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SNETP Forum

# EURAD-2 Work Package 11 CLIMATE: Analysis of the impact of climate change on Nuclear Waste Management

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## *Introduction*

CLIMATE: *Impact of Climate Change on Nuclear Waste Management* Work Package (WP), part of the European Partnership on Radioactive Waste Management (RWM), 2024-2029 (EURAD-2), is a Strategic Study that started in October 2024.

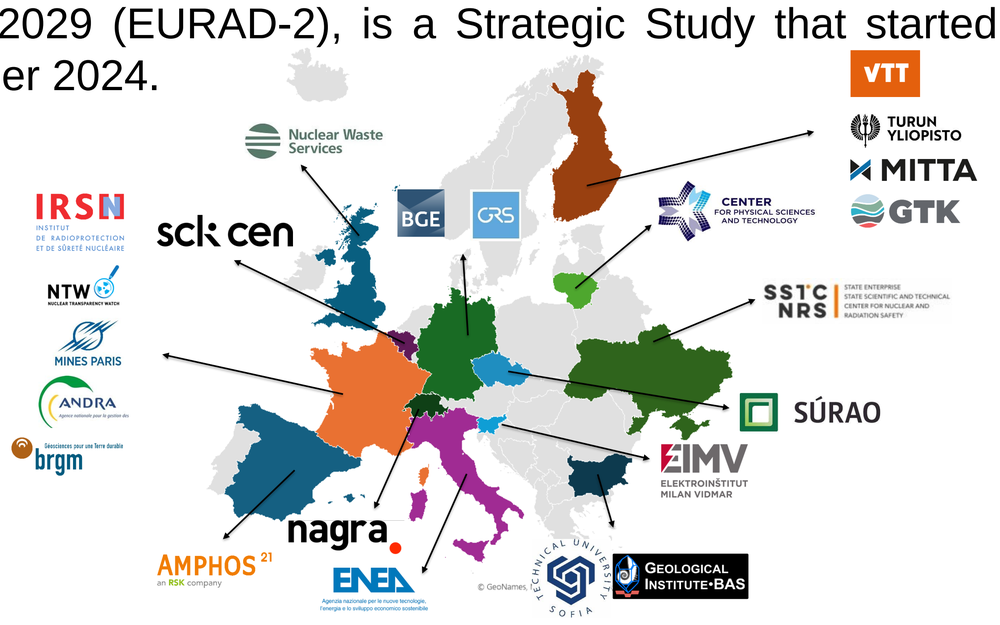


*Figure 1. EURAD-2 WP11 CLIMATE partners.*

## *Objectives and goals of the WP*

•To identify knowledge gaps and provide recommendations for the assessment of the impacts of climate change on the RWM facilities across Europe over their lifetime.

•To analyze the existing regulatory and institutional frameworks on climate change impacts on RWM facilities, offering recommendations for the future.

•To foster collaboration with civil society and stakeholders and emphasising the importance of transparent communication.

## *Description of the project rationale*

The increasing frequency of extreme climate events due to climate change, such as storms and floods, threatens radioactive waste storage and transportation, requiring accurate assessment of their effects on nuclear safety. Uncertainty in climate projections over decades, centuries, millenia, and even geological timescales, complicates the design of safe infrastructure and additional preventive

## *Methodology*

The risk assessment methodology to improve the resilience of facilities in the design, operation and post-closure phases consists of:

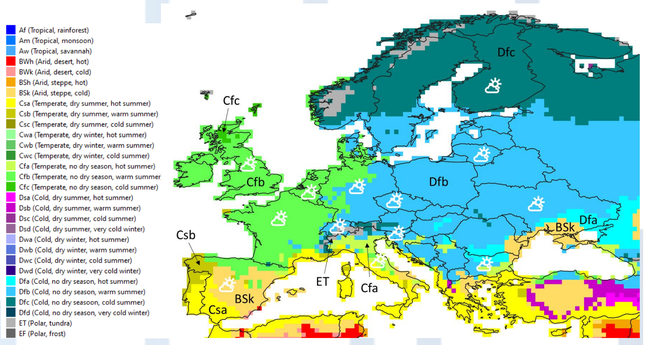


*Figure 2. Current climate map of Europe. Beck, H. et al., Present and future Köppen-Geiger climate classification maps at 1-km resolution, Nature Scientific Data 5, 2018.*

•*Short-term assessment:* study climate scenarios across European climate zones to evaluate the impacts of climate change on the construction and operational RWM phases.

- *Long-term climate risks*: changes in thermal conditions, geomorphological evolution, and hydrogeological shifts should be evaluated, since they could compromise the integrity of radioactive waste repositories over time in the post-closure phase.

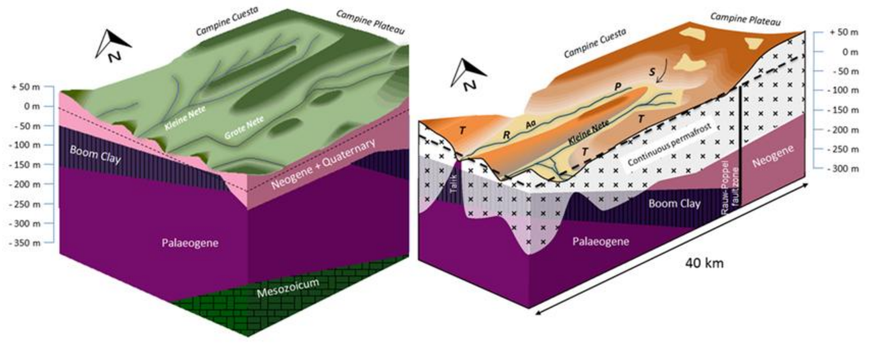


*Figure 3. Local and regional geomorphological evolution. SCK CEN External Report 184, 2012.*

This Strategic Study explores natural analogues that represent future climate conditions to improve safety assessments for the long-term containment of radioactive materials (e.g., natural analogues can help to understand how glaciation may affect the repository performance).

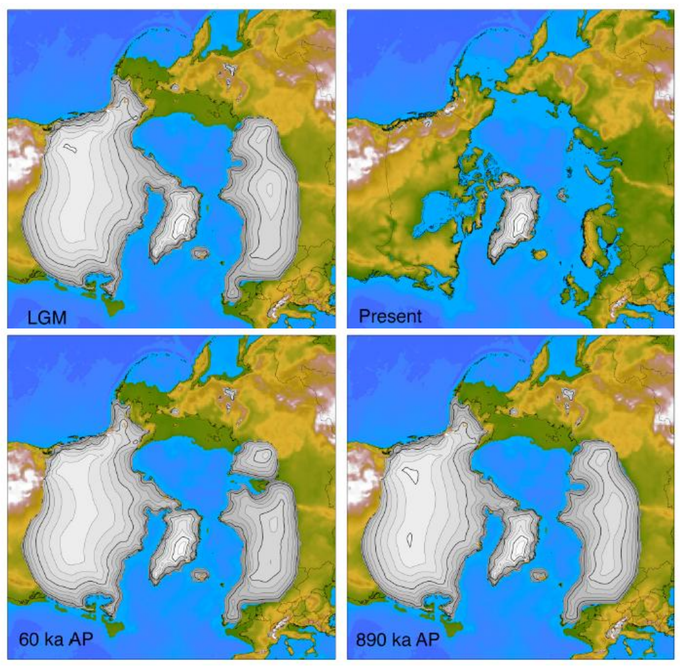


*Figure 4. Future ice sheets in Europe. Huybrechts, 2010, VUB Report 10/01.*

## *Results*

By 2026, the WP CLIMATE will deliver:

- A White Paper on the impact of climate change on nuclear waste management analyzing gaps and providing recommendations for future actions.
- A Synthesis Report, consolidating data on climate scenarios, facility profiles, and risk assessment methodologies.
- An Outcomes to Member States, identifying the challenges for the WP and the next actions to deliver.

## *Conclusions*

The documents generated will provide valuable recommendations to policymakers, regulators, and the scientific community, contributing to the development of safety-oriented and effective strategies for radioactive waste management in the context of short-term (decades and centuries) and long-term (millennia and longer) climate change.

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