# OVERVIEW AND CHALLENGES OF FLEXIBILITIES FOR THE NEEDS OF THE ELECTRICITY SYSTEM

think SMARTGRIDS

MINISTÈRE DE LA TRANSITION ÉNERGÉTIQUE

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# EXECUTIVE SUMMARY

This report aims at informing French decision-makers, local authorities, industry and French consumers on the challenges of flexibilities for the needs of the electricity system, and the levers that need to be considered to accelerate their development.
It is based on documentary research, on the expertise of Think Smartgrids and its members, as well as on numerous interviews with key players in the sector.

The massive integration of intermittent and decentralised renewable energies sources, the resulting need for investments in grid infrastructure, the achievement of the ambitious decarbonisation targets set out in the Fitfor55 package and the volatility of electricity prices are all challenges to which flexibility can provide a partial answer. The subject of flexibilities is a complex one, and it is not the purpose of this report to provide new 2050 scenarios between. Instead, it focuses on the 2035 timeframe, and as such, it draws a parallel with the scenarios proposed in October by RTE in its Bilan Prévisionnel 2023 report.

This publication by the French transmission system operator reaffirmed the need to develop our flexibility capacities and emphasised that two areas, demand-side management and batteries will play a growing role in the resilience of the electricity network.
Our report focuses particularly on the first area, which seems the most promising in the short term, while giving a broad overview of the other existing flexibility levers.

Doing so, we identify three mature flexibility levers that should be exploited as a priority:

- **Tariff lever**, a solution that has been tried and experimented in the past with simple technologies. But new technological developments (smart metering in particular) offer opportunity for increased potential.

- **Industrial load shedding**, which still has unexploited potential to date that could be even more important in a context of industrial electrification and reshoring.

- **Distributed load shedding in the tertiary sector** (office buildings, malls, public buildings, warehouses, etc.), which represents a significant potential source of flexibility that has historically been little tapped due to insufficient return on investment considering the technologies required.

Complementary to the tariff lever, the industrial development of distributed load shedding in the residential sector requires the deployment of management technologies (smart meters, connected equipment, etc.) directly into consumer's home. This lever should also be accelerated to mobilise residential electric consumption for shorter periods of time, generally during winter consumption peaks.

In the final section, Think Smartgrids interviewed several players of the ecosystem to highlight the concrete challenges **encountered by a widescale deployment of flexibility. It comes out that:**

- **Short-term effects can be achieved with awareness-raising and financial support from public authorities for tertiary and residential consumers** transitioning towards dynamic tariffs and control equipment.

- **Regarding tertiary and residential flexibilities,** coordination and proper financial incentives will be key to encourage equipment interoperability and appropriate remuneration of demand-side flexibility. It seems most appropriate to capitalise on mature and proven solutions (hot water tank control, heating, air conditioning and ventilation)

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- **Interactions between players in all sectors need to be carefully coordinated.** Information and communication technologies and market mechanisms are key to ensuring this coordination and facilitating integration ensure this coordination and facilitate sectoral integration.

A power system with a higher penetration of renewable energy can only work if all the flexibility levers (generation, consumption, storage) are mobilised in a broad and coordinated way, as well as smartly dimensioned network infrastructures.

The role of public authorities and regulators is fundamental in:

- **Setting ambitious national targets** to encourage a more flexible electricity system.

- **Targeting economic support** to encourage the emergence of flexibility solutions that are relevant for the general interest is desirable before they find their own economic space.

- Supporting the transformation and gaining **acceptance from businesses and public opinion**.

- Support, through future regulations, the **investment and innovation in smart grid infrastructures** to enable system operators to exploit flexibilities levers, and to make flexibility economically viable and competitive in France and Europe.

Because time is short, and because uncertainties can still change the context (geopolitical conflicts, unavailability of raw materials, etc.), it is becoming urgent for the use of electrical flexibility to be included as a reliable lever in the management of the electrical system, by initiating an industrial or semi-industrial deployment of these solutions.

Electrical flexibility will play a major role in the development of smart electricity grids, which is why Think Smartgrids put this topic as a priority in it road map and is publishing this **first introductory report on the challenges to the development of demand flexibility and the levers available to accelerate its deployment.** A second document will complete this report during the 1st quarter of 2024, proposing an inventory and recommendations on the hardware and digital infrastructures connecting buildings and networks, and their role in unlocking the necessary flexibility potential.

Supporting territories in their energy transition is one of Think Smartgrids' core concerns, which is why, in a second phase, the results of this work will serve as a basis for launching projects to support local authorities willing to make better use of the energy consumed by their buildings, in the interests of the grid. These projects, ideally on the scale of entire territories, will aim at establishing a technical reference framework for the development of the grid.

# THE THINK SMARTGRIDS ASSOCIATION

The Think Smartgrids association federates an ecosystem of French stakeholders contributing to the decarbonization and efficiency of power systems: grid operators RTE and Enedis, the main French manufacturers and equipment suppliers in the energy sector, major digital services companies, numerous SMEs and French startups at the cutting edge of energy and digital technologies, as well as the academic and research ecosystem.

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