# WHAT DO I NEED TO GET MY TECHNOLOGY/ PRODUCT READY FOR SAP/HEM?

## Aim and scope

This short document is aimed at innovators to help them understand whether their technology is ready for SAP Appendix Q as well as the type of evidence required to demonstrate its performance.

Each new technology will have its specific requirements, so it is only possible to describe general principles here.

As SAP is used to demonstrate compliance with building regulations and to produce EPCs, the evidence demonstrating performance needs to be robust.

To be considered, technologies should generally be market-ready and improve a dwelling's energy performance either through increased efficiency or improved control. They should also focus on 'regulated' energy uses, i.e. energy for space, water heating and fixed lighting rather than energy for appliances.

## Q1A IS YOUR TECHNOLOGY/PRODUCT READY FOR SAP/HEM?

### Is the product at Technology Readiness Level 7 or greater?

- ☐ Yes
- ☐ No

| TRL | Title |
|---|---|
| 1 | Basic research |
| 2 | Applied research |
| 3 | Proof of technical concept |
| 4 | Lab and Test Bench Demonstrations |
| 5 | Development Prototypes |
| 6 | Engineering or Demonstration Prototype |
| 7 | Operational Prototype (Alpha Product) |
| 8 | Production Prototype (saleable Beta product) |
| 9 | Marketable Product |

### Q1B Is the design/specification of your technology fixed?

- ☐ Yes
- ☐ No

If the answer is 'no' to either question, then your product is not ready for SAP. In the majority of cases technologies considered for SAP are in the form of a marketable product, i.e. TRL 9. If you are unsure on this contact BRE for specific guidance.

## Q2A WHAT IS NEEDED TO IMPLEMENT IN SAP/HEM?

Is there an energy performance calculation method for your technology available in the form of an engineering standard[1]?

- ☐ Yes
- ☐ No

Q2B Is there an engineering test standard that incorporates typical UK operating modes and service delivery profiles that could be adapted into a calculation method to estimate energy saving benefit of your technology?

- ☐ Yes
- ☐ No

If the answer to both questions is 'yes' this will make implementation easier, but it will be necessary to review these and adapt them as required as part of the recognition process.

If either of the answers is 'no', there will be a need to develop a calculation and/or testing methodology which will extend the recognition process. This is linked to the provision of evidence.

## Q3 WHAT TYPE OF EVIDENCE AND HOW MUCH DO I NEED TO PROVIDE?

This is influenced by how the technology operates:

- Category 1: A technology that works without user intervention and has no scope for variable installation quality, i.e. does not require extensive set-up and commissioning.
  - Example: Waste Water Heat Recovery System (WWHRS)
- Category 2: A technology that may require user intervention and has scope for variable installation quality.
  - Example: Mechanical Ventilation with Heat Recovery (MVHR)
- Category 3: A technology that improves energy efficiency through human behaviour interaction.
  - Example: Space heating controls

If Category 1: A field trial or laboratory test must demonstrate that a functional characteristic of the technology works in the field. Likely scale: 1 – 10 sites A laboratory test can be more

[1] Engineering standards are documents that specify characteristics and technical details that must be met by the products, systems and processes that the standards cover. In the case of an energy performance calculation method within an engineering standard, this will include specifying the procedure and data inputs required. It does not have to be a UK one. An example is EN15316-4-2 which covers the performance of heat pumps.

suitable where a test standard is available and/or testing would benefit from more controlled conditions such as when measuring a change in efficiency.

Key points to consider for laboratory tests:

- Robust under well-controlled conditions.
- Adopt or adapt existing engineering test standard
- Testing protocols consistent with SAP/HEM methodology and assumptions (e.g. temperatures, duration, levels of use etc.)
- Agree test protocols with BRE before proceeding

If Category 2: A field trial must assess and compare the energy performance of a technology relative to a laboratory test. The scale of the field trial may in part be dictated by the requirements for system design, installation and commissioning, plus available modes of operation for users in the field. Likely scale: 10 – 200 sites. Where there is greater potential for variation in performance a large field trial would be required.

If Category 3: A field trial must assess and compare the human behaviour in the field with the technology and without it. Changes in behaviour affecting dwelling energy efficiency must persist throughout the monitored period, which must be of sufficient length. Likely scale: 100 – 1,000 sites. An example would be a space heat controller that lowers the average set point temperature but does not compromise householder thermal comfort.

Key points to consider for field trials:

- Range of UK dwelling types and SAP/EPC ratings
- Broad geographic range
- Performance over whole heating season or seasons
- Variables to monitor (e.g. indoor temperature, air quality, total energy consumed, energy consumed by technology, weather, water volume and temperature etc.)
- Whole house or individual rooms
- Frequency of monitoring (minute, half-hourly, hourly etc.)
- Air tightness
- Occupancy levels
- Occupant surveys etc.
- Agree approach and scope of field trial with BRE before proceeding

Further guidance and additional examples is available here. A few examples can be found in the Appendix of this document.

# APPENDIX: CASE STUDIES

## Heat pumps

In 2016, available test data for space heating heat pumps changed as a consequence of Ecodesign regulations (No. 811/2013 and 813/2013) being launched. The new test method was the Engineering Standard EN14825. This necessitated a change to the energy performance calculation method used by SAP. The new test method (EN14825) also incorporates a calculation method for estimating the energy performance of heat pumps. BRE conducted a review of this method and confirmed it was unacceptable for SAP purposes, so a new method (DAHPSE – Domestic Annual Heat Pump System Efficiency) was developed, based on Engineering Standard EN15316-4-2 – a performance calculation method developed in support of the EU's Energy Performance of Buildings Directive.

## Mechanical Ventilation and Heat Recovery Systems

Mechanical Ventilation and Heat Recovery was recognised in SAP as a New Technology in 2008 (via Appendix Q). This recognition included the development of a test method representing common installation practices in compliance with Building Regulations. As part of this recognition, a field trial was commissioned by the Energy Saving Trust comprising 36 dwelling installations. Resultant findings informed in-use factors that were incorporated into SAP's recognition of the technology.

## Waste water heat recovery systems (WWHRS)

WWHRS can be fitted to showers to allow heat from the waste water flowing out of a shower to be recovered. This heat is used to preheat water to the shower itself or to the dwelling's heating system. These systems can be used with or without a store. In this case, a Dutch Engineering Test Standard (NEN 7120) was used to form the basis of the energy performance calculation for WWHRS.