

**OECD Nuclear Energy Agency (NEA) and Halden HTO Project**  
**Summer school 2023**  
**Small Modular Reactors**

Fredriksten Fortress, Halden, August 21-24, 2023  
**Tentative Program** (subject to change)

**Summer school Chair: Stine Strand, IFE**

<b>Sunday August 20</b>		
18:00-21:00	<b>Getting acquainted, evening barbeque</b>	
<b>Monday August 21</b>		
09:00-09:10	<b>Welcome</b>	<b>Tomas Nordlander, IFE</b>
09:10-10:00	<b>Overview of the OECD Nuclear Energy Agency (NEA) role and functions in nuclear safety</b> <ul style="list-style-type: none"> <li>• Efforts and developments on SMRs and advanced reactors</li> </ul>	<b>Veronique Rouyer, OECD NEA</b>
10:00-10:30	<b>Introduction to the Halden HTO program, focus on SMRs, multi-unit and automation</b>	<b>Andreas Bye/ Sizarta Sarshar, IFE</b>
10:30-10:45	<b>Coffee</b>	
10:45-12:00	<b>Small Modular Reactors – an overview</b>	<b>Rob McDonald, IFE</b>
12:00-13:00	<b>Lunch</b>	
13:00-16:00 (Coffee 14:30-14:45)	<b>“Part 53” – Risk Informed, Technology-Inclusive Regulatory Framework for Advanced Reactors</b> <ul style="list-style-type: none"> <li>• Why a new regulatory framework is needed</li> <li>• The Part 53 approach toward being technology inclusive</li> <li>• Part 53 requirements as they apply to the role of personnel and human-system integration</li> <li>• Guidance for scalable HFE reviews, staffing, and operator licensing</li> <li>• Research to address knowledge gaps – current initiatives and future plans</li> </ul>	<b>Dave Desaulniers, U.S. NRC</b>

16:00-17:00	<p><b>Panel session:</b></p> <p><b>Key takeaways from today's sessions: Implications for boundaries for the human role and requirements for human actions</b></p> <ul style="list-style-type: none"> <li>• First 30 minutes summaries by today's speakers</li> <li>• Next 30 minutes takeaways from other speakers and the attendants</li> </ul>	<p><b>Chair:</b> S. Sarshar  <b>All Speakers:</b>  V. Rouyer  D. Desaulniers  K. Priestman  R. Flamand  J. Oncken  R. Boring  T. Ulrich  R. McDonald  C. Blackett  A. Bye</p>
<b>Tuesday August 22</b>		
09:00-12:00  (Coffee 10:30-10:45)	<p><b>The design and concept of operation of the GE Hitachi SMR</b></p> <ul style="list-style-type: none"> <li>• Technical design</li> <li>• Passive safety features</li> <li>• Concept of operations including control room design, crew roles and staffing</li> <li>• Human role in operations</li> <li>• HFE-beneficial technologies versus cost challenges</li> </ul>	<p><b>Karen Priestman,  GE Hitachi</b></p>
12:00-13:00	<b>Lunch</b>	
13:00-16:00  (Coffee 14:30-14:45)	<p><b>The design and concept of operation of the NuScale SMR</b></p> <ul style="list-style-type: none"> <li>• Technical design</li> <li>• Passive safety features</li> <li>• Concept of operations including control room design, crew roles and staffing</li> <li>• Human role in operations</li> </ul>	<p><b>Ryan Flamand,  NuScale</b></p>
16:00-17:00	<p><b>Panel session:</b></p> <p><b>Key takeaways from today's sessions: Implications for boundaries for the human role and requirements for human actions</b></p> <ul style="list-style-type: none"> <li>• First 30 minutes summaries by today's speakers</li> <li>• Next 30 minutes takeaways from other speakers and the attendants</li> </ul>	<p><b>Chair:</b> S. Sarshar  <b>All Speakers:</b>  K. Priestman  R. Flamand  D. Desaulniers  J. Oncken  R. Boring  T. Ulrich  R. McDonald  C. Blackett  A. Bye</p>
17:30-	<b>Social event, dinner</b>	

Wednesday August 23		
<p><b>09:00-12:30</b></p> <p>(Coffee 10:30-10:45)</p>	<p><b>Microreactors</b></p> <p><b>Overview of fission batteries and microreactors</b></p> <ul style="list-style-type: none"> <li>• Examples from DoE and DoD microreactors under development at INL</li> <li>• Uses of reactors of different scales.</li> <li>• Attended vs. unattended operations.</li> <li>• Use of digital twins to support operations.</li> </ul> <p><b>Human factors considerations for microreactors</b></p> <ul style="list-style-type: none"> <li>• Early evaluations of concepts of operations</li> <li>• Using prototyping tools and Wizard of Oz techniques to design and evaluate</li> <li>• Consideration of HRA for emerging designs</li> </ul> <p><b>Human factors for remote operations</b></p> <ul style="list-style-type: none"> <li>• Visualization for automation</li> <li>• Walkthrough of example pilot study using Rancor simulator</li> </ul>	<p><b>Joe Oncken, INL</b></p> <p><b>Ron Boring, INL</b></p> <p><b>Tom Ulrich, INL</b></p>
<b>12:30-13:20</b>	<b>Lunch</b>	
<b>13:20</b>	<b>Bus to Os Alle 7, HTO-labs</b>	
<p><b>13:30-16:00</b></p> <p>(Coffee 14:30-14:45)</p>	<p><b>Multi-unit challenges and possible solutions</b></p> <ul style="list-style-type: none"> <li>• Overview</li> <li>• Lab exercises in HAMMLAB</li> </ul>	<p><b>Claire Blackett, Rob McDonald, IFE</b></p>
<b>16:00-17:00</b>	<p><b>Panel session:</b></p> <p><b>Key takeaways from todays' sessions: Implications for boundaries for the human role and requirements for human actions</b></p> <ul style="list-style-type: none"> <li>• First 30 minutes summaries by today's speakers</li> <li>• Next 30 minutes takeaways from other speakers and the attendants</li> </ul>	<p><b>Chair:</b> S. Sarshar  <b>All Speakers:</b>            J. Oncken            R. Boring            T. Ulrich            R. McDonald            C. Blackett            D. Desaulniers            K. Priestman            R. Flamand            A. Bye</p>

Thursday August 24		
<p><b>09:00-11:30</b></p> <p>(Coffee 10:30-10:45)</p>	<p><b>The design and concept of operation of the eVinci micro reactor, Gen IV technologies</b></p> <ul style="list-style-type: none"> <li>• Technical design</li> <li>• Safety features</li> <li>• Fuel cycle including waste reduction</li> <li>• Human role in operations and human factors implications</li> <li>• Concept of operations</li> </ul>	<p><b>Adana Stanish, Westinghouse</b></p>
<p><b>11:30-12:30</b></p>	<p><b>Summary session:</b></p> <p><b>Key takeaways from the summer school: Implications for boundaries for the human role and requirements for human actions</b></p>	<p><b>S. Sarshar / A. Bye</b></p>
<p><b>12:30</b></p>	<p><b>Adjourn and Lunch</b></p>	