



Active Classroom

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Led by



Swansea University
Prifysgol Abertawe

Funders

EPSRC

Engineering and Physical Sciences
Research Council

Innovate UK

Technology Strategy Board



Strategic Partners



TATA STEEL



Generate



Store

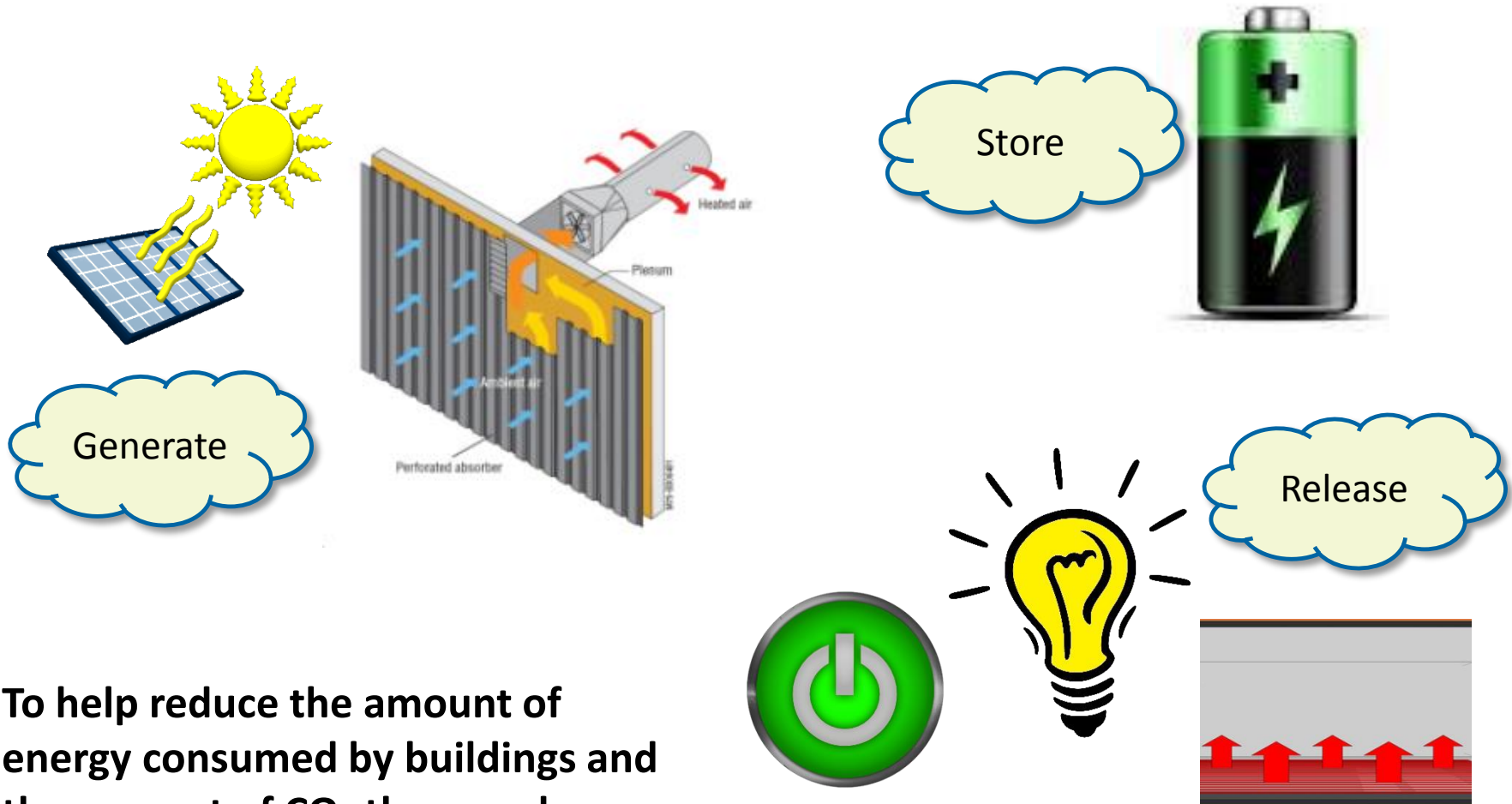


Release

Why?

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Ambition: turn Buildings into Power Stations



To help reduce the amount of energy consumed by buildings and the amount of CO₂ they produce

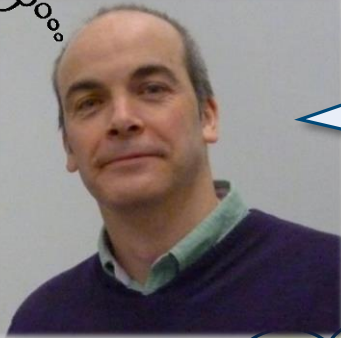
Why?

- Scale up of research
- Collaboration with industry
- Reduce energy use in buildings using innovative solutions

**High
Risk**



The Active Classroom



Let's build our
own demonstrator
building

Provide a valuable
teaching resource
for university

Enable us
to help UK
companies

Develop new
systems with
companies

Showcase new
products and
technologies

Demonstrate
our scale up
research work

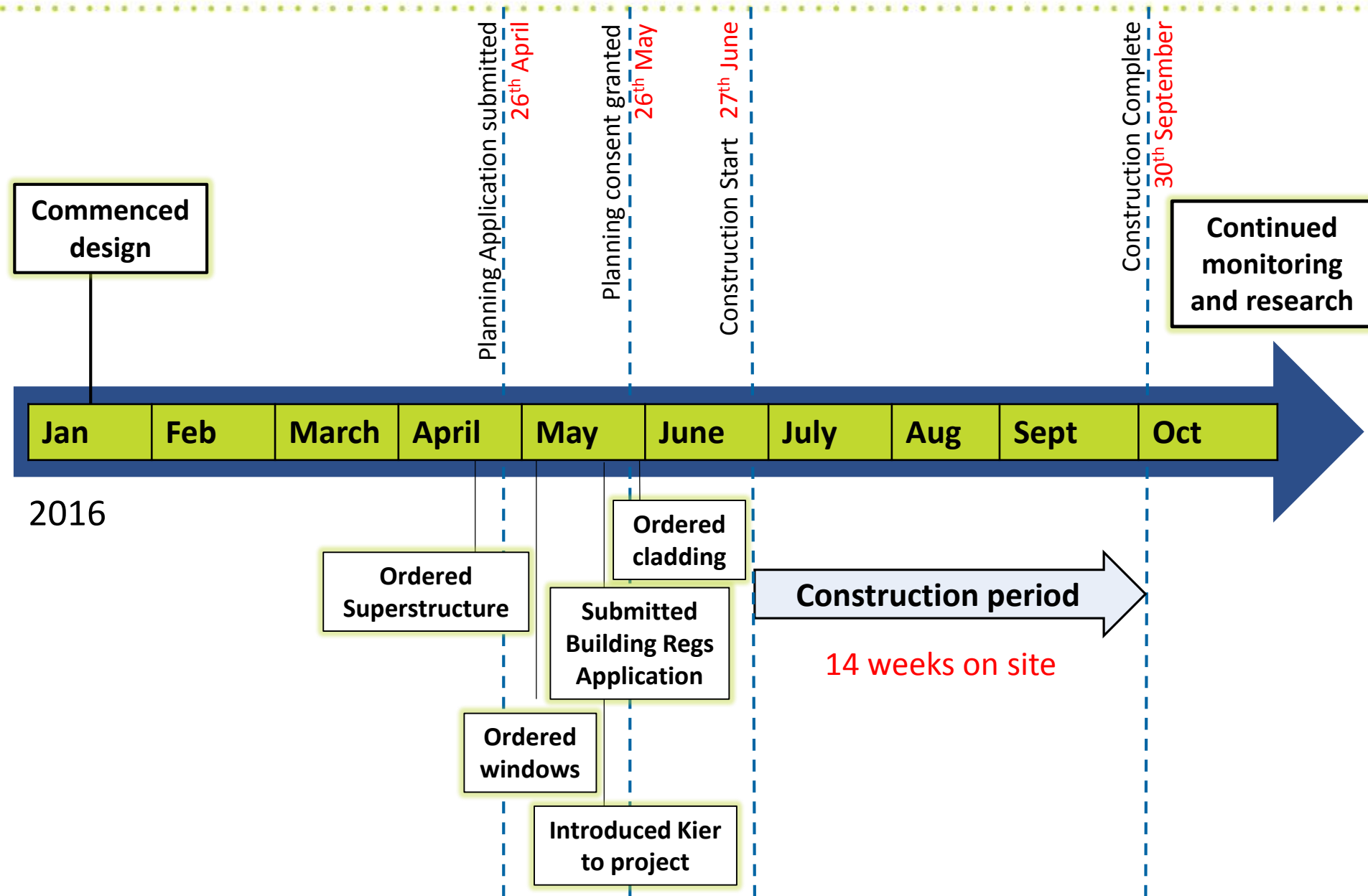
Test and prove
new technologies

Integrate with
construction
industry

Gather data to feed
back to research
and to industry

Develop principles
to use on future
buildings

Timescales



Design for Deconstruction

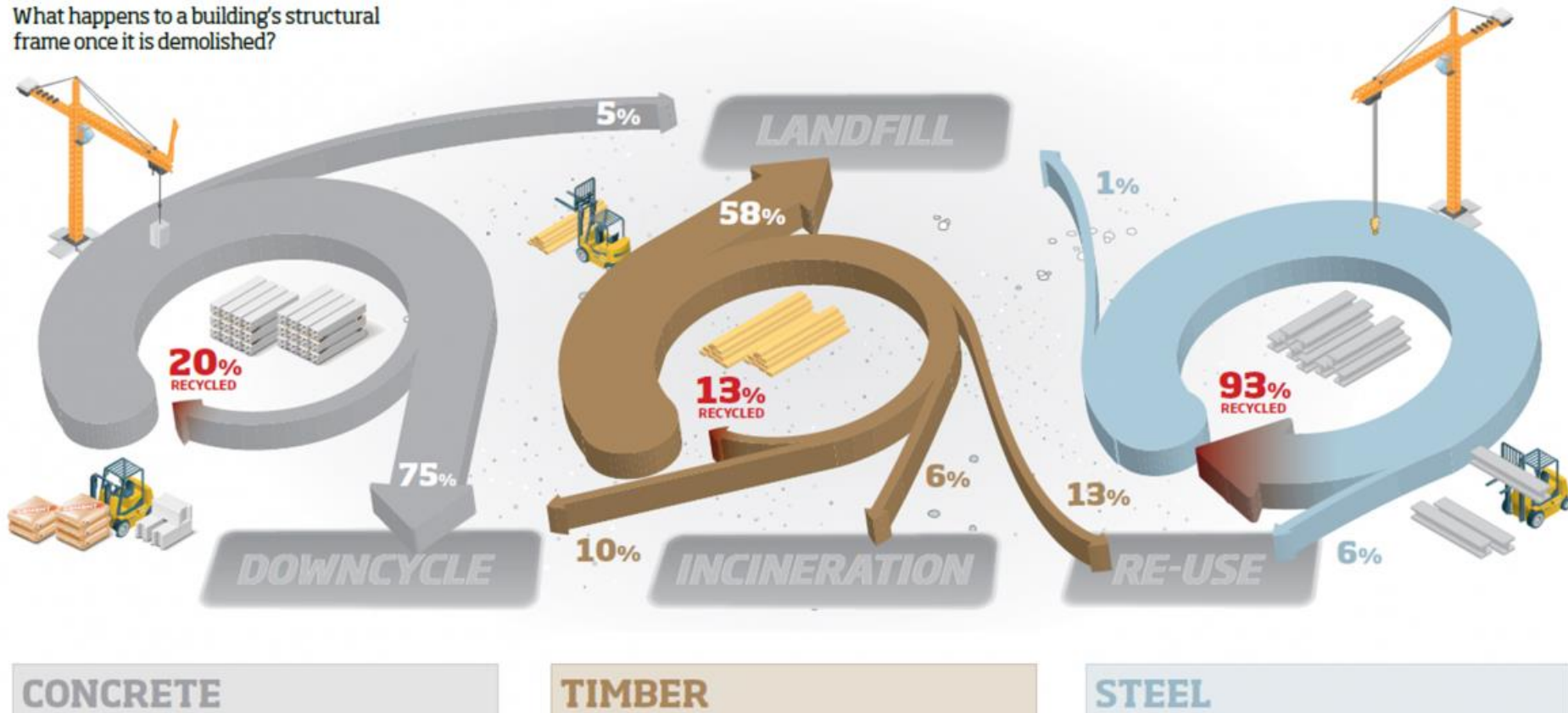
1. Design for prefabrication, preassembly and modular construction
2. Simplify and standardise connection details
3. Simplify and separate building systems
4. Consideration of worker safety - reduce potential hazards and use of hazardous materials
5. Minimise building parts and materials
6. Select fittings, fasteners, adhesives, sealants etc that allow for disassembly
7. Design to allow for deconstruction logistics
8. Reduce building complexity
9. Design with reusable materials
10. Design for flexibility and adaptability

High steel content

screw piles, building base, superstructure, external wall cladding, roof cladding, internal wall linings, underfloor heating system

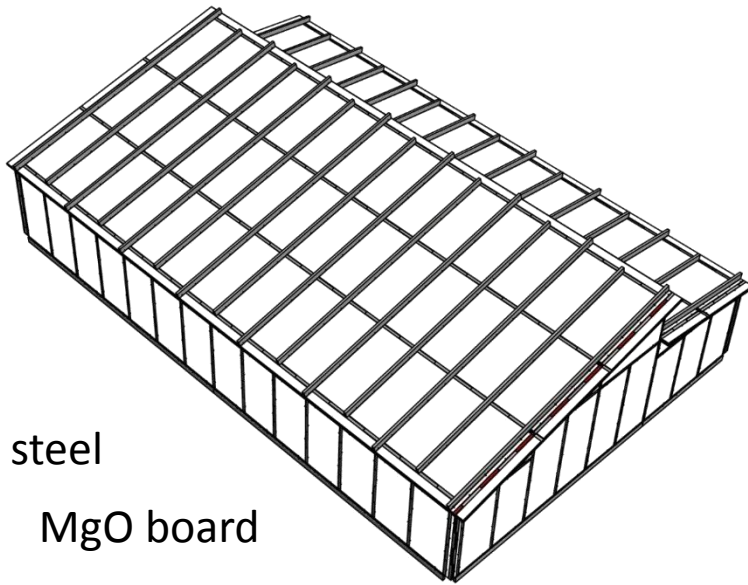
END-OF-LIFE SCENARIOS

What happens to a building's structural frame once it is demolished?





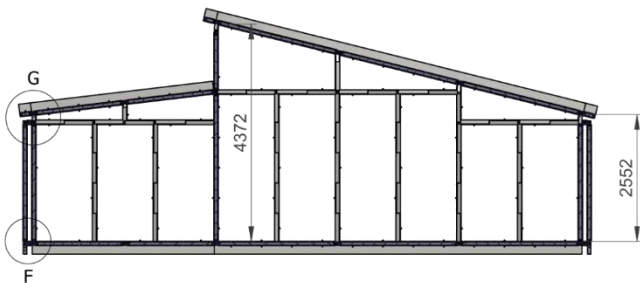
What the future's built on



steel

MgO board

EPS insulation



E-E (1 : 50)

New construction method – lightweight, steel framed interlocking panels forming walls, floors and roof



Benefits of Off-site Panel Construction



What the future's built on

- * Tight tolerances (u-values, air tightness)
- * Quick to assemble, able to meet tight deadlines
- * Easy to handle – size of panels and lightweight
- * Availability of materials – building of houses using traditional construction techniques continues to be delayed due to lack of materials and skilled labour
- * Less waste of materials
- * Reduced on-site costs
 - speed of construction – less time on site; less delays due to inclement weather;
 - less transport issues: fuel costs, vehicle movements in and around the site, traffic congestion, pollution; less storage space needed on site; method of assembly – less mistakes and re-working necessary; ease of demolition
- * Clean assembly
 - cleaner construction sites; less wet trades; less cutting; less dust; less noise
- * Quality controlled – design, manufacture and installation by one company in a factory environment, using operatives trained in how to use the system
- * Opportunity for growth in UK manufacturing and associated training programmes

Design Stage

- * Importance of Communication
- * Clear Scope of Works and co-ordinated information
- * Programme and programme review throughout all stages
- * Structural design



What the future's built on

Manufacturing and Assembly Stage

- * Quality control
- * Sequencing of operations
- * Numbering of panels for ease of transport and erection on site

Construction Stage

- * Panel manufacture complete before site works commence
- * Transport considerations – distance from site, loading/off-loading, local storage
- * Enough site operatives, including trained operatives where needed
- * Health and Safety – RAMS
- * Method of construction
- * Detailing and sealing of the structure

Collaboration



TATA STEEL



Brand new cladding colours

High steel content throughout building
– 16 tonnes in superstructure alone

Two transpired solar collectors
integrated into south facade



New Coretinium wall panels



Collaboration

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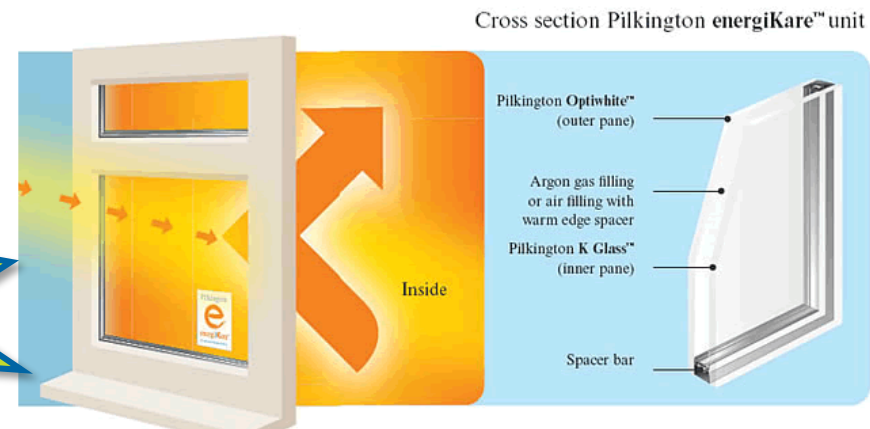
NSG
GROUP

Pilkington
e
energiKare™

Supplied all the glass for our windows



Brand new
PV window





First BIPV Co roof in the UK – generating approx. 17kWp of electricity

Solar Plants

Renewable Energy for Your Future

Their off-grid team worked with our Electrical Engineers, Richard and Tom, to assist with the design and installation of the solar to storage connectivity, working with Victron controllers and Aquion Salt Water battery technology



WIND & SUN
Powering the future

Since 1984



Biodiversity

specific®

Featured on
BBC
Newsround!

Living Wall

- Modular
- Manufactured in the UK from 80% recycled materials and is 100% recyclable
- Provides a wildlife habitat and improves biodiversity – working with our sustainability team to grow suitable species – adjacent to Crymlyn Burrows SSSI
- Protects the building façade
- Regulates temperature
- Improves air quality
- Reduces noise
- Links with the community



Integral bird boxes



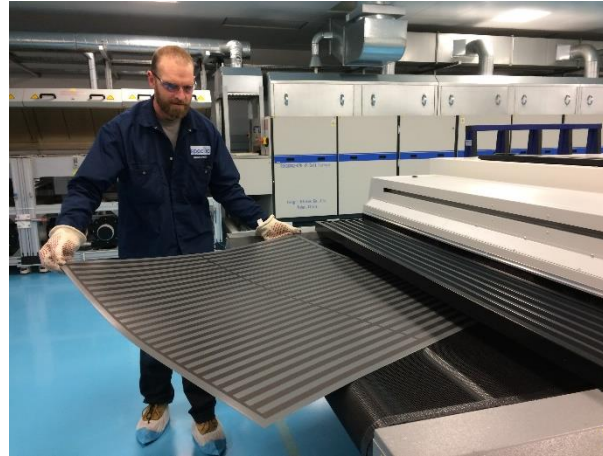
The Heated Floor



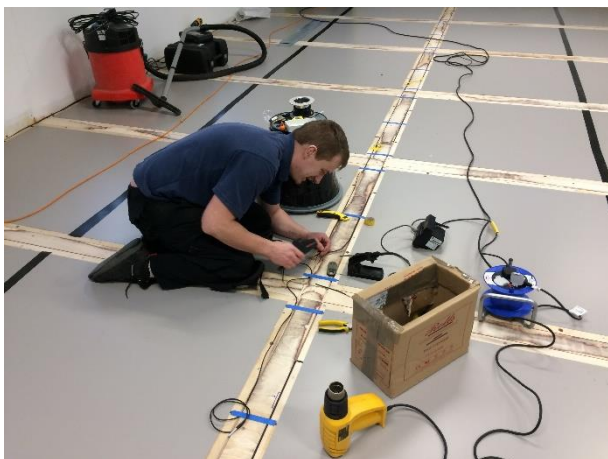
Ink development



Printing metal sheets



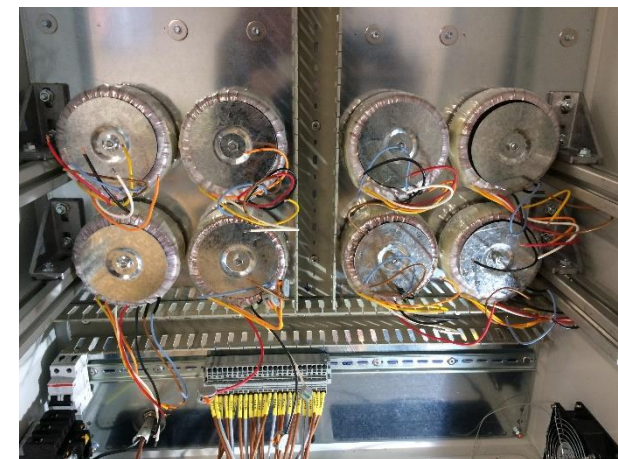
Laying electrical braids and temperature sensors
Laying printed metal sheets



Connecting cables

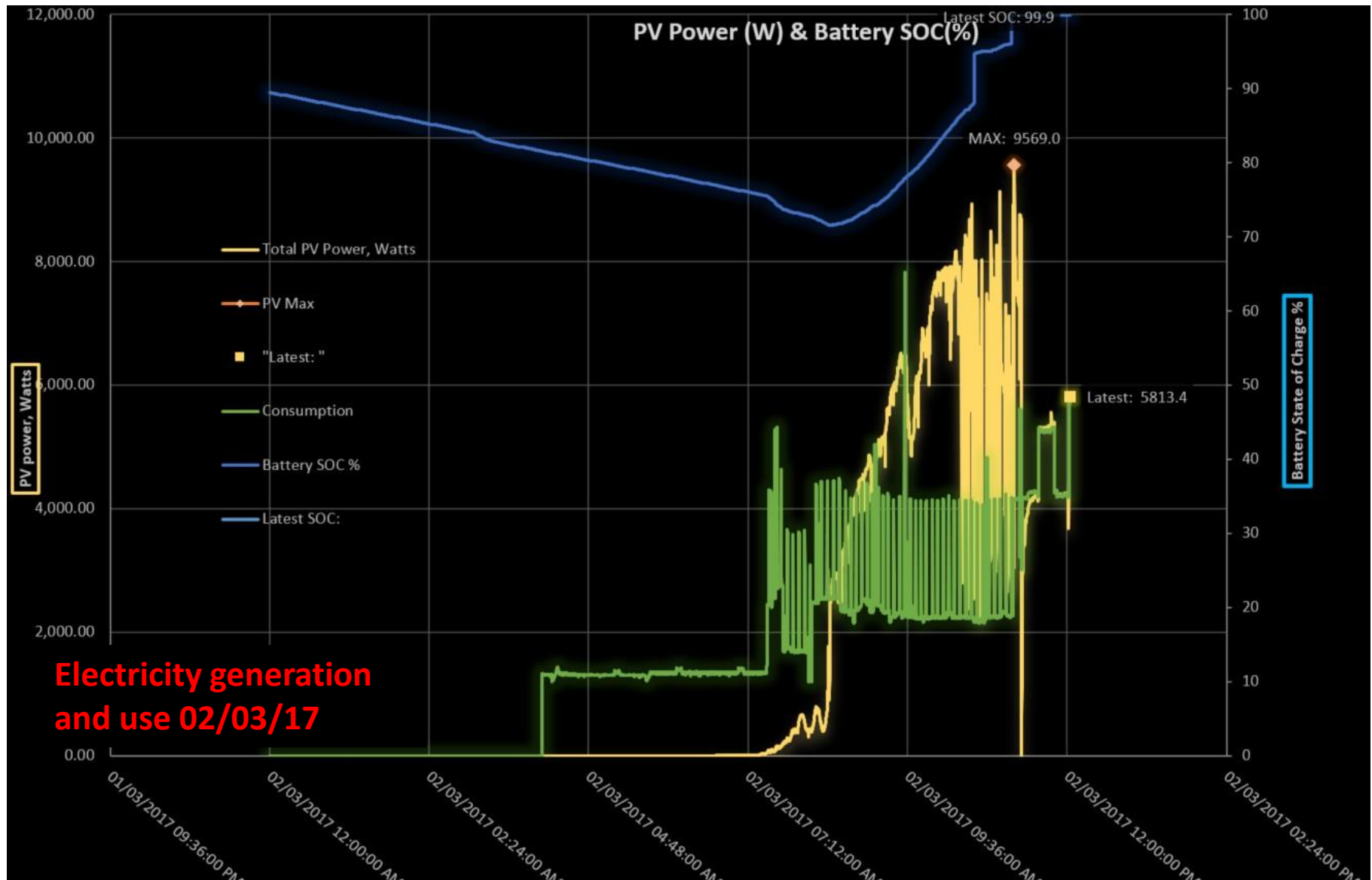


Securing edges



Making the control panel

In Action.....



Thank you for listening

specific[®]

Any questions

