TES s.r.o.
Pražská 597
Třebíč 674 01
Czech Republic

TES Company Introduction for EMUG 2025

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AGENDA

- Shortly about TES

- Overview of Core Business Areas

- Nuclear Safety Department in TES

- MELCOR and Other Tools in Use

- MELCOR applications in TES

- R&D Projects and International Cooperation

WHO WE ARE

- TES company was established in 1992

- Engineering company providing specialized services for nuclear power industry

- Czech private company, independent from NPP operator

Legend:
- Specialist with University Degree
- Specialist with High School
- Administrative Workers
- Mechanical Workers

7%   3%

30%   60%
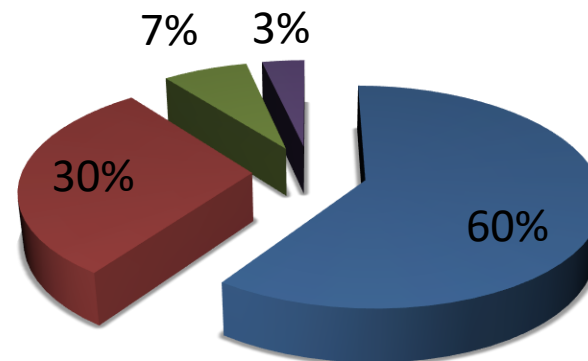
TES COMPANY PREMISES

The company has established workplaces in 3 locations in the Czech Republic:

- Headquarters at Třebíč
- Branch office at NPP Dukovany
- Branch office at NPP Temelin

NPP Dukovany (4 x VVER-440)

NPP Temelín (2 x VVER-1000)

TES CORE BUSINESS

Support of Commissioning and Operation of NPPs

Support of Accident Management and SAR

Monitoring and Diagnostic Systems

Service and Maintenance of NPP Equipment

Support of Nuclear Regulators

Nuclear Safety Department

- Support of plant operator and its suppliers
  - Deterministic Safety Analyses (TH + NK)
  - Validation of AccM procedures
    - EOPs validation on full scale simulator (FSS)
    - SAMGs validation with TSC staff and FSS
  - AccM Setpoints calculation
  - Independent assessment of DSA in SAR (DEC A,B)
  - Periodic Safety Review (SF5: Deterministic safety analysis)
- Technical support of national regulator (SÚJB)
  - Regulatory documentation (Safety Guides,...)
  - Independent reviews

MELCOR and Other Tools in Use

- RELAP5, TRACE, PARCS, Cobra TF, ACAP
  - Licence from U.S. NRC CAMP (Code Applications and Maintenance Program)

- MELCOR
  - Licence from U.S. NRC CSARP (Cooperative Severe Accident Research Program)

- SCALE/TRITON
  - Licence from OECD/NEA Database

- ANSYS Fluent, OpenFOAM, ALTHAM
  - Commercial licences

- In-house scripts (R, Python, Excel, Perl)

MELCOR NPP Input Decks

Extent of MELCOR plant input decks

	Real Plants		
	VVER-440	**VVER-1000**	**APR1400**
MELCOR 2.1	CNT model (DBA and DEC A)	CNT model (DBA and DEC A)	-
MELCOR 2.2	CNT model (DBA and DEC A)	Full plant model (Severe Accidents)	Full plant model (Severe Accidents)

MELCOR Code validation (1)

Validation of MELCOR Code against experimental data

	Experimental Facilities					
	BC-V213 (VVER-440 CNT)	**CVTR** (PWR CNT)	**THAI** (PAR)	**PHEBUS**	**QUENCH**	**CCI**
MELCOR 2.1	LB LOCA SLB	SB LOCA SLB	Hydrogen Recombiner (HR) test	-	-	-
MELCOR 2.2	LB LOCA SLB	SB LOCA SLB	Hydrogen Recombiner (HR) test	FPT-1 test (ISP-46)	QUENCH-06 (ISP-45)	CCI-2 (corium-concrete interactions)
	DBA & DEC A		**DEC B (Severe Accidents)**			

MELCOR Code validation (2)

Validation of MELCOR Code using whole plant models

Facility	Test	Type of validation	Description
VVER-1000	SARNET benchmark	Benchmark to WECHSL	SARNET Severe Accident benchmark focused on MCCI in **VVER-1000** cavity.
APR1400	SLOCA_S157	Benchmark to MAAP5	Severe Accident SB LOCA +LOSIP scenario at **APR1400** unit.
	SGTR_S37	Benchmark to MAAP5	Severe Accident SGTR + LOSIP scenario at **APR1400** unit.
	SBO_S277	Benchmark to MAAP5	Severe Accident SBO scenario at **APR1400** unit.

R&D Projects and International Cooperation

- Cooperation with U.S. NRC in development and validation of codes for nuclear safety, since 2003
  - Code Application and Maintenance Program (CAMP)
  - Cooperative Severe Accident Research Program (CSARP)
- TACIS projects funded by European Commission
  - Branch Diagnostic System
  - Hydrogen Control System
- Examination and improvement of mitigation capabilities and strategies of operating PWRs and an APR series PWR against Design Extension Conditions (2021-2023)
  - Joint research project in cooperation with BUT and South Korean partners (KHNP, FNC, KINGS)
  - RELAP5 and MELCOR models VVER-1000 and APR1400
- Ongoing R&D Project:
  - CANUT II (Center for Advanced Nuclear Technology)

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Thank you
for your attention

www.tes.eu