INSTITUT
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Conference

France's **nuclear plans** versus reality

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Nuclear Energy Conference

18 May 2022

"France needs to reduce its double dependency on oil and nuclear power"

François Hollande
French president, 2012-2017

10 years of French nuclear policy, between myth and reality…

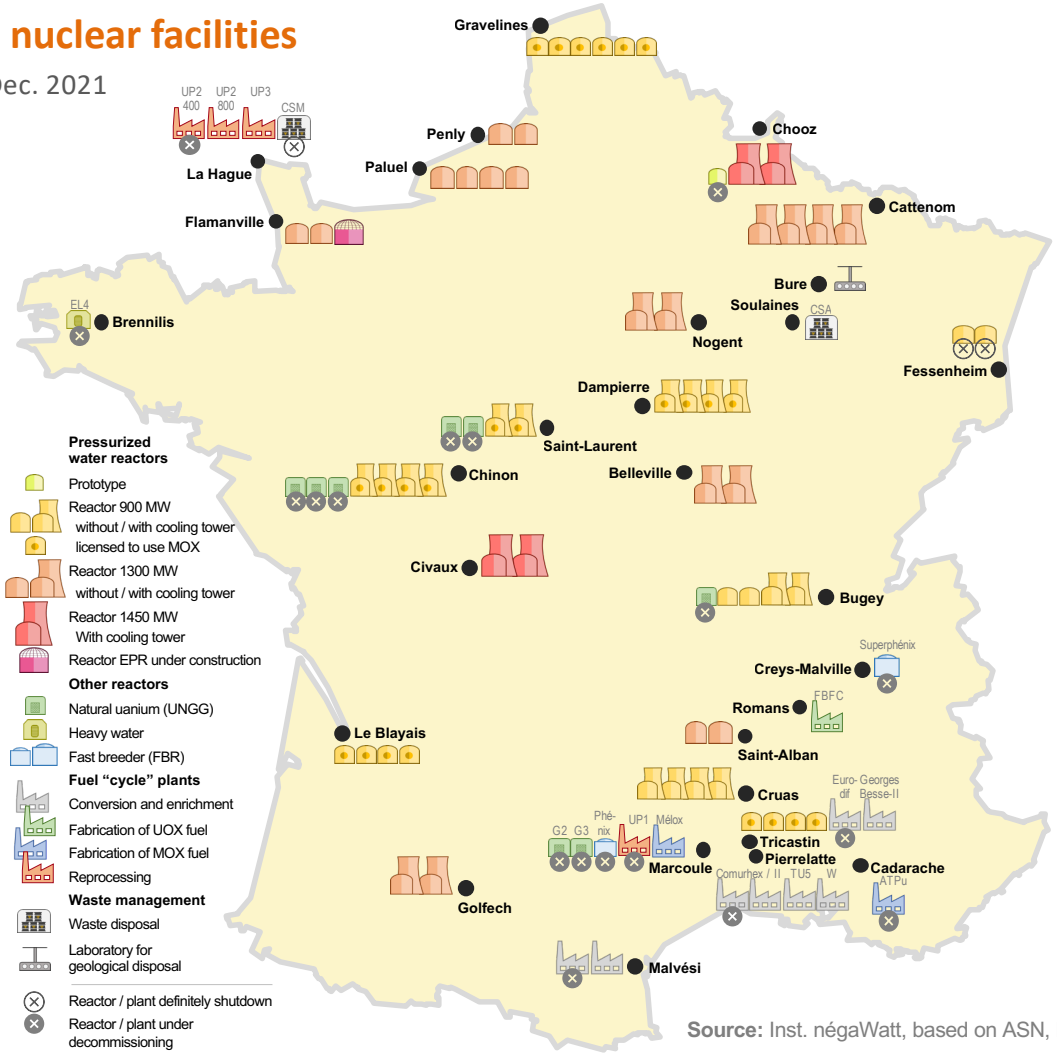
"France's energy and ecological future depends on nuclear power"

Emmanuel Macron
French president, 2017- …

Status quo

French nuclear facilities

as of 31 Dec. 2021



Source: Inst. négaWatt, based on ASN, EDF (2022)

Nuclear energy

- Nuclear power: less than 20% of final energy
- 70-75 % of electric generation, framing the whole system

Nuclear industry

- 56 reactors operating
- A comprehensive, integrated "fuel cycle" industry
- A strong international ambition

Political lock-in

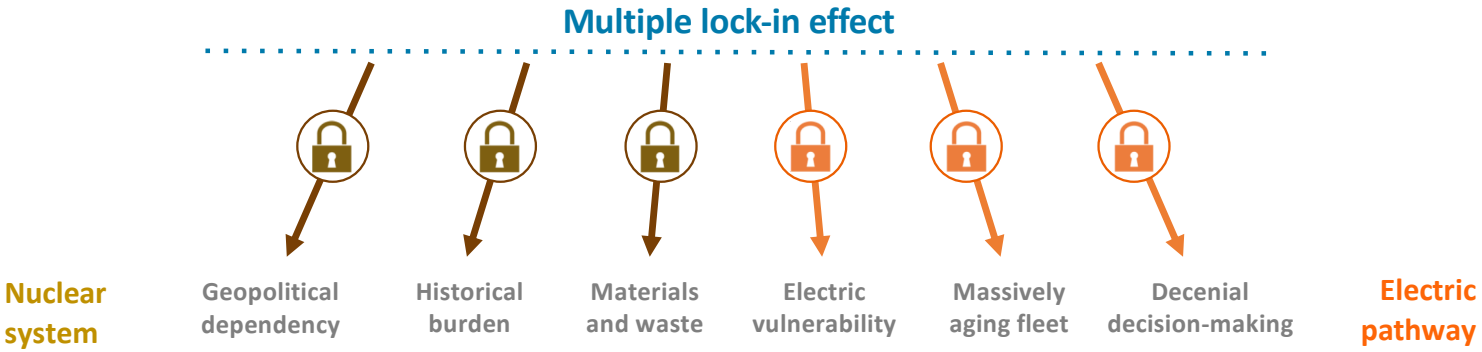
2012 Introduction of the **objective of reducing the share of nuclear power** in electric generation **down to 50% by 2025**

2015 Enforcement of the objective of 50% of nuclear power by 2025 in the law

2017 **Strategic plan to shutdown 14 reactors** by 2035 meaning life extension to 50 years or beyond of most of the remaining

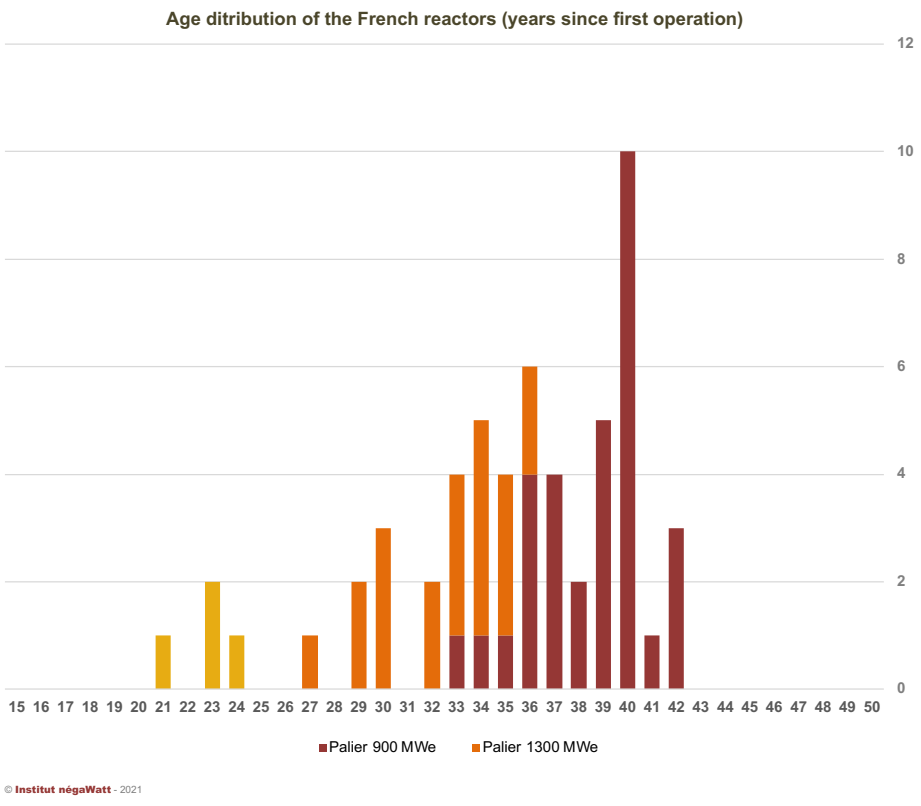
2019 Two reactors shutdown (Fessenheim), Deadline for reaching **50% postponed to 2035 in a new law**

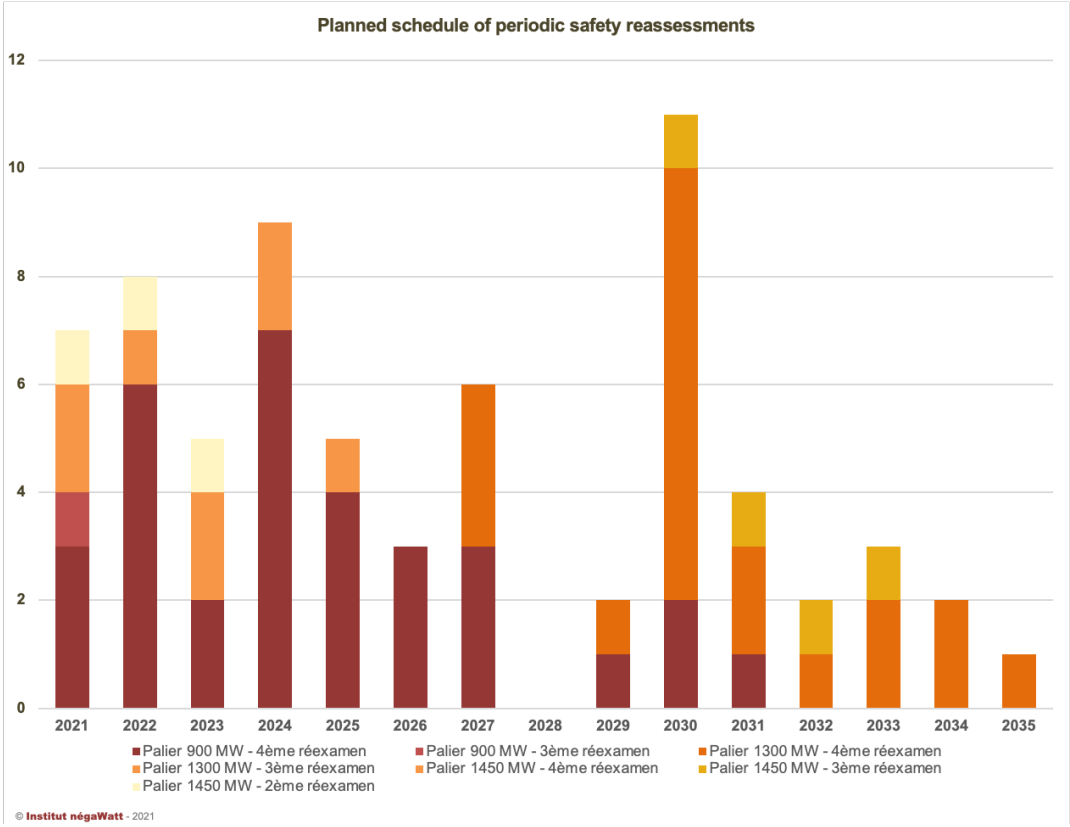
2022 No reactors shutdown for non-safety related reasons before 60 years of operation Announcement of a new reactors programme of **6 + 8 new EPR reactors**



Aging and life extension issues

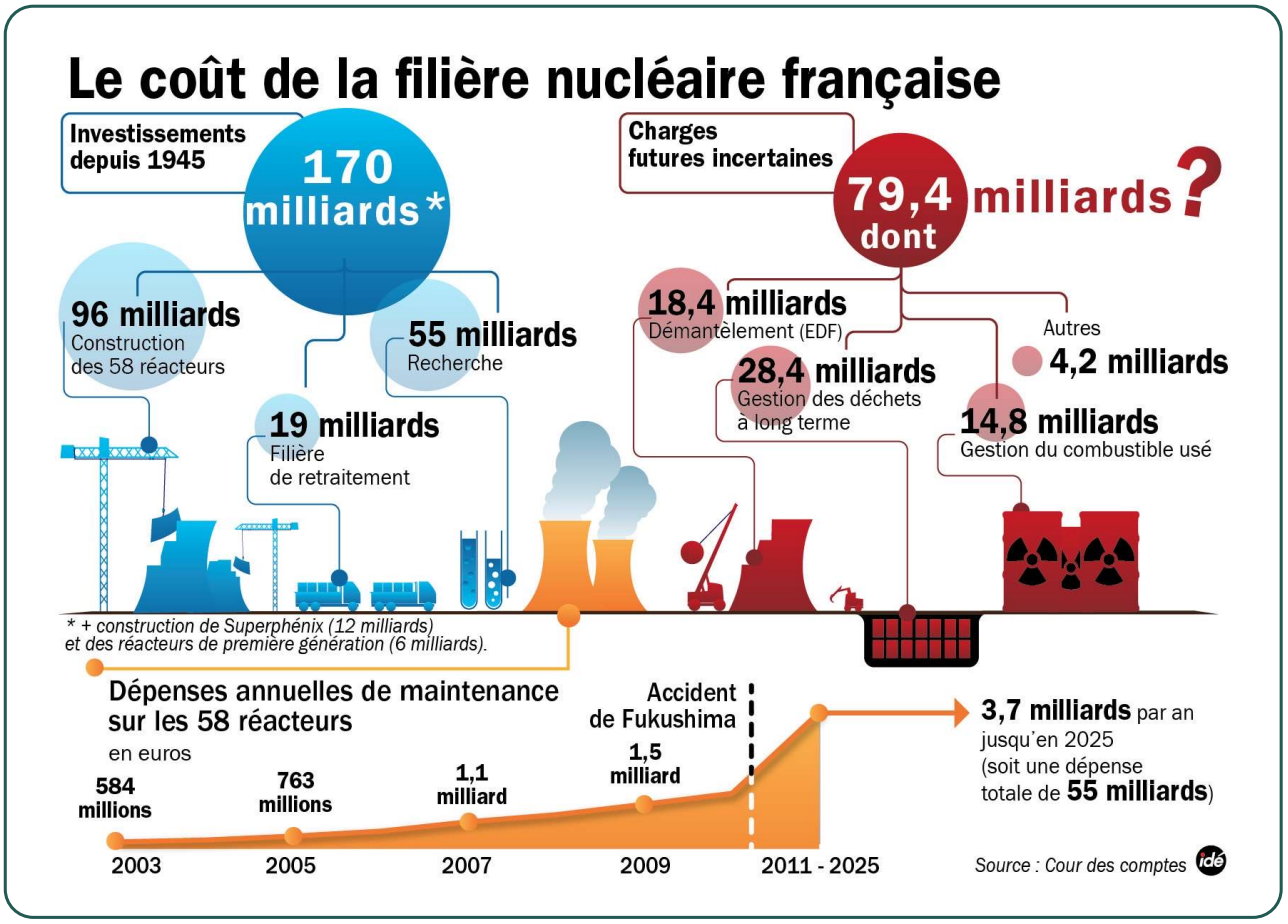
Over 35 years of operation on average
80% of the fleet was started in 10 years





Costs and financial equation

2012: first comprehensive cost assessment by French Court des Comptes



Future costs:
uncertain and rising

Perspective of increasingly **non-profitable assets** massively turning into **heavy liabilities**

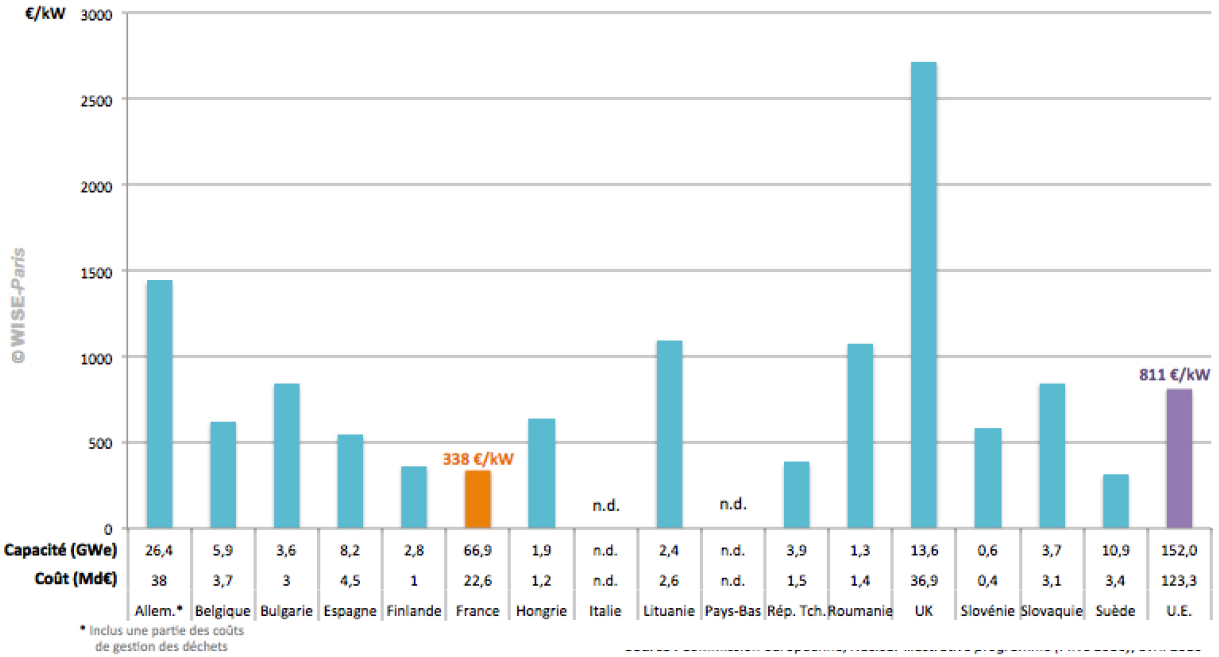
Ongoing costs:
increasingly up

Decommissioning and waste management

- Future **decommissioning costs** are most probably under estimated
- Long term costs will include the bearing of accumulated “reusable” materials
- Therefore current financial provisions won’t be sufficient

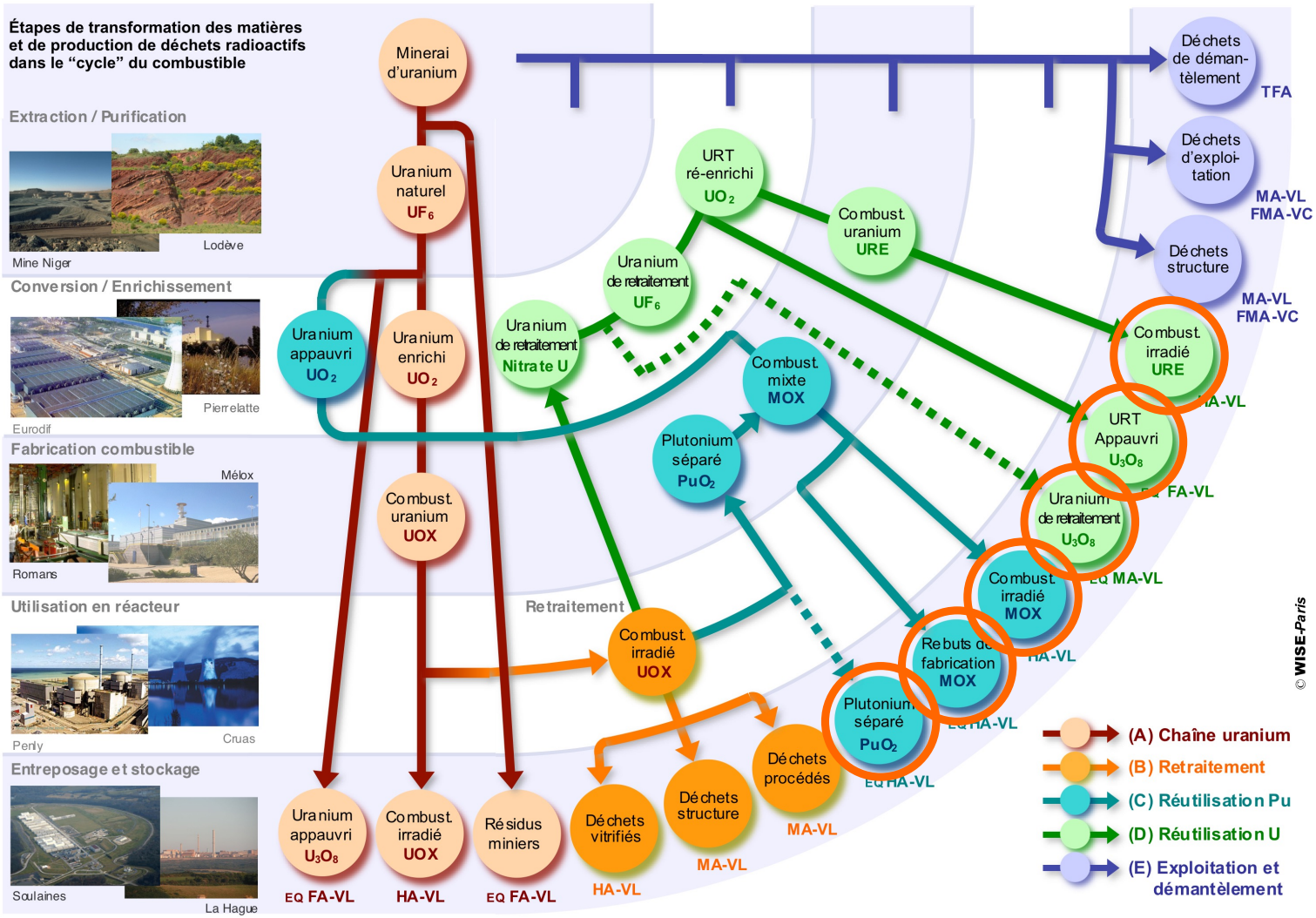
Decommissioning costs of reactors

Real and projected costs, as declared by Member States to the European Commission



Source: based on European Commission (2016), *Nuclear Illustrative Programme (PINC)*

Waste and nuclear materials piling-up



A very complex management scheme based on reprocessing…

Piling-up of various categories of waste and **"reusable" nuclear materials**

Issues with operation of plants… and shortage of storage capacity

- **Spent fuel (particularly MOX)**
- **Reprocessed uranium**
- **Unirradiated plutonium**

Headlong rush

"EDF is like a cyclist who has to pedal not to fall"

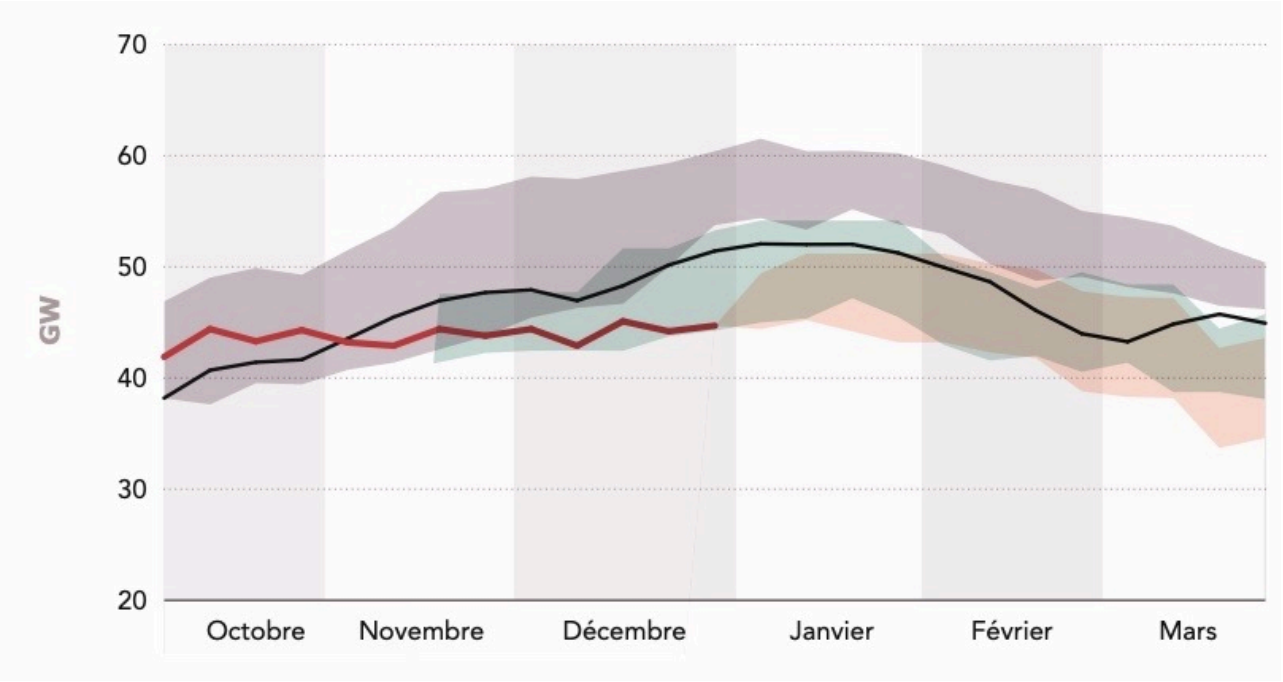
Jean-Bernard Lévy
CEO of EDF, 2014- …

→ **Life extension of existing reactors**

Building of new reactors

Decreasing performance

- The availability of existing reactors is decreasing through time
- Combination of strong planned factors (periodical safety reassessment) and significant unplanned factors (stress corrosion cracks)
- **28 reactors out of 56** in planned or unplanned outage as of today
  Current historical low – **55 to 60% planned availability** over 2022-2023

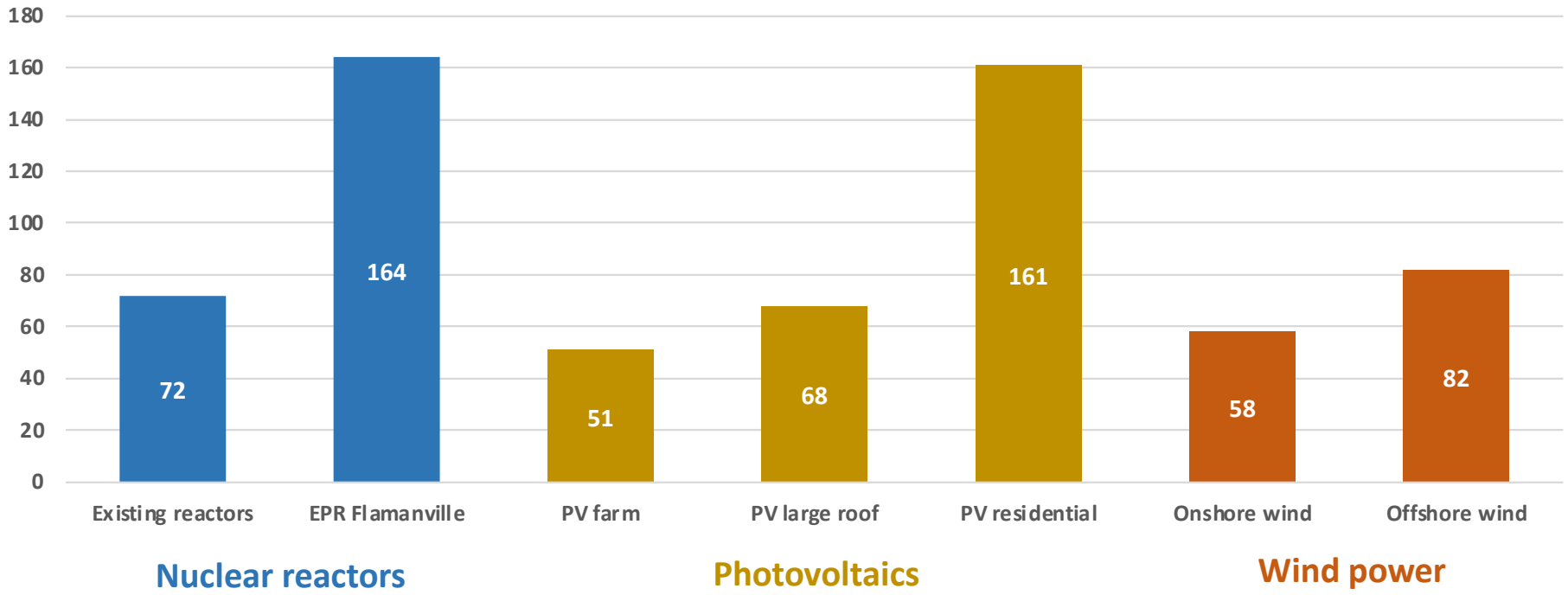


Lost competition

Like anywhere else, renewables are increasingly more competitive than new reactors and even existing ones

The difference is increasingly likely to cover the additional costs of a renewable-based electric system

Current economic cost of different generation options (in € 2020 by MWh)

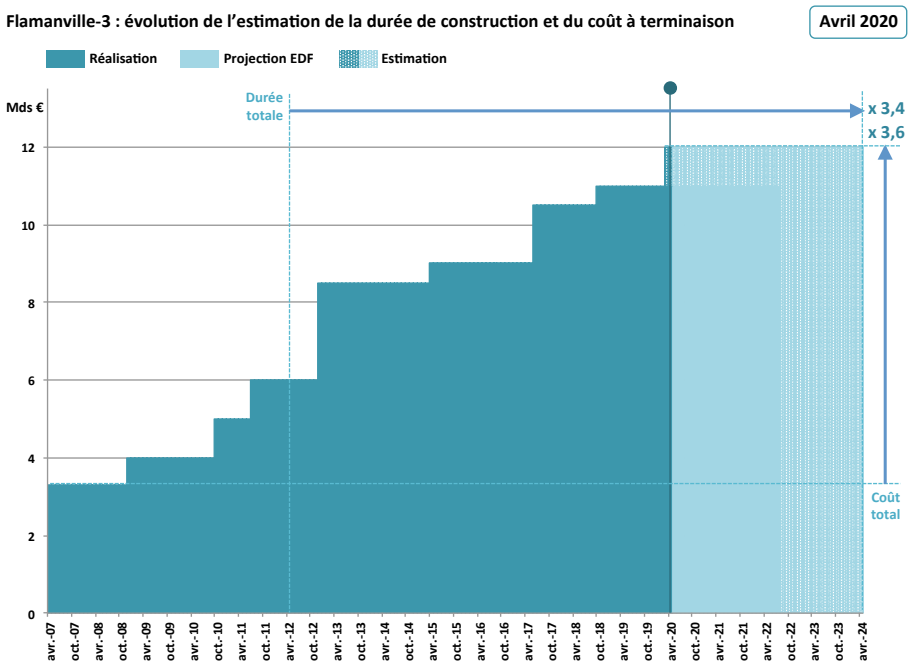


Source: Institut Rousseau & Greenpeace France (2022)

New build

Construction of the EPR – Flamanville-3

- Initial plan to start it in 2021 at a cost of € 3,3 billion
- Latest official estimate: industrial service in 2023 for a cost of € 12 billion
  Cour des Comptes estimates, including financial cost: € 19 billion

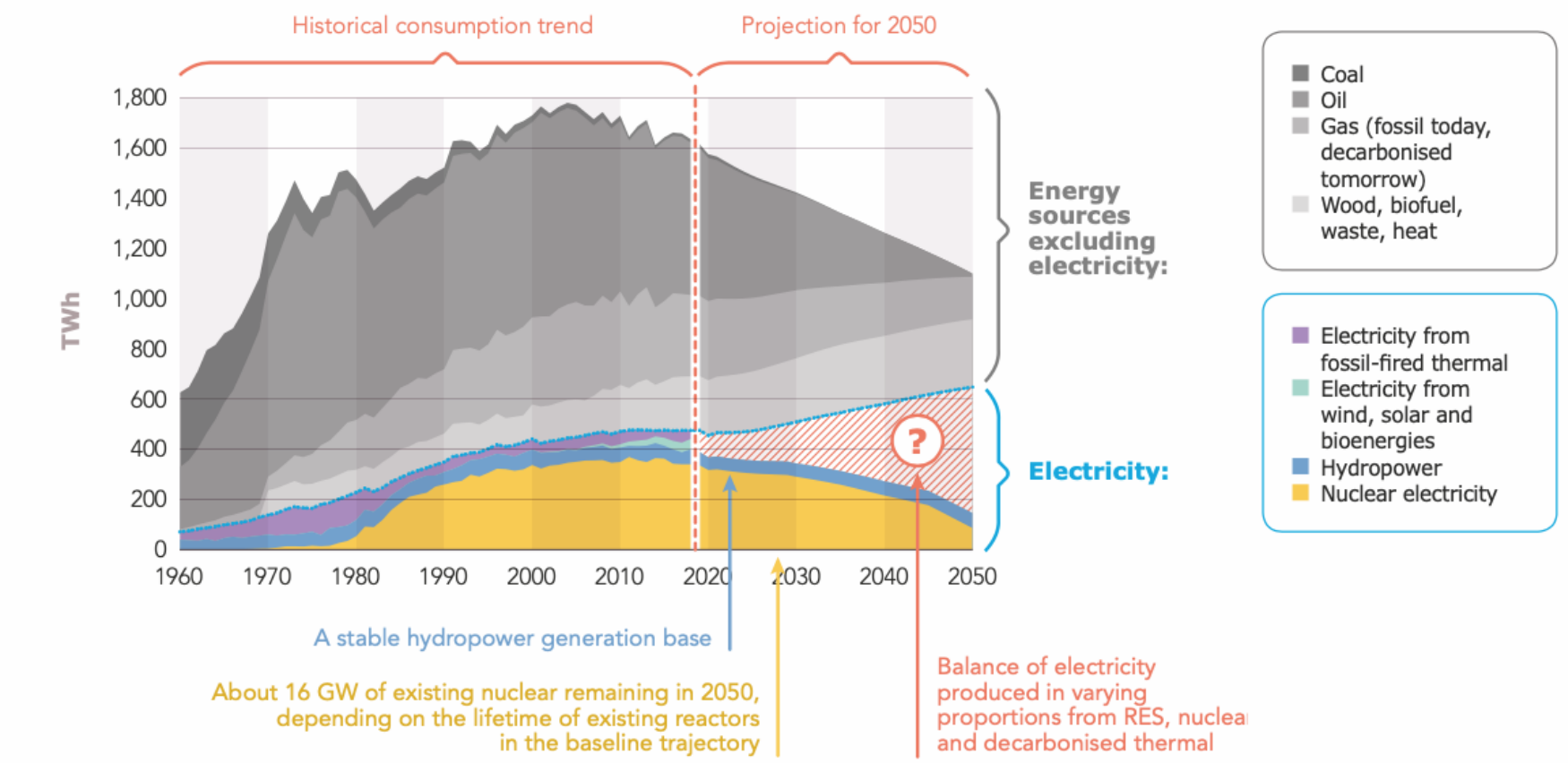


Plans to build new reactors EPR2

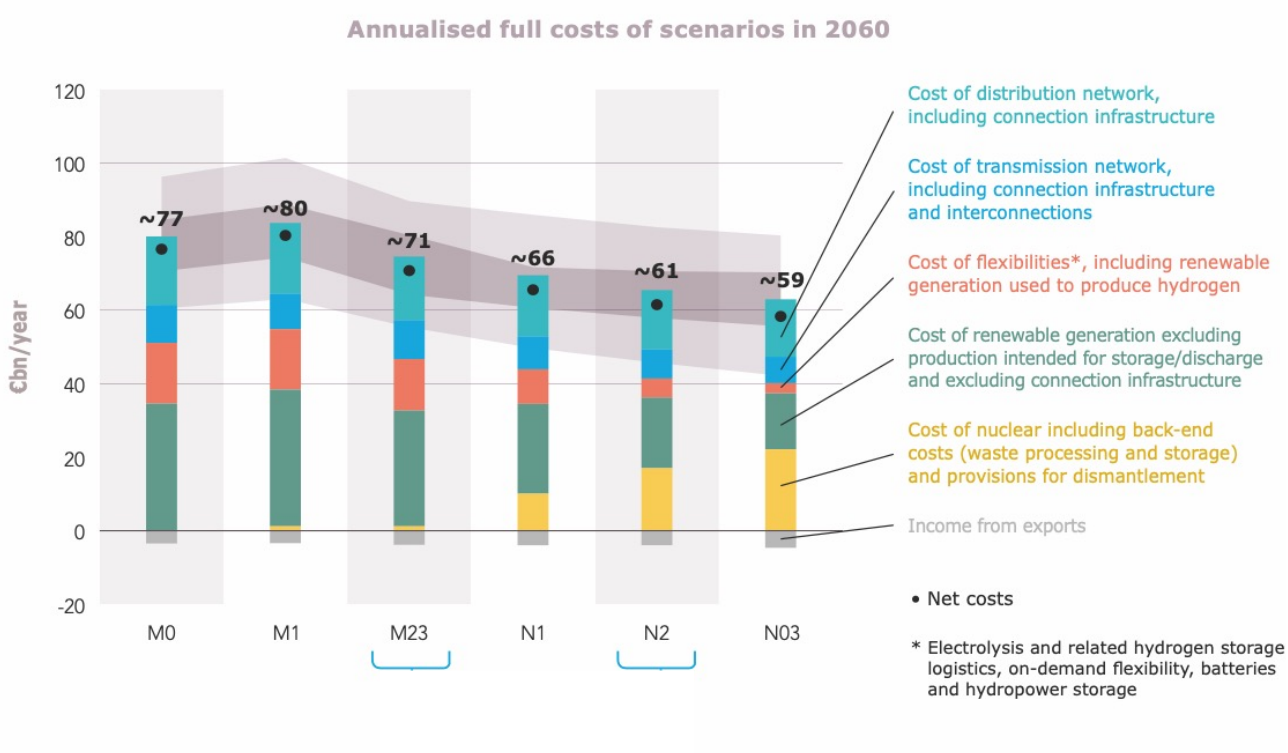
- Simplified design, recession on key saffety features
- Still in early design phase, generic license planned in 2024-2025
- Official cost estimate: at least **€ 46 billion** for 6 reactors
- First service not expected before **2037 at the earliest** by the Government

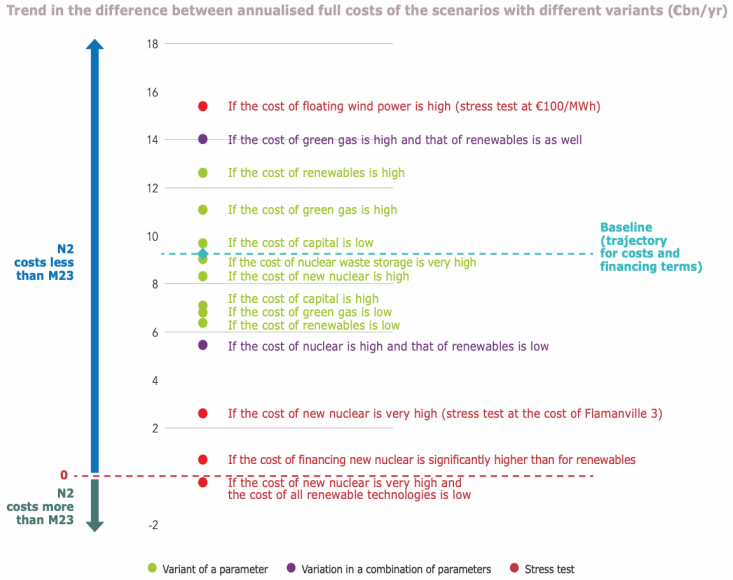
RTE prospective study

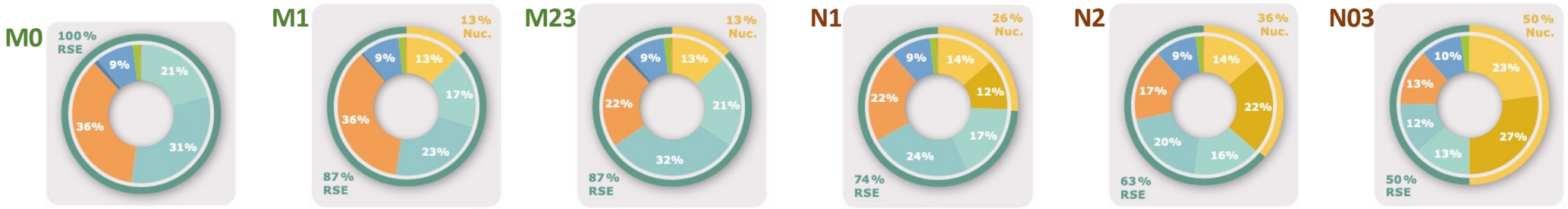
Current status of discussion around the overall demand and the share of electricity as part of a carbon neutral strategy



RTE prospective study

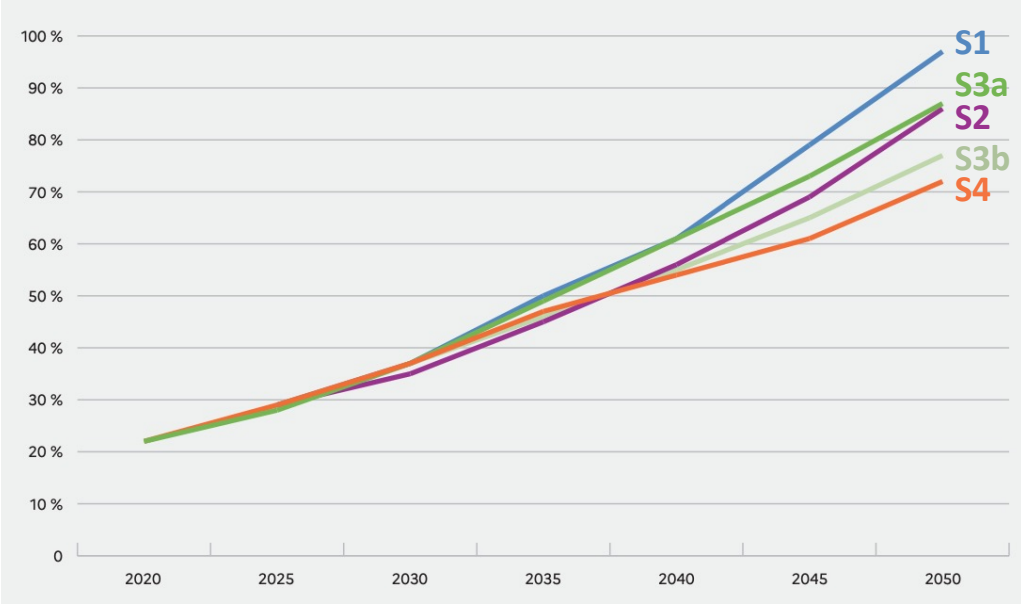




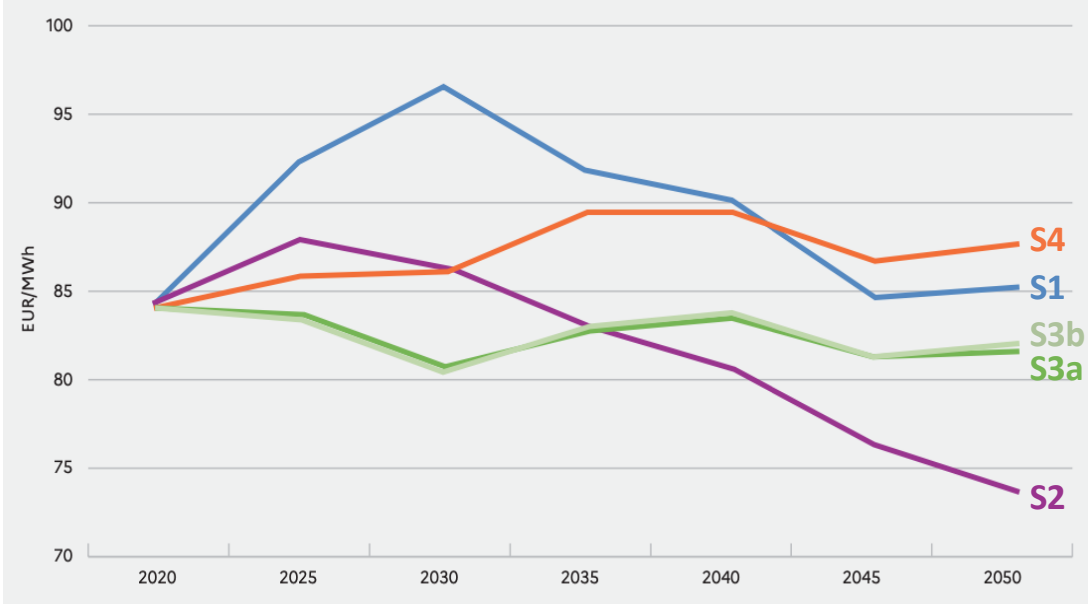


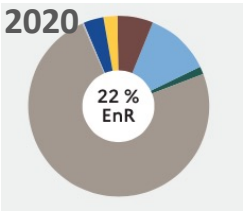
ADEME prospective study

Evolution of the share of renewables in the electric mix



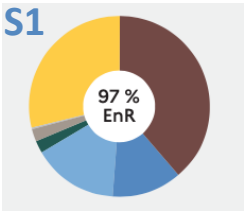
Evolution of yearly complete electric system costs by MWh

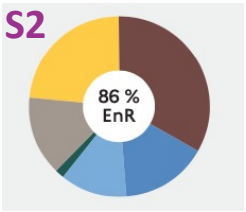


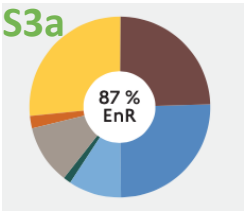


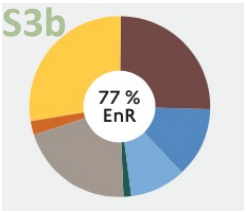
468 TWh

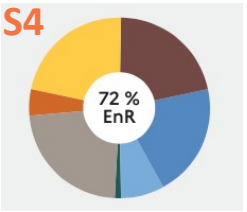
Nuclear
Gaz turbine
Other thermal
PV
Onshore wind
Offshore wind
Hydro
Other renew.











	S1	S2	S3a	S3b	S4
Electric demand in 2050:	408 TWh	537 TWh	656 TWh	656 TWh	839 TWh
Total cost 2020-2060:	€ 1,045 bn	€ 1,097 bn	€ 1,318 bn	€ 1,309 bn	€ 1,518 bn

Conclusion

"No expert says 100% renewables is realistic, serious, possible for our Nation"

by ïoO

Emmanuel Macron
French president, 2017- …

French nuclear strategy is struggling with an increasingly adverse reality

Pursuing nuclear plans is driven by:

- **the need to maintain nuclear military capacity,**
- **the postponing of heavy financial issues**
- **the need of a dynamic to sustain competences**

Plans for life extension and new builds are bound to face increasing hurdles, which it is not clear how much Government support will allow to overcome

Thank you for your attention!

More information: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