Active Building Induction

Version 1.0, October 2020

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SPECIFIC Profile

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Background

- SPECIFIC was established in 2011 as an Innovation and Knowledge Centre (IKC) initially to investigate building integrated technologies to generate, store and release energy, focused on solar energy
- SPECIFIC 2 was funded from 2016 to 2023 to collaborate with businesses and develop a building demonstration programme

Capabilities

- Printed PV Research
- Energy Capture
- Electrical Storage
- Thermal Storage
- Industrial Coatings
- Technology scale up
- Building Energy Systems
- Building Demonstration
- Training:
  - Metal
  - M2A

Stakeholders

- Professor Dave Worsley (PI)
- Senior Management Team:
  - Dr Christian Bryant
  - Dr Eifion Jewell
  - Dr Justin Searle
  - Dr Trystan Watson
- Funders:
  - UKRI
  - ERDF through WG
- Industry Partners
  - AkzoNobel
  - NSG
  - Tata Steel

Accreditations

- Featured in UKRI Clean Growth and Infrastructure Annual Review 2020 (p.46)
- Featured in UKGBC Net Zero Case Study catalogue, here

Vision and Mission

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Active Building Vision

We envisage a future where buildings **generate**, **store** and **release** their own solar energy, and are integrated into the energy system, assisting the energy grids to perform efficiently through use of buildings as 'nodes' that help balance energy demands.

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Active Building Mission

Our mission is to significantly reduce the energy use and associated carbon emissions of buildings by integrating renewable energy technologies with intelligent controls and energy storage, to ensure controlled export or import of energy to or from buildings. This has the potential to reduce pressures on the national energy grid, saving costly and disruptive grid upgrades and ensuring the existing grid can perform efficiently.

Active Building Goal

Our goal is the development of affordable technologies that can be manufactured at scale and re-used or recycled at the end of their life.

This includes incorporating the affordable technologies on to Active Buildings, which are integrated into the energy grid to help the UK achieve their decarbonisation targets and reduce pressure on the existing grid infrastructure.

Active Building History

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2011 — SPECIFIC IKC established

2014 — ACTIVE POD

2016 — SPECIFIC 2 funded

ACTIVE CLASSROOM

2018

ACTIVE OFFICE

2019 — ACTIVE TRAIN SHELTER

2012 - 2020

THE SHED

Background & Context

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Sustainable Development

- United Nations Sustainable Development Goals (UN SDGs) – 17 global goals to **end poverty**, improve health and education, reduce inequality, spur economic growth, **tackle climate change** and preserve natural environments
- Wellbeing of Future Generations (Wales) Act 2015 – 7 wellbeing goals to **prevent poverty**, health inequality and **climate change**

Energy

- Clean Growth Challenge within UK Industrial Strategy: **halve the energy consumption of all new buildings by 2030** (aligned with Construction 2025 targets set in 2013 and the Climate Change Act 2008)

Carbon

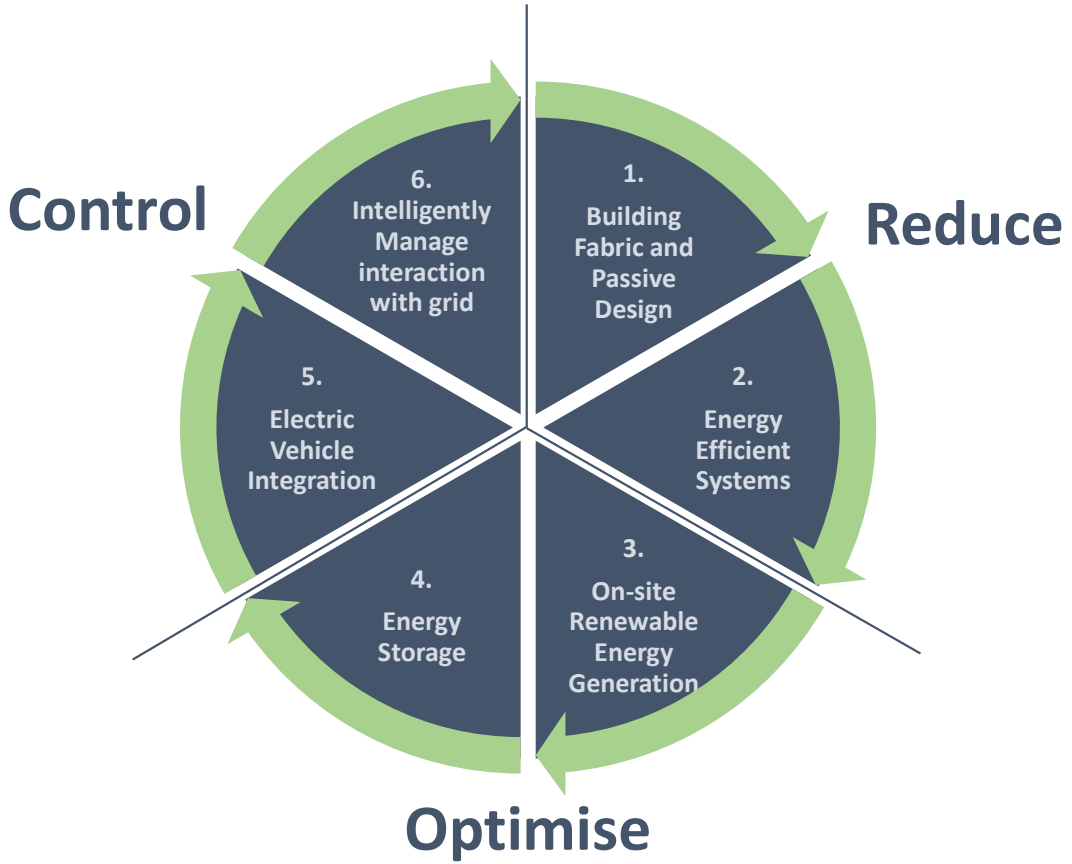
- Climate Change Act 2008 (amended 2019): **cut greenhouse gas (GHG) emissions by 100% below 1990 levels by 2050**
- **Decarbonise heat: no gas connections in new housing developments from 2025** (Future Homes Standard)
- **Decarbonise transport**: Road to Zero Strategy – **no new petrol or diesel cars or vans from 2035**

Whole Life Values

- Reduce **Whole Life Cost** (WLC) of buildings by 33% by 2025 (Construction 2025)
- Incorporate Life Cycle Analysis (LCA) into all building projects to strive for **Net Zero Carbon** (embodied and operational)

What is an Active Building?

"An Active Building supports the energy network by intelligently integrating renewable energy technologies for heat, power and transport"



Principle 1: Building Fabric and Passive Design

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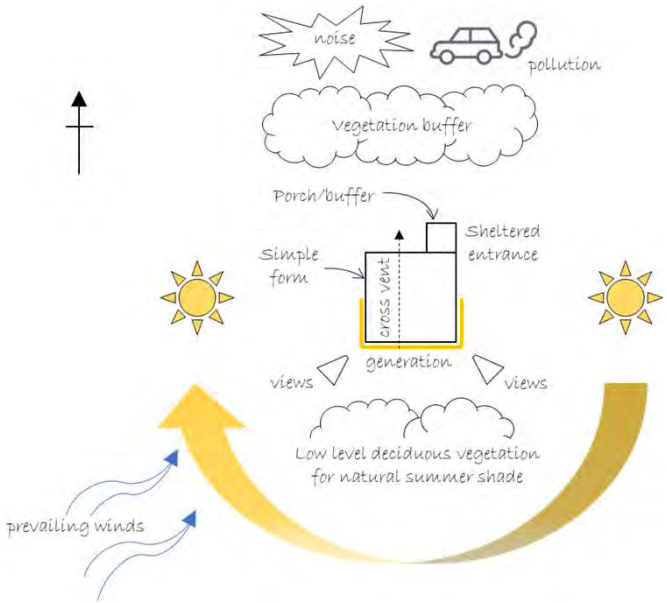
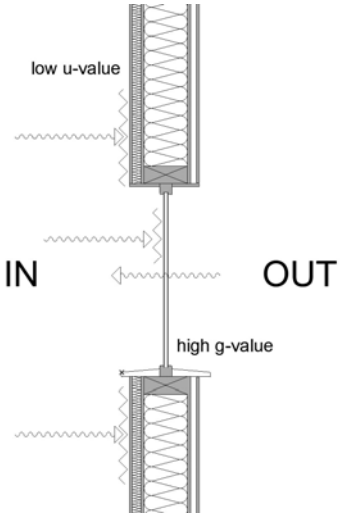
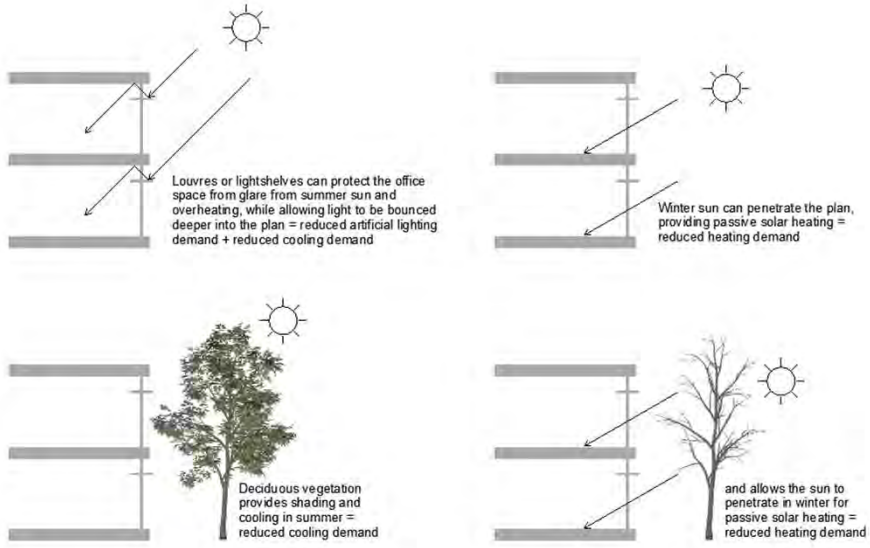
Integrated engineering and architectural design approach including consideration of orientation and massing, fabric efficiency, natural daylight and natural ventilation. Designed for occupant comfort and low energy by following passive design principles







Principle 2: Energy Efficient Systems

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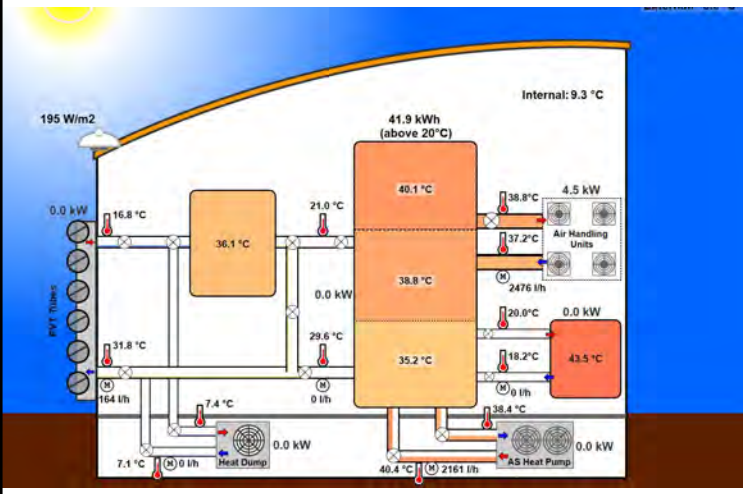
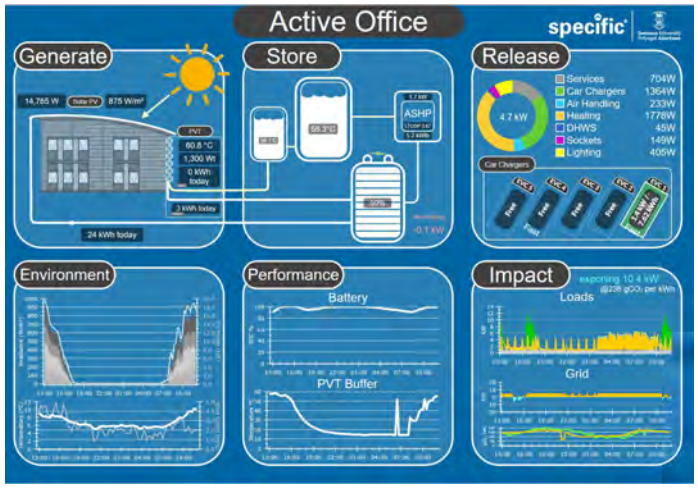
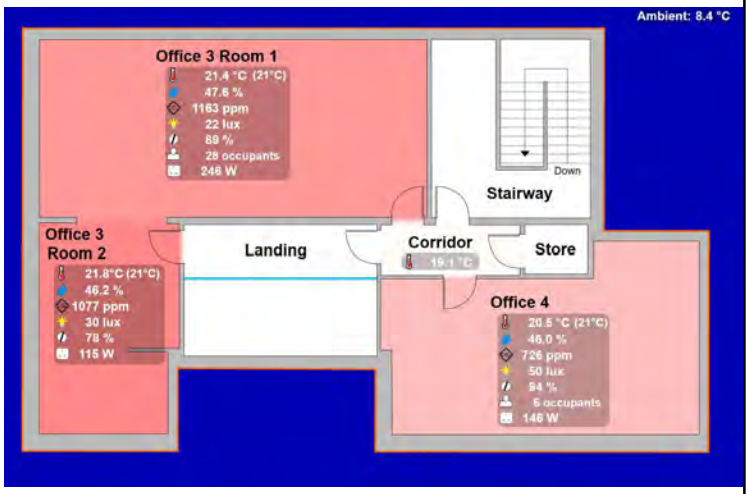
Intelligently controlled & energy efficient systems to minimise loads - HVAC, lighting, vertical transportation. Data capture via inbuilt monitoring to enable performance validation, optimisation and refinement of predictive control strategies, including dissemination of performance data to building occupants.







Principle 3: On-Site Renewable Energy

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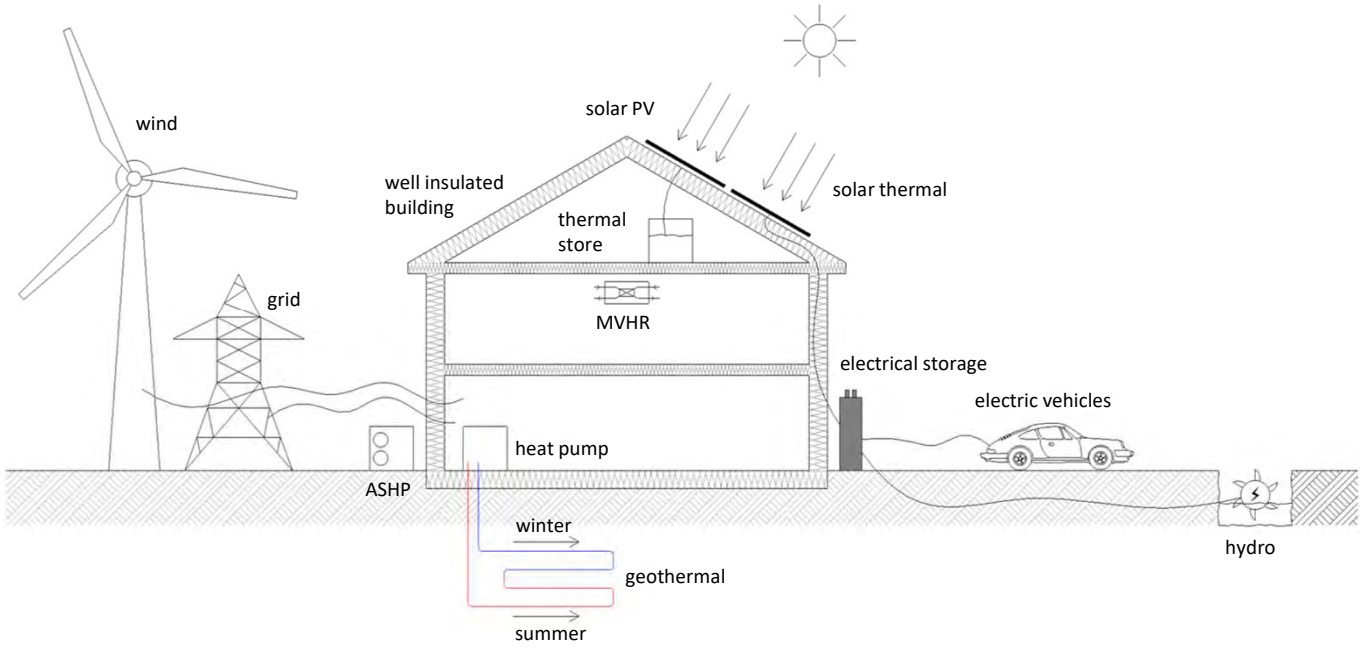
Renewable energy generation to be incorporated where appropriate. Renewable technologies should be selected holistically, given site conditions and building load profiles combining, where applicable, both photovoltaic and solar thermal technologies.



Principle 4: Energy Storage

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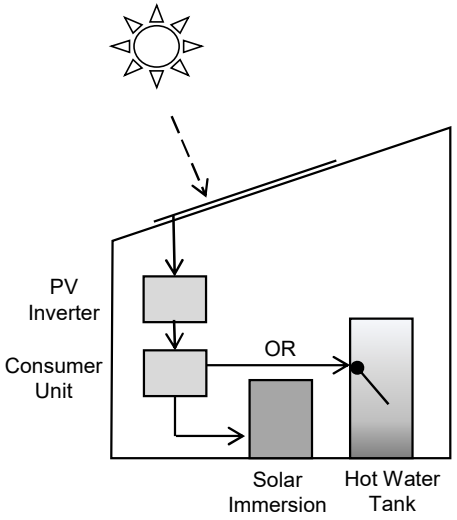
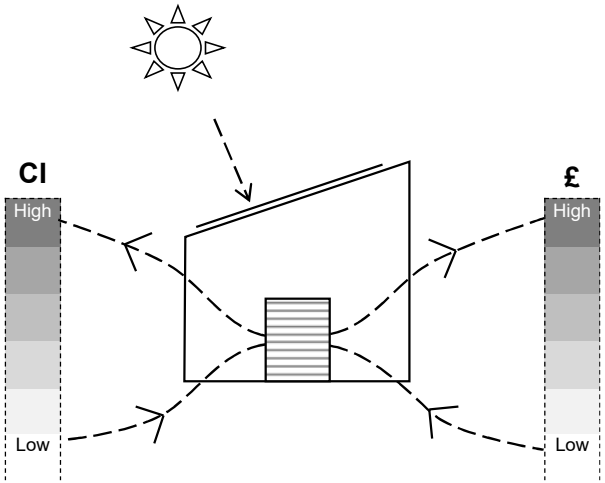
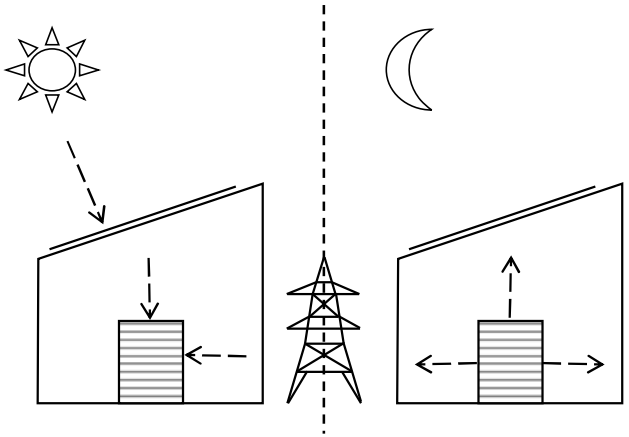
Thermal and electrical storage should be considered to mitigate peak demand, reduce the requirement to oversize systems, and enable greater control, with a view to supporting the local infrastructure through time shifting of demand and controlled export, and enabling flexible control to enable virtual power plant integration (VPP).







Principle 5: Electric Vehicle Integration

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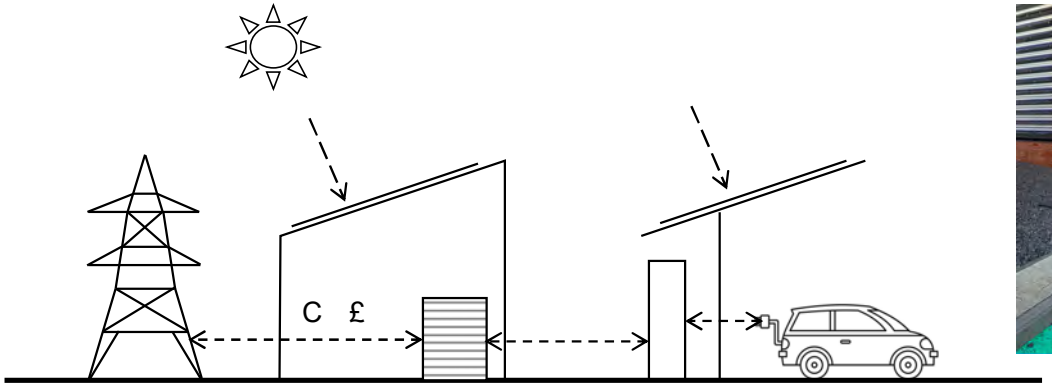
Where appropriate Active Buildings integrate electric vehicle charging. Combined Charge Systems (CCS) with local control and the option of either VPP aggregated control or frequency response should be considered. As technology develops, bi-directional charging will allow electric vehicles to deliver energy to buildings as required, participate in demand side response, and work with the wider building control systems.



Principle 6: Integration with wider energy networks

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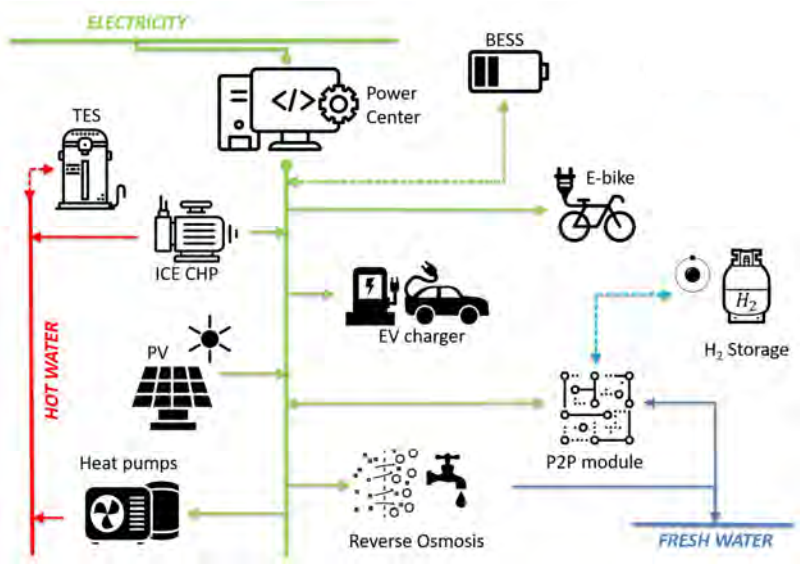
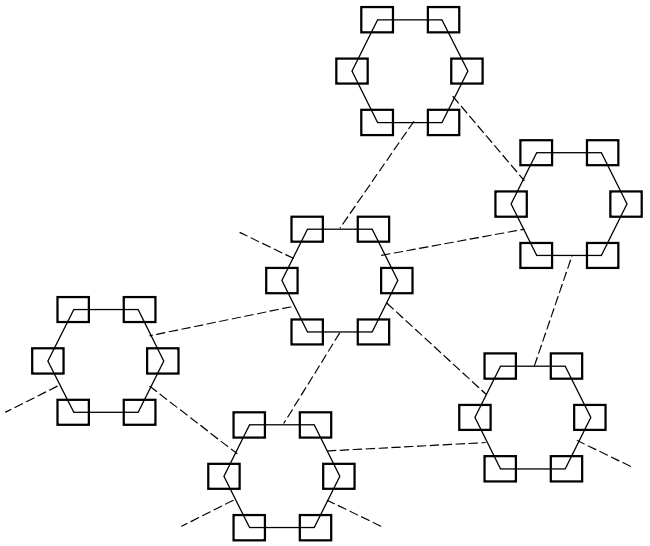
In addition to intelligent controls, Active Buildings manage their interaction with wider energy networks, e.g. demand side response, load shifting & predictive control methods, aiming to minimise uncontrolled import or export of energy by effectively utilising the storage assets.





Active Building Case Studies

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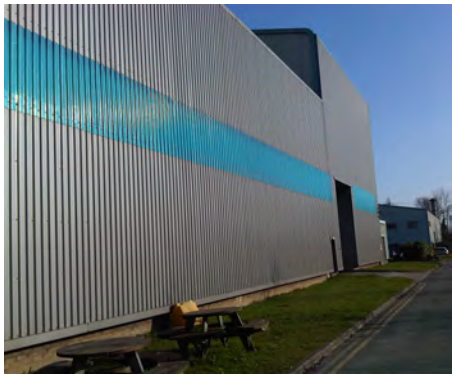
The Active Pod
2014

The Active Classroom
2016

The Active Office
2018

The Active SHED
2012 - 2020



Collaborative Projects

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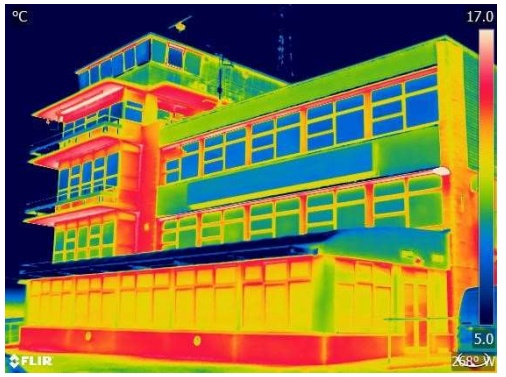
Active Rail Shelter
2020

Demand Side Response
2020

Thermographic Survey
2019



Building Performance

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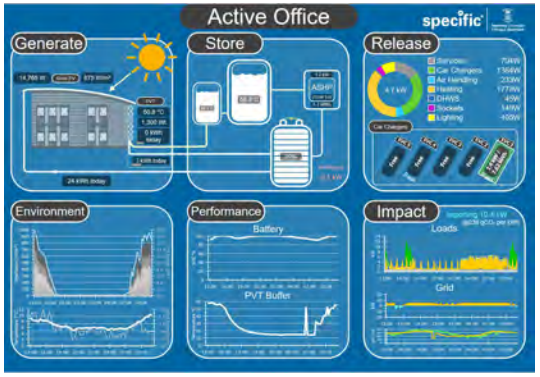
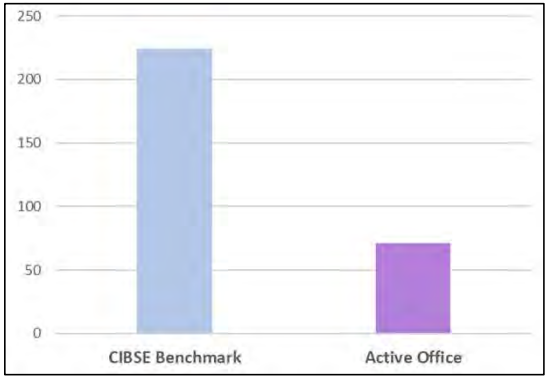
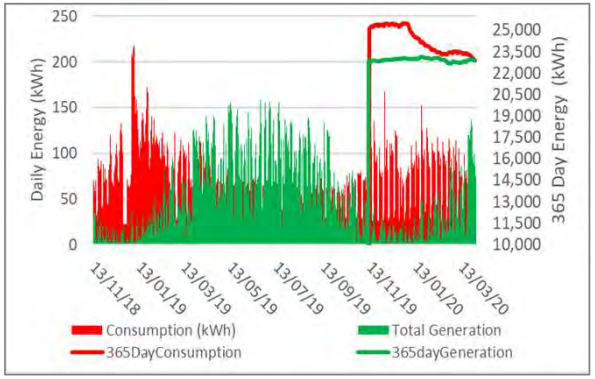
Robust installation and commissioning of all building services is critical to realise the true benefits of an Active Building. Post-installation, data on performance is captured and used to optimise performance in a continuous improvement loop

Data Capture → **Feedback** → **Improved performance**







Data visualisation provides a useful tool to engage building occupants with their energy consumption

Key Rules

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- Consult Active Building Toolkit at Stages 0 - 7
- Ensure all members of project design and delivery team are aware of project goals
- Uphold collaboration within project team
- Complete installation and commissioning checklists
- Maintain clear and regular communication – keep a project record using Active Building Template

- Do not allow anyone to work on an Active Building project until Active Building Induction has been viewed
- Do not sign off project until Commissioning Checklist complete and signed off

Key Documents

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For reference:

- Active Building Code of Conduct
- Active Building Glossary
- Active Building Design Guide
- Active Building Frequently Asked Questions
- Active Building Technology Showcase
- Active Classroom Case Study
- Active Office Case Study

To complete:

- Active Building RIBA Plan of Work Checklists
- Active Building Project Template
- Active Building Commissioning Checklist
- Active Building Handover Pack

Key Contacts

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Technical

Dr Justin Searle
Technology Director

Dr Richard Lewis
Electrical and Smart Systems

Dr Bruce Philip
Thermography and Heating Systems

Joanna Clarke
Architectural Design

Business Development

Chris Bailey
Business Development

Dr Mark Spratt
Business Development

Communications

Sharon Bishop
Comms & Engagement

Ella Newington
Marketing

Project Management

Dr David Bould
ERDF Operation Manager

Sophie Phelps
Project Impact Officer

Key Recommendations

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1. Always remember the key outcomes of an Active Building project:
   - To reduce energy consumption and carbon emissions
   - To optimise generation of heat and electricity with storage assets to ensure minimised uncontrolled import and export of energy
   - To support the grid network through intelligent controls and energy storage
   - To deliver whole life value

2. Join Supply Chain Sustainability School (SCSS) for access to free training resources to improve your knowledge on sustainability in buildings

3. Sign up to a Climate Emergency Declaration:
   - UK Architects Declare
   - UK Building Services Engineers Declare
   - UK Contractors Declare

Partner Projects

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Prifysgol Abertawe
Steel and Metals Institute
Sefydliad Dur a Metelau

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ATiP

Thank you for watching

Good Luck for a successful Active Building Project

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