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FACTHP - In Use Factors for Heat Pumps and other energy technologies in Residential Buildings

Abstract

FactHP set out to determine if an "In-Use" factor should be applied to the use of Heat Pumps in relevant Compliance Tools in Ireland e.g. the Dwelling Energy Assessment Procedure (DEAP). The performance of heat pumps was monitored in 42 domestic buildings with a range of dwelling types (detached/semi-detached etc) and scenarios (new building and retrofit). The assessment considers the operation of the heating in the context of the building fabric. Predicted SPF and energy consumption was compared to actual energy performance to determine a potential In-Use factor for Heat Pumps and Building Fabric.

Research Outcomes

1. In Space Heating mode, heat pumps produced an average of 12% more thermal energy than predicted.
2. Space heating SPF was 17% lower than predicted.
3. In DHW mode, heat pumps produced an average of 51% less thermal energy than predicted.
4. DHW SPF was 16% higher than predicted.
5. Looking at combined data for space heating and DHW modes led to a false picture of prediction matching measured performance. By chance in this case, the errors for both modes almost cancelled each other out.

Recommendations

1. Further monitoring and analysis work which provide more details on occupancy, internal temperatures, use of secondary space heating, metering the quantities of hot water used, all in conjunction with engagement with the developers of the DEAP software. The underperformance of SPF in space heating mode could be further investigated with greater information about emission system design and the control strategies employed.
2. A wider rollout of data collection and analysis to keep pace with the increase in installations. This must be adequately funded to allow for high quality manufacturer independent meters, data loggers and reporting systems.
3. Development of Manufacturer Independent data monitoring and collection systems for heat pumps where space heating and DHW modes can be analysed separately.
4. Research into data logging and transmission systems – ideally with 15-minute intervals and resistant to external interference.