

NUCLEAR ENERGY: THE PROS AND CONS

In light of the current energy crisis, nuclear seem to experience a come back. Read the pros and cons!

FACT CHECK

CAN NUCLEAR ENERGY BE READY ON TIME TO ANSWER THE ENERGY AND CLIMATE CRISIS?

The construction time of nuclear power plants have exceeded 13 to 15 years in Northern America and Europe, according to the IPCC.



8 TO 16 YEARS

That's the average construction time of a modern European nuclear power plant - delays not even taken into account.



160 NEW NUCLEAR POWER PLANTS

Would have to be added globally by 2030 if we want to limit global warming to 1,5 degrees.



MORE THAN 9,5 BILLION EUROS

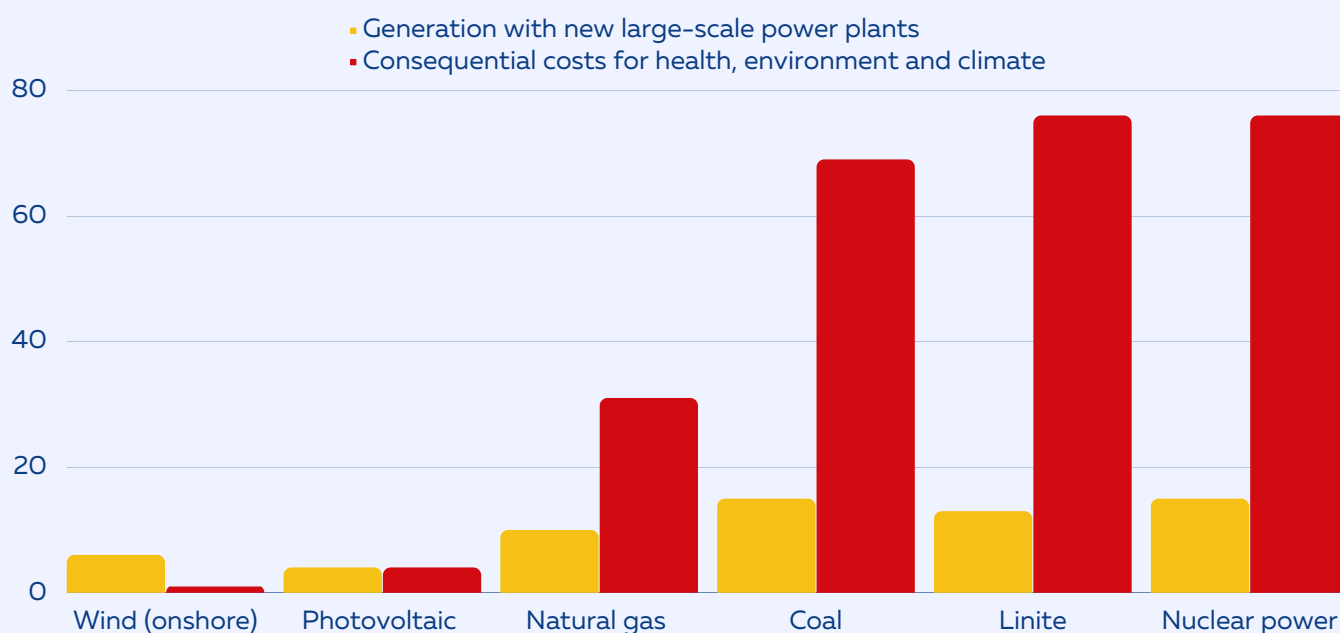
Of investments are required to finance a nuclear power plant, according to the IPCC.

FACT CHECK

IS NUCLEAR ENERGY CHEAP?

Nuclear energy has gradually lost its competitive position compared to renewable energy sources.

What does electricity generation cost in the EU?



Source: [Deutsche Welle](#), [Fraunhofer ISE](#), [UBA](#), [DIW](#), 2021

What about the Small Modular Reactors (SMR)?



SMRs are expected to have lower investment costs and a higher power generation per unit.



However SMRs are not market ready yet, as their prototypes are still being developed. If successful, SMRs can only be market ready in the 2030s.

FACT CHECK

IS NUCLEAR ENERGY SAFE?



31 INCIDENTS SINCE 1952

Three Mile Island in 1979, Chernobyl in 1986, Fukushima in 2011.



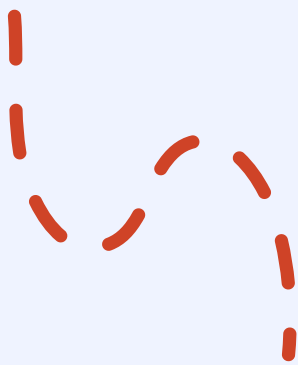
1/5 OF FRANCE'S NUCLEAR FLEET IS SHUT DOWN

Due to safety concerns. The average age of French reactors is 35 years old. The older the reactor, the higher the accident risks.



RISKS OF TERROR ATTACKS

Nuclear facilities can become targets during conflicts. Russian forces occupied the Chernobyl nuclear power plant and fired missiles near the Zaporizhzhia power plant in April 2022 during the invasion of Ukraine.



CAN NUCLEAR ENERGY GUARANTEE ENERGY INDEPENDENCE FROM RUSSIA?

Pros

- Increasing the share of nuclear energy would **relax Russia's grip** on the European energy supply, as the EU buys 47% of its gas and 30% of its oil and coal from Russia
- Belgium and Netherlands have already **increased or reactivated** their nuclear capacities because of this

Cons

- The EU nuclear industry is **dependent from Russia**, as 20% of its uranium is imported from Russia
- **18 Russian-designed nuclear reactors** in the EU exclusively rely on Russian fuel

Domestically produced energy with wind turbines or photovoltaic are independent from geopolitical issues and contribute to the fight against climate change.



CAN NEW TECHNOLOGIES HELP TO DELIVER THE ENERGY TRANSITION?

Pros

- The third and fourth generation reactors are **safer** than current reactors
- Fourth generation reactors could **run on nuclear fuel** for decades and **process old nuclear fuel** - solving the nuclear waste issue
- SMRs are considered **safe low-carbon energy generators** and can be operational quicker than other reactors

Cons

- Third generation reactors **still have safety concerns** - the first third generation reactor built had to be shut down after security concerns
- Fourth generation reactors seem promising, but they **cannot be ready on time** to deliver the energy transition, as their market development in the 2030s depend on the successful deployment of prototypes in the 2020s
- A higher number of SMRs present on our soil multiplies the **security risks** for the environment and the population

CAN NUCLEAR ENERGY SERVE AS A BRIDGE FOR THE ENERGY TRANSITION?

Pros

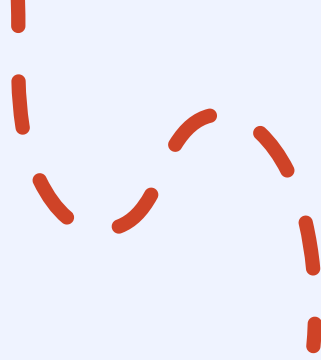
- Nuclear power has a **low carbon footprint** compared to traditional energy sources such as gas and oil
- Nuclear power also has a **smaller land occupation footprint** compared to renewable energy sources

Cons

- Nuclear power plant emits **117 grams of CO2 per KW/hour**, compared to 9 grams for onshore wind and 33 grams for solar energy
- **Huge investments** are needed to deliver the energy transition. Therefore focusing these investments on nuclear energy instead of renewable energy do not make sense economically or ecologically

Continued innovation and investments are key to enable green technologies to continue to outperform fossil fuels. However, in 2019 15% of research and development funds of IEA members states were allocated to renewables, against 21% for nuclear energy.





IS NUCLEAR ENERGY A RELIABLE SOURCE OF ENERGY?

Pros

- As renewable energy rely on external factors such as weather conditions, nuclear energy can safeguard a **reliable** and **stable** energy supply
- Nuclear energy **and other fossil fuel** is **used** until the energy grid infrastructure has been adapted to the reality of "**energy-rich**" and "**energy-poor**" regions

Cons

- A **European energy grid** is key to cope with the natural fluctuations of renewable energy supply
- Can nuclear reactors be **flexible to be combined with renewable energy?** Putting them on and off the grid puts stress on the materials
- If we use less and less nuclear power, it **makes less and less sense economically** to operate them
- Climate change threatens the nuclear industry, as water-intensive inland nuclear power plants may contribute to **localized water stress** and competition for water uses, according to the IPCC

The argument for "continued base-load supply" does not fit the realities of renewable energy. Still using this idea could prevent the timely delivery of the energy transition.



CAN WE SOLVE THE PROBLEM OF NUCLEAR WASTE STORAGE?

Pros

- Fourth-generation reactors have the ability to **process old nuclear fuel**, solving the problem of nuclear waste
- **New technologies** can reduce the time needed for nuclear waste to be kept in final storage
- France has managed to **recycle** the majority of its spent nuclear fuel

Cons

- The different stages of nuclear cycle all have **environmental and proliferation risks**
- **Spent fuel rods** cannot be reprocessed by these technologies and would have to be stored safely
- France cannot convert its **used uranium**. It is stored by Rosatom in closed cities of Siberia, Russia

The question of the storage of nuclear waste remains unresolved.



FES Just Climate

FES Just Climate acts as a think tank about current and coming trends, and a policy advisor in ongoing debates. We support FES offices and their partners in shaping the industrial revolution of our times.

This infographic was written and designed by Clara Dassonville and Thies Siemen. It is part of our **Nuclear Energy Series: Energizing the Debate**. It includes a mapping of nuclear energy in the OSCE region, the pros and cons of nuclear energy, as well as arguments for the debate.

Friedrich-Ebert-Stiftung Competence Centre for Climate and Social Justice

Rue du Taciturne 38
BE-1000 Brussels
Belgium

+32 22 34 62 90
justclimate@fes.de