



# Active Buildings

10<sup>th</sup> January 2019

**Joanna Clarke**

Architect & Building Integration Manager



info\_specific



ActiveBuildings



GenerateStoreRelease



# specific<sup>®</sup>

Led by



Swansea University  
Prifysgol Abertawe

Funders

## EPSRC

Engineering and Physical Sciences  
Research Council

We work with  
**Innovate UK**



Strategic Partners



**NSG**  
GROUP

**TATA STEEL**



generate



store



release

## Functional Coatings



## Buildings as Power Stations

Applied R&D



Proof of Concept



Scale Up



System  
Integration



Building  
Integration



Demonstration



Science &  
Innovation Campus



Baglan Bay  
Innovation Centre



PMRC Pilot  
Manufacturing  
Research Centre



SHED Solar Heat  
Energy  
Demonstrator



Active  
Classroom

An **Active Building** is described as *“a building which integrates solar generation and storage technologies for both electricity and heat within its construction, and which is controlled by an intelligent system to optimise energy management and comfort for inhabitants. Active Buildings aim to be net energy generators and have the potential to utilise the surplus energy to trade.”*

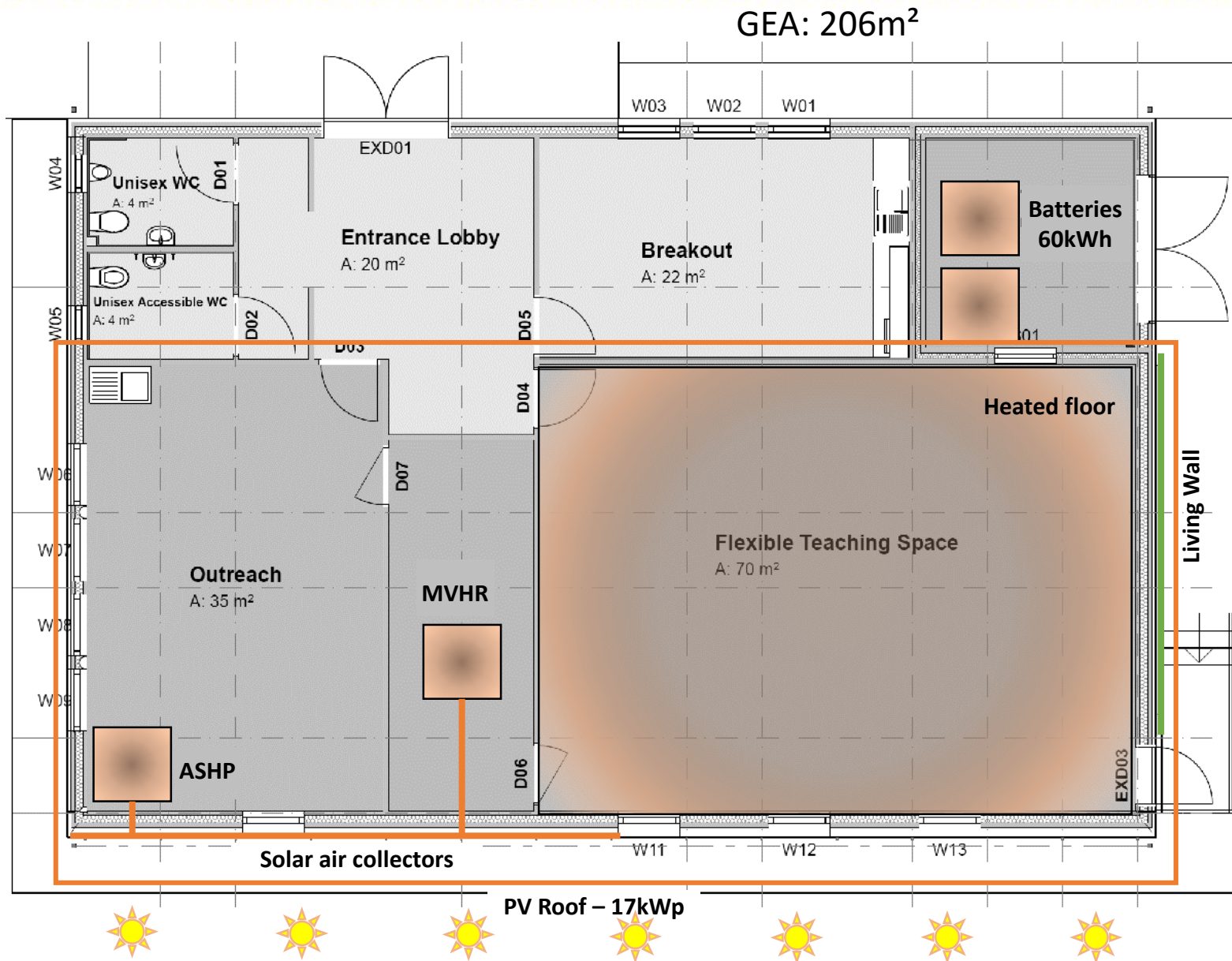
# Active Building Case Studies



# Case Study 1: The Active Classroom



# Layout



# PV & Battery Technologies



Renewable energy generation ~17kW Photovoltaic panels

- Building integrated, low voltage
- Thin film on Prisma coated Tata Colorcoat Urban®



Aqueous Hybrid Ion Battery storage

- 2x 30kWh Aquion M-Line battery modules, *Cradle-to-Cradle* certified

# Heat Generation & Storage



Two transpired solar air collectors, Tata Colorcoat Renew SC<sup>®</sup>:

- Air Source Heat Pump
- Mechanical Ventilation Heat Recovery



Thermal Storage:

- Inter-seasonal heat storage developed at SPECIFIC with Tata to be incorporated into the heating system next year

# Building Integrated Heated Floor



- Conductive coating on Prisma coated steel sheeting
- 8 Zones each with reconfigurable power output



# Case Study 2: The Active Office

26<sup>th</sup> October 2017



## 3 Primary Aims:

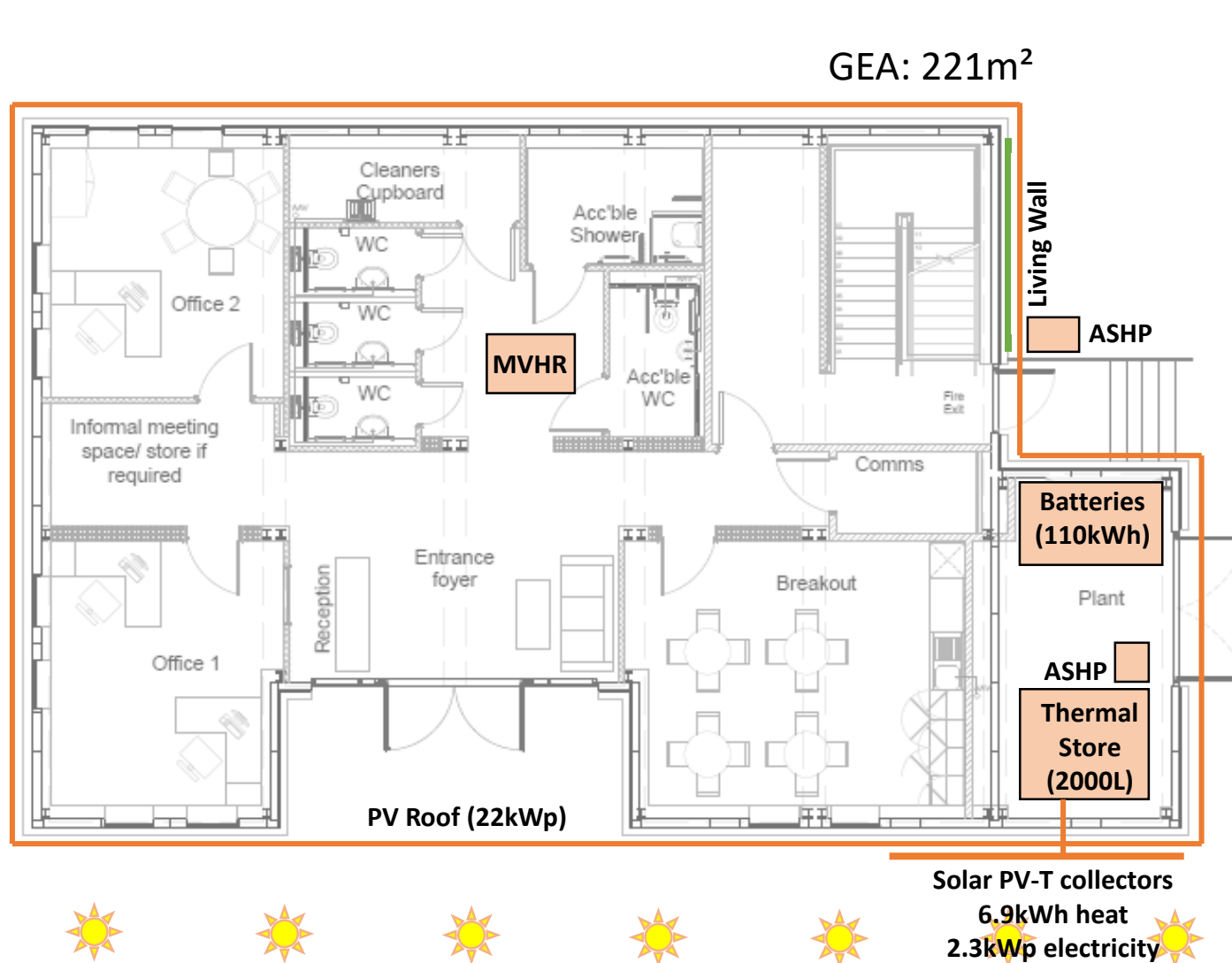
- Active Building
- Repeatable
- Commercially available, innovative technology, integrated to optimise the operation of the building

Once finished the office will be occupied by up to 40 staff.

The Active Office will be linked to its Active Classroom building – an existing space which provides teaching space and a laboratory for Swansea University students, as well as a building-scale development facility for SPECIFIC and its industry partners.



# Layout – ground floor





24<sup>th</sup> January 2018 - Groundworks



28<sup>th</sup> February 2018 – Roof truss installation



28<sup>th</sup> March 2018 – PV Roof Installation

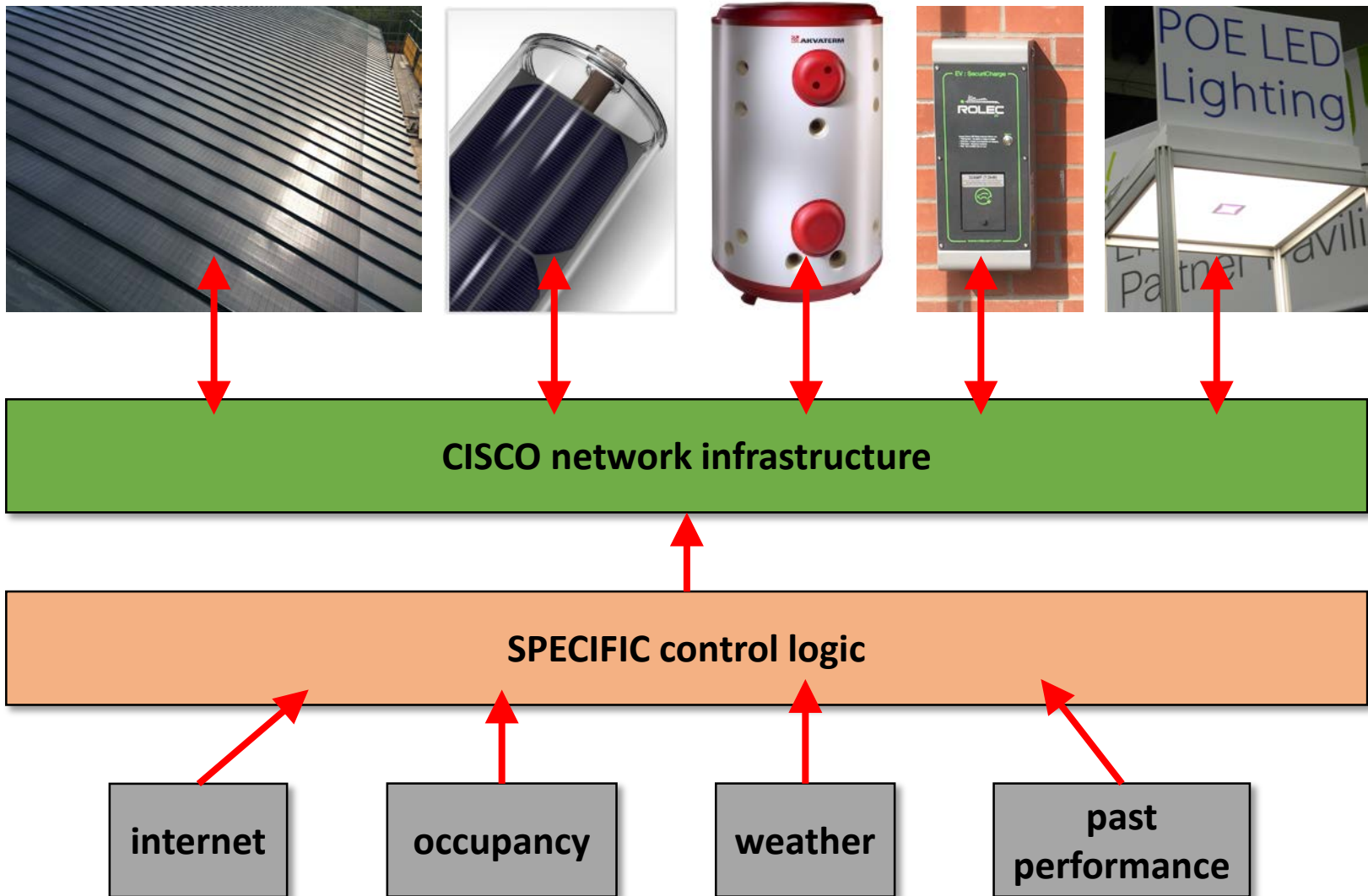


20<sup>th</sup> April 2018 – PV Roof complete

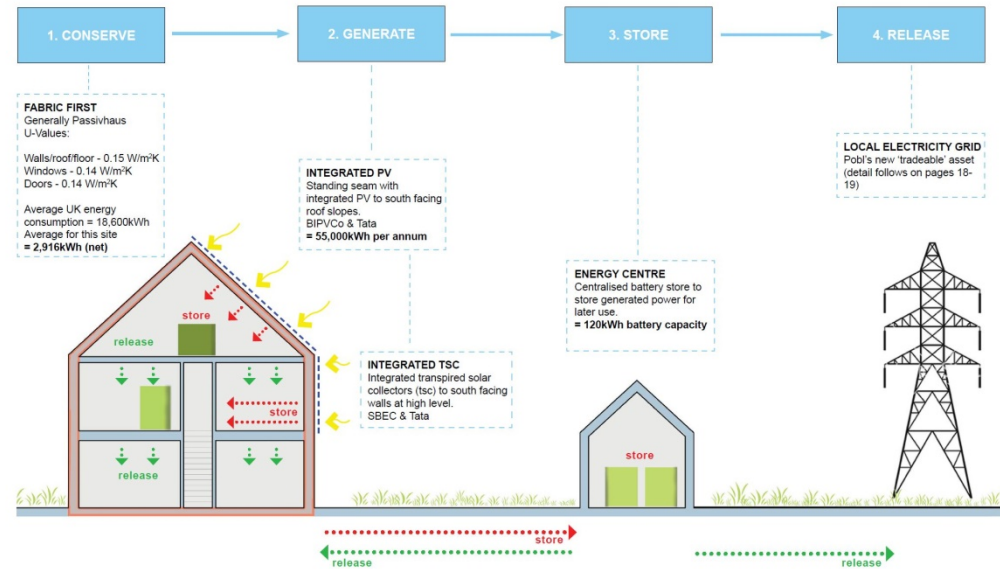


8<sup>th</sup> June 2018 – Building complete!

# Technology Elements



# Active Homes Neath





## UK-funded 'homes as power stations' project to bring solar-storage to Indian villages



The energy-positive classroom at the Swansea University Bay Campus (photo: Swansea University)

Consortium led by Swansea University awarded £7m government funding to trial solar-storage technology in India

A Swansea University-led consortium has been awarded £7m in UK government funding to demonstrate solar homes capable of generating and storing their own electricity in several remote Indian villages. ...

Announced August 2017

**£7m of funding from the Global Challenges Research Fund set up by RCUK – a project led by Swansea University and involving 12 UK and Indian universities - to build five self-sufficient solar-powered buildings in remote Indian villages.**

**Project Scope:** Prepare a design for a three-bedroom Active House using the draft 'Code of Practice for designing Active Buildings' and with reference to two case study buildings - the Active Classroom and the Active Office.

**Project Objectives:** to design an Active House that integrates solar energy generation technologies for both electricity and heat within its fabric and energy storage, with the aim of being a net energy generator. Key design considerations:

- Orientation
- Shading
- Building form – affects heating demand
- Renewable energy generation technologies
- Energy storage
- Fabric efficiency
- Materials – sustainability, sourcing, life cycle
- Use of local supply chains
- Control systems
- Value/Life cycle costing