Matching real and predicted residential heating energy and comfort in Belgium

Ghent University (UGent)
Faculty of Engineering & Architecture
Building Physics, Construction & Services Research Group

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NUMERICAL SIMULATIONS using – developing - coupling

EXPERIMENTS & MEASUREMENTS on site - in lab

approaches
outreach

• **Governmental policy-making**
  - EPBD
  - standardisation
  - quality of workmanship

• **Industry:**
  - R&D
  - control algorithms
  - performance assessment

• **Dissemination**
  - stakeholders
Building stock

Random sampling

Detailed cases
Field data
Neighbourhoods: from old to new
Neighbourhoods: renovation

Demonstration projects: monitoring + data collection & analysis
Data analysis
Smartmetering: *from static to dynamic*

IEA-EBC Annex 58
Reliable Building Energy Performance Characterisation Based on Full Scale Dynamic Measurements
EPBD & surveys: statistical analysis
Theoretical vs. real energy use

real gain?

$Q_{H,\text{theoretical}} [\text{kWh}/(\text{m}^2\cdot\text{yr})]$ vs. $Q_{H,\text{real}} [\text{kWh}/(\text{m}^2\cdot\text{yr})]$

Theoretical gain

real gain
Theoretical vs. real energy use

- **Q_{H, real} [kWh/(m² yr)]**
- **Q_{H, theoretical} [kWh/(m² yr)]**
- **Primary heating setpoint [°C]**

**Graphs and charts**
- Scatter plots showing the relationship between daily heating hours and primary heating setpoint.
- Line graphs illustrating the percentage distribution of energy use.
- Bar charts comparing theoretical and real energy consumption for various standards.
Modelling
Models:

1-zone: FL EPB
Models:

1-zone: FL EPB, corrected ventilation
Models:
Multi-zone (corrected ventilation & heating profiles)
building stock, single-zone

typologies, multi-zone

multiple selections

multiple fittings
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scenario analyses

building stock
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