Eco Bicester Living Lab 2016 annual event

Franklins House, Bicester

Tuesday 7th June 2016

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ECO BICESTER living lab
Knowledge • Innovation • Collaboration

OXFORD BROOKES UNIVERSITY

Welcome

Councillor Barry Wood

Leader of Cherwell District Council and Chair of Bicester Strategic Delivery Board

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Update on the Eco Bicester Living Lab

Professor Rajat Gupta, Director of OISD, Oxford Brookes University

Nicole Lazarus, Bicester programme manager, Bioregional

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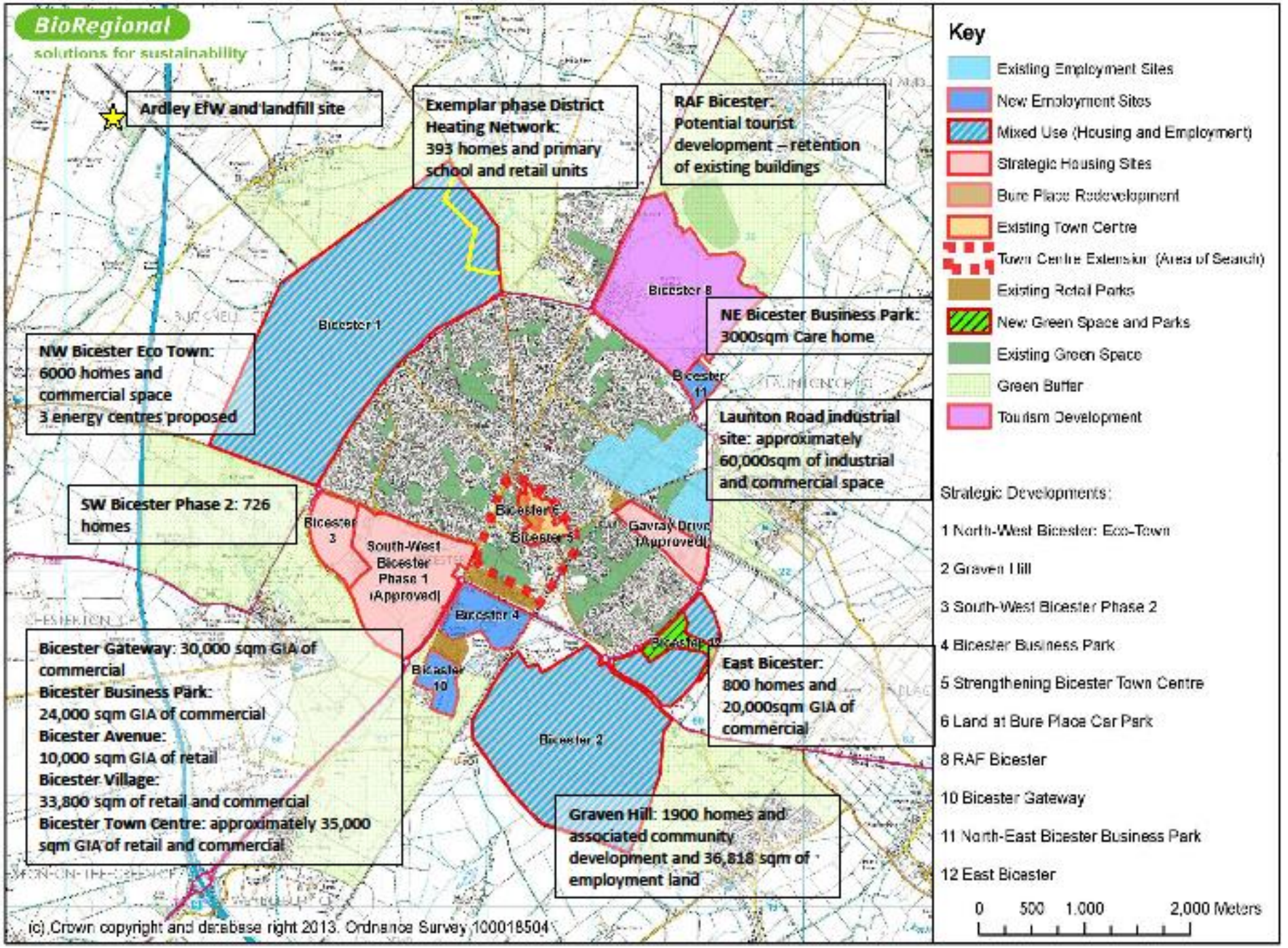
BioRegional
solutions for sustainability
Ardley EfW and landfill site
Exemplar phase District Heating Network: 393 homes and primary school and retail units
RAF Bicester: Potential tourist development – retention of existing buildings
NW Bicester Eco Town: 6000 homes and commercial space 3 energy centres proposed
NE Bicester Business Park: 3000sqm Care home
Launton Road industrial site: approximately 60,000sqm of industrial and commercial space
SW Bicester Phase 2: 726 homes
Bicester Gateway: 30,000 sqm GIA of commercial
Bicester Business Park: 24,000 sqm GIA of commercial
Bicester Avenue: 10,000 sqm GIA of retail
Bicester Village: 33,800 sqm of retail and commercial
Bicester Town Centre: approximately 35,000 sqm GIA of retail and commercial
East Bicester: 800 homes and 20,000sqm GIA of commercial
Graven Hill: 1900 homes and associated community development and 36,818 sqm of employment land
Bicester 1
Bicester 2
Bicester 3
Bicester 4
Bicester 5
Bicester 6
Bicester 8
Bicester 10
Bicester 11
Bicester 12
South-West Bicester Phase 1 (Approved)
Gavray Drive (Approved)
Key
Existing Employment Sites
New Employment Sites
Mixed Use (Housing and Employment)
Strategic Housing Sites
Bure Place Redevelopment
Existing Town Centre
Town Centre Extension (Area of Search)
Existing Retail Parks
New Green Space and Parks
Existing Green Space
Green Buffer
Tourism Development
Strategic Developments:
1 North-West Bicester: Eco-Town
2 Graven Hill
3 South-West Bicester Phase 2
4 Bicester Business Park
5 Strengthening Bicester Town Centre
6 Land at Bure Place Car Park
8 RAF Bicester
10 Bicester Gateway
11 North-East Bicester Business Park
12 East Bicester
0 500 1,000 2,000 Meters
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Eco Town PPS1

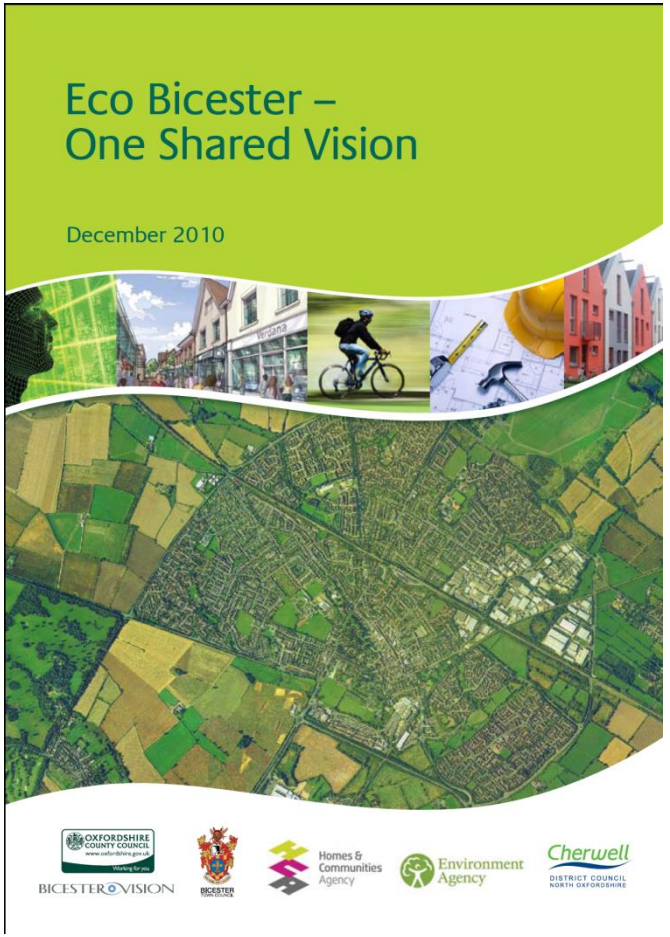
PPS standards

- True zero carbon
- Walkable neighbourhoods
- Highest water efficiency (80l/person/day)
- Managing embodied carbon of construction
- Zero waste to landfill during construction
- Climate change adaptation
- Community governance planning
- Net biodiversity gain
- 40% open space
- 1 new job / household

Eco Bicester - One Shared Vision

Aspirations for the whole town

- Adapting PPS standards
- Adopted by all three levels of local government
- “Effecting a town wide transition to a low carbon community, triggered by the new eco development at NW Bicester”



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Town wide Eco Bicester projects

Demonstration buildings:

- **JPII Community Centre**
- **Demo house**
- **Zero carbon Cooper school extension**
- **Bryan House – 23 Code 4 and 5 homes**
- **Self build programme**

Energy:

- **Biomass boiler for municipal swimming pool**
- **Community owned PV roll out**
- **Heat network feasibility study**

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Town wide Eco Bicester projects

Bicester Green Reuse Centre

Retrofit:

- **1500 installations**
- **Green Deal pilot**
- **Garth innovative retrofit**
- **Boiler replacement scheme**

Engagement:

- **Travel behaviour project**
- **Energy efficiency workshops**
- **Carbon conversations training**

Bicester Green
Centre for Skills, Sustainability & Secondhand Stuff

Sobell House Hospice Charity
Serving the hospice,
Serving the people of Oxfordshire.

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Eco Bicester Living lab

- An umbrella initiative for all projects in Bicester that:
  - introduce academic rigour and
  - contribute to delivery of the Eco Bicester Vision

Eco-Bicester Living Lab (EBLL)

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- **Cross-sector collaborative initiative** launched in 2014, that provides a home for all projects in which novel ideas related to sustainability are tested in Bicester, with the explicit goal of **learning** and **knowledge-sharing**.
- Integrates **academic rigour** with **innovation** in a real urban setting.
- Capture learning for **continuous feedback** and **improvement**.
- **Share knowledge** and **learning** with **industry**, **policy-making** and **voluntary** sectors within and outside of UK.
- Initiates projects of strategic importance to promote **Bicester** as a **Centre for Excellence** in research and innovation on sustainability.

Who is involved in the Living Lab?

Partners

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Prof Rajat Gupta
Co-Director of Living Lab

Nicole Lazarus
Co-Director of Living Lab

Key stakeholders

Cherwell DISTRICT COUNCIL North Oxfordshire

a2dominion

Other stakeholders

Bicester Town Council, Oxfordshire County Council, Bicester Vision, Bicester Schools, Bicester Chamber of Commerce, Innovate UK

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Living Lab website www.bicesterlivinglab.org

Living Lab leaflet (updated)

Smart power & Smart community energy

The project explores new approaches to maximising the on-site use of the high-density photovoltaic power generated in new housing developments. The project uses the 393-home NW Bicester Eco-Town Exemplar development as a case study.

Funder: Innovate UK

Green Deal Pioneer Places

The project enables the establishment of a Green Deal network of local assessors and installers in Bicester. 100 homeowners and seven businesses received free Green Deal Energy Assessment Reports 14 homes and four businesses underwent Green Deal-type retrofits completely free.

Funders: Department of Energy and Climate Change & Cherwell District Council

Rethinking the building process

The Bicester Eco-Town Process Improvement Toolkit (BEPIT) is a four year research project based at the Eco-Town Exemplar. The approach enables systemic process failures in technologically innovative build systems to be detected and resolved. Learning from each stage will be captured in a toolkit for wider dissemination across the wider building industry.

Funder: Innovate UK

Partners

Oxford Institute for Sustainable Development (OISD) is a multi-disciplinary research institute comprising eight research groups, based within the Faculty of Technology, Design and Environment at Oxford Brookes University. Established in 2004, OISD is regarded as one of the largest academic research institutes in the UK dedicated to research on sustainable development in the built environment.

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We work with partners to create better places for people to live, work and do business. Our ambition is simple. We want our practical projects to inspire people to live happy, healthy lives within the natural limits of the planet, leaving space for wildlife and wilderness.

Key stakeholders
Cherwell District Council and A2Dominion

Other stakeholders
Bicester Town Council, Oxfordshire County Council, Bicester Vision, OCVC, Bicester schools, Good Homes Alliance (GHA), Green Building Council, Innovate UK, Bicester Vision, Bicester Chamber of Commerce

Contact us

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Senior Programme Manager
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A collaborative initiative by
Oxford Institute for Sustainable Development
and BioRegional

- Promote Bicester as a centre for excellence in research and innovation.
- Develop a test-bed of innovative solutions in sustainability at all scales.
- Provide rigorous academic evaluation of sustainability initiatives in Bicester.
- Capture learning for continuous feedback and improvement.
- Enable knowledge sharing with industry, policy-making and voluntary sectors.

www.bicesterlivinglab.org

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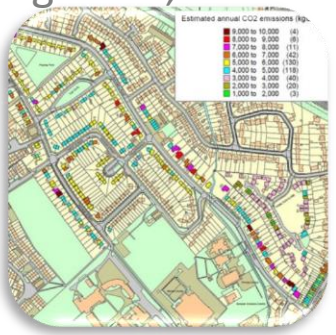
Projects to date (where one/ both of Living Lab partners are involved)

Design for Future Climate

Building Performance Evaluation of Bryan House

Invest in Innovative Refurbishment

Carbon mapping Highfield, Bicester

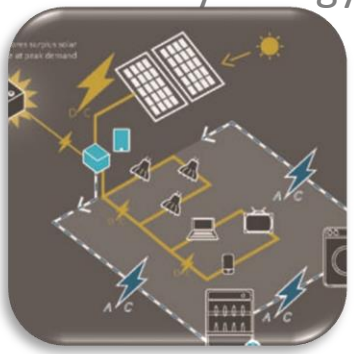


Rethinking the building process

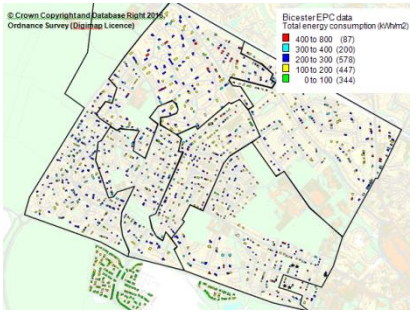
Green Deal Pioneer Places

GREEN DEAL
PIONEER PLACES

Smart power & Smar community energy



Local Energy Mapping for Urban Retrofit



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Bicester Green
Centre for Skills, Sustainability & Secondhand Stuff

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Forthcoming projects

- Doctoral research study on evaluating the actual performance of the NW Bicester exemplar development.

- Green infrastructure in a rapidly growing town.

- Energy infrastructure: heat networks and grid constraints.

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Activities of Eco Bicester Living Lab

- **Dedicated website** for knowledge-sharing
- **Showcase publications**, monitoring results and learning from the Living Lab case studies
- **Annual dissemination event** on cross-cutting themes
- Offer student research projects at a PhD level
- Act as **launch pad** for new research and innovation projects for which we welcome new partners.
- Secure **external funding** for future. Host Knowledge Transfer Partnerships
- Host **key study days** of relevance to partners working in Bicester
- Facilitate **cross fertilisation of knowledge and experience** between business, academia, social enterprise and community action.

Future research priorities

- Building performance evaluation programme of new build and refurbishments – addressing the performance gap
- Building climate resilience and adaptation in buildings and communities
- Carbon mapping, scaling-up retrofit and mass PV installation
- Smart grids and widespread uptake of renewables
- Social cohesion and community development in the existing town and new community
- Health impacts of sustainable neighbourhoods
- Sustainable transport
- Green infrastructure
- Heat networks

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Update on NW Bicester Eco Town

Lewis Knight, Bicester Eco town
Project Manager, Bioregional

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ONE PLANET LIVING

One Planet Living is about enjoying a high quality of life within our fair share of the earth's resources.

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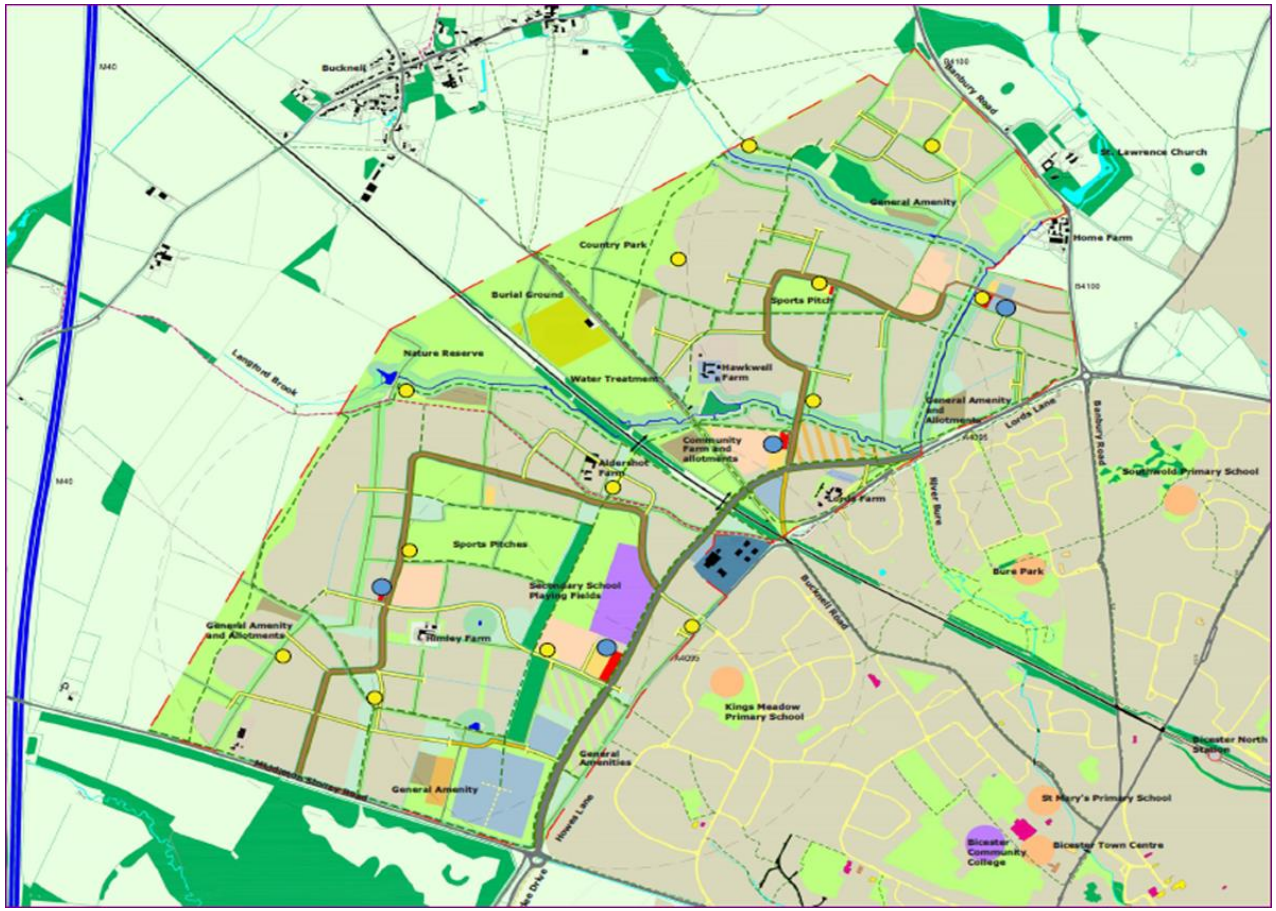
Lewis Knight, Bicester Eco Town Project Manager

What is NW Bicester?

- 6,000 true zero carbon homes
- Primary Schools
- Local centres
- Commercial centres
- Energy centres
- 40% green space



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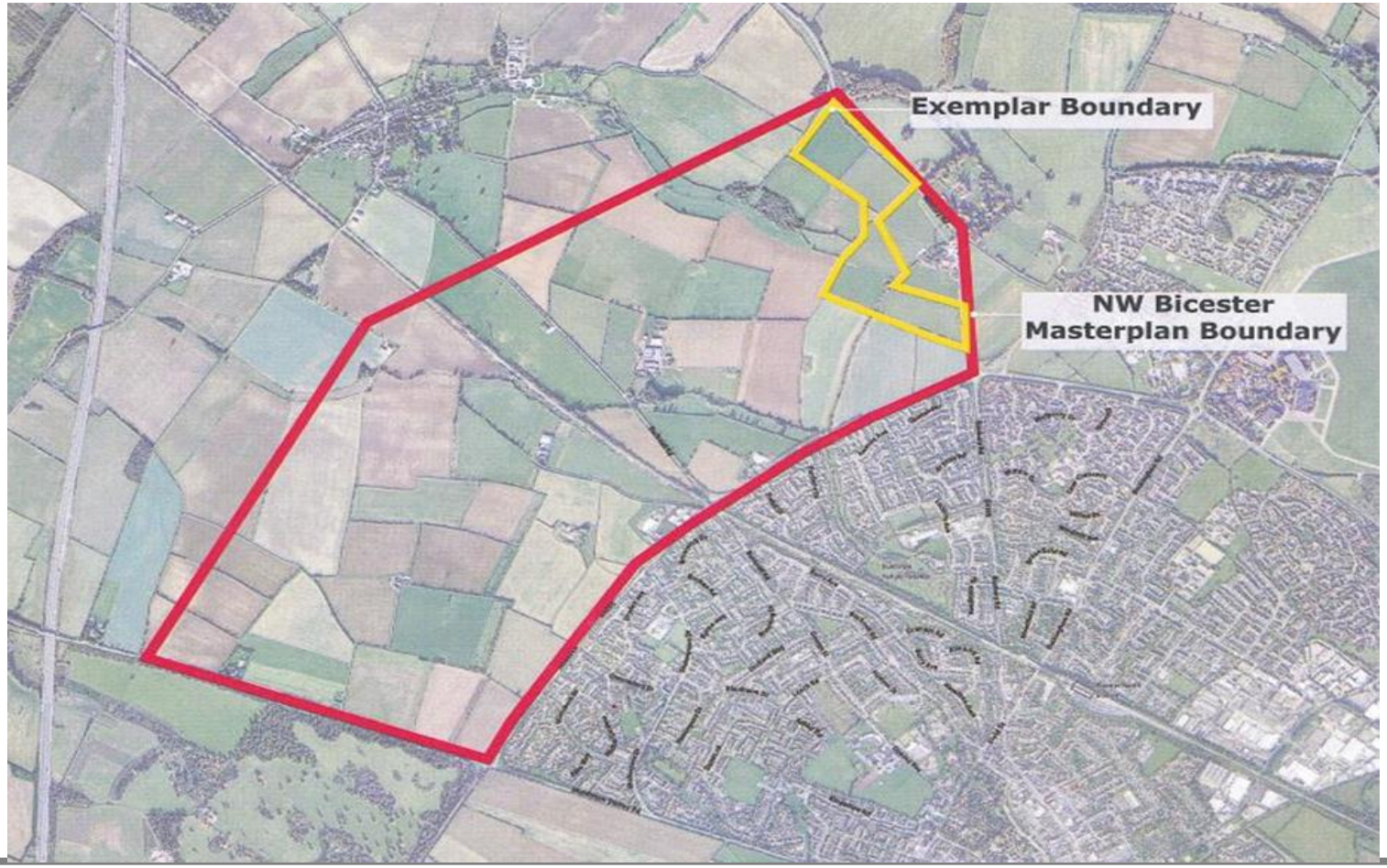
NW Bicester, Exemplar



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What makes NW Bicester Unique?

- First Eco-town in the UK and part of the wider Garden Town for Bicester
- Healthy Town Partnership

- Award winning scheme

winner of housebuilder awards 2015

SILVER WINNER WhatHouse? AWARDS 2015

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One Planet Action Plan

- Exemplar is an endorsed One Planet community
- One Planet action plan has been written
- Reviewed annually

OPAP Headlines

- True zero carbon at scale
- Code 5 at scale
- 30% reduction in embodied CO2
- Modelled and adapted for future climate
- Zero waste to landfill during construction
- Net biodiversity gain
- Reducing car usage to 50% from 65%
- 40% open space

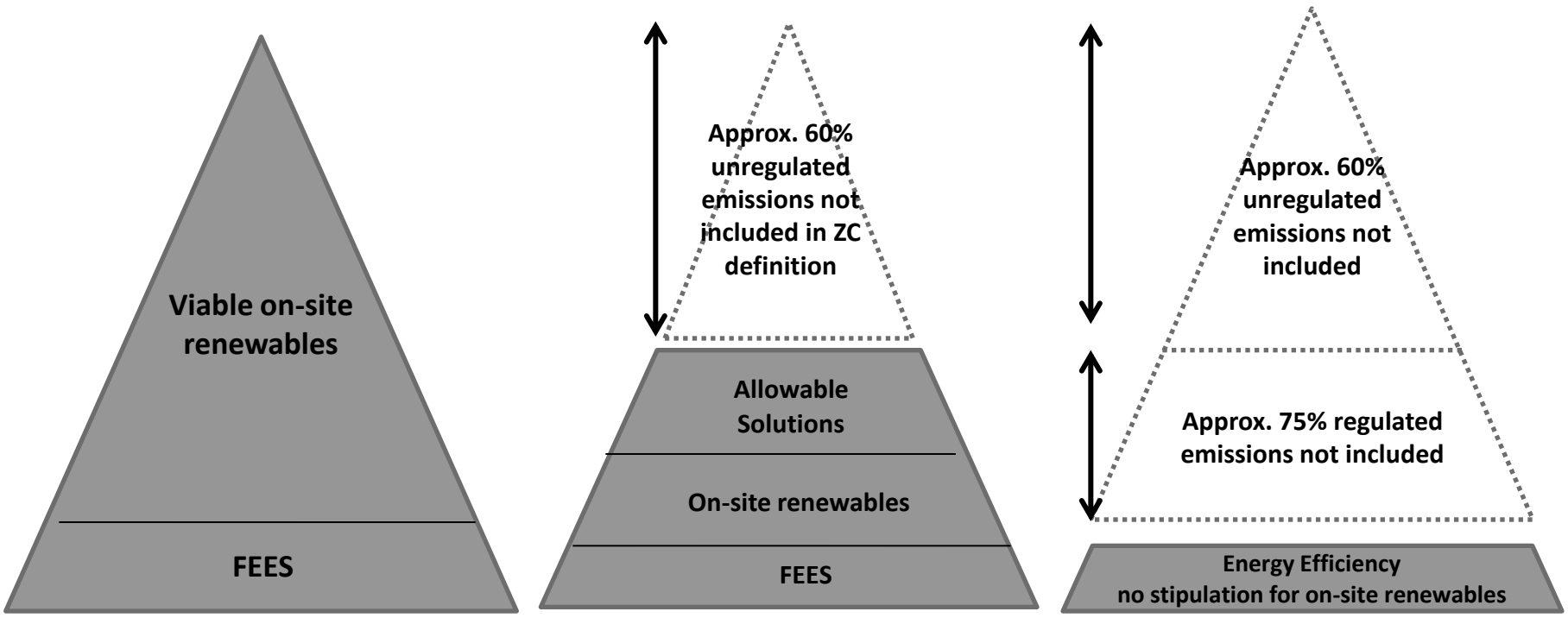
“True” zero carbon

-20 $kgCO_2/m^2/year$

0 kgCO2/m2/year

Approx. equivalent Code 3

20 kgCO2/m2/year



NW Bicester Eco Town - True Zero Carbon *(both regulated and unregulated emissions)*

Current zero carbon definition by Zero Carbon Hub – *(100% of regulated emissions only)*

2010 Building Regs– 25% reduction on 2006 baseline

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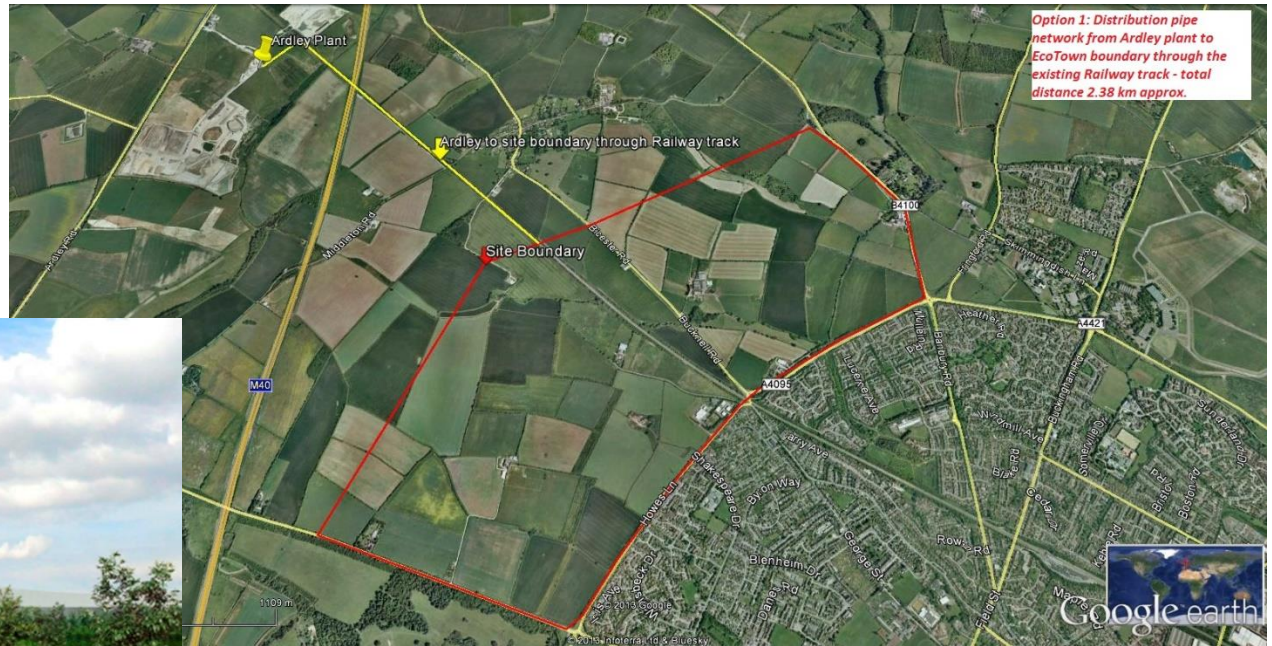
Demand reduction

- Code 5 fabric performance
- Air tightness: 3m3/(hr.m2) @ 50Pa
- 100% low energy lighting (>45 lumens/Watt)
- All private and shared ownership homes issued with
  - Fridge freezers, dishwashers, washing machines A++
  - Ovens A+
  - Induction hobs

District Heating and Energy Centre

- District Heating network
- Short/medium term: Gas CHP
- Medium/long term: Waste heat from existing nearby incinerator plant



PV solar provision

- Installed capacity 1,461kWp
- Average PV per home 3.7kWp

Homes

- Excellent daylighting levels
- Homes are super-insulated
- Good ventilation and indoor air quality
- Adapted to Climate Change



Homes

- Cheaper running/living costs
- Technology such as Photovoltaics and Rainwater Harvesting
- Super-fast broadband
- Code 5, Building for life and lifetime homes



Greenspace / Public realm

- Lots of greenspace (40% of the site)
- Great walking and cycling routes
- Play areas
- 2 community orchards and allotments
- Wildlife habitats
- Fruit tree available in every garden




Transport

- Semi-rural car club and community bus service
- Electric vehicle charging points
- 5-minute walk to bus stops
- Homes are 10mins from local school
- Real time public transport information

Economy

- Eco Business Centre being built
- Local labour and apprenticeships used on site
- Local centre planned

Community

- Community Events – welcome to your home, reuse and repair workshops, cookery classes etc…
- UK's first Heart Safe Community



Community

- The ‘Green Charter’
- Strong identity, community spirit and volunteering
- Local Management Organisation

Proposed Residents' Green Charter

We the residents of NW Bicester agree to:

1. Look for ways to be as environmentally friendly as possible
2. Take part in the spirit of this eco town and be creative about reducing our community's eco footprint
3. Take part in surveys and activities that measure our carbon footprint and other environmental measurements
4. Learn how best to use our state of the art eco home and be mindful of energy and water use
5. Report any problems with the home that stop us from being as energy and water efficient as possible

In summary…

- The first 91 homes (phase 1)complete
- First residents have moved in!
- First welcome to your home event
- Primary school is underway

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Gagle Brook Primary School

In summary…

- DECC Ministerial visit and opening of energy centre
- Monitoring starting soon on occupied dwellings
- Phase 2 foundations started

Thank you

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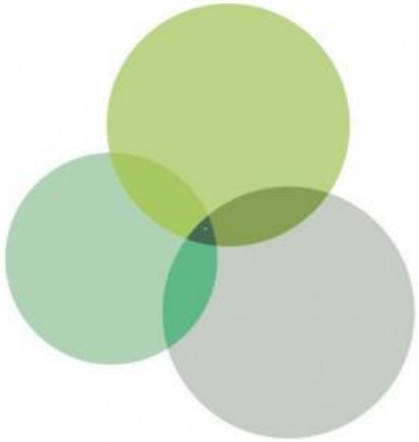
Project Updates



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Improving the performance of new-build housing

- Design for future climate
- Closing the performance gap
- Monitoring and evaluation

Design for future climate: Future-proofing through adaptation measures in Bicester

Kirk Archibald, Associate Director, PRP

Designing for Future Climate
Bicester Ecotown

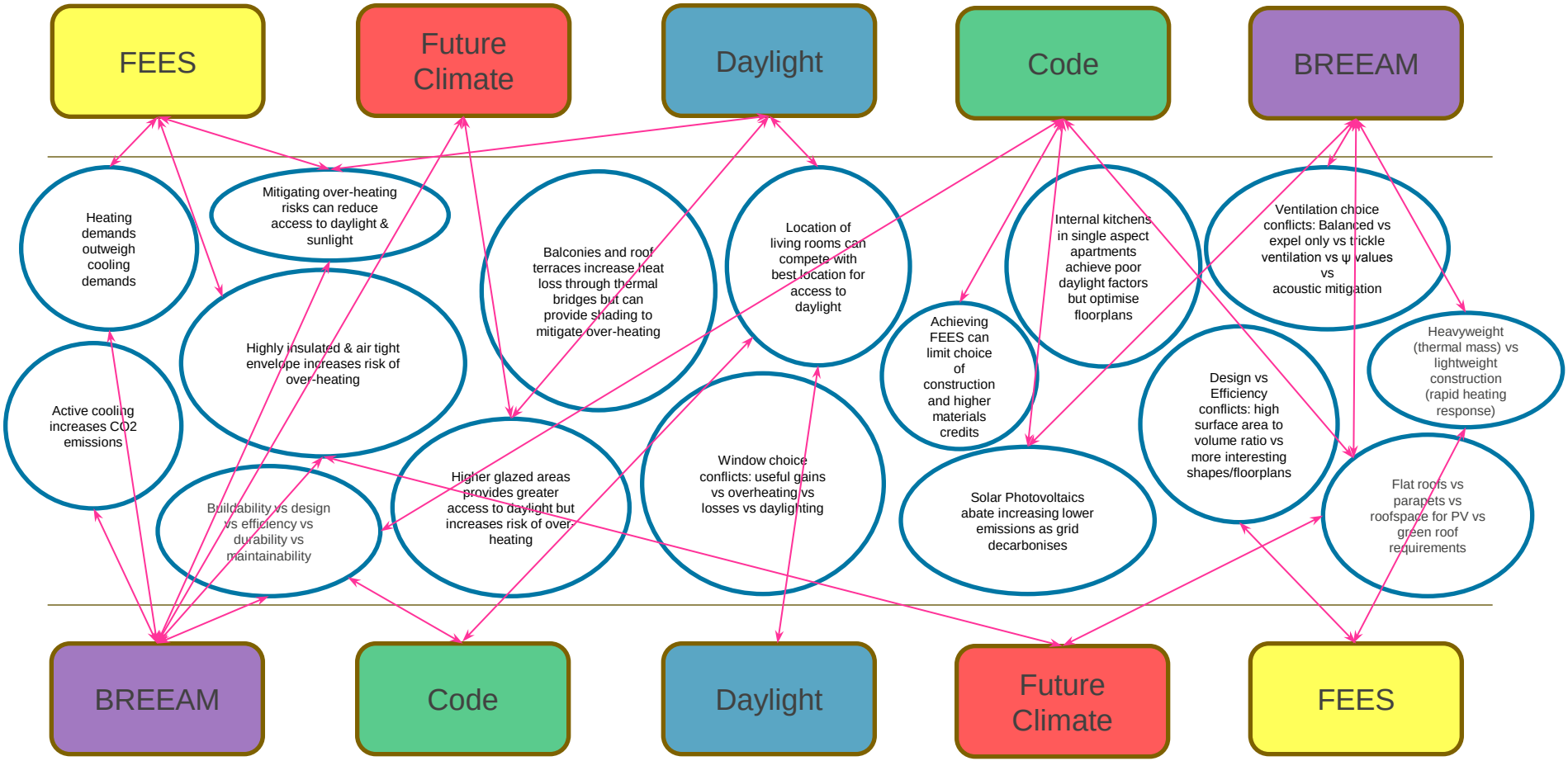
07 June 2016

Kirk Archibald, Associate Director

Pertinent Planning Conditions

Condition	Requirement
8	Daylighting
10	Overheating
11	Passive ventilation + thermally massive floors
20	Green roofs
34 & 48	Zero Carbon + Construction emissions
42 & 58	Rainwater harvesting
69	SUDs

PRP


FEES
Future Climate
Daylight
Code
BREEAM
Heating demands outweigh cooling demands
Mitigating over-heating risks can reduce access to daylight & sunlight
Balconies and roof terraces increase heat loss through thermal bridges but can provide shading to mitigate over-heating
Location of living rooms can compete with best location for access to daylight
Internal kitchens in single aspect apartments achieve poor daylight factors but optimise floorplans
Ventilation choice conflicts: Balanced vs expel only vs trickle ventilation vs ψ values vs acoustic mitigation
Highly insulated & air tight envelope increases risk of over-heating
Achieving FEES can limit choice of construction and higher materials credits
Heavyweight (thermal mass) vs lightweight construction (rapid heating response)
Active cooling increases CO2 emissions
Design vs Efficiency conflicts: high surface area to volume ratio vs more interesting shapes/floorplans
Buildability vs design vs efficiency vs durability vs maintainability
Higher glazed areas provides greater access to daylight but increases risk of over-heating
Window choice conflicts: useful gains vs overheating vs losses vs daylighting
Solar Photovoltaics abate increasing lower emissions as grid decarbonises
Flat roofs vs parapets vs roofspace for PV vs green roof requirements
BREEAM
Code
Daylight
Future Climate
FEES

Cotemporary unit

- Larger windows + Spandrel Panels
- Albedo effect (reflective surfaces)
- Soft landscaping under ground floor windows

Traditional unit

- Small windows
- Traditional façade (non-reflective surfaces)
- Hard landscaping under ground floor windows

PRP

Single storey unit

- Mono-pitched bungalow
- High form factor (SA/FA ratio)
- Secure night cooling?

Larger family unit

- 5-bed house with integral garage
- Naturally ventilated in some cases

Designing for Future Climate
Overheating

Initial Research (Oxford Brookes)

Effective/passive adaptation packages for tackling overheating combine shading, ventilation strategies, colour of fabric and material of construction elements (thermal mass).

Dynamic thermal simulation is vital for testing adaptation strategies in design of low impact buildings.

No consensus yet on what emissions scenario, weather year or probability level to use for modelling climate change risk

A range of overheating metrics exist for different building typologies

For holistic evaluation and take-up, we need to simulate both overheating implication and energy savings of adaptation measures

PRP Overheating Assessment

Three separate overheating assessments to date:

- Phase 1 (exemplar Ecotown)
- Phase 2
- Specific unit (plot 313)

Planning Condition:

- Overheating risks must be mitigated for 1st 20 occupied years
- Mitigation solutions proposed for 2030s & 2050s

Methodology/criteria:

Phase 1

- CIBSE Guide A (2006)
    - Annual hours above 26° (living rooms) & 28° (bedrooms) must be no more than 1% of total annual occupied hours

Phase 2

- CIBSE TM52 (2013)
    - Adaptive criteria; Hours of exceedance; Daily weighted exceedance; Upper limit Temperature

Dynamic Modelling

Base assumptions

1, 2 & 3 storey dwellings

Suburban density (~35dph)

Edge of town urban extension (surrounded by green space)

High thermal performance

- low U-values
- good detailing & low thermal bridging
- Airtight construction
- triple-glazing
- Heat recovery ventilation (MVHR)
- Low thermal mass
- Communal heating
- 100% LELs
- No A/C

Designing for future climate

- Addressing overheating in 1st 20 years with current designs
- Mitigation measures for future years (20+)
- Rainwater harvesting
- SUDs
- True Zero Carbon

Assumptions

- Occupancy, lighting & equipment gains
- Natural Ventilation (window openings and times)

Phase 1 Overheating Assessment (Jan14)

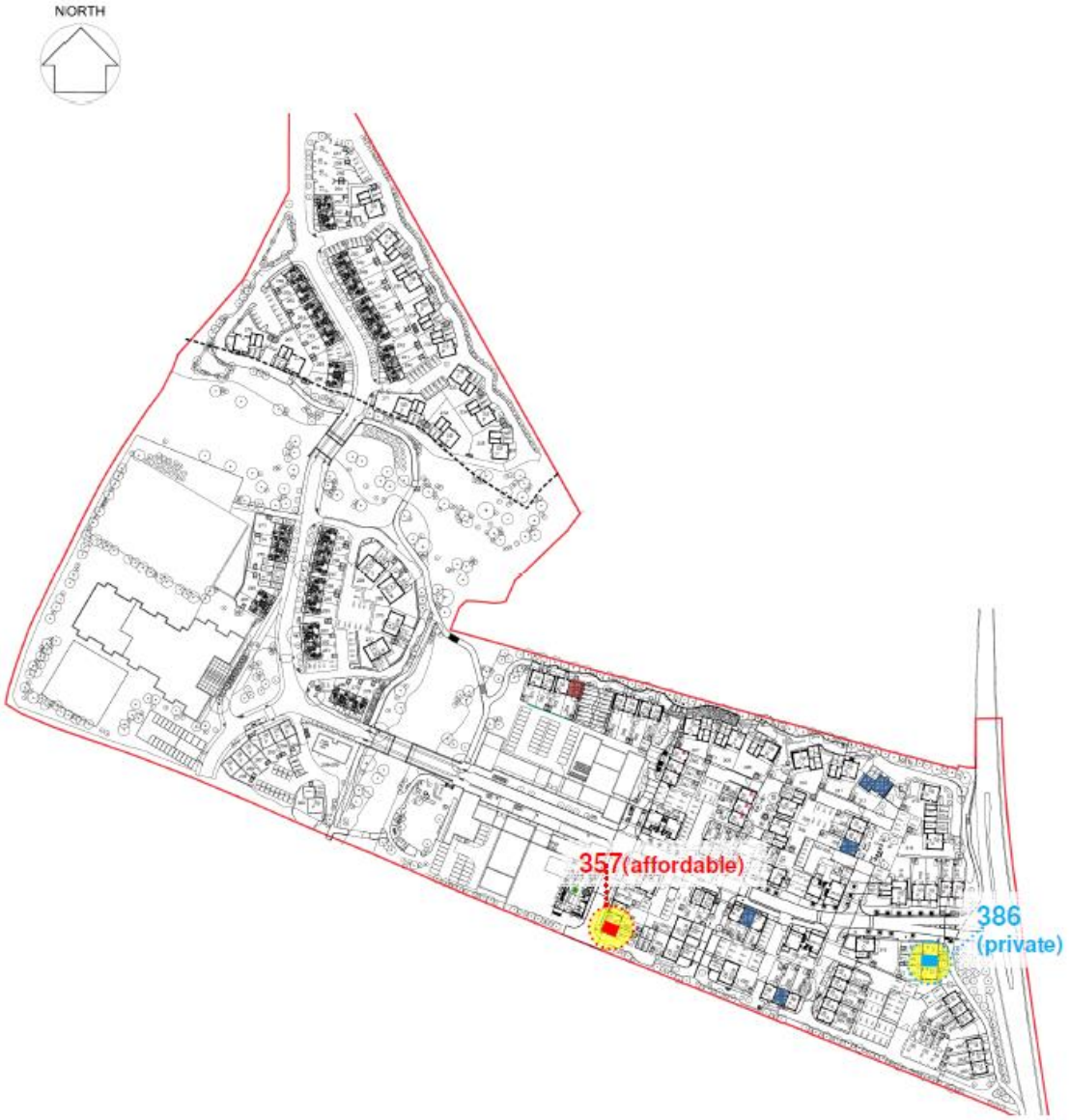
Phase 1

Assessment of typologies likely to overheat:

- South, west & east facing
- Surrounding shading
- Large windows/exposed walls
- Single aspect/heat loss coefficients
- Layouts/Hard landscaping

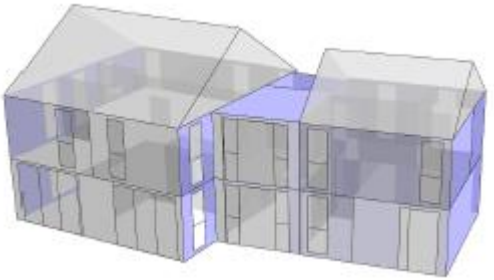
2 worst-case unit typologies modelled using dynamic simulation

- Plot 357 – 2 storey house (affordable)
- Plot 386 – 2 storey house (private)



Plot 313 (Sep14)

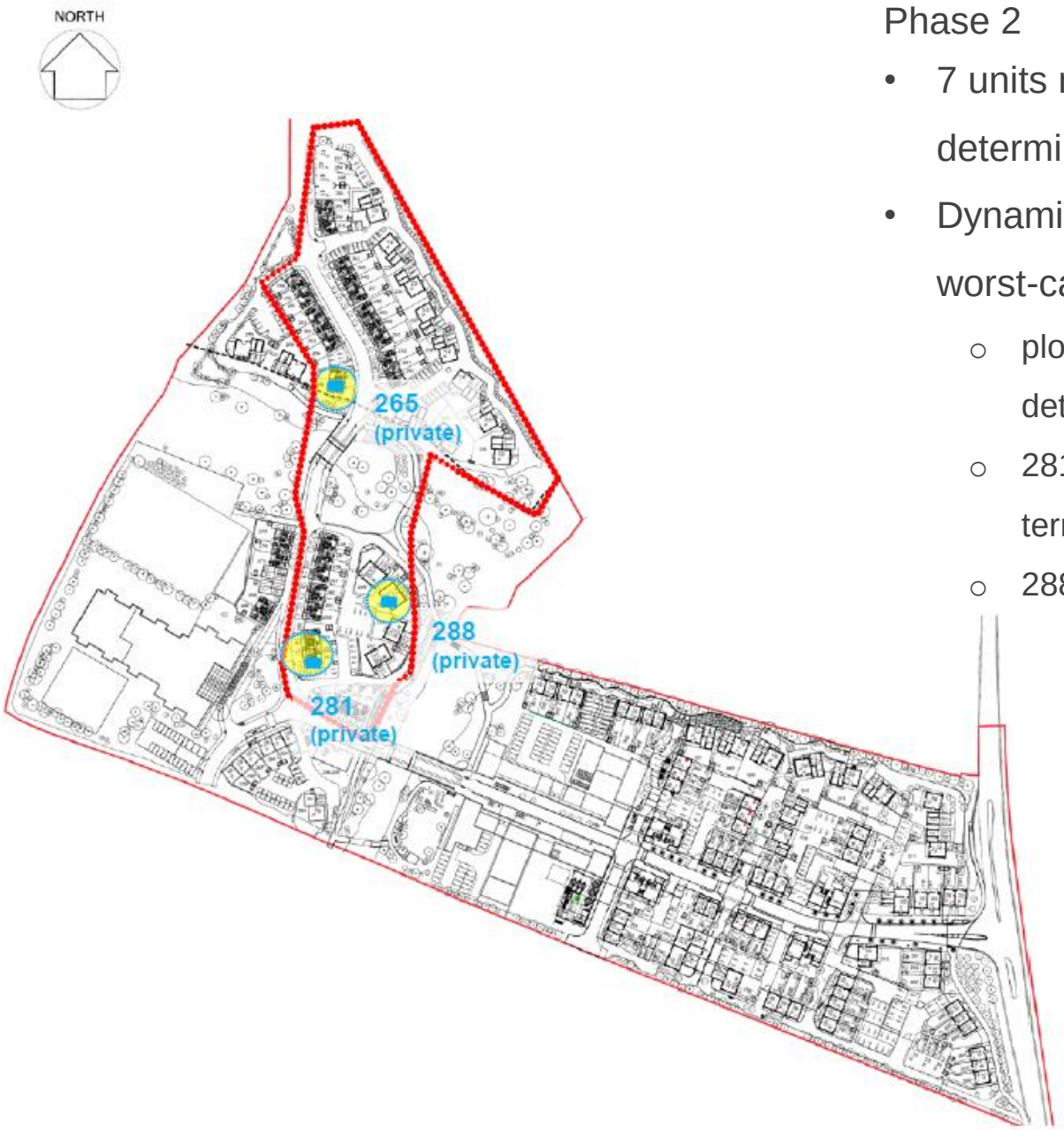
Large 5 bed house
Passively ventilated



Ground floor

First floor

Phase 2 (Apr16)



Phase 2

- 7 units modelled using NCM to determine high risk typologies
- Dynamic simulation performed on 3 worst-case unit typologies
  - plots 265 – traditional 2 storey semi-detached
  - 281 – Contemporary 2 storey end terrace
  - 288 - affordable bungalow

Modelling Results

Phase 1 Results

		Mitigation measures				plot 357
Weather year	**Room**	**basecase**	**walls/windows**	**Ext. shutters**	**Night cooling**	**Combined (Shutters + NC)**
current	living	0.30%	0.26%	0.16%	0.00%	0.00%
	dining	0.14%	0.07%	0.00%	0.00%	0.00%
	bed1	0.74%	0.62%	0.56%	0.22%	0.04%
	bed2	0.71%	0.65%	0.46%	0.23%	0.07%
2030s	living	0.30%	0.23%	0.03%	0.00%	0.00%
	dining	0.13%	0.09%	0.00%	0.00%	0.00%
	bed1	1.93%	1.69%	1.08%	0.20%	0.03%
	bed2	1.90%	1.64%	0.91%	0.29%	0.06%
2050s	living	1.60%	1.41%	0.97%	0.50%	0.12%
	dining	1.25%	1.11%	0.84%	0.17%	0.07%
	bed1	4.02%	3.92%	2.86%	1.36%	0.71%
	bed2	4.10%	3.94%	3.22%	1.47%	0.75%

		Mitigation measures				plot 386
Weather year	**Room**	**basecase**	**walls/windows**	**Ext. shutters**	**Night cooling**	**Combined (Shutters + NC)**
current	living	0.16%	0.16%	0.03%	0.10%	0.00%
	dining	0.07%	0.07%	0.04%	0.04%	0.01%
	bed1	0.52%	0.52%	0.20%	0.29%	0.06%
	bed2	0.46%	0.46%	0.20%	0.25%	0.07%
2030s	living	0.30%	0.32%	0.00%	0.07%	0.00%
	dining	0.00%	0.00%	0.00%	0.00%	0.00%
	bed1	0.82%	0.85%	0.22%	0.36%	0.04%
	bed2	0.53%	0.55%	0.17%	0.13%	0.03%
2050s	living	1.36%	1.38%	0.43%	1.00%	0.12%
	dining	0.46%	0.46%	0.19%	0.22%	0.07%
	bed1	2.87%	2.88%	1.05%	1.77%	0.71%
	bed2	2.35%	2.39%	0.98%	1.38%	0.75%

Plot 313 Results

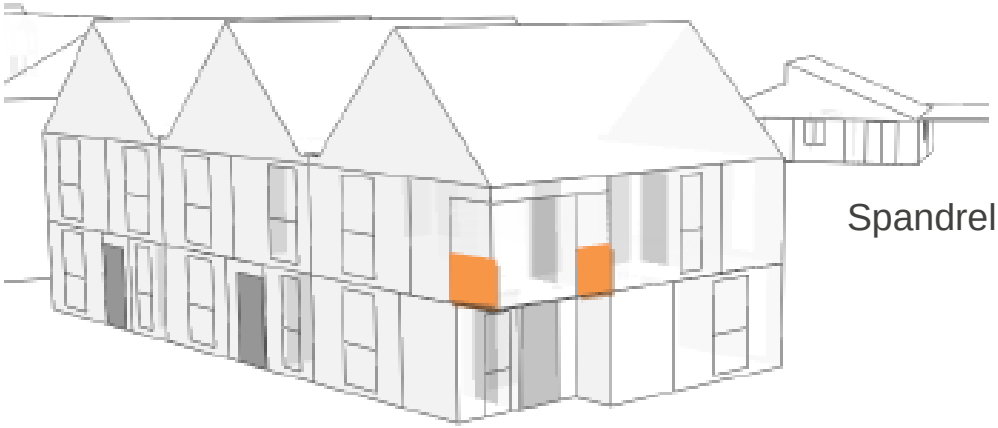
plot 313		Mitigation measures			
Weather year	**Room**	**basecase**	**Blinds**	**Night cooling**	**Combined (Blinds + NC)**
current	Living	0.70%	0.40%	0.60%	0.30%
	Dining	0.80%	0.40%	0.60%	0.30%
	Kitchen	0.70%	0.40%	0.60%	0.30%
	Breakfast	0.60%	0.30%	0.50%	0.20%
	Study	0.30%	0.10%	0.20%	0.00%
	Maste bed	0.70%	0.40%	0.30%	0.10%
	bed2	0.60%	0.50%	0.10%	0.01%
	bed3	0.70%	0.50%	0.20%	0.10%
	bed4	0.70%	0.50%	0.10%	0.01%
	bed5	0.70%	0.40%	0.10%	0.01%
2030	Living	1.20%	0.60%	0.80%	0.10%
	Dining	1.40%	0.80%	0.90%	0.30%
	Kitchen	1.10%	0.60%	0.60%	0.20%
	Breakfast	0.90%	0.40%	0.50%	0.10%
	Study	0.20%	0.20%	0.10%	0.10%
	Maste bed	1.20%	0.60%	0.20%	0.10%
	bed2	0.90%	0.10%	0.01%	0.01%
	bed3	1.20%	0.20%	0.01%	0.00%
	bed4	0.90%	0.10%	0.01%	0.00%
	bed5	1.00%	0.10%	0.01%	0.00%
2050	Living	3.10%	1.90%	2.20%	1.20%
	Dining	3.40%	2.10%	2.50%	1.30%
	Kitchen	3.20%	1.70%	2.10%	1.00%
	Breakfast	3.00%	1.50%	1.90%	0.90%
	Study	1.50%	0.50%	0.80%	0.20%
	Maste bed	2.70%	1.60%	1.00%	0.60%
	bed2	2.10%	0.90%	0.80%	0.30%
	bed3	2.60%	1.10%	0.60%	0.30%
	bed4	2.10%	0.90%	0.70%	0.30%
	bed5	2.20%	0.90%	0.70%	0.30%

Phase 2 Results (plots 265 & 288)

		Mitigation measures			plot 265
Weather year	**Room**	**basecase**	**Blinds**	**Night cooling**	**Combined (Blinds + NC)**
current	kitchen	no risk	no risk	no risk	no risk
	living	no risk	no risk	no risk	no risk
	bed1	minor risk	no risk	no risk	no risk
	bed2	minor risk	no risk	no risk	no risk
	bed3	minor risk	no risk	no risk	no risk
2030s	kitchen	no risk	no risk	no risk	no risk
	living	no risk	no risk	minor risk	no risk
	bed1	no risk	no risk	no risk	no risk
	bed2	no risk	no risk	no risk	no risk
	bed3	no risk	no risk	no risk	no risk
2050s	kitchen	minor risk	minor risk	minor risk	minor risk
	living	minor risk	minor risk	minor risk	minor risk
	bed1	minor risk	minor risk	no risk	no risk
	bed2	minor risk	minor risk	no risk	no risk
	bed3	minor risk	no risk	no risk	no risk

		Mitigation measures			plot 288
Weather year	**Room**	**basecase**	**Blinds**	**Night cooling**	**Combined (Blinds + NC)**
current	kitchen	no risk	no risk	no risk	no risk
	living	no risk	no risk	no risk	no risk
	bed1	no risk	no risk	no risk	no risk
	bed2	no risk	no risk	no risk	no risk
	bed3	no risk	no risk	no risk	no risk
2030s	kitchen	no risk	no risk	no risk	no risk
	living	no risk	no risk	minor risk	no risk
	bed1	no risk	no risk	minor risk	no risk
	bed2	no risk	no risk	minor risk	no risk
	bed3	no risk	no risk	minor risk	no risk
2050s	kitchen	minor risk	minor risk	risk	minor risk
	living	risk	no risk	minor risk	no risk
	bed1	minor risk	no risk	minor risk	no risk
	bed2	minor risk	minor risk	minor risk	minor risk
	bed3	minor risk	no risk	minor risk	no risk

Plot 281



Spandrel Panel

Overhang

Phase 2 Results (plot 281)

		Mitigation measures			plot 281
Weather year	**Room**	**basecase**	**Blinds**	**Night cooling**	**Combined (Blinds + NC)**
current	kitchen	minor risk	minor risk	no risk	no risk
	living	no risk	no risk	no risk	no risk
	bed1	minor risk	minor risk	minor risk	minor risk
	bed2	no risk	minor risk	minor risk	no risk
	bed3	risk	risk	risk	minor risk
2030s	kitchen	minor risk	no risk	minor risk	no risk
	living	minor risk	no risk	minor risk	no risk
	bed1	minor risk	minor risk	risk	no risk
	bed2	minor risk	minor risk	minor risk	no risk
	bed3	risk	risk	risk	risk
2050s	kitchen	minor risk	risk	minor risk	minor risk
	living	risk	minor risk	minor risk	minor risk
	bed1	risk	risk	risk	minor risk
	bed2	risk	risk	minor risk	minor risk
	bed3	risk	risk	risk	risk

Spandrel		Mitigation measures			plot 281
Weather year	**Room**	**basecase**	**Blinds**	**Night cooling**	**Combined (Blinds + NC)**
current	kitchen	minor risk	minor risk	minor risk	no risk
	living	no risk	no risk	no risk	no risk
	bed1	minor risk	minor risk	minor risk	minor risk
	bed2	minor risk	minor risk	no risk	no risk
	bed3	risk	minor risk	risk	minor risk
2030s	kitchen	no risk	no risk	no risk	no risk
	living	no risk	no risk	no risk	no risk
	bed1	minor risk	minor risk	minor risk	no risk
	bed2	minor risk	no risk	no risk	no risk
	bed3	risk	risk	risk	minor risk
2050s	kitchen	risk	minor risk	minor risk	minor risk
	living	minor risk	minor risk	minor risk	minor risk
	bed1	risk	risk	minor risk	minor risk
	bed2	risk	risk	minor risk	no risk
	bed3	risk	risk	risk	minor risk

Outcomes

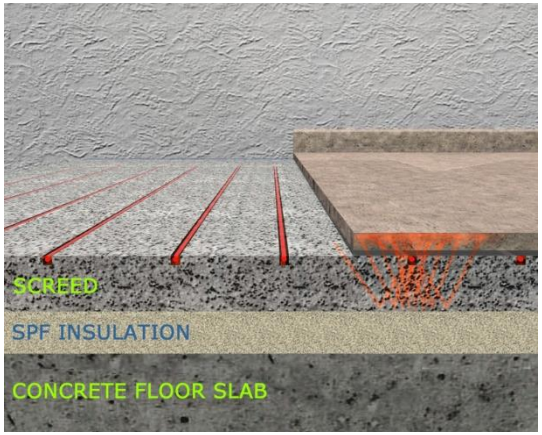
Mitigation measures implemented

- ✓ Thermal mass – screeded ground floors with hard surface treatment only
- ✓ Lower G-values (triple glazing)
- ✓ Blinds – provision within specification + user education
- ✓ Shading – spandrel panels + some canopies
- ✓ Ventilation – maximising openable areas
- ✓ Night cooling – upstairs windows (NB single storey units)
- ✓ Soft landscaping – large areas of green space

- x Shutters – potential to install external shading in future
- x Additional mass – Potential to include phase change materials in future
- x Secure night cooling (ground floors) – potential for louvered vents

Other Future Proofing Measures

Thermal Mass – 6 units with passive ventilation



Rainwater harvesting

Green roofs

Soft landscaping

Guidance / Rules of Thumb

SUMMER OVERHEATING

NORTH ELEVATION

- Medium or high Window to Wall Ratio (WWR) if combined with high performance glazing (low-emissive/triple glazing)
- No need for shading although some solar gains will occur during the summer

WEST ELEVATION

- Low or medium WWR combined with vertical shading devices
- Shading can be provided by means of landscaping / vegetation. Consider deciduous trees to let solar radiation in winter and block it in summer.

GENERAL GOOD PRACTICE (Other than Solar Gains)

Minimise unwanted internal heat gains:

- Energy efficient appliances and lights
- Insulate distribution pipes (heating, hot water) and tanks

Purge excess heat:

- Natural cross ventilation very effective
- Mechanical ventilation (MVHR) always to be combined with natural ventilation for heat purge
- Consider Passive Ventilation with Heat Recovery Systems for houses (2+ storey high) as ventilation strategy in winter and summer

Delay heat gains:

- Thermal mass (to store heat during the day) combined with night-time ventilation (to purge it)

EAST ELEVATION

- Low or medium WWR combined with vertical shading devices
- Shading can be provided by means of landscaping / vegetation. Consider deciduous trees to let solar radiation in winter and block it in summer.

SOUTH ELEVATION

- Medium or high WWR combined with horizontal shading devices, otherwise passive heat gains can be lost in winter.
- High performance glazing (solar control double glazing or triple glazing) unless shading devices are present.
- Horizontal shading devices, such as balconies, overhangs or brise solei.
- Difficult to shade with landscaping/vegetation due to high sun angle, but tall trees can be used.

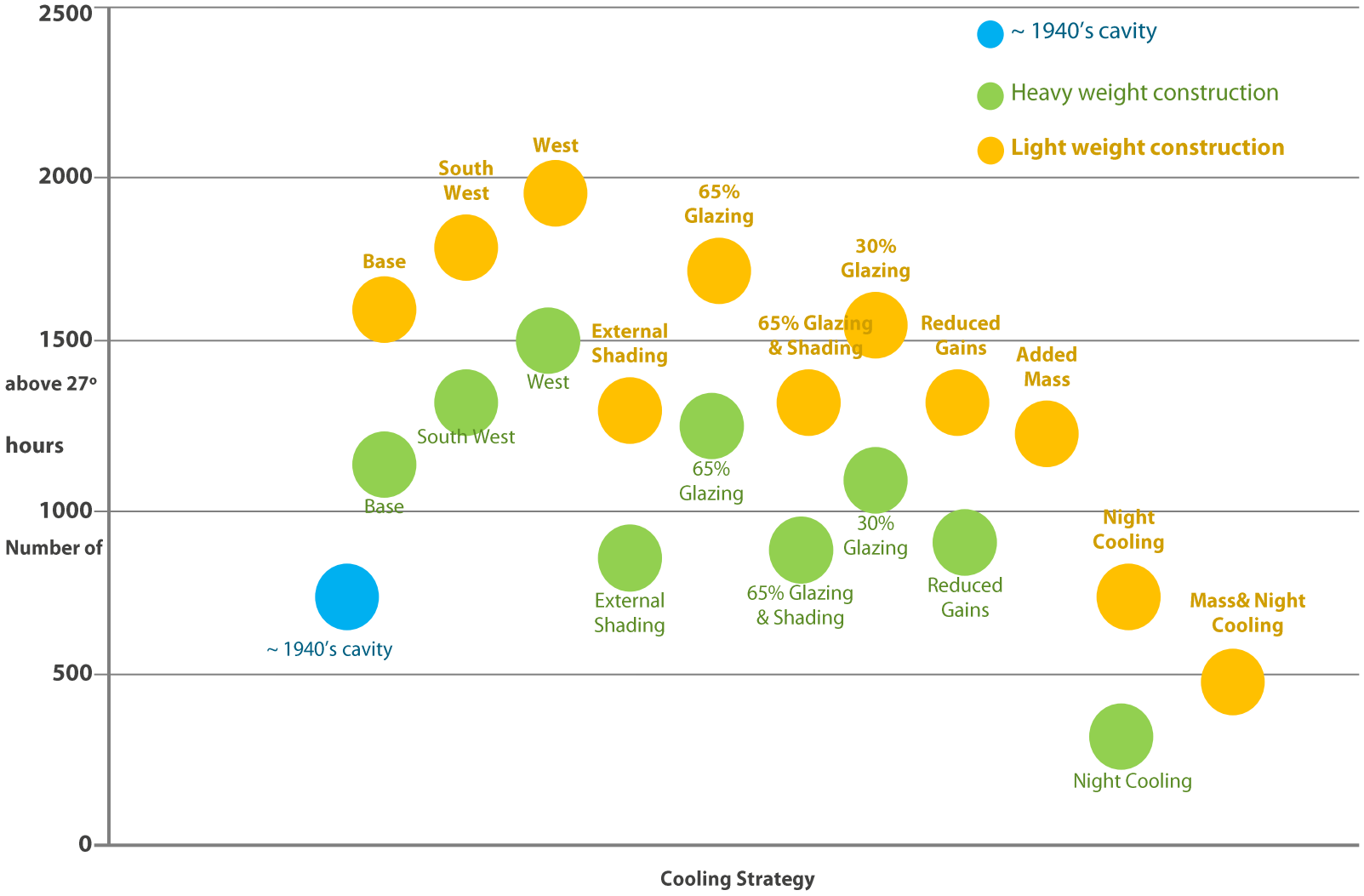
RULES OF THUMB:

NOTE: This Rules of Thumb to be used as a general guidance for design purposes. Dynamic thermal simulation should be undertaken to calculate overheating, when design is more advanced.

PRP

Overheating risk for different design options

Degree Hours above 27° All construction, 1st June to 30th September



Bicester Eco-Town Performance Improvement toolkit (BEPIT): Closing the performance gap

Colin Hobart, Loughborough University

Bioregional

ECO BICESTER living lab
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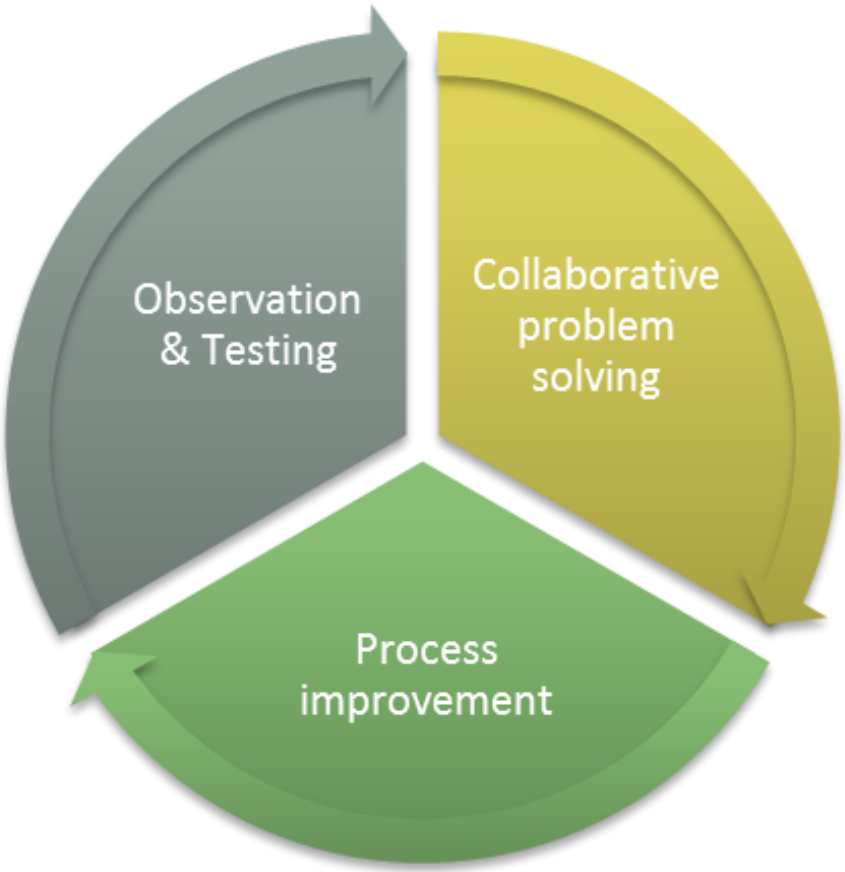
The Bicester Ecotown Process Improvement Toolkit (BEPIT)



BEPIT Project

Innovate UK
Application number
22757-158268

a2dominion

silver

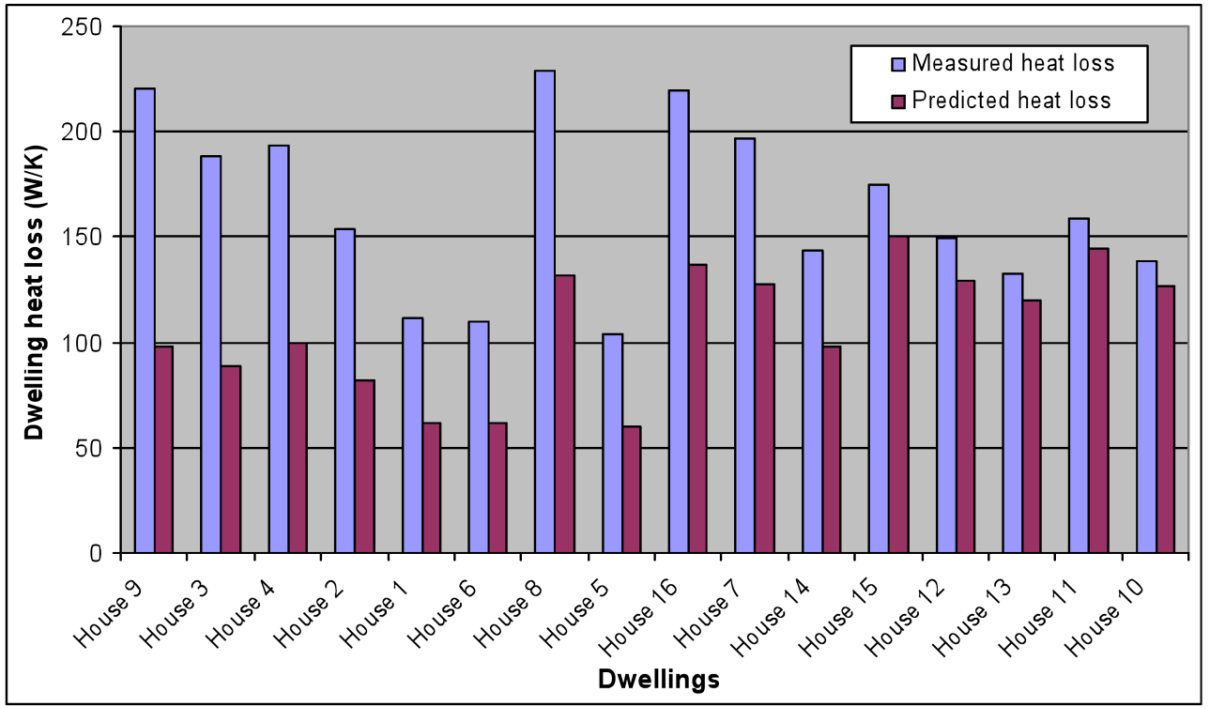
WILLMOTT DIXON
SINCE 1852

PRP

Bioregional

Loughborough University

The Energy Performance Gap



Co-heating test results for 16 new homes (Zero carbon hub, 2010)

Loughborough University

Method and Headline Findings

Action Research

- Site Observers
- Performance Testing
- Collaborative Problem Solving

Headline Findings

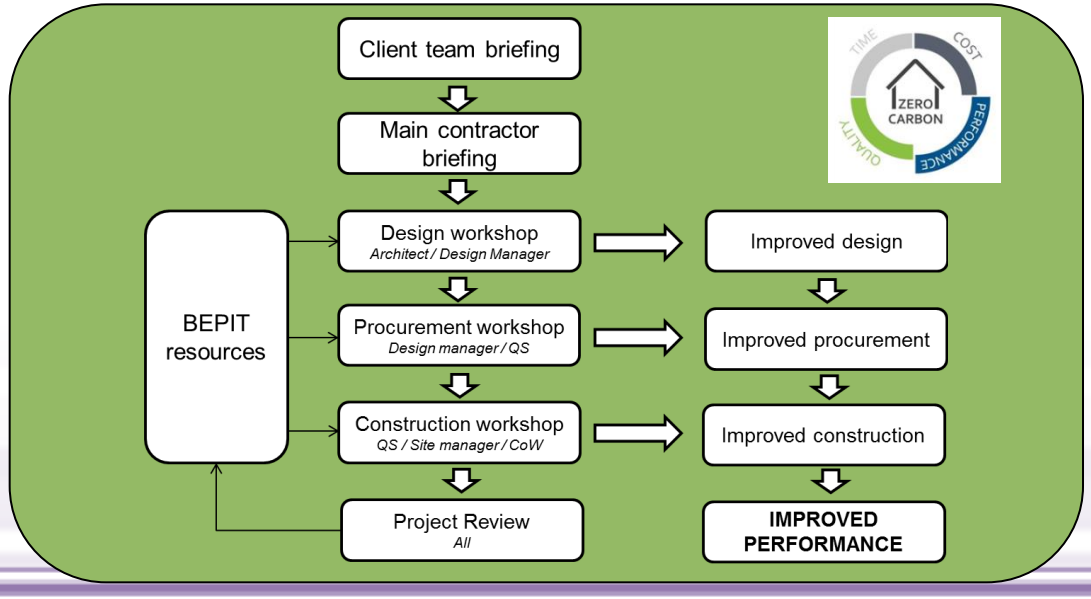
- Issues are minor, but commonly occurring and difficult to detect
- Airtightness / Thermal insulation / Building Services
- Knowledge to develop solutions is already held in project team

Loughborough University

Developing Solutions – The BEPIT Toolkit

Toolkit

- Tools and Knowledge
- Focus on 8 Critical Operations
- Design, Procurement and Construction Stage Solutions
- Facilitated Process



"Clusters"

1. Below ground services
2. DPM, Floor Insulation and Screed
3. Timber Frame Structure
4. Timber Frame Internal Works
5. Window Fitting
6. 1st Fix Services
7. Loft Insulation
8. Commissioning and Handover

Loughborough University

Monitoring and evaluation: Learning from new build homes in Bicester

Prof. Rajat Gupta, Oxford Brookes University

Bioregional

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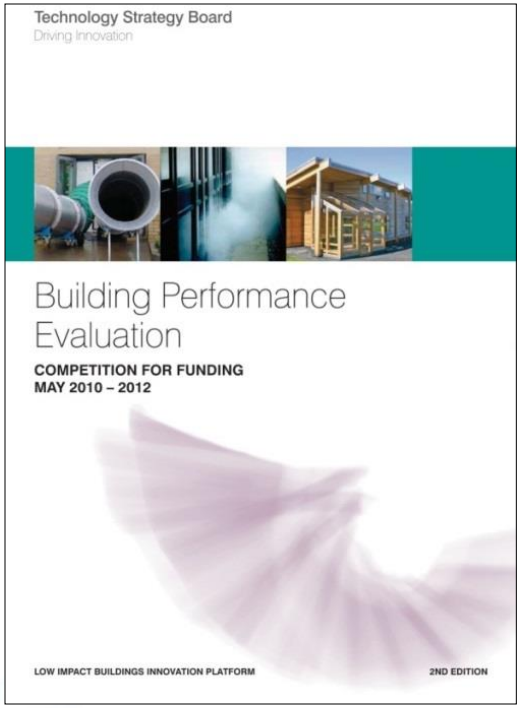
Overview of the scheme

- Exemplar eco-development
- Fabric first approach
- Steel frame with pre-insulated panels.
- MVHR with summer bypass
- Air Source Heat Pumps
- PV panels
- Code for Sustainable Homes Level 4



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Case studies

- Houses 1 and 2, were monitored and assessed for a period of 12 months.

	House 1	House 2
Area (m^2)	88	123
Typology	3 bedroom end-terrace	4 bedroom mid-terrace
Floors	Two	Three
Occupancy patterns	Weekdays: 15:00-8:00 Weekend: 24h	Weekdays: 24h Weekend: 24h
Occupants	2 adults, 1 child	4 adults, 1 baby

Design specifications & construction details

Target design rating	CSH Level 4
'As designed' Dwelling Emission Rate	11.53kgCO_2/m²/year
Main construction elements (as designed) U-values W/m²K	Walls: Light steel frame with pre-insulated panels, U-value: 0.15 Roof: Tile on timber, U-value: 0.15 Ground floor: Concrete over steel frame with Cube 6 EPS insulation block, U-value: 0.15 Windows: Timber frame, triple glazing, U-value ≤1.2
Space heating and hot water system	Air Source Heat Pump (ASHP); underfloor heating coils, immersion heater.
Target air tightness (m³/hm² @50Pa)	3
Ventilation strategy	MVHR with summer bypass
Renewables	5.9 kWp Photovoltaics per block

Methodology: BPE tools to assess 'as built performance'

Design & construction audit	Fabric testing	Review of systems	Evaluation of handover	Review of control interfaces	Review of occupant feedback
Review of drawings and SAP calculations	Air permeability test, infra-red thermography, in situ U-value measurement, smoke air leakage test	Installation and commissioning checks, measurement of performance and energy use of heating and mechanical ventilation systems	Review of handover process and any guidance provided to the occupants	Review of usability of control interfaces	Review of occupant feedback through walkthroughs, interviews and building user survey questionnaires

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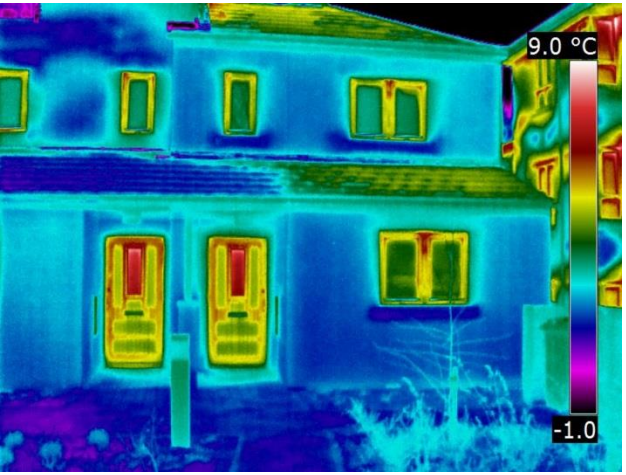
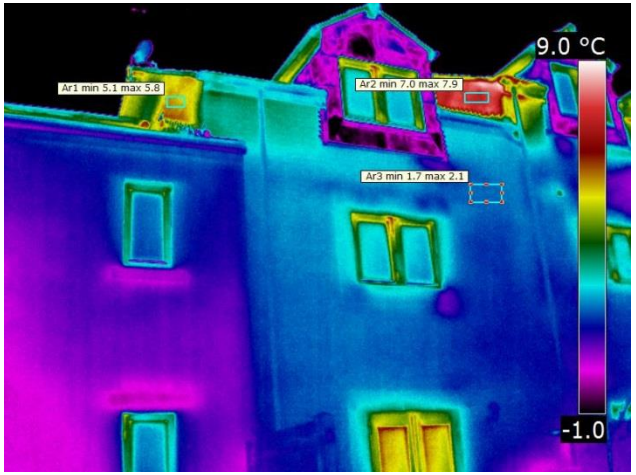
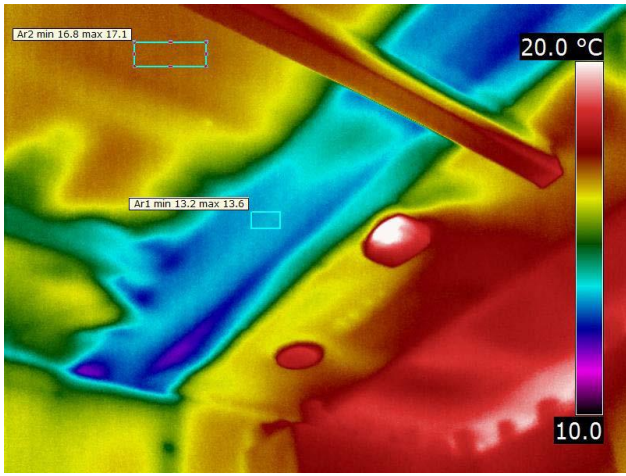
Fabric performance

- Actual wall U-values very close to those intended at design stage
  - No major thermal abnormalities evident in the walls
  - Some issues with party walls.
- Actual air permeability was above the design target of 3 $m^3/(h.m^2)$
- Air leakage paths identified – windows, door frames
- Cold bridging from ceiling beams and thresholds

Location	Design Wall U-value (W/m2K)	Final averaged U-Value (W/m2K)
House 1 – North Facing External Wall	0.15	0.16
House 2 – North Facing External Wall	0.15	0.13







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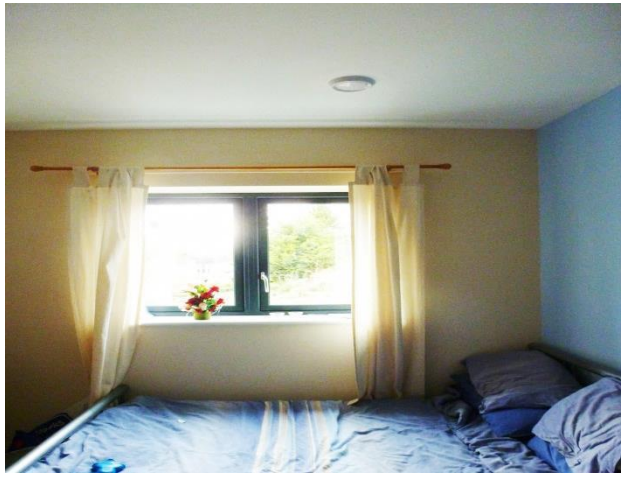
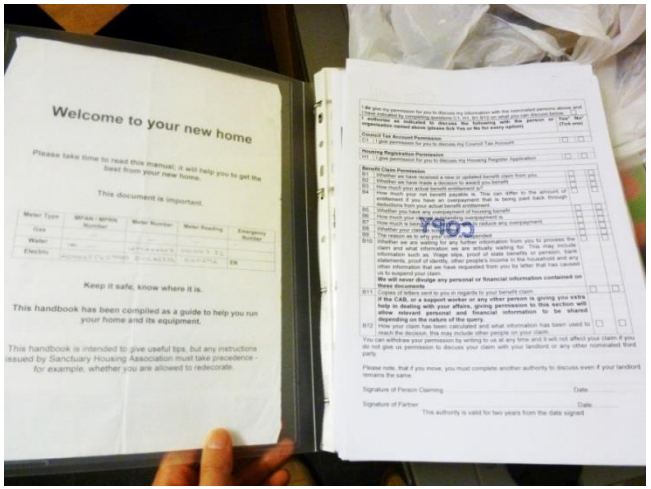
Commissioning review of systems

- MVHR system was not balanced in terms of supply and extract air flows.
- MVHR terminals not commissioned properly. Awkward position of MVHR outlet terminals in relation to space usage.
- Room thermostats not properly connected to heating system
- These faults were addressed by the builder – rapid feedback helps to discover and resolve issues.



Evaluation of handover induction and user guide

- Demonstration tour was clear and easy-to-follow for the residents.
- Overall good list of topics covered.
- A more phased approach to handover is recommended with re-training of residents.
- Shorter and visual user guide more likely to be read
- Good to combine overview of guidance documents with demonstration tour.



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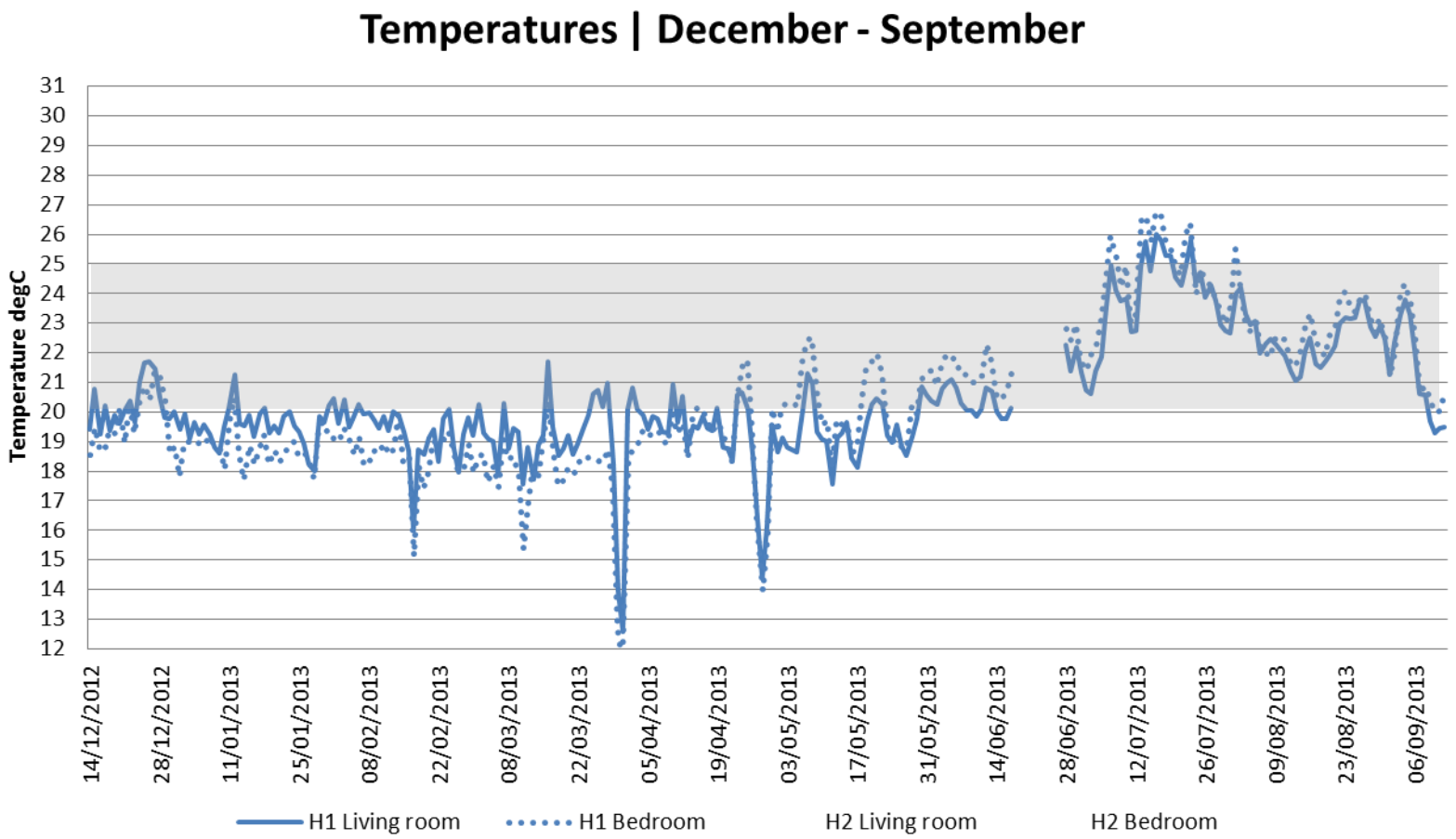
Environmental monitoring



House 1: temperatures range between 12ºC-25ºC. Bedroom 1-2ºC cooler than living room during winter and 1-2ºC warmer in summer.

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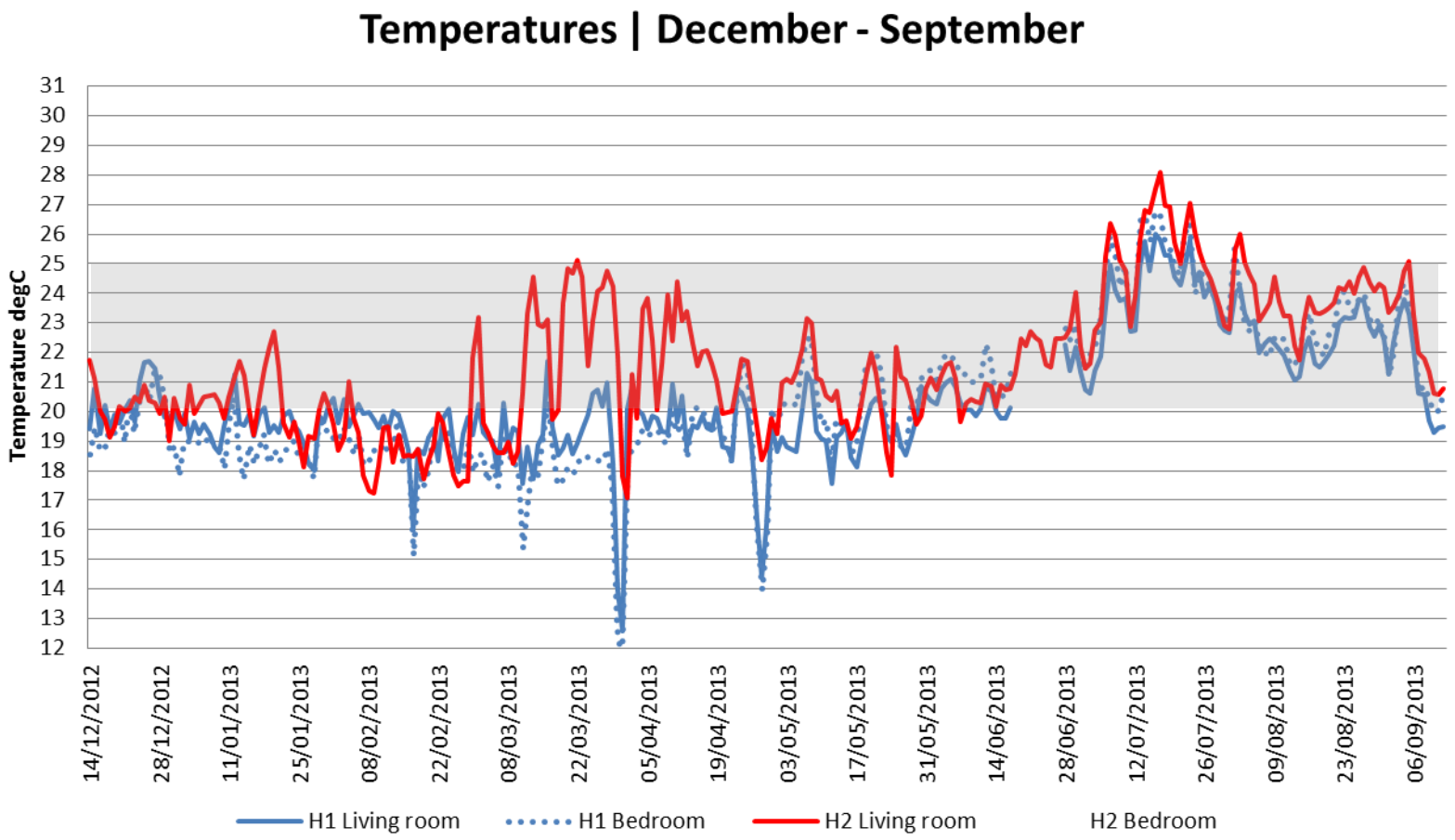
Environmental monitoring



House 1: temperatures range between 12ºC-25ºC. Bedroom 1-2ºC cooler than living room during winter and 1-2ºC warmer in summer.

House 2: living room temperatures range between 19ºC-26ºC.

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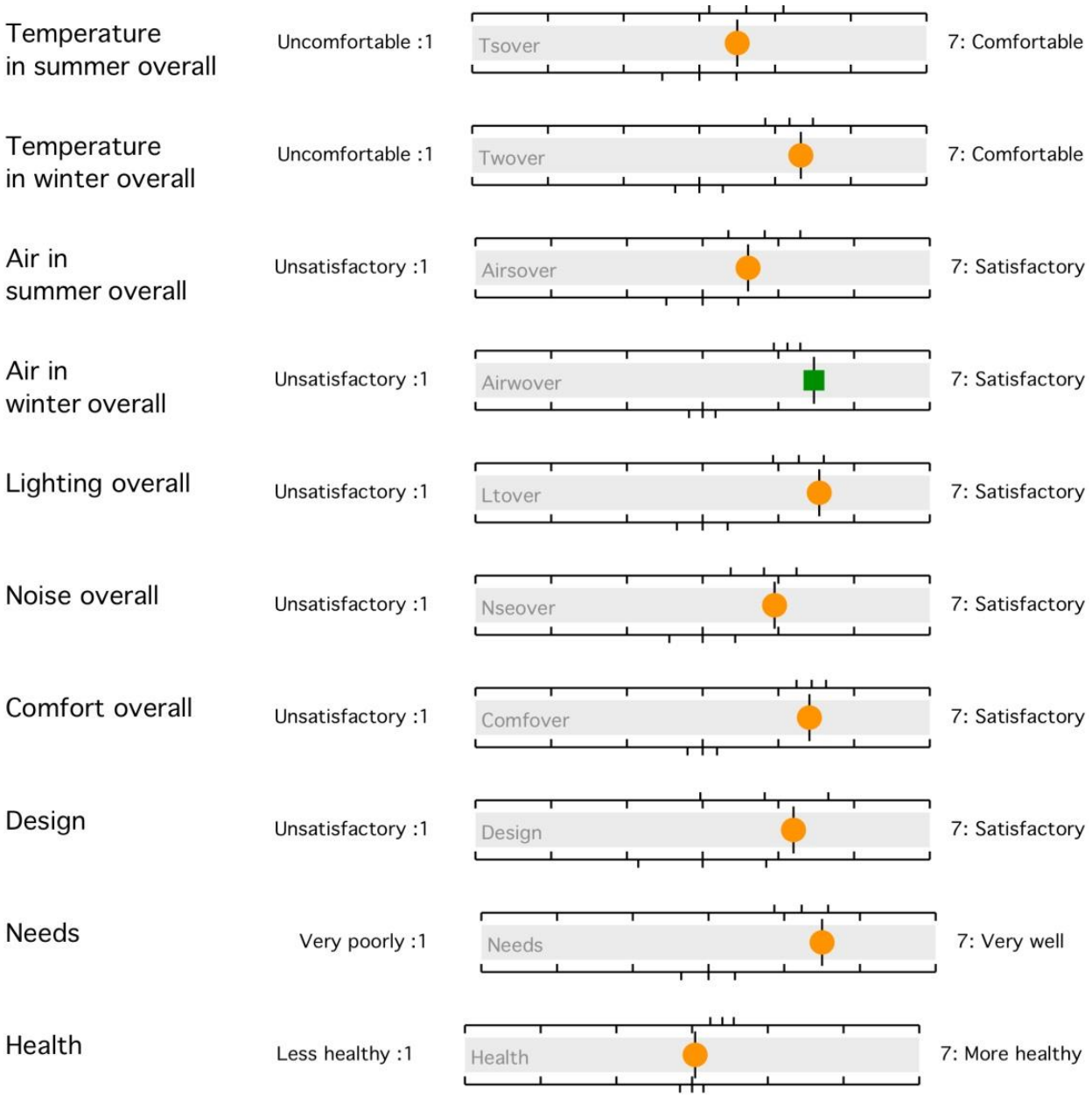
Feedback from residents (n = 24)



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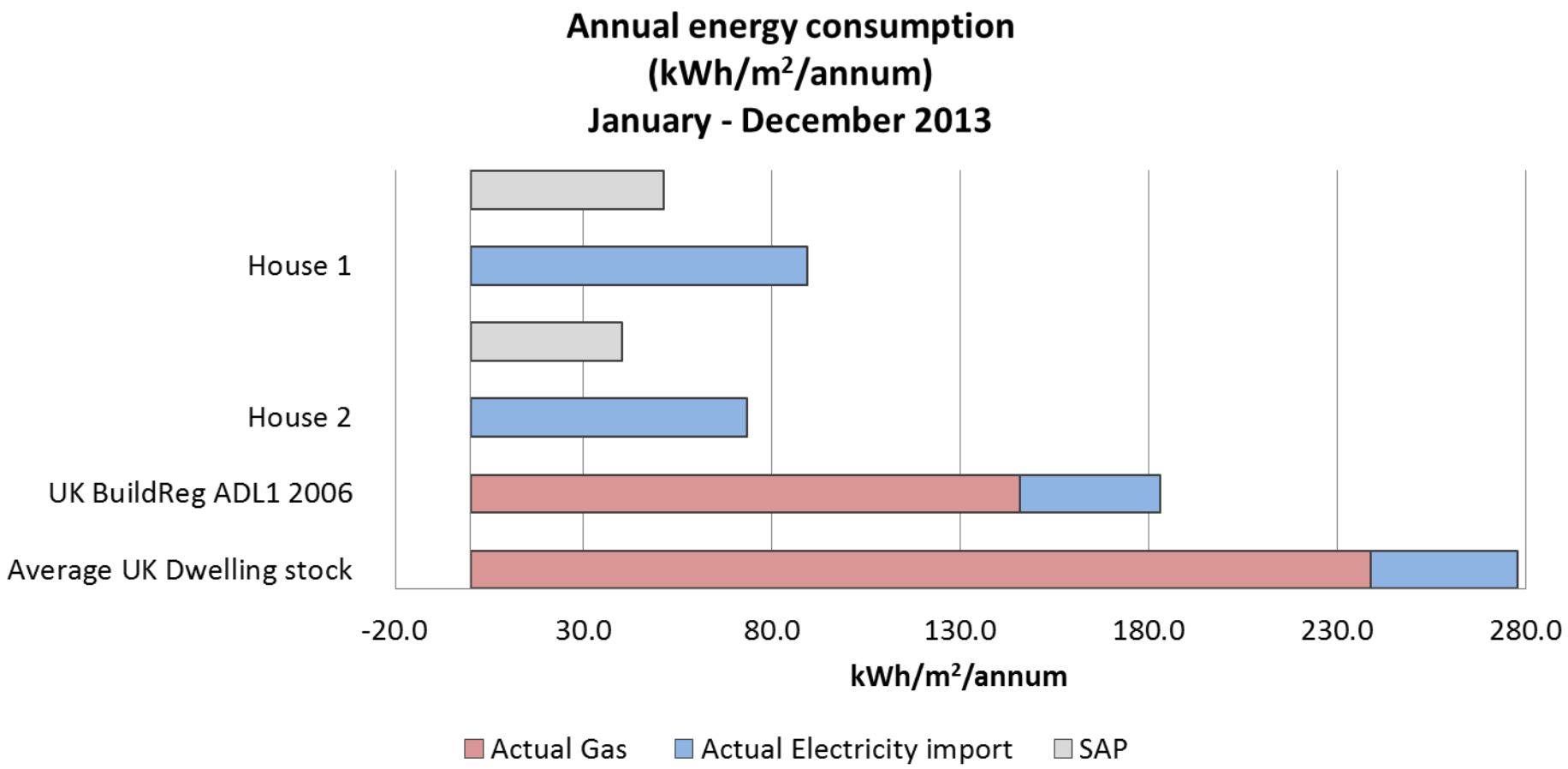
Energy use of the case study houses



- Electricity consumption is almost twice the predicted energy use but better than the CSH 4 benchmark (25 kWh/m^2/year for electricity and 72 kWh/m^2/year)

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Eco Bicester Living Lab PhD studentship

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Co-funded by Oxford Brookes University 150th year studentship, Bioregional, Cherwell District Council and A2Dominion

Duration: 2016-2019

PhD researcher: Danielle Greenspan
Director of Studies: Prof Rajat Gupta
Second supervisor: Nicole Lazarus

Doctoral study evaluating the actual performance of the NW Bicester exemplar development against the aspirations set for an eco-town and one planet community.

How effective is an exemplar development in meeting the design expectations of an eco-town and aspirations of one planet community?

Improving the performance of new-build housing

Q & A

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Eco Bicester Living Lab
2016 Annual Event

Coffee Break

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Retrofitting Bicester

- The Bicester Story

- Innovative retrofit of the Garth

- The Circular Economy

The Bicester retrofit story

Dr Matthew Wood, Bioregional

Nicole Lazarus, Bioregional

Bioregional

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Engagement projects

- Energy workshops with Grassroots Bicester
- 12 trained Carbon Conversation facilitators
- Schools visits, individual home assessments
- Eco Bicester Day
- Green Deal pilot: 100 assessments, 20 homes retrofitted, follow up monitoring
- Travel behaviour project with bike loan scheme

Retrofit projects

- 1,500 free cavity/loft insulations
- Boiler replacements
- 20 “green deal pilot” homes
- Deep retrofit of town council building

Potential for cost effective CO_2 emissions reduction

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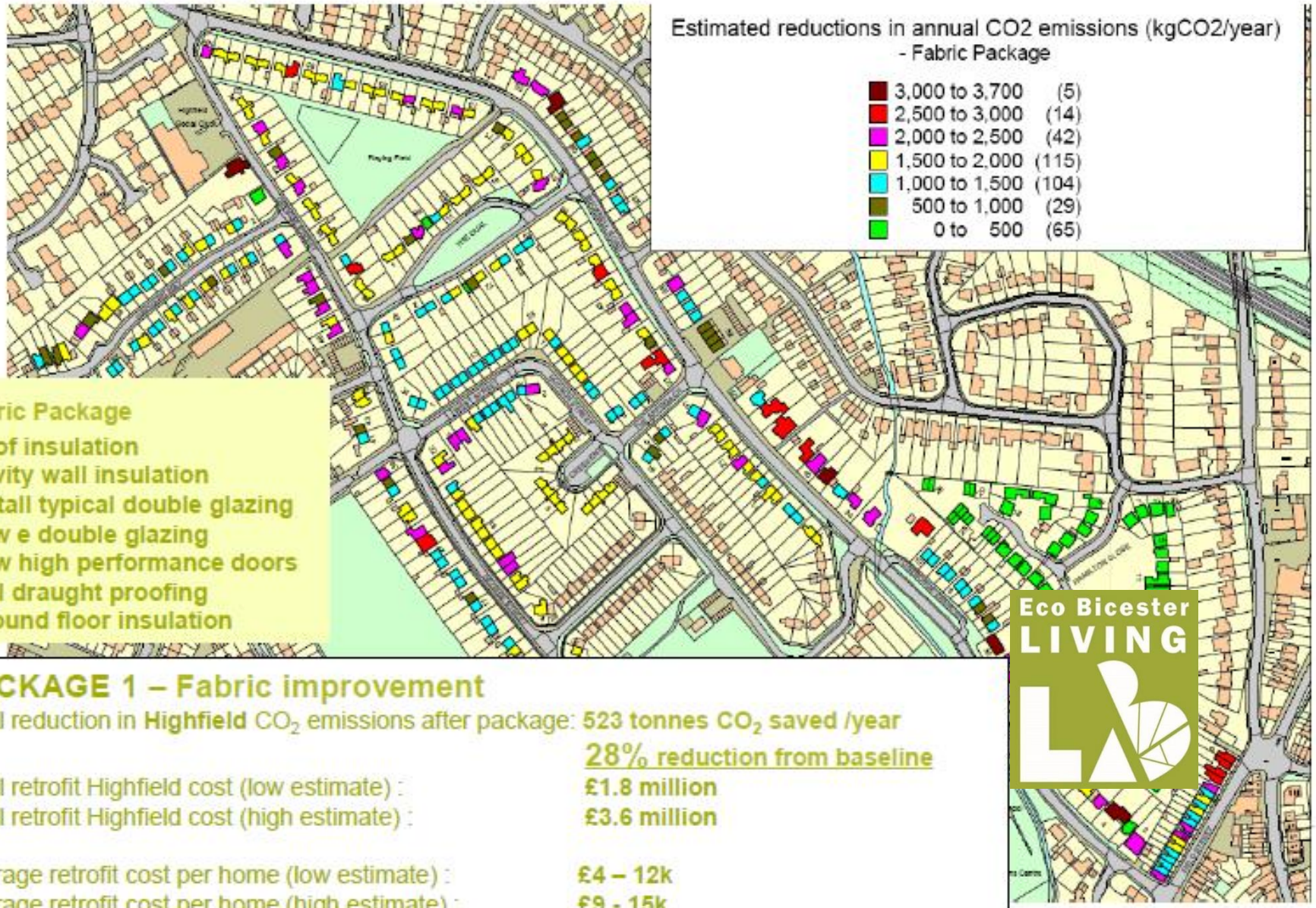


Fabric Package

- Roof insulation
- Cavity wall insulation
- Install typical double glazing
- Low e double glazing
- New high performance doors
- Full draught proofing
- Ground floor insulation

Eco Bicester LIVING

PACKAGE 1 – Fabric improvement

Total reduction in **Highfield** CO_2 emissions after package: **523 tonnes CO_2 saved /year**

28% reduction from baseline

Total retrofit Highfield cost (low estimate) :	**£1.8 million**
Total retrofit Highfield cost (high estimate) :	**£3.6 million**
Average retrofit cost per home (low estimate) :	**£4 – 12k**
Average retrofit cost per home (high estimate) :	**£9 - 15k**

What is Lemur?

Cherwell DISTRICT COUNCIL NORTH OXFORDSHIRE

OXFORD BROOKES UNIVERSITY

CATAPULT Future Cities

Bioregional

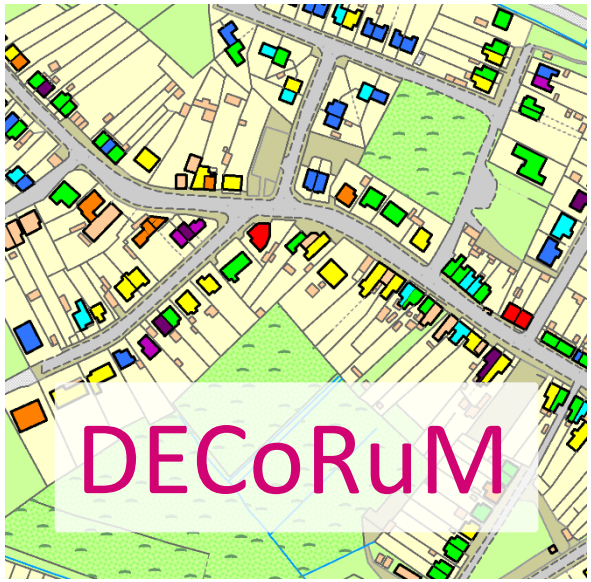
Funded by: Innovate UK

Aim

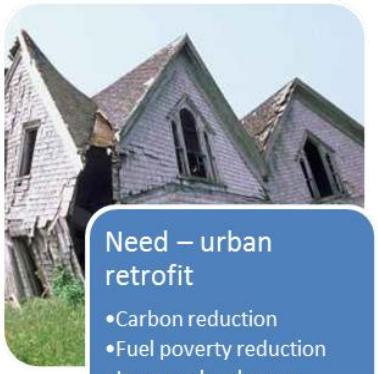
To develop a data-driven service for LAs and RSLs for better targeted planning and delivery of energy efficiency projects

Two tools


Community Energy Manager
Community Energy Manager


DECoRuM

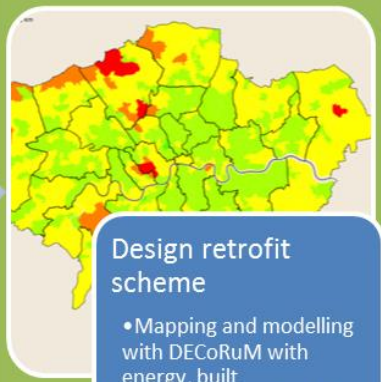
Lemur service delivery process



Need – urban retrofit

- Carbon reduction
- Fuel poverty reduction
- Improve local areas

LEMUR



Design retrofit scheme

- Mapping and modelling with DECoRuM with energy, built environment and social data
- Identify target areas, community groups and interventions
- Input community collected data via CEM

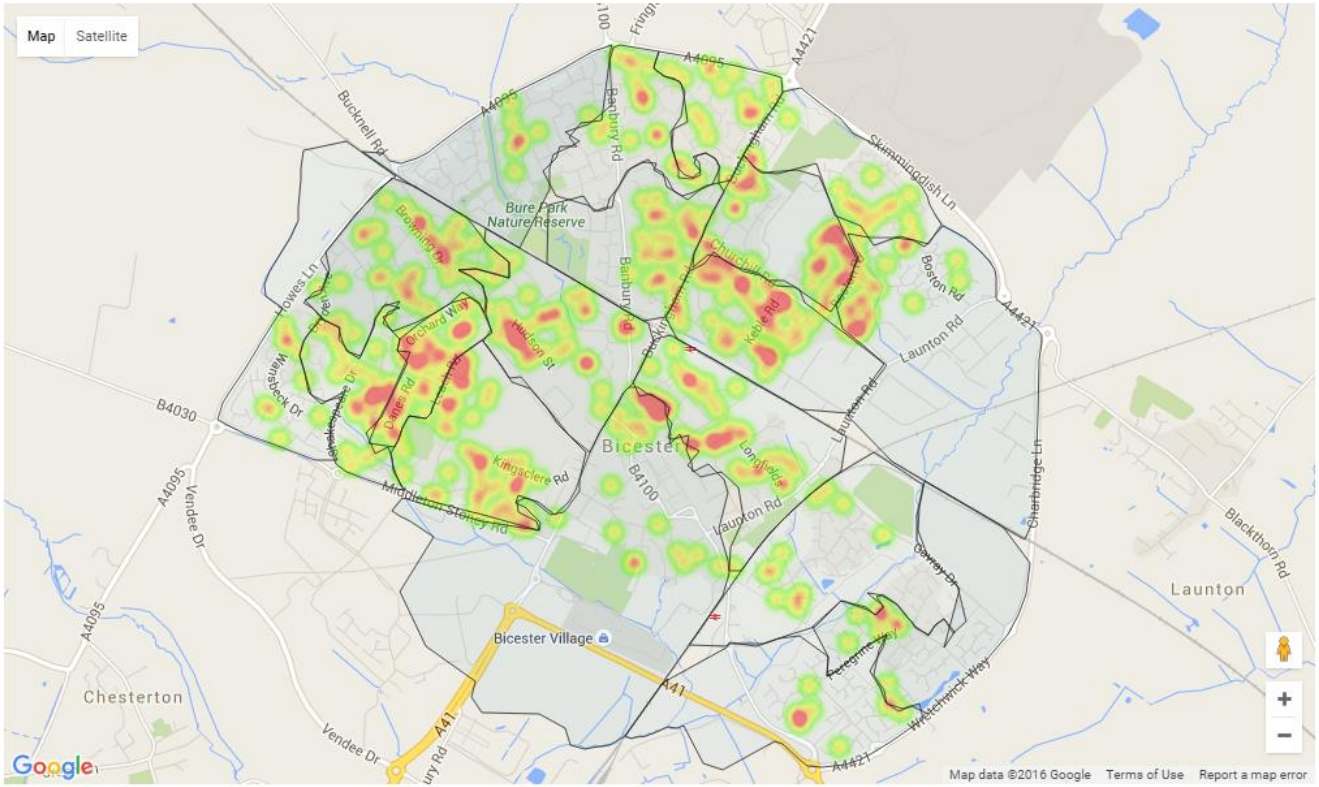
Deliver scheme

- LA procures provider
- ECO/GD provider project manages & installs
- Community group delivers outreach and refers householders via CEM

Outcomes

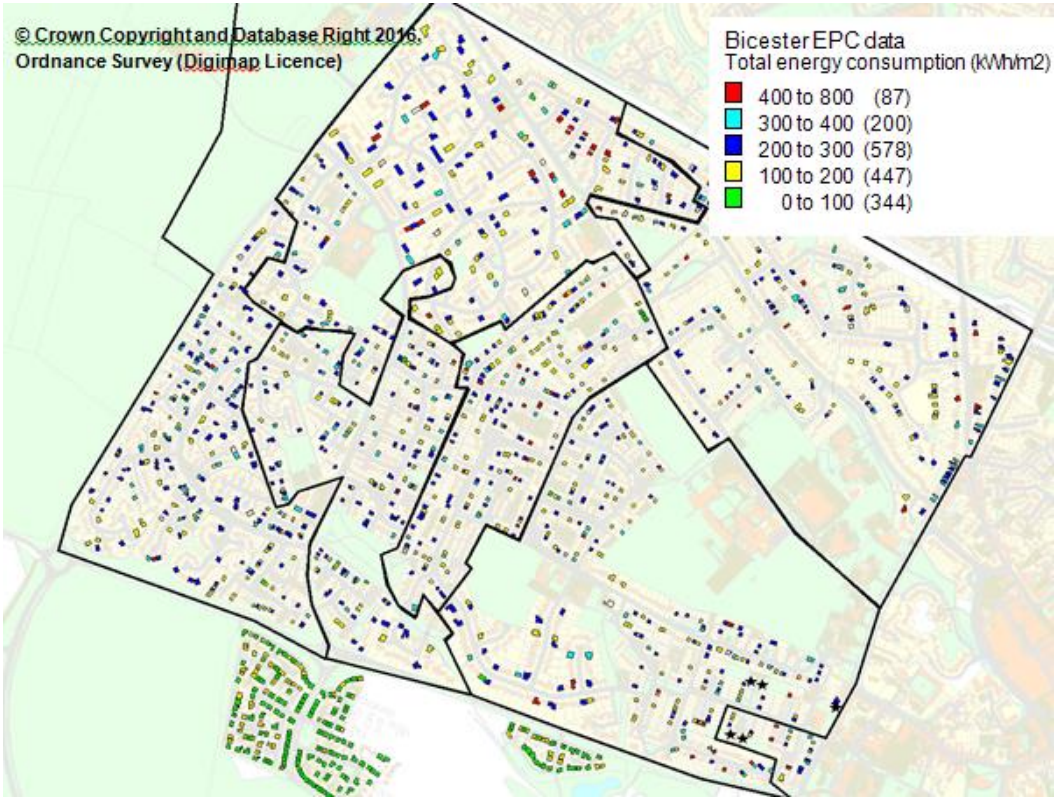
- Insulated homes
- Reduced carbon
- Reduced bills and fuel poverty
- Reduced project costs
- Income for local community groups

Mapping Bicester (CEM)

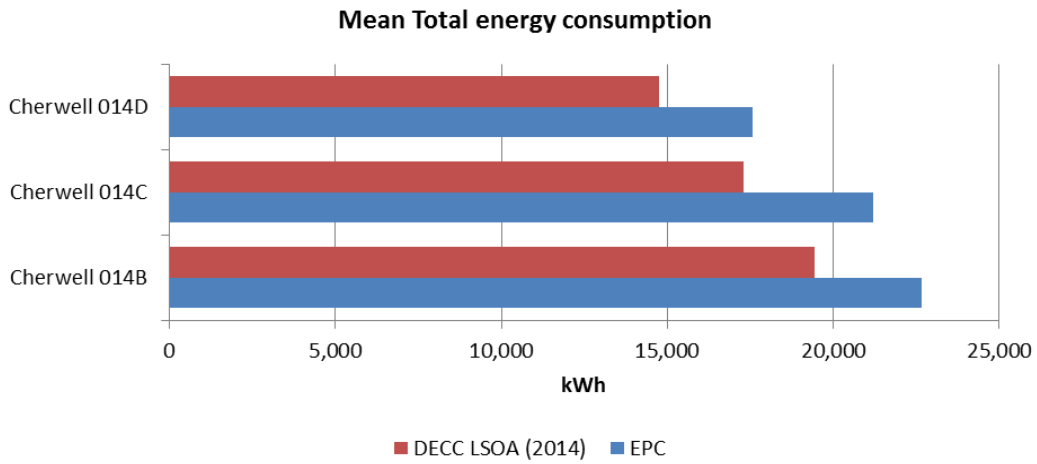


Properties with EPCs showing uninsulated cavity walls and <150 mm loft insulation

Mapping Bicester (DECoRuM)



Comparing EPCs to national data



Over-estimate of between 3,000-4,000 kWh/yr in the mean energy figure for the EPCs.

	Cherwell 014B	Cherwell 014C	Cherwell 014D
No. of meters (electricity)	636	691	489
No. of EPCs	212	231	206
% of area covered by EPC	33%	33%	42%
Bicester mean 2014 (LSOA)	16,181 kWh		
Bicester mean EPCs	16,929 kWh		

	2014
Average UK consumption (DECC, 2015c)	16,406

Next steps

- Analyse data from pilot
- Market analysis
- Determine viability of service

Innovative Retrofit of the Garth: Performance results

Adrian Kite, Ridge Architects

Prof. Rajat Gupta, Oxford Brookes University

Bioregional

ECO BICESTER living lab
Knowledge • Innovation • Collaboration

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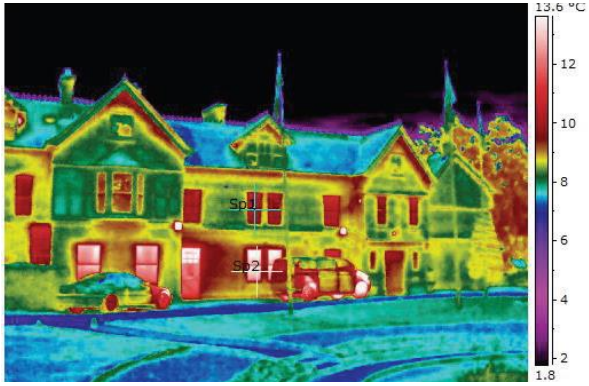
Innovative Retrofit of the Garth

Eco Bicester Living Lab 7 June 2016



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Craftsmanship in construction

BICESTER TOWN COUNCIL

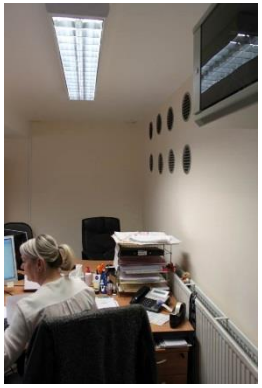
Garth House Retrofit


Insulated plasterboard

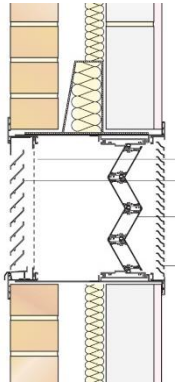

Improved Airtightness


Secondary Glazing


Spacetherm C




Cross Ventilation




MVHR

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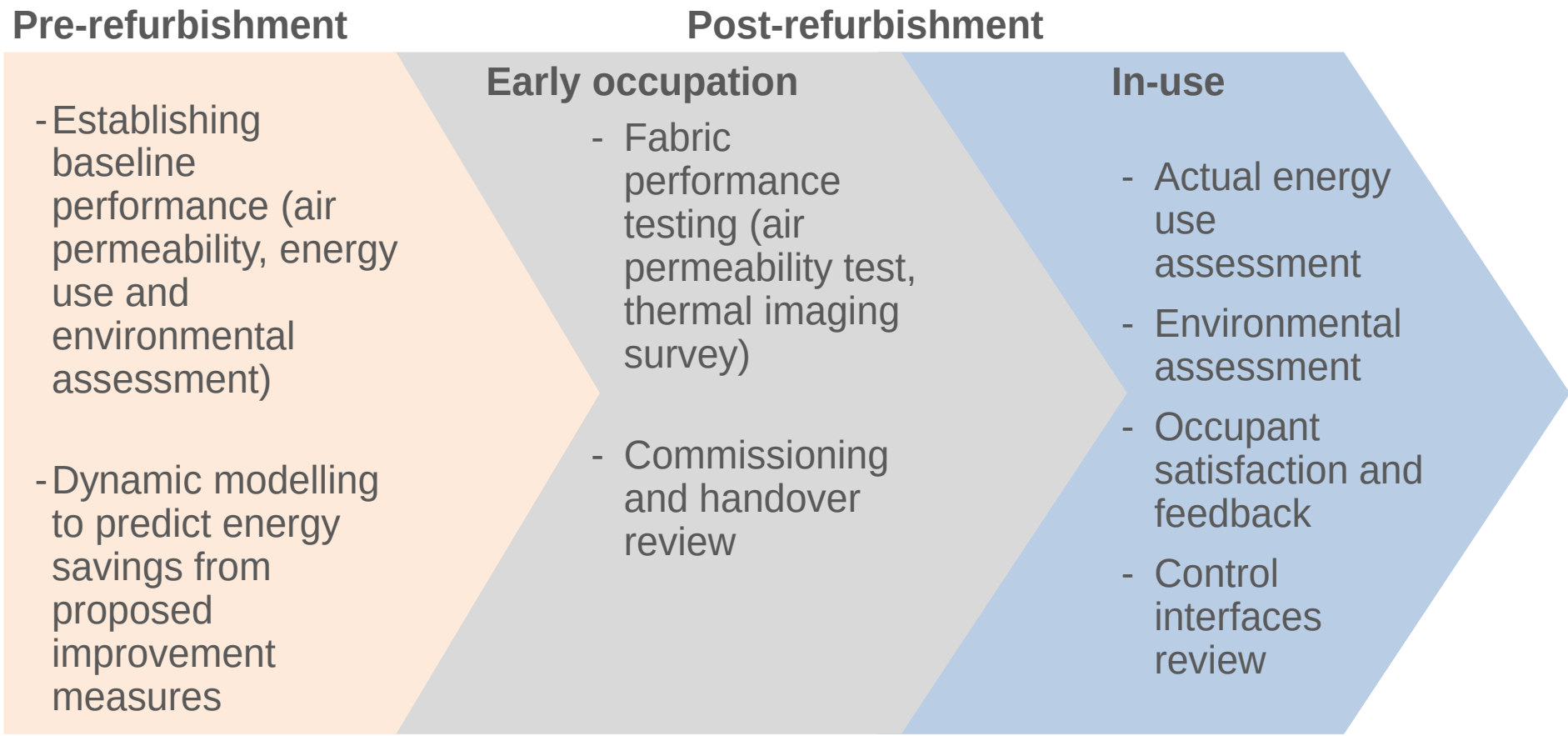
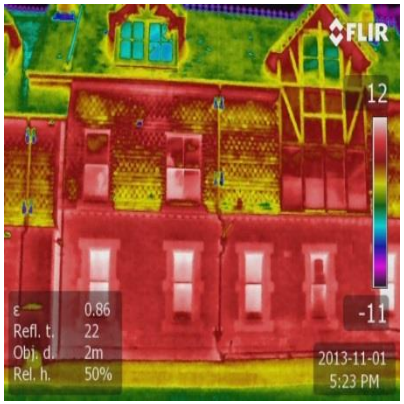
Monitoring retrofit performance

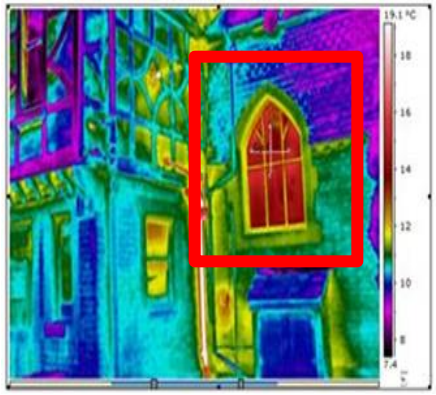
Using a building performance evaluation (BPE) approach, the process and performance of the refurbishment was evaluated.

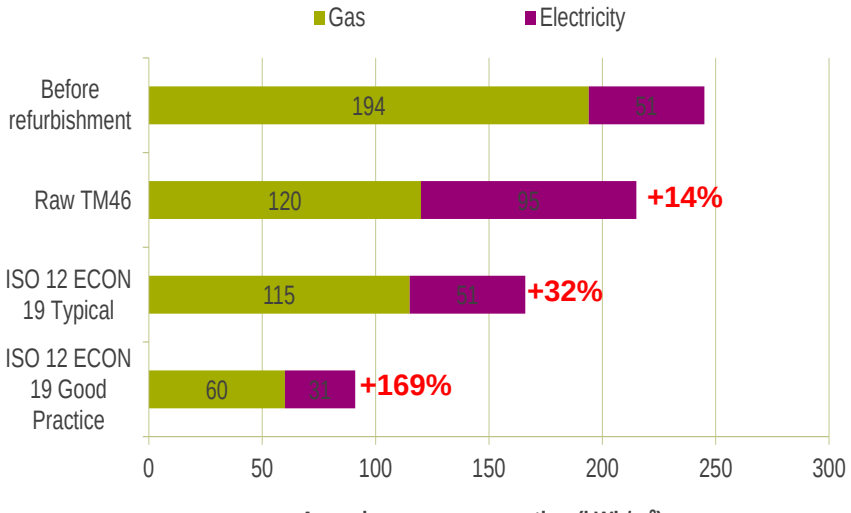


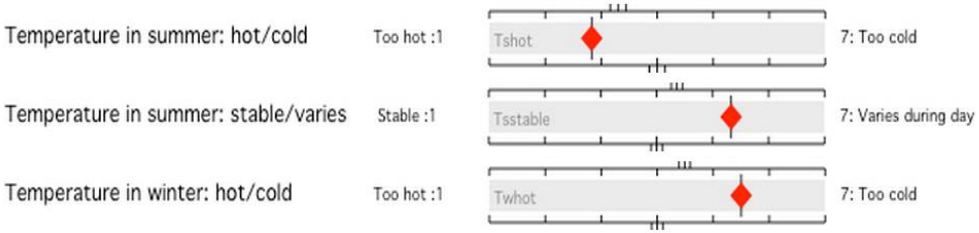
Pre-refurbishment BPE

- Air permeability of 20.52m^3/h.m^2@50Pa
- Significant heat loss through external wall and single glazed windows
- Annual energy consumption was 245kWh/m^2 and greater than most benchmarks. Gas use very high.
- Indoor temperature '**too hot**' in the summer and '**too cold**' in the winter.
  - Heating system always on during winter.
- Occupants concerned over disruption during the refurbishment works



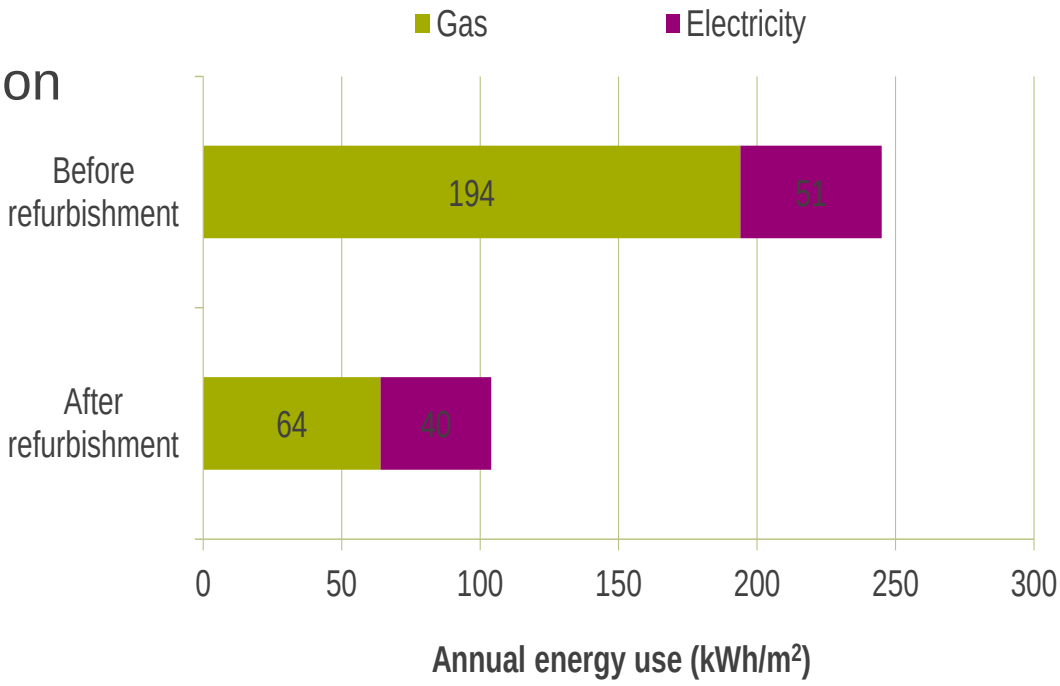






Pre-refurbishment actual energy use

- Annual energy consumption reduced by 58% compared to pre-refurbishment levels
- 67% reduction in gas consumption
- 22% reduction in electricity consumption.
- 49% reduction in overall annual carbon emissions.
- Significant reduction in gas consumption was due to the improved insulation and careful management of heating which was on during occupied hours only.



Fabric performance – air tightness

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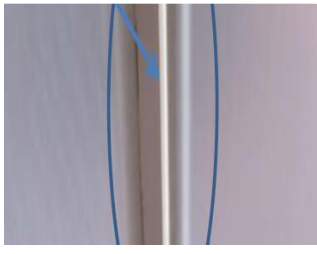
- **52% reduction** in air tightness after the refurbishment
- Air leakage paths detected through a smoke pencil test.
- Air leakage paths were found around door frames, skirting boards and exposed floor boards
- **Following the tests the contractor carried out repairs of the frames and sealed the gaps.**

	Air tightness ($m^3/h.m^2$ @50Pa)	
	Target	Measured
Before refurb	-	**20.5**
After refurb-1	**10.0**	**10.62**
After refurb-2 (following smoke test and improvements)		**9.31**



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Review of refurbishment process and handover

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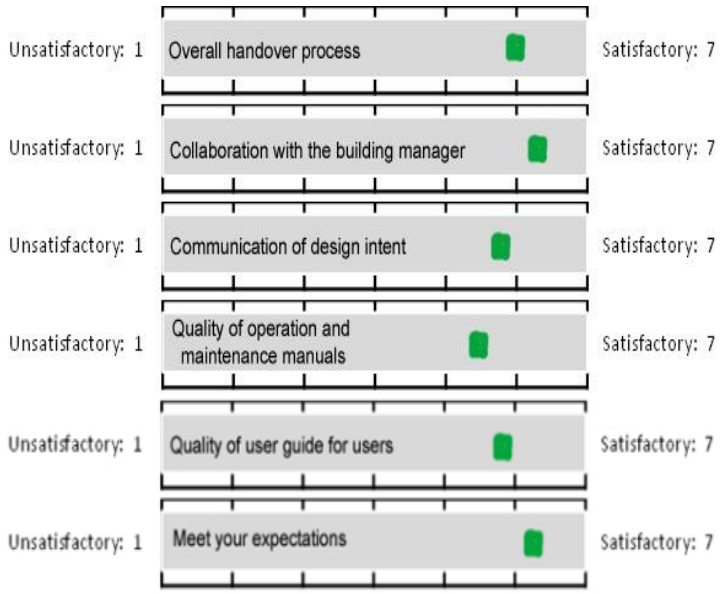
- Overall building manager and users were satisfied with the building handover and user guide (missed out maintenance schedule of MVHR).
- Process caused greater disruption to the occupants than planned due to unforeseen problems associated with the old building.
- Having two contractors with parallel contractual arrangements led to some delays.
- Issues with installation of internal insulation: transport footprint to deliver the boards; little attention to detail with regard to cutting, labelling and installation; lack of detailed survey and design liability



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Environmental monitoring - temperature

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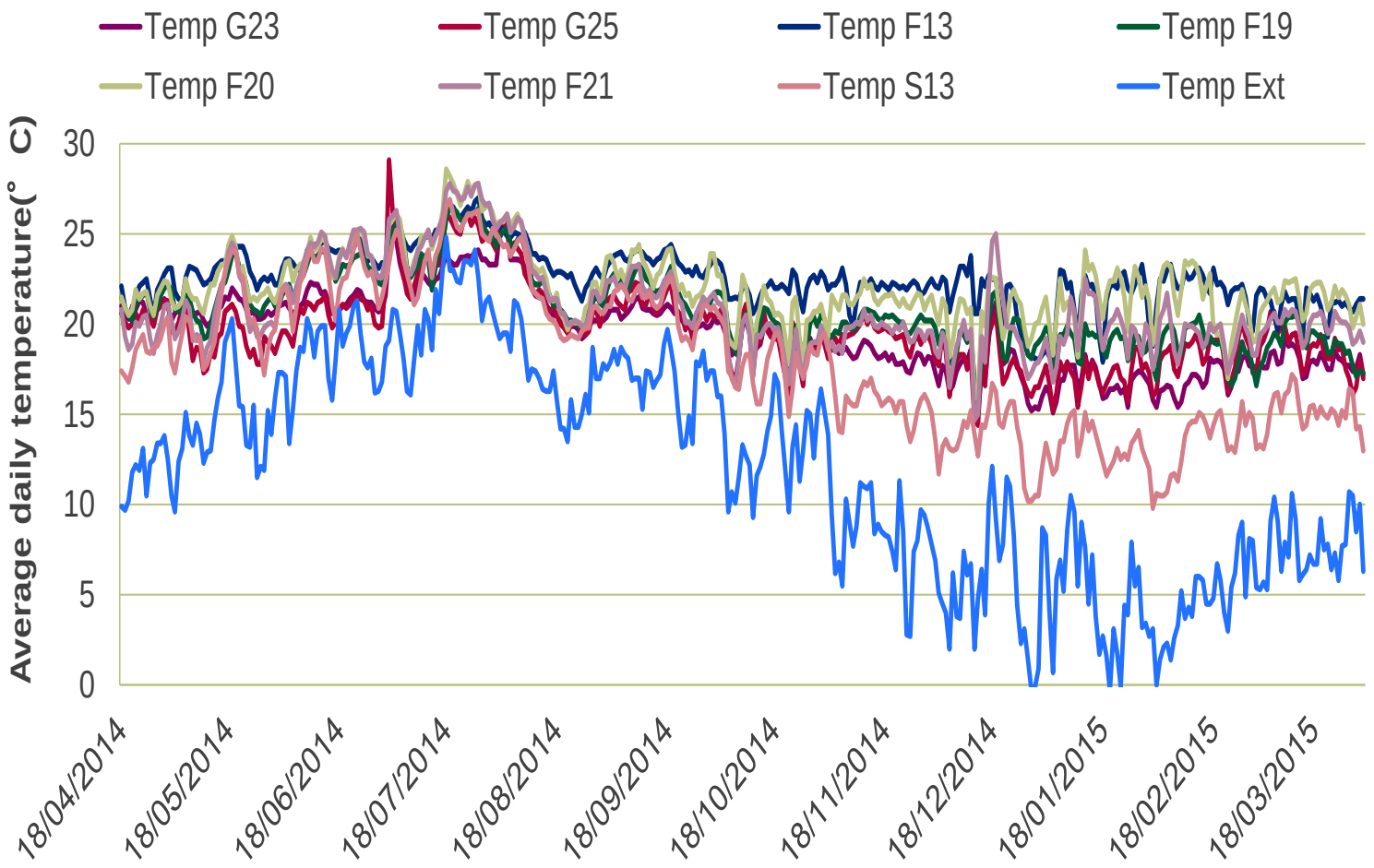
Overall temperatures are within comfort levels most of the time



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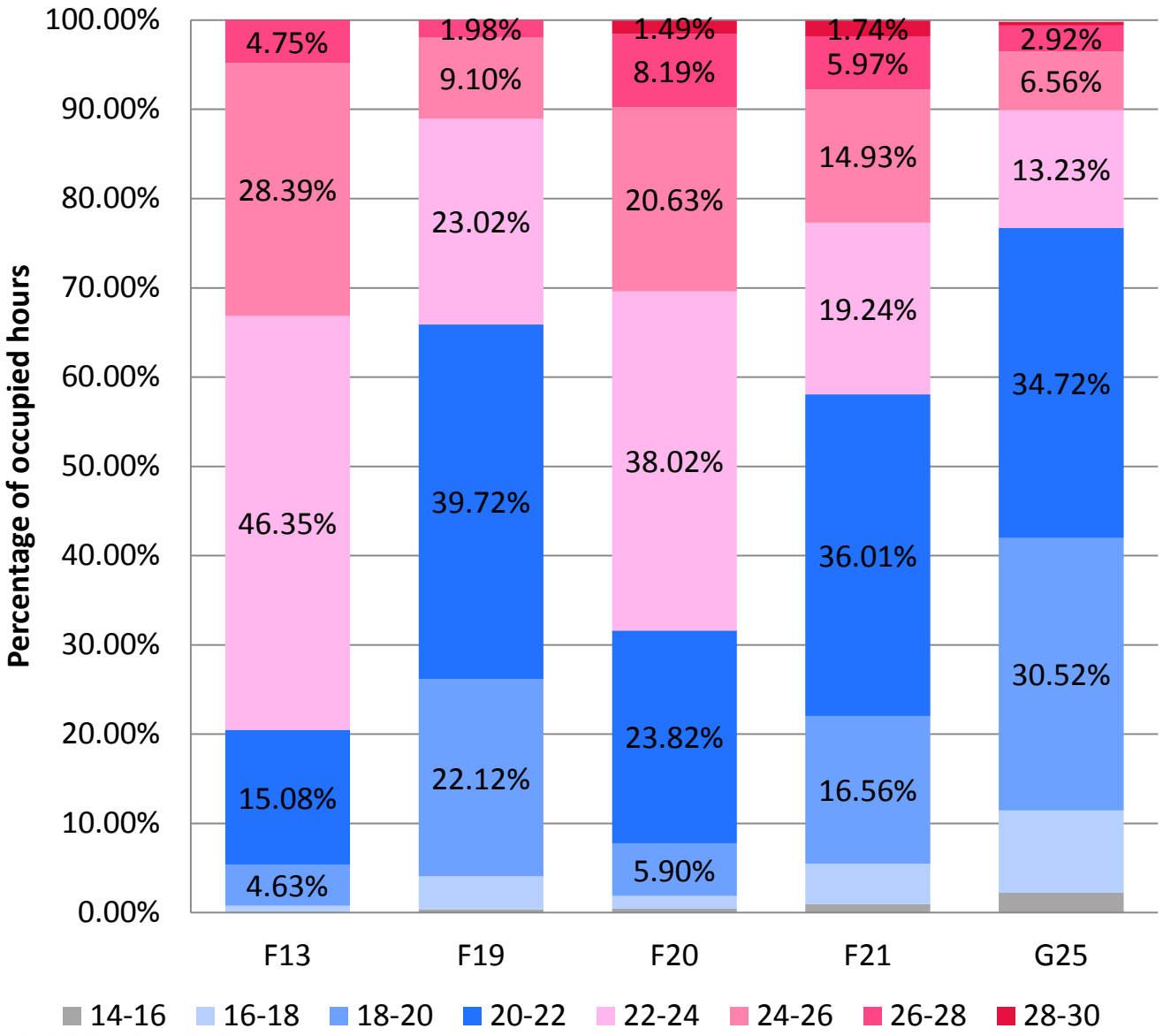
solutions for sustainability

Environmental monitoring – risk of overheating



South facing rooms on the first floor experience higher temperatures (F20, F21)

1.5% of occupied hours during monitored period in office F20 and 1.7% in office F21 exceeded the overheating CIBSE Guide A criteria (28 ^{o}C).

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Environmental monitoring – moisture content

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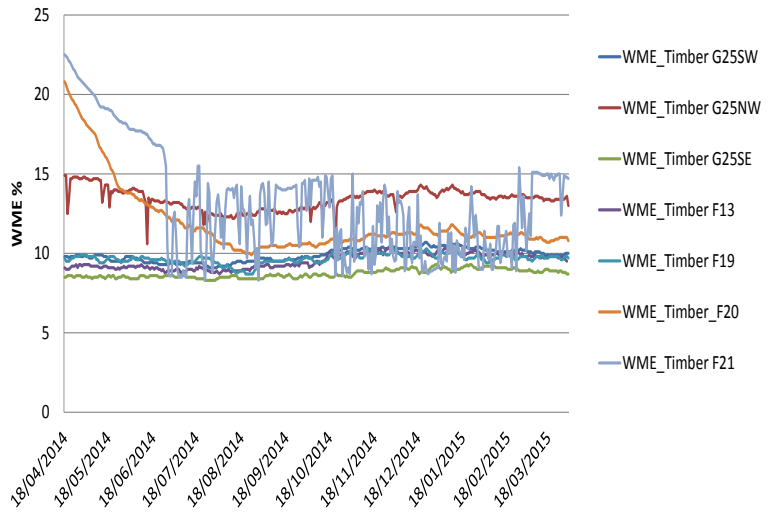
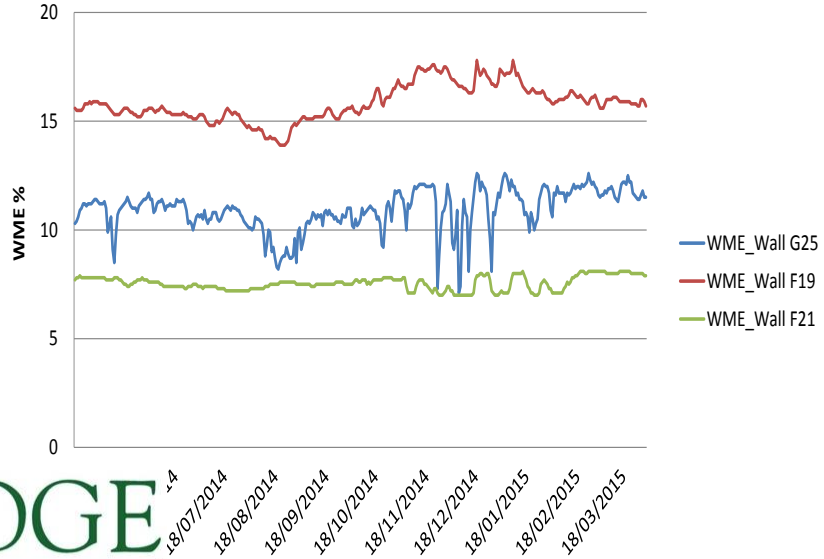
WME of the timber studs inside the internal wall insulation



Moisture sensors (in the timber studs)

WME of the external wall



- **WME of the timber studs** in all the rooms is **under 15%**
- **WME in the external wall is below 20%**

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Occupant satisfaction

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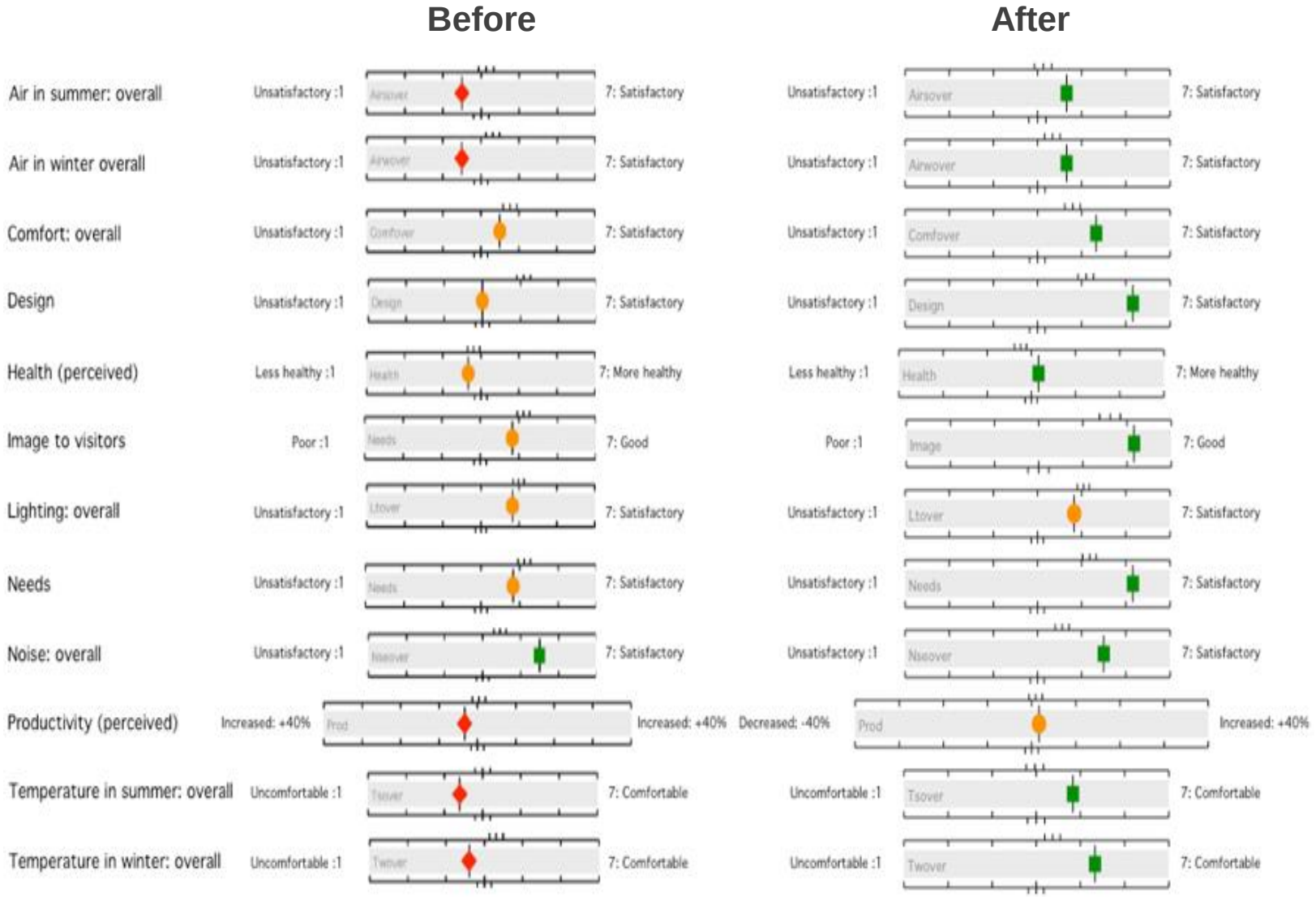

Occupant feedback on most of the elements of the building improved after the refurbishment

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Wider lessons

- By minimising disruption to residents, business continuity was successfully preserved which avoided costs associated with renting alternative offices
- Use of innovative technology meant that the process respected the historical character of the building.
- While no electricity saving measures were installed, electricity use was reduced by 22% which can be partly attributed to users becoming more energy-conscious due to the works.
- Pre-refurbishment BPE is valuable for identifying the most appropriate interventions and establishing the baseline performance of the building.
- Diagnostic measures such as thermal imaging surveys and smoke tests, help to identify and address workmanship issues that may affect thermal performance.
- Greater integration of the project team with higher levels of collaboration is essential for minimising gap between intent and outcome.

Circular economy: Bicester Moves and Bicester Green

Emma Gordon, Bicester Green

Bioregional

ECO BICESTER living lab
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Bicester Green

Centre for Skills, Sustainability & Secondhand Stuff

Skills

Second Hand Stuff

Sustainability

Saving waste from landfill

FIXING
BIKES
FURNITURE
& ELECTRICAL
ITEMS

Donations & Collections

We ♥ real wooden furniture

Power Tools

Vacuum cleaners

We cannot accept: sofas, beds, white goods, any chipboard furniture

Who does the fixing?

Job Seekers

Retirees

Special needs & their carers

Disabled

Work Experience

Duke of Edinburgh

Youth offenders

FRIDAY 11AM 10.10.14

SHARING SKILLS

Where we sell?

Green Tuesdays

March & April, Tuesday evenings 6:30pm - 9:00pm

£5

Build a birdbox

17th March

Build your own Birdbox.
Learn basic DIY

Mosaic Workshop

New

14th April

Experiment with mosaics.

Shabby Chic Furniture

21st April

Techniques to spruces up your old bits of furniture.

Nettle Extravaganza

31st March

How to forage and to cook with nettles.

Bike repair

OXFORDSHIRE COUNTY COUNCIL

24th March, 28th April

2x Sessions

We show you how to fix your bike.

Drill Baby Drill

Beginners DIY evening classes

- Basic Electrics
- Using tools

3 easy steps

a2dominion

We come to you!

1. Get together 6 friends
2. Find a venue
3. Invite us to teach DIY

Spring 2015

Bicester Green

Centre for Skills, Sustainability & Secondhand Stuff

Volunteer with us

Learn new skills	Share your knowledge
Help us deliver our projects	Be part of the team
Fix stuff & be creative	10:00 - 13:00 14:00 - 17:00 Mon Tue Wed Fri
Find your strengths	

Email, call, or drop in to discuss volunteering

Contact us

01869 388 564
07591 754 787

@bicgreen

Bicester Green
Station Approach
OX26 6BZ
10-5pm

www.facebook.com/BicesterGreen
www.bicestergreen.org.uk
info@bicestergreen.org.uk

Buy a bike from us

Kids	Adults	Vintage
£10/£30	£40/£100	£65/£120

Refurbished with a 3 month warranty

*Some bikes sold as seen for reduced prices.

Bicester Bike Loan

OXFORDSHIRE COUNTY COUNCIL

Borrow a bike

Adult bike £15

Brompton £18

For a weekend, a week or a month.

*You will need a chequebook for the deposit.

Birdboxes, Butterfly & Doormouse houses.

£5

Made from reclaimed wood

For Sale.

Events coming up

Re-fashion Oxford 3rd March
Tandem Festival 19 - 21st June
Bicester Big Lunch 7th June
Low Carbon Week 13-21st June

Green Tuesdays

Build a birdbox
17th March

Build your own Birdbox.
Learn basic DIY

Mosaic Workshop
New

14th April

Experiment with mosaics.

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Bike repair
OXFORDSHIRE COUNTY COUNCIL

24th March, 28th April

2x Sessions

We show you how to fix your bike.

Making Xmas
All £5

Upcycling Xmas
14th October & 11th November

2x Sessions

Making your own xmas presents and decorations.

Xmas Liquores
21st October

Learn how to make delicious liquors in your own kitchen.

Bicycle Loan Scheme

Bicester Moves

Bicester wide increase in re-use

The team

Community Action Groups

Cherwell District Council North Oxfordshire

Bicester Green
Centre for Skills, Sustainability & Secondhand Stuff

Oxford Brookes University

Grassroots Bicester

Communications campaign

Engagement events

Communications

We distributed **12,000 bin hangers**

Clear out guide for home movers

www.bicestergreen.org.uk/bicester-moves

Step 1: SELL your unwanted stuff

- Use websites such as ebay, gumtree, etc.
- Coming soon: Training session to help sell stuff by Bicester Green (check for updates on our website)

Step 2: GIVE away your unwanted stuff

- Donate to charity, give them to friends or to community
- Mid-July: Check map on our website with your nearest charity drop-off points and links to community sharing sites (freecycle etc)

Step 3: FIX/TRANSFORM what can still be used

- Coming soon: Furniture repair and shabby chic furniture workshops by Bicester Green (check for updates on our website)

Step 4: If you are moving in BUY secondhand or GET FREE stuff through the channels above!

For more information please visit:
www.bicestergreen.org.uk/bicester-moves

- If you would like to be on our mailing list for workshop info, please email: motoko.bicestergreen@gmail.com

Bicester moves

Bicester moves

by Bicester Green

A local project to support movers, provide good quality items to the community, and decrease waste.

If you are interested in internships or volunteering, please contact motoko.bicestergreen@gmail.com

www.bicestergreen.org.uk/bicester-moves

Easy Money

Before you throw away your old stuff, why not try...

Selling your stuff for some cash £?
Giving away to friends or community?
Donating to support a good cause?
Fixing or refurbishing what can still be used?

Check these easy ways to give your old stuff a second chance.

www.bicestergreen.org.uk/bicester-moves

See back for more info

Bicester moves by Bicester Green Centre for Skills, Sustainability & Secondhand Stuff

Oxford Brookes University · WRAP · Cherwell District Council North Oxfordshire

Communications

Bicester Secondhand and Repair Guide

Bicester moves

Sell or buy at antique & secondhand shops

1. Bicester Green
   Station Approach OX26 6BZ
   Mon, Tue, Wed, Fri 10am-5pm,
   3rd Sat 10am-2pm 01869 388564
   info@bicestergreen.org.uk
2. Lisseters of Bicester
   3 Kings End OX26 6DR
   Mon-Sat 9am-5pm
   01869252402
   Lissters@aol.co.uk
3. Robinson's Antiques
   15-16 Crown Walk, OX26 6HY
   Mon-Fri 10am-4pm, Sat 9.30am-5pm
   07979408811
   robinsonsantiques@hotmail.co.uk
4. Old Flight House (buy only)
   Northampton Road,
   Weston on the Green, OX25 3TJ
   Mon-Sat 10am-5pm, Sun 11am-5pm
   01869343441
   info@theoldflighthouse.co.uk
5. Phoneland
   19b Sheep Street
   Mon-Sat 9am-5.30pm
   01869 242500
   bicester@phoneland.co.uk
6. Computer King
   Sheep Street (Friday market)
   Fri 7am-4pm
   07774486373

Sell or buy on national internet sites

www.ebay.co.uk

www.gumtree.com

www.preloved.co.uk

Donate or buy at charity shops

1. Bicester Green
   Station Approach OX26 6BZ
   Mon, Tue, Wed, Fri 10am-5pm,
   3rd Sat 10am-2pm 01869 388564
   info@bicestergreen.org.uk
7. Sue Ryder
   28 Sheep St. OX26 6LG
   Mon-Sat 9am-5pm 01869 248943
8. British Heart Foundation
   23 Sheep St. OX26 6JF
   Mon-Sat 9.30am-5pm
   01869 322878
9. Oxfam
   38 Sheep St. OX26 6LG
   Mon-Sat 9am-5pm 01869 246735
10. Sobell House Hospice Megastore
    Station Approach OX26 6BZ
    M-F 9.30am-4.30pm Sat 10am-4pm
    01869 245235
11. Sobell House Hospice Shop
    21 Market Square OX26 6AD
    Mon-Sat 9am-4.30pm 01869 248788
12. Katherine House Hospice
    12 Market Square OX26 6AD
    Mon-Sat 9am-4pm 01869 322133
13. Shaw Trust
    2 Sheep St. OX26 6TB
    Mon-Sat 9am-5pm, Sun 9am-4pm
    01869322818
14. Helen and Douglas Hospice
    40 Sheep St. OX26 6LG
    Mon-Sat 9.30am-5pm 01869 327554
15. Age UK
    15 Deans Court OX26 6RD
    Mon -Sat 9am-5pm 01869243751

Repair and up-cycle at repair shops

1. Bicester Green
   Station Approach OX26 6BZ
   Mon, Tue, Wed, Fri 10am-5pm,
   3rd Sat 10am-2pm 01869 388564
   info@bicestergreen.org.uk
16. Churchill Domestics
    44 Churchill Rd OX26 4UB
    07957 346224
17. HMC mobile phones
    1A Crown Walk OX26 6HY
    Mon-Fri 9am-4.30pm, Sat 9am-1pm
    07842 517375
    simonturner2492@gmail.com
18. Latham Upholstery
    35 Launton Rd. OX26 6PY
    01869 241365 / 07740 091767
19. Furniture Pro
    Furniture repair/restoration
    07739 144752
20. Go Restore and Repair
    Langford Gardens, OX26 2NA
    01869 713017
21. David Gibbons Upholstery
    W Edge OX27 0HA
    01869 278119
23. Bicester Dry Cleaners
    25 Market Square OX26 6AD
    Mon-Sat 9am-5pm
    01869 248664
5. Phoneland
   19b Sheep Street
   Mon-Sat 9am-5.30pm
   01869 242500
24. Crown Dry Cleaners
    10 Crown Walk OX26 6HY
    01869 246423
25. Ros's Alteration
    19 Dean's Court OX26 6RD
    Tue, Wed, Fri 9am-5pm Sat 9am-4pm
    01869 244199
26. Henry's
    42 Sheep St OX26 6LH
    Mon-Sat 9am-5.30pm
    01869 252213
27. Bicester Shoe Repairs
    8 Evans Yard OX26 6JT
    Mon-Sat 8.30am-5.30pm
    01869 324404
28. Broadribb Cycles
    85 Sheep St. OX26 6JS
    01869 253170
    Mon - Wed 9am-5.30pm ,
    Thu 9am-7.30pm
    Fri, Sat 9am-5.30pm, Sun: CLOSED
    Bank Holidays: 10am-2pm
29. Halfords
    4 Launton Road Retail Park,
    Launton Road OX26 4JQ
    Mon-Fri 9am - 8pm, Sat 9am - 6pm
    Sun 10am - 5pm
    01869 324723

Sell, buy or give away on local facebook sites

Bicester Bargain Basement

Bicester Sales, Buys, Swaps, Wanted, Free stuff, House Items, Kids Stuff, ect

Bicester Funiture

Bicester FreeRecycling

Sell or buy at in-store advertising boards

30. Wilko's
    3 Market Square, OX26 6AA
    Mon-Sat 8am-6pm, Sun 10am-4pm
    01869 250100 Cost: FREE
31. Costa Coffee
    7 Sheep St. OX26 6JD
    Mon-Fri 6am-7pm, Sat 6.30am-7pm, Sun 7am-7pm
    01869 248497 Cost: FREE
32. Costa Coffee
    37 Sheep St OX26 6JD
    Mon-Sat 6am-7pm
    01869323344 Cost: FREE
33. Martin
    22 Sheep Street OX26 6TB
    7am-5.30pm
    01869 242711
    Cost: £1.25/wk, £4.50/4wk, £55/yr
34. Martin Mccoll
    22 Market Square, OX26 6AQ
    5.30am-10pm.
    01869 357903
    Cost: £1/wk, £3.50/4wk, £40/yr

Icon categories

- Cycle equipment
- Clothing and accessories — Clothes, shoes, bags, jewellery and accessories
- Household textiles — Bedding, towels, linen and curtains
- Books and music — Books, CDs, videos, DVDs, tapes and record
- Bric a brac — General household and kitchen items
- Baby equipment — Prams, cots and clothes
- Large electrical — Cookers, fridges, freezers, washing machines and tumble dryers
- Small electrical — Kettles, toasters and cd players
- Large furniture
- Small furniture
- IT equipment — Computers, printers and monitors
- Mobile phones
- Printer cartridges
- Toys and games

Edition: 1

*Interacted with **4900 households** via map & website & social media.*

Events

We directly engaged with **708 people** through our re-use events and **52 people** through workshops.

A few observations

- Half the charity shops who participated in our survey said their donations increased.
- There is a big hole in how charity shops collect their data.
- We are still directing people to the Re-use and repair map.
- Larger furniture sold better through an event with a longer duration. Single day events worked for smaller items.
- We identified furniture transport as a key barrier for re-use
- Sharing online trade knowledge required less resources than other workshops but was just as popular


Bicester Green
Centre for Skills, Sustainability
& Secondhand Stuff

Thank you

Retrofitting Bicester

Q & A

Bioregional

ECO BICESTER living lab
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Forthcoming projects

- Green Infrastructure

- Energy Infrastructure

Green Infrastructure in a rapidly growing town

Pam Berry, Oxford University

Bioregional

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Tools for Planning and Evaluating Urban Green Infrastructure: Bicester and Beyond

Pam Berry, Alison Smith, Rob Dunford, ECI, Oxford
Keiron Doick and Darren Moseley, Forest Research

NERC SCIENCE OF THE ENVIRONMENT

1991–2016 25 ANNIVERSARY eci UNIVERSITY OF OXFORD

Aims

1. **Understand the range of existing GI** and the ecosystem services it currently provides.
2. **Identify spatial gaps** in the habitats and services provided by existing GI, taking account of connectivity for wildlife, accessibility for recreational use by people and possibilities for interlinked sustainable travel routes.
3. Engage with developers, users and managers to **identify opportunities for enhancing existing GI and creating new areas** that fill spatial and functional gaps, thus increasing the ecosystem service benefits provided (including by enhancing connectivity).
4. **Evaluate the benefits** of existing and planned GI, including in monetary terms where possible and appropriate, to enable different options to be compared and to support the business case for investment.

Approach

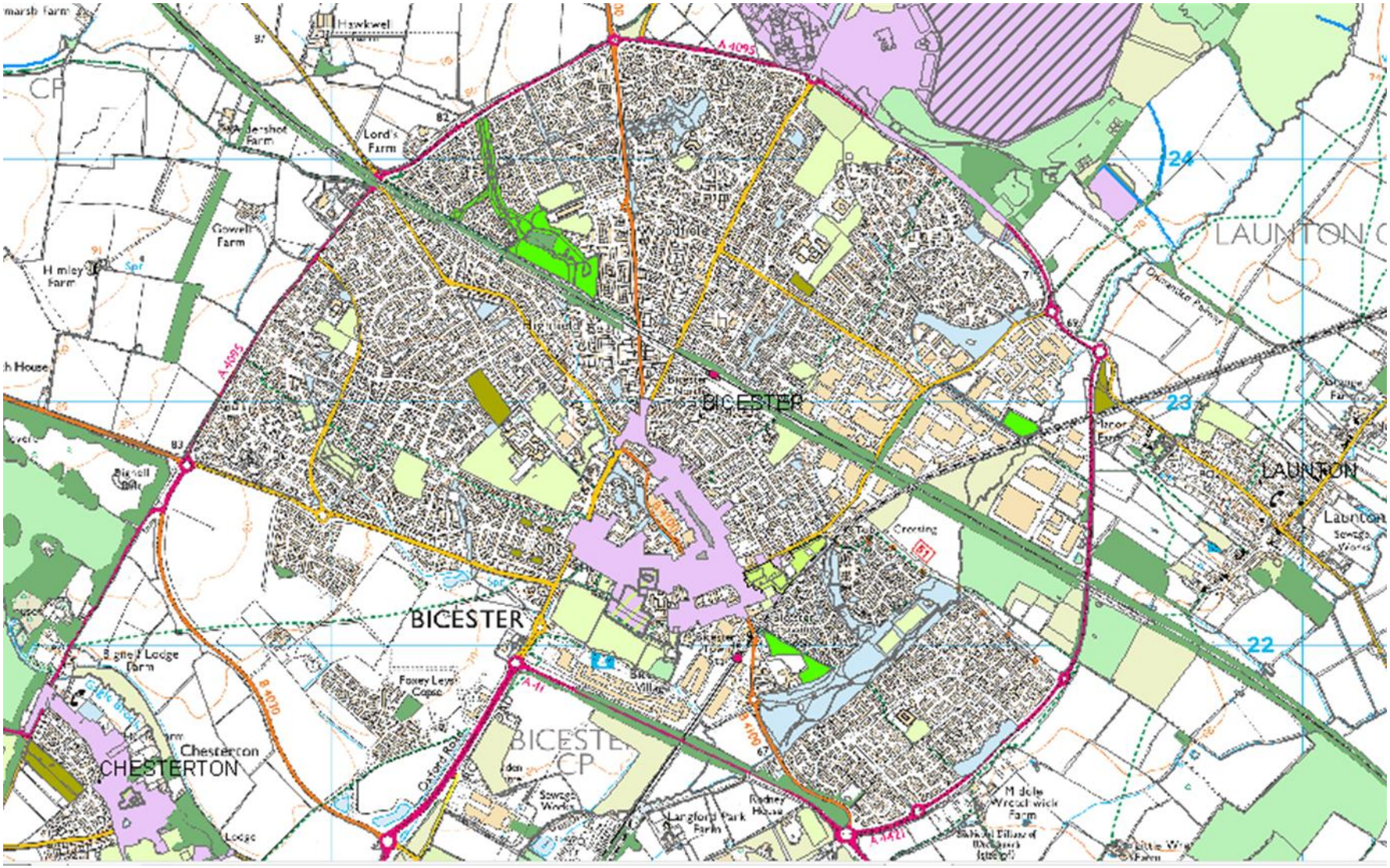
1. **Compile a toolbox of proven ES/GI assessment tools** suitable for use by UK local authorities in planning and evaluating urban GI, using readily available datasets.
2. **Produce clear step-by-step guidance** to enable end-users to select the most appropriate tools and apply those tools in a range of locations.
3. Where necessary, **improve the existing tools and methods** selected for the toolbox so that they are ready for wider practical use.
4. **Support our end-users in applying these tools** to develop a Green Infrastructure Plan for Bicester

Co-production and co-learning: working closely with end-users and stakeholders, we hope to learn how to tailor research tools to meet the needs of users in the real world.

Prioritisation of ES in Bicester

Priority Ecosystem Services	H	M	L	Score
Recreation (walking, running, cycling, fishing, boating, playing, etc.)	10			30
Water quality regulation	7	2	1	26
Flood protection	7	2		25
Food (allotments, gardens, orchards)	4	6		24
Habitat for wildlife: connectivity	8			24
Local distinctiveness / sense of place	5	3		21
Habitat for wildlife: quantity	3	6		21
Aesthetic value	6	1		20
Air quality regulation	1	8		19
Habitat for wildlife: quality	5	1		17
Local climate (cooling, shading, shelter)	3	3		15
Water supply	4			12
Existence value (satisfaction from just knowing that nature exists) and bequest value (for future generations)	1	4	1	12
Pollination	1	4		11

Green infrastructure in Bicester



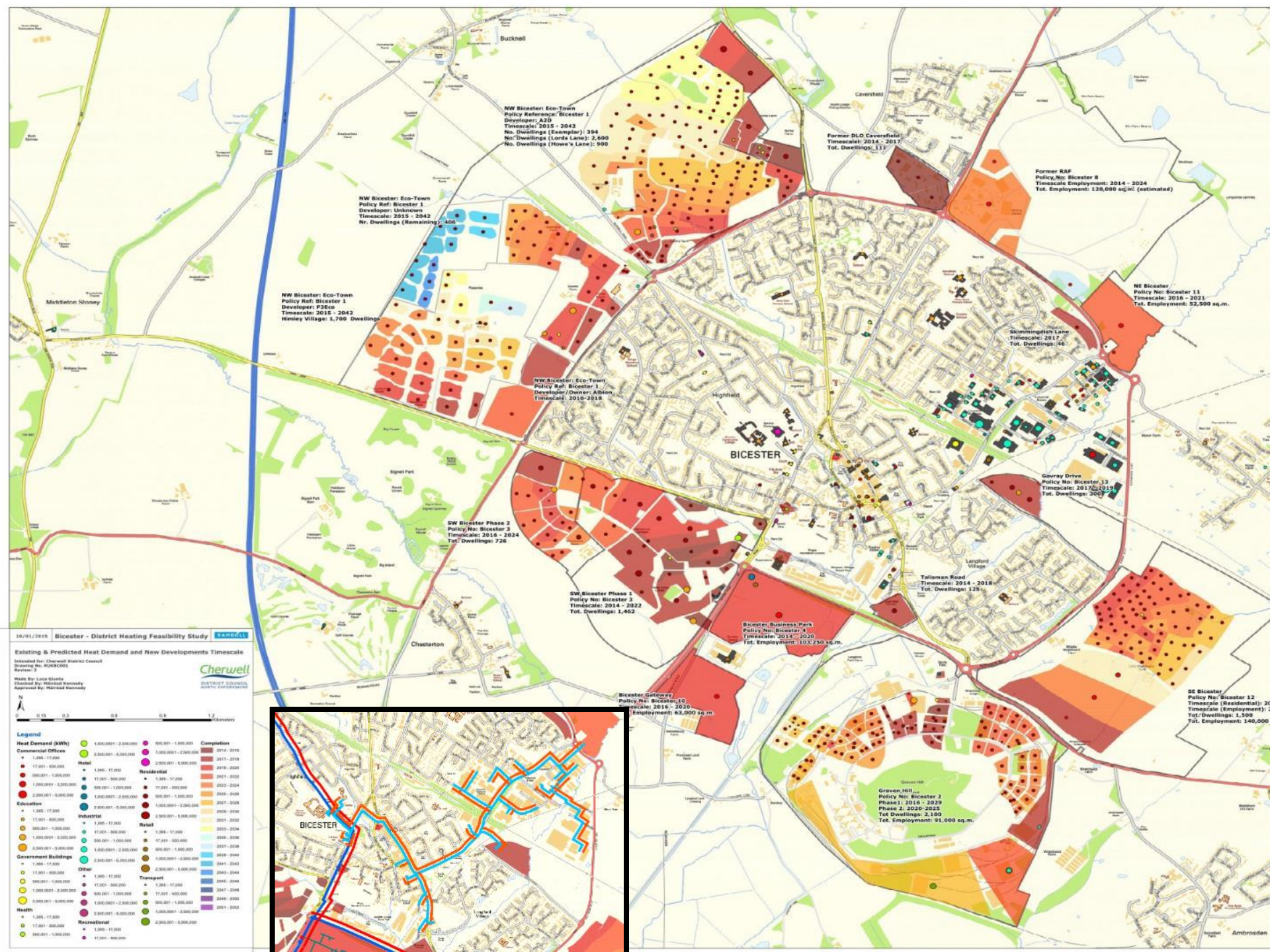
Next steps

1. **Assess the ES provided by existing and planned green infrastructure**
2. **Assess the tools available, their ease of use and applicability**
3. **Explore alternative options for GI and enhancing of ES**

Co-production and co-learning: working closely with end-users and stakeholders, we hope to learn how to tailor research tools to meet the needs of users in the real world.

Energy Infrastructure: heat networks and grid constraints

Nicole Lazarus, Bioregional


Bucknell
Caversfield
Former DLO Caversfield
Timescale: 2014 - 2017
Tot. Dwellings: 111
Former RAF
Policy No: Bicester 8
Timescale Employment: 2014 - 2024
Tot. Employment: 120,000 sq.m. (estimated)
NW Bicester: Eco-Town
Policy Reference: Bicester 1
Developer: A2D
Timescale: 2015 - 2042
No. Dwellings (Exemplar): 394
No. Dwellings (Lords Lane): 2,600
No. Dwellings (Howe's Lane): 900
NW Bicester: Eco-Town
Policy Ref: Bicester 1
Developer: Unknown
Timescale: 2015 - 2042
Nr. Dwellings (Remaining): 406
Middleton Stoney
NW Bicester: Eco-Town
Policy Ref: Bicester 1
Developer: P3Eco
Timescale: 2015 - 2042
Himley Village: 1,700 Dwellings
NE Bicester
Policy No: Bicester 11
Timescale: 2016 - 2021
Tot. Employment: 52,500 sq.m.
Skimmingdish Lane
Timescale: 2017
Tot. Dwellings: 46
NW Bicester: Eco-Town
Policy Ref: Bicester 1
Developer/Owner: Albion
Timescale: 2016-2018
Highfield
BICESTER
Gavray Drive
Policy No: Bicester 13
Timescale: 2017 - 2019
Tot. Dwellings: 300
SW Bicester Phase 2
Policy No: Bicester 3
Timescale: 2016 - 2024
Tot. Dwellings: 726
Talisman Road
Timescale: 2014 - 2018
Tot. Dwellings: 125
SW Bicester Phase 1
Policy No: Bicester 3
Timescale: 2014 - 2022
Tot. Dwellings: 1,462
Bicester Business Park
Policy No: Bicester 4
Timescale: 2014 - 2020
Tot. Employment: 103,250 sq.m.
Chesterton
Bicester Gateway
Policy No: Bicester 10
Timescale: 2016 - 2020
Employment: 63,000 sq.m
SE Bicester
Policy No: Bicester 12
Timescale (Residential): 20
Timescale (Employment): 2
Tot. Dwellings: 1,500
Tot. Employment: 140,000
Graven Hill
Graven Hill
Policy No: Bicester 2
Phase 1: 2016 - 2029
Phase 2: 2020-2025
Tot Dwellings: 2,100
Tot. Employment: 91,000 sq.m.
Ambrosden
16/01/2015
Bicester - District Heating Feasibility Study
RAMBOLL
Existing & Predicted Heat Demand and New Developments Timescale
Intended For: Cherwell District Council
Drawing No. RUKSC001
Revision: 3
Made By: Luca Giunta
Checked By: Mairead Kennedy
Approved By: Mairead Kennedy
Cherwell
DISTRICT COUNCIL NORTH OXFORDSHIRE
N
0 0.15 0.3 0.6 0.9 1.2
Kilometers
Legend
Heat Demand (kWh)
Commercial Offices
1,388 - 17,000
17,001 - 500,000
500,001 - 1,000,000
1,000,001 - 2,500,000
2,500,001 - 5,000,000
Education
1,388 - 17,000
17,001 - 500,000
500,001 - 1,000,000
1,000,001 - 2,500,000
2,500,001 - 5,000,000
Government Buildings
1,388 - 17,000
17,001 - 500,000
500,001 - 1,000,000
1,000,001 - 2,500,000
2,500,001 - 5,000,000
Health
1,388 - 17,000
17,001 - 500,000
500,001 - 1,000,000
1,000,001 - 2,500,000
2,500,001 - 5,000,000
Hotel
1,388 - 17,000
17,001 - 500,000
500,001 - 1,000,000
1,000,001 - 2,500,000
2,500,001 - 5,000,000
Industrial
1,388 - 17,000
17,001 - 500,000
500,001 - 1,000,000
1,000,001 - 2,500,000
2,500,001 - 5,000,000
Other
1,388 - 17,000
17,001 - 500,000
500,001 - 1,000,000
1,000,001 - 2,500,000
2,500,001 - 5,000,000
Recreational
1,388 - 17,000
17,001 - 500,000
500,001 - 1,000,000
1,000,001 - 2,500,000
2,500,001 - 5,000,000
Residential
1,388 - 17,000
17,001 - 500,000
500,001 - 1,000,000
1,000,001 - 2,500,000
2,500,001 - 5,000,000
Retail
1,388 - 17,000
17,001 - 500,000
500,001 - 1,000,000
1,000,001 - 2,500,000
2,500,001 - 5,000,000
Transport
1,388 - 17,000
17,001 - 500,000
500,001 - 1,000,000
1,000,001 - 2,500,000
2,500,001 - 5,000,000
Completion
2014 - 2016
2017 - 2019
2018 - 2020
2021 - 2022
2023 - 2024
2026 - 2028
2027 - 2028
2029 - 2030
2031 - 2032
2033 - 2034
2036 - 2036
2037 - 2038
2039 - 2040
2041 - 2042
2043 - 2044
2045 - 2046
2047 - 2048
2049 - 2050
2051 - 2052
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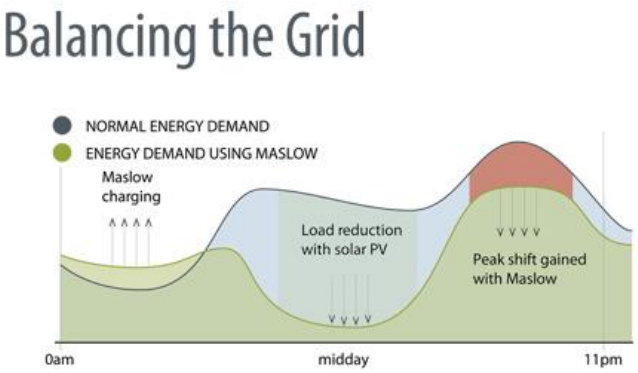
Bicester Leisure Centre

- PV array installed and out performing predictions
- 500kW biomass boiler

Energy infrastructure

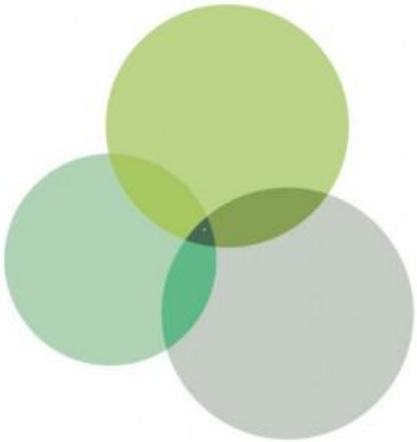
- Heat networks
- Smart grid solutions
- Fuel cell feasibility



Bioregional

zeta Specialist Lighting · Carnegie Systems · Innovate UK Technology Strategy Board · moixa TECHNOLOGY

Discussions and Q & A



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Closing remarks

Sue Riddlestone OBE, Chief Executive and Co-Founder Bioregional

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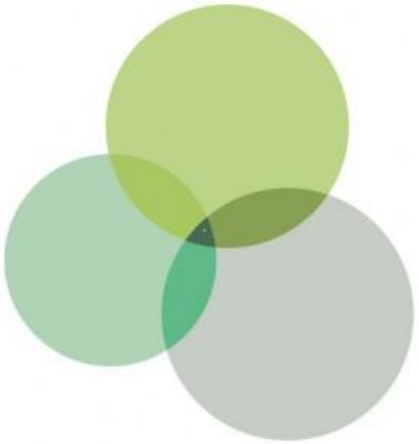
Thank you



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