



# Bespoke PER

UK Certifiers' Circle Guidance

June 2024

“ I was working as a physicist. I read that the construction industry had experimented with adding insulation to new buildings and that energy consumption had failed to reduce. This offended me – it was counter to the basic laws of physics. I knew that they must be doing something wrong. So I made it my mission to find out what, and to establish what was needed to do it right. ”

— Prof. Dr. Wolfgang Feist

## Acknowledgements

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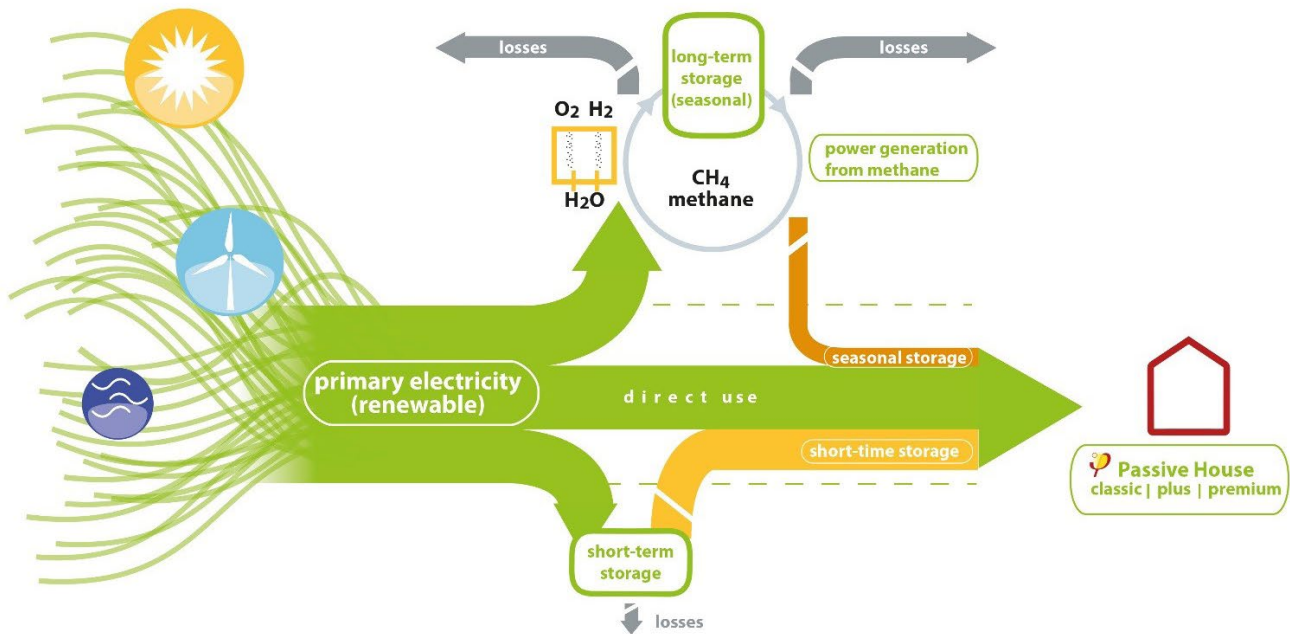


## Introduction

Most Passivhaus projects will be certified using the standard total primary energy demand (PER) criterion. This brief note gives some information about what PER is, how it relates to other metrics used in the UK, under what circumstances a bespoke PER criterion might apply, and how to check if it does.

### Q What is PER?

It's the Passivhaus total energy metric, aimed at aligning low operational energy buildings with a future all-renewables grid. It stands for **Primary Energy Renewable**.



Energy flowchart from the renewable energy supply to the energy consumed at the building, including facilities for short-term and seasonal storage. © Passive House Institute (PHI)

It aims to quantify how much renewable energy generation would be required, in a future all-renewable grid, to supply the energy needed at the building. This includes storage and distribution losses, and it's therefore different from Energy Use Intensity, which is often used by other energy assessments in the UK<sup>1</sup>.

For more information, see:

[https://passipedia.org/basics/energy\\_and\\_ecology/primary\\_energy\\_renewable\\_per](https://passipedia.org/basics/energy_and_ecology/primary_energy_renewable_per)

<sup>1</sup> EUI figures can be easily generated using the UK Metrics Plugin for PHPP, developed by Passivhaus Trust members DeltaQ. It's available to download for free online at <https://pht.guide/UKMetrics>.

## Q What is the standard PER limit?

For a Passivhaus Classic building, it's **60 kWh/m<sup>2</sup>.a**, measured against the Treated Floor Area (TFA)<sup>2</sup> as defined by Passivhaus methodology. There are other limits set for Passivhaus Plus, Passivhaus Premium, EnerPHit, and the PHI Low Energy Building standard (PHI LEB).

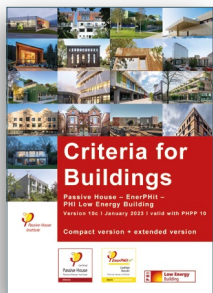
## Q What about renewables and offsetting?

PER is aimed at energy efficiency first, then renewables. There is some allowance for exceeding the standard PER limit with some associated renewable energy generation, described here: [https://passipedia.org/certification/passive\\_house\\_categories/classic-plus-premium#energy\\_generation\\_relative\\_to\\_the\\_building\\_s\\_ground\\_area](https://passipedia.org/certification/passive_house_categories/classic-plus-premium#energy_generation_relative_to_the_building_s_ground_area) – please note the renewable generation is measured against the projected building footprint<sup>3</sup>, and not the TFA.

As with other energy calculations for certification, this renewable generation must be calculated in PHPP, rather than a third-party software.

## Q Are there any buildings with different PER limits?

The majority of projects should be able to certify using the standard limits (whether they are Passivhaus or EnerPHit Classic, Plus or Premium, or PHI LEB). As some energy uses are driven by occupancy, PHPP 10 has in-built calculations to set a project-specific PER requirement for residential and office buildings:



*“For residential and office/administrative buildings with a high occupancy density the automatically calculated “project-specific” criterion in the PHPP can be used alternatively (selection in the “Verification” worksheet). The requirement for renewable energy generation will not change in this case.”*

[https://passiv.de/downloads/03\\_building\\_criteria\\_en.pdf](https://passiv.de/downloads/03_building_criteria_en.pdf)



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## Q What about other buildings?

The Passivhaus criteria say:

*“The limit value applies for typical residential, educational and office/administrative buildings. In case of uses deviating from these, if a very high energy demand arises then the limit value may also be exceeded after consultation with the Passive House Institute. Evidence of efficient use of energy for all significant devices and systems is necessary for this, with the exception of equipment which was already owned by the user before the construction measures if retrofitting or replacement for improving the energy efficiency can be shown to be uneconomical over the lifecycle.”*

**2** Passivhaus uses Treated Floor Area as the denominator for space heating demand, space heating load, space cooling demand, and PER. The calculation is defined in the PHPP manual, and includes scaling factors for low floor-to-ceiling height, and for different space usage types (e.g. circulation space in non-residential buildings). It's different from Gross Internal Area, Net Internal Area etc.

**3** This is equal to the exterior dimensions of the thermal building envelope, which roughly equates to the roof area that is useable for a photovoltaic system.

## Q How do I get a bespoke PER?

Talk to your Certifier. The value will come from the Passive House Institute (PHI), but communication will be via the Certifier.

## Q What information will I need to provide?

You will need to provide a PHPP with supporting information regarding the equipment driving the PER demand, including evidence that this is efficient. For Passivhaus designers, when producing this, please use standard values from PHPP / the criteria where available, and use realistic assumptions (for example, most equipment will work at a fraction of the nominal power the majority of the time). This information should be clear, and you should identify where figures are based on assumptions, reference design information etc.

It's worth also reviewing the information at [https://passipedia.org/planning/non-residential\\_passive\\_house\\_buildings](https://passipedia.org/planning/non-residential_passive_house_buildings).

## Q What's the workflow?

- PHPP and supporting information is submitted to Passivhaus Certifier.
- Certifier reviews the information, and raises queries if applicable.
- Passivhaus Designer / Consultant addresses these queries.
- If deemed necessary, the Certifier sends the reviewed PHPP and information relevant to the PER demand to the PHI.
- The PHI confirms whether the PER requirement needs to be reviewed, and if it does, confirms the PHI fee for this.
- The certifier confirms total cost to their client (including certifier fees if applicable), and gets client acceptance or rejection of the fee.
- If the fee is accepted, the PHI carries out the review of the PHPP and supporting information. If needed, PHI asks for clarification.
- Once all issues are clarified, the PHI set a project-specific limit.

## Q How long will this take?

Up to 10 working days from issue of information to PHI (i.e. after Certifier issues to PHI), if there are no unresolved questions. If there are further clarifications needed, it can take longer.

## Q How much will it cost?

The fee will be agreed between the PHI and the certifier based on the nature of the project, including scale, level of complexity, number of different usage types etc.

## Q When is the earliest a PER review could happen?

Only when there is a PHPP available, and the PHPP has sufficient information about the equipment leading to a higher PER demand. If the PHPP includes only general factors (e.g. 25% of full load according to standard XYZ), then there is no way to evaluate the efficient use of the equipment. We would not expect this to be before RIBA Stage 2.

## Q Will the PER limit be fixed / how many reviews should we expect?

Yes and no: if nothing else on the project changes the same limit will apply. If aspects of the project change, including quantity of devices, occupancy patterns etc., then it will need to be reviewed. PHI typically expects to carry out two reviews, one fairly early in design, and one around Certification. We suggest discussing the number and timing of these reviews with your certifier, and considering your project context. We think the timing should be informed by procurement and when the project would go to tender, with the reviews and subsequent discussions used to be clear about where responsibility lies for different elements of the project that contribute to Passivhaus certification (e.g. client fit-out items which may be outside the contractors control, catering equipment which may be a specialist package etc).

## Q What's planned for other building typologies?

To provide more transparency, more consistency and to streamline and accelerate the certification process for other building types, the Passive House Institute is developing a scheme for a standardised approach for project-specific PER requirements. Automatic calculation already exists for residential and office projects. The PHI plans to develop similar calculations for other building typologies if required.

If you are interested in helping with or funding this project (for example, for secondary schools), please contact [info@passivhaustrust.org.uk](mailto:info@passivhaustrust.org.uk).

The Passivhaus Trust is an independent, non-profit organisation that provides leadership in the UK for the adoption of the Passivhaus standard and methodology.

Passivhaus is the leading international low energy design standard, backed with over 30 years of building performance evidence. It is a tried & tested solution that enables a meaningful transition to net-zero now. Over 65,000 buildings have been certified to this standard worldwide. The Trust promotes Passivhaus as a robust way of providing high standards of occupant comfort and health AND slashing energy use and carbon emissions from buildings in the UK.

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[www.passivhaustrust.org.uk](http://www.passivhaustrust.org.uk)

