

Assured Performance at Quebec Park

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**East
Hampshire**
DISTRICT COUNCIL

 **RADIAN**
where people flourish

 Architecture
PLB

 NATIONAL
ENERGY
FOUNDATION

 **greenbox**
associates

Assured Performance at Quebec Park

1. Whitehill and Bordon
2. Radian's Journey
3. The APP
4. Design Implications
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6. Top Priorities

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Whitehill & Bordon

Whitehill & Bordon

- Former Army Town
- Population circa 14,000
- Edge of the South Downs National Park
- Second largest town in EHDC

Previously an EcoTown



Whitehill & Bordon

£1bn project over 15-years to transform the town by 2030;

- 3,350 new homes;
- 5,500 new jobs ;
- 84,000sqm of new commercial space;
- New town centre;
- New schools;
- New leisure centre;
- New health facilities;
- New public service hub;
- New Relief road;
- SANGs;
- Population increase from 14,000 to 21,000 by 2036.

East Hampshire
DISTRICT COUNCIL



Whitehill & Bordon

How are EHDC using the APP

- Integration into Planning policy
- Supporting the Green, Healthy & Connected Town vision
- Raise Environmental Standards
- Reaction to Changing Government Policy
- Links with CITB training and Future Skills Centre



Radian's Journey

Towards Zero Carbon, for 2016...

- Four sites identified
- Tested a range of Code Levels and construction types
- In-use Monitoring

Culminated with Stoneham Green:

- 11 homes
- Code Level 6
- Timber frame
- Central Biomass

Outcomes:

- POE
- 2 years of monitoring
- Resident satisfaction
- Platform for final project



Radian's Journey

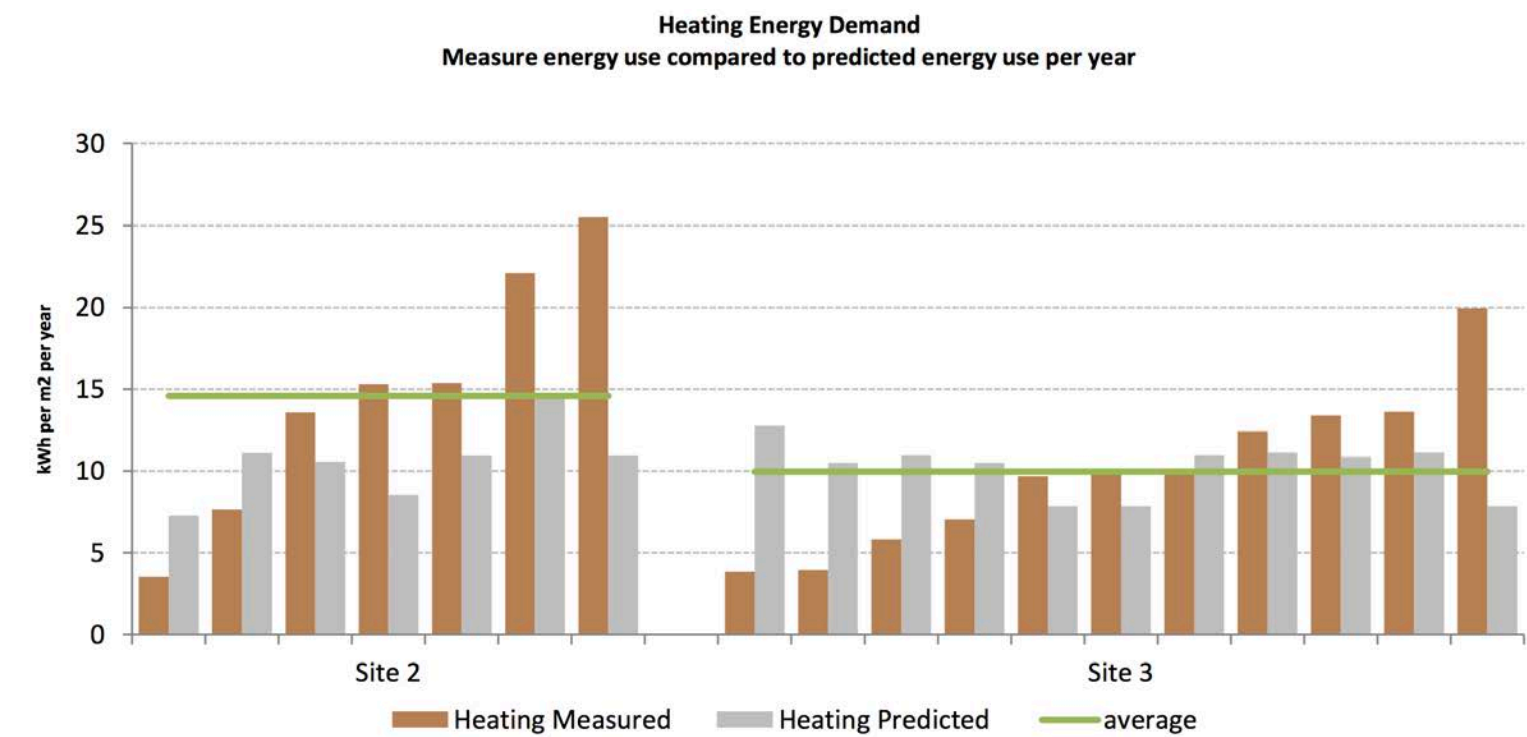
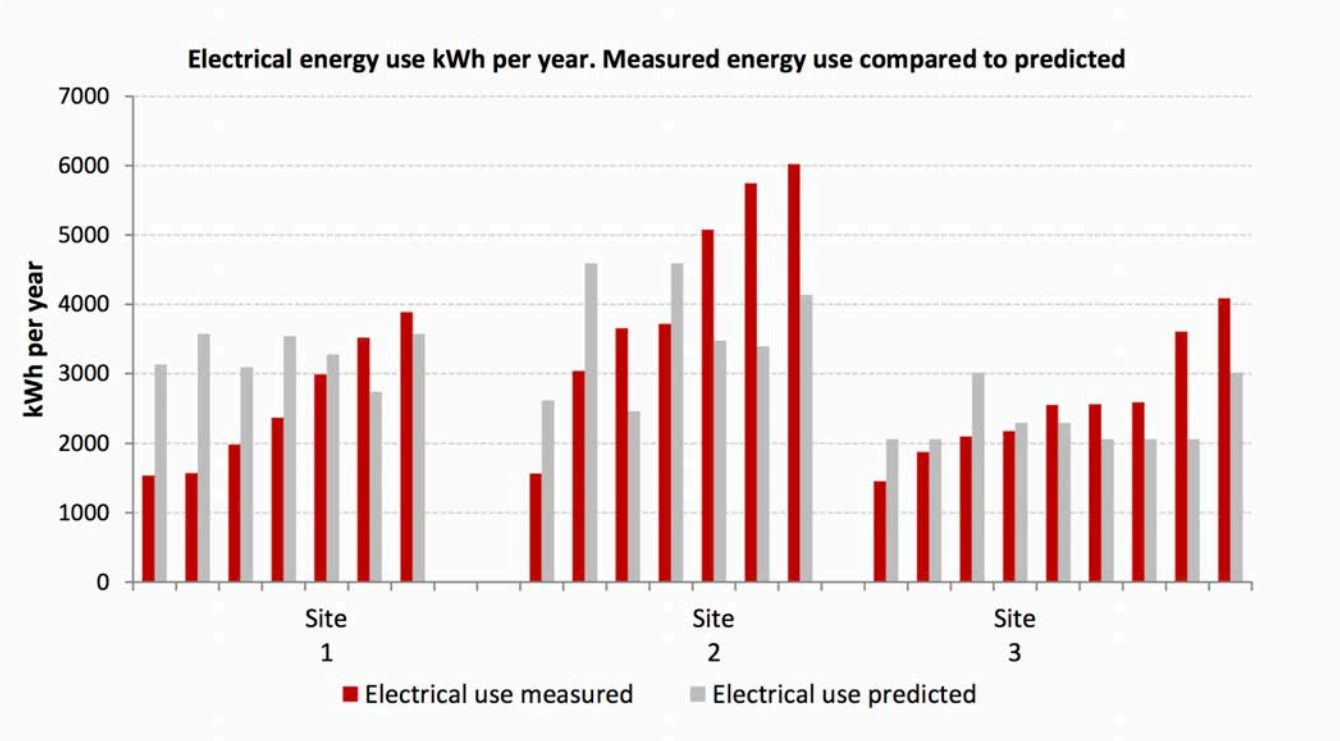
Monitoring Stoneham

What performance gap?

- High levels of oversight
- Exemplar schemes
- Code gave a structure and target
- Is it repeatable at scale?

Why performance is critical

- Long term stewardship
- Fuel poverty
- Affordable warmth
- Sales - property mis-description



Radian's Journey

Why Quebec Park?

Open competition to win the site via OJEU:

- Provide 100 homes in an area where Radian has large amount of stock
- Detailed criteria around:
 - Energy Performance
 - Design
 - Employment
- Commercially viable

Change in strategy for Radian:

- First entry to the open market
- Establishing a Radian 'brand'



The APP

Assured Performance Process

A Quality Assurance Process for
Housing



The APP

Performance Gaps

- In-use carbon up to 250% predicted in SAP, but
- 50-100% more typical
- Indoor air quality
- Overheating
- Maintenance

What leads to a Gap?

- Tick box compliance
- Risks not assessed in design
- Value Engineering
- Build quality
- Limited in-use evaluation
- Limited feedback
- Limited market awareness



CLOSING THE GAP BETWEEN
DESIGN



AS-BUILT
PERFORMANCE

END OF TERM REPORT

July 2014



The APP

What is APP?

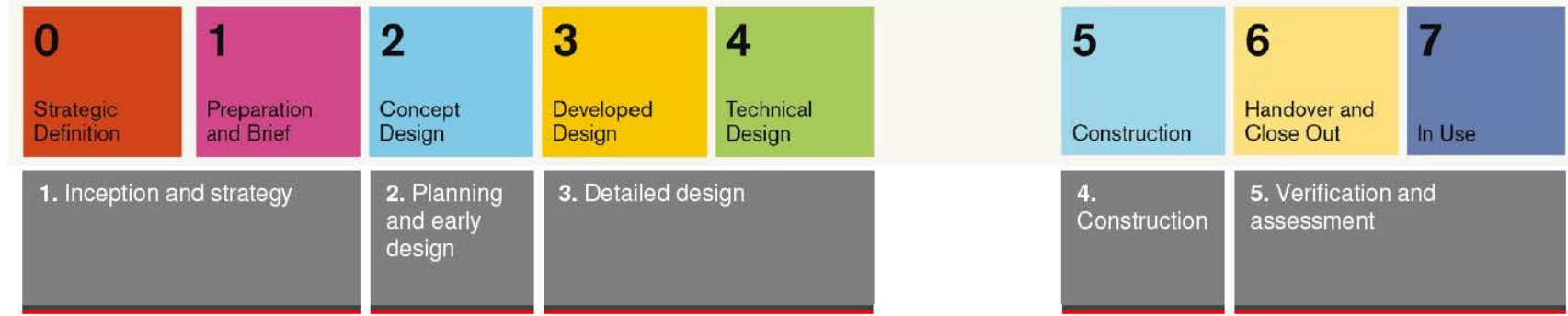
APP - Assured Performance Process

Aims to identify and mitigate in-use performance risks:

- Risk register
- Review targets, masterplanning and detailed design
- Technical reviews
- Buildability assessment
- On site supervision
- Verification to test construction
- Commissioning
- Ensure outcomes are feedback

Not a target, but a process to help targets be met

RIBA Plan of Work



NEF Assured Performance Process



The APP

Common problems:

- Commercial Pressures
- Skills shortage
- Enforcement (building control)
- Client oversight
- POE



Benefits of the APP for Radian

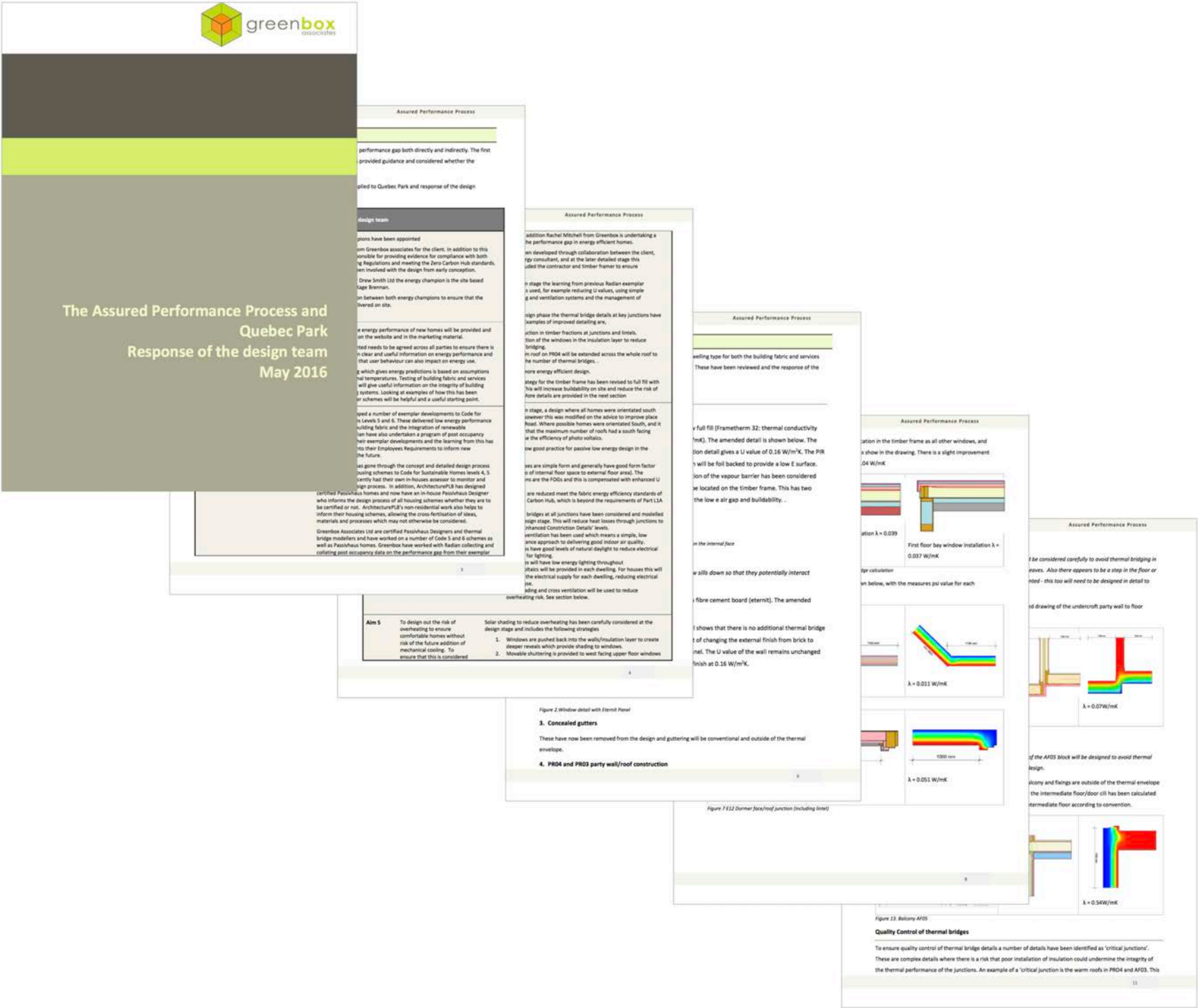
- Lower energy demands for every home
- Confidence in predicted standards
- Resident satisfaction
- Reduced oversight for Radian
- More 'sustainable' than Code?



The APP at Quebec Park

Nine Aims of the APP at Quebec Park

1. Accountability
2. Clarity on performance measures
3. Ensure feedback to other schemes
4. Incorporate passive low energy design
5. Design out the risk of overheating
6. Encourage design innovation to deliver comfortable homes
7. Avoid ambiguity in implementation of the design
8. Provide energy efficient heating, hot water and power
9. Evidence the construction quality



Design Implications



Design Implications

Targets for Quebec Park

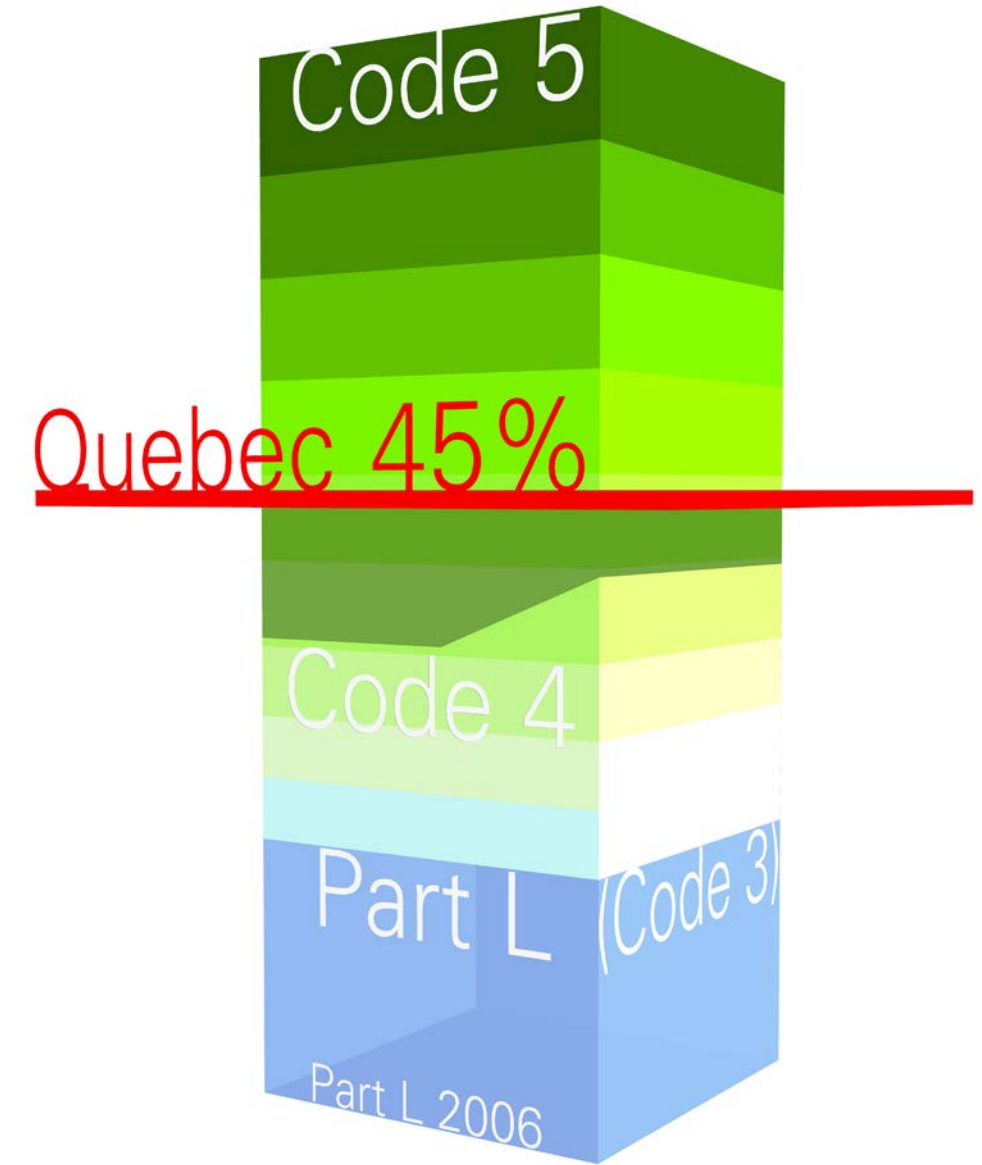
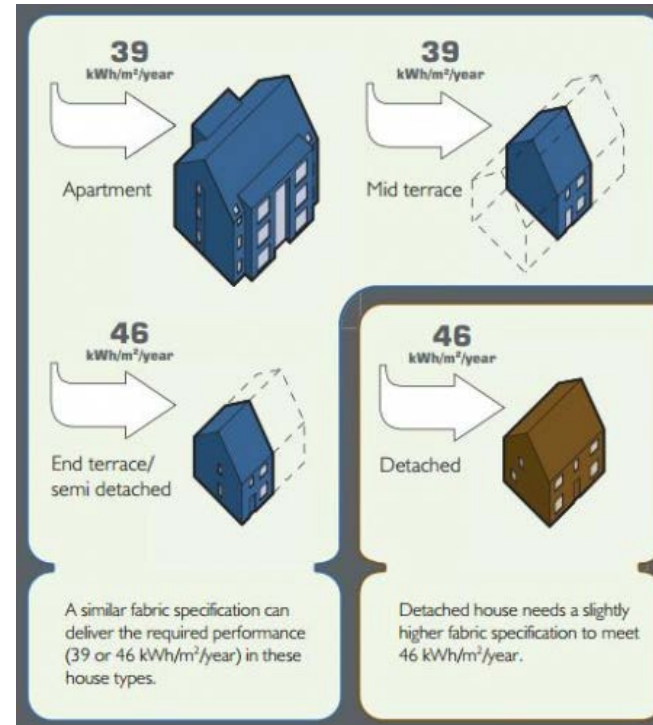
Up to planning:

- Code Level 4 and 5
- Zero Carbon Hub Standards
- Allowable Solutions

Post planning:

- Assured Performance Process (APP) Mark
- Zero Carbon Hub Standards
- Allowable Solutions

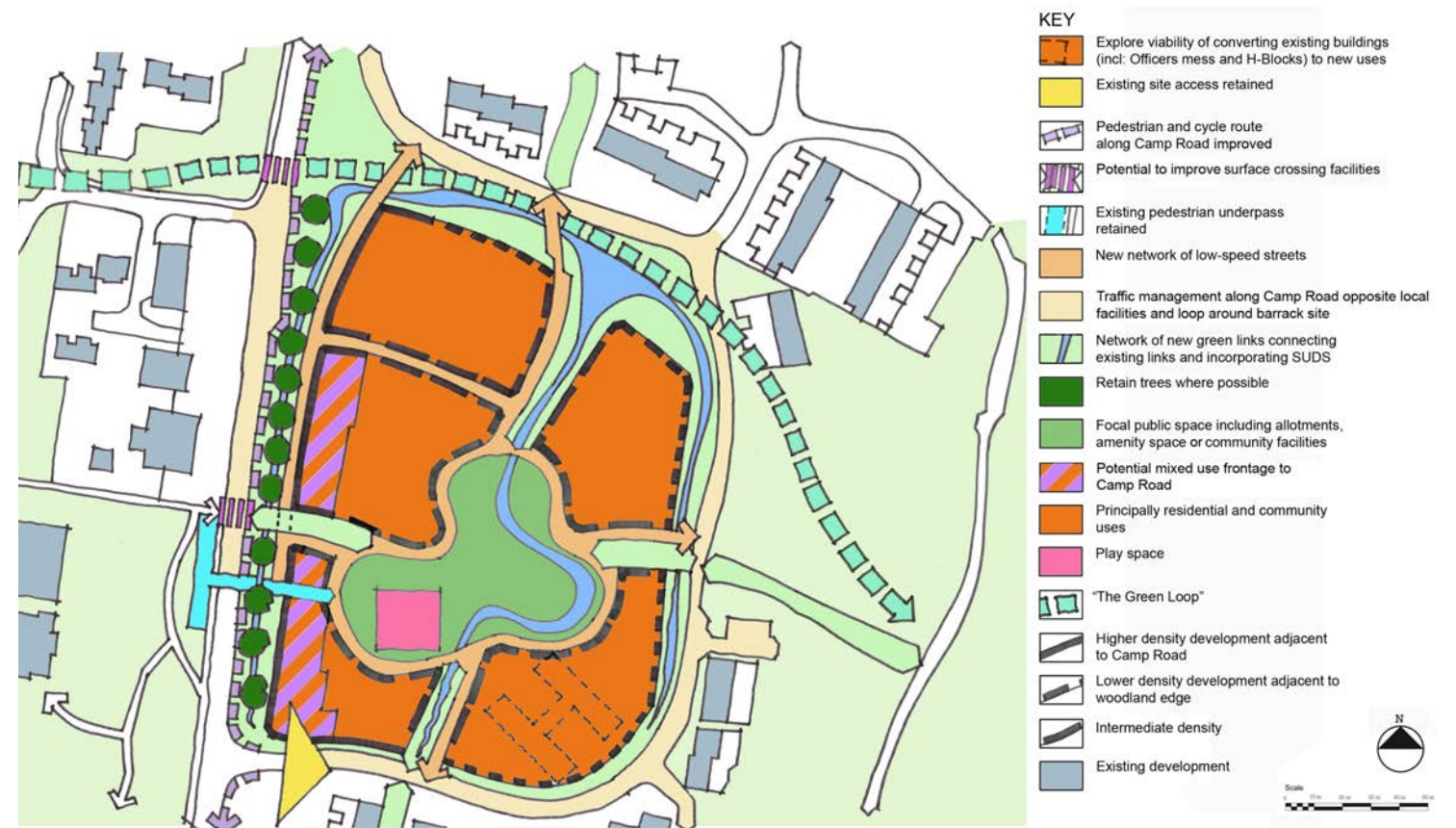
% Improvement DER/TER: 45%
average across the site



Design Implications

Exemplar scheme to inform the following phases of the masterplan:

- Exemplar low energy design;
- Viability;
- Mixed Use;
- High Quality Housing;
- Retention of some existing buildings and trees;
- Connection with infrastructure;



Impact of the APP

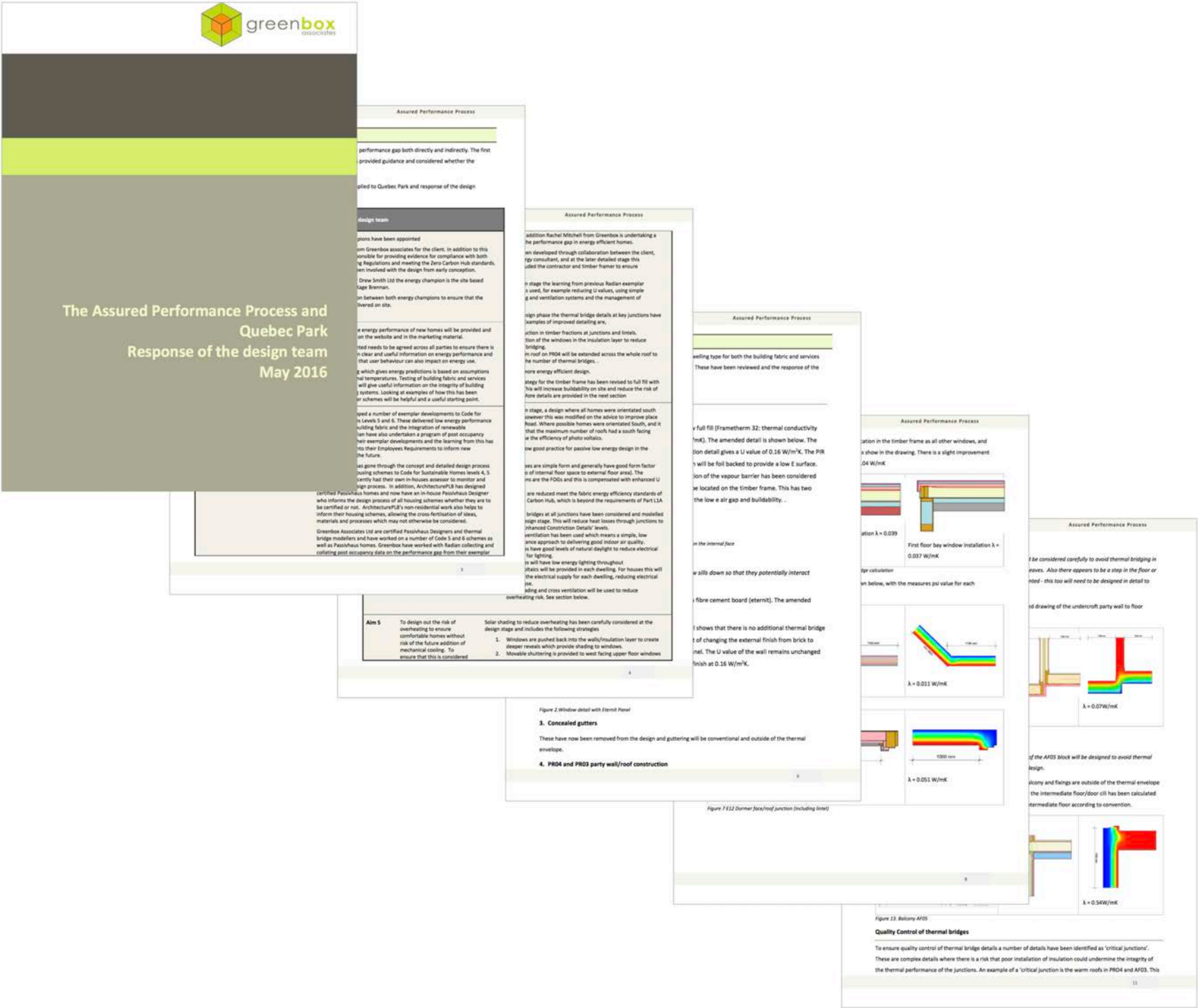
Initially: fear of the unknown!



Nine Aims of the APP

Nine Aims of the APP at Quebec Park

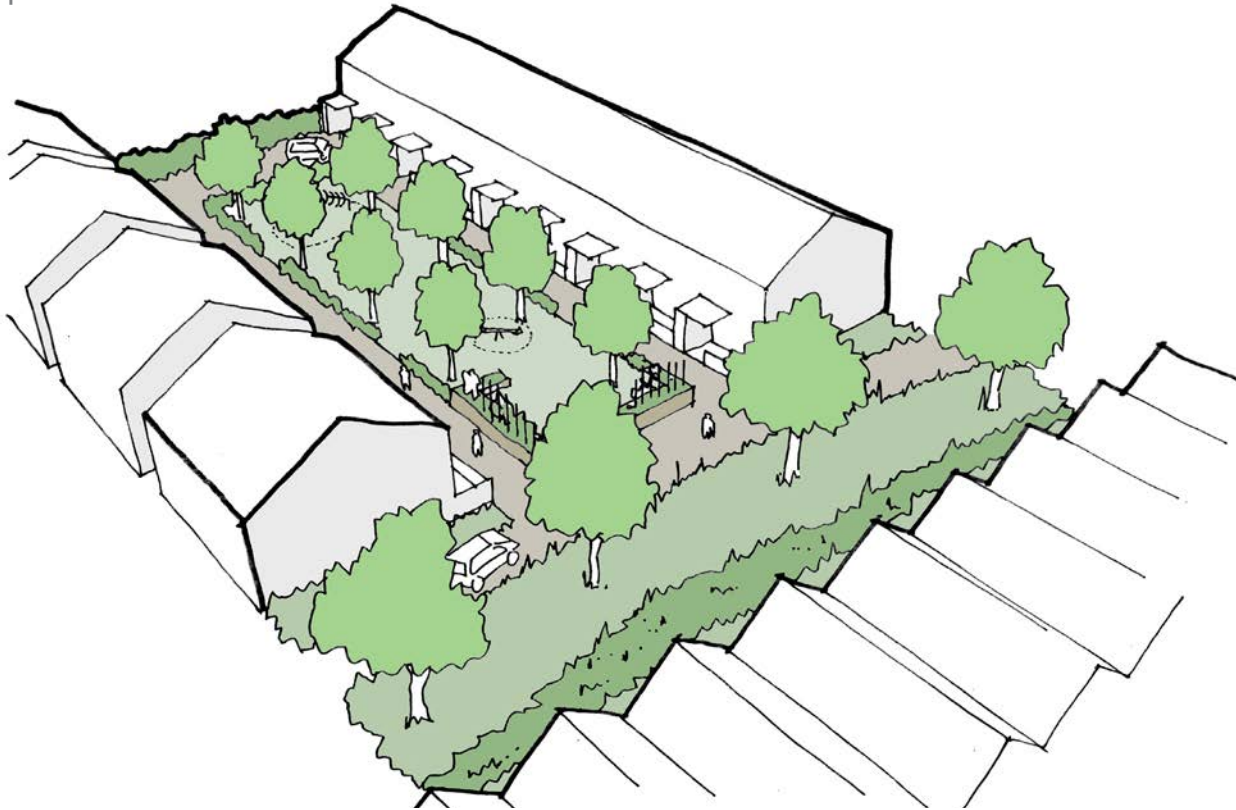
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Aim: Incorporate Good Practice Passive Low Energy Design

Option 1 - Solar Village

- Excellent solar orientation
- Inward facing
- Car free (car park proposed)
- Retained existing buildings
- Garden streets
- But, no 'heart'? And poor local precedents



Aim: Incorporate Good Practice Passive Low Energy Design

Option 2 - Perimeter Blocks

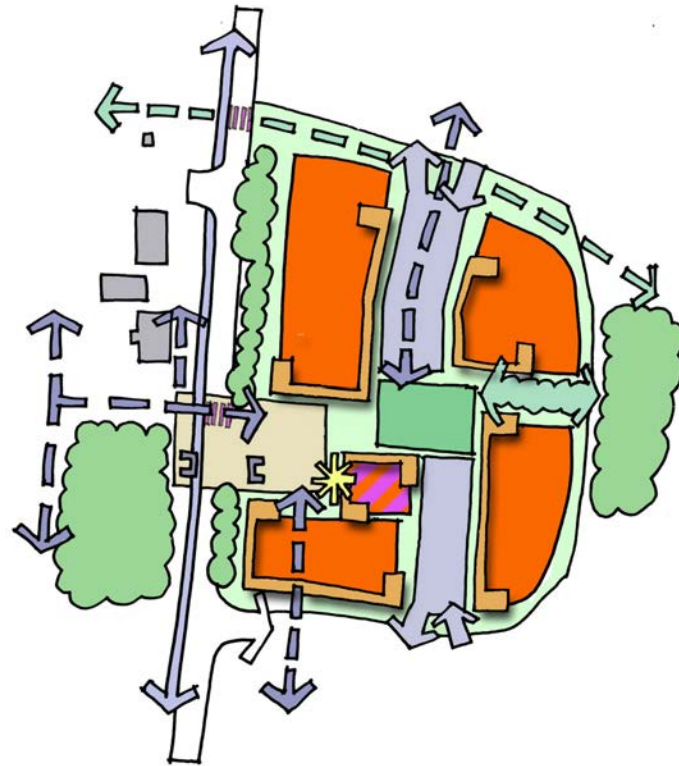
- Outward facing connections
- Hierarchy of routes
- Retained existing buildings
- Shared space mews parking
- Traditional streets
- But, solar orientation not ideal



Aim: Incorporate Good Practice Passive Low Energy Design

Planning Submission

- Placemaking
- Heritage
- Focus on character areas
- Creating a sense of place
- Sunny external amenity spaces
- Simple building massing



Urban Design Strategy

Planning Submission

- Placemaking
- Heritage
- Focus on character areas
- Creating a sense of place
- Sunny external amenity spaces
- Simple building massing



Aim: Incorporate Good Practice Passive Low Energy Design

Question of 'best practice'?

Should solar design lead the process?



Aim: Design Out Overheating

Placemaking approach:

- sub-optimal solar design,
- west facing façades

Combined with:

- enhanced u-values
- reliance on natural ventilation
- window restrictors

Risk of overheating was high



Aim: Design Out Overheating

East / West Facing:

- PVs to the east
- Shutters and Pergolas to the west
- Defensible space
- Greening of streets and spaces



North / South Facing:

- Outward facing
- Deep reveals to south
- Avoid large areas of glass
- Rural edge to green link



Aim: Design Out
Overheating



Aim: Design Out
Overheating



Aim: Design Out
Overheating



Aim: Design Out
Overheating



Aim: Design Out
Overheating



Aim: Delivering Comfort and Avoiding Ambiguity

Key to reducing the performance gap:

- Translation of the 'design' into information that can be built from.
- Design has to be right
- Modellings has to be right
- Sub-contractors need to interpret correctly
- Site workers need to be skilled and engaged enough to implement the design

Two aims:

- Ensuring that in the detailed design, that we understand the implication of what has been drawn
- Ensure that what has been drawn, can be built



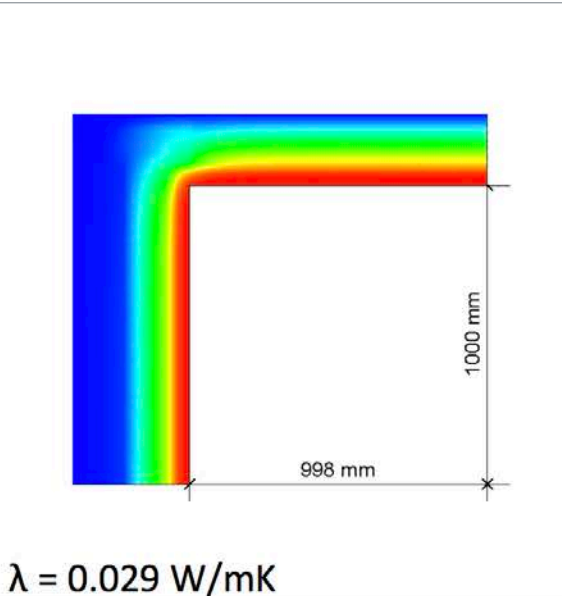
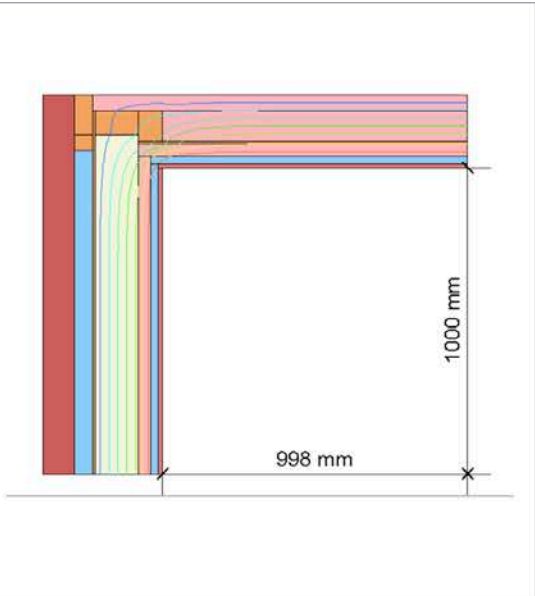
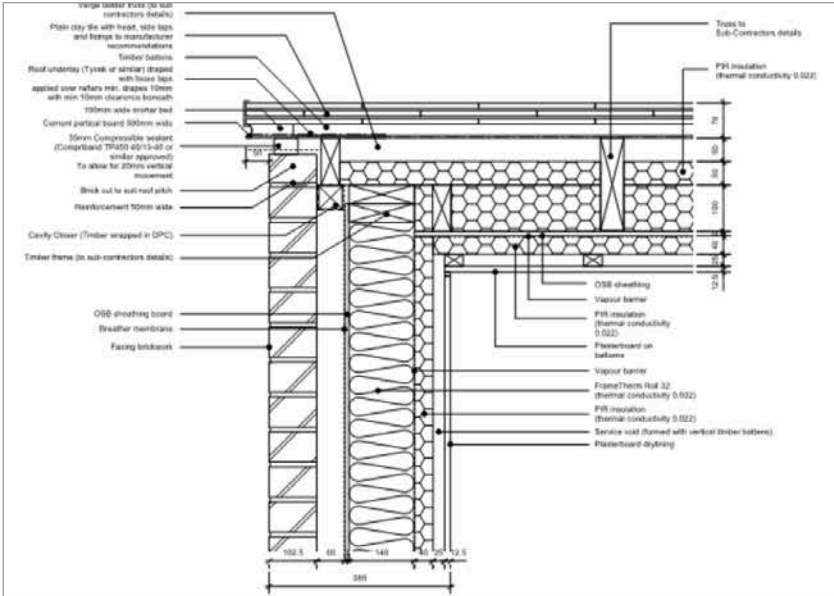
Aim: Delivering Comfort
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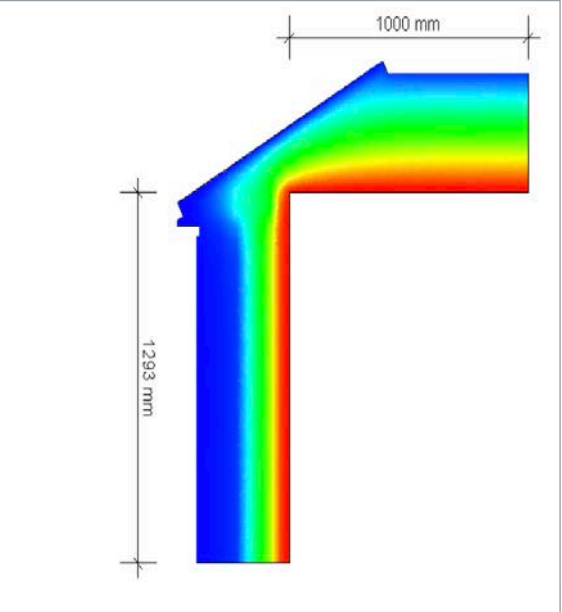
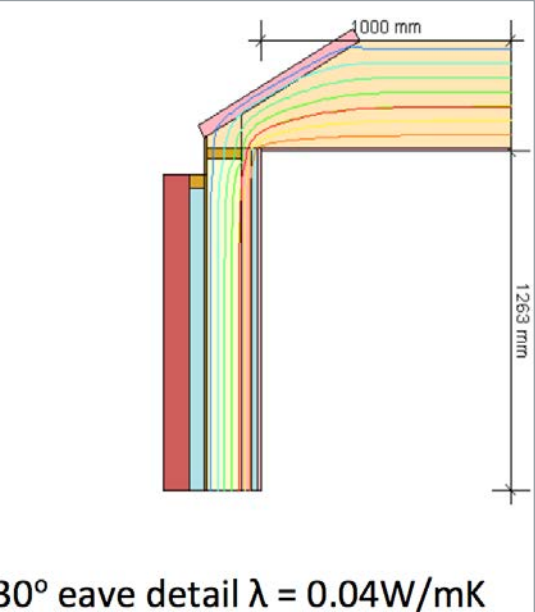
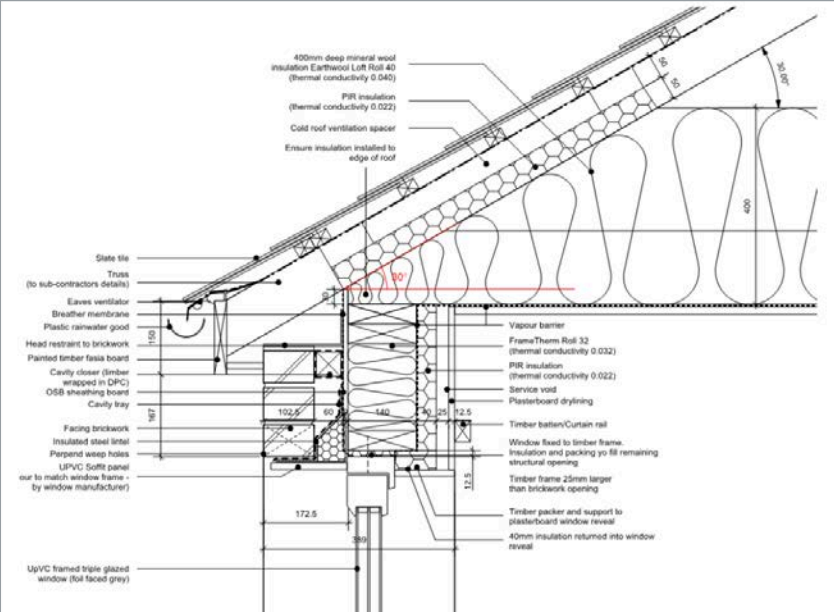
Aim: Delivering Comfort and Avoiding Ambiguity

Detailed Design

- Understanding Thermal Bridges
- Consistent Internal Surface Temperature
- Buildability



$\lambda = 0.029 \text{ W/mK}$



30° eave detail $\lambda = 0.04 \text{ W/mK}$

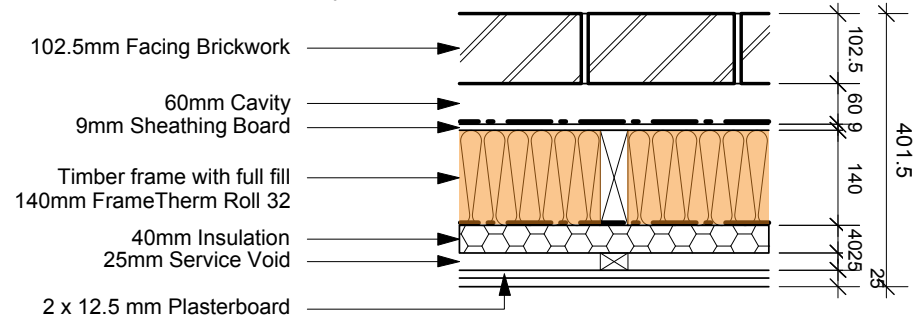
Aim: Delivering Comfort and Avoiding Ambiguity

Identifying the Performance Gap

- As designed
- As built

Affordable Flats (U-Value 0.17 W/m2K)

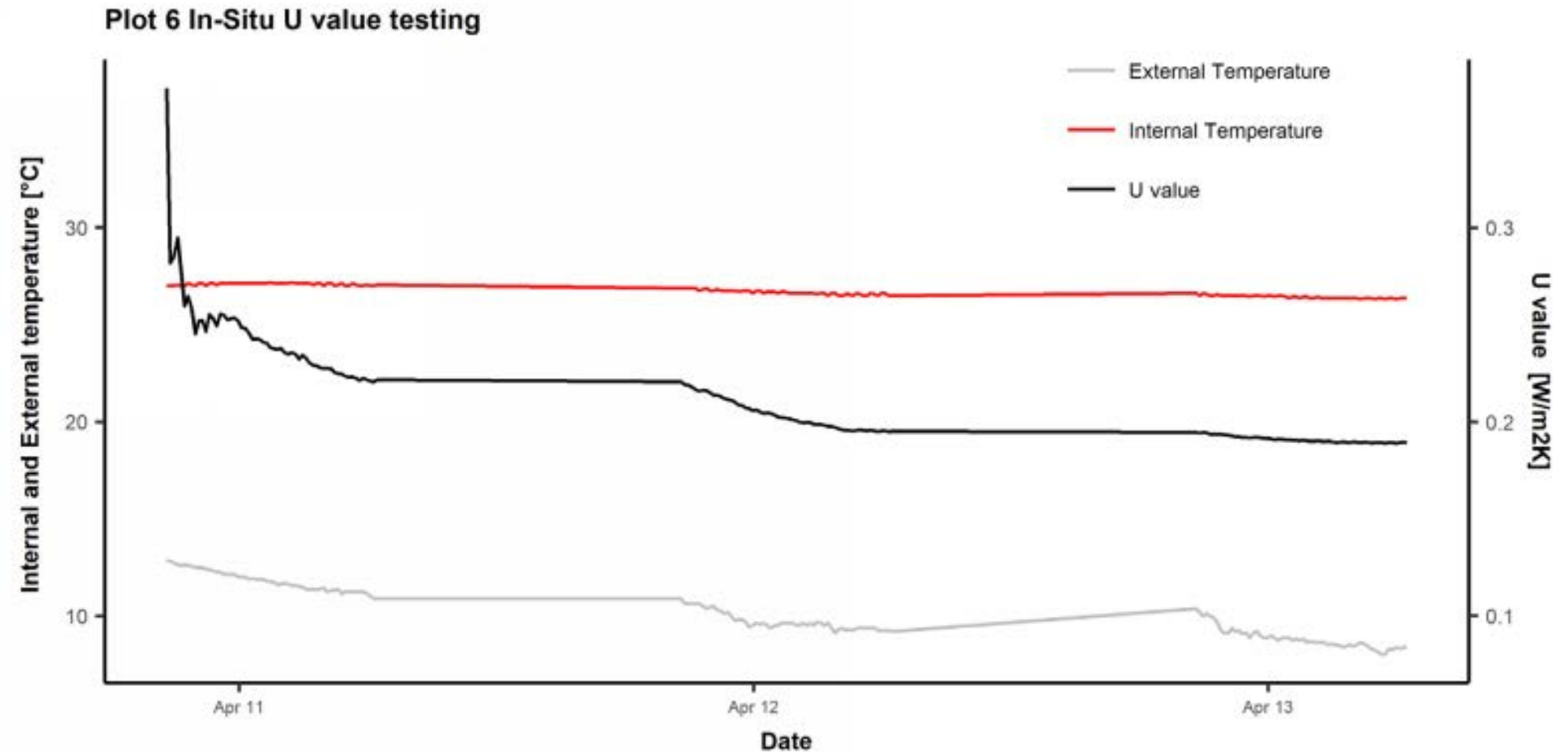
External Wall (Type EC) - 401.5mm
Typical External Wall



Aim: Delivering Comfort and Avoiding Ambiguity

Identifying the Performance Gap

- Design U-Value: $0.15\text{W/m}^2\text{K}$
- In-situ U-Value: $0.19\text{W/m}^2\text{K}$
- Actual timber fraction 26%,
- SAP assumes 15%



Aim: Delivering Comfort and Avoiding Ambiguity

Identifying the Performance Gap

- Site led changed
- Sequential improvements



Initial Results

Occupant Feedback

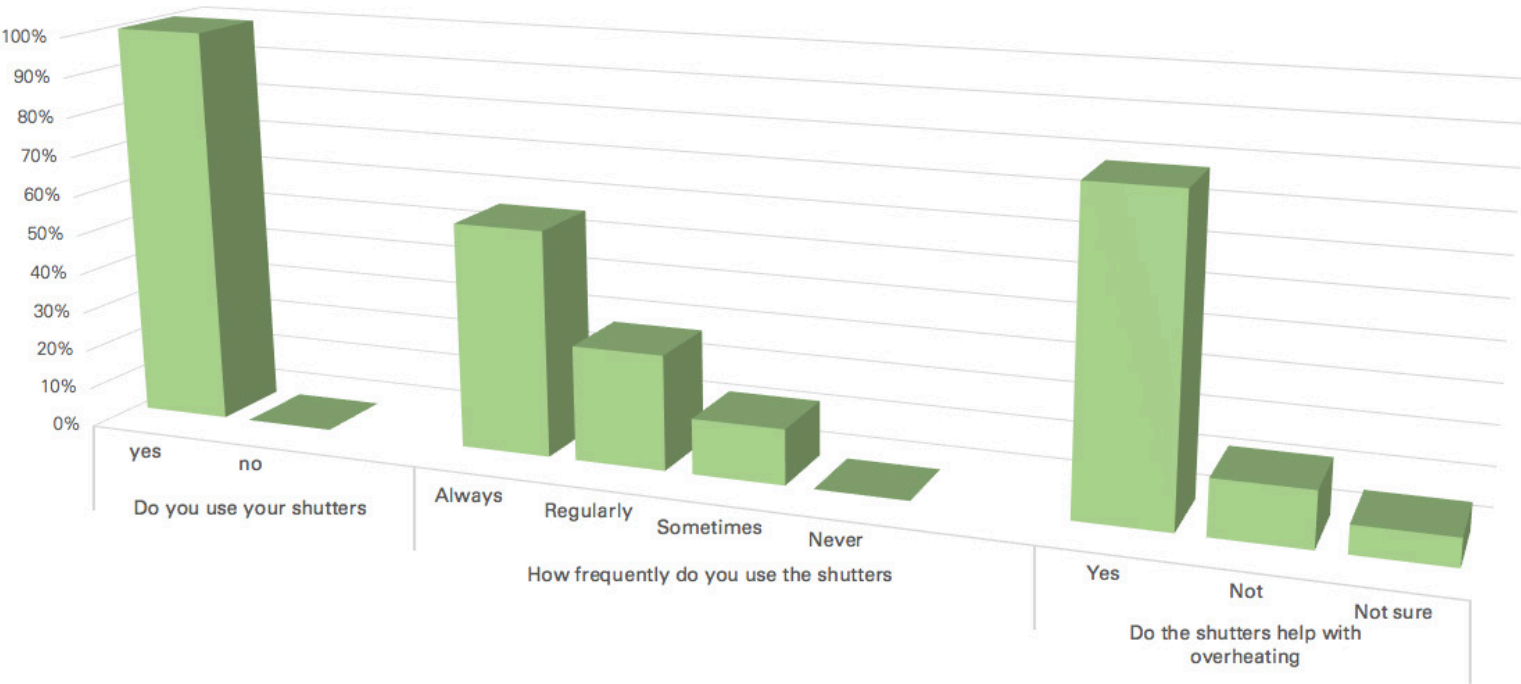
Data from Monitoring



Initial Results

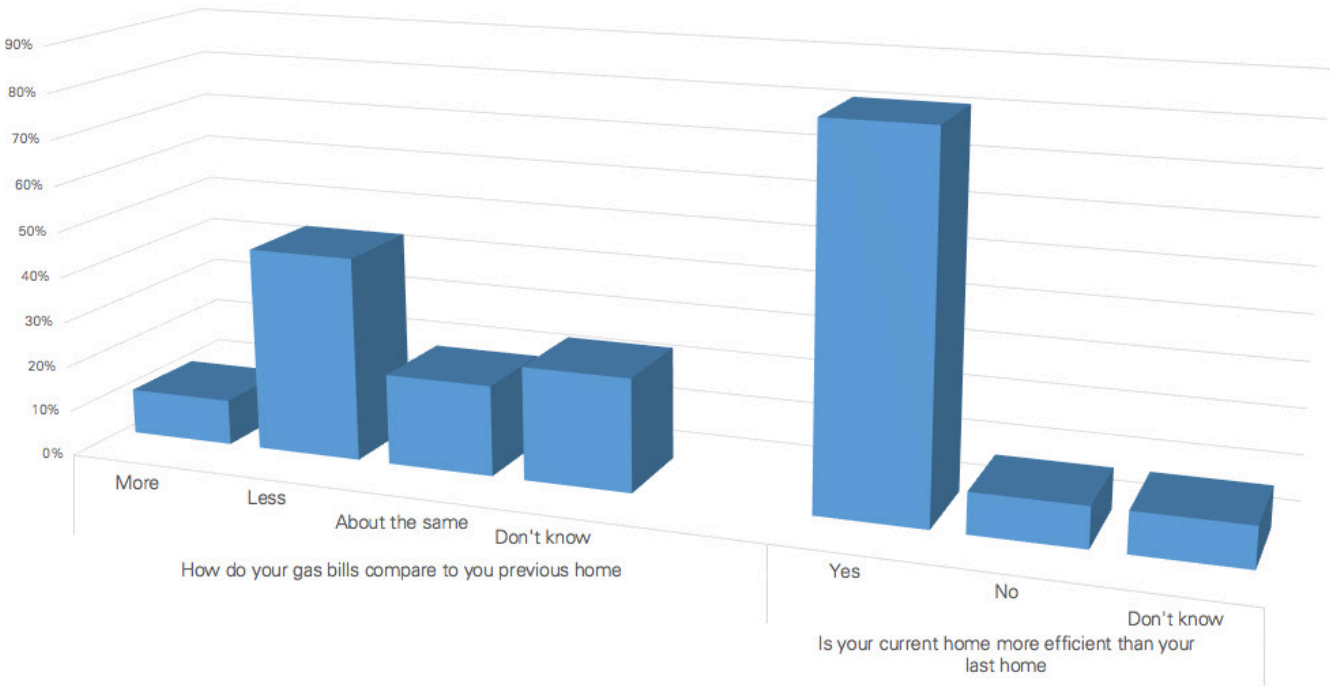
Occupant Feedback: Shutters

- Use of shutters
- Effectiveness of shutters
- Control of overheating



Occupant Feedback: Energy

- Fuel Bills
- Energy Efficiency



Initial Results

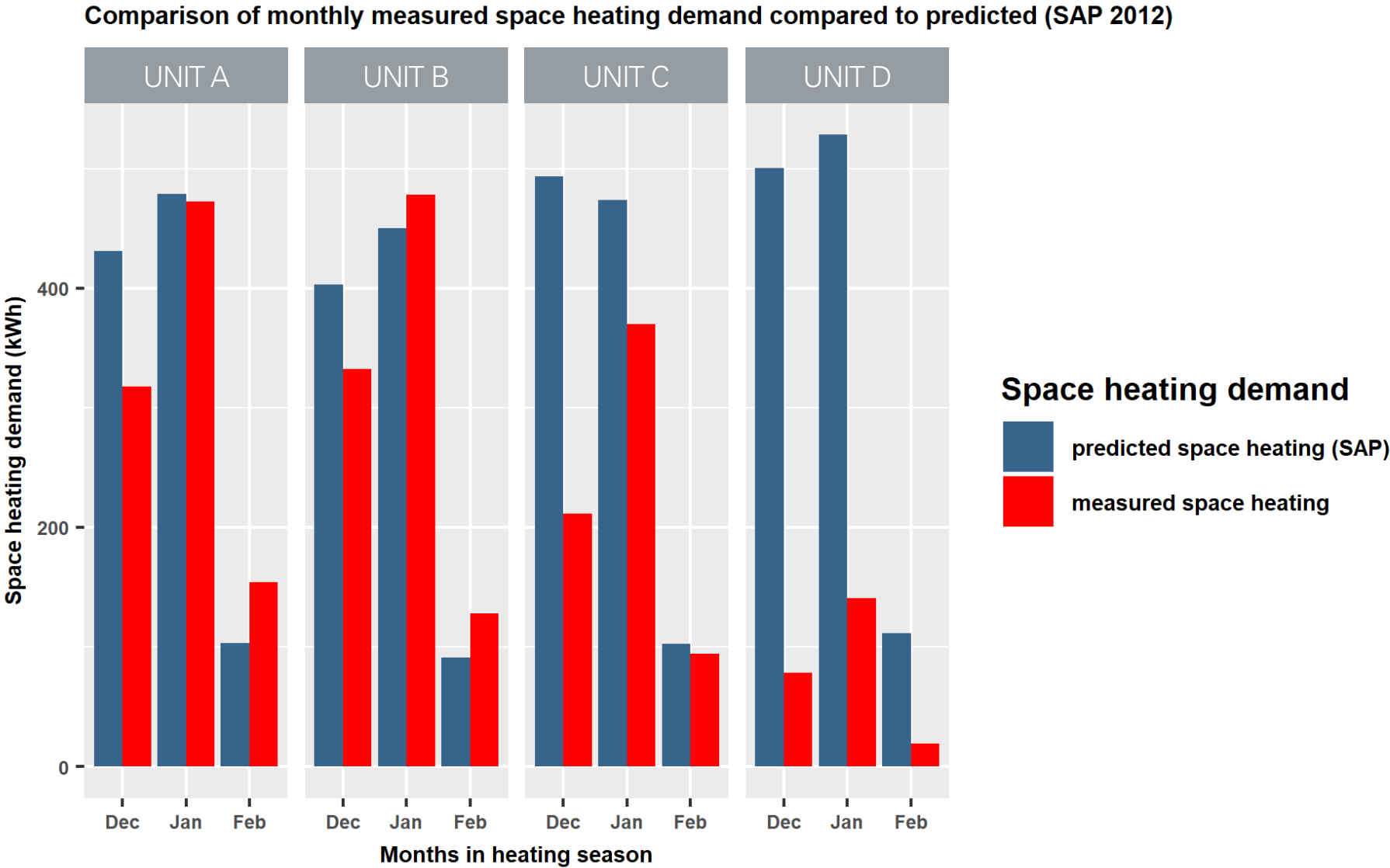
Monitoring - Space Heating

Data from affordable flats
February incomplete (8 days)

Units A & B are in line with SAP

Units C & D are significantly below

Occupant feedback: Heating not often on, and when on, its on for a short time



Initial Results

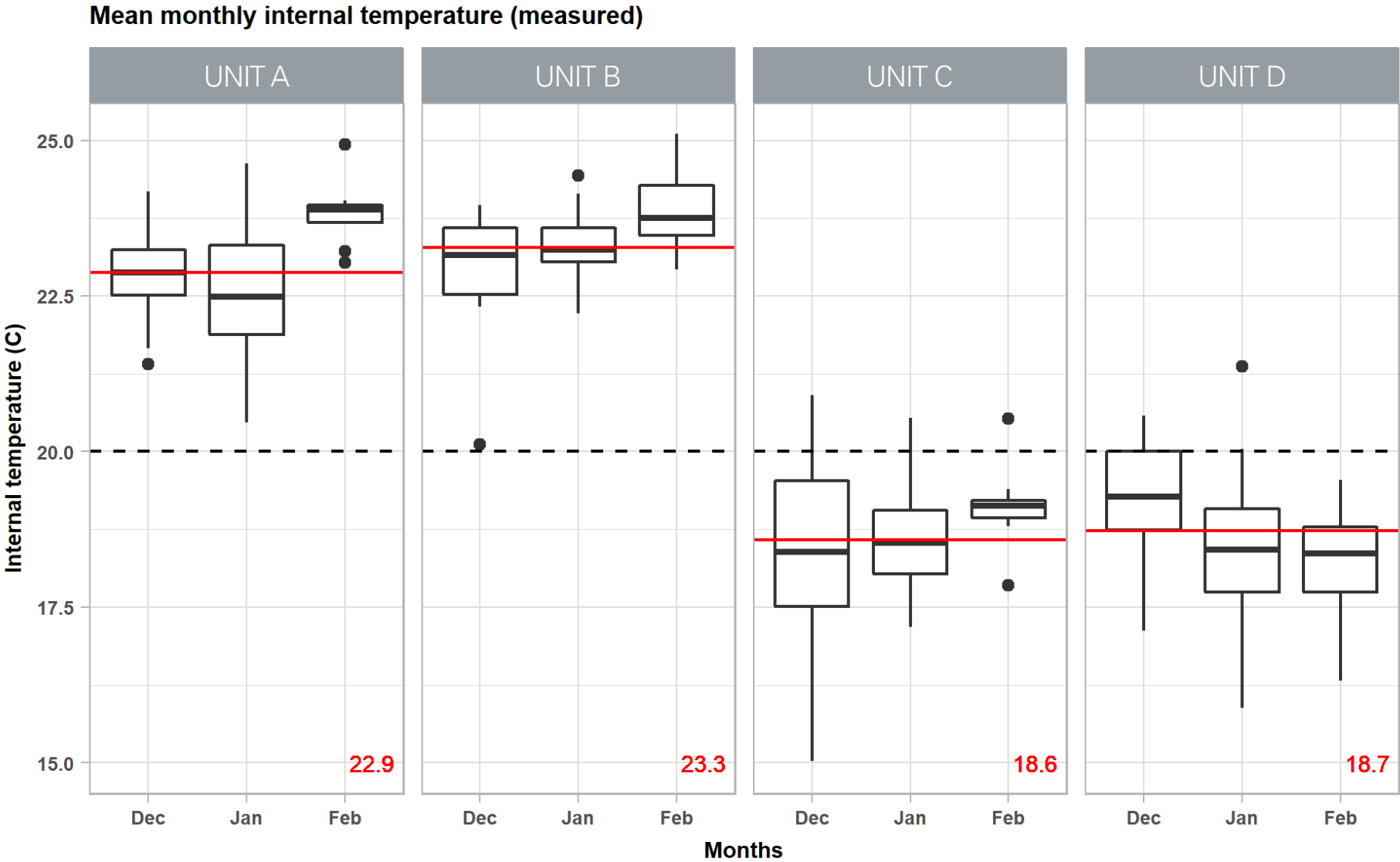
Monitoring - Internal Temperature

Same data set as above

‘Box and whisker’ graphs showing the range of internal temperatures

Lower internal temperatures to Units C & D leading to lower heat demand

Even with higher internal temperatures, Units A & B remain in line with SAP for heat demand



Initial Results

Monitoring - Hot water demand

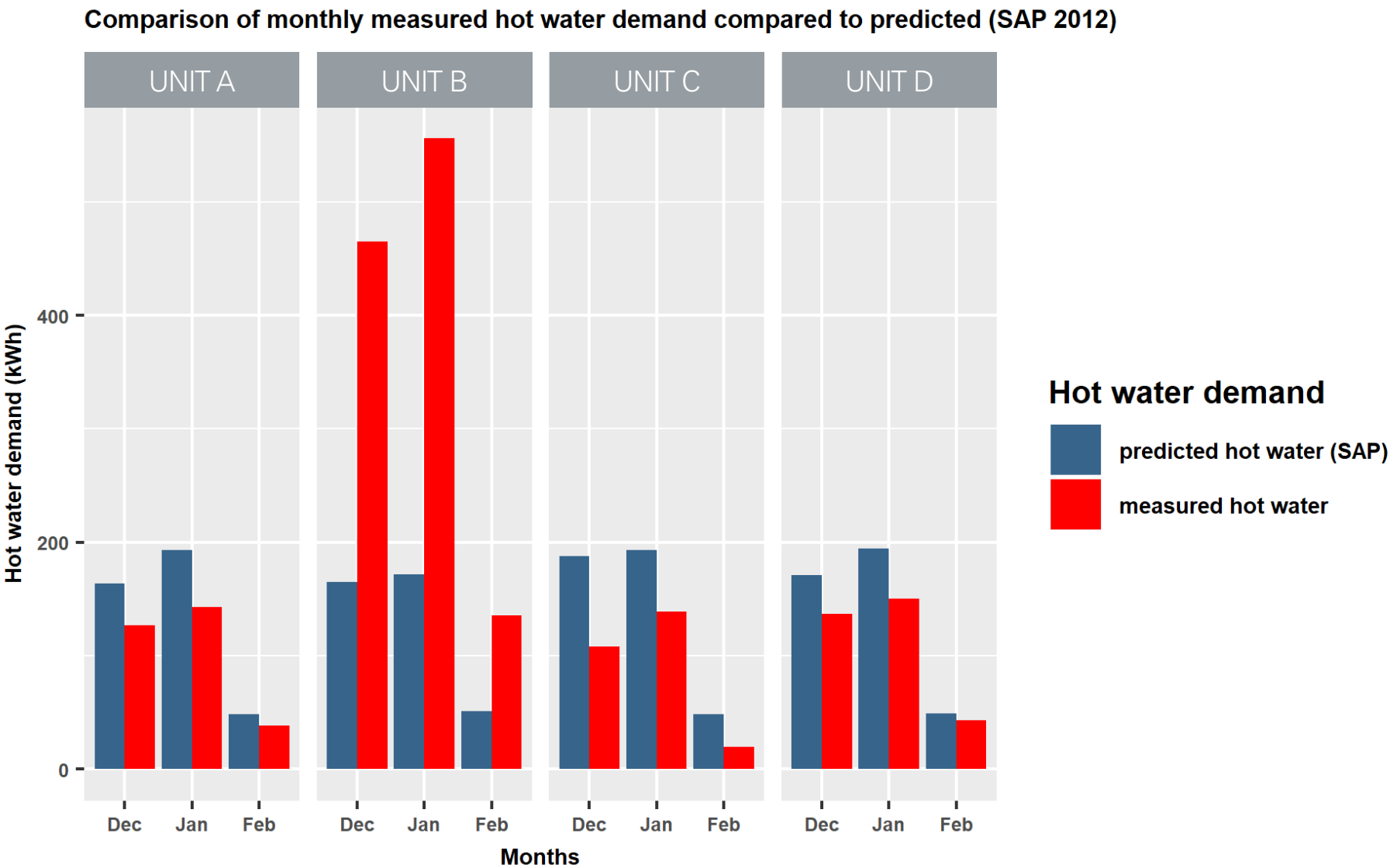
Same data set as above

Generally less than predicted by SAP (which is common)

Unit B - lots of baths?

Difficult to provide direct feedback to over schemes, but predictability important for national fuel supply

Overall - Success!!
But, we need more data...



Top Priorities

Many of the APPs aims could simply considered as 'good design'

Removal of Code and ZCH standards downgraded sustainability

APP does not seek to replace, but simply ensure compliance

Oversight essential



Top Priorities

1 – Take a holistic view

- Requires strong leadership, and ideally support from planning policy
- Don't get lost in Green Wash (eg: roof pitch)
- Solar design can't lead everytime, but the implications need to be understood
- Better literacy for all (designers, planners, assessors, contractors)
- Feedback results



Top Priorities

2 – Take time

- Early engagement required at all levels
- Analyse and take inspiration from context (climate / typology) as richness can be achieved through climatic design response
- Model to understand the implication of design or value decisions – thermally bridges / solar gains / overheating
- Review details for sequencing and installation with the contractor
- Monitor construction to identify areas of divergence



Top Priorities

3 – Keep it simple

- Simple form of building is more efficient (form heat loss factor)
- Make the installation harder to get wrong
- Items that are easy to operate are more likely to be used
- Renewable systems need to be understood



Thank you

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