Building Performance Evaluation

- £8m funding between 2010 & 2014
- Individual buildings & developments
- Identify factors that encourage good performance
- Case study investigations
- Domestic & non-domestic
- Explore lessons learnt
- Expose activities that contribute to poor performance

https://connect.innovateuk.org/web/building-performance-evaluation
Domestic: 53 projects (350 homes, 76 with detailed monitoring data)
- 23 “Early occupation” projects
  - 6 months assessment post construction & initial occupation
- 30 “In-use” projects
  - 2 years detailed performance monitoring and occupant assessment

Non-domestic: 48 projects (55 buildings, 49 with detailed data)
- 8 “Early occupation” projects
  - 6 months assessment of handover
- 40 “In-use” projects
  - 2 years detailed performance monitoring and occupant assessment
Energy consumption is often much higher than design calculations suggest

- A lot of data has been gathered
- Design teams have been reformed to investigate the building
- Occupants have been involved
- Procurement methods have been reviewed
- We can now look beyond the numbers

What have we found?

https://connect.innovateuk.org/web/building-performance-evaluation
BPE domestic portfolio: infographic

- 76 homes monitored for 2 years
- 2.6x more than design estimates
- 35 kgCO₂/m²/yr average carbon emissions
- 3,300 kWh average electricity and 5,900 kWh fuel per year
- informs 150,000 new homes built each year

- 21 solar electric systems
- 6 solar water heaters
- 7 biomass boilers
- 35 heat-recovery systems
- 3 air exhaust heat pumps
BPE non-domestic portfolio: infographic

- 49 buildings monitored for 2 years
- 3.8x more than design estimates
- 75 kg CO₂/m²/yr average carbon emissions
- 103 kWh/m² electricity per year
- 92 kWh/m² fuel per year
- 1 wind turbine
- 13 solar electric arrays
- 16 heat-recovery systems
- 16 solar thermal systems
- 12 biomass boilers
- 7 ground-source heat pumps
- 5 air-source and 2 other heat pumps
Key theme

Innovation requires care and attention

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Commissioning and handover activity is inadequate or overlooked

- Commissioning and reconciliation of systems rarely carried out
  - strategies not fully understood, implemented or reconciled
  - meters not functioning
  - no seasonal commissioning
- Handover time is often squeezed or sacrificed for other activities
- Inadequate training in what handover is supposed to achieve

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Sub-meters installed for chillers in Petchey academy are not wired up and do not report the electricity intake of the chillers
Low energy aspirations influence system complexity

• There are many conflicting factors at play that are outside of the “teams” control
  – carbon/ energy targets
  – policy related to planning
  – conditional funding

• Attention needs to be given to implementation of new technologies

• Certification planned at design is not achieved in use

POE work to review, fine tune and feedback on findings is vitally important

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Disconnection of the building from the end users

- In-use strategies are not thought through
  - no consideration of occupants’ energy-related behaviours and the way they might interact with the building
- BMS systems impenetrable and confusing
- Complex controls - now with added bespoke protocols

Lack of post occupancy consideration means projects may not achieve operational outcomes

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Lack of client engagement

Activities occur throughout the build that can adversely effect the final building performance

- procurement tends to focus on cost not value
- value engineering tends occur without fully recognising the consequences

Clients are not getting the benefit of the measures they are paying for

https://connect.innovateuk.org/web/building-performance-evaluation
Programme outputs

eembed
building intelligence for innovation
getembed.com

CarbonBuzz
an RIBA CIBSE platform
carbonbuzz.org

BUS methodology
busmethodology.org.uk

DomEARM

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Unlocking building performance data

The Building Data Exchange is a platform to unlock one of the largest unexplored datasets in the built environment.

The Building Data Exchange has been created to stimulate innovation and bring together the digital and built environment communities to work together and create data-driven solutions, which deliver greater certainty to whole-life building performance, productivity and wellbeing.
Featured Reports

**Scotland’s Housing Expo**
Scotland’s Housing Expo in Inverness was a high profile event developed to showcase innovative sustainable housing that includes a variety of design ideas.

**Dungannon Passivhaus**
This scheme of five homes timber framed homes is certified to Passivhaus Standard and achieved Level Four of The Code for Sustainable Homes. A mechanical ventilation with

**The Quarries – Housing for over 55s**
The Quarries development consists of 58 2-Person flats over 2-storeys arranged around a central courtyard with a communal hub containing resident’s lounge, tea kitchen,

**Marks and Spencer Cheshire Oaks Store**
Cheshire Oaks is Marks & Spencer’s second largest premier store, carrying the full product catalogue, and their third ‘sustainable learning store’. The aim of sustainable

**Operational Evaluation of Graham Head Office Building**
The GRAHAM Head Office is a three storey sustainable low energy building 12 miles west of Belfast. The client was involved throughout the entire process of the design and

**Rogier Primary School Building Performance Evaluation**
Rogier school is a single storey building constructed with a pre-fabricated timber panel system with cellulose (Warmcell) insulation.
Research, develop & deliver datasets and lessons for industry to stimulate the crossover of digital technology into the built environment

First data Hackathon on 5th to 7th February in London
Thank You

To join the BPE community and be kept up to date go to:
connect.innovateuk.org and search for Building Performance Evaluation
Join www.buildingdataexchange.org.uk
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