[*THE PUZZLE OF SHARING FRANCE'S NUCLEAR RENT*]

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Overview

The very high proportion of nuclear power in French electricity production (75% in 2000) represented a "barrier to entry" for new entrants in the retail sector and competition has so far been encouraged by the existence of a regulatory mechanism allowing alternative suppliers to obtain electricity volumes at a price close to the actual cost borne by the incumbent operator EDF, lower than the wholesale price. This mechanism reffered to as ARENH in French (standing for "regulated access to historic nuclear energy") has been introduced in 2011 for a transitional period of 15 years ending in 2025. The ARENH mechanism enables suppliers to purchase a volume of 100 TWh of nuclear electricity at cost price (set at 42 prices per MWh since 2012) on the basis of their customers' foreseeable consumption. The system has worked rather well, insofar as it has enabled alternative suppliers to gain market share from the incumbent operator while allowing end-consumers to continue to benefit, at least in part, from relatively lower production costs for existing nuclear power plants (Percebois and Solier, 2023). But the mechanism has remained unchanged since its implementation and several critical flaws that have emerged over time have not been corrected. Many of EDF's competitors and consumer groups want the system to continue beyond 2025, but both EDF and the public authorities do not, and are looking for a solution that will enable French residents to continue to benefit from low-carbon, relatively inexpensive energy without overly penalizing the incumbent's revenues. Several solutions are therefore conceivable, some based on public contracts such as CfDs (Contracts for Differences), while others are based on private contracts such as PPAs (Power Purchase Agreements) and still others envisage the auctioning of nuclear production by the incumbent operator. We discuss in the various reform options being considered to replace the ARENH mechanism based on an empirical analysis of their impact on retail market players.

Methods

We develop an empirical evaluation of the different reform options to shed light on the implications of the future policy on the sharing of the nuclear rent between the incumbent operator on one side and suppliers and end-consumers on the other side. We rely on an ex post approach allowing us to simulate what the incument income and the procurement costs of alternative suppliers could have been under various reform options based on historical data. The counterfactual scenario corresponds to the extension of the current ARENH mechanism under similar conditions. We then consider alternative public policy scenarios involving different degrees of regulation : bilateral agreements (PPA, capacity allocation contratcs) or market auctions; revised ARENH ; unilateral or bilateral Cfd. Our analyses rely on a set of data covering the French electricity system over the period 2021-2024. Data regarding physical flows come from RTE (the French's Transmission system operator). We collect hourly levels of electricity consumption, nuclear generation and renewable (solar and wind) injections into the French electricity network. We use hourly day-ahead prices published by the spot market operator (Epex-Spot) as the reference for wholesale electricity exchanges in France.

Results

Our empirical findings show that replacing the current ARENH mechanism by an ex-post regulation based on contract for differences (either unilateral or bilateral) would increase the cost paid by end-consumers while ensuring higher income for the incumbent operators to invest in the building on new capacities. Under an unilateral contract

for differences (with one or several price caps) consumers would have to pay a relatively higher price for their electricity compare to the current system, depending on the level of the strike prices but in return they would benefit from better protection in the event of new tensions on the wholesale markets similar to the 2022 energy crisis. Under a bilateral contract for differences with corridor (i.e. with a price floor and a price cap), both end-consumers and the incumbent producer are to some extent protected against the volatilty of wholesale prices. With such a mechanism, when the wholesale price is between the ceiling price and the floor price, the incumbent sells the nuclear MWh at the wholesale price; when it exceeds the ceiling price, the nuclear rent is collected by the State and redistributed to consumers, provided that the levy is properly reflected in sales prices. When the wholesale price is below the floor price, the incumbent operator receives additional income financed by a tax paid by the consumer. Our results show that such a mechanisms would have been costly for the government in 2020 and 2021 (with depreciated wholesale prices), but would have yielded substantial sums in 2022 when wholesale prices soared. The question then is whether, in 2022, the State would have passed on the gains to the consumer; if so, this would have constituted a kind of tariff shield.

Conclusions

Nuclear energy raises specific problems, as not all producers can afford it. It often generates rent, and the question is how to share this rent between the various market players (incumbent operator, alternative operators, government). The market alone cannot solve the problem of this sharing, so a minimum of regulation is required. Several solutions exist, each with its advantages and drawbacks.

References

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