# DesignForIU: Comparison of certified versus in-use performance of energy efficient technologies

## Abstract

The goal of this project was to monitor several residential and non-residential Mechanical Ventilation Heat Recovery Systems (MVHR), Air to Water and Exhaust Air Heat Pumps (AWHP, EAHP) Systems to determine if there exists a "performance gap" between certified and actual performance levels, as well as whether heat pumps comply as renewable energy sources and, by way of comparison with Ireland's Building Energy Rating (BER) database, whether our current national energy rating methodology is robust as a policy tool in providing a reasonable assessment of a buildings future energy and emissions performance. The project monitored four residential buildings with AWHPs & EAHPs, as well as MVHR systems. Two non-residential buildings were assessed, one ASHP and one MVHR.

## Research Outcomes

1. Two of the three Air to Water Heat Pumps studied underperformed by between 23% and 49% while one heat pump performed well with respect to design expectations.
2. Of the MVHR systems studied the average Heat Recovery Efficiency (HRE) was 80%, two of the three systems studied performed close to design expectations, one did not.
3. The average difference between standardised SPFs used to represent heat pumps in the BER database (4.4) and that of the literature (2.8) and this study (3.4) for space heating (SH) mode is between 100% and 160%, while DHW mode was found to be comparable with expectations.
4. Over-sizing or underutilisation of heat pump systems is likely to lead to underperformance with shorter run times and more compressor cycling.

## Recommendations

1. A national heat pump "nct" should be considered to verify renewable status, or an in-use performance register that requires project delivery teams to verify performance post-handover to clients. This could form part of the evaluation for any support grants from Govt.
2. Life Cycle Analysis of MVHR and ASHP systems is needed to assess the potential degradation of their efficiency and performance. Completing an LCA could form part of an increased grant.
3. More work is needed to determine what effect different performance measurement boundaries have on efficiency calculations.
4. Standardised installation requirements are needed to ensure adequate performance testing is possible post-handover. Most systems do not have necessary configurations to allow performance testing.

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**MTU** Ollscoil Teicneolaíochta na Mumhan
Munster Technological University