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Security of electricity supply in France: are we covering the issue?

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Projections announcing an imminent imbalance between supply and demand for electricity in France have been regularly revised downward under the combined effect of sluggish demand for electricity and the maintenance of power generation and demand-side management capacities. This situation enables broader consideration of the measures that contribute to the security of electricity supply. It thus appears that the ambitious French target of a 50% reduction in final energy consumption by 2050 must translate into a higher level of ambition for the efficiency of electricity consumption. Moreover, the emergence of a more flexible power system has become a policy objective in itself at the European and regional levels in order to respond to the development of intermittent renewable electricity production. However, a more flexible power system that is better integrated with neighbouring countries implies the development of solutions that provide clear benefits in terms of the security of supply.

A planned measure to secure a rapidly increasing winter peak

The capacity mechanism was provided for in the law on the new organisation of the electricity market (NOME law) of 2010 to address the problem of high national demand for electricity when temperatures drop in winter. The power system in France is characterised by significant “temperature sensitivity” linked to the high percentage of electric heating. In the 2000s, this peak demand increased two to three times more rapidly than overall demand, revealing serious concerns about the ability of the power system to cope (see 1). The projections made at the time by RTE in terms of requirements for power generation capacity or demand-side management in order to achieve security criterion 1 stood at 103.8 GW for winter 2014-2015 and 107.7 GW for winter 2019-2020.

To ensure that supply can match demand, the capacity mechanism requires electricity suppliers to provide the necessary capacity to cover their customers’ peak winter demand. Electricity producers or demand-side management operators have their capacities certified by their grid operator, and if necessary, exchange these certificates with electricity providers, thereby creating a market value for these capacities. If a supply-demand imbalance is anticipated by market operators, this value will be positive and will encourage operators to maintain existing capacity or to invest in new capacity.

A smaller supply-demand imbalance than expected

When the capacity mechanism was proposed, concerns about the supply-demand balance were justified by the growth in peak demand and the progressive ageing of the generating fleet in France. However, it is clear that these alarming outlooks have since abated, despite the new all-time peak of 102.1 GW reached in 2012.

In terms of demand, the anticipated levels of “critical” demand have been regularly revised downward: for winter 2017-2018, RTE’s 2015 projections established the demand level to be covered at 101.8 GW, almost 4 GW below the level anticipated in 2009 for the same year (see 2). This is due to the combined impact of the slowdown in economic activity, energy efficiency efforts and energy switching for different uses. Consequently, electricity consumption for residential heating, growth in which remains central to the formation of peak electricity demand, is now expected to rise slightly by 0.4% per year to 2020, whereas growth of 1.7% per year was predicted in 2009.

In terms of supply, the production capacities available in France have remained largely stable since 2008, with the 2 GW reduction in fossil-fired power plants being offset by the increase in renewable capacities, especially wind power: + 5.7 GW. Demand-side management capacities have been maintained at a level of 3 GW. Sluggish demand for electricity and the maintenance of production capacities have resulted in a situation of limited risk at the present time. In the 2015 baseline scenario established by RTE, the capacity gap applies only to winter 2017-2018, where a requirement of 200 MW appears in the case in which the two Fessenheim nuclear reactors are closed before the commissioning of the EPR reactor in Flamanville, and if 1.3 GW of oil power plants are also closed before this date.

The limited risk of an imbalance between electricity supply and demand in the short term therefore makes it possible to step back and rethink the security of supply beyond the capacity mechanism, from a perspective that integrates not only demand-side policies (energy efficiency and fuel switching), but also solutions to make the electricity system more flexible and the integration of the electricity system in France with those of its neighbouring countries.

For a broader vision of the security of supply

The capacity mechanism can contribute to the maintenance of conventional plants, to the development of demand-side management, or even to the creation of new peaking power plants. However, it cannot take advantage of all the benefits provided by other measures known as “no regrets measures” since they contribute to both the security of electricity supply and the integration of intermittent renewable energies.

A first set of “no regrets” measures includes those which improve the energy efficiency of uses associated with peak demand, in particular electric heating. The French energy efficiency regulation of 2012 has shown that the reduction in the use of electric heating in new buildings has significantly influenced changes in residential electricity demand. Measures targeting potential energy savings in existing buildings equipped with electric heating should therefore be considered. These would in fact have the threefold advantage of helping to meet the ambitious goal of a 50% reduction in energy consumption by 2050, supporting achievement of renewable energy development targets and reducing the level of peak electricity demand in winter.

A second set of measures focuses on the development of cross-border exchanges in electricity, the designated goal of the European Energy Union strategy. Indeed, in the same way in which they facilitate the integration of renewable energies through their smoothing effects (see p. 7 of our study), these exchanges also help to smooth peak demand at the continental level. France has a lot to gain from encouraging these exchanges, as electricity demand in its southern European neighbours is far less temperature-sensitive. This requires the development of physical interconnections and greater integration of national markets. To this end, starting this year, the European Union is encouraging its member states to establish assessments of supply security at the regional level and is considering the need to harmonise national capacity mechanisms.

Finally, it will also be necessary to ensure electricity markets and the system as a whole are accessible to innovative demand-side or electricity storage solutions. In a tense situation, these solutions improve the balance between supply and demand by providing new possibilities for reducing consumption or by releasing previously stored energy. These solutions are expected to be developed in the future as technology progresses and will benefit from differences in market prices for electricity over time that will inevitably arise because of the intermittency of some renewable energies. They stand to gain even more from these price variations as the electricity market becomes more real-time and as measures to limit significant market price variations are removed. They will also benefit from the limitation of barriers to access to some types of additional remuneration such as the balancing market, ancillary services or the capacity mechanism itself.