

# The Big Seven: Key risks facing France's nuclear fleet

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# Introducing the Big Seven

1.

Political risk



3.

Financial risk



5.

Reputational risk



2.

Age-related  
operational risk



4.

Labor risk



6.

Nuclear waste risk



7.

Climate risk



# 1. Political risk (1/3)

- France's aging nuclear fleet faces a multitude of **interconnected political risks** that hinge on policy decisions.
- **The main political risk is domestic:** Inconsistent government policies regarding the exiting fleet continue to create challenges for both short- and long-term planning, investment, and industry stability.



**November 2018:** France will shut down 14 of its 56 nuclear reactors by 2035, including up to six by 2030 (two reactors were subsequently decommissioned).



**October 2021:** France will be a leader in low carbon production through small modular reactors, as part of the broader France 2030 vision.



**February 2022:** France will have a nuclear renaissance with a massive programme of up to 14 new reactors to help make the country carbon neutral by 2050.



# 1. Political risk (2/3)

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**Domestic policy risk then leads to EU policy risk:**

- The **ongoing discord between France and Germany over the EU energy market reform** will affect the nuclear sector in France and the broader energy sector across Europe
- France wants to allow **contract for differences (CfD)** for its existing nuclear fleet; Germany wants to limit such contracts for newly built clean energy solutions
- If France wins > **Germany might retaliate** with its own, direct subsidy for its industry > Backlash from EU countries will follow > No resolution before EU parliament dissolves > **Possible end of EU wholesale power market** (as most consumption would be locked into fixed prices) > **No timely reform** to bring in much needed investment and lower energy costs in Europe



# 1. Political risk (3/3)

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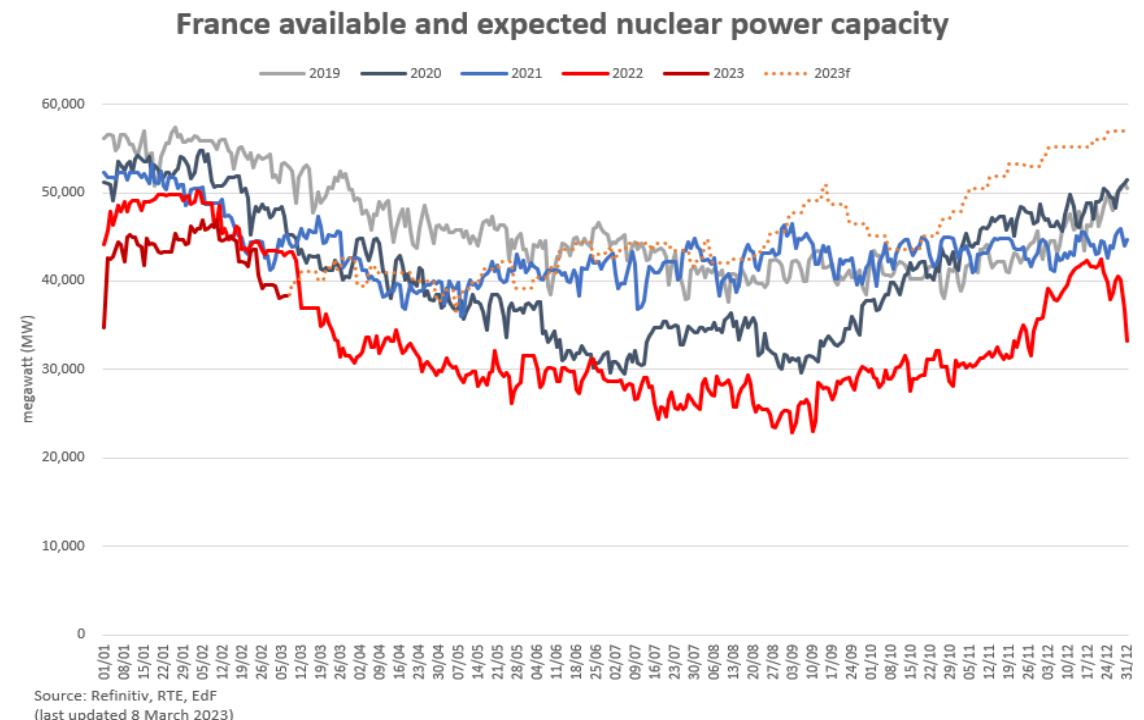
- **African political risk is limited in the short term, but worth monitoring:** The political instability in countries supplying uranium raises concerns about the reliability of this essential resource (e.g., recent coup in Niger)
- **Global geopolitics is a growing, indirect risk:** The unpredictability of the ever-changing geopolitical order introduces an element of uncertainty to the French nuclear industry by making worst-case scenarios more likely (e.g., last year's nuclear woes and broader energy crisis in France)



## 2. Operational risk

**Age-related operational risk is probably the most intuitive risk from the Big Seven:**

- **Corrosion and maintenance issues:** The older reactors are prone to corrosion and require extensive maintenance, which can lead to operational disruptions, extended outages, and increased costs.
- **Poor planning:** An ageing fleet requires robust and consistent policy decision-making regarding next steps to avoid reliability and efficiency issues. That was not the case in France.
  - The initial **push to decommission** turned into a **push to extend the lifetime of old reactors** (most of France's 56 reactors are between 30 and 40 years old; goal is now to push for up to 60 years of operational time).
- **The ageing fleet will not be enough** to meet the country's current nuclear ambitions > hence the strong need for new reactors.



### 3. Financial risk

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**Financial risk casts a shadow over the nuclear sector,** affecting both operational sustainability and expansion efforts.

- **Daunting needs:** The substantial financing requirements for extending the lifetime of reactors and constructing new ones present financial challenges for the industry.
  - Current estimates are around EUR 50 billion for lifetime extensions and an additional 50 billion envelope for the first six new reactors.
- **Cost overruns and delays:** Ambitious nuclear expansion plans often result in cost overruns and project delays, straining financial resources and timelines.
  - EDF is already having huge trouble starting up its current developments, including the **1.6 GW Flamanville plant**, which is many years behind schedule and billions of euros over budget.



## 4. Labor risk

The nuclear sector grapples with **significant labor-related challenges**, affecting workforce availability, expertise, and project timelines for both the ageing and new fleets.

### Where are the experts?

Costly delays are a reminder of **France's loss in expertise and human capital** as nuclear specialists retire without replacement and as young engineers—who were told the golden years of the nuclear era were over—have developed expertise in other energy sectors.

### Where is the workforce?

A significant shortage of skilled workers, including **welders, pipe-fitters, and boiler makers**, hinders maintenance and expansion efforts. This scarcity is so pronounced that EDF had to **bring in 100 of these professionals from the United States and Canada** last year.

### Who will bridge the gap?

French nuclear sector will require an annual recruitment of **10,000 to 15,000 workers until 2030**. EDF has an annual hiring target of 3,000 new employees over that period (i.e., 15% of its current nuclear workforce). It also aims to employ 1,000 welders by 2030, doubling current numbers.



## 5. Reputational risk

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Reputational risk is a **constant concern for the nuclear industry**, particularly for ageing fleets.

01

Incidents  
still matter

02

Polarizing  
topic

03

Narrative  
challenge

Accident and incidents across the world will continue to negatively affect the industry's reputation and public trust (e.g., legacy of Fukushima).

Nuclear energy remains a polarizing and emotionally charged topic, making it challenging to find consensus and manage public expectations.

How to build trust in a time of ageing reactors and associated, new concerns? Has this been thought through?



## 6. Nuclear waste risk

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The management of radioactive waste presents a multifaceted and evolving risk that demands careful consideration.

- **No more space at La Hague?** Cooling pools used for spent fuel face the risk of reaching capacity by 2030, likely triggering reactor shutdowns.
  - EDF is building a new one, expected by 2034 (so this might be too late).
- **The “Cigéo” storage project:** France's proposal for a long-term radioactive waste storage project encounters local and activist opposition in the eastern part of the country.
- **Still no permanent repository in France:** To date, not a single country has a permanent nuclear waste repository, and a global shift is very unlikely as it is difficult to secure community buy-in on permanent waste sites (with the exception of Finland).

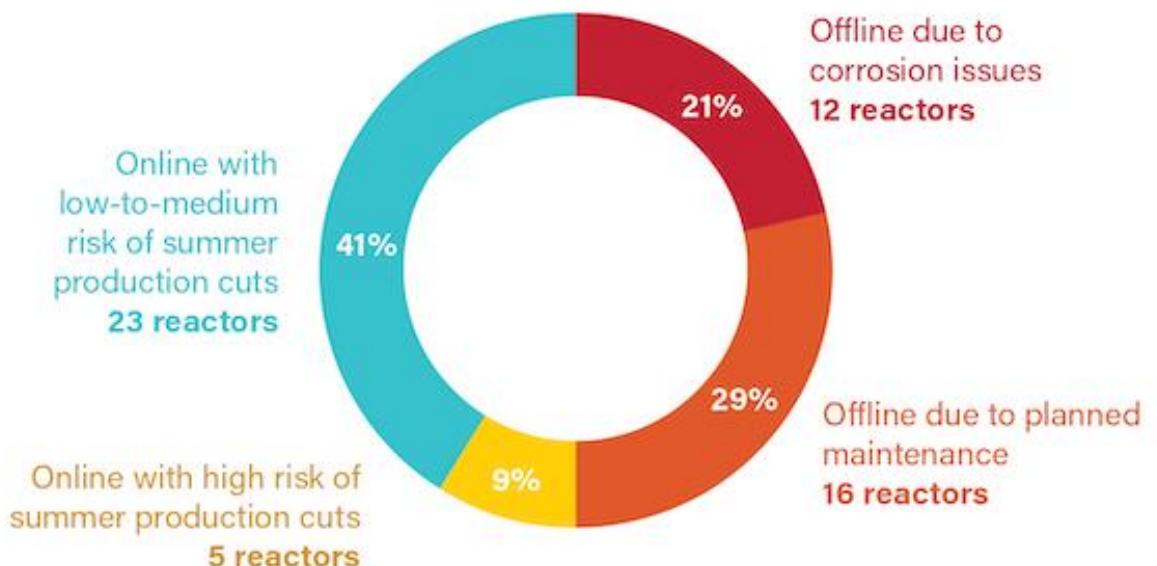


## 7. Climate risk

Climate-related risks introduce **additional complexities and vulnerabilities** to the aging fleet.

- **Biodiversity conservation:** The water used for cooling—which is then dumped back into rivers—is set to exceed France’s regulatory limits (designed to protect biodiversity) more frequently in coming years as **summer heatwaves and droughts** intensify.
  - This increases the likelihood of reactor shutdowns.
- **Climate planning:** Comprehensive climate resilience planning for existing plants is needed in the face of global warming. Such considerations might delay lifetime extension projects or new construction.
  - The future of the aging fleet as a climate mitigation tool in France will be contingent on its ability to grapple with climate disruption.

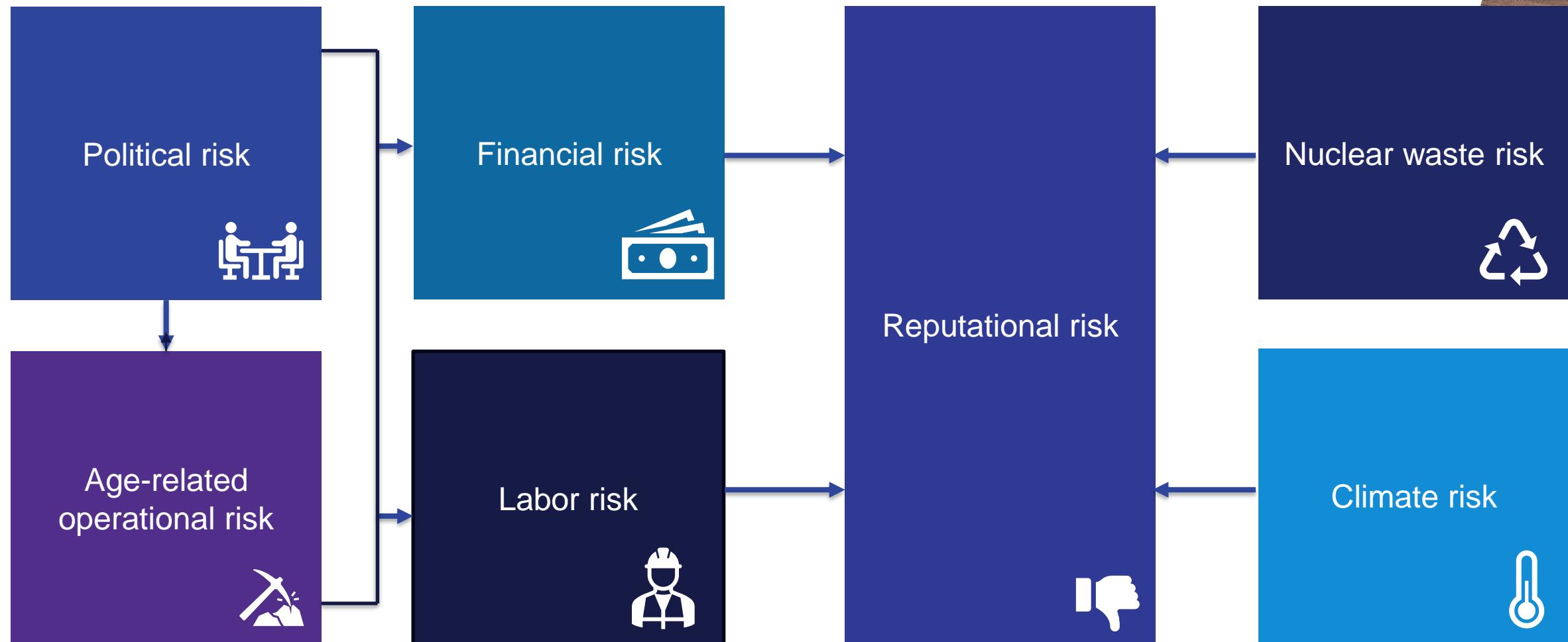
Nuclear reactor status in France (June 2022)



Source: EG Research



# The Big Seven explained





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