**The regulation of incumbent nuclear electricity:**
**lessons from the ARENH mechanism and prospects for the future**

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***Summary***

*The debate on the reform of the French nuclear regulations, opened by the President of France in November 2018,[2] is already well underway.[3] In light of its competitiveness and the volumes at issue, the electricity generated by the country's incumbent nuclear plants represents a major challenge in a market open to competition. An analysis of the French wholesale and retail markets shows that the configuration which justified the implementation of the ARENH mechanism in 2010 has only partially changed since then. Given this situation, it remains necessary to contemplate maintaining a regulated access to this resource – which meets the criteria of an essential facility – either in the form of a revised ARENH mechanism or in alternative forms still to be defined. In any event, the future regulation should create the conditions for (i) continuing to open the French supply market to competition and (ii) securing the financial dimension of operating the incumbent nuclear fleet.*

**Key words**

Incumbent nuclear electricity, regulation, *ex ante* regulation, *ex post* regulation, market failure, public policy objectives, NOME Act, ARENH, essential facilities doctrine, competition law.

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[2] French President Emmanuel Macron's speech on the strategy and method for the ecological transition, delivered in Paris on 27 November 2018: "Nuclear power currently allows us to benefit from low-carbon, low cost energy. That is a reality, and that is why, moreover, we will be undertaking work on a new regulation of the existing nuclear fleet, since the current mechanism, which allows the French people to have electricity prices that are among the lowest in Europe, will end in 2025. It is however indispensable that the French people be able to continue benefitting from this beyond then, for as long as the nuclear reactors are still in operation." (unofficial translation)

[3] J. Percebois, "Controverses sur le rôle et le devenir de l'ARENH : un peu d'histoire," *La Revue de l'Energie*, no. 644, 2019, pp. 5-12.

**INTRODUCTION**

This study focuses on the economic regulatory framework of the French incumbent nuclear power fleet. The fleet is composed of 58 nuclear reactors spread across 19 power plants located throughout (metropolitan) France. With an installed capacity of roughly 63 GW and an average annual production of nearly 400 TWh, the French nuclear fleet – the second largest in the world – can generate over 70% of the electricity fed into the grids.

The competitiveness of the French nuclear fleet results from a combination of three factors:

- The standardization of the fleet: the 58 reactors are pressurized water reactors (PWRs). Developed in successive stages, the reactors are nonetheless very homogeneous in design and were built under very similar industrial circumstances. This standardization of the fleet has made it possible to reap significant learning and pooling effects at every phase of the plants' life cycle.
- The creation of the fleet within a short period: the French government's nuclear program was rolled out in just 20 years (from the mid-1970s to the mid-1990s). Initially designed to operate for 40 years, the nuclear plants are thus expected to reach the end of their average longevity in 2025.[4]
- The unified management of the fleet: France's nuclear plants are run solely by their incumbent operator. This choice, which was based in part on safety concerns, further enhances the economies of scale and competitiveness of this production facility.

In the context of a liberalized market, the incumbent operator's exclusive ownership of the French nuclear fleet was perceived, by the European authorities in particular, as an obstacle to the development of competition and as possibly constituting a "market failure,"[5] particularly insofar as concerns the development of a competitive electricity supply market.

The European Commission thus noted that "In view of the scale and uniqueness of the competitive advantages conferred in the past and still conferred on this undertaking by the operation of its nuclear power capacity […], it would have been pointless to hope that competition alone by new entrants would have permitted optimum conditions of competition to be created in the provision of electricity supply services."[6]

It was therefore necessary for the public authorities to intervene to correct this situation and create the conditions for a workable competition in the electricity supply market.[7]

However, the selected mechanism would have to take into account two fundamental requirements for the French market. Indeed, it would have to preserve:

- on the one hand, the incumbent operator's integrated upstream/downstream character;
- on the other hand, the integrated management of the nuclear fleet.[8]

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[4] Th. Dahan, Hearing in connection with the Commission of inquiry on electricity prices, French National Assembly (2014).
[5] European Commission Decision of 12 June 2012, SA.21918, point 156.
[6] *Ibid*., §155.
[7] On the concept of "workable competition," see notably ECJ, 25 October 1977, *Metro SABA*, 26-76, point 20.
[8] Report of the commission on the organization of the electricity market, 2009 (Champsaur Report).

These factors – which are particularly determinative – allow us to better understand the difficulties encountered when the French market was opened up to competition and to better appreciate how important access to nuclear production is for the exercise of the supply activity.

Indeed, thanks to the preservation of the incumbent operator's integrated character, the downstream branch (i.e. the supply branch) is able to purchase electricity directly from the upstream branch (i.e., the production branch, and notably nuclear production) without going through the midstream wholesale market.

In addition, the choice to preserve the unity of the nuclear fleet means that the benefit of producing nuclear electricity is reserved primarily, even exclusively, for EDF.

As a result, the incumbent operator's supply branch enjoys very competitive purchasing conditions that are difficult to replicate. In other words, in the absence of other means of production at comparable costs, the only way to foster the development of competition in the supply market was to allow EDF's rivals to have access to nuclear electricity at a price reflecting the costs of the nuclear power plants.

Thus, under law no. 2010-1488 of 7 December 2010 on the new organization of the electricity market (referred to as the "NOME Act"), a system of regulated access to incumbent nuclear electricity (Accès Régulé à l'Electricité Nucléaire Historique – ARENH) was put into place. The mechanism consists of granting alternative suppliers a right of access, at a regulated price, to a quantity of the electricity generated by EDF's incumbent nuclear fleet.

The mechanism, directly inspired by the findings of the Champsaur Commission's report, is subject to two limitations:

- a temporal limitation: the mechanism expires in 2025;
- a quantitative limitation: the mechanism applies to a total maximum electricity volume of 100 TWh.

The upcoming expiration of the current system, as well as the 2019 excess of alternative supplier ARENH requests beyond the legal ceiling, bring the mechanism's limitations to the forefront and raise the question of what the future regulation should be.

In the context of this debate, the French Competition Authority (Autorité de la concurrence – ADLC), after having initially taken a position against any prolongation of this mechanism[9] which in its view should have "been interpreted as a regulatory failure,"[10] now considers that it may be necessary to maintain the nuclear regulatory measures and that it would be appropriate to "develop a competition analysis specific to the French situation."[11]

[9] ADLC, opinion no. 10-A-08, 17 May 2010, on the bill for a new organization of the electricity market, point 59; ADLC, opinion no. 14-A-16, 20 October 2014, on a draft decree […] laying down the terms of regulated access to incumbent nuclear electricity, point 82; ADLC, Evaluation report, 18 December 2015, point 72.

[10] Unofficial translation, ADLC, opinion no. 10-A-08, 17 May 2010, supra, point 59.

[11] ADLC, opinion no. 19-A-01, 21 January 2019, on a draft decree relating to the regulated access to incumbent nuclear electricity (ARENH) mechanism, point 221.

To contribute to that analysis, we will first reexamine the uniqueness of nuclear power in the French market, which fulfills the criteria of an essential facility (**I.**).

Secondly, we will present in greater detail the ARENH mechanism, which organizes the terms of access to this resource (**II.**).

Thirdly, we will study the current limitations of the mechanism (**III.**).

Lastly, in conclusion, we will offer some thoughts for further reflection, in the form of three distinct options that could be contemplated for the future treatment of incumbent nuclear power (**IV.**).

## I. Incumbent nuclear power: An essential facility in the French context

It should first be recalled that, under established case law, a facility is "essential" to the exercise of an activity if "there [is] no real or potential substitute" for it.[12] In other words, a facility should be recognized as essential if, on the one hand, there is no way to technically or economically replace the resource in question and, on the other hand, it is impossible or especially difficult to reproduce it under reasonable economic conditions.

Following up on previous studies on the subject,[13] we will reexamine the criteria used to conclude that incumbent nuclear electricity is essential (**I.1.**) and revisit that conclusion in light of the drop in the level of ARENH requests during the subscription rounds for the years 2014-2016 (**I.2.**).

### *I.1. Analysis of the essentiality criteria*

Assessing the essentiality of nuclear electricity involves answering the following question: is access to incumbent nuclear electricity necessary in order to operate on the French supply market? In other words, without access to that resource, is it possible for an alternative operator to compete with the incumbent operator's offers on the retail market?

To answer this question, we must verify whether there are any real or potential substitutes for this resource (**i.**). The other elements, particularly those relating to co-investment and the financial strength of EDF's competitors on the supply market, are not relevant to this assessment (**ii.**).

#### *i. The absence of any real or potential substitute*

[12] CFI, 12 June 1997, *Tiercé Ladbroke SA v. Commission*, T-504/93, Rec. p. II-923, spec. point 131.

[13] G. Dezobry, "Électricité nucléaire et théorie des facilités essentielles," *Revue des affaires européennes*, 2011, vol. 17; F. Marty and J. Pillot, "Des critères d'application de la théorie des facilités essentielles dans le cadre de la politique de concurrence européenne," *Reflets et perspectives de la vie économique*, 2011, vol. 4;
A. de Hauteclocque, F. Marty and J. Pillot, "The essential facility doctrine in European competition law policy: The Case of the Energy sector," *in J.-M. Glachant, D. Finon and A. de Hauteclocque, Long-term Contracts and Competition in Electricity Markets*, Edward Elgar, 2011, pp. 259-292. For a contrary approach, see the above-cited ADLC opinion no. 10-A-08.

This analysis involves focusing on the available means of baseload generation. Indeed, nuclear electricity is mainly a baseload electricity source (as opposed to peak-demand electricity).

Baseload electricity can be defined as "the portion of supplied electricity corresponding to the output of power plants operating continuously except for maintenance shutdown periods."[14] It is generated by production facilities whose annual use time is generally over 6,000 hours per year.[15]

From an economic standpoint, baseload generation facilities have the lowest variable costs of all so-called conventional means of production.

In the French market, baseload electricity is generated mainly by nuclear power plants.

The question is therefore twofold:

1. are there any other existing means of production with the same characteristics as nuclear electricity? (analysis of real substitutes)
2. is it possible to replicate the nuclear plants? (analysis of potential substitutes)

To analyze whether there are any existing alternative means, the focus must be placed on the two most plausible alternatives: baseload hydro-electrical plants (so-termed run-of-river plants) and procurement on the wholesale market.

It is clear that an alternative supplier would not be able to build a business plan rivalling EDF's offers by basing its sourcing on the wholesale market. The volatility and levels of prices observed over the past few years show that the wholesale market cannot offer a sustainable alternative to a sourcing model based on the costs of the nuclear power plants.

Indeed, even though the wholesale prices for the years 2014, 2015 and 2016 were lower than the ARENH price (i.e. below €42/MWh), the (often unpredictable) price fluctuations and resulting uncertainty would make it unfeasible for such an operator to sustainably compete with the incumbent operator on the supply market.

As for run-of-river hydropower, the answer is provided by the ADLC, which has specified that: "the large 'run-of-river' production sites, such as the dams on the Rhine or the Rhone, are not able to generate electrical power under the same conditions as nuclear plants, given the variability of the flows according to climate conditions and seasons. Even assuming a full use of these baseload generation facilities, the run-of-river capacities remain modest […], as output is limited to roughly 8 TWh per year for the Rhine and from 12 to 15 TWh per year for the Rhone."[16]

It is equally important to point out why the other – so-called non-steerable[17] – renewable energies, whose auction prices are becoming increasingly competitive, nonetheless do not constitute alternatives (at least in the short and medium term). We must remember that the objective here is to identify means of production that would allow an integrated upstream/downstream operator to compete with the incumbent operator on the supply market. Under this logic, an operator would

[14] Unofficial translation, NOME bill.
[15] Champsaur Report, supra, p. 27.
[16] ADLC, opinion no. 19-A-01, 21 January 2019, supra, point 209.
[17] We refer here mainly to wind and solar power.

have to secure its supply purchases, particularly of baseload electricity, i.e. the portion of electricity that its customers will continuously consume throughout the year. The price of the electricity is therefore not the only criteria. It must be coupled with a continuous year-round output. Yet the non-steerable means of power generation do not offer such continuity and therefore do not constitute substitutes for incumbent nuclear electricity.

It follows from these considerations that there are presently no means of baseload generation – i.e. of supplying steerable power for more than 6,000 hours per year – which would allow an operator to compete with EDF on the supply market.

This brings us to the next question of whether it would be possible to duplicate the incumbent nuclear plants.

Here again, the answer is no. The non-reproducible character of the incumbent nuclear plants results from the following three factors.

The first factor is economic. The competitiveness of the nuclear fleet is judged to be "unmatchable." This results mainly from (i) the fact that the incumbent fleet is largely amortized and (ii) the efficiency gains arising from the serial building and operation of the nuclear units.

The high performance of the French nuclear power fleet is therefore not rooted solely in a technology – nuclear technology – but also in a specific historic context: the nuclear program of the 1970s.

The second factor is practical and relates to the virtual impossibility of finding an available physical site on which to build such an infrastructure.[18] The only sites on which the construction of new nuclear plants seems possible are those already occupied by such facilities. And those sites are owned by the incumbent operator.

The third factor is contextual. The French baseload market is sometimes described as being in an overcapacity situation, with no short or medium term need for the development of new capacities.[19] In this situation, it is unlikely that the price dynamics will, at least in the short term, motivate alternative suppliers to invest in new baseload generation capacities.

The Champsaur Commission's report perfectly summed up this point by noting that a duplication of the nuclear power fleet by alternative suppliers "is neither desirable nor feasible."[20]

No real substitute and no potential substitute: the essentiality of nuclear electricity for the activity of supplying electricity in the French market appears to be established.

*i. Elements not relevant to assessing the essentiality of the incumbent nuclear fleet: co-investment and the financial capacity of EDF's competitors*

*Co-investment:*

[18] ADLC, opinion no. 10-A-08, 17 May 2010, supra, point 19.

[19] See in particular: P. Champsaur, Hearing in connection with the Commission of inquiry on the real cost of electricity, French Senate (2012). This assessment can be understood only if one compares the total output of the baseload production means installed in France with the total consumption of baseload electricity.

[20] Champsaur Report, supra, p. 11.

In an essential facility analysis, the question of co-investment is relevant, not at the stage of assessing the resource's essentiality, but at the stage of determining the conditions on which access to the resource will be granted.

In other words, the act of allowing competitors to co-invest in the infrastructure does not negate the infrastructure's essentiality and does not permit the owner to eliminate the possibility for its competitors to obtain a "straightforward" access.[21]

Moreover, it is important to note that antitrust authorities do not look favorably upon co-investment schemes that give rise to structural ties between competing operators. The ADLC has highlighted the "anticompetitive risks of creating long-term structural ties between competing undertakings."[22] Similarly, in the *E.ON* case, the European Commission underscored the market foreclosure risks attached to co-investment schemes.[23]

*The financial strength of the essential facility owner's competitors:*

In its opinion of 21 January 2019, the ADLC points out that "the three main players on the retail electricity market, EDF, Engie and Total, are incumbent operators in the energy sector, vertically integrated upstream, with largely comparable turnover, technical resources and capacities to invest in production."[24]

This observation calls for two comments.

First, the emergence of integrated operators who follow the model of the incumbent operator is the homothety sought by the authorities when they opened the sector up to competition. However, due to the above-analyzed essentiality of the nuclear fleet, that homothety has not been possible.

Secondly, the assessment of a facility's essentiality is never based on the financial solidity of the operator seeking access to it.[25] Rather, the assessment is conducted objectively and is based on an analysis of how a rational economic player would behave. All that matters is the existence of and access to economically comparable alternative resources.

*I.2. The essentiality of the incumbent nuclear fleet and the drop in ARENH requests over the 2014-2016 period*

Over the 2014-2016 period, wholesale electricity prices were relatively low, with the result that alternative suppliers made less use of the ARENH mechanism to purchase their electricity.

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[21] See, for example, the above-cited *Terminal Railroad* case.
[22] ADLC, opinion no. 10-A-08, 17 May 2010, supra, point 203.
[23] Ph. Chauve, M. Godried, K. Kovacs, G. Langus, K. Nagy, S. Siebert, "The E.ON electricity case: an antitrust decision with structural remedies," *Competition Policy Newsletter*, no. 1, 2009. The authors point out that "E.ON may in addition have pursued a strategy of deterring generation capacity investments by third parties by either offering them long-term contracts or shares in E.ON generation projects (p. 53).
[24] ADLC, opinion no. 19-A-01, 21 January 2019, supra, point 213.
[25] See in this respect the *Oscar Bronner* decision (ECJ, 26 November 1998, *Oscar Bronner v. Mediaprint*, C-7/97, Rec. p. I-779).

Thus, "[b]etween May 2013 and December 2014, the prices of the 2014 and 2015 annual baseload products traded on the wholesale market remained very close to the ARENH price, at €42/MWh, and then, starting December 2014, dropped to a level markedly below the ARENH price. The alternative suppliers then turned to the markets to purchase electricity, causing a sharp decrease in the volumes of ARENH delivered, which fell from 71.4 TWh in 2014 to 16.1 TWh in 2015 before finally hitting zero in 2016. Correlatively, the volumes traded on the wholesale markets rose substantially."[26]

How should we analyze the drop in requests for the 2014, 2015 and 2016 ARENH subscription rounds, as described above by the French Energy Regulatory Commission (*Commission de regulation de l'énergie* – CRE)? Does this configuration call into question the claim that access to incumbent nuclear electricity is necessary in order to engage in the supply business?

The answer depends on the nature of the electricity purchased on the markets and, therefore, on the underlying physical reality. If the wholesale markets served as another channel through which alternative suppliers purchased nuclear electricity, the episode does not call into question the claim that access to incumbent nuclear electricity is essential to engaging in the supply activity, but rather highlights the sometimes competitive relationship between the regulated (ARENH) portion of incumbent nuclear electricity and the unregulated portion of this resource, which the incumbent operator may decide to sell on the market when the level of its customers' demand is insufficient to consume all of its output. Indeed, it should be borne in mind that the ARENH mechanism applies to only about 25% of the output of the incumbent nuclear plants.

To better understand the unprecedented configuration of the 2014-2015-2016 episode, let us look at an example based on the *Terminal Railroad* case[27] – the first "essential facility" case – which concerned a railroad bridge at Saint Louis, Missouri, via which trains could cross the Mississippi river.

Imagine that there are three railroad tracks on this bridge. As access to the bridge is critical to the development of railway transport, an access mechanism has been set up. The chosen mechanism provides for the following asymmetrical regulation:

- One of the tracks is reserved in priority for new entrants, who must share the time slots between each other. A price of €10 is charged to the operator for each train crossing. This price represents the full cost (the marginal cost being €2). If the new entrants do not use all the available time slots, the incumbent operator takes back the unused slots.
- The other two tracks are reserved for the incumbent operator who owns the bridge and who is free to use them as it sees fit.

If the incumbent operator's activity decreases to a level at which it can no longer fill enough trains to use all the slots available on its two tracks, it will decide to place the unused slots on the market. The sales price will (in principle) still be above €2 (i.e. the marginal cost) but may very well fall below €10 (i.e. below the total average cost corresponding to the regulatory price).

In such a configuration, the new entrants will abandon the track reserved for them in favor of the slots that have been freed up by the incumbent operator, which are offered at a more attractive price than the regulatory price.

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[26] Unofficial translation, CRE, ARENH Report, 18 January 2018, esp. p. 4.
[27] *United States v. Terminal Railroad Association of Saint Louis*, 224 U.S. 383 (1912).

This scenario, wherein the new entrants' slot requests switch over from the regulated system to the market, calls for the following three comments:

1. The non-regulated slots, sold on the market by the incumbent operator at a cost below the average cost, thus come into competition with the regulated slots, reflecting a temporary or structural overcapacity of the infrastructure relative to the level of activity on the railway transport market.
2. The non-use of the regulated slots does not mean that access to the infrastructure is not critical to engaging in the activity in question. Access to the bridge is still necessary in order to be able to cross the river and operate on the railroad transport market.
3. If the overcapacity becomes structural, this will inevitably raise the question of how to finance the infrastructure, as its full costs may no longer be covered in the long term.

The same reasoning could apply to explain the three very low (even zero) levels of ARENH requests over the 2014-2016 period.

It should be recalled here that "EDF engages in arbitrage operations on the differentials between its production costs and the prices available at any given time on the wholesale market. Where there are excess capacities and the market price is above variable costs, EDF sells on the market."[28]

According to a 2005 report, the short-term marginal cost of nuclear energy stood at around €8/MWh.[29] Even allowing for an increase in these costs since then, it is clear that when the nuclear fleet generates more than EDF needs in order to supply its customers, the incumbent operator has no problem placing its excess volumes on the market at a positive operating margin. But if the market price falls below €42/MWh, that operating margin will no longer allow the incumbent operator to cover its fixed costs. So depending on the market conditions, it is possible that the incumbent operator, by placing nuclear electricity on the wholesale market, may offer alternative suppliers a means of buying baseload electricity at a more attractive price than the ARENH price.

The option thus offered to alternative suppliers, while far from negating the indispensable nature of incumbent nuclear electricity, nonetheless raises questions about the potential long-term consequences of such a situation with regards to the financing of these facilities.

In any event, as the essentiality of nuclear electricity appears to be established, we will now turn to look at the conditions under which access to this resource has been organized.

## II. The legislator's intervention and the recognition of a right of access to incumbent nuclear electricity

Before describing the characteristics of the ARENH mechanism (**II.2.**), it is worth recalling the general structure of the NOME Act and the respective objectives pursued by the two mechanisms it put into place (**II.1.**).

[28] Unofficial translation, Cons. Conc., decision no. 07-MC-04, 28 June 2007, supra, point 13.
[29] CRE, Communication on the Virtual Power Plants (VPPs) implemented by EDF and their transition toward a regulated program for making electricity available on the wholesale market, 2005, p.3.

*II.1. General structure of the NOME Act*

According to the preamble of the law of 7 December 2010, the new organization of the electricity market instituted by the legislator pursued three objectives:

- To allow consumers to benefit from the competitiveness of the incumbent nuclear fleet;
- To allow competition to develop on the supply market;
- To reinforce the security of supply by favoring investment in means of production.

To meet these objectives, the legislator chose to set up two complementary mechanisms.

The first, the ARENH mechanism, aims to help meet the first two above-mentioned objectives.

The second – aimed at meeting the third objective – consists of a capacity mechanism designed to provide the proper incentives for developing peak-demand generation capacities in order to reinforce the security of supply by increasing supplier accountability.

From a regulatory standpoint, the two mechanisms seek to remedy two very distinct market failures:

- ARENH seeks to neutralize the incumbent operator's unmatchable advantage in the baseload market arising from its ownership of the most competitive baseload facilities;
- The capacity mechanism seeks to remedy the limits of the "energy only" market by compensating operators for available capacity.[30]

So, contrary to what is often asserted, the ARENH mechanism was not designed to spur alternative suppliers to invest in baseload generation facilities.

This understanding of the ARENH mechanism is notably confirmed by the statements made by Paul Champsaur, the Chairman of the commission whose work directly inspired the NOME Act. At his hearing during the Senate commission's inquiry into the true cost of electricity, Mr. Champsaur very clearly explained the reasons why the objective was not to incentivize alternative suppliers to invest in baseload generation facilities: "We were explicitly asked to base our reasoning on the assumption of the prolongation of the reactors. It is clear that, in such a case, there will be no need for an investment decision, as we are currently in an overcapacity situation in France: insofar as we export baseload, we will not need to provide for significant baseload investments aimed at increasing capacities in the next fifteen years."[31] Mr. Champsaur added that "we have enough nuclear electricity production capacity, so the subject of building new power plants will arise, at the earliest, in fifteen years."[32]

[30] It should be noted that the capacity mechanism is not intended to incentivize investment in baseload facilities, but only in peak-demand facilities, which are exposed to a "missing money" risk.

[31] Unofficial translation, P. Champsaur, Hearing in connection with the Commission of inquiry on the real cost of electricity, French Senate (2012).

[32] Unofficial translation, ibid. In other words, regardless of the ability of the incumbent operator and alternative operators to invest in baseload production facilities, the overcapacity described by Paul Champsaur and the absence of any need for additional baseload production facilities has rendered any investment in such production facilities useless, or even economically irrational.

*II.2. The characteristics of ARENH*

In keeping with the above-mentioned considerations, the legislator's desire to neutralize the incumbent operator's unmatchable advantage on the supply market, arising from its ownership of the entire incumbent nuclear electricity generation infrastructure, materialized in the creation of a mechanism for accessing incumbent nuclear electricity at a price based on the full accounting costs.

It should be recalled here that, when the conditions of access to an infrastructure are regulated, the pricing method will depend on the objective pursued by that regulation. Two main objectives can be distinguished.

If the objective is to incentivize operators to invest in alternative infrastructures, the preferred choice will be a so-called "make or buy" pricing method, sometimes referred to as "replacement cost" pricing.[33] By making the access beneficiary pay a price that is close to the replacement cost, this method places the beneficiary in a situation in which it must decide between building its own infrastructure or paying an access price that is close to the cost it would bear if it chose the former option. This pricing method – which allows the owner of the existing infrastructure to benefit from a temporary economic rent – makes sense only if the infrastructures in question are capable of being duplicated; it therefore does not make sense with respect to an essential facility which, by definition, is not replicable.

If, on the other hand, the aim is to allow competition to develop on a market in which entry is dependent on access to an essential facility, a cost-based pricing method should, in principle, be adopted. Indeed, according to the ADLC, "requiring an undertaking to align its prices with its costs can sometimes allow competition authorities to ensure that access to an essential infrastructure held by that undertaking will be offered under fair and non-discriminatory conditions. But above all, it is one of the best ways to open network industries up to competition and to favor low price levels in the downstream markets, by enabling new entrants to benefit from the cost advantages of the incumbent operators."[34]

In the present case, the objective is indeed to enable competition to develop on the supply market. The choice, therefore, was naturally made in favor of cost-based pricing (Article L.337-14 of the Energy Code).

However, in addition to the financial aspects, the conditions of access also feature two limitations whose effects we will assess below.

## III. The limitations of the ARENH mechanism

Probably wishing to proceed with caution on such a complex subject and to set up a mechanism thought to be adaptable, the legislator placed two limitations on the access to incumbent nuclear electricity, the impacts of which will be examined below:

[33] See for example: The letter from the French Electronic Communications and Postal Regulatory Authority (Autorité de régulation des communications électroniques et des postes), January/February 2008, p.4.
[34] Unofficial translation, Cons. Conc., Thematic study on cost-based pricing, 2002 Activity Report, p. 88.

- a quantitative limit: the mechanism covers an overall maximum volume of electricity of 100 TWh (**III.1.**);
- a temporal limit: the mechanism expires in 2025 (**III.2.**).

*III.1. An access limited in volume: the case of the 2019 ARENH subscription round*

Starting in 2017, rising prices in the wholesale markets made the ARENH mechanism attractive again. Moreover, the growth of competition naturally brought about an increase in the level of the alternative suppliers' requests to the regulator. It is in this context that, for 2019, total requests exceeded the legal ceiling of 100 TWh (for the first time), reaching 132.98 TWh.[35]

In accordance with Article R.336-18 of the French Energy Code, the CRE then allocated this capped volume in proportion to the alternative suppliers' requests.

For the excess portion of their requests, the suppliers were forced to buy electricity on the wholesale market at prices sometimes significantly higher than the ARENH price.

This unprecedented configuration reveals the "limits of the current regulation"[36] and the competitive distortion resulting from a volume-capped access system (i). The only option, under the current state of the law, is to deploy the essential facilities doctrine (ii).

*i) A volume-capped regulation*

The reaching of the legal ceiling, and the resulting rise in the purchase prices borne by the alternative operators, necessarily raise the question of what impact this unprecedented situation should have on the incumbent operator.

Two possible configurations can be distinguished.

**Under the first configuration,** the incumbent operator raises the price of its market offers so as to replicate the alternative suppliers' purchasing conditions (which are less favorable when the wholesale price exceeds €42/MWh).

While this option allows the incumbent operator's competitors to continue to rival its offers on the supply market, it exacerbates the negative effects on consumers of reaching the ceiling.[37]

In addition, it is not certain that this configuration would be compatible with competition law. Indeed, when an operator in a dominant position exercises its market power to raise its prices on the relevant market, the risk that its conduct will be characterized as exploitative abuse cannot be ruled out.[38] If the price increase results from the dominant operator's own voluntary behavior, it could

[35] CRE, Press release of 29 November 2018.
[36] ADLC, opinion no. 19-A-01, 21 January 2019, supra, point 198.
[37] The loss of the benefit of incumbent nuclear power's competitiveness would affect all consumers, not just those of the alternative suppliers.
[38] It should be borne in mind that, according to the ADLC, "the prohibition against […] exploitative abuses is linked to the special responsibility borne by the undertaking in a dominant position. This applies where an undertaking has a monopoly that no other undertaking can possibly contest and where the Government has

constitute a violation of Article 102 TFEU. If the increase results from a statutory or regulatory requirement, it would be necessary to assess, under a combined reading of Articles 102 and 106 TFEU or Articles 4 TEU and 102 TFEU, whether such rules comply with competition law. [39]

**Under the second configuration,** the incumbent operator does not modify its prices and continues to reflect, in its market offers, the competitiveness of its means of production. If the wholesale prices surpass €42/MWh, the competitive gap between the incumbent operator's market offers and those of the alternative suppliers would be such that the ARENH ceiling would constitute, in practice, a barrier beyond which competition could no longer be exercised on the French supply market. The regulatory mechanism for the upstream market would thus determine the degree of openness of the downstream market, which in the present case would stand at 25% of the French market. This option should be examined in the light of EU law and, in particular, the Electricity Directive,[40] which does not provide for the possibility for Member States to only partially open their supply market.

According to the ADLC, the incumbent operator has the choice and can let its market offers range between these two limits. Indeed, for the ADLC, "EDF, when benefitting from the most efficient means of generating baseload electricity, thus has the choice of using its competitive advantage to maximize its margins by aligning its offers with the market prices, just as it may, conversely, try to expand its market share by lowering its prices, on the condition however that it covers its costs, without necessarily thereby committing a margin squeeze abuse."[41] The ADLC adds that "Competition law does not, in principle, prohibit a dominant operator from using the economic space afforded to it by the gap between its own production costs and the wholesale supply costs to propose offers at lower prices than those of its competitors."[42]

In other words, if the wholesale prices are higher than €42/MWh, then the alternative suppliers' capacity to maintain and develop their business will depend on the strategy chosen by the incumbent operator. If the latter decides to exercise its market power on the supply market and increase its margins, its competitors will remain capable of rivalling its market offers. However, if the incumbent operator decides to continue to propose offers that reflect the competitiveness of its production fleet, the alternative suppliers' business will be significantly compromised.

To better grasp the dilemma arising from these two options, let us pursue the comparison with the example from the *Terminal Railroad* case (*cf. supra* II.A.). Let's imagine that the intensity of the new entrants' activity is such that the railroad track reserved for them becomes saturated. If additional time slots on the incumbent operators' tracks are not granted to them, they will have to use another bridge located 300 km further up the river. Such a detour, which will cause a significant delay (of several hours) upon arrival, will also force the new entrants to significantly raise their ticket prices in

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not regulated the prices" (ADLC, decision no. 18-D-17, 20 September 2018, on practices employed in the infectious clinical waste elimination sector in Corsica, p. 2) (Unofficial translation).

[39] The CRE's position that the incumbent operator's price increase would result from the application of competition law does not seem convincing to us. The sector regulator notes that "In the event that the ceiling is reached, EDF thus appears to be obligated to reflect, in its own market offers, the rationing of the ARENH volumes imposed on the alternative suppliers, at least for as long as it remains in a dominant position. Consequently, [EDF] would likely be obligated to upwardly adjust its market offers, thereby leaving intact the competitive development possibilities of the alternative suppliers" (unofficial translation) (CRE, ARENH Report, 18 January 2018, supra, p. 43).

[40] Directive 2009/72 of 13 July 2009 concerning common rules for the internal market in electricity, OJEU 14 August 2009, L. 211/55.

[41] ADLC, opinion no. 19-A-01, 21 January 2019, supra, point 113.

[42] *Ibid.,* §122.

order to cover the additional costs generated by this nearly 600 km detour (costs due to the energy used for the carriage, wear and tear of the equipment, crossing the other bridge, etc.). The two contemplated options will thus result in the following two outcomes:

- If the incumbent operator is required to replicate these conditions in order to maintain the possibility of competition, it will have to significantly raise the price of its tickets (even though it does not bear any additional cost) and to limit the speed of its trains so that they arrive with the same delay as those of the new entrants, relative to normal travel times.

- If the incumbent operator is allowed to continue utilizing its infrastructure without limitation, it will be able to offer much cheaper tickets and much faster travel times than its rivals' best offers, thereby eliminating any form of competition.

As this example clearly illustrates, the difficulties tied to the surpassing of the legal ceiling are hard to overcome[43] and highlight the need to reconsider the choice of a volume-capped access system.

*ii) Recourse to the essential facilities doctrine*

Under the current state of the law (i.e. without waiting for any modification or reform of the mechanism), the only way to preserve the competitive public order would be to apply the essential facilities doctrine to the excess portion of the ARENH requests.

Use of this doctrine would enable the alternative suppliers to have access to incumbent nuclear electricity under reasonable and non-discriminatory conditions – i.e. at a price based on EDF's costs – for the portion of their requests not satisfied by the ARENH mechanism.

Access to incumbent nuclear electricity would thus result from a hybrid regulatory framework combining an *ex ante* regulatory system (the ARENH mechanism) and an *ex post* regulatory system (the essential facilities doctrine). The two systems would interact as follows:

- For requests between [0-100] TWh, the alternative suppliers would have no choice but to use the ARENH mechanism (which excludes recourse to the essential facilities doctrine);[44]
- For the portion of requests exceeding the 100 TWh ceiling, recourse to the essential facilities doctrine would involve the alternative suppliers' submitting a request to the incumbent operator to sell them nuclear electricity under reasonable and non-discriminatory conditions. If the incumbent operator were to refuse, the alternative suppliers could then contest that refusal before the courts or a competition authority.

While an in-depth analysis of the applicability and conditions of application of the essential facilities doctrine in this specific context is beyond the scope of the present study, three elements must be underscored here:

- The access system arising from the application of the essential facilities doctrine would likely be in line with the existing ARENH mechanism. However, there would be no guarantee of that: a (French or European) competition authority could grant access on terms that are different (more or less favorable) than those provided for under the ARENH mechanism.

[44] See, to that effect, G. Dezobry, "Électricité nucléaire et théorie des facilités essentielles," supra.

- Recourse to this doctrine would serve to preserve the two objectives of the ARENH mechanism, i.e., to allow all consumers to benefit from the competitiveness of the incumbent nuclear fleet and to develop competition.
- The mechanism should allow the operator to fully cover its average costs of operating its power plants. Indeed, the conditions of access to an essential facility must always enable its owner to carry on its operations under sound economic conditions. In other words, the access price must always allow the operator to cover its costs. Yet, as we saw in point I.2., the alternative suppliers benefit from an option that enables them, when wholesale prices fall below €42/MWh, to purchase baseload electricity without using the ARENH mechanism. In such a configuration, the incumbent operator will no longer be able to cover all its costs, which will, in the short term, jeopardize the operation of the power plants in question. This risk should thus be taken into account in determining the terms of access to the resource, by providing for a mechanism which ensures that the operator will cover its costs in any circumstances.[45]

*III.2. An access limited in time: the mechanism expires in 2025*

The question raised here is: what should be the duration of the mechanism?

The elements to be taken into account to answer this question have been clearly stated by the ADLC: "The law thus intervenes to correct, for a limited period, the effect on the electricity market of the incumbent operator EDF's ownership of all the nuclear plants in service, which gives it a competitive advantage in terms of electricity production costs that, at least in the medium term, proves to be unmatchable by the competing suppliers."[46]

Logically, the mechanism should therefore apply for as long as the competitive advantage on production costs remains "unmatchable." In other words, the mechanism should apply for as long as access to the resource is essential to the supply activity.

In the event that the incumbent operator's integrated upstream/downstream model is preserved, the mechanism should continue to apply for as long as the nuclear power plants remain in operation.

## IV. Concluding observations and future prospects

After nearly 10 years of application, the ARENH mechanism – which the ADLC judged to be "competitively virtuous"[47] upon its conception – appears to have met the two objectives pursued by the legislator under the NOME Act. Indeed, competition has developed on the French supply market and consumers have, to date, been able to benefit from the competitiveness of the incumbent nuclear fleet. However, in light of the essentiality of incumbent nuclear electricity in the French context, competition cannot be maintained and developed unless access to this resource is maintained for all suppliers.

[45] Several avenues can be explored: integrating a premium representing the value of the option, setting up an insurance-like mechanism guaranteeing a constant remuneration, etc.
[46] ADLC, opinion no. 10-A-08, 17 May 2010, supra, point 38.
[47] ADLC, opinion no. 10-A-08, 17 May 2010, supra, point 65.

In terms of efficiency, the net result of the mechanism also seems positive. The positive effects are mainly located at the level of the electricity supply market. While price competition remains admittedly limited insofar as the purchasing conditions of the various players are similar (so long as the cap has not been reached), the arrival of new players has led to improvements in service quality and fosters innovation at the level of the offerings. On the production market, the effects are rather negative but seem to be limited. They can be of two types: a loss of productive efficiency (as the manager of the nuclear plants may have less incentive to invest in the production facility) and a loss of dynamic efficiency on the infrastructure market in general (as players, anticipating similar regulatory decisions, elect not to invest).

If we focus on the competitive aspects, a correlation can be drawn between (i) the symmetry of the conditions of access to nuclear electricity between the (incumbent and alternative) suppliers and (ii) the development of competition. The ARENH mechanism started this movement, which still needs to be perfected, as the conditions of access to the essential facility remain unequal (since only the alternative suppliers are subject to a system of subscription rounds and rationing).

The only way to intensify competition would be by further strengthening this symmetry, which ultimately involves calling into question the integrated upstream/downstream character of the incumbent operator. [48]

There are three different configurations in which the symmetry of the conditions of access to the nuclear resource between (incumbent and alternative) suppliers can be ensured.

**An "off-market" configuration:** This option, evoked by the ADLC in its 2019 opinion,[49] consists of setting up a "heritage" price representing the portion of nuclear energy consumed. Under this configuration, the competitiveness of the nuclear fleet is passed on directly to the end consumers and does not pass through the suppliers (who are therefore all in the same situation with regard to the nuclear resource). The price could be set on the basis of the updated cost of incumbent nuclear electricity.

**A "regulated market" configuration:** This second option consists of expanding the ARENH mechanism by enhancing equal treatment between the suppliers. Like the regulation set up for grid access, this option involves isolating the nuclear assets (either legally or for accounting purposes) and subjecting all the suppliers (both incumbent and alternative) to the same conditions of access to this resource. The price is regulated and reflects the competitiveness of the incumbent nuclear fleet. To maintain a symmetry of upside and downside risks, this approach would require the establishment of a price guarantee in the event that the annual average wholesale price fell below the ARENH price and that demand dropped to zero.

**An "all-market" configuration:** Under this last configuration, the incumbent operator's upstream branch sells the entire output of the incumbent nuclear plants on the wholesale market. The suppliers (both incumbent and alternative) must then purchase their electricity on that market and are therefore placed in an equivalent situation. However, this option does not guarantee that the

[48] The other way to strengthen the symmetry could be to dismantle the unified management of the nuclear fleet in order to then allocate the assets between the various players. Aside from the loss of efficiency resulting from such an option (loss of economies of scale in particular), a dismantlement of the unified management of the fleet does not seem politically possible.

[49] ADLC, opinion no. 19-A-01, 21 January 2019, supra, point 226.

price at which the electricity will be sold on the wholesale market will reflect the full costs of the incumbent nuclear fleet. This configuration could thus raise a twofold risk. If the price on the wholesale market is below the full cost of operating the nuclear fleet, then the proceeds from the sale of electricity on the wholesale market will not allow the operator to cover the costs of operating its power plants. Conversely, if the price on the wholesale market is much higher than the full cost of the nuclear fleet, the suppliers will pass those prices on in their retail offers, thereby depriving the consumers of the benefit of the nuclear fleet's competitiveness.[50] To limit the incumbent operator's exposure in case of low prices, and to preserve the consumers' benefit from the competitiveness of the fleet in case of high prices, a contract for difference (CFD) could be contemplated.

The question of the incumbent operator's vertical integration is therefore decisive. Some recent announcements from EDF's president suggest that the integration of the upstream/downstream branches might be abandoned. The discussion is open. The essential facilities concept and the above three options will each have their role to play.

[50] Under this scenario, the increase in retail prices would result, not from the exercise of the incumbent operator's market power, but from the normal functioning of the wholesale market. From a competition standpoint, there is a significant difference between (i) the integrated upstream/downstream model in which EDF is a "price maker" on the supply market and (ii) a non-integrated model in which EDF would be a "price taker" not only on the wholesale market (the price being determined by the marginal costs of the marginal unit) but also on the supply market (as EDF's supply branch would purchase electricity on the wholesale market on the same terms as its competitors).