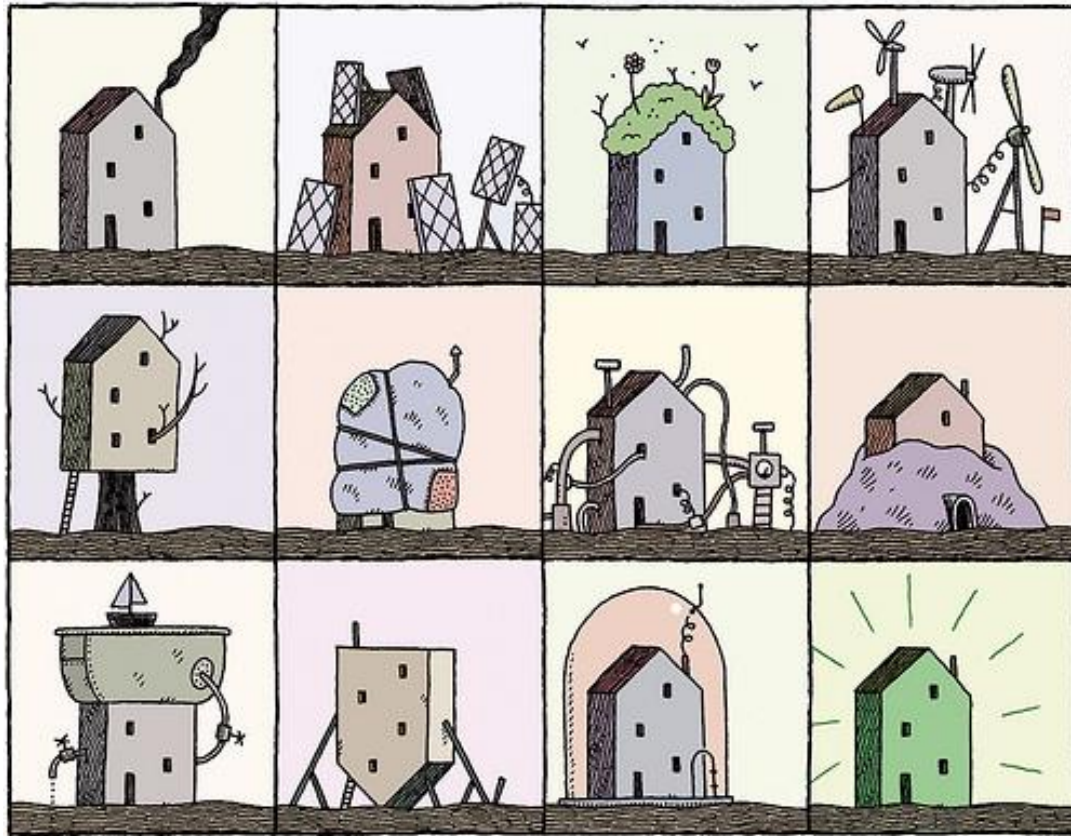


Green Homes - Image used with the kind permission of Tom Gauld



www.tomgauld.com/

Resilience, Retrofit and the Suffolk Sustainability Institute

Dr Alison Pooley
Research Fellow
a.pooley@uos.ac.uk

**“BUILDINGS DON'T
USE ENERGY
PEOPLE DO”**

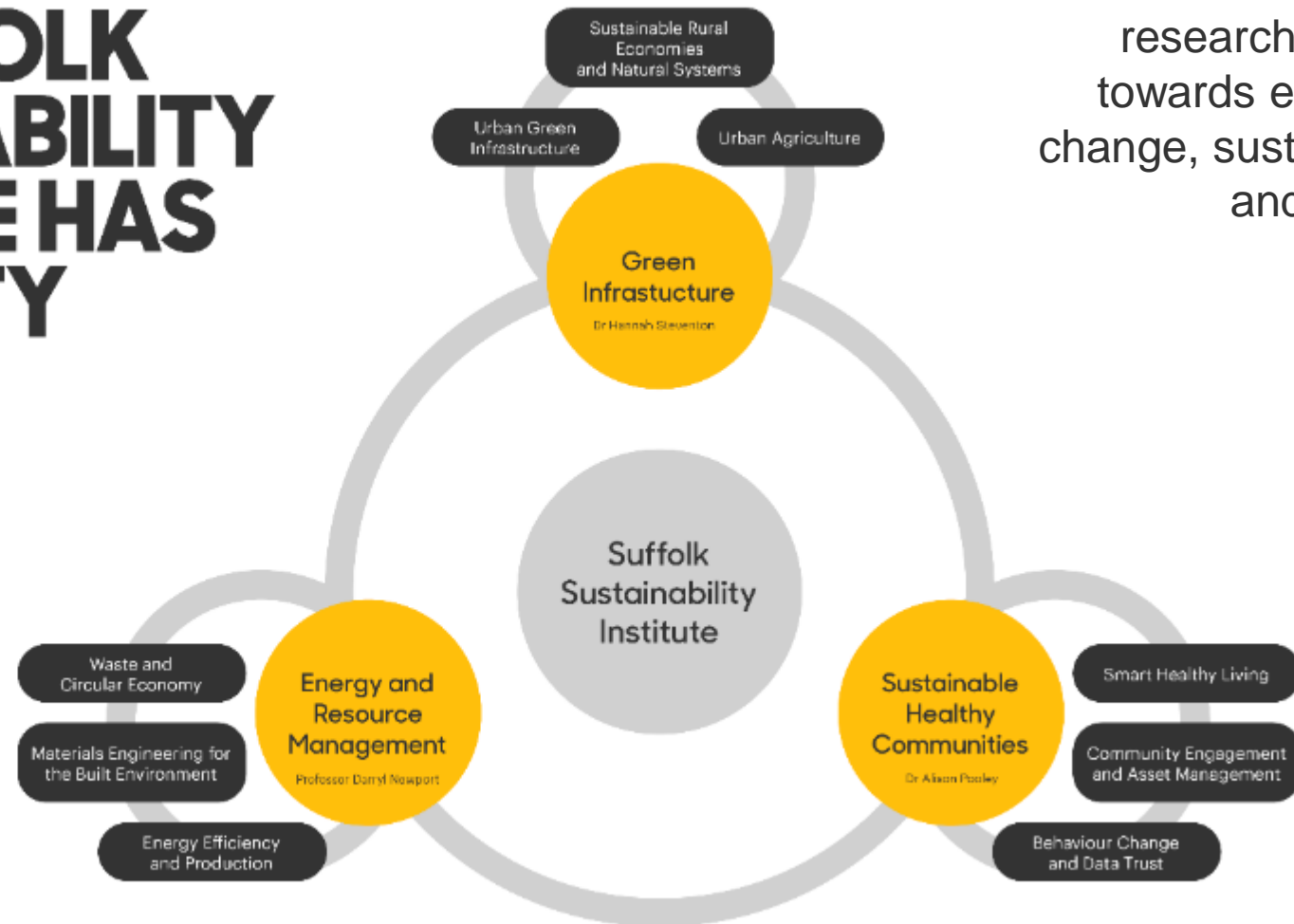






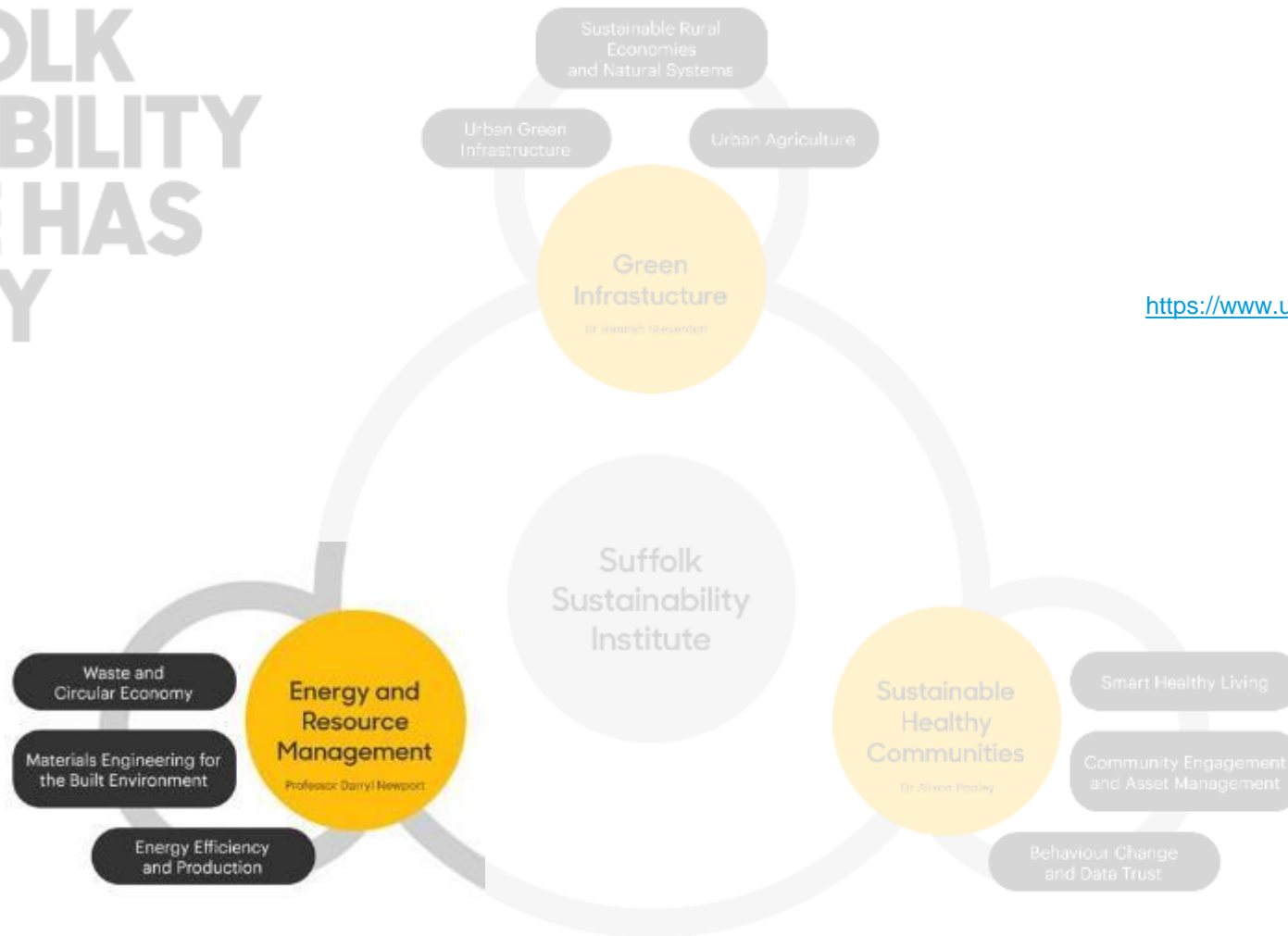
I DON'T BELIEVE IN
GLOBAL WARMING
GLOBAL WARMING
I DON'T BELIEVE IN

THE SUFFOLK SUSTAINABILITY INSTITUTE HAS 3 PRIORITY THEMES



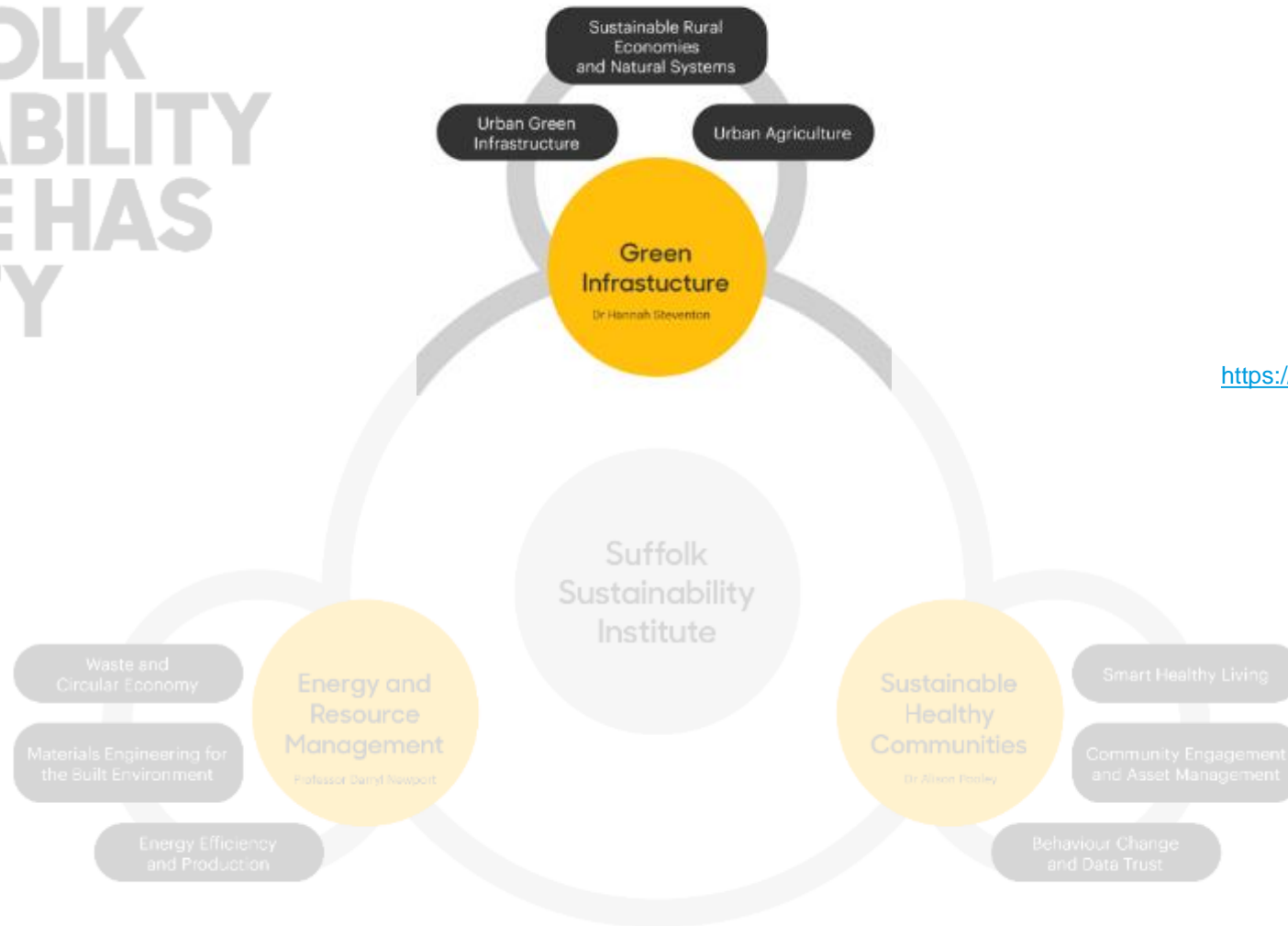
To contribute to, and lead on, quality research, training, and innovation towards effective action on climate change, sustainable use of resources and a healthy environment.

THE SUFFOLK SUSTAINABILITY INSTITUTE HAS 3 PRIORITY THEMES



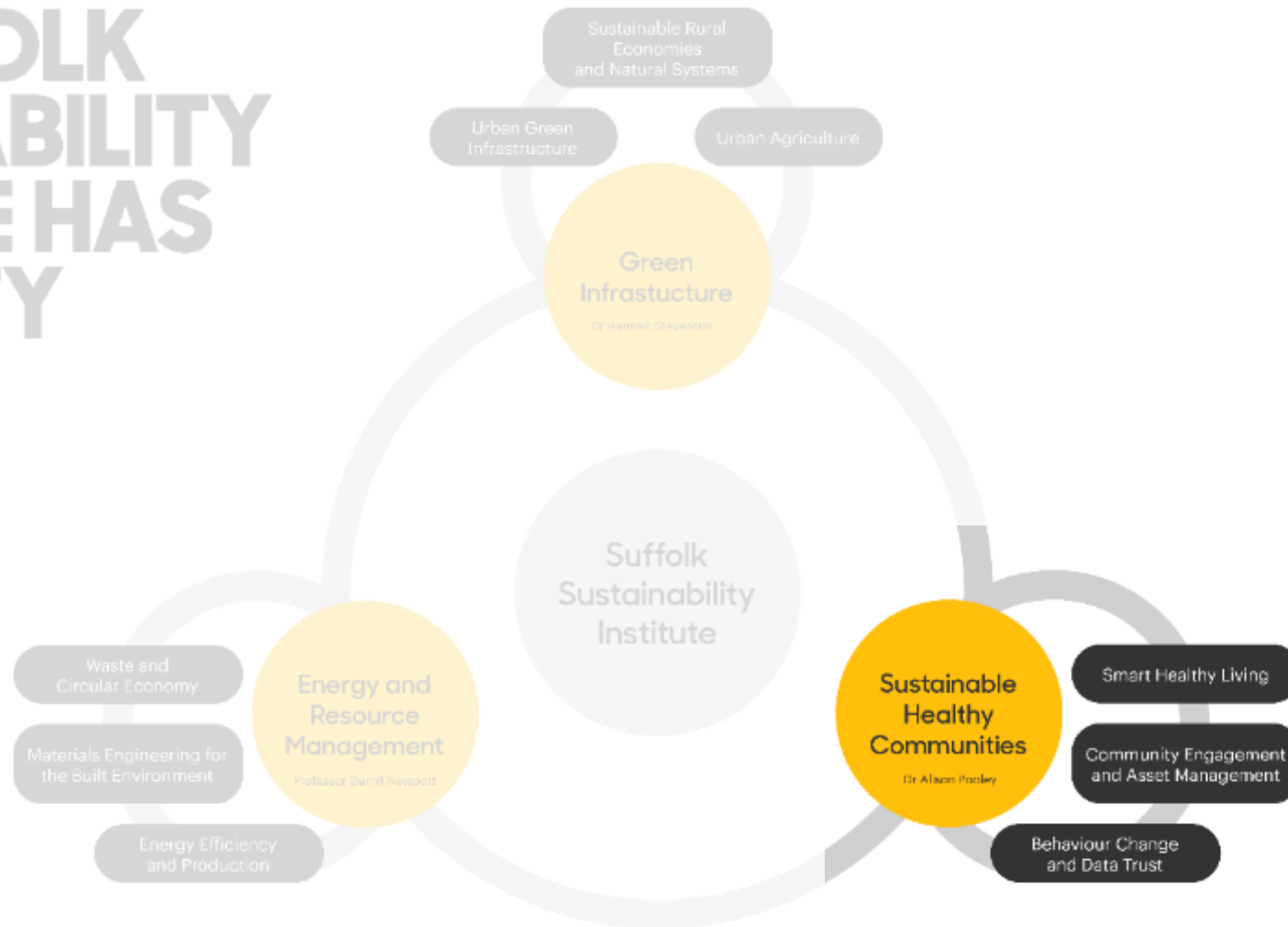
<https://www.uos.ac.uk/people/professor-darryl-newport>

THE SUFFOLK SUSTAINABILITY INSTITUTE HAS 3 PRIORITY THEMES



<https://www.uos.ac.uk/people/hannah-steventon>

THE SUFFOLK SUSTAINABILITY INSTITUTE HAS 3 PRIORITY THEMES



24 November 2022

University of Suffolk

Image: studio manifest



- Two storey starter home
- Student collaboration
- Showcasing opportunity for sustainability conscious build
- MMC
- Garden studio

Image: Hannah Steventon



Image: Hannah Steventon

University of Suffolk Smart House:
Developing a facility for
interdisciplinary collaborative
sustainability research in an
innovative domestic environment

DiSH (Digitech Smart House)

- Research in, on and around the house
- Including:
 - Connected devices/IoT
 - Student projects – ecology/architecture/engineering
 - Embodied carbon and whole life costing
 - Environmental technology – energy supply and generation
 - Sensors for daily living
 - Energy monitoring and data gathering
 - Materials technology/application
 - Retrofitting/adaptation
 - Air quality
 - Product testing



Image: Hannah Stevenon



Research on the building: Embodied Carbon



<https://www.uos.ac.uk/people/benjamin-powell>



Jemma Jamin

- Embodied carbon associated with materials and construction
- Embodied carbon now often 50%+ of overall carbon footprint
- Smart House designed to reduce embodied carbon
- Initial estimates indicate a carbon saving around 50% (Ben Powell)
- CAT M.Arch student Jemma Jamin validating these figures
- Extending in terms of scalability, resourcing and supply chain



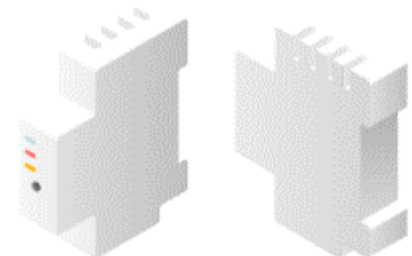


Natural Building Systems

Research on the building: Energy production



- Energy supply and generation
 - Air Source Heat Pump
 - Roof mounted solar panels
 - Mains electricity connection
 - Ground mounted solar panels*
 - Car port with dedicated solar panels and battery storage for ev charging*
 - Heat recovery
- High resolution energy data gathered for appliances



Daily Activity Sensors



- Sensors for daily living activities:
 - Motion sensors
 - Smart plug
 - Contact sensors
- Collect and dashboard data: internal and external
- ZigBee connected
- Remote Digital Twin visualisation

IoT Use Cases - UoS



Air Quality Research

- Particulate matter from domestic burning
- Collaborating with Ipswich Borough Council, DEFRA-funding
- Range of burning materials
- Range of weather conditions
- Indoor and outdoor monitoring



Internet of Things and Data

- Multitude of internal connectivity
 - ZigBee, Thread, LoraWAN, WiFi
 - Ethernet connected
 - 5G backhaul
- Data management processes being developed
 - Dedicated data server
 - Technical processes
 - Information management protocols
- Data Sources: sensors
 - BIM including windows, energy, air quality
 - Motion, activity and appliance use



THREAD



<https://www.uos.ac.uk/people/hannah-steventon>



Building collaborations

- Sustainability
- Community
- Health
- Environment
- Technology and data



Natural
Building
Systems



GLAZE ALARM™



IPSWICH
BOROUGH COUNCIL

MANCHESTER
1824
The University of Manchester



Centre for Alternative Technology
Canolfan y Dechnoleg Amgen

Informetis



Liveable
Cities

SILICON LABS

NEWANGLIA
Local Enterprise Partnership
for Norfolk and Suffolk



1. Cavity wall insulation for easy-to-treat properties
2. Floor insulation for suspended floors
3. Loft insulation for easy-to-treat properties
4. Thermostatic radiator valve heating controls
5. Draught-proofing of single glazed windows
6. Cavity wall insulation for hard-to-treat
7. Full heating controls
8. Internal wall insulation
9. Floor insulation for solid floors
10. Single to double glazing
11. Loft insulation for hard-to-treat
12. External wall insulation



Towards a carbon neutral Suffolk – Sustainable homes

Account for over 25% of CO₂ emissions. 3 goals and 23 actions proposed to reduce them.

Goal 1

Transition to a fully decarbonised heat supply for homes.

Goal 2

Improved energy efficiency of homes.

Goal 3

Behavioural change to use less energy.

5

PRIORITY ACTIONS

1

Maintain and expand existing energy hubs.

2

Retrofit energy efficiency measures to homes in line with PAS 2035.

3

All Suffolk LPAs to develop new policies to require new homes to be built in line with the 2025 Future Homes and PAS 2035 standards.

4

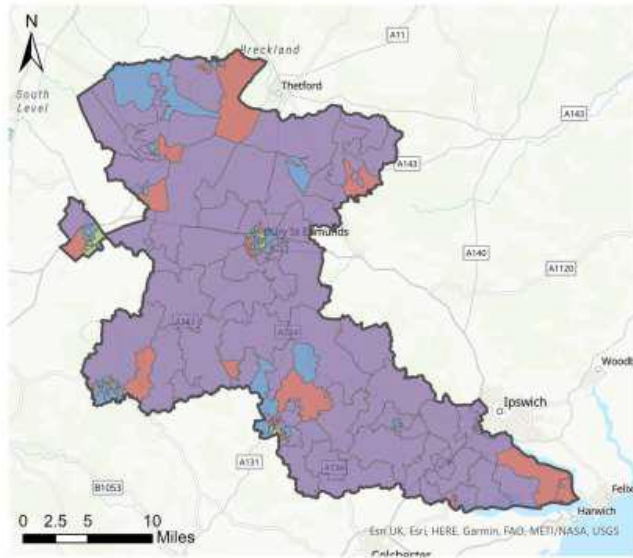
Develop incentives to increase the uptake of heat pumps in private owner-occupied homes.

5

Commission three feasibility studies to establish techno-economic potential for low temperature or ambient loop heat networks

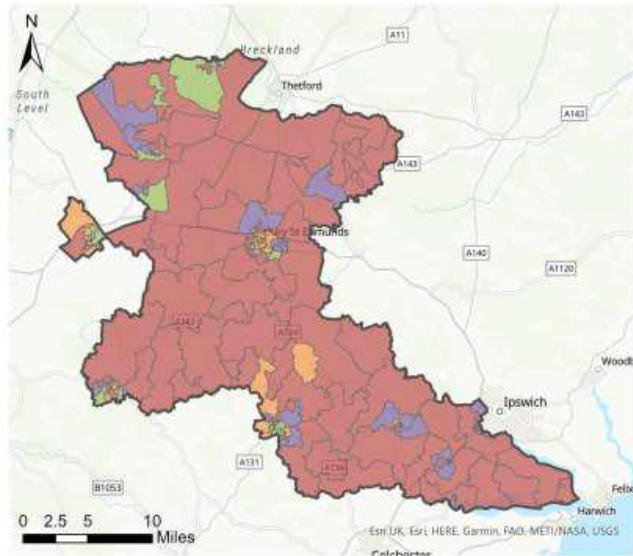


Local Energy Asset Representation (LEAR) for Suffolk



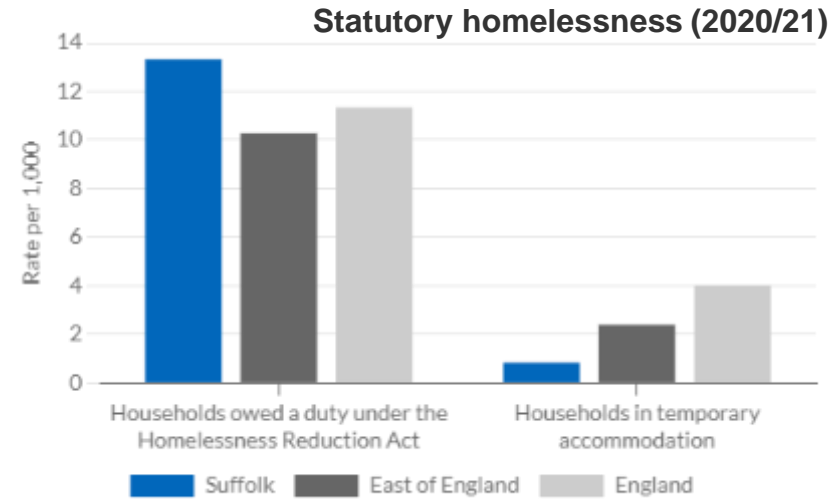
Most Common Dwelling Type within LSOA

- Detached
- Flats
- Semi-detached
- Terraced

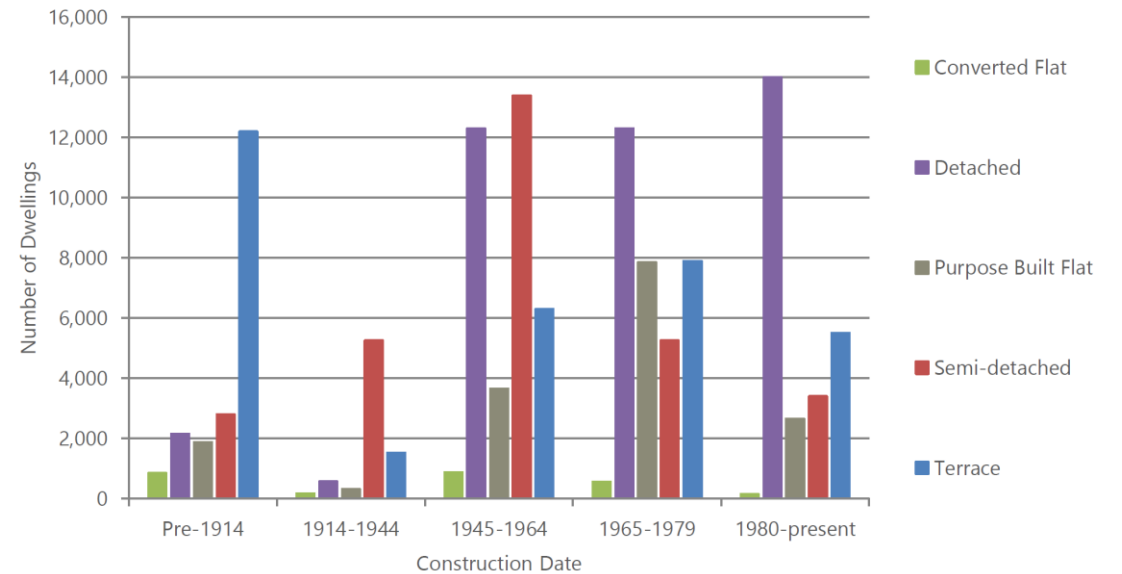


Most Common Dwelling Age within LSOA

- Pre-1914
- 1914-1944
- 1945-1964
- 1965-1979
- 1980-present



<https://www.suffolkobservatory.info/>



<https://www.greensuffolk.org/home/eastern-new-energy/local-energy-asset-representation-lear-for-suffolk/>

Scale of challenge



2019 est. 14.5 % of 350k households in fuel poverty

50k households



2022 post April Ofgem price cap +50%
• (average of £693 increase)

70k households
+20%

The 50% increase comes from NEA - [Fuel Poverty Statistics Explainer | National Energy Action \(nea.org.uk\)](#)
The 14% comes from the JSNA - [Where we live 2022 - Healthy Suffolk](#)

330 000 residential buildings in Suffolk; 66% detached or semi-detached, 58% EPC Band D, 20% E or below 3% Band B

- In 2017, 10,658 people in Suffolk were living in homes which did not meet the Decent Home Standard because they were **excessively cold**
- Suffolk already has a median of **110 excess winter deaths each year**. If the national causes apply, 11 of these deaths would be attributable to fuel poverty, and 24 due to cold homes.
- In 2019 **50,000 people in Suffolk were living in fuel poverty** - this is **14.5%** of households, higher than the England average of 13.4%. Within Suffolk the highest percentages in fuel poverty in 2020 were in Ipswich and East Suffolk
- This figure was calculated when the average annual household bill was around £1,000. With that figure now increasing by 64% to £2,100 after the £400 household rebate and the introduction of the £2,500 average energy cap, **the numbers in fuel poverty are still likely to rise substantially - one estimate suggests that 23% of households in England were already in fuel poverty by the Spring of 2022**

Source: Suffolk JSNA; Ofgem; National Energy Action



Images used with the kind permission of Ralph Carpenter

[Watch Ralph Carpenter's talk and others from the Suffolk Retrofit Conference](https://lowcarbonhomes.uk/about)





Image used with the kind permission of Ralph Carpenter

Image used with the kind permission of Ralph Carpenter





Outward facing community embedded, need led housing, which we need more of
The Mills Charity, Framlingham image used with kind permission of **Seamans Building**



Intergenerational terrace.

Welcome to the [Low Energy Building Database](#), a repository of low-energy building information created to help inform the planning and development of low energy new build and refurbishment

You can [browse projects](#) in our database, you can also create and edit projects if you have a [log-in](#).
New users can [create an account](#).

Featured Projects



[Steel Farm](#)

WINNER of the UK Passivhaus Awards 2015 - Steel Farm is the first Certified Passivhaus in Northumberland. Built using traditional construction technology it is located near Hexham in the North Pennine Area of Outstanding Natural Beauty.

Detached, Masonry Cavity, New build
Project owner : -

 Passivhaus certified building

About the LEB

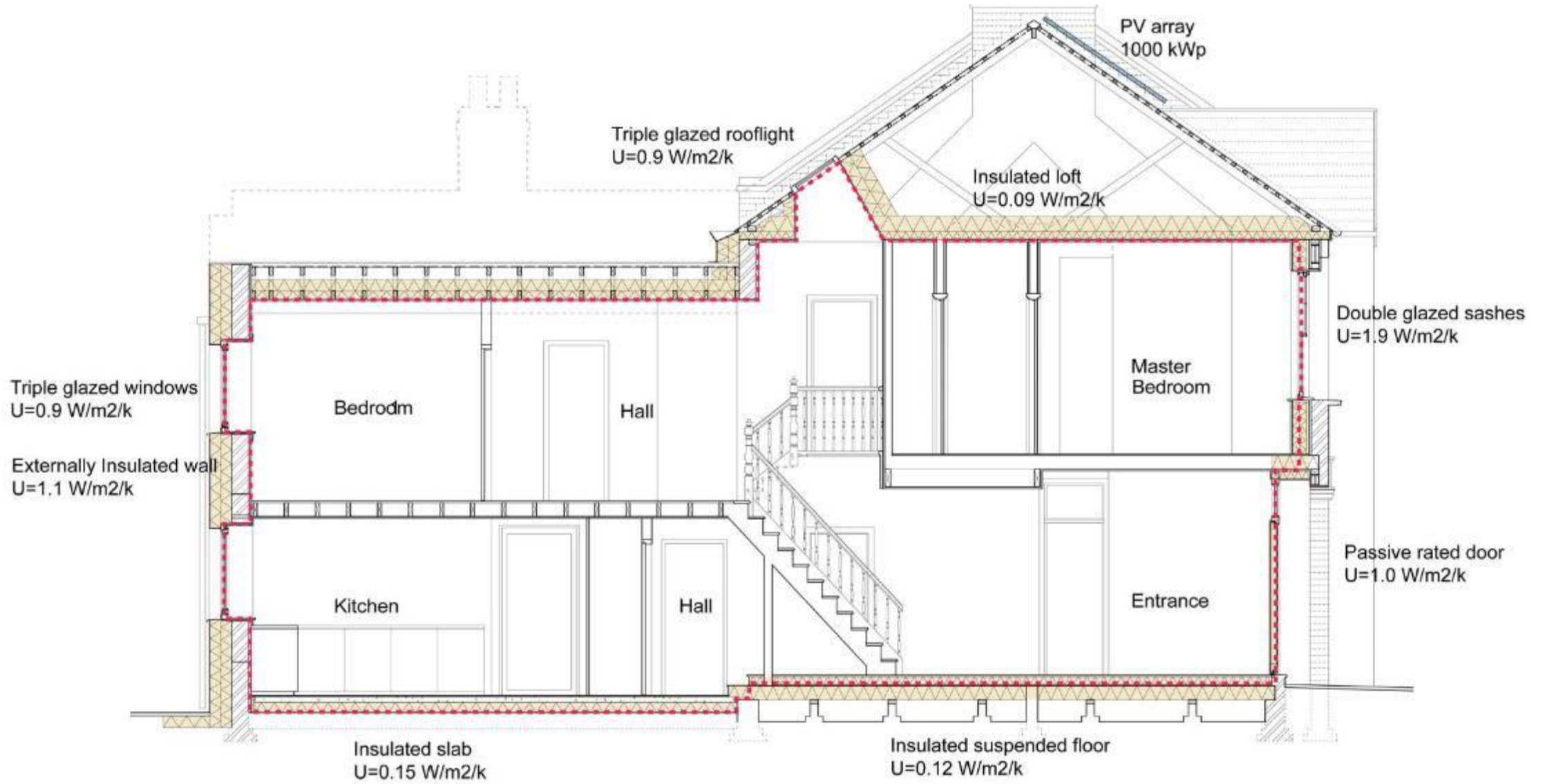
During 2009-2010, the Technology Strategy Board implemented a £17m programme known as Retrofit for the Future (RfF), to kick-start the retrofitting of the UK's social housing stock. AECB – the sustainable building association was asked to develop appropriate energy performance targets for the competition and provide ongoing support and guidance. The AECB and the TSB have developed this database as an education and dissemination tool, incorporating both the RfF projects as well as new and refurbished domestic and non-domestic low energy buildings. [Find out more about the LEB](#)

Home energy use check



<http://www.prewettbizley.com/-built-projectretrofit-for-the-future-house-index>











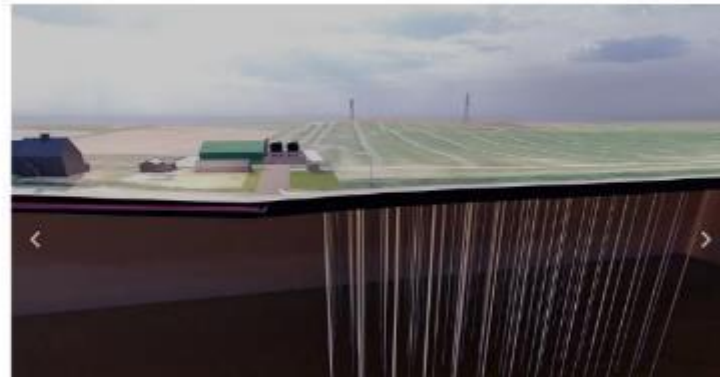
A Heating Project for Bildeston

Heating Bildeston aims to install a heat network which will provide you with heat for your hot water and radiators that is both cheaper and better for our planet. As a community project, with the support of our village, we hope to:

- Save residents money with lower cost energy.
- Avoid heating cost fluctuation by using renewable energy.
- Reduce our carbon footprint to help combat climate temperature rise.

Using heat pumps to power a village-wide heating network.

We plan to discover the most feasible solution to bring low carbon heat to village residents. Heat networks are explained [here](#). Our current consumption can be seen [here](#).



Almshouse Resilient Communities (ARC) for the Future



what is resilience

... that resilience is an adaptive response of a system to change, such that the system is better able to cope with future change ... that the identity of the system ... persists over time. The system is an almshouse community.



DAMHA 1913



Mary Dains 1914



DAMHA 1952



Southwark Charities 2022

what is an almshouse

residential accommodation
belonging to a charity
to meet the charity's purposes
(the relief of financial need)
occupied under a licence



... a charity for the relief of financial hardship by the provision of housing and associated services or benefits which must provide its primary benefit by the grant of a licence to occupy the accommodation that it owns to its beneficiaries.

Hopton's Almshouses, Southwark, founded 1752



December 2020

Almshouses: a model of community housing for an ageing population

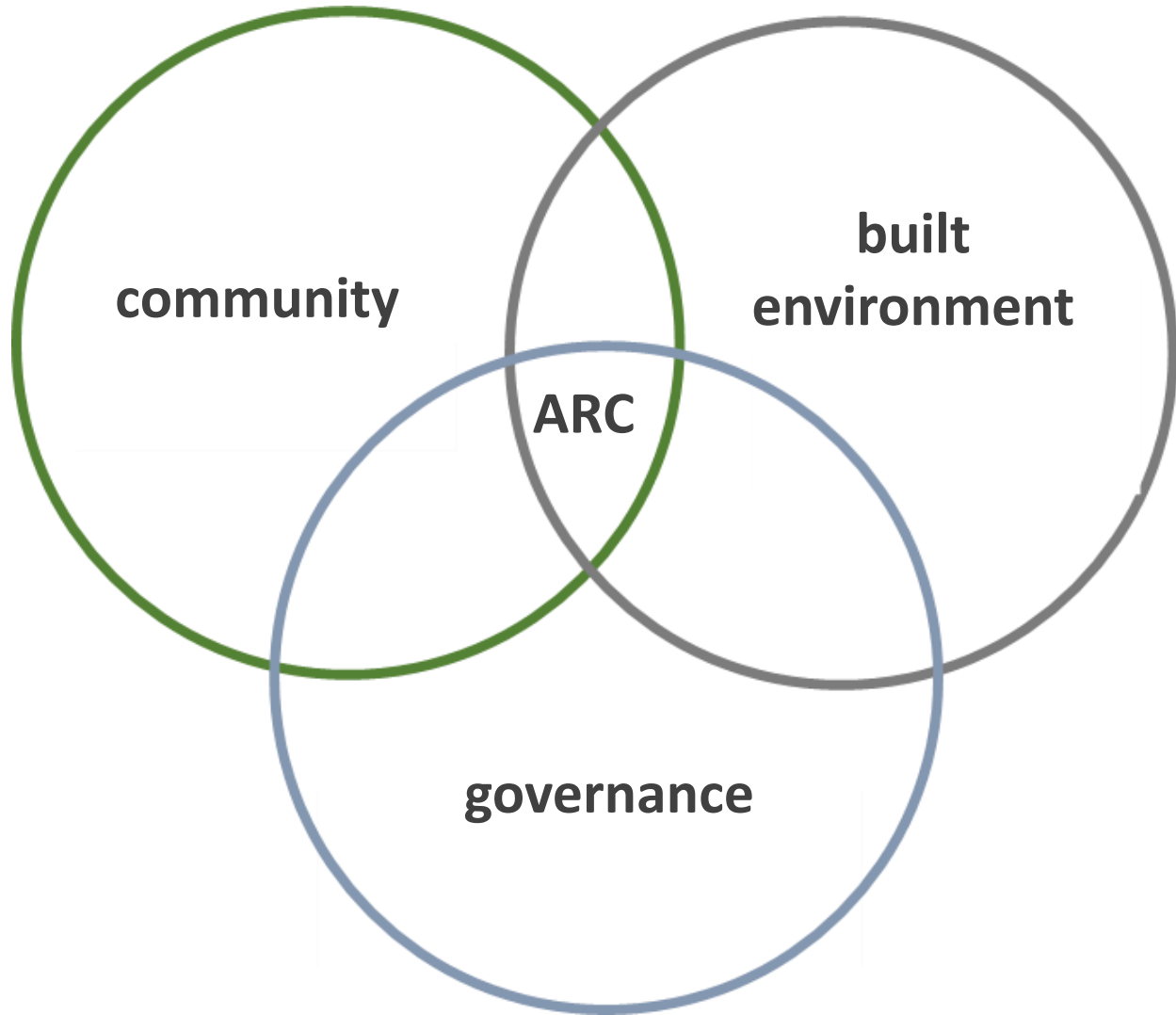


Drawing on detailed case studies, the report explores what can be learnt from the enduring almshouse model of housing for an ageing population, with a focus on key issues:

- why and how different almshouse charities decided to build new almshouses;
- the approaches they took, the opportunities and barriers they faced;
- the extent to which barriers have been overcome; and
- future lessons for almshouse charities, their advisers and other stakeholders.

<https://www.rics.org/uk/news-insight/research/research-reports/almshouses-a-model-of-community-housing-for-an-ageing-population/>

what we are doing



ways in which our partners

- support community resilience (that is, enabling resident communities to support each other in maintaining a high quality of life despite changes),
- support built environment resilience (that is, ensuring that the buildings and facilities continue to support independent, comfortable living)
- support governance resilience (that is, ensuring that charity structures and practices are effective within the local context so that almshouse charities continue into the future).

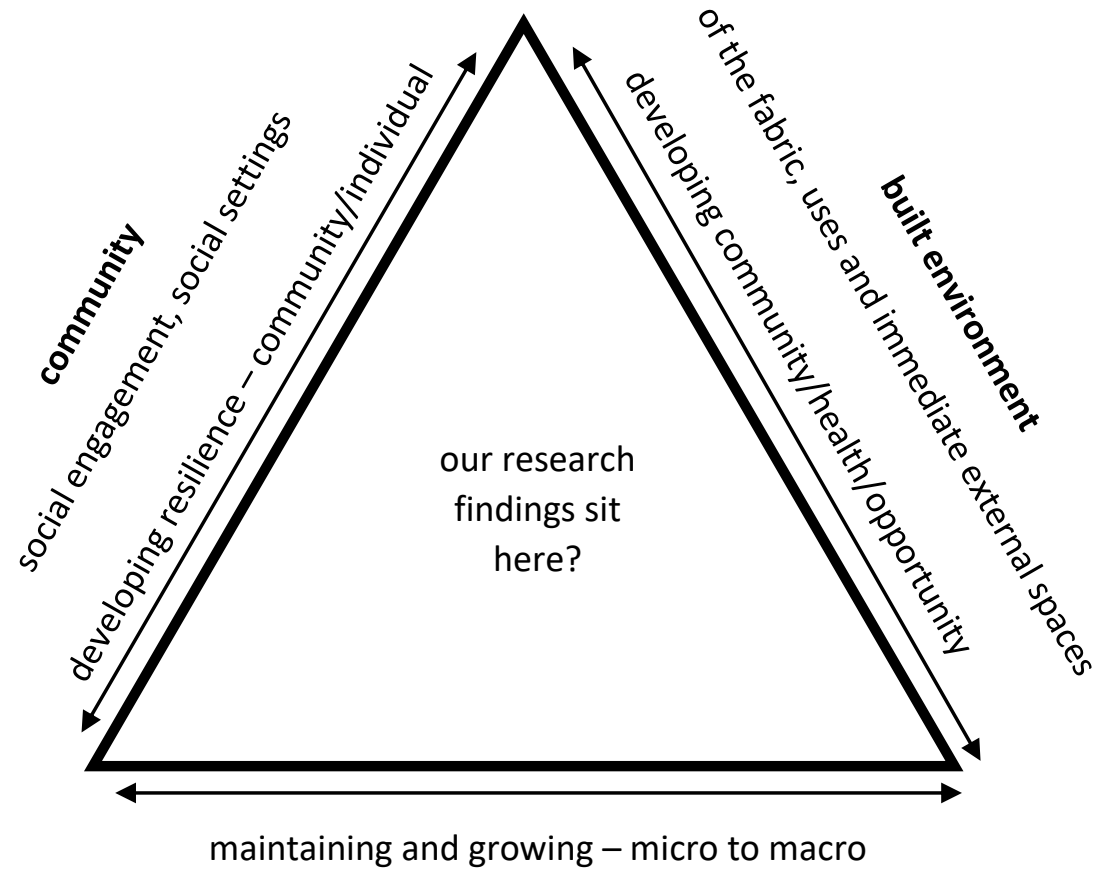
who we are doing it with



"We'll be working with a wide range of sites, from those in operation for over a hundred years to sites which have just received planning permission, and from County Durham to Bristol to East Anglia. Almshouse settings offer a fantastic opportunity to investigate resilience holistically and with sensitivity to context and from which we hope to learn lessons of importance for older housing and community resilience more generally. An important theme in our research will be the connection between diversity, equity and inclusion and resilience."

who we are doing it with





how it contributes/develops/enhances life within an almshouse – including wider activities/use of grounds/development opportunities/legacy



What are the challenges to resilience and energy efficient homes?

What are the challenges to resilience and energy efficient homes?

- Sharing good practice across the county
- Accessing knowledge contained in projects and individuals
- The hard to treat and the hard to reach
- Cost effective solutions, access to funding
- Access to expertise and people to do the work in Suffolk
- Education and training
- Supply chain issues
- Where does the funding come from?

**If we know how to do this stuff ...
why aren't we doing it?**

THANK YOU FOR LISTENING