UK Government

The Home Energy Model

Summary of responses received and Government response

October 2025

Any enquiries regarding this publication should be sent to us at:
homeenergymodel@energysecurity.gov.uk

Contents

Executive Summary

Introduction

This document presents the government's response to the Home Energy Model (HEM) consultation, which was published on 13 December 2023 and closed on 27 March 2024.

Background

HEM is a calculation methodology designed to assess the energy performance of our homes. It will replace the Standard Assessment Procedure (SAP), which was first published in 1993. Like SAP before it, HEM will underpin a large number of government policies, making it of critical importance to the delivery of housing, fuel poverty and climate objectives.

One of our aims has been to clarify and delineate between the model's different purposes and functions. The first function we have developed is for demonstrating compliance with Building Regulations Part L, also known as the Future Homes Standard (FHS). We are also developing a HEM methodology to produce Energy Performance Certificates (EPCs). To support this, we have separated the model's core building physics from any policy-specific assumptions. This will enable users to adapt and use the model in various contexts, with different inputs and outputs suited to their needs and the underlying regulatory requirements which apply.

The HEM Consultation summarised the development and validation work which had taken place and was designed to elicit feedback to enable further model development in advance of its introduction.

HEM is under development and its first version will be implemented alongside the FHS in 2025. This will be done alongside making a version of SAP temporarily available for compliance with the FHS, so that either methodology can be used to demonstrate compliance, enabling the sector to smoothly transition to HEM.

What has been published?

This Government Response document is part of a wider set of publicly available material relating to the HEM. Depending on your interests, you may be interested in all or part of this response document, as well as one or more of the other publications within this package. The full list of publications is as follows:

The Home Energy Model Government Response (this document)

What: This document sets out the government's response to the Home Energy Model consultation, which explained the overhaul to the SAP methodology and sought views on the approach taken by the new model.

Audience: This document will be of interest to those who want to understand the feedback received in response to the consultation and how the government responds to them.

Please note that this government response does not cover the Home Energy Model: Future Homes Standard (FHS) Assessment consultation which was published at the same time as HEM consultation. A separate government response to the HEM: FHS assessment consultation will be published in Autumn 2025.

This response also does not address EPC reform or the development of a specific Home Energy Model methodology for producing EPCs. The government consulted on proposals for improving EPCs, including the performance metrics they display between 4 December 2024 and 6 February. The outcome of the EPC consultation will feed into the development of a Home Energy Model methodology for producing EPCs and will be published in due course.

HEM reference code

What: A full technical explanation of the HEM methodology has been published and can be found here:
https://dev.azure.com/Sustenic/Home%20Energy%20Model%20Reference

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 HEM.

Home Energy Model technical documentation and validation reports

What: This consultation is accompanied by several technical documents and validation reports, to be published shortly after the response, which go into further detail on the methodology, including any changes since the consultation, and further validation exercises that have been carried out.

Audience: The technical documentation will be of interest to those who want to understand the detail of how HEM works and how different technologies are treated.

Summary of stakeholder responses to the consultation proposals

This document sets out the Government's response to the consultation 'The Home Energy Model - Making the Standard Assessment Procedure fit for a net zero future'. The consultation was published on GOV.UK on 13 December 2023 and ran until 27 March 2024. We received a total of 120 individual responses from a wide range of organisations, trade bodies, industry professional, academics and individual members of the public. While not every individual point raised has been captured in this summary response publication, all the views that were shared with us have been taken into consideration.

A breakdown of the responses we received according to different stakeholder categories is provided in Table 1.

Table 1 - Consultation responses by type of organisation

Respondent type	Number of responses	Percentage of total (rounded)
Accreditation scheme/body	4	3.33%
Building control	2	1.67%
Consultancy	15	12.5%
Energy network	4	3.33%
Energy regulator	1	0.83%
Environmental organisation	5	4.18%
Housebuilders	8	6.67%
Housing association	4	3.33%
Local Government	7	5.83%
Manufacturer	45	37.5%
Member of the public	9	7.5%
Research/academic organisation	6	5%
Trade association/body	10	8.33%
	120	**100%**

This Response document sets out a summary of the responses we received to the 50 consultation questions and outlines the Government's position on each issue. Where there are multiple questions related to one issue, a single government response is provided in relation to all the relevant questions on that theme.

Summary of the government response to stakeholder feedback

We are grateful for the valuable responses to the consultation from respondents across a diverse range of stakeholder groups. We would like to thank everyone who took the time to respond, often with detailed submissions and supporting evidence.

In this section questions on similar topics are grouped under sub-headings. The evidence from respondents is summarised for each question in turn, and then a single government response is provided covering each group of questions.

We had several key reoccurring themes across the consultation:

Accuracy: Respondents often raised support for areas where HEM would provide higher accuracy, despite potential granularity of detail and data. This appeared even in non-technical questions, such as in the section titled "The need to replace SAP (Q1-3)" where responses praised the new name as more accurate to its functionality.

Collaboration: Increased collaboration was raised throughout the consultation, highlighting specifically the desire for increased cooperation between the department and external industry. Suggestions were made as to develop working groups to not only further this aim but prevent potential negatives such as unnecessary duplication of work.

Clarity: A common reoccurring issue raised highlighted a lack of clarity, whether to do with the name of the model, documentation, and timelines within the PCDB and Appendix Q processes. We have sought to address these within our responses and demonstrate how we're working to increase transparency with HEM.

Integration: Better integration was raised as a key theme. Notably relating to a technical sense, and the adoption of new technologies within existing databases such as the PCDB. In our responses, we've addressed how we see HEM will work to further improve the need for an integrated system.

Flexibility: Flexibility was raised across the entire consultation, in varying senses. Some respondents called for higher flexibility for processes within the model, such as data collection requirements. Additionally, there was a call for more flexibility within energy schemes as a whole, including for manufacturers working within the industry.

The Home Energy Model

The need to replace SAP (Q1-3)

Question 1

What are your views on the choice of name for the new model? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 83 responses to this question. Forty-six respondents supported our proposal to call the new model ‘The Home Energy Model’. Eight disagreed and 22 had mixed views. The remaining responses were indifferent or not directly relevant to the question asked.

Those in support of the new name stated that it is more descriptive, clear, and understandable than the previous name, Standard Assessment Procedure (SAP).

The majority of those who disagreed with or had mixed views about the new name raised concerns over potential confusion with a similar acronym used in the industry, Home Energy Management System (HEMS). A HEMS is a digital system that monitors and controls energy generation, storage, and consumption within a household, focusing on optimising energy usage. The acronym is widely used, including by manufacturers, energy companies, and in the wider retrofit sector.

Some respondents suggested using a name that included SAP for continuity and familiarity with the old name, whilst others suggested alternative names, such as Domestic Energy Model (DEM), Energy Smart Home Model (ESHM), Home Advanced Dynamic Energy Calculation (HADEC), Residential Building Energy Model (RBEM), Home Energy Assessment Model (HEAM), and Home Energy Assessment Test/Tabulation/Target (HEAT).

Question 2

What are your views on the choice of name for the version of the model which is to be used to demonstrate compliance with the Future Homes Standard? Please provide your reasoning and any supporting evidence.

Summary of responses

We proposed naming the model for Future Homes Standard compliance as ‘Home Energy Model: FHS Assessment.’ Of the 68 responses received, 23 supported the name, 16 disagreed, and 18 had mixed views.

Those in support of the new name stated that it is clearer and accurately describes the model version's function. The majority of those who disagreed or had mixed views suggested including version numbers in the name to ensure updates to the model can be distinguished,

such as adding the year (2025) or a number (Version 1). Some respondents suggested different names for the FHS compliance version, such as HEM: FHS compliance, and Modern Home Standard: FHS assessment.

Question 3

What are your views on the potential implications of this proposed name change? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 71 responses to this question. Thirty-nine respondents suggested potential implications of the name change, whilst 5 said there is no impact. Fourteen respondents did not have a view, with the remaining responses being unclear or not directly relevant to the question asked.

Respondents highlighted several potential implications, including possible disruption and confusion within the industry. This could be due to long-standing familiarity with the name 'SAP' and the similar acronym of HEMS. Some respondents also raised the need to update industry documents and legislation that reference SAP, such as Approved Document L, PAS 2030/2035, training materials for domestic energy assessors, and Energy Company Obligation legislation.

On the other hand, 6 respondents highlighted that the name change could enhance engagement, understanding, and acceptance among users, consumers, and the general public.

Government response – Questions 1 - 3

We will use the name 'Home Energy Model' for the new methodology. Feedback from the majority of respondents has indicated support for this name, praising its clarity and ability to effectively convey the model's purpose when compared to the former SAP. This enhanced clarity is anticipated to improve public understanding and engagement with the methodology, and to highlight the step-change which HEM represents.

Acknowledging concerns about potential confusion with existing acronyms, we intend to implement a comprehensive communication strategy. This will involve targeted stakeholder engagement and informative outreach efforts to ensure seamless adoption of the new terminology.

For the version aimed at demonstrating compliance with the FHS, the name 'HEM: FHS' will be adopted. In response to feedback suggesting the inclusion of version identifiers, such as years or numbers, we will incorporate these elements, ensuring the model's updates and iterations are easy to distinguish from each other.

A new home energy modelling ecosystem (Q4-14)

An open-source methodology (Q4-5)

Question 4

What are your views on using the open-source code as the approved methodology for regulatory uses of the Home Energy Model? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 94 responses to this question. Twenty-one respondents supported using the code as the approved methodology for regulatory uses of HEM, 10 disagreed and 18 had mixed views. The remaining responses were unclear, indifferent, or not directly relevant to the question asked.

The largest share of responses misinterpreted the question as asking whether we should use open-source code generally, unrelated to it being or not being used as the approved methodology for regulatory uses.

Regarding using open-source code generally, the majority stated that the open-source code increases transparency and opportunities for innovation. Others highlighted that using the code will reduce differences and inconsistencies between software providers.

Some respondents expressed concerns regarding protecting commercially sensitive information/algorithms in open-source code. These respondents also expressed the need for a specification document in addition to the publicly available code. Some respondents raised concerns whether the code could be manually altered to manipulate compliance and how software developers would use the code to create software.

Regarding using the code as the approved methodology, several responses highlighted that using the code is more specific, clear, and transparent, compared to using text documents to explain complex algorithms. Some also suggested that using the code allows for competition for the best user-friendly interfaces.

Those raising concerns questioned how errors in the code would be identified and dealt with, what the risks and liabilities were, and how quickly the code could be amended, corrected, and updated. Some also suggested that errors in a document are visible to all and may be more likely to be noticed than those in code. Many were concerned that the code is not accessible to everyone and even if supporting documents or a specification are published alongside, the documents would not be a definitive statement of the methodology, meaning most stakeholders would be excluded from understanding the approved methodology.

Question 5

What forms of collaboration would you be interested in for future development of the Home Energy Model codebase? Please provide further details.

Summary of responses

We received 80 responses to this question, with 68 respondents providing suggestions. The majority of respondents were eager to collaborate on the HEM codebase, emphasising the importance of industry consultation and increased accessibility for future development.

Many respondents interpreted the question as a broader one about collaboration, noting topics beyond the codebase, including the development of wrappers, the PCDB and Appendix Q process, and the treatment of specific technologies and representation of traditional buildings.

Suggestions for future development of the codebase included manufacturer-provided plug-ins, code contributions, and validation support. Respondents proposed several methods of collaboration, such as workshops, industry forums, workstream-specific working groups, training sessions, and hackathons. Many respondents highlighted the interdisciplinary nature of the required collaboration, referencing multiple stakeholders such as manufacturers, software providers, academia, government, energy assessors, and retrofit providers.

Government response – Questions 4 - 5

The open-source code will be the complete and up to date representation of the HEM methodology. We are continuing to consider how to refer to the methodology in the regulations which will refer to HEM's application to the Future Homes Standard and the creation of new Energy Performance Certificates.

Regardless of how the methodology is referenced in law, we have heard stakeholders' concern that we need to provide clarity about how HEM works, what updates to the HEM code mean in practice when they are made, and how to access more detailed information on specific parts of the model if required. In response to this feedback, Government will ensure that the landing pages for HEM contain supporting information to better inform both experts and the wider public about HEM, its operation, and what any updates to the codebase do (and why they have been made). In addition to this, as we have throughout the development of the model, we will continue to engage with interested stakeholders. Workshops, industry forums and show-and-tells will form part of this as we get closer to the launch of HEM and will continue afterwards to hear feedback and embed continuous improvement as part of our approach.

Changes to the delivery model and provision of software (Q6-7)

Question 6

What are your views on our assessment of issues with the current SAP delivery model? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 84 responses to this question. Forty-nine respondents supported the assessment of issues with the current SAP delivery model, 12 disagreed and 12 had mixed views. The remaining responses had no view or were irrelevant.

Those that agreed highlighted several issues with the current SAP delivery model, including inconsistencies across providers, slow updates, and a lack of accountability. Many stated that while the model has worked historically, it is now considered outdated and struggles to incorporate new technologies and innovations through the process known as “Appendix Q”, leading to inefficiencies and increased costs.

Those that disagreed with the assessment argued that further issues should have been mentioned, such as the challenges in including new technologies in SAP and inconsistencies relating to assumptions.

Those with mixed views acknowledged the issues presented but also highlighted the lack of obligation for software developers to update their software in a timely manner. Many stakeholders highlighted weaknesses within current SAP and emphasised the need for improvement in these areas within SAP 10.2. This includes improved governance, timely delivery of specifications, and accurate test cases. Suggestions included maintaining modularity for adaptability, adopting open-source principles for transparency, and ensuring a robust support framework to address inconsistencies and encourage innovation.

Question 7

What are your views on the concept of a centralised, cloud-based version of the Home Energy Model, to be used for regulatory purposes? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 94 responses to this question. Forty-two respondents agreed on the concept of a centralised cloud-based version of HEM. Ten respondents disagreed, 28 had mixed views and five proposed changes. The remaining responses were either unsure, irrelevant, or had no view.

Those in support stated that a centralised, cloud-based version would offer consistency, standardisation, and modernisation. They believed it could address current issues such as

discrepancies, slow updates, and unclear accountability. Many respondents valued the efficiency of a unified system, noting the potential for faster updates and innovation.

Those that raised concerns highlighted potential issues with system reliability, connection stability, and the risk of slow simulation times during peak usage, which could disrupt workflows, particularly in remote locations. Many advocated for retaining decentralised or desktop-installed systems to ensure faster processing and resilience.

Other suggestions included thorough documentation for third-party developers. Respondents suggested clearer documentation for third-party developers and raised concerns about operational issues like downtime, accreditation, peer review, and version control. Some flagged risks around data ownership, productivity, fees, security, and governance, including dispute resolution.

Government response – Questions 6 - 7

We will be using a centralised, cloud-based version of HEM to facilitate the provision of the Home Energy Model software to assessors. This is being delivered through MHCLG's project: Energy Calculation as a Service (ECaaS).

The Python HEM git repository will remain the reference methodology for HEM, as this is the version used in ongoing methodology development. We have released a suite of technical documentation covering all aspects of the HEM core engine, including details of the equations, assumptions and mathematical formulae used, along with theoretical background and reference to any international standards.

The ECaaS team have taken this reference methodology and developed a high-speed HEM calculation engine hosted on GOV.UK. MHCLG will also develop a user interface for this calculator, primarily intended for users such as academics who will not be using the calculator for regulatory purposes.

Third-party software providers will develop advanced HEM user interfaces with additional capabilities for the housebuilding industry. ECaaS is being developed openly, with monthly show-and-tells which have been running from mid-2024, each attended by approximately 40-60 industry attendees. You can find out more in our link annex A at the bottom of this document.

The first release of ECaaS software, including a usable front-end, is expected by Autumn 2025.

In response to the points raised:

- **Connection stability:** ECaaS is being built as a cloud-based application with high availability to ensure reliable access.
- **Downtime management**: ECaaS is being built on modern cloud infrastructure to ensure minimal downtime and high reliability.

- **Simulation times:** ECaaS is able to run HEM calculations quickly, with current test cases completing in less than 2 seconds. It is designed to manage many hundreds of calculations concurrently.
- **Version control:** DESNZ and MHCLG have agreed processes to capture and address any reported errors. Issues will be attributed to either MHCLG (ECaaS-related) or DESNZ (HEM methodology-related), and fixes will be communicated to stakeholders. The cloud-based nature of the software means that updates are available to users immediately. We will coordinate with accredited schemes to ensure that all changes are clearly communicated to energy assessors. When significant updates are made to the methodology software, we expect these schemes to update their commercial front ends and training materials to support assessors effectively.
- **User accreditation:** ECaaS will be accessible only to energy assessor accreditation schemes. These schemes will have secure credentials to access ECaaS and will restrict access to their front-end software to their members.
- **Fees:** MHCLG is engaging with energy assessor accreditation schemes to determine how fees will be applied to ensure the sustainability of the service while keeping it accessible.
- **Data security:** ECaaS does not store data but will have capability to lodge outputs (such as BREL reports and EPCs) on the MHCLG Energy Performance of Buildings register much as SAP software does now.

For further questions or information about ECaaS, we encourage stakeholders to attend the show-and-tell sessions. Please contact homeenergymodel@energysecurity.gov.uk to request an invitation.

A revised database of product characteristics (Q8-10)

Question 8

What are your views on revising the database of product characteristics (currently the "PCDB") for the Home Energy Model? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 87 responses to this question. Fifty-four respondents agreed that the database of product characteristics (currently the "PCDB") should be revised for HEM, with 42 respondents proposing specific changes. Twenty-one respondents had mixed views, three disagreed that the database needed to be revised, and the remaining responses were either unclear, expressed no view, or were not directly relevant to the question.

The majority of responses stated that the product recognition process should be streamlined to make it simpler and quicker to integrate new products with fixed timelines for manufacturers (for example with agreed service level agreements (SLAs)). Other frequent suggestions included ensuring the database reflects accurate performance data, technological advancements, and product diversity, as well as making the database more user-friendly.

A common issue cited was the lack of clarity on intended revisions or timelines, with many respondents calling for a formal consultation specifically on reforming the product database. Other frequent concerns included the process of data transfer to the HEM product database, including the potential for retesting and the associated costs for manufacturers.

Question 9

What changes would you recommend to the PCDB data collection procedures? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 59 responses to this question. Forty-three respondents proposed changes and three had mixed views. The rest of the responses were either unclear, expressed no view, or were not directly relevant to the question. Many respondents misinterpreted this question as a forum to raise broader concerns about the need to reform both the PCDB and Appendix Q processes. The majority of those who proposed changes stated that the data collection procedure should be made more accessible for applicants to encourage the integration of new technologies. This included shortening timelines through SLAs to facilitate faster listing and reducing costs for manufacturers, and particularly SMEs, when additional data is required within the model. Respondents also highlighted the need for more clarity on data submission. Some emphasised the importance of further consultation with industry before implementing changes. Others called for standardising testing procedures and ensuring products are assessed against the most up-to-date sector knowledge.

Other recommendations focused on introducing more flexibility in how data is collected. Suggestions included accepting test data from third-party sources, removing restrictions based on product categories, and incorporating real world data provided by manufacturers.

Some respondents proposed the creation of a “sandbox” environment to allow manufacturers to understand how product-specific performance data is used by the model. Additionally, various suggestions were made to enhance data collection procedures for specific product categories.

Question 10

What changes would you recommend to the PCDB data requirements for particular technologies? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 55 responses to this question. Thirty-six respondents proposed changes to PCDB data requirements for particular technologies. Two respondents stated no changes were necessary, two provided mixed responses, and five were unsure, requesting further information following the launch of HEM. The remaining responses were either unclear, expressed no view, or were not directly relevant to the question.

Many respondents provided technical evidence for detailed changes to specific product technologies including heat batteries, ventilation systems, hydronic underfloor heating, heat pumps, infrared heating, smart thermostats, and hot water cylinders.

Some respondents argued for greater clarity and flexibility in data requirements for emerging technologies to facilitate their quicker inclusion in the PCDB. Suggestions included standardised testing and field trials. Other respondents emphasised the importance of data consistency across technologies, highlighting the need to evaluate manufacturer-verified claims against actual performance data.

Additional cross-cutting suggestions included evaluating the benefits of interaction between multiple technologies, conducting a gap analysis to develop new data requirements, and establishing technology-agnostic requirements focused on how energy demands are met.

Government response – Questions 8 - 10

We are proceeding with developing an improved PCDB which reflects a diversity of modern products. The transition to a modern relational database will ensure a more user-friendly interface and experience. We seek to improve the Product Application portal with the aim of reducing review time and we will engage with stakeholders as part of the quality assurance of the viewing site and the application portal.

We understand the importance of ensuring data consistency; however, different technologies will require a different evidence-basis, such as field trial data. We acknowledge the concerns of respondents on the overall duration and complexity of the product recognition process. We will work with partners to provide improved guidance materials and clearer timelines for data submission and recognition processes. We will continue to engage with stakeholders to ensure that the data requirements for these products remain accurate and any updates are impacted to avoid issues or delays.

Recognising new technologies in HEM (Q11-13)

Question 11

What are your views on our assessment of issues with the way SAP currently recognises new technologies (currently the “Appendix Q process”)? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 72 responses to this question. Twenty-seven respondents agreed with the assessment of issues, two disagreed and 32 provided mixed responses which agreed while providing additional issues. A further three respondents provided negative responses which highlighted other issues. The other responses either expressed no view or were not directly relevant to the question.

Several respondents highlighted additional issues beyond those listed or proposed solutions to improve the recognition of new technologies in future.

Those who agreed with the issues listed often emphasised issues based on their personal experiences with the Appendix Q process, with long timeframes being the most frequently mentioned issue.

Among those with mixed views, some stated that Appendix Q was initially fit for purpose, while others argued for its abolition and integration into the PCDB. Additional issues raised included:

- navigating multiple government schemes and processes alongside Appendix Q,
- deviation from existing standards,
- minimal testing capacity,
- first-mover disadvantage, and
- lack of funding.

A few respondents emphasised the disproportionate impact of these issues on SMEs, particularly the time-cost burden. Others highlighted that the impact may vary depending on the technology. Some respondents also suggested that even after achieving recognition, the issues led to a lack of product uptake and limited rewards at the energy assessment stage. Concerns were also expressed about the transition from Appendix Q to the equivalent process in HEM and its potential impact on manufacturers.

Those who disagreed with the assessment had contrasting views, either praising Appendix Q or criticising innovation entirely.

Question 12

What are your views on the principles for how the Home Energy Model will recognise new technologies once it is in use? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 73 responses to this question. Twenty-two respondents agreed with the listed principles, 12 provided additional ones and 24 had mixed or uncertain views. The remaining responses were either generally positive, expressed no view, or were not directly relevant to the question.

Of those respondents who agreed, some emphasised the importance of specific principles, particularly transparency, continuous evaluation, and alignment with other processes such as Ofgem or PAS2035). Respondents also proposed a fast-tracked process for technologies with prior industry accreditation.

Many respondents suggested additional principles. The most common examples were cost-effectiveness and timeliness for applicants, with a focus on removing the burden and risk from the applicant. Another suggestion was to increase the scope of technologies that HEM initially recognises, reducing the need for a process to incorporate new technologies.

Most respondents in the mixed and unsure category stated that further information was required for the implementation of the listed principles, arguing that the principles were too broad. Concerns were also raised about the risk of ongoing updates to HEM to recognise new technologies, introducing new bugs or issues. Others were concerned about an increased expectation that stakeholders would need to understand Python/computer code to present a new methodology for their product.

Question 13

What are your suggestions for how to integrate new innovative products into the Home Energy Model? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 63 responses to this question. Fifty-four respondents provided suggestions, two were unsure, and one stated no changes were required. All other responses were either irrelevant or expressed no view.

A common theme was the need for further clarity on the Appendix Q process and the transition to HEM. Many respondents stated that the existing process was too burdensome for applicants and required reform in consultation with industry. Suggestions for collaboration included technical working groups and funding to support innovators, as well as utilising existing certification schemes to avoid duplication. Some respondents stated that the new process must balance accurate recognition of new innovative products with the protection of Intellectual Property (IP).

Suggestions included, but were not limited to:

- Enabling open submissions, subject to peer review,
- incorporating life-cycle testing of the product and in-use monitoring,
- implementing 12 month closed-box digital test cases, where manufacturers could test their product in an IP protected model,
- scheduling annual updates for adding new technologies to the model.
- offering further training and user guides for assessors to improve the assessment process
- establishing a clear pre-assessment process checked against performance indicators before submission to the database.

Government response – Questions 11 - 13

We remain committed to addressing the issues with the Appendix Q process highlighted in the consultation which the majority of respondents agreed with, as well as the additional issues raised.

We recognise the diverse range of opinions on how to recognise innovative products in HEM. We are committed to improving this process and we will continue to engage with stakeholders as we transition from the Appendix Q process to its successor in HEM.

We have implemented stronger KPIs in our latest contracts to address and rectify certain issues highlighted, including application timescales and frequency of database updates for the innovative technology process. This includes working with our commercial partners to define timeframes where possible and appropriate.

Concerns around the clarity of documentation were raised. We will reform and refine current guidance materials to increase clarity and deliver a more accessible end-to-end process. Where guidance is changed, we will strengthen assessor knowledge and experience, to ensure full diffusion of information. This improves timeline efficiency and outputs, without sacrificing quality.

The SAP Scientific Integrity Group has been a valuable source of impartial advice on innovative product applications. We plan to expand its membership and refresh our engagement approach to better leverage its industry expertise.

Using “wrappers” to distinguish different use cases (Q14)

Question 14

What are your suggestions for other wrappers that could be developed for the Home Energy Model in future? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 77 responses to this question. Fifty-eight respondents suggested other wrappers, whilst the remaining responses were unclear or ambivalent.

Over 60 different wrappers were suggested, with many respondents suggesting multiple wrappers within their responses. Most of the wrappers suggested were related to the production of Energy Performance Certificates (EPCs) (for new builds, existing buildings, or both), followed by whole life carbon and indoor air quality assessments. Other suggestions included wrappers for overheating assessments, heat load calculations[1], and for design purposes. Another common suggestion was a wrapper to enable self-assessment of energy use, taking account of occupant-specific information.

Government response – Question 14

We remain committed to delivering a wrapper for HEM to support Building Regulations (Part L) for new homes and a wrapper to support EPC assessments for both new and existing homes.

[1] Heat load refers to the amount of heating or cooling necessary to maintain the required temperature in a building.

The government is not formally committing to developing any other wrappers beyond these two at this time so we can focus on ensuring the effective implementation of HEM for the FHS and for EPC assessments.

We have undertaken some early exploration of the application of HEM to establish performance standards for material change of use (MCU), where a building is converted from one purpose to another (e.g. converting an office into a residential block of flats or dividing a house into multiple flats). There are no immediate plans to take this work forward, but may be considered further in the future.

We are committed to fostering an open development community for HEM and to creating opportunities for innovation. We will actively maintain HEM's core engine on the government Git repository and provide support to those seeking to develop and innovative new wrappers and use cases for HEM. For support and to share your ideas, please contact us at homeenergymodel@energysecurity.gov.uk.

The new Home Energy Model – an overhaul (Q15-17)

Question 15

What are your views on the increased time resolution offered by the Home Energy Model? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 81 responses to this question. Twenty-nine respondents supported the increased time resolution for HEM. Four disagreed, eight proposed changes, 33 had mixed views. The remaining responses were either unsure, expressed no view, or were not directly relevant to the question.

Those in favour of the increased time resolution emphasised its potential to significantly improve accuracy and better represent modern energy technologies. They noted that using finer intervals, such as half-hourly data, enables more precise modelling of energy use, peak demand, and the behaviour of smart technologies like solar panels, battery storage, heat pumps, and time-of-use tariffs. Many respondents viewed the increased resolution as essential for accurately modelling low-carbon technologies and facilitating flexible, cost-effective energy solutions, particularly as the energy market evolves towards more granular pricing and load-shifting opportunities.

Some respondents raised concerns regarding the computational load, noting that the increased processing required could significantly slow down the model, potentially limiting its practical use. Suggestions were made to consider using snapshots across the year instead of constant half-hourly calculations to improve efficiency while maintaining accuracy. While the half-hourly resolution is seen as an improvement over SAP, some believe it may not be sufficient for high-fidelity simulations, calling for even shorter time steps in certain cases, such as for appliances that operate in shorter bursts or those affected by fast-changing grid signals.

Question 16

What are your views on the choice of BS EN ISO 52016-1:2017 (in its half-hourly form) as the basis for the Home Energy Model? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 46 responses to this question. Fifteen respondents supported our approach to use BS EN ISO 52016-1:2017 as the basis for HEM. Five disagreed and 14 had mixed views. The remaining responses were indifferent, expressed no view, or were not directly relevant to the question.

The majority of those in support did not provide detailed reasoning for their views. Some stated that it enables more accurate modelling, particularly of fabric performance, storage, and load shifting. Most respondents with mixed views supported the use of an international standard in general, highlighting improved accuracy. Ten respondents raised concerns that it may take longer to calculate results because of using half-hourly timesteps in the model. Some respondents also criticised that the standard is not freely available. Three respondents stated that HEM would need to be updated when the standard is updated in the future.

Question 17

What are your views on the ability of the Home Energy Model to model energy flexibility and smart technologies? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 75 responses to this question. Thirty-three respondents supported HEM's modelling of energy flexibility and smart technologies. Nine expressed concerns and nine had mixed views. Sixteen respondents proposed changes, and the remaining responses were indifferent, expressed no view, or were not directly relevant to the question.

Those in support noted the significant advancement in comparison to SAP. Some respondents raised concerns that the consultation version of HEM lacked the ability to fully incorporate smart technologies and simulate energy flexibility, whilst providing an uncertainty on real-world performance, noting that discrepancies between predictions and actual outcomes may occur. Some respondents who proposed changes state the calculation for primary energy factor currently has limitations by using a single data point which and should reflect real-world technology use, integrate low primary energy factor (PEF) imports and renewables, with a focus on time-of-use (ToU) tariffs. A few respondents stated that HEM must accurately model energy flexibility and smart technologies to effectively assess their impact on energy consumption and carbon emissions and support the transition to a low-carbon energy system. A variety of other suggestions were made.

Government response – Questions 15 - 17

We will retain the increased time resolution in HEM to support more accurate modelling of modern energy use. We also support the use of BS EN ISO 52016-1:2017 as a robust, standardised method for calculating building energy performance. We acknowledge concerns about computational load potentially slowing the model. These will be considered as we work to balance accuracy with efficiency, noting that HEM's live-service implementation helps mitigate this issue in official assessments.

We recognise the support for HEM's ability to monitor energy flexibility and smart technologies, which represents a significant advancement over SAP. We are committed to building and continuously improving HEM. In response to feedback, we are exploring enhancements such as more dynamic data inputs and better simulation of real-world conditions and will continue engaging with stakeholders to ensure the model evolves with the energy market.

What is inside the Home Energy Model? (Q18a-23)

Space heating and cooling demand (Q18a-g)

Question 18a

What are your views on the methodological approach for calculating space heating and cooling demand? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 62 responses to this question. Twenty-one respondents fully supported our methodological approach. Seven disagreed or had negative views. Twenty-one had mixed views, including making suggestions for changes. The remaining responses were indifferent, expressed no view, or were not directly relevant to the question.

The majority of those in support highlighted increased accuracy and granularity as well as improvements compared to SAP. Those that raised concerns highlighted increased complexity and the need for heat transfer between zones to be included. Some respondents questioned how different technologies are represented or affected, particularly infrared heaters and smart controls/technologies, or how pre-heating a building is incorporated into the model. A variety of other suggestions were made.

Question 18b

What are your views on the methodological approach for calculating fabric heat loss? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 55 responses to this question. Eighteen respondents fully supported our methodological approach for calculating fabric heat loss in HEM. Fourteen disagreed or had

negative views. Seven had mixed views, including making suggestions for changes. The remaining responses were indifferent, unclear, or irrelevant.

The majority of those in support did not provide detailed reasoning for their views, but some noted increased accuracy, robustness, and other improvements over SAP. Some of those respondents who raised concerns highlighted that the shading of windows (such as shutters, blinds, and curtains) should be included in the calculation. Others raised concerns that the model does not allow for replacing the predicted heat transfer coefficient (HTC) with one calculated externally. These respondents suggested that this undermines government investment in smart meter enabled thermal efficiency ratings (SMETER) technologies, which use algorithms to calculate the HTC of occupied homes from smart meter data.

Question 18c

What are your views on the methodological approach for calculating thermal bridges? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 42 responses to this question. Nineteen respondents supported our methodological approach for calculating thermal bridges in HEM. Nine had mixed views and two disagreed. The remaining responses expressed no view or were not directly relevant to the question.

The majority of those in support did not provide detailed reasoning for their views, but one manufacturer highlighted the robustness and alignment with industry standards as positive. Some of the respondents who raised concerns highlighted the difficulty of calculating thermal bridges accurately for complex geometries and the need for more detail on how repeated point thermal bridging and thermal bridging in lintels will be included in the model.

Question 18d

What are your comments on the methodological approach for calculating infiltration and/or controlled ventilation? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 56 responses to this question. Eight respondents supported our methodological approach for calculating infiltration and controlled ventilation, 15 disagreed and 19 had mixed views. The remaining responses were expressed no view or were not directly relevant to the question.

The majority of those in support and with mixed views highlighted the improved approach to infiltration, including the use of CIBSE Guide A, and noted its increased accuracy compared to SAP 10.2. Some respondents who raised concerns highlighted that the model does not account for:

- Wind direction in relation to the dwelling layout,
- air bricks providing passive ventilation,
- "Stack effect",
- amount and effectiveness of draught proofing (for each door, window and chimney including chimney draught excluders),
- dynamic interplay between several types of ventilation (e.g. natural, mechanical extract, and mechanical with heat recovery) and their combined effect on indoor air quality and thermal comfort,
- energy performance of various ventilation technologies, and
- balanced mechanical ventilation without heat recovery.

Some respondents described extrapolating a 4Pa (N4) test result up to a N50 test when a divisor is subsequently applied as inappropriate. Others questioned how the final calculation and the products database will work in an integrated way. Additionally, some suggested further research and in-situ testing to improve the methodology.

Question 18e

What are your views on the methodological approach for calculating thermal mass? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 42 responses to this question. Twenty-one respondents supported our methodological approach for calculating thermal mass in HEM. Six disagreed and six had mixed views. The remaining responses were indifferent, expressed no view, or were not directly relevant to the question.

The majority of those in support did not provide detailed reasoning for their views, but some highlighted improvements over the existing SAP methodology, including increased accuracy. Some of the respondents who raised concerns questioned whether furniture should be included in the calculation. Other concerns included whether non-standard or complex buildings and differences in architectural design are sufficiently considered, including how walls consisting of straw bales and lime plaster would be classified. Other individuals suggested that using predefined thermal mass distribution classes could lead to oversimplification. Another suggestion was for HEM to consider insulation degradation and compression.

Question 18f

What are your views on the methodological approach for calculating solar gains and solar absorption? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 34 responses to this question. Twelve respondents supported our methodological approach for calculating solar gains and solar absorption in HEM. Six had mixed views and 3

disagreed. The remaining responses expressed no view or were not directly relevant to the question.

The majority of those in support did not provide detailed reasoning for their views, but a third of respondents highlighted the improvements over the existing SAP methodology. Some of the respondents who raised concerns highlighted that the model does not take account of:

- internal blinds, curtains or dynamic solar shading,
- local surroundings such as shade from vegetation,
- effects from conservatories,
- reflectiveness of window glazing, and
- the solar absorption characteristics of building materials.

Question 18g

What are your views on the methodological approach for calculating shading? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 41 responses to this question. Eleven respondents supported our methodological approach for calculating shading in HEM. Twelve disagreed and 9 had mixed views. The remaining responses expressed no view or were not directly relevant to the question.

The majority of those in support did not provide detailed reasoning for their views, but many respondents highlighted improvements over the existing SAP methodology, including the inclusion of shading from distant objects. Many of the respondents who raised concerns suggested that the model does not take account of:

- Blinds, shutters, curtains, and other movable shading,
- shade from vegetation that changes over the year, and
- shading of diffuse radiation or reflectance[2] from distant shading objects.

Government response – Questions 18a – 18g

Space Heating and Cooling Demand: We have continued to improve HEM's approach to space heating and cooling demand since the consultation. Notably, the ventilation and infiltration model has been substantially reworked, with the new methodology based on BS EN 16798-7:2017. We have also made further incremental improvements to other aspects of the space heating demand calculation. These changes are fully documented in the code

[2] Solar reflectance is a measure of the ability of a surface material to reflect solar radiation.

changelog and the new methodology is described in detail in the revised technical documentation to be released shortly after this document.

We plan to implement the space heating and cooling model from the consultation version of HEM, based on BS EN ISO 52016-1:2017. Many respondents were supportive of this approach, but we acknowledge the concerns raised regarding heat transfer between zones. We will continue to review the possibility of integrating inter-zone thermal transfer into the model, balancing the potential benefit of improved accuracy against increases in calculation time.

We remain committed to collaborating with stakeholders to ensure that HEM's approach to space heating and cooling demand is accurate and dependable. We will continue to review suggestions for improving the methodology and further validation work will be undertaken to ensure stakeholder confidence in the model.

Fabric Heat Loss: We intend to continue to proceed with the consultation version approach to calculating fabric heat loss. Many respondents were positive about the consultation methodology, noting an improvement compared to SAP.

We also note that some respondents raised the possibility of overriding the predicted heat transfer coefficient (HTC) with one calculated from a SMETER. We recognise the potential utility of SMETER technology for assessing the performances of homes, once occupied. However direct incorporation of SMETER outputs as HEM inputs is neither straightforward nor appropriate in many cases. We will continue to engage with stakeholders to explore how best to use data from SMETERs alongside HEM, as part of our consultation on Reforms to the Energy Performance of Buildings Regime.

Shading: We recognise that several respondents raised the importance of accurately accounting for the shading of windows in energy performance calculations. The basic functionality to account for these effects is already present in HEM.

Shading from external obstructions, glazing orientation, and window size is already incorporated into the solar gains methodology. In addition, Transparent elements may also have curtains and/or blinds, which provide additional thermal resistance when closed, but have no effect when open, as per BS EN ISO 52016-1:2017 section 6.5.8.3. This section specifies that the thermal resistance of such shading devices is only considered in the energy performance calculation when they are fully closed, as their insulating effect is otherwise negligible. Details of the operation of curtains and blinds is represented using the OnOffTimeControl object, is detailed in the HEM-TP-17 Controls technical paper. This object defines binary open/closed states based on fixed time schedules, which are designed to reflect typical occupant behaviour and energy efficiency strategies. We will consider best to support assessors in applying these features effectively and consistently.

Thermal Bridging: We intend to proceed with the approach to thermal bridging used in the consultation version of HEM. We note that the majority of respondents supported this methodology. This method uses a combination of default and calculated values to represent thermal bridges and integrates them into the model's dynamic heat loss calculations. The

majority of consultation responses supported this approach, recognising its balance of accuracy and practicality.

Ventilation and Infiltration: In response to consultation feedback, we have revised our approach to ventilation and infiltration. While some respondents supported the original method included in the consultation version of the Home Energy Model (HEM), the majority raised valid concerns. We agree with the helpful points made and have acted on this feedback.

We now plan to use a reworked ventilation and infiltration methodology based on BS EN 16798-7:2017 which fully replaces the previous approach. We recognise that some respondents were satisfied with the previous approach and felt it was an improvement over SAP. However, we consider the subsequent revisions to have resolved several of the concerns raised with the previous approach – such as the inclusion of the stack effect, the effects of wind direction and interplay of different ventilation sources. The extrapolation of a 50Pa air test result from a 4Pa test is also no longer required.

Thermal Mass: We have proceeded with the approach to the modelling of the thermal mass of building components used in the consultation version of HEM. This is based on BS EN ISO 52016-1:2017. We recognise that while the majority of respondents were supportive of this methodology, noting the potential for increased accuracy over SAP, some respondents had concerns regarding oversimplification. We will continue to assess the model's performance and engage with stakeholders to ensure it remains robust, transparent, and fit for purpose.

Solar Gains and Absorption: We will continue to use the solar gains methodology set out in BS EN ISO 52016-1:2017. This includes the shading approach used in the consultation version of HEM, which accounts for factors such as orientation, glazing area, and external obstructions, in line with the national calculation methodologies approved under Building Regulations.

We have carefully considered all feedback and are prioritising the delivery of a stable and predictable core engine and Future Homes Standard (FHS) wrapper. To support continuous improvement, we will actively gather user feedback to identify where further refinements may be needed to enhance the efficiency and effectiveness of HEM. A series of "show-and-tell" sessions began in July, offering regular opportunities for stakeholders to engage with the model's development and contribute to its ongoing evolution.

Domestic Hot Water (DHW) demand (Q19a-d)

Question 19a

What are your views on the methodological approach for calculating Domestic Hot Water demand? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 55 responses to this question. Fifteen respondents supported our methodological approach for calculating Domestic Hot Water demand. Ten disagreed and five had mixed

views. The remaining responses expressed no view or were not directly relevant to the question.

Supportive respondents highlighted benefits such as calculating demand from hot water events and improved estimations of hot water storage volumes. Additional positives included enhanced accuracy and flexibility, particularly for solar water heating and wastewater heat recovery systems. Respondents who raised concerns suggested:

- Using the term ‘thermal storage for hot water’ instead of ‘hot water tanks’ because the former is a technology-agnostic term incorporating heat batteries for hot water and hot water tanks,
- a 30-minute time resolution is too coarse, as most DHW events are shorter, and
- that DHW modelling should not be modelled in isolation from space heating and cooling demand and that the model should better reflect the performance of hybrid systems, renewable integration, and heat networks with water-to-water heat pumps.

Some respondents used this question to raise points relating to the performance of specific systems which provide hot water. These are dealt with the in following section, which covers questions 20a-20k.

Question 19b

What are your views on the methodological approach for calculating heat losses from Domestic Hot Water pipework? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 48 responses to this question. Sixteen respondents supported our methodological approach for calculating heat losses from Domestic Hot Water (DHW) pipework, five disagreed and five had mixed views. The remaining responses were ambivalent, expressed no view, or were not directly relevant to the question.

Supportive responses noted improved accuracy over SAP 10.2. Concerns raised included:

- Including losses from temperature and pressure safety relief valves, as these components are often uninsulated and can contribute to heat loss,
- considering how the location of pipes is classified, such as whether they are external, in unheated but protected spaces (e.g. lofts or garages), within floor voids or service ducts, or within rooms, and
- assessing whether the additional calculations significantly enhance model accuracy, as some respondents questioned the value added by the increased complexity

Question 19c

What are your views on the methodological approach for calculating heat losses from hot water cylinders? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 44 responses to this question. Eight respondents supported our methodological approach for calculating heat losses from hot water cylinders, 22 disagreed and seven had mixed views. The remaining responses were ambivalent, expressed no view, or were not directly relevant to the question.

The majority of those in support did not provide detailed reasoning for their views, but some highlighted improvements over the existing SAP methodology, including improved accuracy and flexibility.

Among those who raised concerns, a common theme was the recommendation that hot water cylinders be included in the Product Characteristics Database (PCDB), rather than relying on user-entered values. This was seen as a way to improve consistency and reduce user error.

Mentions of other thermal storage technologies, such as heat batteries, were present but limited. These are more appropriately addressed in broader discussions of thermal storage rather than in the context of hot water cylinder heat loss specifically.

Question 19d

What are your views on the methodological approach for calculating incidental gains from domestic hot water? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 33 responses to this question. Eleven respondents supported our methodological approach for calculating incidental gains from domestic hot water, three disagreed and three had mixed views. The remaining responses were ambivalent, expressed no view, or were not directly relevant to the question.

The majority of those in support did not provide detailed reasoning for their views. Some respondents questioned the evidence supporting the assumptions and whether new research was available to substantiate them. Respondents who raised concerns suggested that the methodology approach should take greater account of:

- Occupant behaviour, such as the tendency to open windows after bathing, which may reduce incidental heat gains, and
- factors such as water temperature, internal conditions, and the duration of water use).

Several respondents made suggestions which were not entirely relevant to this question relating to heat losses/heat gains from pipes and hot water cylinders, which are included in other parts of the model.

Government response – Questions 19a – 19d

We recognise the importance of accurately modelling domestic hot water demand to deliver an accurate overall Home Energy Model calculation. Since the consultation, we have made

several improvements to the modelling of hot water demand and storage, while retaining the underlying event-schedule approach. These changes are fully documented in the code changelog and the new methodology is described in detail in the revised technical documentation to be released shortly after this document.

The hot water cylinder model has been improved, notably by increasing the number of modelled layers from 4 to 24, which allows for improved modelling of draw-off temperature and ability to meet demand. Pipework can also be more precisely specified.

Further changes are expected, notably the addition of wastewater heat recovery systems incorporating storage.

We will continue to draw on respondents' suggestions as we consider future improvements.

Heating and cooling systems (Q20a-k)

Question 20a

What are your views on the modelling of heat pumps in the Home Energy Model? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 60 responses to this question. Nineteen respondents supported our methodological approach. Fifteen disagreed and nine had mixed views. The remaining responses expressed no view or were not directly relevant to the question.

Respondents who supported our heat pump modelling stated that this would be an improvement compared to SAP and agreed with the use of hourly external temperatures to help calculate heat pump performance. Respondents who disagreed stated that model should be able to reflect the use of time-of-use (TOU) based tariffs. Other respondents called for the model to output additional data relating to heat pump performance, and for additional clarity of the heat pump methodology. A variety of other suggestions were made.

Question 20b

What are your views on the modelling of electric resistive heaters in the Home Energy Model? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 30 responses to this question. Nine respondents supported our methodological approach, nine disagreed and seven proposed changes to add electric resistive heaters into the database of product characteristics. The remaining responses were unclear, ambivalent, expressed no view, or were not directly relevant to the question.

Respondents who agreed with the modelling of electric resistive heaters welcomed the addition of a convective fraction input. Respondents who disagreed called for greater specificity of

control types and heater sizing. Some respondents mentioned that electric resistive heaters are inefficient in comparison to heat pumps. A variety of other suggestions were made.

Question 20c

What are your views on the modelling of electric storage heaters in the Home Energy Model? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 43 responses to this question. Thirteen respondents supported our methodological approach for modelling electric storage heaters in HEM. Seven respondents disagreed, three respondents had mixed views, and 11 respondents proposed changes. The remaining responses were not directly relevant to the question.

Respondents who agreed with the modelling of electric storage heaters stated that there was better representation and a significant improvement over the current SAP methodology. Respondents who disagreed stated that the model should have the ability to adjust charging patterns based on weather conditions and occupancy. The majority of those proposing changes suggested including electric storage heaters in the products database.

Question 20d

What are your views on the modelling of heat networks in the Home Energy Model? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 41 responses to this question. Eight respondents agreed with the modelling of heat networks with no detailed explanation. Eight respondents disagreed. Nine respondents proposed changes with the majority suggesting that heat networks should be incorporated within a product database. Ten respondents provided mixed views, and the remaining responses were indifferent or irrelevant. Those that raised concerns stated that the model should have the ability to represent shared ground loops. A variety of other suggestions were made.

Question 20e

What are your views on the modelling of boilers in the Home Energy Model? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 41 responses to this question. Sixteen respondents supported the modelling of boilers, three disagreed and three respondents had mixed views. Five respondents proposed changes, and the remaining responses were not directly relevant to the question.

Those in support highlighted the advancement in the methodology as compared to SAP. Those that raised concerns highlighted that further consideration was needed in relation to boiler cycling. Others were concerned that HEM may penalise boilers compared to other technologies.

Question 20f

What are your views on the modelling of heat batteries in the Home Energy Model? Please provide your reasoning and any supporting evidence

Summary of responses

We received 43 responses to this question. Eighteen respondents agreed with our methodological approach, one disagreed, three had mixed views, and ten respondents proposed changes. The remaining responses were not directly relevant to the question.

Those that proposed changes highlighted the need to simulate heat batteries as a substitute for hot water cylinders, and to ensure that heat battery technology can enable ‘smart’ behaviours such as load shifting. Some respondents suggested that the model should have options for selecting the charging method and source. A variety of other suggestions were made.

Question 20g

What are your views on the modelling of air conditioning in the Home Energy Model? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 43 responses to this question. Ten respondents fully supported HEM's modelling of air conditioning. Eight expressed concerns and two had mixed views. Nine respondents proposed changes, and the remaining responses were indifferent, expressed no view, or were not directly relevant to the question.

Those in support stated that it is essential for air conditioning to be modelled, while those who raised concerns said they do not see air conditioning as a priority. A variety of other suggestions were made.

Question 20h

What are your views on the modelling of other Domestic Hot Water heating (e.g. immersion heaters, point-of-use, solar thermal) in the Home Energy Model? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 43 responses to this question. Twelve respondents supported our methodological approach. One respondent disagreed while 12 proposed changes. The remaining responses were expressed no view or were not directly relevant to the question.

The majority of those in support did not provide detailed reasoning for their views, although some praised the more accurate modelling. Most respondents with mixed views welcomed the approach, however a few called for broader discussions on the range of technologies included in HEM, emphasising the need to reflect the diverse solutions available in the market. Some respondents who proposed changes stated the model should support hybrid systems. A variety of other suggestions were made.

Question 20i

What are your views on the modelling of heat emitters in the Home Energy Model? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 48 responses to this question. Seven respondents supported our methodological approach, ten respondents raised concerns, 14 had mixed views and eight respondents proposed changes. The remaining respondents either had no view or were unsure.

The majority of those in support did not provide detailed reasoning for their views. Several respondents raised concerns over the extensive data entry required, stating that this data is often unavailable at early design stages. Some of the respondents who proposed changes stated that radiant emitters and infra-red panel heaters should be represented within the model. A variety of other suggestions were made.

Question 20j

What are your views on the methodological approach for calculating pumps and fans' energy consumption in the Home Energy Model? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 39 responses to this question. Twelve respondents supported our methodological approach. Five respondents disagreed, ten proposed changes, one respondent had mixed views. The remaining respondents had no views.

The majority of those in support did not provide detailed reasoning for their views. Some stated that it enabled more accurate modelling. Respondents who raised concerns stated additional control options should be considered. Some of those who proposed changes mentioned HEM currently lacks the ability to distinguish between centralised (uses one unit for the whole building) and decentralised (uses multiple units for different areas) Mechanical Extract Ventilation (MEV) systems, which can affect the accuracy and reliability of the energy

efficiency ratings given to buildings Some mentioned that the modelling should consider instances where technology is deactivated during different seasons. A variety of other suggestions were made.

Question 20k

What are your views on the modelling of controls for heating and/or hot water in the Home Energy Model? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 49 responses to this question. Nine respondents supported our methodological approach, six raised concerns and 21 respondents proposed changes. The remaining responses were ambivalent, expressed no view, or were not directly relevant to the question. The majority of those in support did not provide detailed reasoning for their views. Some respondents who raised concerns stated the current controls do not support building flexibility for load shifting or use smart thermostat features such as time-based electricity tariffs. The majority of those who proposed changes suggested HEM should support advanced Time and Temperature Zone Controls (TTZC) and include room-by-room zoning to reflect multi-zone heating systems. A variety of other suggestions were made.

Government response – Questions 20a – 20k

Following the consultation, we have continued to refine the approach of HEM to heating and cooling systems. In particular, the representation in the model of storage heaters and heat batteries has been reworked. Additional forms of ventilation have also been included, enabling HEM to better capture the breadth of available ventilation products. Further incremental improvements to other heating and cooling systems have also been made. These are fully detailed in the code changelogs, with revised technical documentation being released shortly after this document.

The basic methodology for modelling heat pumps has been retained, using BS EN 15316-4-2:2017 (Path B) and drawing on manufacturer test data from BS EN 14825. Various fixes and minor improvements have been implemented since the consultation. The methodology is also being expanded to incorporate reversible air-to-air systems providing space cooling, exhaust air heat pumps, water-source heat pumps and packaged hybrid systems. Further output data is now available from the heat pump module.

The methodology for electric resistive heaters that was included at the time of consultation is not expected to change fundamentally, although some expansions (e.g. to include dry underfloor and ceiling-mounted panels) are planned.

We have also developed a new methodology for modelling electric storage heaters. Whilst some respondents were satisfied that the consultation methodology offered an improvement over SAP, we recognise the concerns of many respondents related to the representativeness of the charging and discharge profiles, particularly under dynamic tariff conditions and varying user behaviours. The new methodology is based on a simulation approach that models' energy

flows at half-hourly intervals, enabling more accurate representation of smart charging. We will continue to review and validate the new methodology and engage with stakeholders to ensure that storage heaters are accurately represented in HEM.

We intend to proceed with approach to modelling gas boilers in HEM from the consultation. A plurality of respondents supported this methodology, with many highlighting improved accuracy over SAP. We recognise the concerns of some respondents over the modelling of boiler cycling. To address this, we have incorporated detailed operational cycling parameters—such as thermal inertia, ramping constraints, and load-following behaviour—into the model. These refinements improve realism in dispatch scenarios and allow for sensitivity analysis under varying demand profiles, helping to mitigate concerns around oversimplification and better reflect real-world boiler performance.

The modelling of heat batteries in HEM has been substantially reworked since the consultation version. We appreciate the wide range of views from respondents concerning heat batteries and recognise the importance of ensuring that HEM can enable ‘smart’ behaviours such as load shifting for an effective and flexible energy system. We recognise that heat batteries are a diverse product category. A new methodology for representing systems based on a phase-change medium has been introduced, with further developments to represent dry-core systems to follow.

We will engage with stakeholders to assess the new methodology, the modelling of heat batteries as a substitute for hot water cylinders, and to ensure the model reflects their ability to support smart behaviours such as load shifting.

HEM now supports decentralised mechanical ventilation (dMEV) by allowing users to specify individual continuously operating extractor fans, each with its own design airflow rate and specific fan power. These systems are modelled without requiring a control schedule, enabling more accurate representation of these systems.

The heat network model and HIU model in HEM are largely unchanged since the consultation. We note the advantages of collecting data on Heat Networks via the PCDB, which would lead to a more accurate representation than any dwelling model could provide. Few networks have been explicitly represented in the SAP PCDB. In HEM, we plan to take advantage of the Heat Network Technical Assurance Scheme (HNTAS) to enlarge and enhance this dataset.

The modelling of heat emitters has been extended since the consultation, with multiple foundational improvements to the interactions between hydronic emitter circuits and thermal zones, and the addition of wet underfloor heating and fan coil units. While the HEM core continues to require detailed input parameters for emitters, the user experience when entering emitters will be significantly simpler in the final model vs the consultation tool. We will continue to engage with industry on the modelling of radiant systems.

We are continuing to extend the modelling of different types of control logic for heating systems. New control options have been added for heat batteries and storage heaters, which will facilitate interaction with variable electricity grid signals (including tariffs). In addition, a smart load-shifting control option has been added for non-heating electrical appliances, the use

of which is now defined as an event schedule rather than a smooth load curve. HEM continues to support multiple heating zones, with the final approach to zoning in FHS compliance assessments to be announced in the corresponding Government Response.

We also received feedback on the potential to model time-of-use tariffs more explicitly. While HEM does not currently simulate consumer tariff choices directly—given their variability and behavioural dependencies—we recognise the importance of ensuring the model can reflect the enabling role of smart technologies. In this context, we note the relevance of ongoing work to reform EPCs, where the ability of a home to respond to dynamic pricing signals may be more appropriately recognised. HEM is being developed with the flexibility to support such future enhancements, and we will continue to explore how best to represent smart readiness and load-shifting potential in a way that complements wider policy developments.

Electricity generation, self-consumption, and storage (Q21a-d)

Question 21a

What are your views on the current priority order for allocating electricity supply and demand in the Home Energy Model? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 46 responses to this question. Eleven respondents supported our methodological approach, 11 disagreed, five proposed changes, and eight had mixed views on the current priority order for allocating electricity supply and demand in HEM. The remaining responses were unclear, expressed no view, or were not directly relevant to the question.

Respondents who agreed did not provide detailed reasoning for their views. Some respondents raised concerns on battery storage taking priority over PV diverters and thermal storage in heat batteries. Many also expressed that the priority order for how generated energy is used should not be fixed, but instead manually configurable. Respondents' who proposed changes stated that HEM should include variables for the maximum load capacity of solar and battery inverters [3] to accurately simulate energy allocation and reduce reliance on the national grid. Other suggestions included incorporating greater flexibility in the priority order to consider time-of-use import and export tariffs, accounting for all home energy demands, and offering user input options alongside default priority orders. A variety of other suggestions were made.

Question 21b

What are your views on the modelling of solar PV in the Home Energy Model? Please provide your reasoning and any supporting evidence.

[3] Solar inverters convert the direct current (DC) electricity generated by solar panels into alternating current (AC) electricity, which can be used by household appliances or fed into the national grid
Battery inverters convert the stored DC energy in batteries into AC power, making it usable for home appliances.

Summary of responses

We received 47 responses to this question. Thirteen respondents supported the modelling of solar PV, five disagreed, 13 suggested changes, and two had mixed opinions. The remaining responses either expressed no view or were not directly relevant to the question. Many respondents who agreed did not provide detailed reasoning for their views. A few respondents welcomed the development and the move to a half hourly resolution. Some respondents argued that the model does not have uniformity and precision in the shading and ventilation on solar PV, or that too much data is required in comparison to SAP 10.2. Those who suggested changes mentioned the model should be expanded to accommodate G59 limits[4] and time-varying tariffs. They highlighted the need to include battery storage results to enhance efficiency. Ensuring appropriate inverter capacity was also suggested and using half-hourly resolution and regional solar gain factors. Some respondents stated that including heat batteries and PVT technology for cost and carbon savings. Defining ventilation criteria for integrated systems and accounting for degradation rates and technologies like Solar Edge for higher output were also recommended.

Question 21c

What are your views on the modelling of electric batteries in the Home Energy Model? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 42 responses to this question. Eleven respondents supported the modelling of electric batteries, four disagreed, 12 suggested changes, and four had mixed opinions. The remaining responses expressed no view or were not directly relevant to the question.

Those in favour of the modelling welcomed it but provided no further explanation. Some respondents argued that the model could disadvantage onsite storage and self-consumption and fail to account for cost savings. Some respondents who proposed changes pointed out that the 15kW of usable capacity currently present in SAP needs to be reconsidered to accommodate larger batteries. Additionally, respondents suggested that the model should account for total home energy use and incorporate EV batteries for improved load management and system optimisation. A few emphasised the importance of collaboration with the industry in refining the model.

Question 21d

What are your views on the modelling of PV diverters in the Home Energy Model? Please provide your reasoning and any supporting evidence

Summary of responses

[4] G59 limits are technical and safety requirements for connecting generating plants to the UK distribution networks, ensuring grid stability and protection.

We received 45 responses to this question. Eighteen respondents supported the modelling of PV diverters, four disagreed and 11 suggested changes. The remaining responses expressed no view or were not directly relevant to the question.

Those in favour of the modelling stated PV diverters are essential for optimising solar energy use and welcomed the changes compared to SAP 10.2. Some respondents felt that the current HEM modelling is too simplistic and does not account for the nuances of individual products. Additionally, some respondents stated that the model should expand to include other uses of diverted electricity such as space heating (including heat pumps or heat batteries), to provide a more comprehensive understanding of PV diverter benefits.

Government response – Questions 21a – 21d

We recognise the importance of ensuring that HEM delivers an accurate and effective model of electricity generation, self-consumption, and storage. Since the consultation, the modelling of solar PV and electric batteries has been reworked – see the code changelog and accompanying technical documentation, to be released shortly after this response.

We intend to use an updated methodology for solar PV in HEM. This methodology depends on solar irradiance on the panels and system performance factors, following the method in BS EN 15316-4-3:2017. PV now also accounts for shading objects in the same way as other elements do.

- Modelling of DC to AC inverters has improved significantly since the consultation, with efficiency curves updated to reflect modern inverters, and the suggested output caps now implemented.
- Priority ordering between batteries, PV diverters etc. for consumption of electricity is now a configurable input.
- Electric batteries now have parameters for charge and discharge rates, along with various minor improvements.

Future features development (Q22-23)

Question 22

What are your views on future features development for the Home Energy Model? Please make suggestions, explaining your reasoning.

Summary of responses

We received 61 responses to this question. Three respondents had positive views on future features development, one had negative views, and 42 proposed changes. The remaining responses expressed no view or were not directly relevant to the question.

Respondents who proposed changes stated the need for a comprehensive and adaptable Home Energy Model that can incorporate a wide range of technologies and real-world scenarios. Some respondents highlighted the importance of allowing flexible configurations of heating systems, accurate performance tracking, and consideration of long-term product lifespans, such as windows and insulation.

A few respondents also mentioned the need to address factors like ventilation, stack effects, and the degradation of loft insulation. They suggested the model should support a dynamic approach to time-of-use tariffs and energy efficiency metrics.

Respondents emphasised the importance of ongoing consultation with industry stakeholders on model updates, balancing innovation with stability to ensure future-proofing.

Question 23

What data or evidence do you have which could support the future development of features within the Home Energy Model? Please provide further details.

Summary of responses

We received 24 responses to this question, of which 16 provided - or offered to provide - data or evidence. The remaining responses expressed no view or were not directly relevant to the question.

Respondents offered evidence or data for:

- in-use building performance post-retrofit,
- environmental and energy data,
- various features, including battery storage systems, ground-source heat pumps, solar PV, insulation, ventilation, heat batteries, fabric energy efficiency, heat networks, and solar shading.

Government response – Questions 22 – 23

We recognise the importance of continuing to develop features for HEM beyond those included at the time of consultation. We acknowledge the feedback from respondents on the need to ensure that HEM is adaptable and comprehensive. However, we also recognise the need to ensure stability for users of the model. We will therefore continue to engage with stakeholders on making updates to HEM in order to strike the correct balance between adding additional features and technologies and providing a stable model.

Several changes (such as the reworking of ventilation calculations) proposed by respondents have already been implemented in post-consultation releases of HEM, as detailed in the release notes and revised documentation to be published shortly after this document. We will continue to draw on respondents' suggestions as development continues.

We are grateful to respondents who provided or offered to provide data and evidence to support future development of new features for HEM. We are committed to working with our stakeholders to establish the best possible base of evidence from which to support the development of new features. We will engage with the evidence and data provided and continue to offer opportunities for sharing data during further feature development. We also continue to develop new features for HEM in the open, enabling stakeholders to assess the development and provide feedback or additional data and evidence at any early stage.

Validating the Home Energy Model (Q24-28)

Question 24

What are your views on the inter-model validation work that has been carried out (i.e. comparison against SAP 10.2 and validation against PHPP, and ESP-r)? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 59 responses to this question. Thirteen respondents had positive views on the inter-model validation work, six had concerns, two had mixed views, and 16 proposed changes. The remaining responses were either unclear, expressed no view, or were not directly relevant to the question.

Those with positive views welcomed the validation of HEM (HEM) against alternative models and considered it a useful process that should continue and evolve as the model develops. Many respondents suggested validating HEM against further building energy models, as well as industry-approved tools like Building Information Modelling and Building Energy Modelling (BIIM-BEM)

Those who raised concerns expressed a strong preference for using PHPP over SAP for inter-model validation, due to perceived flaws with SAP. A few respondents did not support any inter-model validation work, believing that HEM should be developed independently based on its own merits. In particular, there were concerns about comparing dynamic models versus static ones.

Furthermore, there was a call for additional validation in areas such as ventilation systems, heat transfer coefficients, and internal heat gains to improve alignment with real-world performance. Respondents were keen to see clear improvements in HEM's outputs as compared to SAP, providing reassurance about HEM's effectiveness and benefits.

Question 25

What are your views on the validation work that has been carried out against real-world case studies (i.e. IEA Annex 58, Camden Passivhaus, and Marmalade Lane)? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 65 responses to this question. Fourteen respondents had positive views on the validation against real-world case studies, seven raised concerns, 12 proposed changes, and seven had mixed views. The remaining responses were either expressed no view or were not directly relevant to the question. Many respondents with positive views did not provide detailed reasons. Some noted that HEM is more promising as it better reflects dwellings compared to SAP.

Respondents who raised concerns questioned the robustness and representativeness of this validation exercise. Many felt the sample size was too small to provide statistically significant results, particularly given HEM's potential impact on the UK housing market. Concerns were also raised around the focus on low-rise homes with mechanical ventilation systems (MVHR), noting a lack of case studies for more typical new-build, multi-storey residential dwellings (e.g., flats) and alternative ventilation systems (e.g., dMEV or intermittent fans). Respondents recommended that future validation should include a more diverse range of existing homes, particularly older properties in need of improvement.

Question 26

What are your views on the lab testing validation work that has been carried out (i.e. on boiler cycling and heat pumps providing DHW)? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 22 responses, of which 21 were relevant to the question.

Four responses were positive about the approach, including two that said the tests showed the model was generally accurate and an improvement over SAP. However, a few respondents highlighted gaps with the validation of the Coefficient of Performance (COP) of air source heat pumps and suggested further work was needed. These gaps included: 1. Capturing DHW prediction at lower temperatures 2. Accounting for defrost cycles at low temperatures. 3. The energy consumption from running a boiling cycle.

Three respondents highlighted concerns that ground source heat pumps were not included, with some mentioning the limited range of heat pumps assessed. Another respondent stated that there was a lack of definitive benchmark for the validation tests.

Several respondents said that further validation work is needed. These requests include evaluating the impact of anti-cycle software on heat pumps, validating variations with different cylinder sizes, and investigating the impact of multiple showers in quick succession.

Some respondents commented on the suitability of using laboratory testing and stated a preference for real site monitoring. Others stated that they support laboratory testing if it can replicate real life conditions. Another respondent referred to test methodologies for heat batteries, and a lack of transparency and industry consultation.

Question 27

What examples of real-world case studies do you suggest be used to further validate the Home Energy Model? Please provide further information.

Summary of responses

We received 31 responses with several different suggestions of case studies and research.

The case study suggestions ranged from homes of traditional construction (e.g. stone built cottages) all the way through to modern, low carbon buildings. Several respondents stated that housebuilders are building pilot sites in anticipation of the FHS, and that these should be used to validate HEM. A few respondents also suggested making use of the University of Salford's research and data from their Energy House and Energy House 2.0. Some responses suggested further comparison of modelled heat pump performance against measured performance under installed operating conditions.

Question 28

What suggestions do you have for further validation exercises that could be undertaken to refine the Home Energy Model? Please make suggestions, explaining your reasoning, and providing any supporting evidence.

Summary of responses

We received 28 responses to this question. Twenty-six respondents provided suggestions, with some respondents having more than one suggestion in their response, whilst the remaining responses were unclear.

Most of the suggestions were related to using real world data such as case studies involving real homes and their occupants' use of energy, with one respondent emphasising the large role human behaviour plays in understanding building performance.

Other suggestions included conducting validation work on the performance of flexibility-driven energy schemes, real homes with their occupants, stress testing HEM with industry, and validating a larger sample size of built projects to increase certainty.

There were also suggestions around how variations in ground temperature should be included in the model.

Government response – Questions 24 – 28

We are committed to ensuring that HEM undergoes a rigorous validation process to ensure an accurate, reliable and fit for purpose model is produced. Since the consultation, we have continued to undertake a wide variety of validation and assurance activities, ensuring that quality is maintained throughout ongoing development.

We have continued to make use of inter-model comparisons in validation work undertaken since the consultation. We believe such comparisons provide a useful benchmark HEM against other well-validated and established tools. This enables comparison on a detailed component-by-component basis, rather than merely comparing aggregate outputs such as overall heating demand. It also provides a framework for judging the significance and relative strengths of different approaches and for detecting implementation errors. Nonetheless, we acknowledge that no model can be treated as producing the 'ground truth' and that differences in modelling philosophy can produce disagreements even between well-performing models. We particularly acknowledge respondents' concerns regarding comparative testing against SAP. Such comparisons are undertaken to understand the comparative performance of the HEM against its predecessor, but HEM has not been modified to improve consistency with SAP at any point.

We remain committed to utilising real-world case studies to compare HEM's predictions with data from existing dwellings. We continue to believe that empirical testing with real-world dwellings is essential for validating HEM, ensuring the model's outputs accurately represent the performance of real homes. We acknowledge the concerns of some respondents regarding the representation of the housing stock in the real-world case study comparisons. We will continue to explore options for extending the range of real-world dwellings to undertake testing against.

We recognise concerns from some respondents regarding the approach taken to laboratory testing. We will continue to consider options for further such testing to reduce gaps and improve coverage. We will explore the possibility for real site monitoring to complement the laboratory testing undertaken.

We acknowledge that the validation of HEM requires an ongoing and continuous effort. Thus, we will continue to engage proactively with suggestions for validation activities during future model development to establish stakeholder confidence in the model.

Equality Act 2010 (Q29)

Question 29

What are your views on the impact of proposed changes to the modelling ecosystem on those with protected characteristics? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 15 responses to this question. Fourteen respondents shared their views with one respondent providing an answer that was not relevant to the question.

Three were of the view that HEM would have a positive impact on groups with protected characteristics, with two of the view that it would have no impact. Another respondent explained that older people and people with disabilities may use their properties differently, such as occupying their homes for longer periods or using heating throughout the day, and therefore, consideration was needed as to how the application of HEM would cater to these groups.

Government response – Question 29

We recognise the importance of ensuring that all policy changes, including technical modelling reforms, are assessed for their potential impact on individuals with protected characteristics under the Equality Act 2010.

The HEM core engine is designed to model the physics of buildings and does not incorporate behavioural assumptions. However, we acknowledge that the way energy is used in homes can vary significantly across different groups—for example, older people or disabled individuals may occupy their homes for longer periods or require higher baseline temperatures. These usage patterns could influence how model outputs are interpreted or applied in policy and regulatory contexts.

To ensure that the modelling ecosystem does not inadvertently disadvantage any group, a Public Sector Equality Duty (PSED) review has been undertaken. This review considered the potential for indirect impacts and confirmed that the current design of the HEM is unlikely to result in discriminatory outcomes.

We are committed to continuous improvement. The model has been validated against a limited set of real-world homes, and the next phase will expand this to a broader range of home archetypes, including those more likely to be occupied by vulnerable groups.

Environmental Principles Policy Statement (Q30)

Question 30

What are your views on the possible environmental impacts of the Home Energy Model core engine itself? Please provide your reasoning and any supporting evidence.

Summary of responses

We received 22 responses to this question. Seventeen respondents shared their views, four respondents' answers were not relevant to the question, followed by one unclear response.

Most of the 17 respondents were of the view that HEM would have a positive impact on the environment, including a couple of respondents sharing their views on HEM being an improvement to energy modelling. Other suggestions included considering the impact on the emissions caused by building fabric as well as the carbon impact of running high-powered computer simulations.

Government response – Question 30

The government is dedicated to promoting environmentally sustainable, net-zero practices. We recognise that most respondents agree that HEM has a minimal environmental impact as an individual methodology.

As a software-based tool, its primary function is to simulate building energy use with greater realism and accuracy than previous models. This capability enables more informed policy and regulatory decisions, thereby supporting the UK's net-zero objectives. This method aims to eliminate biases towards specific technologies or systems and ensure more accurate outputs.

In summary, while the HEM core engine itself has a negligible environmental footprint, its broader contribution to decarbonisation through enhanced modelling makes it a strong enabler of other policies, which are likely to have a net positive environmental impact.

Next steps

We remain committed to the continued development and refinement of the Home Energy Model (HEM) in support of the UK's net zero and housing objectives. Feedback from this consultation will inform the next phase of work, ensuring that the model remains accurate, inclusive, and fit for purpose.

In 2025, we will engage further on how HEM can be used to generate Energy Performance Certificates (EPCs). This engagement will explore how the model can sit within an EPC "wrapper" to provide clearer, more useful information for households and industry. Our approach will build on lessons from previous work on the FHS and will be shaped by ongoing engagement with stakeholders.

Alongside this, we will continue to develop and validate the HEM core engine and its implementation through the Energy Calculation as a Service (ECaaS) platform. The ECaaS service, led by MHCLG is expected to deliver a high-speed, cloud-based calculator and user interface by autumn 2025. This will support regulatory assessments and enable third-party software providers to build advanced interfaces for industry use.

We will also publish updated technical documentation, and validation reports to accompany the next release of HEM. These will include details of recent improvements to the model's treatment of technologies, as well as expanded validation against real-world case studies and laboratory testing.

Stakeholders are encouraged to continue engaging with the development process through regular show-and-tell sessions and by contributing data, evidence, and feedback. For further information or to request an invitation to upcoming sessions, please contact: homeenergymodel@energysecurity.gov.uk.

Link Annex A:

https://github.com/communitiesuk/epb-home-energy-model

https://github.com/communitiesuk/epb-ecaas-api

https://github.com/communitiesuk/epb-ecaas-frontend

This publication is available from: www.gov.uk/government/consultations/home-energy-model-replacement-for-the-standard-assessment-procedure-sap

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