Building Performance Evaluation

- £8m funding between 2010 & 2014
- Individual buildings & developments
- Identify factors that encourage good performance
- Explore lessons learnt
- Case study investigations
- Domestic & non-domestic
-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
- Average carbon emissions: 35 kgCO₂/m²/yr
- Average electricity and 3,300 kWh fuel per year
- 35 heat-recovery systems
- 21 solar electric systems
- 6 solar water heaters
- 3 air exhaust heat pumps
- 7 biomass boilers

Informs 150,000 new homes built each year
BPE non-domestic portfolio: infographic

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

Innovation requires care and attention

Innovate UK
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

Sub-meters installed for chillers in Petchey academy are not wired up and do not report the electricity intake of the chillers

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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

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

Poor placement of hot water meter

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

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

embed
building intelligence for innovation
getembed.com

CarbonBuzz
an RIBA CIBSE platform
carbonbuzz.org

BUS methodology
busmethodology.org.uk

DomEARM

CIBSE TM22

https://connect.innovateuk.org/web/building-performance-evaluation
The next stage

Research, develop & deliver datasets and lessons for industry to stimulate the crossover of digital technology into the built environment

https://connect.innovateuk.org/web/building-performance-evaluation
Innovating with Built Environment Data

The Building Data Exchange is a platform designed to make built environment data accessible and available to the built environment community, digital innovators, designers and entrepreneurs. Our vision is to unlock innovation, empower new business and technological approaches that can then address built environment issues, challenges and opportunities such as carbon neutrality, building efficiency, and ergonomics.

Developed by The Digital Catapult, the Building Data Exchange forms an online platform to open up built environment data, thus making information accessible and discoverable to all. Our mission is to increase the exploitation of innovation in the built environment for demonstrated business benefit.

Register Your Interest
Enter your details below to pre-register.

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

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