

# Designing Active Buildings

Joanna Clarke, Active Building Centre

Kindly sponsored by



VELUX®



mpa  
The Concrete Centre



always the  
best climate zehnder

GHA 2019 Conference: Delivering Net Zero and Future Homes

Tuesday 19<sup>th</sup> November 2019

# Agenda



Active  
Building  
Centre



UK Research  
and Innovation



- Introduction to Active Buildings
- Transforming Construction and the Active Building Centre
- The 6 Active Building Principles
- Active Building Case Studies
- Future Work to Enable Change

Kindly sponsored by

**VELUX**



always the  
best climate

**zehnder**

**GHA 2019 Conference: Delivering Net Zero and Future Homes**

Tuesday 19<sup>th</sup> November 2019

# Introduction to Active Buildings



Active  
Building  
Centre



UK Research  
and Innovation



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



Kindly sponsored by



always the  
best climate **zehnder**

**GHA 2019 Conference: Delivering Net Zero and Future Homes**

Tuesday 19<sup>th</sup> November 2019

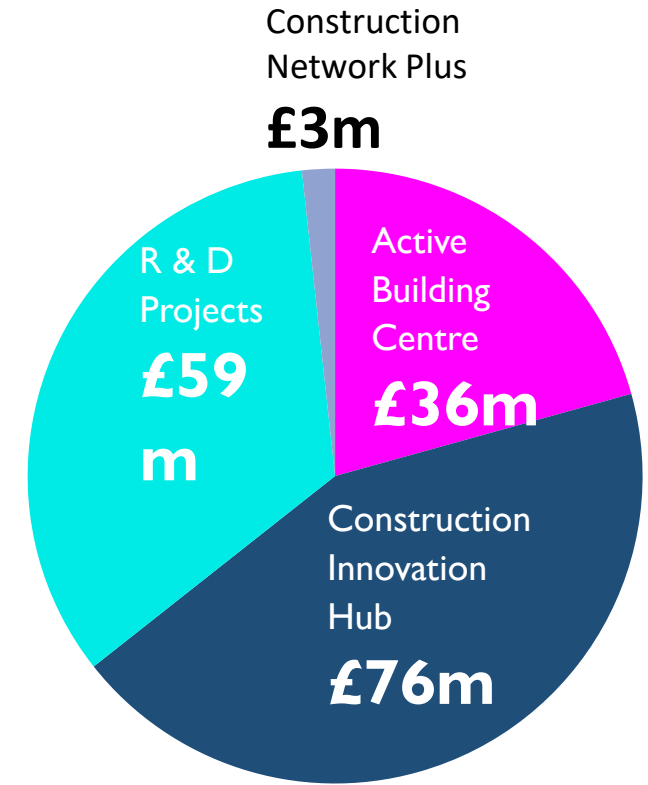
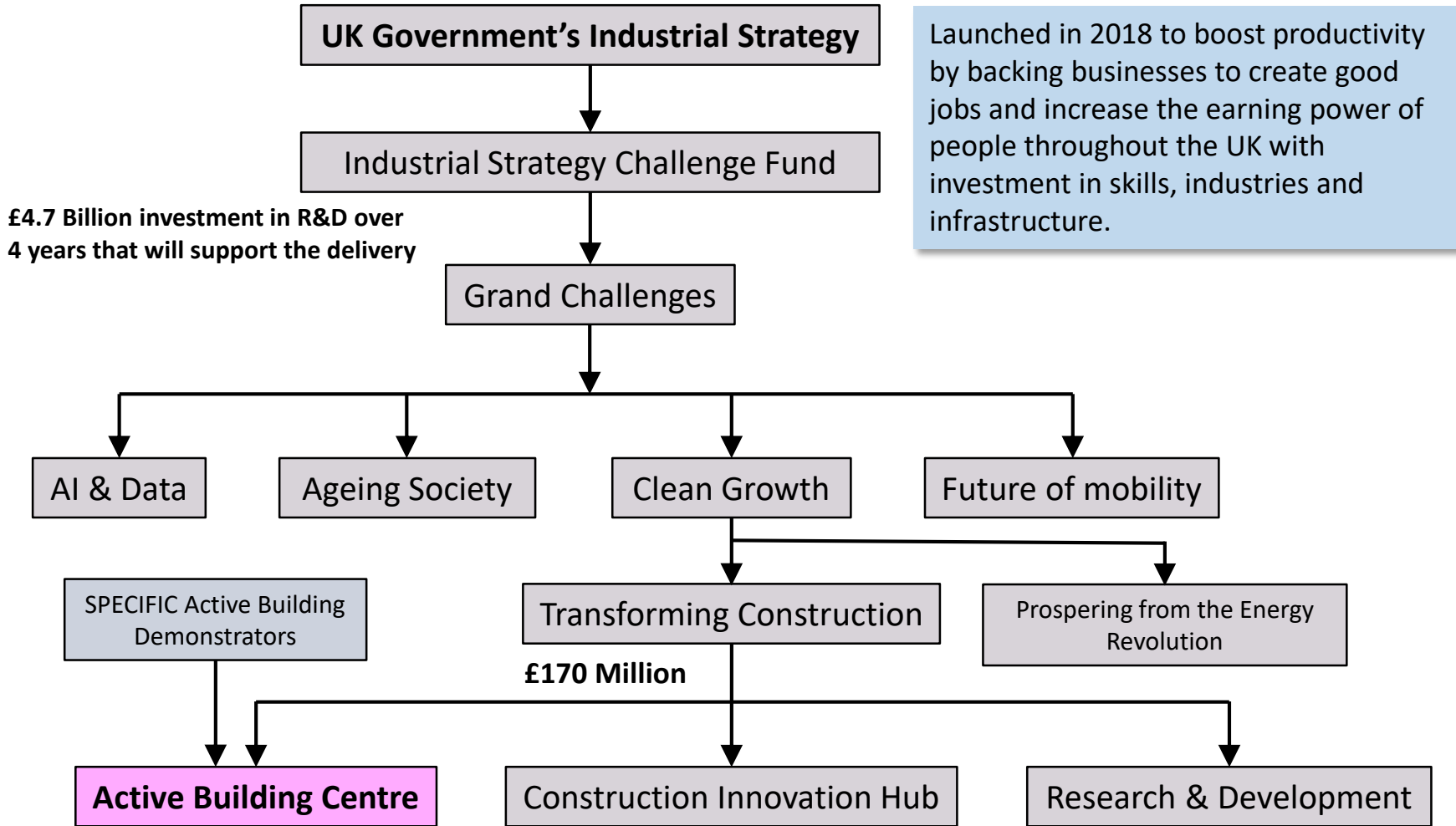
# Transforming Construction



Active Building Centre



UK Research and Innovation



Kindly sponsored by



always the best climate **zehnder**

GHA 2019 Conference: Delivering Net Zero and Future Homes

Tuesday 19<sup>th</sup> November 2019

# The Active Building Centre



Active  
Building  
Centre



UK Research  
and Innovation



**Vision:** To transform both the UK **Construction** and **Energy** sectors through the deployment of Active Buildings, significantly contributing to both vehicle electrification and decarbonization targets, through creating an independent national centre to convene **industry, academia** and **government** to enable the deployment of Active Buildings



Kindly sponsored by



GHA 2019 Conference: Delivering Net Zero and Future Homes

Tuesday 19<sup>th</sup> November 2019

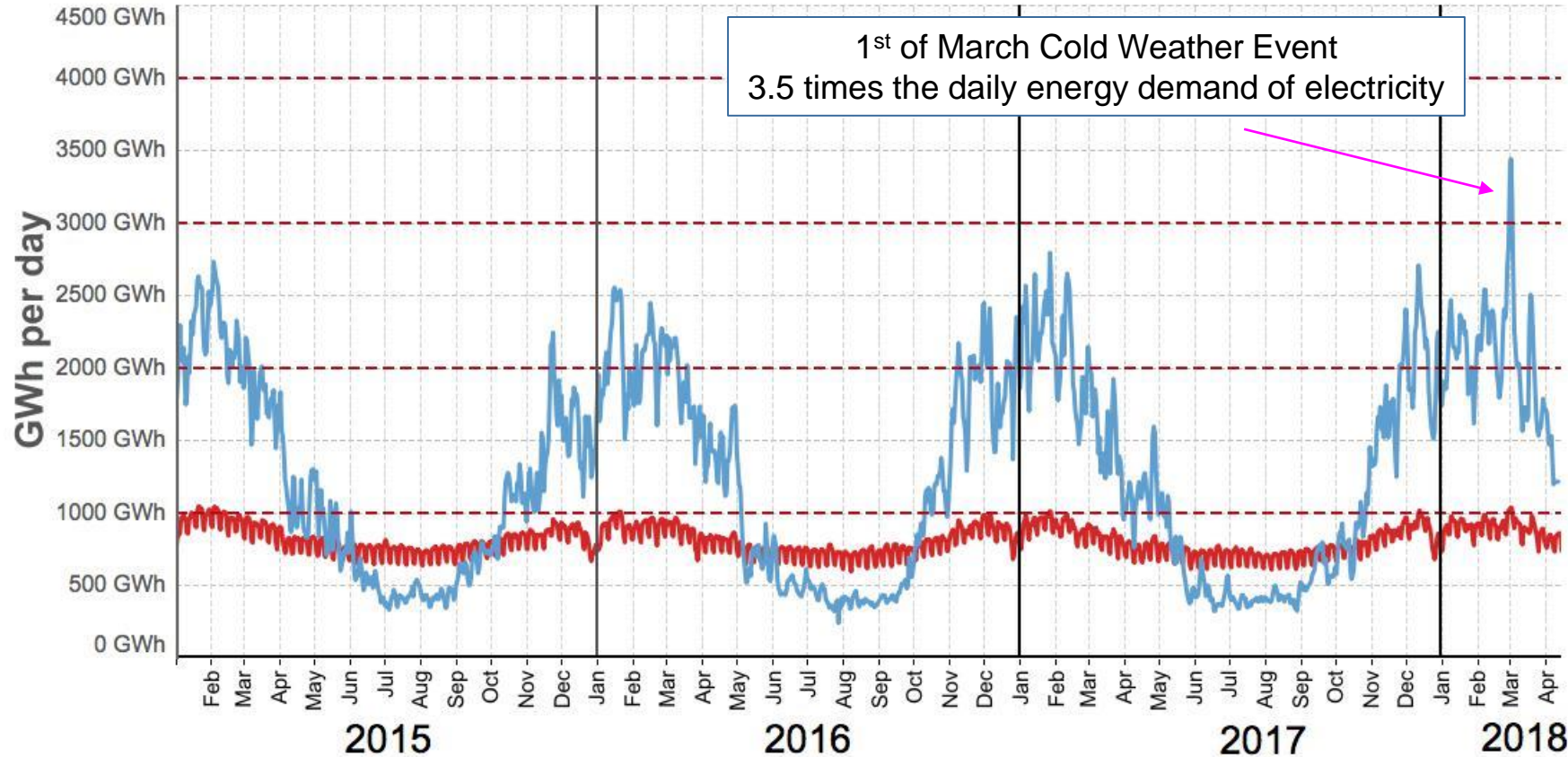
# The Energy Challenge



Active Building Centre



UK Research and Innovation



More than 8 tonnes CO<sub>2</sub> emissions per person per year in UK

40% from Buildings

Data are from National Grid, Elexon and BEIS. Charts are licensed under an Attribution-NoDerivatives 4.0 International license  
Charts can be downloaded from <http://bit.ly/energycharts>



by Dr Grant Wilson grant.wilson@sheffield.ac.uk

Kindly sponsored by



GHA 2019 Conference: Delivering Net Zero and Future Homes

Tuesday 19<sup>th</sup> November 2019

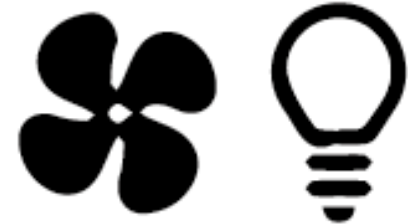
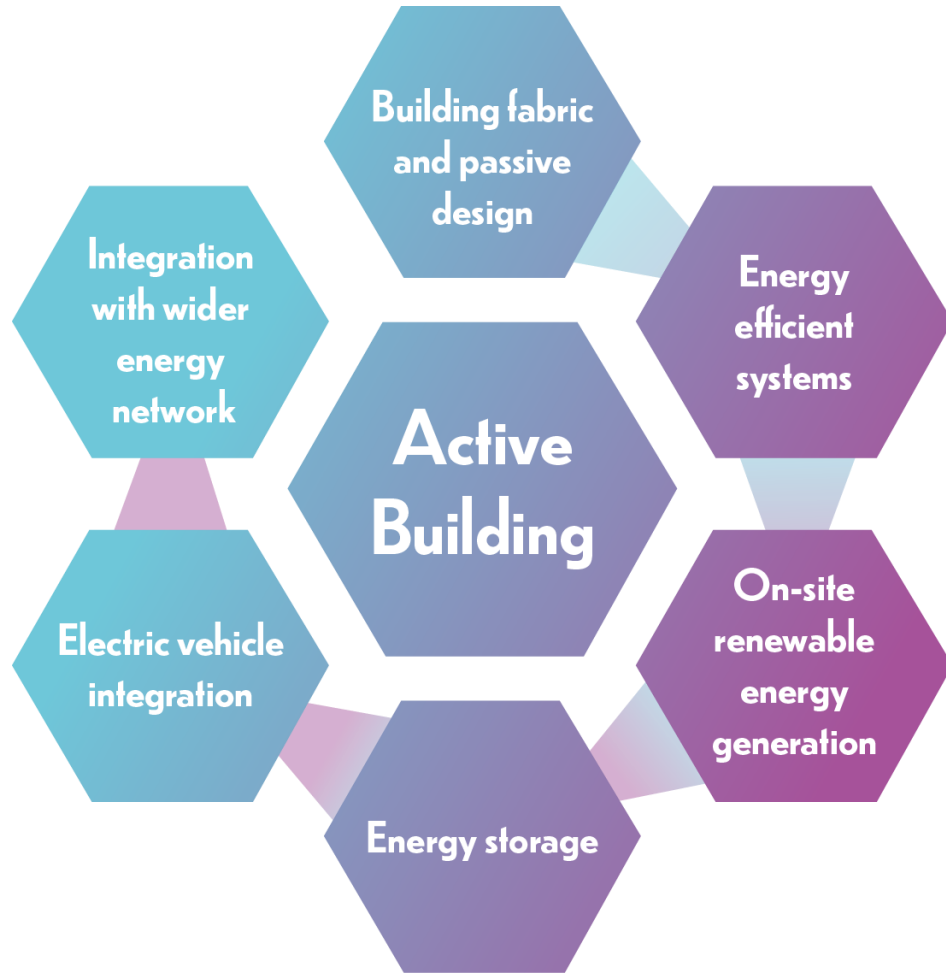
# The 6 Active Building Principles



Active Building Centre



UK Research and Innovation



Kindly sponsored by



GHA 2019 Conference: Delivering Net Zero and Future Homes

Tuesday 19<sup>th</sup> November 2019

# Active Building Case Studies



Active Building Centre



UK Research and Innovation



Jan – Sept 2014



The Active Pod

Jan – Sept 2016



The Active Classroom

Oct 2017 – June 2018



The Active Office

Dec 2015 – Nov 2019



Active Homes

Kindly sponsored by



GHA 2019 Conference: Delivering Net Zero and Future Homes

Tuesday 19<sup>th</sup> November 2019



# The Active Classroom



Active Building Centre

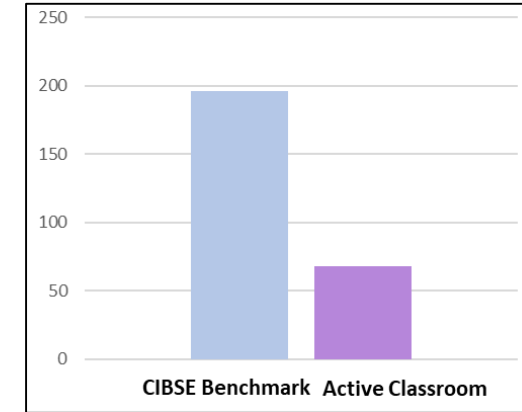
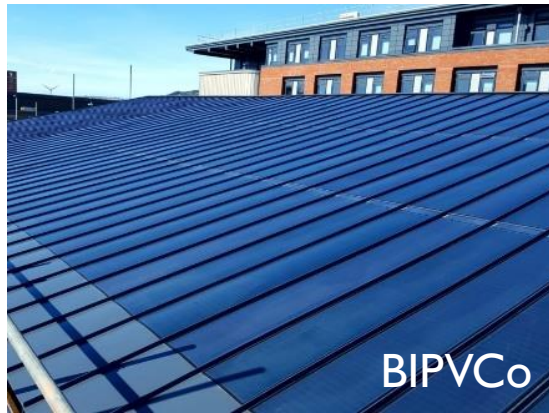


UK Research and Innovation



## Key Facts

- Constructed in 2016
- Solar PV, solar thermal, battery storage, novel resistive heating system, new form of construction
- Generated 5.5MWh excess electricity 2017–2018 (enough to travel 26,000 miles in a Nissan Leaf)



Kindly sponsored by



GHA 2019 Conference: Delivering Net Zero and Future Homes

Tuesday 19<sup>th</sup> November 2019

# The Active Office



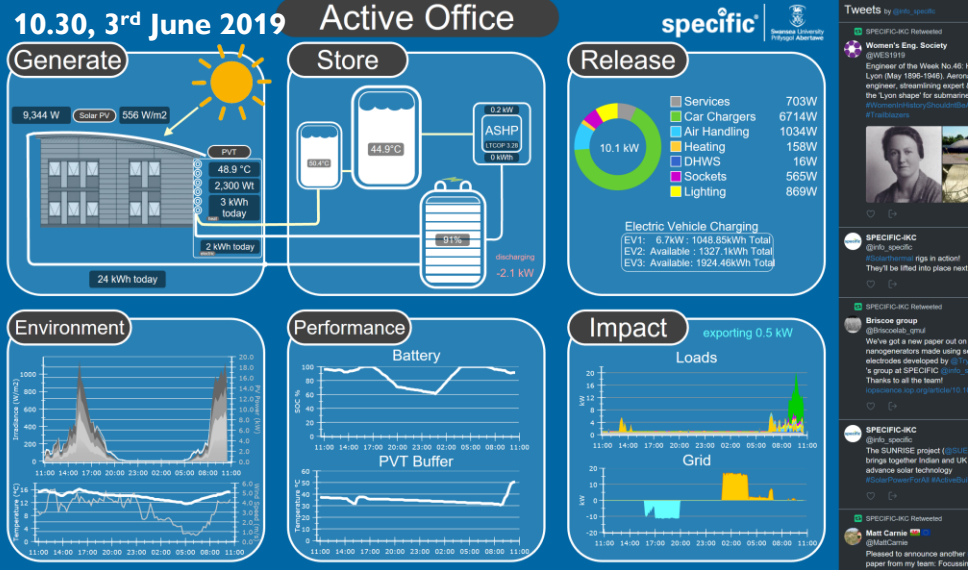
Active Building Centre



UK Research and Innovation



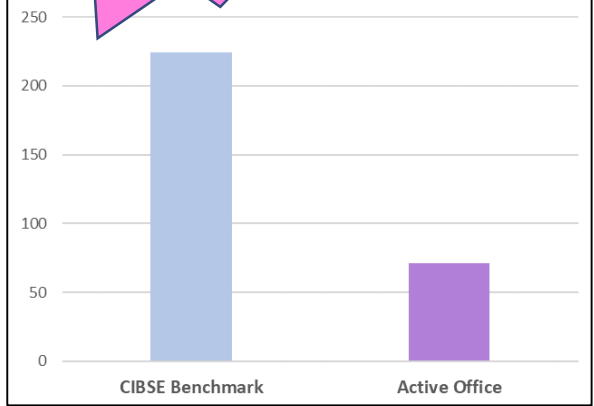
specific®



## Key Facts

- Constructed in 2018
- Solar PV (curved profile), combined solar thermal and PV (PV-T), battery storage, thermal store
- Data collection
- Optimised and predictive controls

3.5 times lower carbon emissions



Kindly sponsored by



# Active Homes Neath



Active Building Centre



UK Research and Innovation



## Key Facts

- Constructed 2018 - 2019
- Solar PV, solar thermal, battery storage, EV charging, ASHPs, MVHR
- 16 dwellings for social housing tenants – main aim to reduce fuel poverty
- BEIS Building for 2050 monitoring for 1 year occupation



Kindly sponsored by



GHA 2019 Conference: Delivering Net Zero and Future Homes

Tuesday 19<sup>th</sup> November 2019

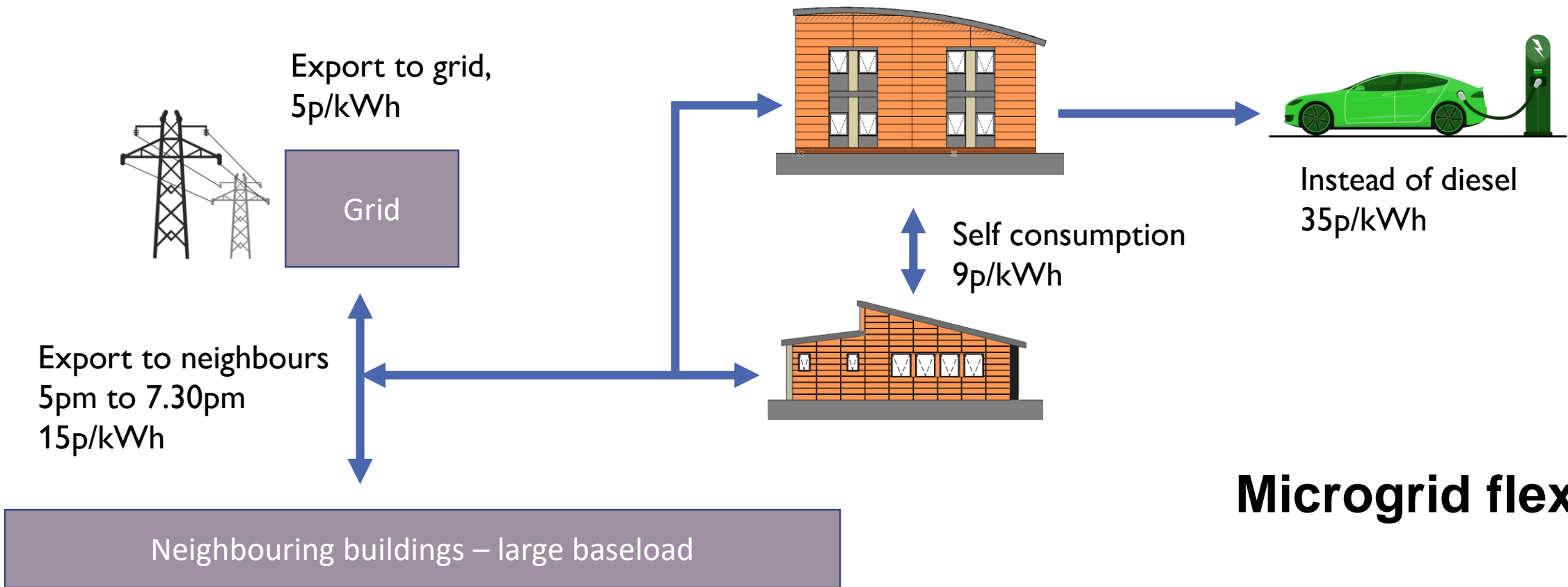
# Integration with Energy Networks



Active Building Centre



UK Research and Innovation



## Microgrid flexibility

Kindly sponsored by



GHA 2019 Conference: Delivering Net Zero and Future Homes

Tuesday 19<sup>th</sup> November 2019

# Integration with Energy Networks



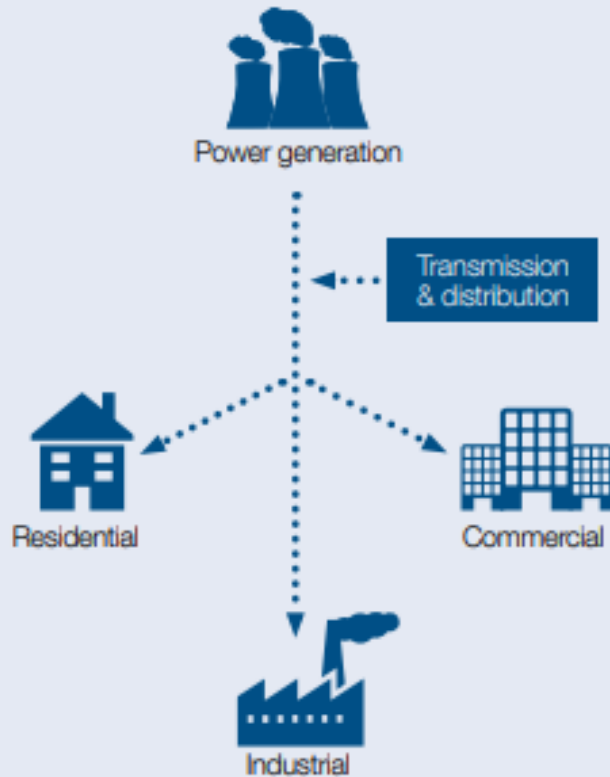
Active Building Centre



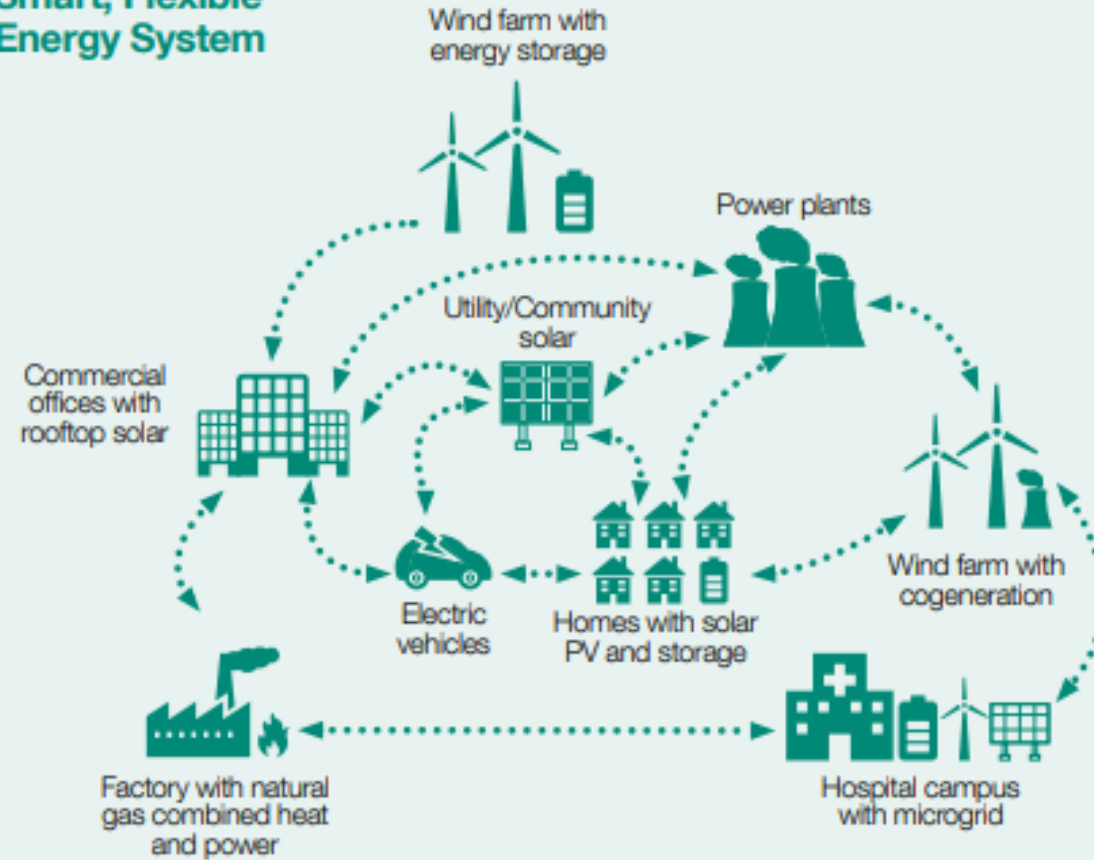
UK Research and Innovation



## Traditional one-way power system



## Smart, Flexible Energy System



Kindly sponsored by



always the best climate zehnder

GHA 2019 Conference: Delivering Net Zero and Future Homes

Tuesday 19<sup>th</sup> November 2019

# Further Work to Enable Change



Active  
Building  
Centre



UK Research  
and Innovation



- Active Building Design Guide
- Performance specifications
- More Active Building demonstrators
- Database of Active Buildings – Building Performance Evaluation (BPE) data
- Whole Life Costing – prove the Business Case
- Life Cycle Assessments (carbon)
- Education – skills and training
- Policy and regulatory changes

Kindly sponsored by



always the  
best climate



**GHA 2019 Conference: Delivering Net Zero and Future Homes**

Tuesday 19<sup>th</sup> November 2019

[joanna@activebuildingcentre.com](mailto:joanna@activebuildingcentre.com)



@ActiveBuildingC  
@joanna\_r\_clarke

[www.activebuildingcentre.com](http://www.activebuildingcentre.com)

[www.designingactivebuildings.blog](http://www.designingactivebuildings.blog)