

# Summary of wrappers for the FHS assessment

A technical explanation of the methodology

## Acknowledgements

This methodology has been developed for the Department for Energy Security & Net Zero by a consortium led by the Building Research Establishment (BRE), including AECOM, Sustenic, University of Strathclyde's Energy Systems Research Unit, Kiwa Ltd., Loughborough University Enterprises Limited, Chris Martin and John Tebbit.

Quality assurance has been undertaken by a consortium led by Etude, including Levitt Bernstein, Julie Godefroy Sustainability, and UCL.

**Document reference:** HEMFHS-TP-06

**Document version:** v1.0

**Issue date:** 13/12/23

**Home Energy Model version:** HEM v0.24

**Home Energy Model: FHS assessment version:** FHS v0.18



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# Background to the Home Energy Model: Future Homes Standard assessment

## What is the Home Energy Model: Future Homes Standard assessment?

The [Home Energy Model: Future Homes Standard assessment](#) is a calculation methodology designed to assess compliance with the [2025 Future Homes Standard \(FHS\)](#). It builds on the government's [Home Energy Model](#), which will replace the government's [Standard Assessment Procedure \(SAP\)](#).

The Home Energy Model: FHS assessment is still under development and its first version will be implemented alongside the FHS in 2025. We are publishing information about the model while it is still at a formative stage to enable industry to participate in the ongoing development process.

## Where can I find more information?

This document is part of a wider package of material relating to the Home Energy Model:

### **Home Energy Model: FHS assessment technical documentation (e.g. this document)**

**What:** This document is one of a suite of [technical documents](#), which go into further detail on the assumptions and the validation exercises that have been carried out. We intend to update and produce further technical documentation throughout the model development process.

**Audience:** The technical documentation will be of interest to those who want to understand the justifications and evidence base behind the assumptions used in the model.

### **The Home Energy Model: Future Homes Standard assessment consultation**

**What:** The [Home Energy Model: Future Homes Standard \(FHS\) assessment consultation](#) seeks views on the proposed methodology for demonstrating compliance with the FHS.

**Audience:** The Home Energy Model: FHS assessment consultation will be of interest to those who want to understand the proposed standardised assumptions around occupancy, energy demand etc. to be used when assessing compliance with the FHS, as well as the methodology for the calculation of the proposed FHS compliance metrics.

### **The Home Energy Model reference code**

**What:** The full Python source code for the Home Energy Model and the Home Energy Model: FHS assessment has been published as [a Git repository](#). This code is identical to that sitting behind the consultation tool. We are currently considering whether the open-source code could serve as the legal approved methodology for demonstrating whether new homes comply with energy performance standards in the Building Regulations.

**Audience:** The reference code will be of interest to those who want to understand how the model has been implemented in code, and those wishing to fully clarify their understanding of the new methodology. It will also be of interest to any potential contributors to the Home Energy Model.

## Related content

This document provides a summary of wrappers for the FHS assessment. For a general summary of wrappers and how they relate to the core calculation, see HEM-TP-02 General summary of wrappers. For a general summary of the core calculation, see HEM-TP-01 General summary of core calculation.

To understand how this methodology has been implemented in computer code, please see:

*src/hem.py*

*src/wrappers/future\_homes\_standard /future\_homes\_standard.py*

*src/wrappers/future\_homes\_standard /future\_homes\_standard\_FEE.py*

*src/wrappers/future\_homes\_standard/future\_homes\_standard\_notional.py*

# Methodology

## 1. Wrappers for the Future Homes Standard assessment

In the current software implementation, wrappers have been defined to model the following:

- Actual building with Future Homes Standard (FHS) assumptions
- Actual building with FHS Fabric Energy Efficiency (FEE) calculation assumptions
- Notional buildings for each of the above.

Eventually, it is intended that an overall FHS assessment wrapper will be implemented that runs all of the above in one run of the software (at the time of writing, the calculation software is invoked multiple times by the consultation interface). This makes no difference to the results of the calculations but would make the calculation software easier to use.

In some circumstances, it may be desirable to apply multiple wrapper steps in sequence. If these wrappers affect different, independent parts of the input data set then there would be no conflict but if two wrappers affect the same or related parts of the input data set then the order of application will be important. For example, the pre-processing part of the FHS assessment wrapper is applied as the final stage of applying the FHS FEE wrapper pre-processing.

### 1.1 Future Homes Standard (FHS) assessment wrapper

For running building energy assessments for the Future Homes Standard, the software should be run with the Future Homes Standard assessment wrapper. At the pre-processing stage, this standardises the following:

- Calculation period and timestep – set to one year and 0.5 hours respectively.
- Internal gains assumptions (metabolic, lighting, appliances, cooking) - see HEMFHS-TP-01 FHS occupancy assumptions and HEMFHS-TP-04 FHS appliances assumptions.
- Space heating and cooling hours and setpoints – see HEMFHS-TP-02 FHS space heating and cooling demand assumptions.
- Cold water feed temperatures - see HEMFHS-TP-03 FHS domestic hot water assumptions.
- Hot water draw-off events (pattern and total amount) - see HEMFHS-TP-03 FHS domestic hot water assumptions.
- Water heating hours (for non-instantaneous systems) - see HEMFHS-TP-03 FHS domestic hot water assumptions.

In some cases, this standardisation does not vary with any user inputs, whereas in others, there may be multiple standard values/profiles to choose from, or the values/profiles are derived from other inputs. See the technical papers indicated above for more details.

At the post-processing stage, the FHS assessment wrapper standardises emissions and primary energy factors to be applied to the predicted energy consumption results from the core calculation. For details, see HEMFHS-TP-05 FHS fuel factors.

### 1.2 Future Homes Standard (FHS) Fabric Energy Efficiency (FEE) wrapper

For calculating the Fabric Energy Efficiency metric for the FHS assessment, additional pre-calculation assumptions are made before the standard FHS assessment wrapper pre-processing step is applied. However, the FHS FEE wrapper applies different post-processing to the outputs from the core calculation than the standard FHS assessment wrapper does. The FHS FEE wrapper is currently implemented as a separate wrapper but in future will be one component of an overall FHS assessment wrapper that runs the core calculation several times with different sets of assumptions. The [draft Approved Document L: Volume 1: Dwellings](#) provides guidance on how to calculate the target primary energy rate, target emission rate, target fabric energy efficiency rate, dwelling primary energy rate, dwelling emission rate and dwelling fabric energy efficiency rate.

### 1.3 Future Homes Standard (FHS) notional building wrappers

For calculating the notional building results for the main FHS assessment and FHS FEE assessment, additional assumptions are made before the main FHS assessment wrapper or FHS FEE wrapper is applied. [The Future Homes Standard 2025: dwelling notional buildings for consultation](#) provides the specifications for the notional dwellings.

## Future development

Eventually, it is intended that an overall FHS assessment wrapper will be implemented that runs all of the individual wrappers described above in one run of the software (at the time of writing the calculation software is invoked multiple times by the consultation interface). This makes no difference to the results of the calculations but would make the calculation software easier to use.

In future, additional wrappers may be defined to suit new purposes, and existing wrappers may be refined.



