Roebuck Castle Student Housing
Context
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Project

A Key Component of the Future Sustainable Campus Development will be more Students Resident on Campus
Roebuck Castle Student Housing

Design
Roebuck Castle Student Housing

Project Particulars

- Highly **Sustainable** by Nature
- **PHPP** favoured over BREEAM
- Focus on **Low Energy Demand**
- Goal was an 'Exemplary' building
- **Highly Supportive Client**
- **Guide for Future Development**
- Exceptional **Learning Tool**
- Use of **Renewable Materials**
Roebuck Castle Student Housing

Brief

135 Student Residents
4,300 square metres
Very High Performance
Rapid Delivery
Roebuck Castle Student Housing

Design

First Floor

Ground Floor
Roebuck Castle Student Housing

Delivery

• Very Detailed Design Documents
• Extensive On-site Oversight
• Quality Management
• Rigorous Pre-handover Testing
• More Sophisticated than your 'Average Build'
• Post-occupation Data-logging and Monitoring
• Architect-led Strategy
Users

Transient Student Population
135 Students from Brazil to Brighton
Meeting User Expectations is Challenging
Promoting Engagement through Guidance
Channelling Feedback into Management
Encouragement of ‘Learned Habits’ is key

“Windows linked by sensors to heating are highly effective – but need to be closed when room is unoccupied”

“19 electrical chargers”
Construction
Construction
Cold Bridge Detailing

Insulation Continuity
Consideration required at all
- Junctions
- Interfaces
- Fixing Points

Point-fixing of Unitised Panels

Thermal Isolation of Primary Structure

Set Design Criteria to allow for Wastage
Envelope
Envelope
Quality
Materials
Post-Occupancy Monitoring

Post-completion monitoring of systems and comfort are essential to continue to learn and develop yet higher skills going forward.

SEAI (through UCD Energy Research Group) is carrying out a programme of monitoring and post occupancy evaluation of the building.

Monitoring equipment logs environmental data in 16 student rooms.

It also records overall energy demand for space heating, hot water, heat flows from HRV and solar collectors.

The data provides verification of the design and will also feed back into research in the design of following projects.
Monitoring

Global:
- Heat Input
- Solar Fraction
- Electrical Power
- HRV
- Water Consumption

Specific at 16 locations:
- Temperature
- CO$_2$
- Humidity
- Voltmeters on light + power
- Flowmeters on heating + water
Data

Extensive and Continuous data logging.
Complexity of Multiple Transient Users.
Space Heating Demand: 15 kW/m²/pa threshold
  12k kW/m²/pa design
  >15 kW/m²/pa on completion
  12-13k kW/m²/pa current

Context - Average Building Value 55kW/m²/pa
Building Regulations Part L 2008

Monitoring at Scale - Plan at Design Stage
Integrated Systems Approach - eBMS
Modest Cost
Centrally Important Tool in High-Performing Buildings
What You Need To Know

User Behaviour Patterns can only be Modelled at Design Stage.

Passive Measures can be Validated at Occupation.

The Control and Interfaces of Building Installations need to be Verified against Actual User Behaviour.

Post-completion Monitoring offers Wide and Rich Source of Factual Information to Refine the Operation of Building Installations.

In the case of the Roebuck Castle Residence, it has allowed the complex pattern of use to be measured and responded to refine the building performance to meet the Exacting Performance Standards for the Project.
Energy Use

Average Energy Use per studio-bedroom (kWh)

Total Energy Use
Conclusions

Traditional Envelope Solutions will yield to LightWeight Envelope Design.

Verification involves Rigorous On-site Quality Controls and Pre-testing before Acceptance and Handover.

In-life Costs are the True Measure of Low-carbon Design.

Low Carbon Design must become “Mainstream”.

Quality in Design is inseparable from Performance.
Conclusions

Increased Building Performance represents a **Challenge** and an **Opportunity**

Fully Documented and Verified Design puts **Architects** at **Centre-Stage**

High Quality Building Design does Deliver **Exemplary Performance** - BREEAM, LEED and PHPP.

Cannot be an Afterthought – starts with "**First Lines-on-Paper**".