

## Summary

The National Built Energy Retrofit Test-bed (NBERT) is a fully instrumented and fully occupied low energy building located on the campus of Cork Institute of Technology (CIT). It's facilities and equipment include:

>50 long-term internal study instruments

>40 short-term experimental study instruments

>25 building management system instruments

>7 local external weather instruments

## Research Interests

- Indoor and enclosed environments
- Energy efficient buildings
- Ventilative cooling strategies
- Statistical turbulence
- Particle transport modelling
- Data driven and mechanistic fluid thermal system modelling
- Whole building model calibration
- Adaptive thermal comfort modelling

## NBERT Team

### Principal investigators

Dr Paul D. O' Sullivan  
Dr Michael D. Murphy

### Researchers

Adam O' Donovan  
Fergus Delaney

## Infrastructural Facilities

### Physical Infrastructure

The primary internal environmental data logging system used in NBERT is a **Hanwell** wireless data logging network. This system measures parameters such as; Internal **air and surface temperatures**, **relative humidity** levels and **carbon dioxide** levels.



A **Campbell scientific** weather station is located at roof level above the retrofit testbed. This weather station measures external parameters such as; **temperature, humidity, wind speed, wind direction, horizontal solar irradiance, pressure and rainfall**. There is also a building management system in use at the building. The system is a **Cylon** system and manages all **energy** metering and time scheduling for the building systems. In particular it controls the **Windowmaster** systems and centralised data logging of ventilated door **opening positions**.



In NBERT there a number of short-term measurement opportunities for researchers. These include the capabilities to measure air change rates, overheating, thermal comfort and occupant interactions in the building or behavioural analysis.

## Research Projects

### IEA EBC Annex 62 (2014 -2017)

The current development in building energy efficiency towards nearly-zero energy buildings represents a number of new challenges to design and construction. One of the major new challenges is the increased need for cooling arising in these highly insulated and airtight buildings, which is not only present in the summer period but also in the shoulder seasons and in offices even in midwinter during periods of occupation. In order to address these cooling challenges of buildings, the research focus of the annex will be on development of design methods and compliance tools related to predicting, evaluating and eliminating the cooling need and the risk of overheating in buildings as well as on the development of new attractive energy efficient ventilative cooling solutions.

[Click here](#) for more information.

### SEAI RD&D (2017- 2018)

This ongoing project involves the development of an online data portal incorporating a ventilative cooling potential assessment platform. The portal will provide two separate complimentary functions:

1) to create an interactive **information portal and data portal** based on the monitoring systems in the building.

2) to allow more general application a **ventilative cooling potential analysis tool** will be provided for assessing the cooling potential of ventilation systems in the Irish climate that do not utilise mechanical cooling energy

[Click here](#) for more information.