



OECD Halden Reactor Project

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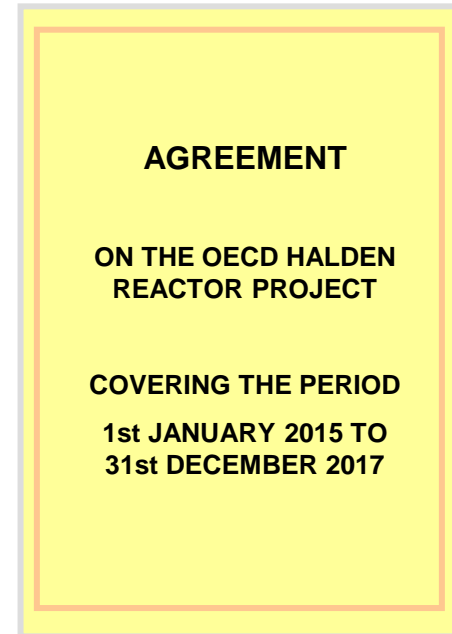


Current and Emerging Methods for Optimising Safety and Efficiency in Nuclear Decommissioning

7-9 February 2017, Sarpsborg, Norway

OECD Halden Reactor Project

- *International collaborative research for the safe and reliable operation of Nuclear Power Plants*
 - Affiliated to the OECD NEA in Paris
 - Performed and managed by the Institute for Energy Technology (IFE) in Norway
- *Governed by the Halden Agreement*
 - First signed in 1958 (renewed every 3 years)
 - 3-year joint research program
 - MTO and Nuclear Fuels & Materials projects
- *Jointly funded by the membership*
 - 20 countries including Norway
 - >100 organizations (utilities, vendors, TSOs, R&D, licensing/regulatory authorities)
 - Budget for 2015-2017 is 431 MNOK (~53 MUSD)
 - Norway contributes 35% of HRP budget



OECD Halden Reactor Project Membership

- **Norway:** IFE Inst. for Energy Technology
- **Belgium:** SCK/CEN Nuclear Research Centre
- **China**
 - **SNERDI** Shanghai Nuclear Engineering R&D Institute
 - **CNPRI** China Nuclear Power Technology Research Inst.
- **Czech Rep:** UJV Rez Nuclear Research Inst.
- **Denmark:** DTU Technical University
- **European Commission JRC:** JRC Karlsruhe
- **Finland:** TYÖ Ministry of Employment & Economy
- **France:**
 - EDF Electricity of France
 - **IRSN** Inst. for Radiological Protection
 - **CEA** Atomic and Alternative Energy Commission
- **Germany:** GRS Global Research for Safety
- **Hungary:** MTA EK Centre for Energy Research
- **Japan**
 - NRA Nuclear Regulation Authority
 - **JAEA** Atomic Energy Agency
 - **CRIEPI** Central Research Inst. of Electric Power Industry
 - **MNF** Mitsubishi Nuclear Fuel
- **Korea:** KAERI Atomic Energy Research Inst.
- **Netherlands:** NRG Nuclear Research and Consultancy Group
- **Russia:** JSC TVEL Fuel Company of ROSATOM
- **Slovakia:** VUJE Nuclear Power Plant Research Inst.
- **Spain:** CIEMAT Centre for Energy Environment and Technology
- **Sweden:** SSM Radiation Safety Authority
- **Switzerland:** ENSI Nuclear Safety Inspectorate
- **United Arab Emirates:** FANR Authority for Nuclear Regulation
- **UK:** NNL National Nuclear Laboratory
- **USA:**
 - NRC Nuclear Regulatory Commission
 - **GNF** Global Nuclear Fuel
 - **Westinghouse** Electric Company
 - **EPRI** Electric Power Research Inst.
 - **DOE** Department of Energy

Most countries have a consortium of organizations represented by a main Signatory to the Agreement

Objectives of the Halden Reactor Project

- The HRP has two main research programs to generate key information for safety and licensing assessments



- **Nuclear Fuels and Materials (F&M)**

- Objective: provide knowledge about the performance of nuclear fuels and materials under normal, transient and accident conditions, with the aim of increasing safety and reliability plus improving the nuclear fuel cycle

- **Man-Technology-Organisation (MTO)**

- Objective: provide knowledge about how and why accidents occur in complex processing facilities, with the aim of contributing to avoidance and mitigation of accidents



IFE's Facilities for Nuclear Fuels and Materials Safety Research

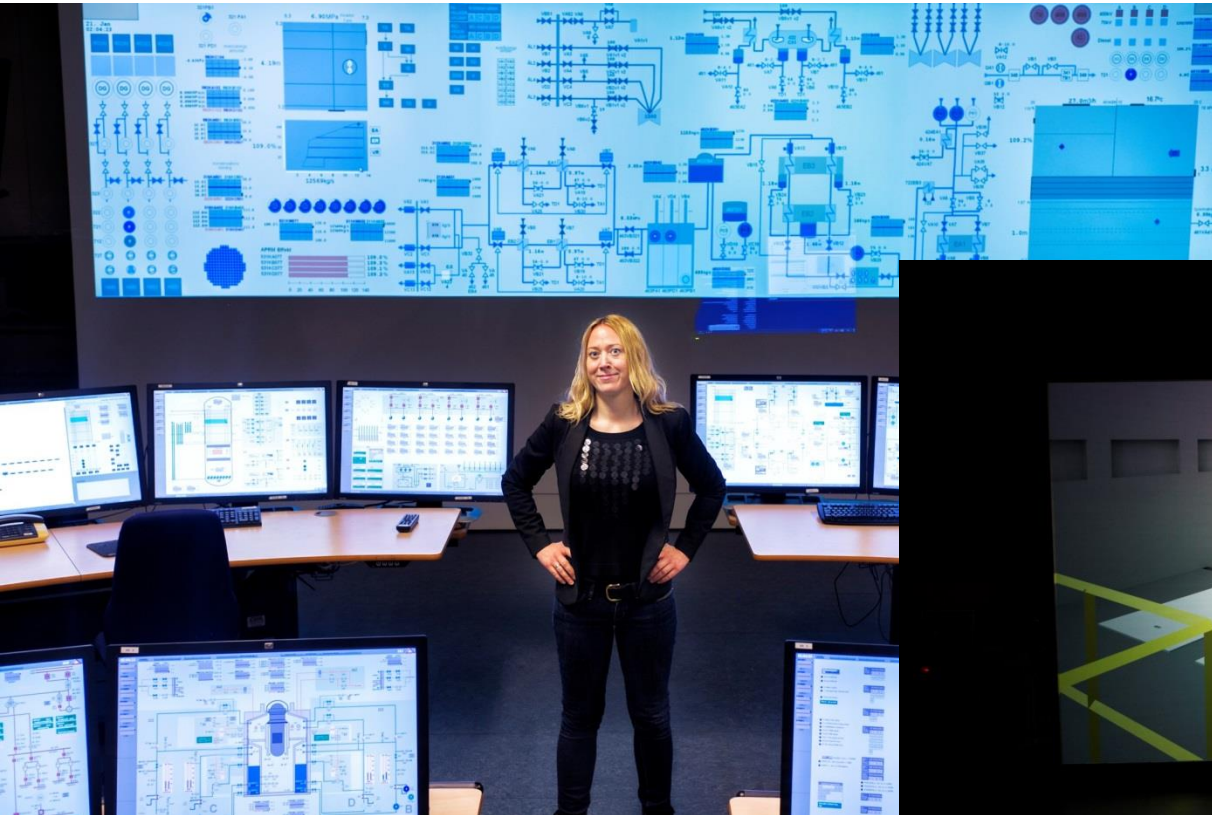
Halden Boiling Water Reactor

Workshops and Chemistry labs

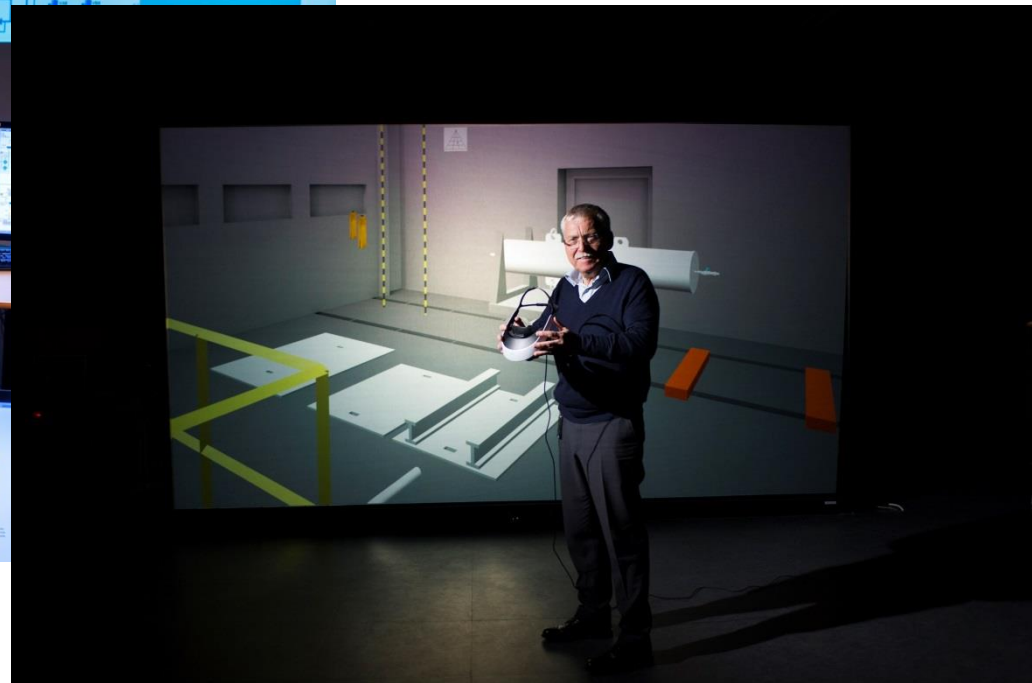


IFE's Facilities for MTO Safety Research

HAMMLAB



VR Centre



Man-Technology-Organisation

Program proposal 2018-2020

Human Factors and Digital Systems research for existing and new reactors

- 1 Operator Reliability
- 2 Severe Accidents and Human Performance
- 3 Safety of Digital Instrumentation and Control Systems
- 4 Control Room Design and Evaluation
- 5 Advanced Reactors
- 6 Plant Operation and Maintenance
- **7 Decommissioning**

Programme Basis (HAMMLAB, VR centre, FutureLab)

Expectation to this workshop

- Workshops are an important instrument for the Halden Project
 - Share experience, knowledge and challenges across member organisations
 - Disseminate Halden Project research
 - **Guide the future research direction of the Project**
- Additional benefit of this workshop
 - Participants from outside Halden member organisations are sharing their experience and challenges, and point to new R&D needs

I wish you all a good workshop !!