UK and European Projects Overview

January 2019
UK Projects

- Efficient GeoTech
- PVT China
- Themac
- EcoPump
- SolarHeatStore
- Low Carbon Heating (BEIS)
EU Projects

- TESSe$^2$b
- Vulkano
- SWS Heating
UK Projects

Innovate UK
PVT with China

- April 2017- March 2019 (2 Years)
- Partners: Hull University (Lead), Queen Mary University, PCM Products, Five-Star (China), USTC (China)
- Low cost, high efficiency solar collector, with PV/micro channel thermal panel and a PCM.
- Offer electricity and heating using solar energy, all from one panel.
- By removing the heat, the solar panels can operate more efficiently.
PVT China

- Aims for 30% higher efficiency and 20% lower costs than existing PVT systems
- Uses 4 innovative technologies:
  - Novel PVT panel;
  - Triplex heat exchanger;
  - Enhanced PCM storage
  - Internet based intelligent monitoring and control system
Enhanced PCM overcomes traditional issue of slow discharge speed.
Possible to achieve 167% increase in thermal conductivity with just a 4.5% drop latent heat capacity.
Solar Heat Store

• 2 year project (September 2018- August 2020)

• Lead by ourselves, with UoN, Geo Green Power, Midea (China), South China University of Technology (China)

• Provide domestic hot water on demand using solar thermal and a supercooled PCM
Solar Heat Store

- Super cooling PCM allows Thermal energy to be stored at room temperature with minimal losses to the environment.
- This PCM can be triggered, making it release heat.
- 5 times the energy density of conventional hot water tanks.
60g sample frozen at ambient in insulated tube, melted in water bath at 67°C

Very narrow phase transition region

Nucleating agent used so spontaneous phase transition
Low Carbon Heating

- 3 year project (October 2018 – September 2021)
- Lead by Hull University with NPS Humber & PCM Products
- Develop a low cost, high efficiency heating system for commercial buildings
- Uses a micro-channel solar panel array, a heat pump connected to the buildings ventilation system and a novel heat storage unit
Low Carbon Heating

- Segregated multi-tank design overcomes traditional slow-response issues.
- Forced convection leads to an enhanced thermal energy storage.
- Micro channel collectors offer an enhanced COP.
European Projects
SWS Heating

- June 2018 – May 2022 (4 Years)
- 16 Partners (Greece, Spain, Germany, Italy, Russia, Sweden) Lead by Athens University
- Development of a seasonal thermal energy store (STES) to store summer solar energy for heating and DHW use in winter, using novel selected water sorbents.
- Aims to reduce the cost of solar season storage by 20-30%
- Optimised system design & sizing will achieve a high solar fraction of over 60% in south, central & northern Europe.
Selectivity of water sorbents (SWS) offer a very high heat storage density of 1.1~1.3 GJ/m³.

Stability of SWS material validated by 1,000 hydrothermal cycles which represents over 50 years of operation.
SWS Heating

**INITIAL STATE**
- porous host matrix
- impregnated anhydrous salt

**HEAT**
- +H₂O sorption
- solid crystalline hydrates

**FINAL STATE**
- +H₂O sorption
- salt aqueous solution
Thank you for your attention