Monitoring and Measuring

the Impact of Energy Efficiency Improvement Measures to the Social Housing Stock

What to measure and why

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Cork City Council Housing Stock

9000 + social houses

50% built pre 1975.

10% apartments

Energy Ratings for 6500 properties

Examples of work done:
https://www.youtube.com/watch?v=603SmvZ7RIs&feature=youtu.be

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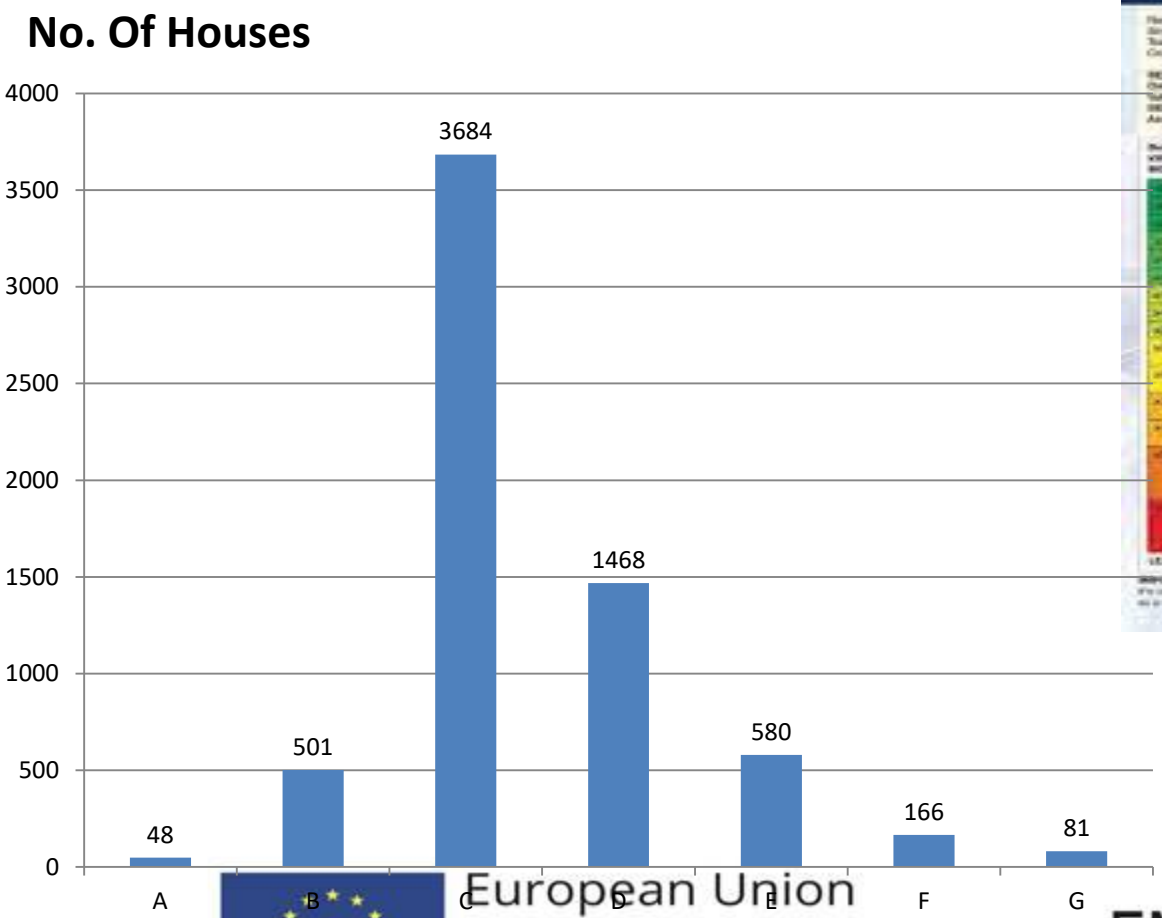
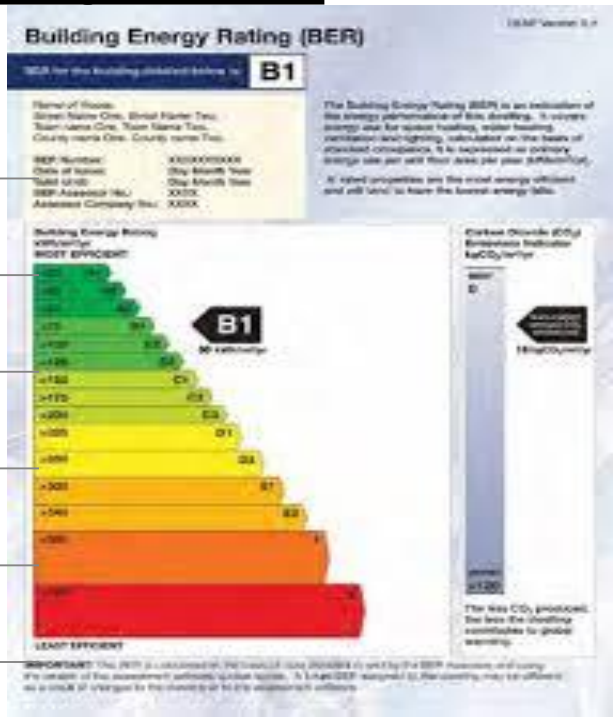
Current BER Status of Properties





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Current and Future Projects

- Drivers towards NZEB (<A3) in all properties by 2050.
  - SECAP
  - Covenant of Mayors
  - Climate Change Act 2015
  - National Mitigation Plan

Ecohesion Funding: TO4-Shift towards a low carbon economy

- Incremental Approach – improve energy rating of selected properties by at least one energy grade.
  - Fabric First Approach
- Apartments – 129 in progress, 200 planned for 2019
- Houses – 200+ planned for 2019
- Vacant units – 1000+ to date, 200 per year.
- Solar PV – 100+ units to date
- Heat Pumps – 400+ units to date
- Battery Storage – exploring possibilities

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Building Fabric Improvements

- Increase wall thickness
  - Reduced light
- Reduce heat transfer through walls and windows
  - Warmer home
  - Less energy needed to heat the home
- Reduce air flows?
  - More CO2, moisture in the air?
  - Improved ventilation

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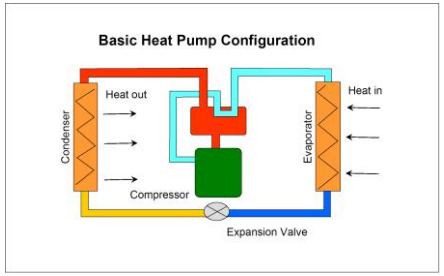
Power Equipment

Electrical White goods – A rated where possible
Solar Electricity generation
Electrical power storage – Batteries



High Efficiency gas boilers
Solar Thermal
Electric heating
Insert Stoves
Temperature and Zone Control

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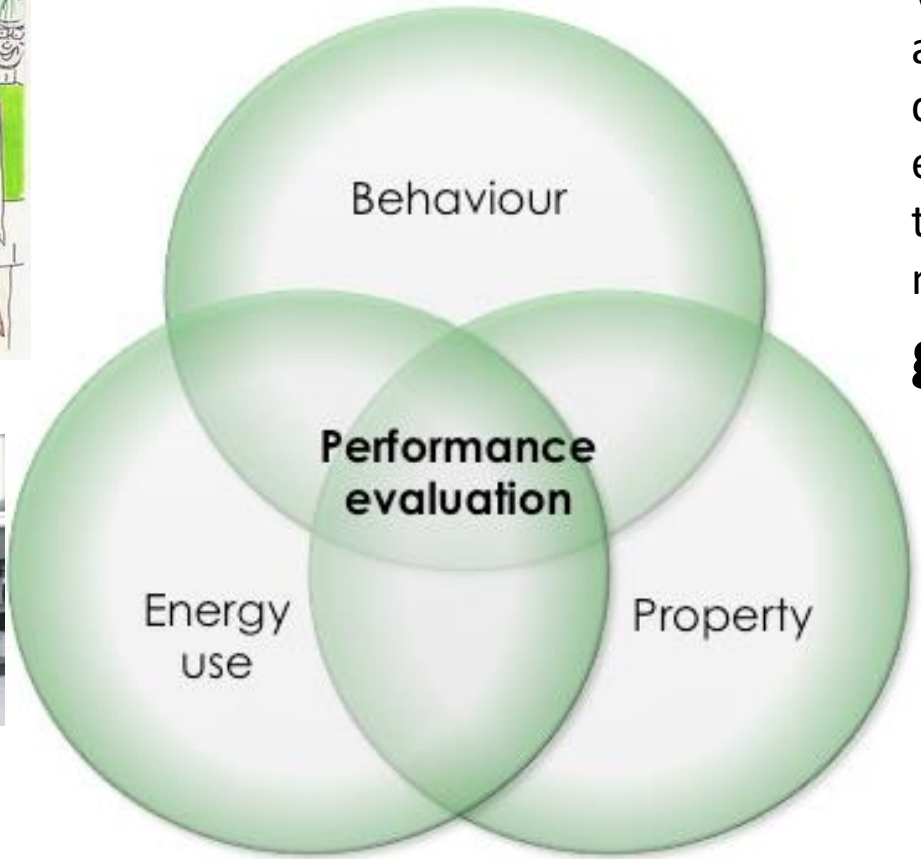
OPTIMISING ENERGY USE THROUGH MONITORING AND MEASURING



We want to bring about behaviour change to optimise energy consumption to meet needs but not promote **gamification**

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What We Need to know

An holistic approach

Impact on the building

- Rated air tightness
- Rated energy consumption (BER Certification)
- Humidity, moisture content, dampness

Impact on the occupants:

- Reduced energy consumption
- Better climate control – Temperature, Humidity, Air Quality
- Better Health Outcomes

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Benefits of holistic measuring

- Whole of house impact of measures can be measured and impacts observed

- Better able to measure fuel poverty or appetite for not using heat

- Change behaviour where it can result in real benefits to occupier

- Demonstrate success of project to others.

- Investigate issues raised by occupiers post works.

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What will be Monitored

Environment

- External Environment
- Internal Environment

Power consumption

- Electricity Consumption
- Heating Consumption

Behaviour

- Interaction with Energy systems in home.

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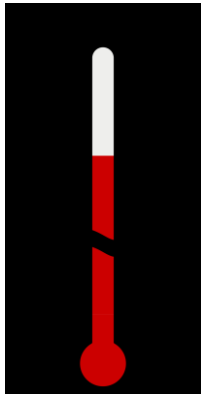
External Environment



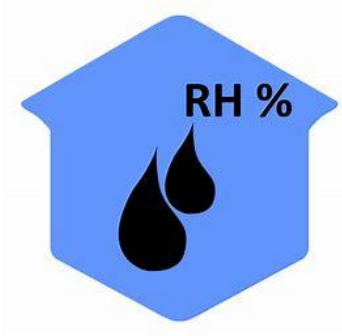
Temperature

Air Pressure

Windspeed

Humidity

Chill Factor



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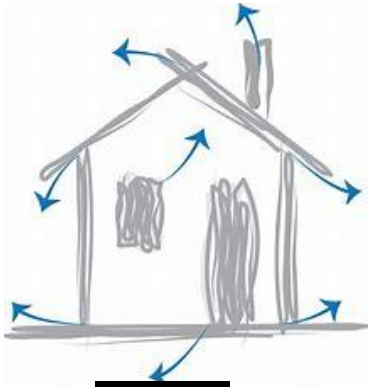
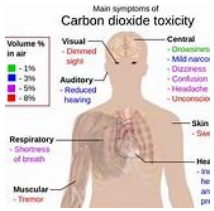
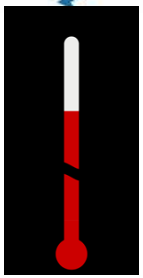
Internal Environment



Airtightness



Air Pressure



Temperature

CO and CO2 Per room/per zone

Humidity

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Electricity Generation and Consumption

Total

- From Electricity provider
- From Solar Photovoltaic
- To electricity provider
- To Storage Battery
- From Storage Battery

Major equipment

- Washing Machine, Dishwasher, Cooker, Fridge, Freezer, Shower

Consumed by circuits

- Lighting
- socket

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Heat Consumption

- Heat Consumption
  - From Gas
  - From Solar Thermal

- By Zone/radiator – Valves Opened/Closed

- Temperature Settings

- Actual Room Temperature

- Humidity levels

- Ventilation fans – on or off

Moisture Meter

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Information displays

- Electrical consumption by component/circuit to make up total real time and aggregated
- Heat consumption by radiator/emitter to make up total, real time and aggregated
- Air temperatures internal/externa;l against heat consumption over time.
- Identify excessive consumption, inadeqaute consumption and heat poverty/starvation
- Educate and Resolve problems for occupants
- The ability to create displays is crucial

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Conclusions and Recommendations

- Energy measuring and monitoring has a role to play in highlighting the benefits of Deep Energy Efficiency measures in social housing.

- Helping residents to understand the performance of their buildings and to take steps to optimise usage.

- It can be expensive, the more you measure and monitor the more information you have but at a cost – know what you want to do and why

- Occupant co-operation is essential if you are to take this data for analysis by either your own organisation or by a third party. – Get there buy in

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