ReCO$_2$ST

Residential retrofit assessment platform and demonstrations for near zero energy and CO2 emissions with optimum cost, health, comfort and environmental quality.

A H2020 project which includes a demo building at Brunel campus started in Jan 2018 to finish in Dec 2021 (four years)

Brunel is Technical Manager, University of Aalborg co-ordinates

Total project budget 9M Euros with 17 partners

Innovation/Ambition

ReCO$_2$ST

COST & TIME EFFICIENCY

- Modular Action Plans with adaptable solutions
- Integreated Project Delivery
- Least Cost Approach
- Synergies between technologies

ENERGY EFFICIENCY

- Ultra-Thin Vacuum Insulation
- Compact PV arrays
- Smart Windows
- Cooling Materials
- System monitored & controlled by BEMS

HUMAN HEALTH & COMFORT

- Thermal, acoustic & visual comfort
- Passive on demand ventilation
- Nature based air treatment
- Streamlined and intuitive IEMS optimized for IEQ

ENVIRONMENT

- Urban microclimate improvement
- RES energy generation
- Low CO_2 footprint of solutions
- Decarbonized refurbishment

Brunel University London

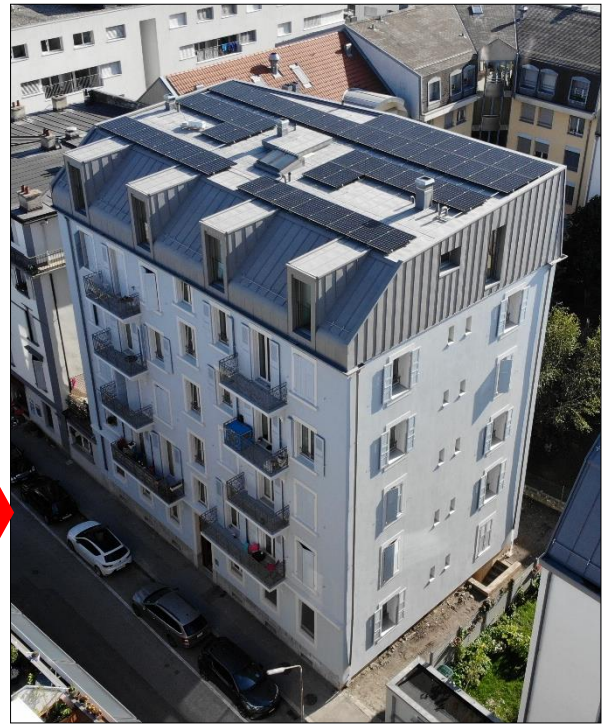
ReCO$_2$ST

3-step approach

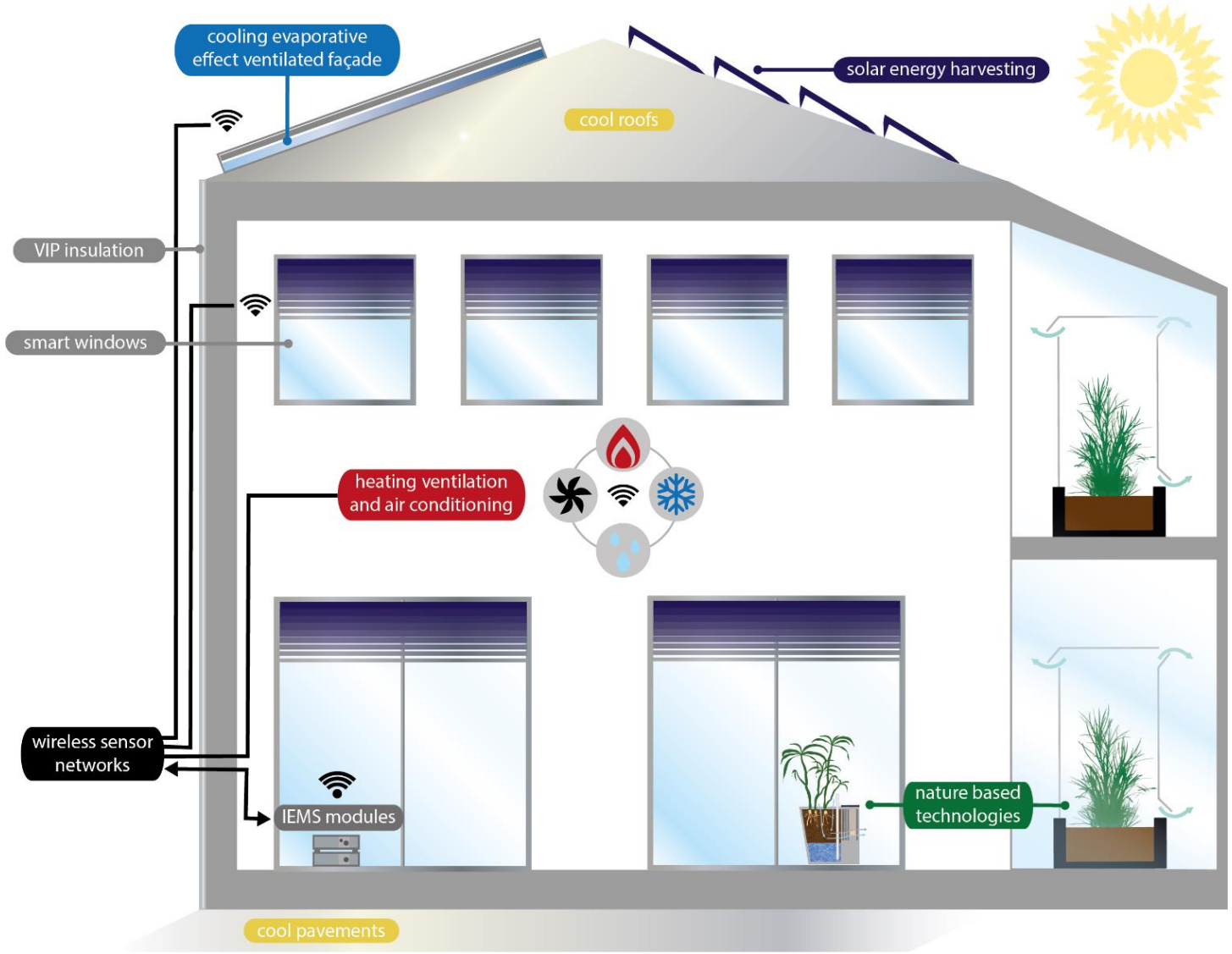
REFURBISHMENT ASSESSMENT	REFURBISHMENT PLANNING	RENNOVATION PROCESS
through **R**ebubrishment **A**ssessment **T**ool (RAT) a holistic overview (cost, energy, user requirements, LCA) of the renovation potential for **user-driven refurbishment scenarios**	with **Least Cost** method and Integrated Project Delivery (IPD) selection of **optimal Action Plan** and optimisation of installation process	Installation of personalised **Retrofit-Kit**

Brunel University London

Residential Demonstration Buildings



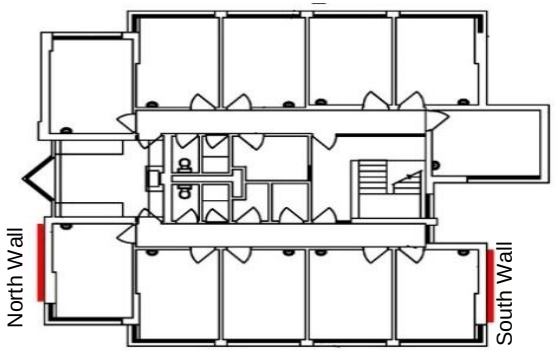
Technologies

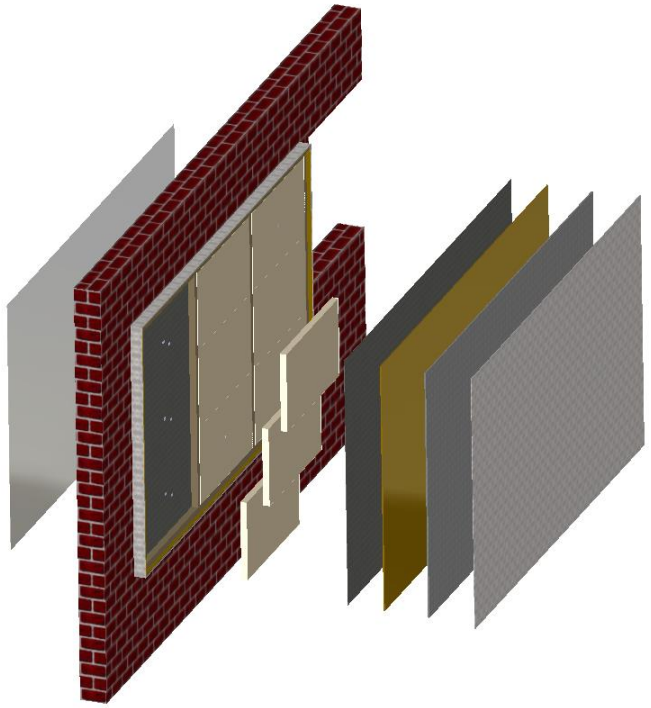


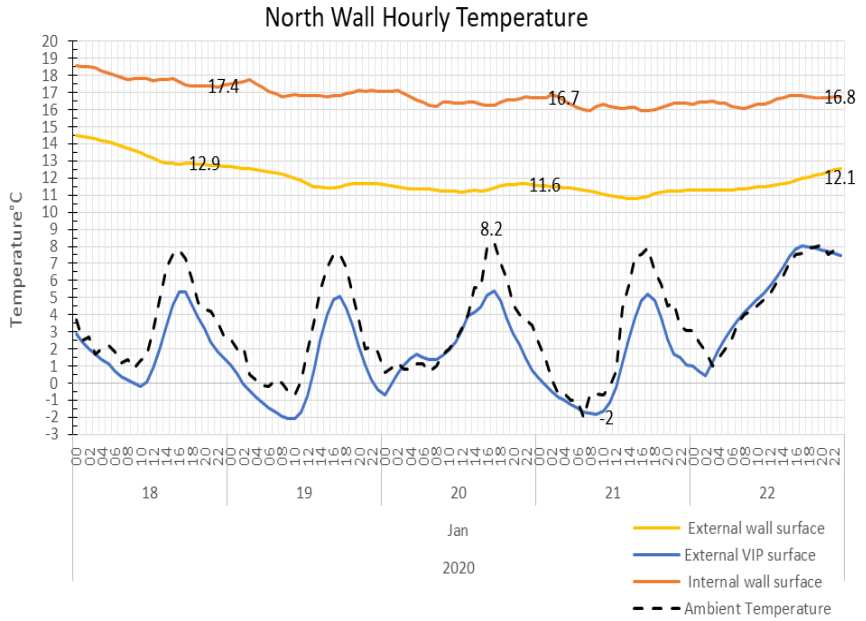
Demo building at Brunel

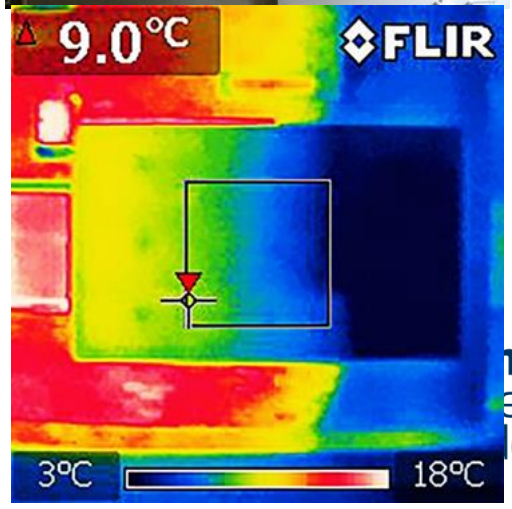
- Brunel Estates agreed for one of the campus buildings to be a demo building.
- A range of buildings were investigated and Clifton Hall was identified as a good candidate which was also due for some upgrades.
- ReCO2ST team was involved in meetings with Estates and external contractors in winter 2019
- Interventions were carried out in summer 2019 when ReCO2ST team, Estates and external contractors worked well together.
- Residences were involved during post interventions
- Required energy data were made available

Building Envelope: Insulation – va-Q-tec

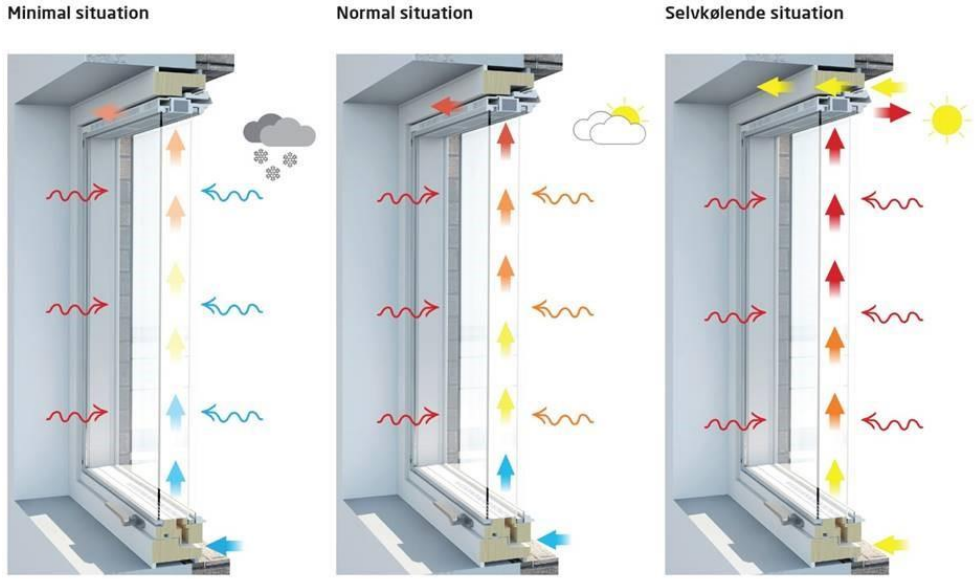


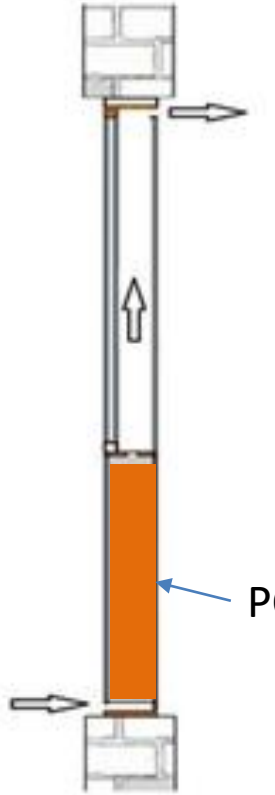






Building Envelope: Windows - Horn



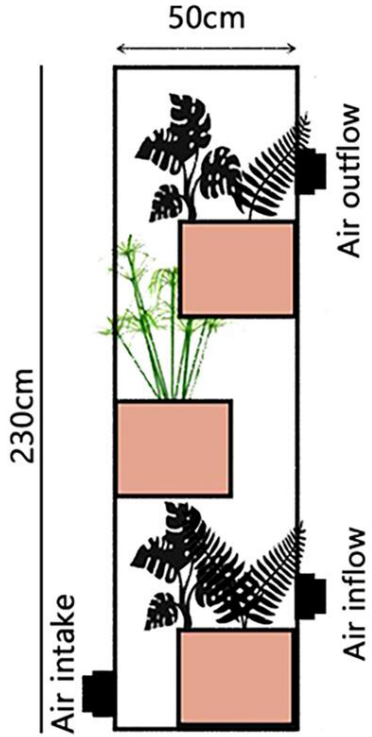


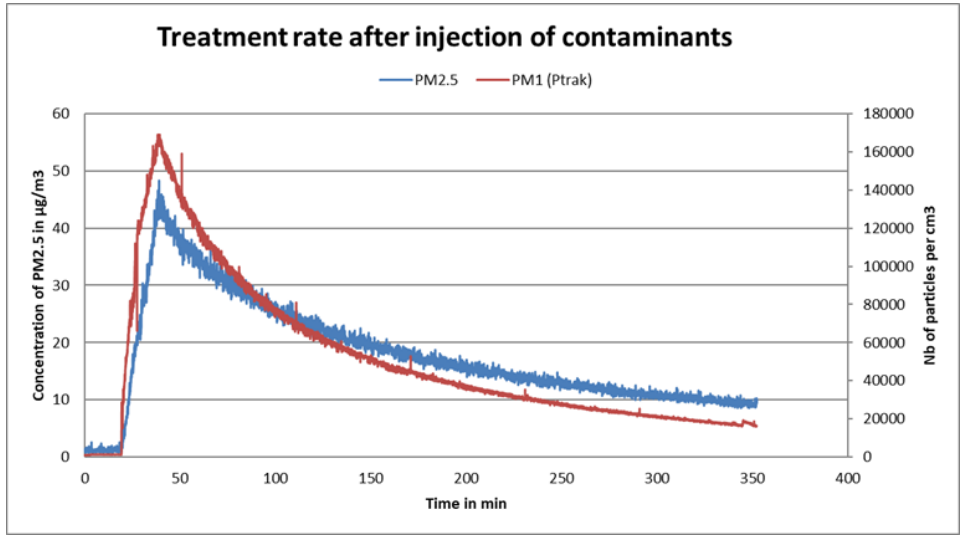
(b) **Ventilation pre-heating mode.** Ventilation goes through the PCM h exchanger to be heated up by the stotage.

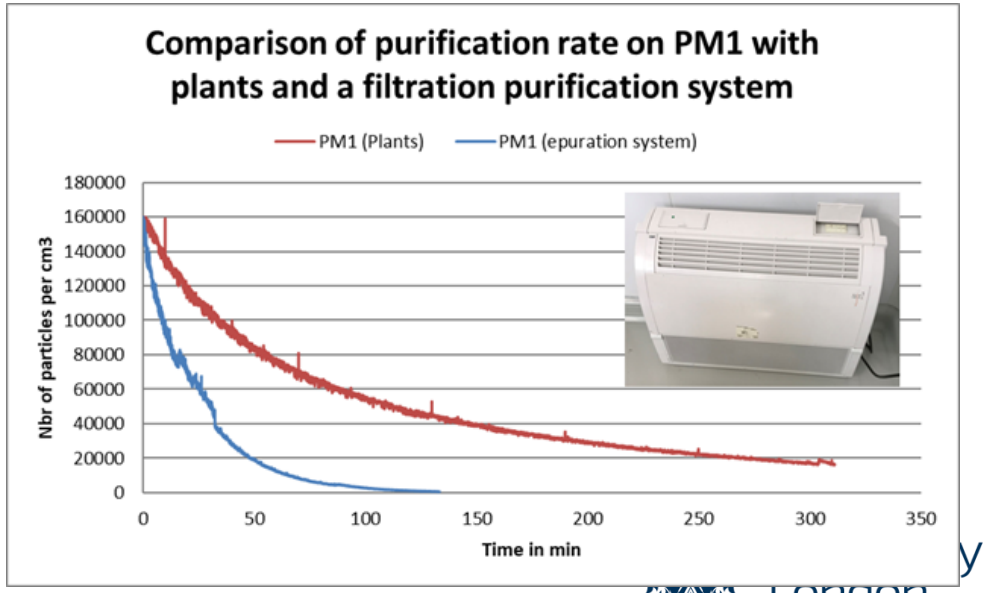
when $I < I_{setpoint}$

$T_{indoor} < 24\ °C$

Building Envelope: Nature based IAQ solutions – alchemia-nova







Building Envelope: Cool Materials - ECRC

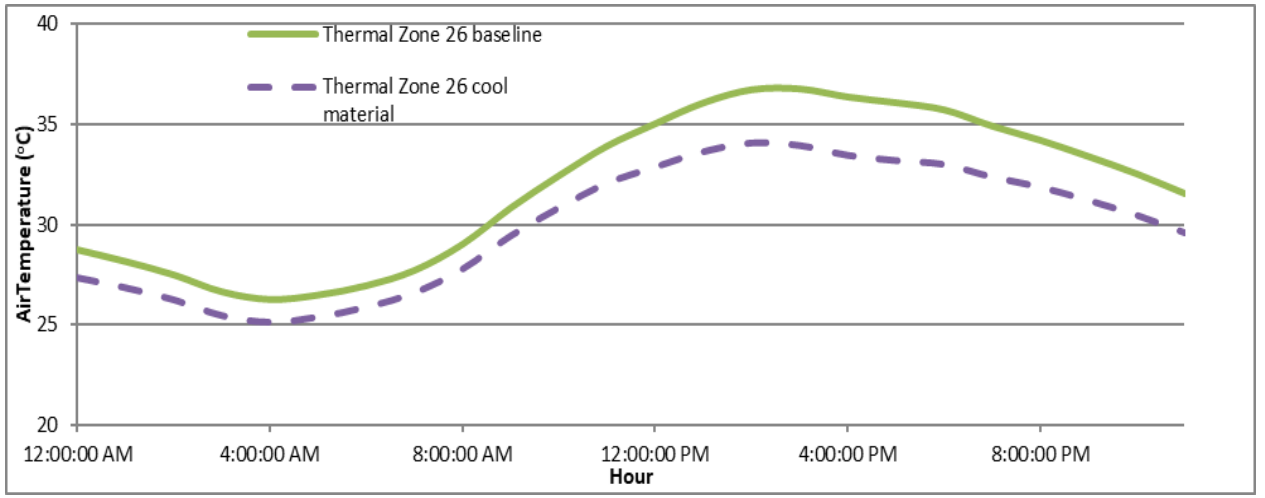


Figure 1. Room air temperature in London demo site

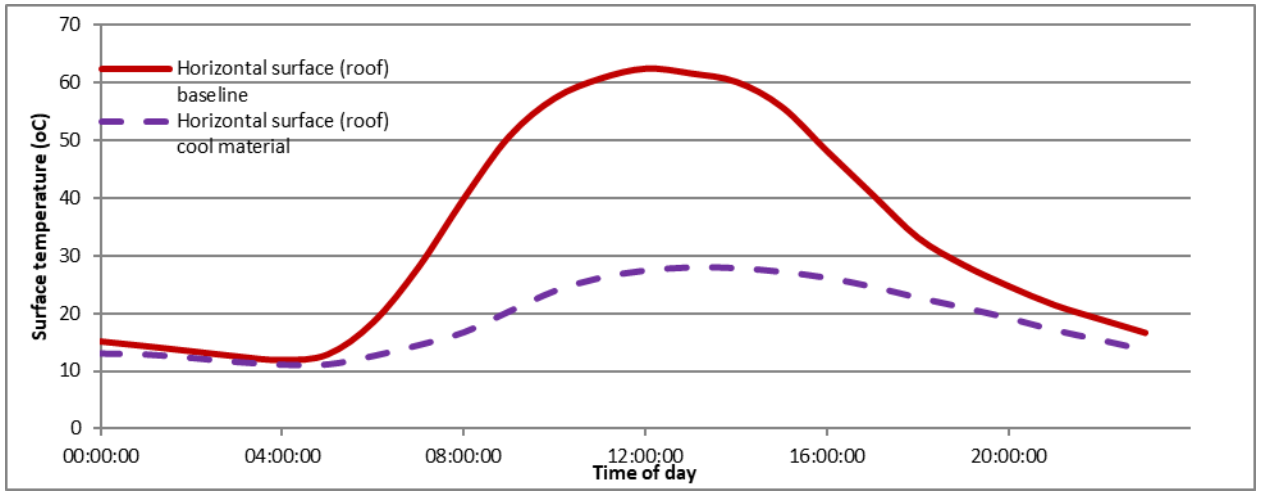


Figure 2. Surface temperature of a horizontal surface at London demo site

Building Systems: HVAC systems

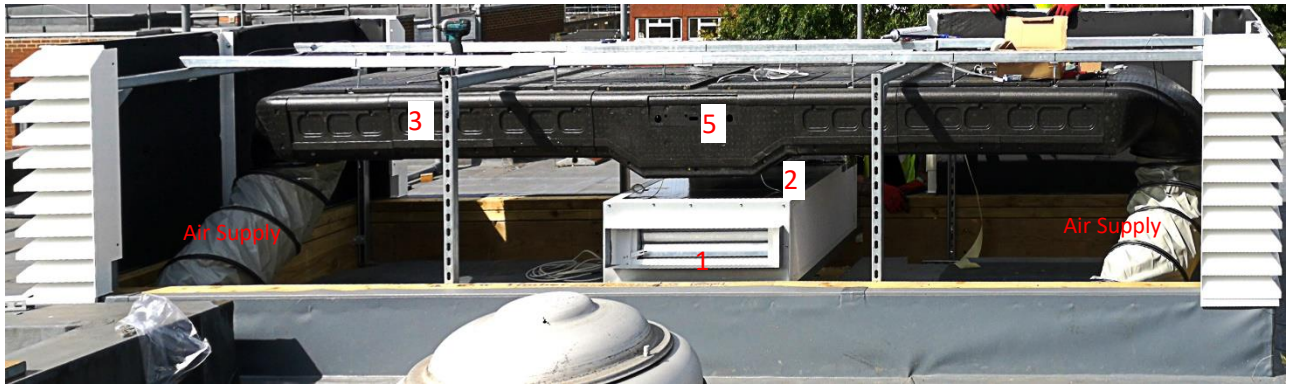


Fig. Cool-Phase outside layout

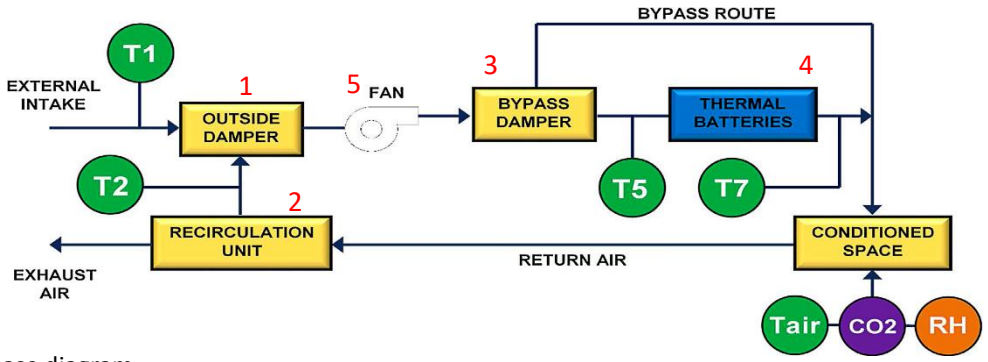
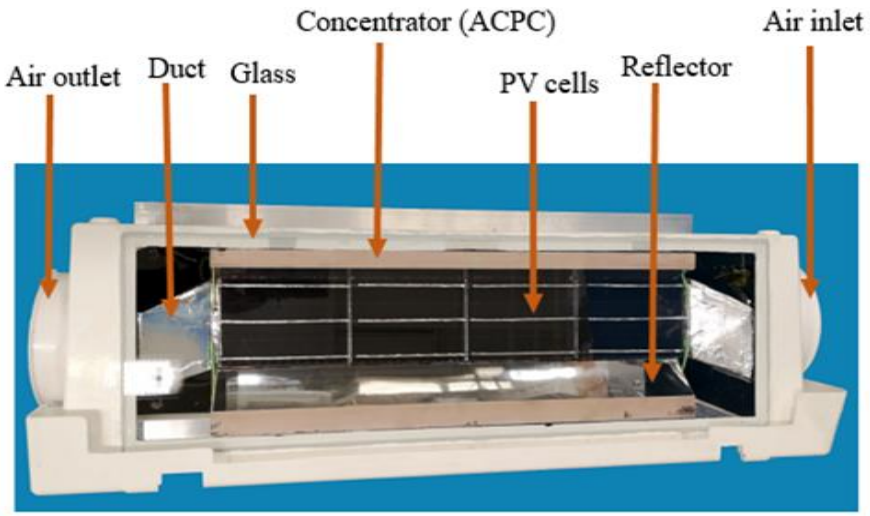
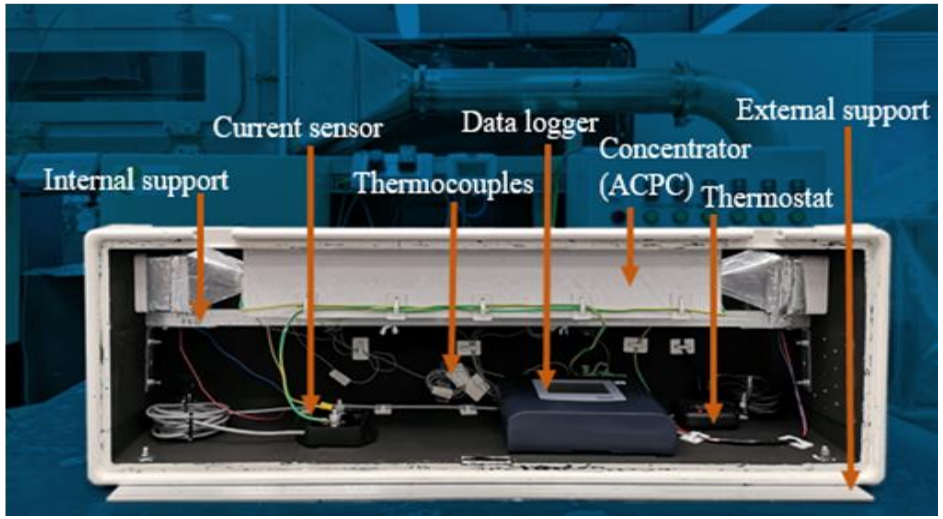


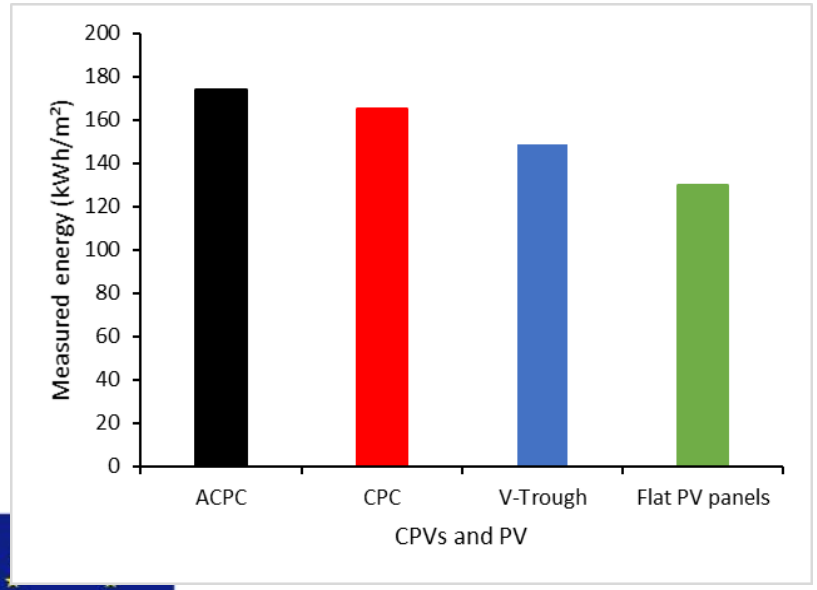
Fig. Cool-Phase diagram

PCM Based ventilation and cooling is installed in the UK demo building

Energy harvesting: CPV and PV - BUL



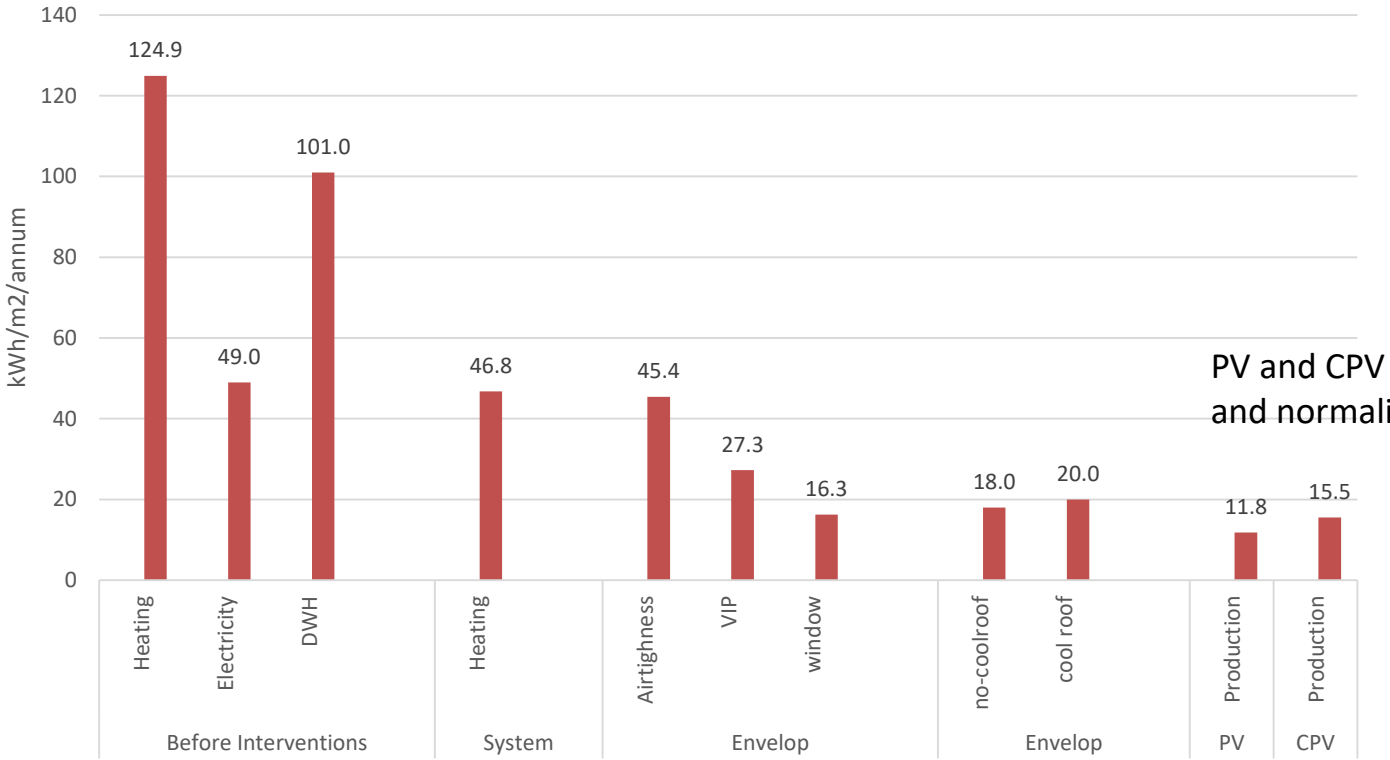




Other measures:
RAT will identify them and cost them

- Domestic hot water
- Improved Air-tightness
- Reduce equipment heat gains: A++ appliances
- LED Lighting
- Heating systems: improvement in London

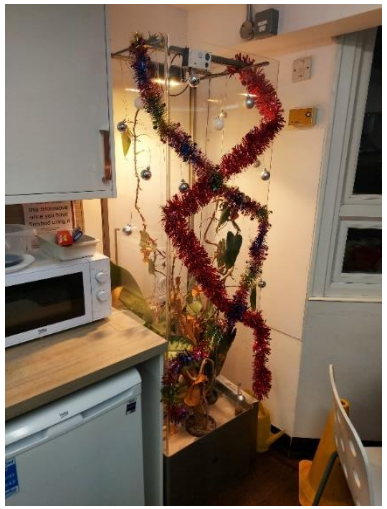
Simulation results for the London demo building



PV and CPV production is for roof area of 195m^2 and normalised for building floor area of 750m^2

Users' engagement

- Energy data for comparison
- Students were engaged with some questionnaire and more widely through a design competition enabled by Residences



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ReCO2ST Horizon 2020 Project

COLOPHON

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The information in this publication does not necessarily represent the view of the European Commission.