



PROGRAMME

-Virtual part-

Thursday, 31 August 2023

14:00–14:15	RES Summer School opening Assist. Prof. Brigita Ferčec, PhD, head of the RES Summer School Full Prof. Sebastijan Seme, PhD, dean of Faculty of Energy Technology, University of Maribor
14:15–14:30	Introduction of Faculty of Energy Technology, University of Maribor Assist. Prof. Brigita Ferčec, PhD Simon Simčič, student
14:30–16:00	Lecture 1: The role of renewables in the power grid and how to live with them Full Prof. Peter Bracinik, PhD, University of Žilina, Slovakia

Friday, 1 September 2023

10:00–10:05	Introductory greeting Full Prof. Bojan Štumberger, PhD, vice dean of research at the Faculty of Energy Technology, University of Maribor
10:05–12:00	Lecture 2: Integration of renewable energy sources via low-cost demand-driven solutions in energy systems Assist. Prof. Péter Bajor, PhD, (University of Dunaújváros, Hungary) Lecture 3: The possible roles of electric vehicles in balancing power systems

	Assist. Prof. Péter Bajor, PhD, (University of Dunaújváros, Hungary)
12:00–13:00	Lunch break
13:00–16:00	Lecture 4: Geothermal Energy Full prof. Jurij Avsec, PhD, Faculty of Energy Technology, UM Urška Novosel, Teaching assistant, Faculty of Energy Technology, University of Maribor

-Abstracts-

Lecture 1: The role of renewables in the power grid and how to live with them (Full Prof. Peter Bracinik, PhD)

Abstract: The structure of the European power system has been changing for several years. The geopolitical problems in Europe opened a very strong position for renewable energy sources (RES). They are expected to cover a raising need for the electricity with respect to decarbonisation goals of the EU. The RES technology has undergone an intensive development but it still has some drawbacks that need to be taken into consideration during their implementation to the grid. The task for the future power system engineers is to study them and understand them better in order to ensure reliable and safe electricity transmission and distribution.

Lecture 2: Integration of renewable energy sources via low-cost demand-driven solutions in energy systems (Assist. Prof. Péter Bajor, PhD)

Abstract: While the electrical grid was originally created for lighting needs, the main consumers of the industry today are stationary rotating machines (mainly pumps, fans, compressors, general machinery) as well as electric heaters, boilers, refrigerators, heat pumps and household appliances in our homes. The integration of intermittent and difficult-to-forecast renewable sources is inevitable in ensuring sustainable electricity systems for the future, therefore it is important to understand the evolution of changing energy needs from both the provider and consumer side.

Better management of assets can bring savings for the infrastructure (power generation, transmission and distribution, storage) and the consumer side (companies, organizations, citizens). With emerging trends in zero-emission transport systems, we face new challenges in charging these vehicle fleets with carbon-free electricity – which necessarily requires new types of energy management toolsets and techniques.

Lecture 3: The possible roles of electric vehicles in balancing power systems (Assist. Prof. Péter Bajor, PhD)

Abstract: Related to the ever-changing electric power system requirements, the electric or hydrogen driven vehicles will apply for their energy share in the foreseeable future - it is necessary to provide sustainable, secure and reliable electricity supply during the transition to zero-emission transportation systems. Charging the family car in our home at night or quick-charge the electric truck alongside the road are extremely different consumer actions - which has its specific impact on the balancing of the grid.

The well-established infrastructure development decisions should consider the nature of vehicle flow (passenger cars, public transport and freight), covering data management as well as grid and energy management issues and the available charging time distribution based on the observation of flow. The goal is to be able to allocate the overall battery capacity of our fleets to the grid, and provide additional storage possibilities for better use of power system assets.

Lecture 4: Geothermal energy (Full prof. Jurij Avsec, PhD; Urška Novosel, Teaching assistant)

Abstract: In the distance lecture, students will be presented with the potential of geothermal energy in the world, in Europe, and in Slovenia. Depending on the use of geothermal energy, we divide the use of geothermal energy into low-enthalpy processes (utilization of thermal energy, use of heat pumps ...) and high-enthalpy utilization processes (binary processes). In the presented lecture, we will take a systematic look at the processes. In addition, students will solve some tasks in the field of geothermal energy and perform a laboratory test to determine the COP number in the heat pump. At the end of the lectures, we will also look at examples of practical implementations of devices for the use of geothermal energy.

