Experimental Characterization of Two Large-scale Latent Heat Thermal Energy Storage Prototypes

1. Background
Latent heat thermal energy storage (LHTES) has been regarded as a heat storage solution with high storage density and small temperature swings. Within the scope of a Horizon2020 EU Project, PUMPHEAT (https://www.pumpheat.eu/), two new large-scale LHTES prototypes with innovative designs are being built at KTH Energy Technology Department for validating the concepts of latent heat storage. The design objectives of the storage units are to store surplus heat in a combined heat and power plant for district heating network use. The two LHTES units (with spiral coil design and phase-change material encapsulation, respectively) will be ready for final commissioning and testing in September 2019.

2. Thesis/Learning Objective
After the thesis has been performed the student should be able to:
- Have a good overview of the thermal storage and PCM technologies;
- Master the necessary skills of experimental investigations related to heat storage unit and heat exchanger characterization, including malfunctions diagnosis, experimental data handling and analysis;
- Acquire deeper knowledge in phase-change material (PCM) properties and relevant heat transfer physics.

3. Method of Attack
The thesis work mainly consists of hand-on lab work, experimental data handling and evaluation.

4. Pre-requisites
- Heat transfer and fluid dynamics;
- Good communication skills and hand-on capabilities;
- Self-driven and independent.
- Better with good Excel skills (Macros and VBA)

5. Time Schedule
- Week 1-4: Commissioning of the two new prototypes
- Week 5-20: Experimental characterization and data analysis
- Week 21-24: Thesis and report writing and finalization
6. Expected Start Date
   September, 2019

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