

## Factsheet



**ACRONYM** APAL

**FULL TITLE** Advanced PTS Analysis for LTO

**PROGRAMME** Horizon 2020/NFRP-2019-2020

**CONTRACT NUMBER** 945253

**ABSTRACT** In the EU, most of the nuclear power plants (NPPs) are currently in the second half of their designed lifetime, making lifetime extension an important aspect for the EU countries. One of the most limiting safety assessments for long term operation (LTO) is the reactor pressure vessel (RPV) integrity assessment for pressurized thermal shock (PTS). The goal is to demonstrate the safety margin against fast fracture initiation or RPV failure. To verify safe operation of existing NPPs going through LTO upgrades, advanced methods and improvements are necessary.

In the EU, currently used PTS analyses are based on deterministic assessment and conservative boundary conditions.

This type of PTS analyses is reaching its limits in demonstrating the safety for NPPs facing LTO and need to be enhanced. However, inherent safety margins exist and several LTO improvements and advanced methods are intended to increase the safety margins of PTS analysis. Additionally, the quantification of safety margins in terms of risk of

RPV failure by advanced probabilistic assessments becomes more important.

The main objectives of this project are establishing of state-of-the-art for LTO improvements having an impact on

PTS analysis: NPP improvements (hardware, software, procedures), development of advanced deterministic and probabilistic PTS assessment method including thermal hydraulic (TH) uncertainty analyses, quantification of safety margins for LTO improvements and development of best-practice guidance.

After establishing the LTO improvements, TH calculations will be performed including also uncertainty quantification relevant to PTS assessment. Benchmark calculations for both deterministic and probabilistic RPV integrity assessment will be performed with the goal to establish the impact of LTO improvements and TH uncertainties on the overall RPV integrity margins.

**DURATION** 48 months (01/10/2020 - 30/09/2024)

**PROJECT FUNDING** 3 999 090.00€

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