ANALYSIS OF THE IMPACT OF CLIMATE CHANGE ON NUCLEAR WASTE MANAGEMENT

SAINZ-GARCÍA, ALVARO M. [(1)*]; BEERTEN, KOEN [(2)]; Geisler-Roblin, Alexis [(3)]; Montoya, Vanessa [(2)]; PARK, JIN BEAK [(4)]; Peti, Leonie [(5)]; Strusińska-Correia, Agnieszka [(5)]; VAN ZWEEL, NICOLAUS [(4)]; VERCELLI, MAIA [(1)]

[(1)] Amphos 21 Consulting S.L., calle Venezuela 103-2º1ª, 08019, Barcelona, Spain
[(2)] SCK CEN Waste & Disposal, Boeretang 200, 2400, Mol, Belgium
[(3)] Nuclear Transparency Watch, 38 rue Saint-Sabin, 75011 Paris, France
[(4)] VTT Technical Research Centre of Finland, 02150 Espoo, Finland
[(5)] Bundesgesellschaft für Endlagerung mbH (BGE), Eschenstraße 55, 31224, Peine, Germany

** Corresponding author email: alvaro.sainz@amphos21.com*

The "CLIMATE: Impact of Climate Change on Nuclear Waste Management" Work Package (WP), part of the European Partnership on Radioactive Waste Management, 2024-2029 (EURAD-2), is a Strategic Study that started in October 2024.
The primary ambition is to identify knowledge gaps and provide recommendations for the assessment of the impacts of climate change on the radioactive waste management (RWM) facilities across Europe over the lifetime of the facility (i.e. construction, operation and post-closure). A secondary goal of CLIMATE is to conduct analyse the existing regulatory and institutional frameworks on climate change impacts on RWM facilities, offering recommendations for future development. Finally, CLIMATE aims to foster collaboration with civil society and stakeholders, by integrating societal concerns and insights into the development of climate resilience strategies for nuclear waste management and emphasising the importance of transparent communication and stakeholder involvement in the research process.
The short-term assessment will focus on the impacts of climate change on the construction and operational RWM phases evaluating climate scenarios across diverse European climate zones. As for the post-closure phase, the WP CLIMATE investigates long-term climate risks, such as changes in thermal conditions, geomorphological evolution, and hydrogeological shifts, which could compromise the integrity of radioactive waste repositories over time. Furthermore, this Strategic Study will explore 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). The goal is to develop robust risk assessment methodologies to improve the resilience of these facilities in the design, operation and post-closure phases.
By 2026, the WP CLIMATE will deliver a White Paper – analysing gaps and providing recommendations on the analysis of the impact of climate change on nuclear waste management across Europe – and a Synthesis Report – consolidating data on climate scenarios, facility profiles, and risk assessment methodologies. These documents 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 (millenia and longer) climate change.

010_abstract_final