Long-term prospects for System Integration of Renewables in France
IEA – RTE project

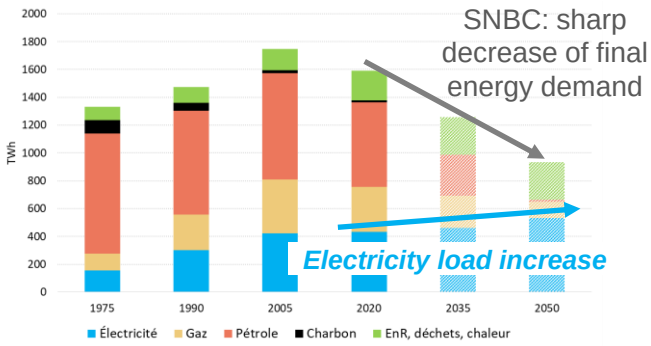
Webinar: Technical secure integration of large shares of converter based power sources

25th March 2020

The French strategy for net zero carbon

- The draft French strategy for reaching net zero carbon by 2050 (SNBC) is under discussion since 2017 and nearly finalized. It provides for:
  - A sharp decrease in final energy demand (to be divided by 2 by 2050)
  - An increase in the share of electricity, to reach circa 50% (against 25% today), directly or indirectly (power-to-X)

Final energy demand in mainland France



- Electricity in France is today mainly carbon-free (93%). The SNBC provides for a 100% carbon-free electricity by 2050, but it leaves open the question of the balance between RES and nuclear. Scenarios leading to a 100% RES power system, or relying on commissioning new nuclear reactors, are to be investigated in details.

- **In this framework, the French Minister for the Ecological and Inclusive Transition has asked the French TSO RTE and the IEA to jointly study the technical feasibility of a 100% renewable-based power system, including mainly wind and solar PV**

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Objectives of the IEA-RTE study

- Explore the operation of the power system in scenarios with a high share of mainly variable renewable energy sources (up to 100%)
- Provide strategic insights about the preconditions for a 100%RES power sector (operational aspects, management of variability of wind and solar PV with back-up capacities, needs for grid reinforcement and development)
- Provide elements about the **technical feasibility of 100%-RES scenarios**, especially in terms of **inertia and stability** of the system, which is still a **key question** to address in the public debate about the future of the electricity mix in France
- Identify relevant international benchmarks taking into account differences and similarities in power system context of other countries
- Share provisional results with international experts (this webinar) as well as French stakeholders (in another dedicated event) and publish a final report by mid-2020. **This report should provide a roadmap for 100%-RES scenarios and determine recommendations for policy-making and R&D priorities**

The IEA-RTE study aims at elaborating a roadmap to address the technical feasibility of 100%-RES scenarios in France

- **The study of the technical feasibility of 100% RES scenarios for the power system in France will result in a roadmap** in order to explain
  - What we **already know** on this kind of scenarios
  - what we should **be investigated**
  - What should **be put into test (proof of concept)**
- The roadmap should then formulate **clear recommendations for policy-making and R&D priorities**

- The analysis will **focus on**

1) **Power system stability (inertia)** → **Todays' topic**
2) **Security of supply**
3) **Operational margins and reserves**
4) **Network development to adapt to 100% RES-scenarios**

The roadmap resulting from the IEA-RTE study must be discussed with international experts

- The study of technical feasibility of 100% RES-scenarios will be based on **input from experts of diverse sectors at the international level**
- As the French power system is integrated within the interconnected European network, the question of the technical feasibility of 100% RES scenarios mainly based on variable production in France is relevant
  - not only at the national scale
  - but also at the international scale

- Security of supply or synchronous inertia are indeed ensured from a European point of view, studies should thus be based on this perimeter
- **Many stakeholders often refer to examples of countries where high shares of RES in power generation are observed (Ireland, Denmark…), in particular about inertia and stability** → detailed analyses should be carried out in order to determine what has actually been achieved in these countries and whether it can be scaled up at European level with massive integration.