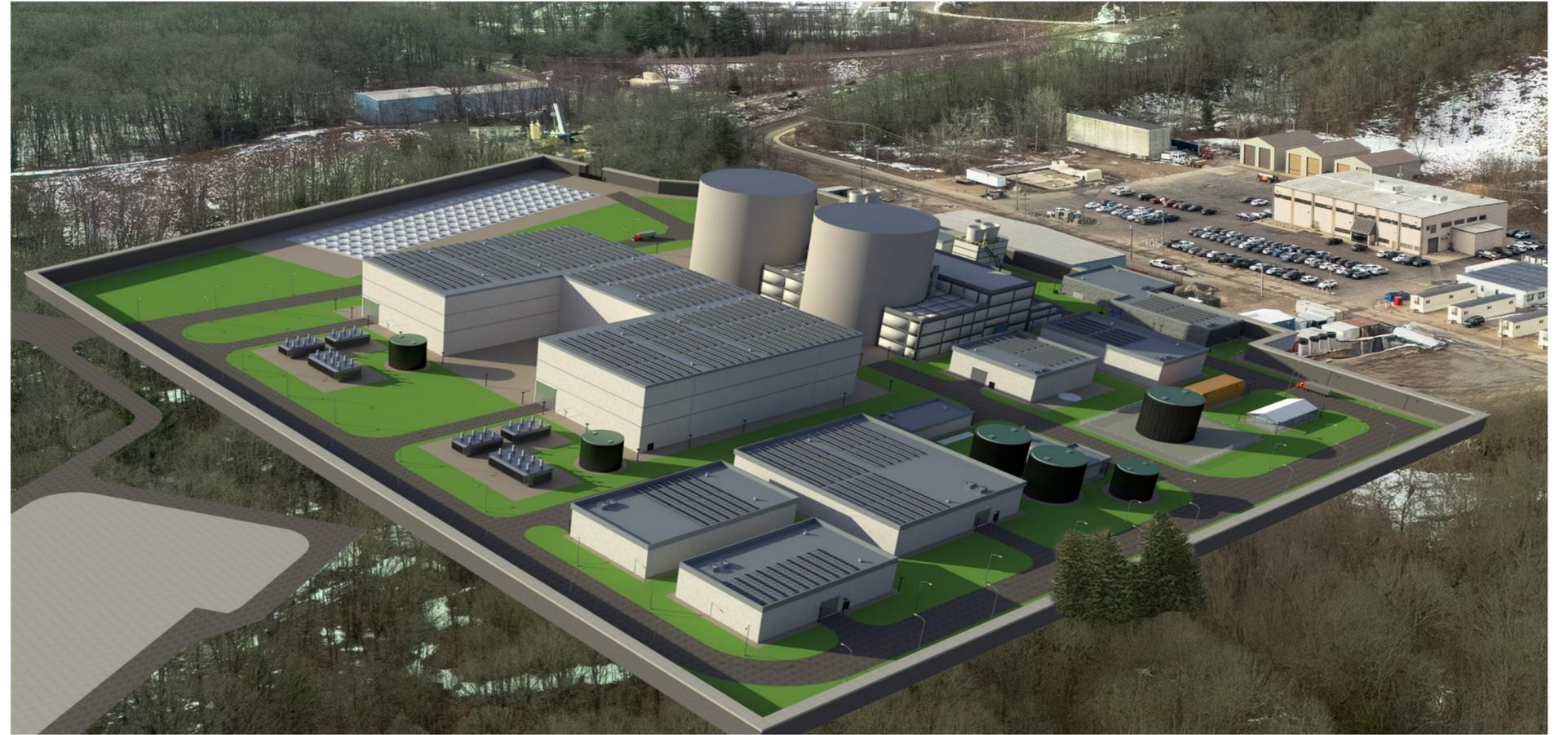# SMR-300 I&C Architecture Topical Report Overview

September 4, 2025

Holtec's SMR-300 Technology

Safe, Secure, Reliable, Flexible, Economical

Clean Energy to Support the World's Energy Needs

Agenda

- Purpose of Meeting
- SMR-300 I&C Architecture Background
- Topical Report Division of Responsibility
- Licensing Strategy and Applicable Regulatory Guidance
- Topical Report Scope and Objective
- Submittal and Review Schedule
- Q&A

Acronyms

- D3 — Diversity and Defense in Depth
- DSRS — Design-Specific Review Standard
- ESF — Engineered Safety Feature
- I&C — Instrumentation and Control
- LTR — Licensing Topical Report
- MELCO — Mitsubishi Electric Corporation
- MELTAC — Mitsubishi Electric Total Advanced Control
- PSS — Plant Safety System
- RT — Reactor Trip
- SE — Safety Evaluation

Purpose of Meeting

- To provide an overview of the LTR scope and objectives. The LTR will describe:
  - ✓ I&C architecture used on the SMR-300 design
  - ✓ Compliance to applicable regulation
  - ✓ LTR is generic and not site-specific
- Alignment on LTR submittal and review timeline

SMR-300 I&C Architecture Background

- **Previous pre-application regulatory engagements include:**
  - ✓ I&C Hazard Analysis Methodology, *Feb 2023*
    - ▪ ML23019A004
  - ✓ I&C D3 Evaluations, *July 2023*
    - ▪ ML23156A182
  - ✓ I&C ISG-04 Conformance Analysis, *Aug 2023*
    - ▪ ML23289A099
  - ✓ I&C Two Division Design Conformance to IEEE 603, *Sept 2023*
    - ▪ ML23296A001
  - ✓ SMR-300 Cyber Security Strategy, *Aug 2024*
    - ▪ ML24262A002

SMR-300 I&C Architecture Background

- The SMR-300 I&C systems are based on digital platforms developed by MELCO.
    - MELCO received a SE for their MELTAC Platform LTR in 2018 (ML18260A211).
    - MELCO is expected to receive a SE for a revision to the MELTAC Platform LTR in 2025 (ML23167C168).
    - MELTAC Platform LTR covers the platform design and not the application use case for the SMR-300.

Topical Report Division of Responsibility

Licensing Strategy and Applicable Regulatory Guidance
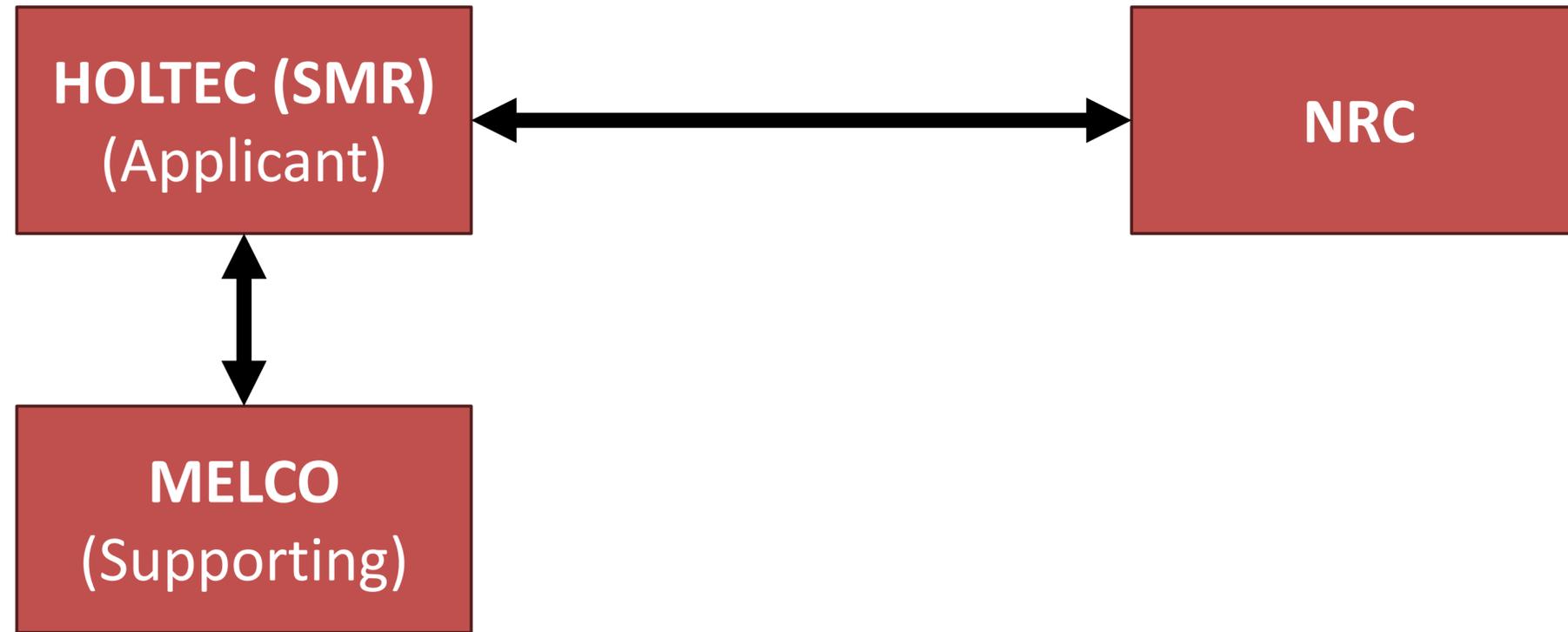
- **SMR-300 is following 10 CFR Part 50.**
  - ✔ LTR will list applicable regulations and demonstrate compliance
  - ✔ No exemptions are being sought for the I&C architecture design
- **DNRL-ISG-2022-01 Appendix A provides guidance for I&C content related to Part 50 construction permit applications.**
  - ✔ The SMR-300 I&C design will follow the guidance in DSRS Ch. 7.
    - Unified framework that emphasizes fundamental I&C design principles:
      - Independence
      - Redundancy
      - Predictability and Repeatability
      - D3
    - Generic for I&C, focused on digital I&C systems

Topical Report Scope and Objective

- The SMR-300 I&C Architecture LTR will describe the architecture design and configuration of the SMR-300 I&C systems.
  - Focus on the I&C Safety System (PSS) Architecture
  - Non-safety systems are discussed to the extent necessary to demonstrate appropriate compliance with applicable regulatory requirements.

- The objective of this report is to obtain an SE from the NRC concluding that the SMR-300 I&C architecture design is acceptable for reference in future SMR-300 licensing applications.

Topical Report Scope and Objective

- The SMR-300 I&C Architecture LTR builds on the MELTAC Platform LTR.
  - Platform LTR covers topics that can be addressed at a platform level.
    - e.g., design of the communications networks
  - Architecture LTR describes how the platform is applied to SMR-300.
    - Addresses some application-specific action items
  - Architecture LTR will not duplicate or restate design concepts from the Platform LTR.

Topical Report Scope and Objective

- **The major topics of the SMR-300 I&C Architecture LTR include:**
  - ✓ I&C architecture description
    - Two division design
    - Communications between safety and non-safety systems
  - ✓ Evaluation of compliance to 10 CFR 50 requirements
  - ✓ Evaluation of compliance to the fundamental I&C design principles
    - Independence, redundancy, predictability and repeatability, D3
    - Includes evaluation of compliance to IEEE 603 and IEEE 7-4.3.2
- **This LTR is intended to be generic and not site-specific**
  - ✓ Does not cover site-specific protection logic

Topical Report Scope and Objective

- I&C architecture description will include:
  - ✔ Architecture block diagram
  - ✔ Coincidence voting descriptions
  - ✔ Bypass logic
  - ✔ RT and ESF initiation
  - ✔ RT and ESF reset
  - ✔ Prioritization functions

- Evaluation of compliance to the fundamental I&C design principles
  - Independence:
    - RG 1.75 "Criteria for Independence of Electrical Safety Systems"
    - RG 1.152, "Criteria for Programmable Digital Devices in Safety-Related Systems of Nuclear Power Plants"
    - IEEE 603 "Standard Criteria for Safety Systems for Nuclear Power Generating Stations"
    - IEEE 7-4.3.2 "Standard Criteria for Programmable Digital Devices in Safety Systems of Nuclear Power Generating Stations"
  - Redundancy:
    - RG 1.53, "Application of the Single-Failure Criterion to Safety Systems"
    - IEEE 379, "Application of the Single-Failure Criterion to Nuclear Power Generating Station Safety Systems"

Topical Report Scope and Objective

- Evaluation of compliance to the fundamental I&C design principles
  - ✓ Predictability and Repeatability
    - IEEE 603 "Standard Criteria for Safety Systems for Nuclear Power Generating Stations"
  - ✓ Diversity and Defense in Depth:
    - BTP 7-19, "Guidance for Evaluation of Defense in Depth and Diversity to Address Common-Cause Failure due to Latent Design Defects in Digital Safety Systems"
    - NUREG/CR-6303, "Method for Performing Diversity and Defense-in-Depth Analyses of Reactor Protection Systems"
    - RG 1.62, "Manual Initiation of Protective Actions"

Submittal and Review Schedule

- LTR submittal is expected October 2025.
- SMR will request a 12-month review cycle to support Palisades SMR-300 construction permit application timeline.

Questions?

Thank You

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