

# **Joint ICTP-IAEA VIRTUAL Course on Nuclear–Renewable Integrated Energy Systems: *Phenomenology, Research and Development***

**4-8 October 2021**

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## **Time Zones**

<b>Country</b>	<b>Time Difference</b>	<b>Course Time</b>
USA (Denver) USA (Idaho Falls)	–8 hours	04:00 – 09:30
Canada (Oshawa)	–6 hours	06:00 – 11:30
Austria (Vienna) Italy (Milan)	-/-	12:00 – 17:30
Pakistan (Islamabad)	+3 hours	15:00 – 20:30

# AGENDA

Time	Monday 4 October	Tuesday 5 October	Time	Wednesday 6 October	Thursday 7 October	Friday 8 October
11:40	Participants Joining the Course Welcoming Videos					
12:00	Opening Remarks <ul style="list-style-type: none"> <li>IAEA</li> <li>ICTP</li> </ul>	Introduction of Today's Speakers (via videos)	12:00	Introduction of Today's Speakers (via videos)	Introduction of Today's Speakers (via videos)	Introduction of Today's Speakers (via videos)
12:10	Course Logistics and Expectations (IAEA)					
12:20	Introduction of Course Organizers and Today's Speakers (via videos)	Advanced Reactors in a Variable Renewable Energy Mix <i>Mr H. ur Rehman (IAEA/NENP)</i>	12:10	Overview of the IAEA PRIS Database <i>Ms Marta Gospodarczyk (IAEA/NPES)</i>	Case Study 1: Integration of Nuclear and Renewable in Existing and Future Power Systems: The new IAEA FRAMES model <i>Mr F. Ganda (IAEA/INPRO)</i>	Techno-Economic Analyses and Interactive Exercises <i>Mr S. Dardour (IAEA/NEPIK)</i>
12:30	What are the Nuclear–Renewable Integrated Energy Systems? <i>Ms S. Bragg-Sitton (INL, USA)</i>					
13:15	Nuclear Power Technology Classification and Relevant Examples <i>Mr H. ur Rehman (IAEA/NENP)</i>	Physics of SMRs of Relevance to Nuclear–Renewable Integrated Energy Systems <i>Mr H. Subki (IAEA/NENP)</i>	13:00	Overview of Process Heat Application and Energy Storage Systems <i>Mr. K. Qureshi (PIEAS, Pakistan)</i>	Case Study 2: Nuclear-Renewable Integrated System for Marine Ships <i>Mr H. Gaber (OTU, Canada)</i>	

Time	4 October	5 October	6 October	7 October	8 October
13:45	Renewable Technologies and Relevant Examples <i>Mr M. Ruth (NREL, USA)</i>	IAEA Relevant Activities <i>Ms T. Jevremovic (IAEA/NENP)</i>	Nuclear – Renewable Tightly Coupling Scenarios with Examples <i>Ms S. Bragg-Sitton (INL, USA)</i>	Case Study 3: Hybridizing Nuclear Energy Systems in the U.S. <i>Mr M. Ruth (NREL, USA)</i>	Engineering-Operation Aspects of Loosely Coupled Nuclear–Renewable Integrated Energy Systems Utilizing Currently Operating NPPs <i>Mr E. Bradley (IAEA/NPES)</i>
14:30	<b>BREAK and Group Photo DAY 1</b> Video A	<b>BREAK and Group Photo DAY 2</b> Video B	<b>BREAK and Group Photo DAY 3</b> Video C	<b>BREAK and Group Photo DAY 4</b> Video D	<b>BREAK and Group Photo DAY 5</b> Video E
15:00	Opportunities and Challenges for Nuclear-Renewable Hybrid Energy Systems <i>Mr M. Ruth (NREL, USA)</i>	Nuclear – Renewable Coupling Scenarios: Introduction <i>Ms S. Bragg-Sitton (INL, USA)</i>	Nuclear – Renewable Loosely Coupling Scenarios with Examples <i>Mr H. Gaber (OTU, Canada)</i>	Case Study 4: Investigation of SMR based tightly coupled Hybrid Energy System for Effective Load-Dynamics <i>Mr. K. Qureshi (PIEAS, Pakistan)</i>	<b>Q &amp; A</b> <b>Moderators:</b> <b>Mr R. El-Emam (Canada)</b> <b>Mr H. ur Rehman (IAEA/NENP)</b>
15:15					<b>3 Best Essays – Announcement, Introductory Videos, Presentations and Q&amp;A</b> <b>Moderators:</b> <b>Mr R. El-Emam (OTU, Canada)</b> <b>Mr H. ur Rehman (IAEA/NENP)</b>
16:00	<b>Q &amp; A</b> <b>Moderators:</b> <b>Mr R. El-Emam (Canada)</b> <b>Mr. K. Qureshi (Pakistan)</b>	<b>Q &amp; A</b> <b>Moderators:</b> <b>Ms S. Bragg-Sitton (USA)</b> <b>Mr H. ur Rehman (IAEA)</b>	<b>Q &amp; A</b> <b>Moderators:</b> <b>Ms T. Jevremovic (IAEA)</b> <b>Mr H. Subki (IAEA)</b>	<b>Q &amp; A</b> <b>Moderators:</b> <b>Mr R. El-Emam (Canada)</b> <b>Mr M. Ruth (USA)</b>	
16:30	<b>Interactive Hands-on #1</b> <i>IAEA Hybrid Energy Systems eLearning module</i> <i>Mr H. ur Rehman (IAEA/NENP)</i>	<b>Interactive Hands-on #2</b> <i>The INL Dynamic Physical Models to Support Integrated Energy System Analysis and Optimization</i> <i>Mr K. Frick (INL, USA)</i>	<b>Interactive Hands-on #3</b> <i>PIEAS Hybrid Energy Systems simulators</i> <i>Mr. K. Qureshi (PIEAS, Pakistan)</i>	<b>Interactive Hands-on #4</b> <i>Hydrogen – production, utilization and storage</i> <i>Mr R. El-Emam (OTU, Canada)</i>	Closing Remarks <b>Mr H. Subki (IAEA/NENP)</b> <b>Mr H. ur Rehman (IAEA/NENP)</b> <b>Ms T. Jevremovic (IAEA/NENP)</b>
17:30	Adjourn DAY 1	Adjourn DAY 2	Adjourn DAY 3	Adjourn DAY 4	Adjourn

