

Nucleareurope response to the Public Consultation:

European climate resilience and risk management – integrated framework

The European nuclear industry has already undertaken several measures to assess its exposure to climate events and to implement measures to minimise the risks. In terms of the different climatic events which could affect European nuclear facilities, these include the following:

- Water temperature (High temperatures, Ice deposition due to sub-cooled water, Ice packing)
- Air (High and low temperatures, wind including storms, tornados, and missile generation due to wind)
- Flooding (High sea level - low pressure in combination with storm)
- Precipitation (rain, snow, ice storm)
- Thunder strikes
- Flooding (Tsunamis, dam breaks)
- Fires (Wildfire)

Given the increasing frequencies of certain weather events due to climate change, and their potential impact on nuclear facilities, this is an issue which the industry is paying close attention to and in many instances, measures are already being implemented.

In general, due to the robustness of construction and as a consequence of the high level of safety required, nuclear power plants are highly resilient to climate-related challenges. The nuclear power sector is well adapted to meet extreme weather events

Hungarian example: In summer, when the water temperature of the Danube exceeds 25°C, and water yield is low, it may be necessary to implement additional cooling strategies to comply with the 30°C temperature limit value specified in accordance with the legislation (which states that the temperature of the recipient water measured anywhere in a section 500 meters downstream of the point of discharge from a nuclear power plant must not exceed 30°C). In such cases, operators may temporarily reduce output as a precautionary measure — a well-established and manageable operational response that preserves compliance and environmental integrity.

Nordic example: A 2021 report entitled 'The Impact of Climate Change on Nuclear Power'¹ confirmed that Swedish and Finnish coastal nuclear power plants are highly resilient to climate-related

¹ <https://energiforsk.se/media/29651/the-impact-of-climate-change-on-nuclear-power-energiforskrappport-2021-744.pdf>



challenges. According to the report “This robustness is a consequence of the high level of safety in the nuclear power sector which is adapted to meet extreme events including also extreme weather events. These safety margins are considered to be essentially sufficient to handle also a changing climate. The recent investments in independent core cooling have further strengthened the resilience to future extreme weather events”. While the report acknowledges minor impacts on efficiency under certain conditions — such as warmer sea temperatures — it concludes that the overall impact on annual electricity production is negligible. Moreover, the long-term effects of sea level rise are not expected to require additional preventive measures before the end of the century.

French example: Since 2000 in France, nuclear production losses for environmental reasons (regulatory limits for water temperature or flow rate) have represented on average less than 0.3% of the annual production of the nuclear fleet and is estimated at 1.5% in 2050 on average. Although losses of production due to compliance with these environmental regulatory limits remain marginal, studies are ongoing to better address the question of water uses in nuclear facilities through a dedicated climate change adaptation plan.

At the same time, it should be noted that it is technically feasible to adapt nuclear power plants in the event of more recurrent drought/water scarcity issues - see for example the US Palo Verde NPP located in the Arizona desert which uses treated wastewater.

Beyond adaptation, climate change mitigation actions such as net zero electricity generation and an increase of the use of electricity in final energy demand (in transport, building and industry) should remain high on the EU agenda to minimise the impacts of climate change. We therefore call for an ambitious European electrification strategy based on a technology-neutral approach.