally, applicants had to demonstrate their financial capacity and technical expertise to operate the generation facility safely and efficiently.

The law also introduced a tendering procedure for new electricity generation capacities, which was aimed at ensuring a competitive and transparent process for allocating production rights (Article 8). This tendering procedure applied mainly to renewable energy projects and projects deemed to be of national interest. The Ministry of Energy issued calls for tenders, specifying the desired capacity, technology, and location. Applicants submitted their bids, and the winners were awarded long-term power purchase agreements at a fixed price.

Today, French electricity production remains heavily concentrated on the historical producer EDF, which provides nearly 85% of it, followed by Engie (4%), Gazel Energie (less than 1%) and Total (Cour des comptes, 2022). Beyond that, more than 350,000 renewable energy production sites provide the bulk of the remaining production. EDF's generation mix is dominated by nuclear power (85%) while its competitors have a predominantly renewable (Engie) or fossil fuel (Gazel Energie, Total) fleet.

### **3.2.4. Supply**

Suppliers of electricity are the companies that sell electricity to end consumers, without necessarily holding production capacity. The supply segment of the electricity market is the one where the greatest potential for competition lies, and which has been the most exploited by the European directives. France has decided to progressively open its supply market to competition, from the major industrialists in 2000, then the businesses and local authorities in 2004, and finally to all consumers in 2007. Consumers therefore became progressively eligible, which



means that they could choose their supplier: the incumbent operator EDF or an entrant. Supply in France has thus been only fully open to competition as of 1 July 2007.

Yet, the way France opened its market to competition was deemed insufficient by the European Commission, who opened an investigation in 2007 to check the effectiveness of competition in the French electric sector, and two years later, threatened France of sanctions on the grounds of a failure to transpose the Directives into French law and the public aid it continued to deliver (Pinon & Véron, 2015). The European Commission considered that the consumer's freedom to choose its electricity supplier was not achieved in the French system. Several limits were indeed obstructing a real competition.

The regulated tariffs, first of all, had not been abolished and could only be sold by the historical supplier EDF, constituting a monopoly to the disadvantage of alternative suppliers (Pinon & Véron, 2015). Moreover, consumers were not free to choose or leave the electricity offers including TRVs whenever they wanted. Successors moving in a new accommodation could not decide to revert to regulated rates if these had been left and could subscribe to an electricity supply with TRVs if the dwelling was already served by a contract at regulated tariffs (Pinon & Véron, 2015). This provision hindered the development of alternative supplier. In addition, EDF's position was very favourable compared to its competitors, due to the competitiveness of its nuclear fleet. The investment in the construction of the latter occurred to a large extent in the 1970s and 1980s, so the fixed costs had already completed their depreciation cycle, leading to an annuity effect benefitting to EDF. The alternative suppliers therefore could hardly offer tariffs as competitive as EDF's TRV. The European Commission saw this as a distortion of competition in favour of the incumbent operator and threatened to abolish the electricity TRVs (Assemblée Nationale, 2021).

In order to implement a real competitive electricity market, a commission, chaired by Paul Champson, looked at different solutions. The latter ruled out several options, such as implementing the single buyer system, regulating comprehensively the electricity market, splitting EDF into several entities or forcing it to sell its power plants to competitors. Instead, it proposed two alternatives of market organisation: a redistributive tax on nuclear power and regulated access to EDF's base load electricity production (Champson, 2009).

The second option was retained and put into law through the Law n°2010-1488 on the new organisation of the electricity market (NOME). The latter has established a transitional regime which opens up the possibility for other electricity generators in France to benefit from EDF's annuity. As of 1 July 2011, EDF was required to sell up to a quarter of the production of its nuclear plant fleet (100 TWh/year) to the suppliers requesting it, at a specific price fixed by public authorities that was supposed to reflect the economic condition of the production of electricity (Pinon & Véron, 2015). This tariff, named the Regulated Access to Incumbent Nuclear Electricity (ARENH), was set at 42 €/MWh (Article 1, Arrêté du 17 mai 2011). It represented a transitional mechanism, with Article L. 336-8 of the Energy Code providing for the termination of the ARENH, 15 years later, on 31 December 2025.

In order to comply with the European Union's requirements and conditions to keep state aids, the "NOME" law also abolished the TRVs for medium and large consumers (Yellow and Green tariffs) and only maintained the TRVs for professionals subscribing to a power level below a certain threshold, and those for individuals (Blue tariffs). The method of calculating the TRVs has also changed: from an approach based essentially on production costs, this calculation is now based on the more complex method of "stacking costs" (Assemblée Nationale, 2021). The tariffs must now integrate in its composites, the price of the ARENH, the cost of the complementary supply of electricity and an adequate remuneration of the supplier. This is aimed at making the TRVs challengeable, so that alternative suppliers can be in a position to propose offers that are competitive in relation to these regulated tariffs. A principle of reversibility, allowing consumers who have opted for a market offer to return to regulated tariffs at any time, was established by Law no. 2010-607.

In return for the sharing of the historical supplier's annuity of nuclear with the alternative suppliers, the latter have been imposed several obligations. These two measures are complementary and aim at putting on an equal footing all suppliers (Pinon & Véron, 2015). Article L3351 of the NOME law establishes a capacity obligation, whereby all suppliers are requested to be able to cover their consumers' peak consumptions needs. The ARENH could be unfair since it would provide alternative suppliers with electricity at the same cost all year, although, in reality, the price of electricity varies greatly. The production of electricity costs indeed more in peak demand, when production capacity of nuclear plants are not enough to cover demand. Through the capacity obligation, suppliers can either possess peak production capacities, so as to inject additional quantity of electricity in the network during peak demands, or they can have deletion capacity available. The latter is about reducing the demand of electricity of the supplier's clients – usually industrials whose consumption is high – in exchange of financial compensation. However, these two options are virtual, meaning that suppliers can hold these capacities themselves but can also hold power reservation or load shedding certificate that they can buy from any producer or large consumer of electricity.

With the abolition of the Yellow and Green tariffs on 31 December 2015, the market share of alternative suppliers increased from 16% at the end of 2014 to 28% in mid-2016 (Tina, 2022). Four different types of suppliers can be now distinguished in France: the historical suppliers, the new entrants, historical suppliers from abroad, and other specialised actors (Pinon & Véron, 2015). Among historical suppliers, there are the large national supplier EDF and the local distribution companies. New entrants, which had previously no activity, entered the market following its opening to competition with different strategies. Some players offered a green approach, this is the case of Planète Oui, Enocoop and Lampiris. Other players have the ambition of becoming a major supplier for small consumers and businesses. Direct Energie for instance, which was created in 2003 and merged with its direct competitor Poweo in 2012, came as a challenger to the historical supplier for small and medium-sized consumers. Others focus their commercial strategy on large and medium-sized consumers (Uniper, Alpiq, etc.) The recent arrival on the French market of new electricity suppliers, such as ENI, Casino or Leclerc, should

be noted. The market share of the incumbent suppliers (EDF and LDCs) remains nevertheless high today, at over 63% in volume (Tina, 2022).

### **3.3 Evaluation**

As demonstrated, France has taken several steps to implement the EU liberalisation directives and open up its electricity market. However, the extent of liberalisation in the French electricity market has not been as comprehensive as in some other EU Member States.

The process of electricity market liberalisation in the European Union was in fact met with a mixed response in France, considering its long history of state involvement in the energy sector, particularly through the vertically integrated national utility EDF.

From a political standpoint, the French government had reservations about the liberalisation process, particularly regarding its potential impact on energy security, public service obligations, and the financing of the nuclear fleet. The fear was that liberalisation could compromise the country's energy independence, an important consideration given France's significant reliance on nuclear power, which requires substantial long-term investment and strategic planning. The government was also concerned about ensuring universal access to electricity and maintaining control over prices, both key aspects of France's public service tradition in the energy sector. A French official once explained, as quoted by Jegen (2014:16): “We are not against opening up to competition, but we don't think that it is enough just to liberalise the market in order to make it work (...). We don't translate security of supply and competitiveness solely into the breakup of big energy companies”. It demonstrates the gap between how Brussels and Paris see the liberalisation process.

From the perspective of the incumbent utility EDF, liberalisation posed a significant challenge. While it recognised the need to adapt to the changing European regulatory environment, it was also keen on preserving its dominant position in the French electricity market. Liberalisation threatened to erode EDF's market share and put pressure on its business model, which was based on the vertically integrated provision of electricity.

Despite these concerns, France transposed the EU directives into national law, albeit with a degree of flexibility. The government sought to balance the requirements of liberalisation with its own policy priorities. This led to a cautious approach to liberalisation, characterised by a gradual opening of the electricity market to competition and the preservation of a significant role for the state in the energy sector.

Today, the market remains dominated by EDF, which holds a significant share of electricity generation and retail supply. The persistence of regulated tariffs for certain consumer categories has been criticised for inhibiting the development of full competition by distorting the market and discouraging new entrants. While the ARENH mechanism was designed to promote competition, its effectiveness has been also debated, as the regulated price may not always reflect market conditions, and the limited access to nuclear power may still put new entrants at a disadvantage. Despite the full opening of the electricity market to all consumers in 2007, the rate

of consumer switching remains low in France, around 3% in 2019 (CRE, 2021). This can be attributed to factors such as limited awareness of alternative suppliers, consumer inertia, and the perceived complexity of the switching process.

Chapter 3 contributed to answering the research question by providing with a practical lens to view the alignment or misalignment of France with the EU liberalisation directives. Its misalignment could engender a gap with the liberal policy goals. It is crucial to dissect the French policies, as they were the product of a very specific national and European negotiation, whose results can therefore not be attributed mainly to the EU directives. This chapter has enabled to answer the thesis' second sub-question by demonstrating that France implemented the liberalisation directives in a minimalistic way, gradually opening its electricity market to relative competition through several legal reforms and initiatives. The significant shift that came with the enactment of the NOME law in 2010 will be of significant importance for the next chapter, as it had a direct impact on the incentives to invest in electricity production, and on the level of electricity prices.

#### **Chapter 4. The results of the French liberalisation process in light of the theory promises**

Chapter 4 takes a closer look at the outcomes of the French liberalisation process in the electricity market by looking at the evolution of investment signals and electricity prices. It dissects the concrete changes that have taken place since the inception of EU directives and places them against the backdrop of the liberal theory expectations. This dive into the outcomes will address the fourth sub-question: did the results of the liberalisation in France reflect the liberal policy-goals? By examining the gaps between theoretical expectations and actual results, one can glean insights into the nuances of France's approach and thus build a more comprehensive understanding of its electricity market liberalisation journey. By critically evaluating the real-world results against theoretical promises, this chapter aims to provide a comprehensive understanding of the effectiveness and implications of the EU electricity market liberalisation directives as originally implemented in France.

Chapter 4 is divided into two primary sections to evaluate the outcomes of France's electricity market liberalisation. The first section (4.1.) discusses electricity prices, starting with a historical overview of pricing before liberalisation (4.1.1.), then detailing the theory's price-related liberal promises (4.1.2.). It subsequently explores the factors causing price increases, despite the advent of competition (4.1.3.), and the impact of growing wholesale prices on consumer cost (4.1.4.). The section ends with a discussion on the potential consequences of ending regulated tariffs (4.1.5.). The second section (4.2.) focuses on investment signals. It describes the state of investment before the liberalisation (4.2.1) and then lays out the theory's investment-related liberal promises (4.2.2.). It critically examines the lack of investments from both alternative suppliers (4.2.3.) and the incumbent EDF (4.2.4.). The chapter concludes with a short evaluation of the results (4.3.).

## **4.1. Prices of electricity**

### **4.1.1. State of electricity prices prior liberalisation**

Before liberalisation, the electricity prices in France were relatively stable, primarily because the state-owned utility EDF had a monopoly on electricity production and supply. EDF's prices were regulated by the state, keeping them relatively low for households and businesses.

One of the reasons for the relatively low prices was the country's heavy reliance on nuclear power, which, once the plants are built, represent a cheap source of electricity. France embarked on a massive nuclear power program in the 1970s and 1980s in response to the oil shocks. Regulated electricity tariffs were therefore high in order to finance the development of the electricity fleet. Over time, these investments have been amortised and consumers, both residential and industrial, have seen their bills fall sharply, with the price per MWh almost halved between 1950 and 1980 for individuals in constant euros, i.e. excluding inflation (Connaissances des Energies, 2014). Electricity production costs became disconnected from fluctuations in hydro-carbon prices. Moreover, during this period, electricity was lightly taxed, meaning its price mainly covered production costs, even declining towards the end of the 1990s (Briand & Oparowski, 2019).

The oil shocks were indeed a wake-up call for France to diversify its energy supply and become less dependent on oil from the Persian Gulf. Following the oil shocks of 1973 and 1989, electricity prices in France saw significant increases, set against a backdrop of very high inflation. As prices were heavily dependent on oil prices, they were highly volatile between 1973 and 1983. In 1986, electricity prices fell due to the oil counter-shock, after which the nominal price of electricity increased very slightly until 2007, namely 2.6 points of percentage between 1986 and 2006, according to INSEE estimates (Briand & Oparowski, 2019).

**FIGURE I - EVOLUTION OF ELECTRICITY PRICES IN FRANCE BETWEEN 1950 AND 2012 IN CONSTANT EUROS PER MWh**



**SOURCE: CONNAISSANCE DES ÉNERGIES, 2014**

Before 1957, EDF proposed the level and structure of electricity tariffs to its supervisory authority, but these were set by the State, which was reluctant to increase the price per kilowatt-hour fearing its impact on the inflation rate (Percebois, 2019). EDF, and notably the French economist Marcel Boiteux, then succeeded in convincing the government that, except in special social cases, it was necessary to practice "true pricing" and to opt for marginal cost pricing, which would lead to price differentiation according to time of day and period. This theory will also make it possible to subordinate the investment program to the principle of satisfying demand at the lowest cost, as provided by the marginal cost theory (Yon, 2014).

#### **4.1.2. Theory promise**

In 2001, the IEA and the OECD published a report explaining the expected benefits of a liberalisation reform in the electricity supply industry<sup>6</sup>. It stated that "under competition, productivity grows, costs and price decrease, and innovation and product diversity flourish". This claim takes its root in liberal and classical economic theory, which is grounded in the belief that free markets and competition lead to efficient outcomes, benefiting both producers and consumers. According to the IEA & OECD (2001), lower prices will result both from competition and increased electricity trade, because the former "puts a downward pressure on the profit margins of generators and suppliers and provides an incentive to reduce costs", and the latter "facilitates

<sup>6</sup> OECD & IEA (2001) Competition in Electricity Market. ISBN: 92-64-185593 2001

inter-system competition and trade in electricity, resulting in a better allocation of resources and, ultimately, a reduction in the cost of supplying electricity” (OECD & IEA, 2001:23).

Yet, the supporters of classical and liberal economic theory agree that the general rule, according to which competition brings down prices, cannot necessarily be applied to the electricity market, due to the high volatility of electricity prices (Combes *et al*, n.d.). Liberal theory validates it only under certain conditions. According to the latter, only the ability to better predict and distribute one’s consumption, combined with a control of one’s periods of need, should succeed in reducing the price.

Nevertheless, the EU policy goal was clear: the liberalisation of the electricity market was a tool to achieve higher environmental standards, quality of supply, but also lower prices for consumers. Until late, the rhetoric of prices was at the center of the EU discourse justifying the opening of competition of the electricity markets. In 2015, the EC praised the achievements of Finland and Sweden in terms of savings made by retail consumers on their electricity bills<sup>7</sup>. Besides, in the recent Directive 944/2019, European institutions reaffirmed this belief stating that “a fully liberalized, well-functioning retail electricity market would stimulate price and non-price competition among existing suppliers and provide incentives to new market entrants, thereby improving consumer choice and satisfaction” (§22).

#### **4.1.3 How to explain increasing prices despite the opening to competition**

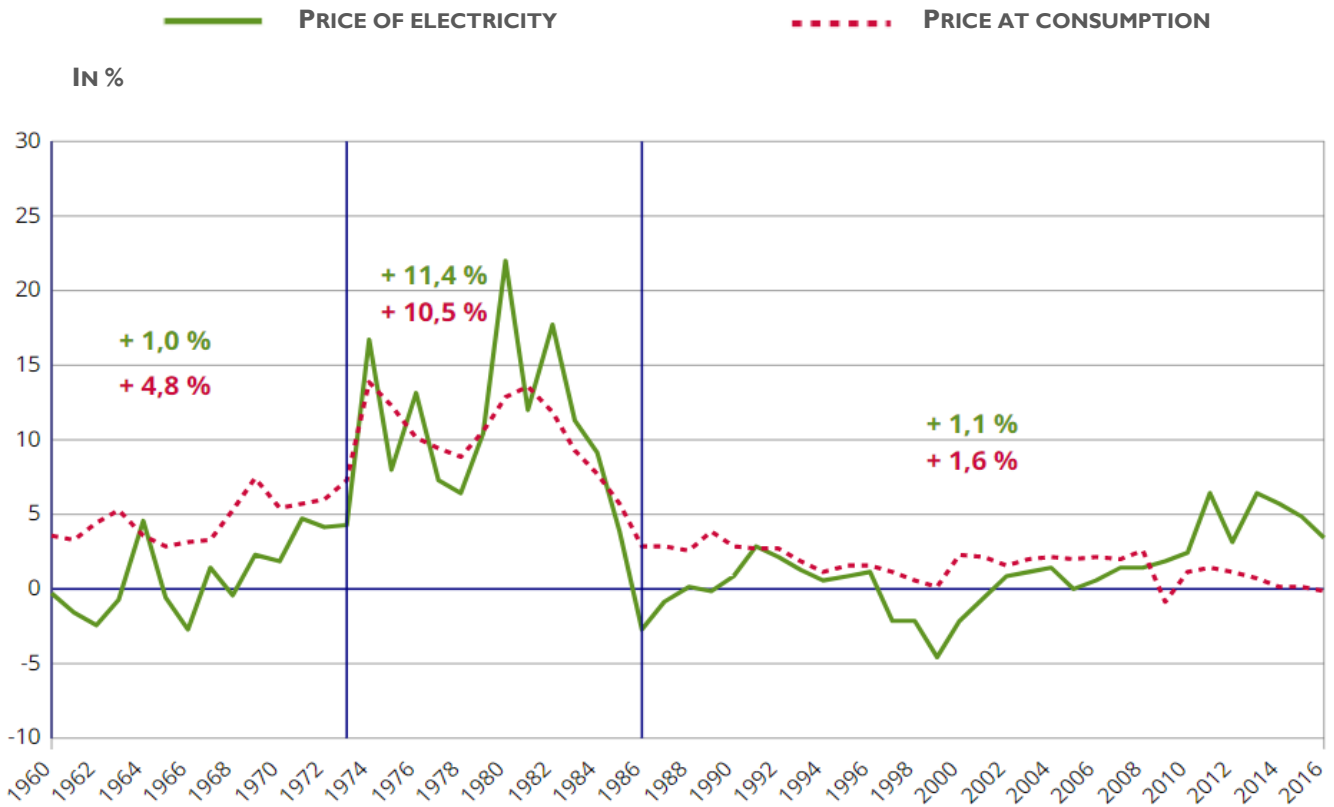
First of all, it's important to note that electricity prices are influenced by a variety of factors, including fuel markets, competition and resulting price convergence, interconnexion capacities, investment in infrastructure, regulatory decisions, and taxes, among other things (Jamasp & Politt, 2005). Thus, it can be challenging to isolate the impact of liberalisation on prices in France.

That said, evidence suggests that liberalisation did not lead to a significant decrease in electricity prices for consumers in France. According to Figure 2, electricity prices for household consumers in France steadily increased from 2007 to 2016, with some minor fluctuations. In 2008, one year after the opening of the French electricity market to competition, electricity prices at consumption, increased of 1.4 point of percentage. While the year 2009 shows a decrease of the prices at consumption of 0.8 point of percentage, the following years are punctuated again by a positive evolution of prices (2010: +1,1%, 2011: 1,5%), to stabilise in 2014 at 0,1 point of percentage of evolution. Thus, between 2009 and 2016, electricity prices rose faster than inflation (+4.3% compared to +0.5%).

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<sup>7</sup> European Commission (2015) Delivering a New Deal for Energy Consumers. SWD 141 final.

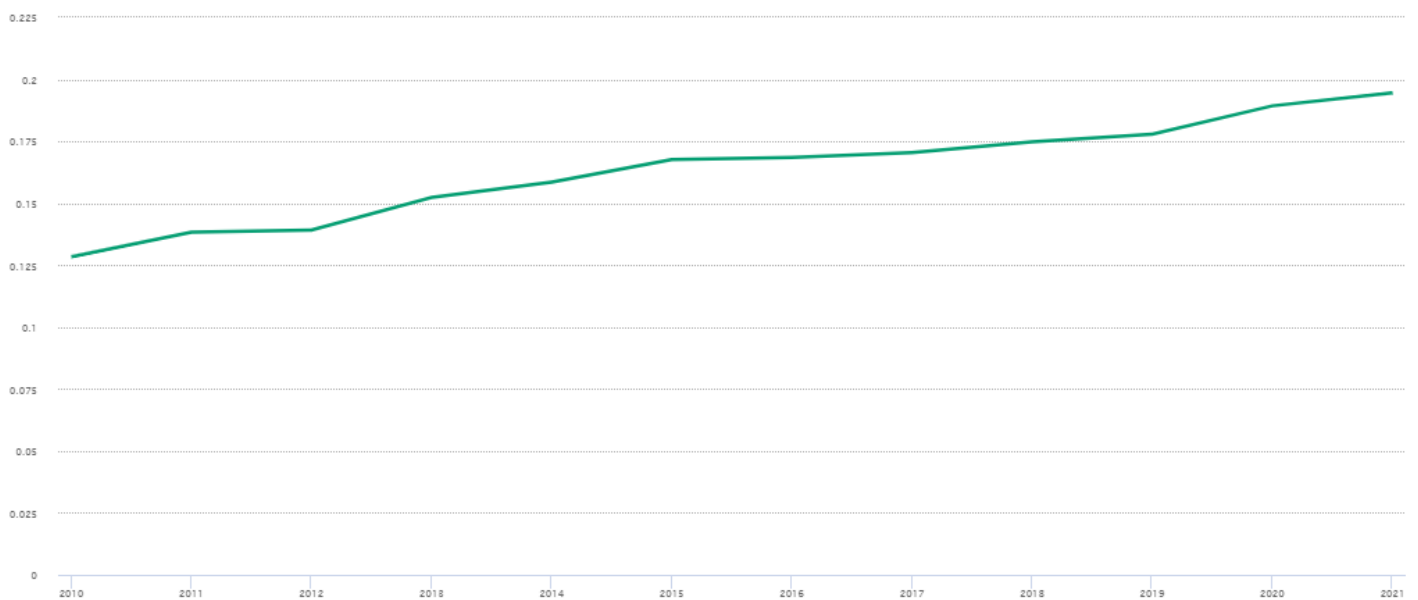
**FIGURE 2 - CHANGES IN ELECTRICITY PRICES AND CONSUMER PRICES FOR HOUSEHOLDS BETWEEN 1960 AND 2016**



SOURCE: INSEE, 2019.

**FIGURE 3 – EVOLUTION OF ELECTRICITY PRICES FOR MEDIUM-SIZE HOUSEHOLDS IN FRANCE BETWEEN 2010 AND 2021**

(€/Kwh)



SOURCE: EUROSTAT, 2023.



Part of this increase can be attributed to rising taxes and levies, notably through the Contribution to the Public Electricity Service (CSPE). The latter, paid by electricity consumers, is used, for the financing of purchase obligations for producers of renewable electricity, of tariff equalisation with non-interconnected zones (Corsica, Overseas Departments, etc.) and of social measures (Observatoire de l'industrie électrique, 2018). Its amount has risen sharply since the beginning of the 2000s (+650% between 2003 and 2018), due to the public support for the development of renewables (Observatoire de l'industrie électrique, 2018).

Yet, as explain Debrégas & Plihon (2021), other causes, which can be attributed to the liberalisation, are at the heart of the increase of the electricity prices. One cause is the additional cost implied by the entry of new players into the electricity market, who have to coordinate and duplicate the information systems, administration, traders, etc. Another major reason for the rise of electricity prices according to Debrégas & Plihon (2021) is the largest financial costs, induced by the opening to competition of markets. First, because financing conditions are less advantageous for private players than for EDF, who holds a public company status. Secondly, because the remuneration of capital for the benefit of private shareholders is a major factor of cost increase. The impact of capital remuneration on the overall cost of the megawatt/hour produced is indeed decisive, in an electricity system essentially made up of long-term investments (Debrégas & Plihon, 2021).

To conclude, electricity prices do not seem to attest to a significant decrease in prices as a result of the introduction of liberalisation in the French electricity market, rather it may have contributed to their increase.

#### **4.1.4. The impact of increasing wholesale prices on consumer price**

The European and French wholesale electricity markets are designed in such a way that their price are structurally volatile while tending to increase sustainably, notably due to the indexation with oil and gas prices (Joannin, 2007).

The increasing amount of renewables used to produce electricity has put downward pressure on wholesale prices, for renewable technology is a mean of production that has a low marginal cost. This is visible on the decreasing tendency of the slope from 2009 to 2016 (figure 4). In particular, their intermittency has a direct impact on wholesale prices, lowering them, even to negative figures, when wind turbines and solar panels are running at full capacity, or raising them when the electric parc is running at low capacity (Bureau *et al*, 2023). On the other hand, the expensive state-of-the-art equipment used to produce the electricity needed for energy security is expected to push price up. Moreover, when nuclear and renewables production of electricity is not sufficient, peak load plants are called (merit order). These plants' production costs, including the price of fuel (gas and oil) and the cost of CO<sub>2</sub> emissions, are higher, and thus rises the wholesale prices. As an example, fuel can account for up to 63% of the production cost of "peak" gas-fired power plants (Joannin, 2007). Considering that commodity prices are on a long-term upward trend and the costs of greenhouse gas emissions are expected to put

more pressure on the price of electricity, Joannin (2007) concludes that “the fundamentals of the wholesale electricity market therefore point to a sustainable price increase”.

**FIGURE 4 – EVOLUTION OF WHOLESAL E PRICES BETWEEN 2001 AND 2021 IN FRANCE**



SOURCE: CONNAISSANCES DES ÉNERGIES, 2021.

The organisation of the electricity market modified by the NOME law has led to the biggest increase in wholesale market prices since the sector was opened to competition, according to the Cour des Comptes (2022). The "base" calendar forward prices for 2022, was indeed continuously set above €100/MWh since September 2021, and has even reached €400/MWh in December and early March 2022 despite the cost of production not exceeding 43€/MWh in France (Cour des Comptes, 2022). These rocketing prices notably demonstrate, in the current market design, the sensitivity of the electricity price to the one of gas which increased following the decision of Vladimir Putin to limit their export.

The dual pricing mechanism of the Nome Law (ARENH and market prices) has indeed definitely set up the increasing tendency of wholesale prices. When the market price is above the ARENH price, suppliers tend to buy as much nuclear power as they could at the lower ARENH price, reducing the demand for power at the market price and causing it to fall. Conversely, if the market price falls below the ARENH price, suppliers tend to stop buying nuclear power, increasing demand in the market and pushing prices up.

The increase of wholesale price has an impact on the price paid by consumers. According to the consumer protection association UFC QUE-CHOSIR (2007), an increase in wholesale market prices leads to an increase in retail prices by design. This increase primarily affects the customers of alternative suppliers, for the vast majority of alternative suppliers obtain part of their supplies on the wholesale markets to cover their customers' consumption.

#### **4.1.5. The end of regulated tariffs: towards another price increase?**

Under this context, it seems clear that the liberalisation in France has failed at delivering its objective of lowering prices for consumers. The market design imperfection is such that, without state intervention, consumer and businesses would have not afforded the electricity prices when the energy crisis hit in 2022. Regulated tariffs hold the same purpose, and yet, strong oppositions have arisen against the latter, notably from the European Commission or alternative suppliers. In 2006 and 2007, the French Constitutional Council and the Council of State stated that permanent provisions of this nature [regulated tariffs] would be contrary to the European directives seeking to liberalise the electricity markets (Finon & Glachant, 2008). Nevertheless, the Council of State, seized by the National Association of Energy Retailers comprised of alternative electricity suppliers, stated in 2018 that "the obstacle constituted by the regulation of electricity sales prices is justified, in a context of high volatility and since it concerns a non-substitutable energy that constitutes a basic necessity, by the pursuit of the objective of guaranteeing consumers a more stable electricity price than market prices" (Conseil d'Etat, 2018).

The new reform of the European electricity market design that the European Commission has proposed in March 2023 allows the maintenance of regulated tariffs only during crises (European Commission, 2023). Regulated tariffs are indeed judged as a distortion of competition. They would hinder the entry of new players, as alternative suppliers are forced to buy on the wholesale market at market prices or to produce with thermal equipment at variable costs higher than the regulated tariffs (Finon & Glachant, 2008).

Yet, if regulated tariffs were to be abolished, French consumers would have to go through a significant increase of their electricity bills. Abolishing the regulated tariff would let consumers bear the costs of the volatility of market prices, which follows the energy commodities' course and is deeply unstable. The case of businesses is a good example. The end of regulated tariffs sales entered in force on 31 December 2020 for companies, associations or local authorities who employ 10 people or more and who have an annual turnover of more than €2 million (Lalane, 2022). They have seen their electricity bills rocketing recently, as they were not protected anymore by any regulated tariffs offers. The INSEE predicted that businesses will have to pay 84% more for their electricity in 2023 than in 2022 (Vie publique, 2023). This statistic does not take into account any emergency measure that the government have implemented or will, to support businesses.

## **4.2. Investment signals**

### **4.2.1. State of investment prior the liberalisation**

After World War II, the French economy had to be rebuilt, the country's rural electrification had to be ensured, and massive investments had to be made in production and networks (Percebois, 2019). This was ensured by the great hydraulic program of the 1950s, then the oil-fired thermal program of the 1960s, and finally the acceleration of the electronuclear program of 1974.

The financing of the nuclear program was done by indebtedness, with the costs being passed on in the electricity tariffs (Percebois, 2019). It is therefore mostly the consumer who ended up paying the investments, although the State has also granted help for research and development in the field of military and civil nuclear power. The state also provided financial support for large infrastructure projects, considering them as a public service obligation.

The centralised system was largely planned, with EDF having a central role to play by orienting the necessary investments to uphold the increasing demand of electricity (Defeuilley, 2011). The investment decisions were based on projected demand, technological advancements, and government energy policy.

It was EDF's mission to implement an investment program designed to keep pace with changes in the national economy and incur very high costs. In return, it however benefited from a monopoly that reduced the risks they face. Having such a centralised and dirigiste organisation also enabled to take advantage of the economies of scale associated with the construction and operation of large-scale production units (Defeuilley, 2011).

As the planner of an optimisation program, it was EDF's goal and responsibility to achieving the optimal level of capacity and mix. The latter was due to minimise the sum of the discounted long-term costs of production and investment over 20 years to satisfy an annual demand whose growing level and horo-seasonal structure could be predicted as reliably as possible, since he was the only one to sell on this market (Finon, 2015).

#### **4.2.2. Theory promises**

The model of optimal spot pricing of electricity, inspired by that of commodity markets, is the organisational reference underpinning the liberalisation of the electricity sector implemented in the European Union from 2000 onwards.

In theory, in a competitive electricity market, the price that balances electricity supply and demand sends signals and provides incentives that allow for optimal investment in the short and long run. This is true at least according to Caramanis (1982) and other theorists such as Bohn, Schweppe and Tabors, who have demonstrated that spot pricing leads to optimal investments in non-utility-owned electricity generation. In a spot energy market the price determines the revenues of the different producers, such that high prices (and therefore high revenues) lead to increased investment and low prices (and therefore low revenues) limit investment (Vassilopoulos, 2007). Prices should allow generators to earn net revenues that are greater than operating costs and the difference must allow them to recover their capital costs, and according to Caramanis (1982), this condition is fulfilled when dispatch is optimal in a liberalised market. Thus, in theory, investments are made until the last MW invested earns a net revenue whose present value is equal to the incremental cost of the new investment (Vassilopoulos, 2007). It is also expected that, in fully efficient markets, investors would be able to form perfect expectations about expected cash flows and would therefore be able to conduct the necessary investments (Marty, 2007). Theory also showed that the liberalisation would enable savings in investment

costs, thanks to better investment decisions and the fact that investors would assume the risks of their investments, which would correspondingly suppress incentives to over-invest (IEA, 2001).

However, experience in France shows that its liberalised electricity market fails to provide sufficient incentives for investment to reach the thresholds required to guarantee reliability of electricity supply.

#### **4.2.3. The lack of investments from alternative suppliers**

Assuming that system costs, which are essentially fixed and long-term, will be covered by remuneration based exclusively on the variable cost of peak generation is indeed a fragile assumption. According to Debrégas & Plihon (2022), the assumptions on which the theory is based are inapplicable in a market environment, whatever the composition of the generating fleet. Moreover, wholesale prices are disconnected from power system costs, and unable to guarantee generators a return on their investment.

Marty & Reverdy (2017) indeed found that little investment is being made in new capacity, and existing units are threatened with decommissioning or mothballing, making them unavailable to cover peak demand. They cite RTE's analysis (2017) on the economic profitability of the combined cycle gas turbine, which demonstrate that, between 2010 and 2016, their units never covered their total costs. They even failed to cover their variable costs, for they did not operate above their shutdown threshold between 2013 and 2015. The National Assembly, in its 2020 report, also showed that, even after alternative suppliers started benefitting from the ARENH, they have not invested massively in new production capacity.

The reasons behind this market failure to incentivise investments in France can be found in the price volatility and the lack of profitability.

According to the National Assembly (2021), the liberalisation of the energy sector has led to greater price volatility. Calling the volatility a “perennial feature of liberalised electricity markets”, Marty (2007:8) considers that it significantly discourages investment, as future revenue streams are marked by a high variability and uncertainty. Price uncertainties are indeed making peak-load investments riskier. It blurs price signals to the extent that investors don't know whether prices will be able to stay high enough for long enough to cover their costs, and it gives rise to fears of public intervention, particularly in the form of price caps. The fact that, under a liberalised market, investments decisions are not made by public entities but by decentralised decisions based on price signals, has surely increased the consequences of this market failure. Price instability has particularly impacted medium-sized companies' investment in energy transition projects who are less protected than electro-intensive companies, according to the National Assembly (2021).

Besides this volatility, liberalised electricity markets are structurally characterised by a boom-and-bust cycle (Ford, 2002), which makes investments socially inefficient. A boom-and-bust cycle represents the “process of economic expansion and contraction that occurs repeatedly” (Investopedia, 2020). In electricity market, this is characterised by the fact that any additional

investment will alleviate tensions on the supply side, increasing the risk that the investor will himself contribute to a situation in which the market price falls below his long-run marginal costs (Marty, 2007). Indeed, any investment in new capacity is likely to reduce peak demand periods, which represent the only time when the fixed costs of "marginal" installations will be covered, following the merit order logic. This is a well-known issue called the "missing money", whereby the financial inflow guaranteed to the investors is insufficient and therefore leads to under-optimal investments. In France, this issue was particularly salient considering that until very recently, the electricity production system was perceived as being in overcapacity (Cayla, 2023). Because of the merit order, a private electricity producer has no interest in investing in a gas-fired power plant, or even in a wind turbine, if the production system is in overcapacity.

In order to deal with this problem, the French government has established since 1st January 2017, a capacity mechanism. The income derived from a capacity mechanism should be sufficient for a producer to handle its essential fixed operational and investment expenses, alongside the earnings from its electricity sales (Cour des Comptes, 2021). The mechanism compels electricity suppliers to own capacity guarantees matching their customers' peak consumption. These guarantees can be purchased either from electricity producers or demand response operators who own them or from the capacity market. It is supposed to encourage investment in new capacity, the preservation of existing capacity, and boosts demand response and energy efficiency efforts. Roques *et al* (2017) have estimated, through a modelisation, that this capacity mechanism will enable to limit the loss of load expectation to go beyond the security of supply criteria, set at 3 hours. It should therefore enable to maintain security of supply in France, despite the lack of investments structural to the market. It should besides lead to further investments in the cost-competitive capacities (Roques *et al*, 2017). For instance, from 2024 onwards, investments in new CCGTs are due to become profitable. This capacity market was notably supplemented by tender mechanisms. Since 2019, new entrants to the capacity market have been eligible for long-term calls for tender (AOLT), organised four years ahead of the delivery year and guaranteeing successful bidders stable capacity income for seven years (Cour des Comptes, 2021).

It remains to be seen whether these new mechanisms will enable to correct the structural inefficiencies of the French electricity market. It is worth recalling that the ARENH was also supposed to encourage alternative suppliers to invest in electricity generation facilities. Yet, their investments remained limited, certainly because it is hard to find sources of production that are as competitive and controllable as nuclear power, and whose investment would be profitable in the short-run (Assemblée Nationale, 2021).

#### **4.2.4. The lack of investments from EDF**

The phenomenon leading to a lack of investment just analysed does not concern peak capacity only, according to Marty (2007), for price volatility can also lead investors away from basic investments in the most capital-intensive production technologies. There are, however, several

other reasons that have worried electricity experts in the wake of the liberalisation regarding its implications for the incumbent EDF.

One concern regards the impact of the liberalisation on the investment policy of EDF, which, according to Debrégas & Plihon (2021), is increasingly dominated by a financial rationale. This effect is, according to him, evident in the transformation of EDF from a state-owned entity to a publicly traded company. The law of August 9, 2004 indeed transformed EDF into a private commercial company. Although the state remained the main shareholder (holding 84,5% of the company), third-party shareholding has become an essential parameter of the group's governance, according to the national federation of local authorities (FNCCR, 2021). According to the latter, shareholders have been influential players in defining the company's strategy, pushing EDF's structural objectives to include profit maximisation and share price support. The necessity to adhere to financial regulations, which aren't necessarily compatible with long-term investments, has compelled EDF to underinvest in public services to enhance its financial performance and bolster its global expansion (Debrégas & Plihon, 2021). The level of R&D has been affected by decisions such as to decrease staff numbers or to give up some public service issues deemed insufficiently profitable for the company (Debrégas & Plihon, 2021). From 2000 to 2007, R&D spending by EDF fell by 33%, from 568 to 375 million euros (Saliès, 2011), before nevertheless rising again as of 2008. This investment shortfall has primarily affected the upkeep of power generation facilities and distribution networks (Debrégas & Plihon, 2021).

The FNCCR (2021:15) has also argued that “the maintenance of the legal monopoly in parallel with the change in the EDF Group's status has unfortunately not been accompanied by sufficient safeguards to guarantee the public interest”. According to the federation, the lack of investment in the networks has led to a decline in the quality of the public service, notably demonstrated by a sharp increase in power outages. The CRE itself has admitted the danger of the financialisation of electricity networks, stating that “the evolution of debt and the dividend policy decided by the shareholder are also factors that can potentially compete with the investment needs of regulated networks” (2009:39).

Besides, the French government has recently decided to buy back 100% of EDF's capital through a public simplified takeover bid so as to restart the nuclear industry freely (Bembaron, 2023). This step backward certainly demonstrates the realisation of the government that the conducting of investments for such a strategic area remains better off without the obligation to account to shareholders.

Another concern lies in the financial health of EDF, which was weakened following the liberalisation of the electricity market. It seems that, in particular since the ARENH was introduced, the electricity market design has largely disadvantaged EDF.

The Cour des Comptes (2022) found that, in the absence of the ARENH, the balance sheet for the period would have been much more favorable to EDF. The ARENH has indeed limited the revenues of the nuclear producer, succeeding in reallocating the profits of the base load generation fleet, as planned. According to the Assemblée Nationale (2021), it is partly responsible

for EDF's precarious financial situation, with net financial debt standing at 42.4 billion euros in 2020. The limited revenues and the increased level of indebtedness have consequently reduced the company's ability to free up investment capacity.

The mechanism is indeed largely imperfect and has penalised EDF on several fronts. No re-evaluation of the price of the ARENH has been decided since 2012 despite the steady rise in nuclear production costs (+46% between 2011 and 2021, according to the Cour des Comptes, 2022), which has a large impact on the level of revenue from the sale of nuclear electricity. The period from 2016 to 2018 saw a decrease in wholesale market prices, resulting in lower revenue from nuclear power production, while alternative suppliers had still access to the cheaper price of EDF's nuclear electricity (Cour des comptes, 2022). Indeed, when wholesale market prices are high, alternative suppliers demand more ARENH, but when market prices are low, they demand less ARENH (Assemblée Nationale, 2021). Under these conditions, the coverage of production costs for the historic nuclear fleet suffers from a lack of legibility and predictability (Cour des Comptes, 2022), which in return has disincentivised investments.

### **4.3. Evaluation**

This chapter answers the fourth sub-question by demonstrating that the results of the liberalisation do not yet reflect the liberal policy-goals for prices and investments. Evidence suggests that prices have not decreased in a stable and continuous fashion following the liberalisation in France and that incentives to invest have drastically plummeted for both alternative suppliers and the incumbent EDF. Chapter 4 therefore significantly contributes to answering the main research question by directly gauging the mismatch between the implementation of the directives at national level and the aspirations of liberalisation.

## **Chapter 5. Conclusions**

### **5.1. Discussion of Research Findings**

The purpose of this thesis was to identify the extent to which the implementation of the electricity market liberalisation directives in France matched the liberal policy goals. Based on quantitative and qualitative analysis of two important variables, price and investment, it can be concluded that the liberal policy goals associated to these variables have not yet been reached in the French electricity market.

The findings of this thesis are significant in several respects. First, they shed light on the dynamics and complexities involved in the implementation of European liberalisation directives at national level, particularly in a sector as crucial and sensitive as energy. Understanding these dynamics can inform future policy-making and regulatory decisions in France and other EU countries with similar electricity market conditions or dominant utility companies. Second, this thesis underscores the influence of national context – economic, political, historical – on the outcomes of European-led liberalisation. This is crucial for informing EU policy as it illustrates that a 'one size fits all' approach may not yield the desired outcomes in all member states, necessitating more nuanced, context-specific policies. Third, the findings contribute to the broader



discourse on energy policy and market liberalisation. By revealing the gap between policy goals and actual outcomes, this research challenges the conventional wisdom about the benefits of liberalisation and underscores the need for more critical, evidence-based debates on the issue, at both national and European level.

The liberalisation of the French electricity market under the European legal framework has shown to be an original and complex process. The minimalistic implementation by France, driven by concerns over security of supply and the dominant position of EDF, has led to an inefficient market design, which has not lived up to the policy goals underpinned by the liberal theory.

The European directives were designed with a significant degree of flexibility to accommodate the diverse contexts and conditions among Member States. France has thus the opportunity to choose between a range of market models, a gradual timeline and different unbundling possibilities. France took advantage of this flexibility to adapt the process to its unique energy landscape and market conditions. In line with its tradition of strong regulatory oversight, it therefore opted for a gradual and staged approach to market opening, as well as the legal and functional unbundling to limit EDF's dismantlement. As a result, France liberalised its electricity market to a much lesser extent than expected by the Commission. Reaching the EU's liberal policy goals have certainly been affected by the choice.

Among the goals of the opening to competition of the electricity market lied in particular the sending of necessary investment signals and the decrease of electricity prices. Due to the limited opening of the market in France, electricity prices have not significantly decreased. The impact of the market design on the investments from both EDF and alternative suppliers in production capacity have also been extensively criticised. The market largely failed to send the signals needed to modernise and develop the electricity production fleet in France, to the extent that France had to implement a capacity mechanism, designed to incentivise electricity suppliers to invest in new production capacity. These findings challenge the liberal theory's promises and highlight the French market's inefficiencies.

If the liberalisation of the French electricity market has failed to realise the anticipated benefits of liberal policy goals displayed within EU institutions and French politicians at the time, it remains nevertheless hard to point a finger at one specific actor for leading to its unintended negative outcomes. A distinguishing aspect of this thesis is indeed its original contextualisation of the liberalisation of France's electricity market within the broader European backdrop. Most existing research tends to analyse market liberalisation in isolation, focusing on the domestic aspects of the process, or broadly comparing European countries all together. However, this thesis takes a more holistic view, evaluating France's policies in comparison with the European regulation. This approach enables to understand how France established policies with differing goals than the EU ones, yet in a constrained setting set by the EU. This enables to nuance the criticisms targeted at one actor by showing the complexity and the multifaceted issue of the French liberalisation. The political class in France indeed tends now to put the blame on the EU for pushing for a liberalisation of the French market which does not work. Yet, the minimalistic

approach adopted by France substantially diverged from the anticipated course of action. As such, it could be argued that the less than optimal outcomes observed in terms of electricity prices and investments are more a product of this partial and unique implementation strategy rather than the result of a particular failing on the part of any individual entity or institution. Certainly, the electricity design chosen at EU level does not correspond to the French market, so it is necessary to reform it. But the liberalisation process cannot be reduced to this unique market design, which is only a tool among others to implement the liberalisation.

### **5.1. Limitations and future research**

This thesis has overlooked a certain number of factors in order to simplify and summarise the main tendencies and challenges at stake in France. It only looked at investment signals and level of prices as the main liberal policy goals of the liberalisation, although other aims prompted institutions to liberalise electricity markets, such as environmental sustainability or consumer choice. The comparison of these two new variables prior and following the liberalisation could have revealed a different outlook of the electricity market design and the general liberalisation process in France.

Another factor that is very significant to discuss comprehensively the liberalisation of the electricity market and that this thesis has not sufficiently addressed is the energy transition. The promotion of sustainable energy at EU and national level has as significantly influenced the policymaking process surrounding the liberalisation. The introduction of several policy instruments aimed at promoting renewable energy sources, improving energy efficiency, and reducing greenhouse gas emissions had to coexist with the principles of competition, free price formation, and non-discrimination of the liberalised market. This has created challenges in ensuring that sustainability measures do not distort market conditions or undermine market efficiency. The inclusion of sustainability goals has altered the dynamics of the electricity market in itself, notably with the funding of renewable energy, whose roll out has led to greater wholesale price volatility.

Further research could focus on a comparative analysis of the electricity market liberalisation process between France and another country. The results could provide valuable insights into how different national contexts, policy choices, and national regulatory frameworks derived from the EU directives, influence the outcomes of electricity market liberalisation. It may also inform policy discussions on the future direction of energy policy and market regulation in the European Union and beyond.

For example, one could compare the French experience with that of Germany, another large European Union member state with a different energy mix and regulatory approach. While France has a significant reliance on nuclear energy, Germany has pursued a notable energy transition strategy ("Energiewende") focusing on renewable energy sources and phasing out nuclear power. Such a comparative study could explore questions such as: How has Germany's differing energy policy influenced its approach to liberalisation? How have the outcomes in

terms of price, competition, security of supply, and environmental sustainability compared to those in France?

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