SHORT COURSE 3: Utilization of Low- to Medium-Temperature Geothermal Resources – The Icelandic Example

Length: 2 days  
Location: Reykjavik University  
Dates: April 25-26, 2020  
Convenor: Dr. Páll Valdimarsson, pvald ehf engineers  
Other main lecturer: Eng. Thorleifur Jóhannesson, Business Manager, Verkís Eng.

Scope of the course
The short course aims at introducing the successful utilization of low- to medium-temperature geothermal resources in Iceland, which is an important pillar for the good living conditions in Iceland today. Thermodynamics are introduced and source temperature dependent utilization. Design of the different types of utilization discussed through thermal calculations and design, including district heating, geothermal baths, agri- and aquaculture, drying, heat pumps for heating and cooling, etc. Binary power production from low-temperature waters is discussed, economics and cascaded use.

Course outline:
April 25
Introduction 08:00-09:00 Registration and coffee  
09:00-09:30 Aim of SC, organization and practical matters  
09:30-10:00 Source temperature dependent utilization  
Wells and pumps 10:00-10:30 Geothermal low-temperature wells and pumps  
10:30-11:00 Coffee/tea break  
District heating 11:00-11:30 Design of geothermal district heating systems  
11:30-12:00 Economics and operation of district heating systems  
12:00-12:30 Space heating – building installations  
12:30-13:30 Lunch  
Mathematics and numerics 13:30-14:30 Scilab and Coolprop for thermal calculations  
14:30-15:30 Weather data analysis exercise  
15:30-16:00 Coffee/Tea break  
16:00-17:00 District heating system design exercise  
April 26
Other direct use 09:00-09:30 Geothermal baths, swimming pools and spas  
09:30-10:00 Geothermal energy and agri- and aquaculture  
10:00-10:30 Drying and industrial use of geothermal energy  
10:30-11:00 Coffee/tea break  
11:00-11:30 Heat pump systems – for heating or cooling  
Power from low temperature 11:30-12:00 Design and selection of binary power plants  
12:00-12:30 Thermoconomics, exergy and efficiency  
12:30-13:30 Lunch  
Mathematic and numerics 13:30-14:15 Heat loss calculation exercise (pipe, greenhouse, aquaculture pond, swimming pool)  
14:15-15:00 Candy dryer design exercise  
15:00-15:30 Thermoeconomic analysis exercise  
15:30-16:00 Coffee/Tea break  
16:00-17:00 Closing and final discussion