The Difference between Predictions and Reality of Non-Domestic Building Performance

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Why the TSB Competition for Building Performance

- Large gap between Real performance and Virtual performance
- Industry has a long way to go before low carbon buildings are realised in the main stream
- 80% reduction in carbon emissions by 2050
- Buildings account for 45% of total UK carbon emissions
- Feedback loop:
  - needs to be closed
  - results of feedback acted upon

- Energy Survey
- Assessment of occupant satisfaction

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Typical Building Headlines

High sustainable agenda:

- EPC Asset Rating ‘A’
- BREEAM ‘Excellent’
- LEED ‘Platinum’
- 50% CO2 less than Part L
- Sustainability & Green awards

- How is this so different than what we modelled?

- Let looks at common themes with these sustainable buildings
Lighting

- Blinds to be added due to glare

- Passive design, lack of make-up air due to lock windows
- User manual produced, no occupant had received
Lighting

Not accounted in design
User Interfaces

“An intelligent building is one that doesn’t make its occupants feel stupid”… Adrian Leaman

- What are these controls for?
- Do users understand lighting or mechanical strategy?
- Underperforming controls

- Night and day mode
- Dimming
- Neither patients or nurses understood
Metering

- Primary means for accounting for energy
- Difficult to find and read
- What does on-site FM know about system? Several not aware of metering system
- Reconciliation sub-meters with main meter – some no working, calibrated incorrectly
- Renewable sources, typically come with own metering package, not tied into main metering system
- Many can’t state how building is performing - flying blind
Building Management System

- Difficult to use – too complex
- May require outside BMS systems engineer to adjust
- Lack of training for on-site staff
- How useful is it as an energy reporting or monitoring tool?
  - If not monitoring, how act?

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Unregulated Loads

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Server Rooms

- What is room set point?
  - “Server room is nice and cold”

- Rooms conditioned 24/7/365

- Check air distribution strategy
Renewable Technologies

Commissioning time squeezed
Renewable Technologies

- Find many that are off
- FM complaints - difficult to clean, problems with woodchip conveyor, expensive to service
- More trouble than its worth?
- Robust design?
- Incorporating features, but not performance

Ineffective meeting heating demands, gas boilers now lead
Good Intentions

- Architect – building form, orientation etc.
- Lighting designer – complementary lighting design to building
- Equipment suppliers – input into design, depending on controls and lights
- Electrical engineer – provision of power, coordination with other trades
- Main Contractor, Electrical sub contractor
- Electrical sub sub contractor for various components, example controls
- Design intent lost in process, fragmented delivery
- Who is going to fine tune the system?
Summary of Gaps between Predictions and Reality

- Over-optimistic design calculations – not everything is counted
- Failure to manage design intention through the entire delivery process, and fine tune systems
- Over complicated systems, over reliance on automation, lack of training for managers, awareness-raising for occupants
- Under performing controls, poor design and commissioning
- Cost and time trumps quality, designs become fragile under these pressures
- Lack of awareness of how building is performing
Closing the Gap

- Design tools are inaccurate predictors of energy use and occupant satisfaction
  - Don’t account for hours of operation and operational preferences
  - Use different tools for regulations vs client expectations – capture true use of building
  - Tools like CIBSE TM22 – Energy Assessment and Reporting method can provide check mechanism

- Need a change in outlook if Energy/Carbon Performance is the new metric, - Clients, designers, contractors and operators need to own their share of the project, and support others in delivery of performance
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Builders and subcontractors are also responsible for meeting design requirements
Soft Landings may be able to help

- Framework for a graded handover of building

- Enhances and defines duties of design and build team, and client:
  - Briefing stage – increasing dialog in supply chain
  - Forecast building performance from a users point of view
  - User involvement, before and after handover
  - Support client during first months of operation up to 3 years of use – fine tune systems
Summary

- Understand our buildings in use via building performance
- Utilise tools that provide a more realistic picture of performance
- Need a change of outlook & encourage a no blame culture within teams
- Make feedback routine and embed a culture of building performance evaluation in the construction industry
- Close the loop between design aspirations and in-use performance
  - BREEAM ‘Excellent’ ≠ DEC ‘D’ rating