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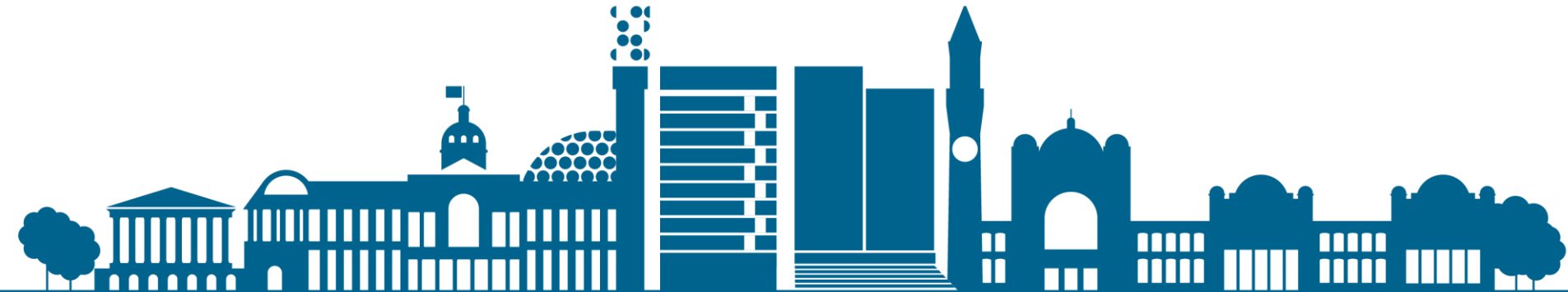
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# Thermal energy storage (TES) and benefits to the local SMEs?

ATETA: ERDF-UoB partnership

Dr. Shivangi Sharma



# Contents

- BCES: the Institute

About, Research, Drivers & Achievements

- ATETA: the Programme

ERDF Programme for the local SMEs

- SME Case Studies: 1 & 2



# Birmingham Centre for Energy Storage (BCES) – Estd. 2013

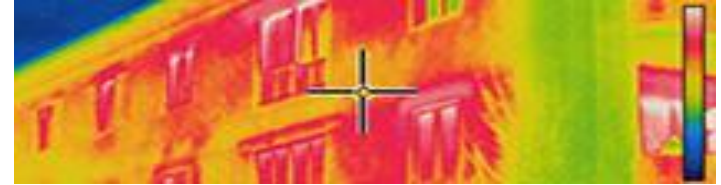
- ❑ World leader in thermal energy storage
- ❑ Led by Professor Yulong Ding
- ❑ 5 senior academics + 3 Senior PDRAs
- ❑ 40+ PhD and early stage research fellows
- ❑ 10 staff :project management, business engagement, R &D administration
- ❑ Overall focus: TES materials (PCM), thermochemical storage, multi-scale modelling, energy systems and policy analysis and multi vector data analytics



# BCES: Research



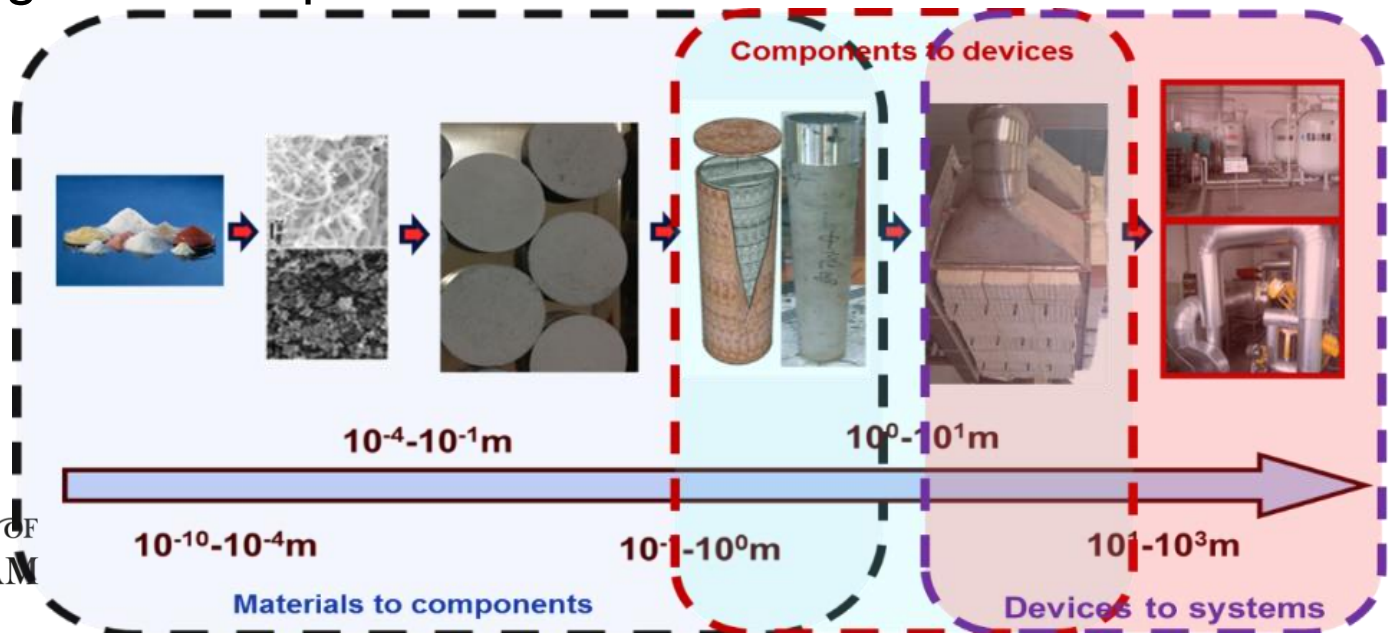
Cryogenic Energy Storage (CES)



Thermal Energy Storage (TES)

## TES Research areas

- Materials & Advanced Manufacturing Technology
- Components/Devices
- Systems Integration & Optimisation



# The drive for TES research

## Environmental targets by 2050

- ❑ UK commitment - 80% carbon reduction
- ❑ G7 summit 2015 - electricity generation from renewables /nuclear
- ❑ COP 21 - UN climate change conference

## Meeting the targets

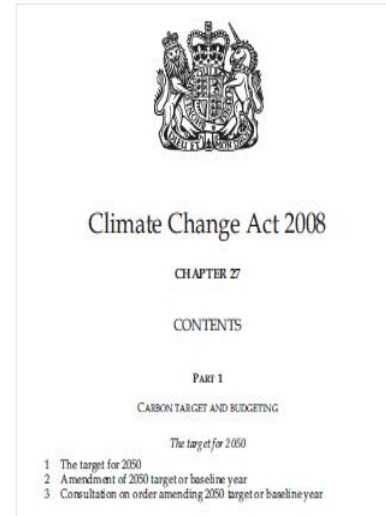
- ❑ High renewable penetration
- ❑ Electrification of transport and heat
- ❑ Reduction of energy use
- ❑ Energy efficiency improvement

## Possible problems

- ❑ Huge stress on networks
- ❑ Significant generation assets degradation
- ❑ Technologies not there and/or expensive
- ❑ Lack of policies for sound business cases



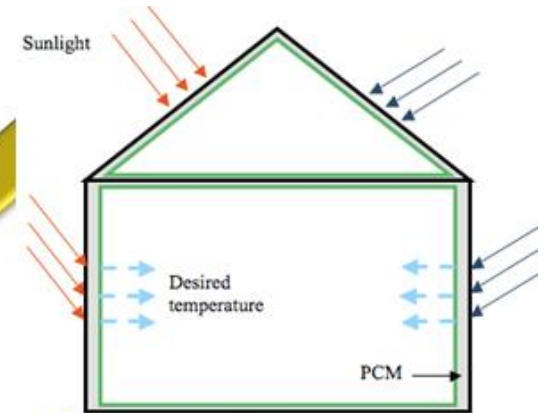
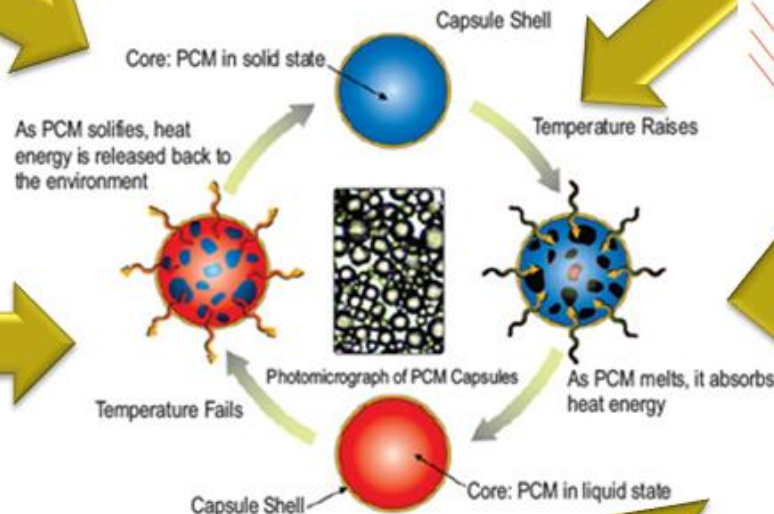
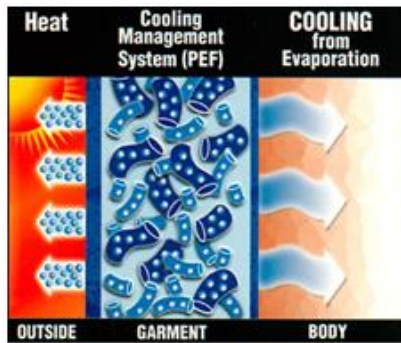
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# Thermal Energy Storage (TES)

## Applications



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# BCES – recent achievements

## Birmingham expert receives major award recognising work in energy storage

Posted on 20 Apr 2018

University of Birmingham energy storage expert Professor Yulong Ding has been awarded a prestigious international prize recognising his work.

Director of the Birmingham Centre for Energy Storage Professor Ding received the Distinguished Individual Award 2018 at the 7th Energy Storage International Conference and Expo (ESIE) Beijing.

The award was presented to Professor Ding in the second annual International Energy Storage Innovation Competition (IESIC), which was part of the high-profile conference.



## The world's first large scale composite Phase Change Material demonstration plant for curtailed wind power

Posted on 09 Apr 2018

The 6MW/36MWh demonstration plant, financed by the China General Nuclear Corporation and built by the Nanjing Jinhe Energy Co.Ltd, industrial partners of the [EPSRC-NSFC NexGen-TEST project](#), has provided heat for 60,000m<sup>2</sup> of space, harnessing 10,000KWh of otherwise wasted wind power and reducing the environmental impact of the energy system by 3,100 tonnes of CO<sub>2</sub> and 10 tonnes of SO<sub>2</sub> per year, equivalent to ~1200 tons of coal per year.

EPSRC reported that building this pilot Phase Change Material plant in one of the windiest regions in China has utilised wind energy that would have otherwise been wasted. This wind energy is converted into heat for 60,000m<sup>2</sup> of space, harnessing 10,000KWh of wind power and reduced the environmental impact of the energy system to the equivalent of ~1200 tons of coal per year.



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# ATETA: UoB-ERDF Programme

*Accelerating Thermal Energy Technology Adoption*

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European Union  
European Regional  
Development Fund



**ateta**  
energising profitability



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**CATAPULT**  
Energy Systems

- SME support programme → help local SME overcome obstacles and unlock business opportunities.
- FREE access to Research Fellows:
  - i. Identify ways to improve efficiency
  - ii. Identify new market prospects
  - iii. Test & demonstrate new ideas for business growth
  - iv. Access to the University's state-of-the-art research facilities

Etc...



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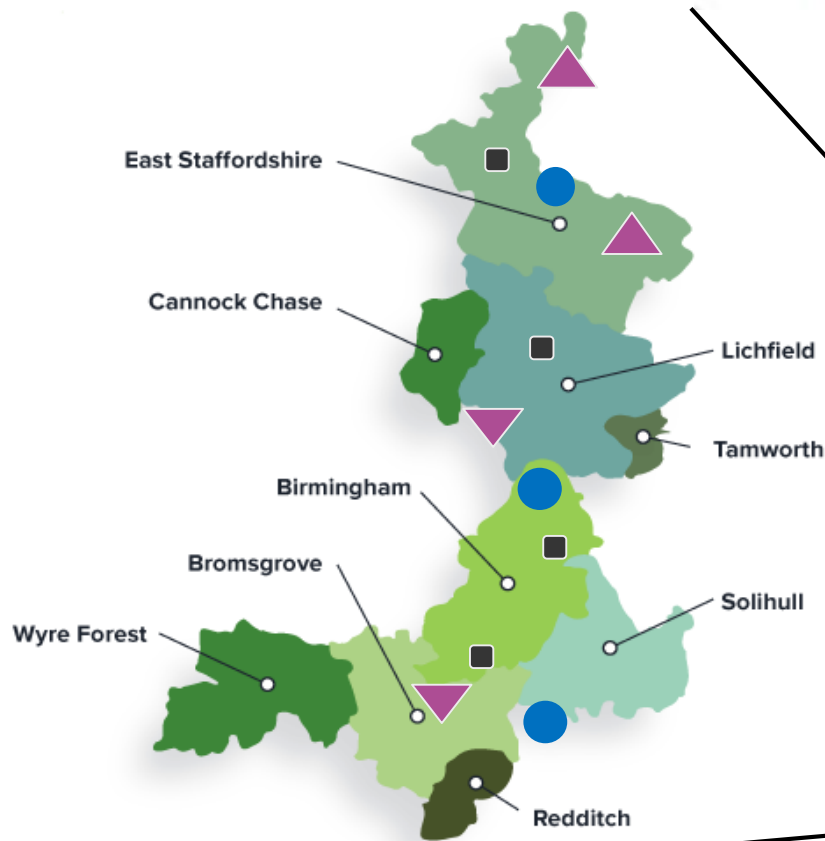


# ATETA: Geography

Greater Birmingham & Solihull

United Kingdom

● ▲ ■ : SMEs



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# Examples of SME interventions

## Case study 1: TES integration with a CHP

PCM TES replaces Hot Water tank with a CHP (gas-fired)

- ❑ **Space savings**
- ❑ Cost Analysis
- ❑ Literature references
- ❑ Case studies

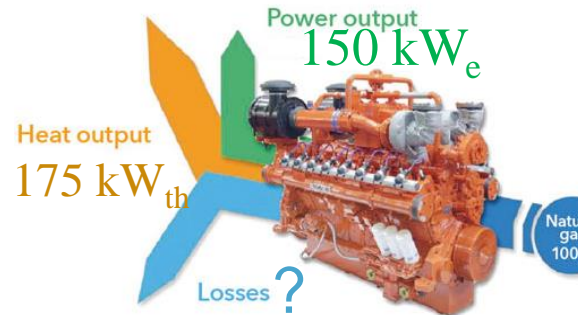
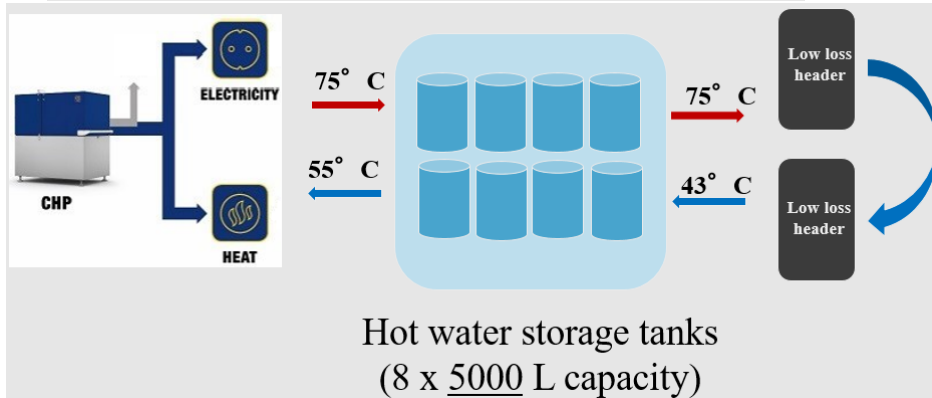


Image courtesy: BSD Ltd.

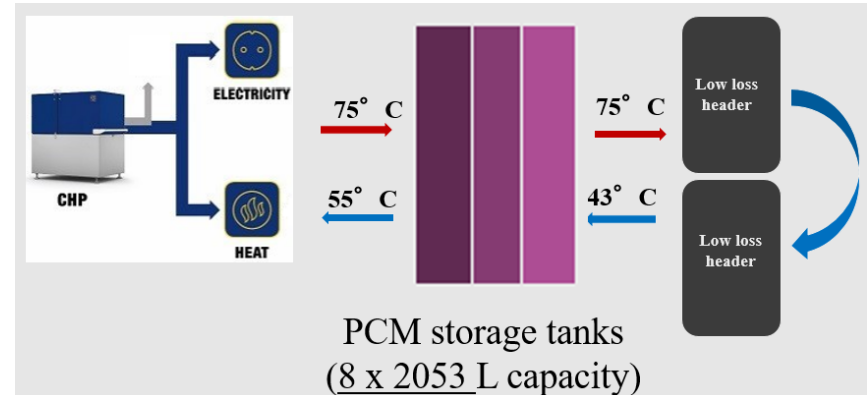
**Volume ratio = 2.434 !**

**Total Capital Cost savings (land only) ~ £303,450**

**Sensible heating:** 40,000 L Hot Water Tank



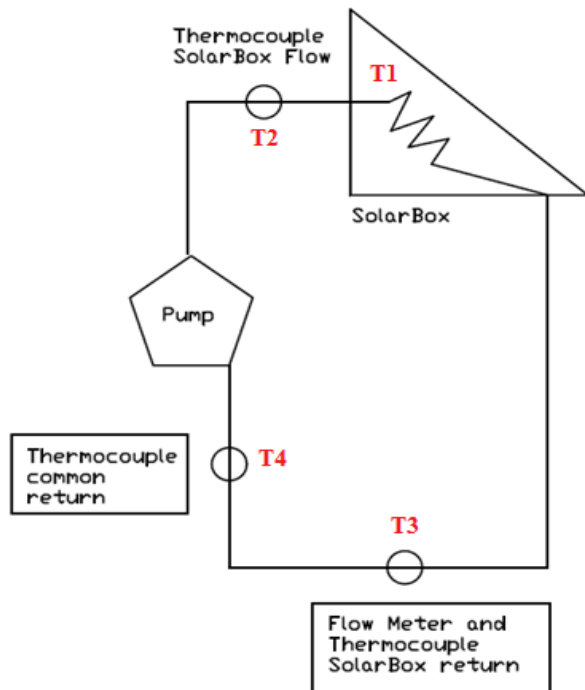
**Latent heating:** 16,429 L PCM Tank



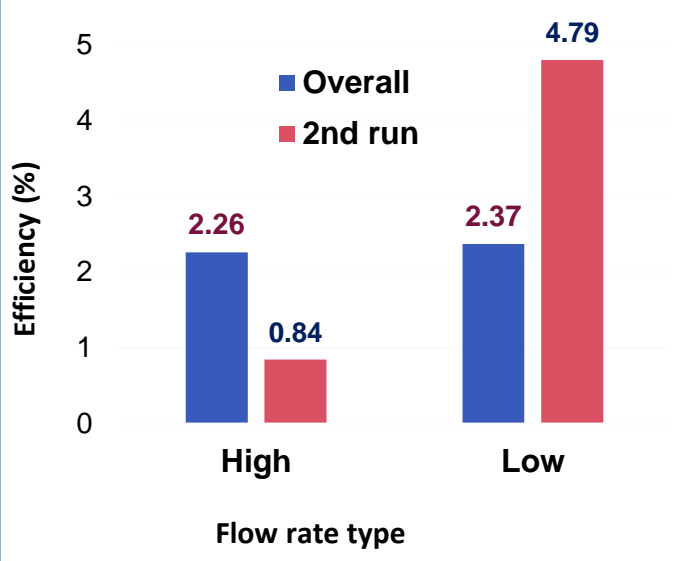
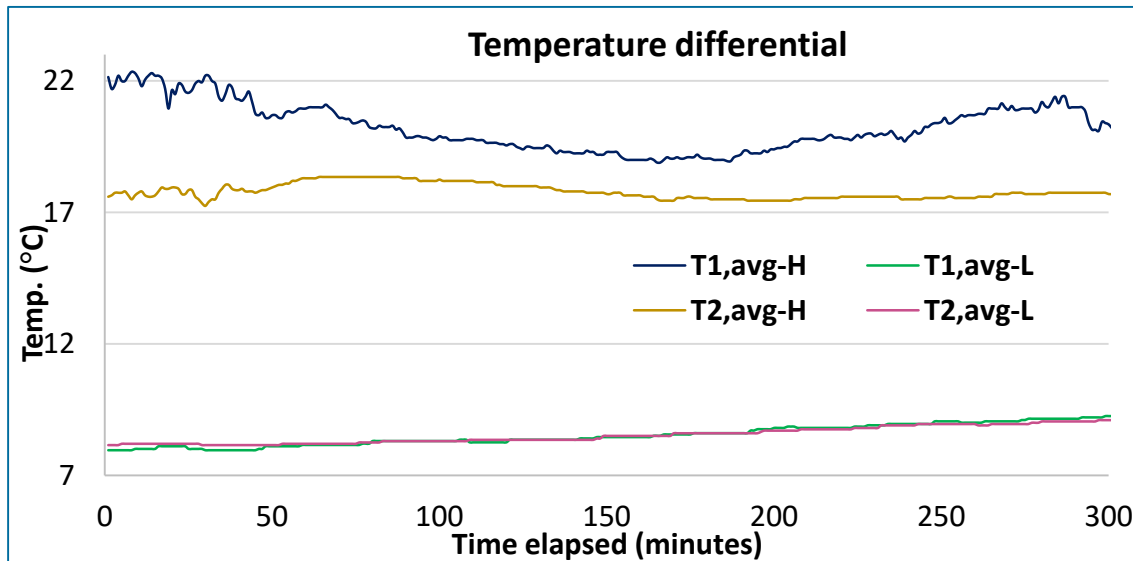
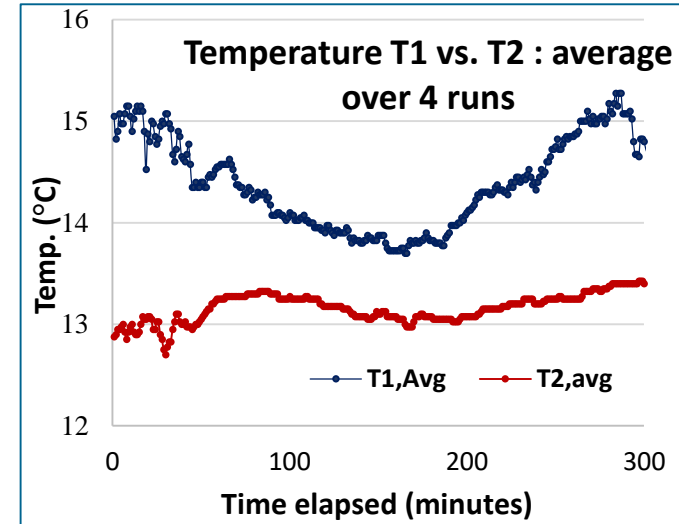
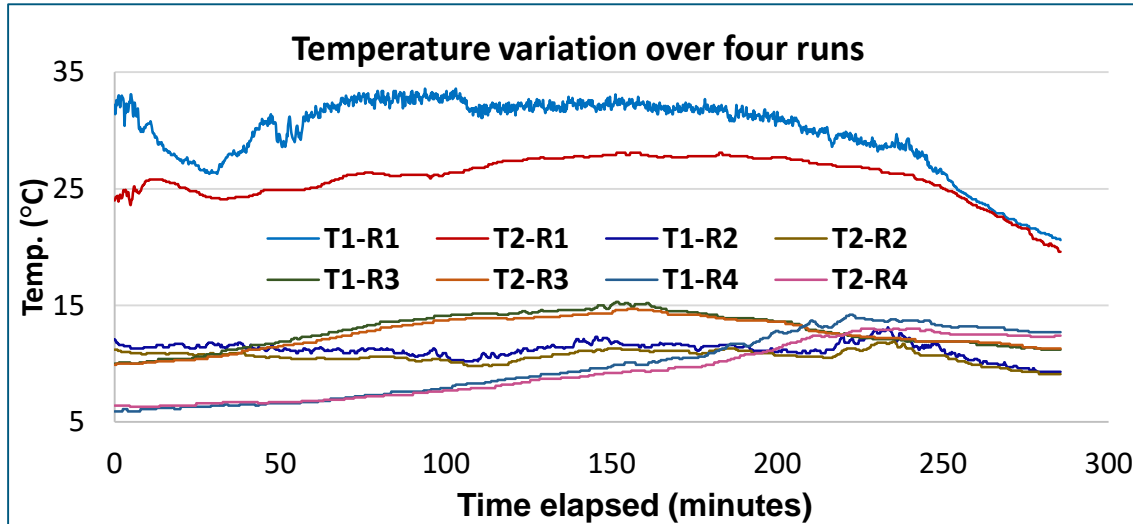
# Examples of SME interventions

## Case study 2: Testing **Solarbox** system

- ❑ Solarbox: Solar heat. device to fit b/w rafters
- ❑ Local SME design: air space heat to HTF in pipes.
- ❑ Different to a flat plate/evacuated tube solar collector



# Results

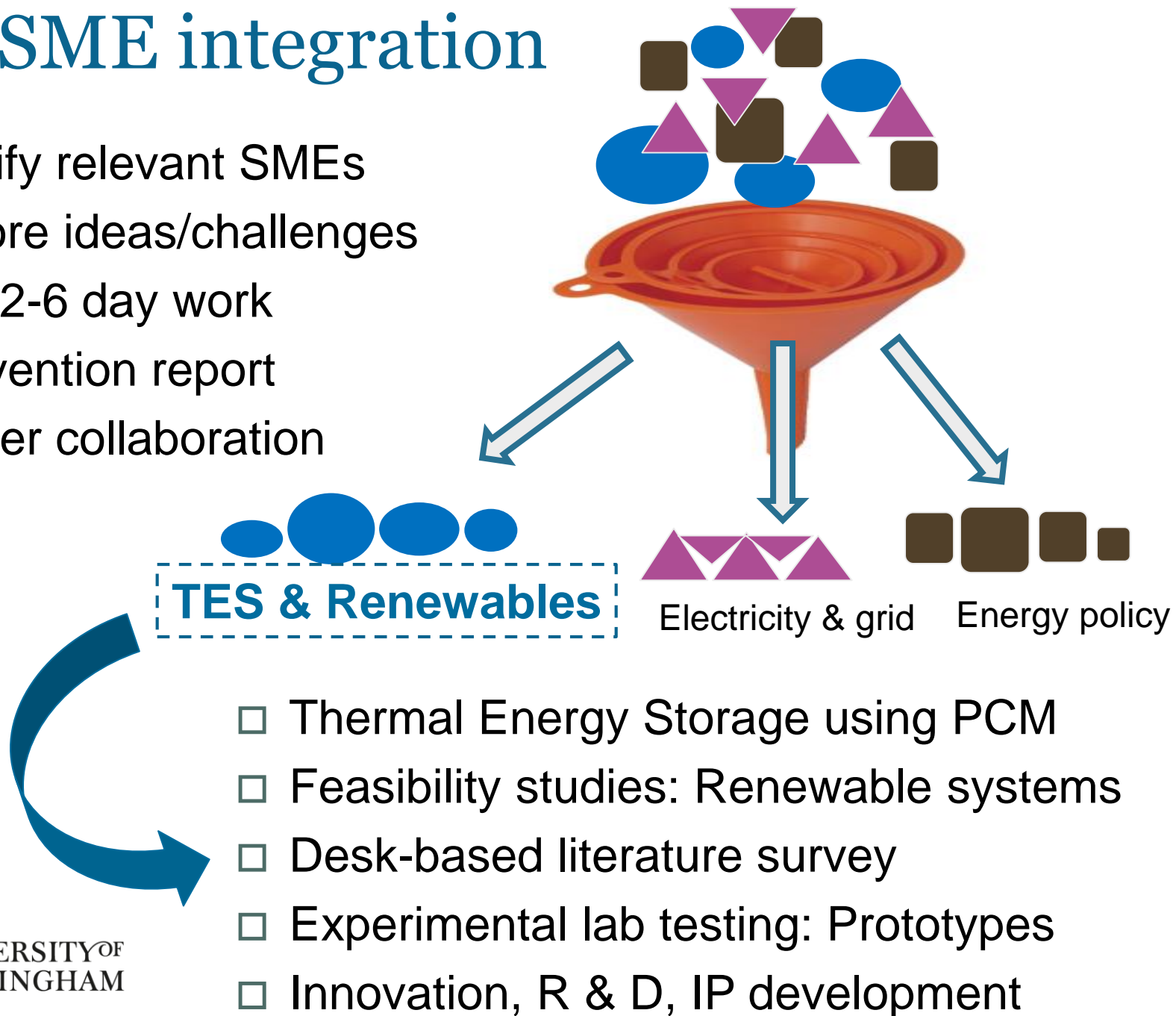


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- **Lower flow rate → optimum**
- **Efficiency increased by 5 % with lower flow rate**

# SME integration

- Identify relevant SMEs
- Explore ideas/challenges
- Brief 2-6 day work
- Intervention report
- Further collaboration







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Birmingham Centre for Energy Storage (BCES)  
University of Birmingham, UK

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