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Foreword to version 9 (2015)

Passive House buildings and energy efficient projects which are carefully planned using the PHPP have proven successful. Whether new builds or retrofits, building projects that achieve the Passive House or EnerPHit Standards meet the level of comfort and the extremely low energy demand being strived for. Moreover, in most cases they can also be realised cost-effectively and profitably. Significant deviations of energy consumptions from the planned energy efficiency targets, often described as the "performance gap", do not occur in Passive House buildings and EnerPHit retrofits which have been planned and quality assured, as has been confirmed by numerous measurement monitored projects. The effectiveness of the dimensioning procedure for systems of building services has also proved effective, and enables the use of simple well-coordinated components and thus the implementation of cost-effective efficiency products. In addition to the application of the Passive House concept and Passive House technologies, the use of the PHPP as a planning tool remains to be the most important basis for the implementation of sustainable building concepts.

An ideal instrument for realising NZEBs
The possibility of planning and assessing efficient projects in a reliable way makes the PHPP an ideal planning tool for the implementation of NZEBs (Nearly Zero-Energy Buildings) or other buildings which are also optimised for low energy consumption. Proven successful over many years, this calculation method for a Passive House buildings, the minimal low energy demand that meets the definition of a NZEB, is also useful for the calculation of very low energy buildings which are now being strived for in Europe and worldwide. This is the case in spite of the different national expressions this definition may take, with reference to the detailed characteristics of the projects. The PHPP does not only offer the possibility of precisely calculating the energy demand; renewable energy sources can also be incorporated into the

planning process and the overall efficiency of a building in the future can also be assessed. The PHPP therefore constitutes an ideal planning tool for the implementation of Passive Houses, NZEBs and other energy efficient buildings.

Calculation of planning variants or refurbishment steps

It is not just in the relatively straightforward field of new construction of residential buildings that projects exist which strive for a high level of efficiency through the use of Passive House technologies. The requirements become increasingly complex when these principles are translated to large-scale, mixed-use projects or refurbishments. The uses of energy efficiency concepts are becoming more and more diverse, resulting in the increased need for the ability to assess and compare diverse design or implementation variants of a project – not just with reference to efficiency outcomes but also with regard to cost-effectiveness. This need has been met by the PHPP 9. It allows the input of variants with completely different efficiency parameters within a single PHPP file, whereas several PHPP calculations were necessary before. The results of the different variants are calculated in parallel so that the effects of these parameters can be easily compared. Comparisons of the economic efficiency of different variants can be carried out in a separate worksheet. Different steps of a building refurbishment may thus also be input in a single PHPP file. In this way, it will be possible to depict improved efficiency due to each refurbishment step, and to enter and assess long-term modernisation projects in a simpler manner.

Input assistance for the application

Planning Passive House buildings or highly efficient EnerPHit retrofits with the new PHPP 9 puts a reasonable demand on experienced users with the relevant background knowledge. For those who are less familiar with the energy balancing tool, or are not at least familiar with all the calculation methods offered in the different calculation worksheets, a system of information has been developed which display the previous alerts/warning messages following a uniform logic, combining them in a new worksheet created for this purpose. In a comprehensible manner, users are informed about the places where incorrect or incomplete input needs to be reviewed or where input data does not seem plausible and has to be evaluated again.

Building assessment based on the concept of renewable primary energy

The energy sector is experiencing a rapid change worldwide, with the objective of a sustainable supply of energy. A planning tool like the PHPP must be able to perform assessment of a building on this basis, because most of the energy demand of the building will coincide with the time when renewable energies will predominate. It therefore makes sense to perform assessment of the energy demand of buildings that are planned today based on such a future scenario. This consideration has been used in the PHPP 9 using the system of renewable primary energy (PER / Primary Energy Renewable). As an alternative to the previously used evaluation method based on the non-renewable primary energy factors (PE), buildings can now be assessed according to the new system. The PHPP 9 also uses the Passive House classes resulting from this assessment, which allow the evaluation of the efficiency of the building taking the interaction between energy efficiency and renewable energy generation into account. The PHPP thus already makes it possible to design tomorrow's buildings today, in a future-proof way.

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- Calculation and depiction of planning variants and refurbishment steps
- Cost-effectiveness comparison of design variants
- Verification of energy characteristic values for EnerPHit refurbishments.

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New features in the Passive House Planning Package version 9 (2015)

New and improved calculation methods have been used in the new version of the PHPP. In addition, input areas, calculation worksheets and the manual have been reorganised and restructured in many places. The interface provided as a macro and text file for the PHPP has been developed further and improved.

In general, the following changes have been made to the PHPP 9:

File format	The PHPP 9 will appear in the now commonly used Excel format *.xlsx for the first time. The PHPP 9 is no longer compatible with the previous Excel file format *.xls or with Excel 2003.
Worksheets	Three new worksheets have been added: **Variants**, **Comparison** and **Check**.
	The worksheet **PE Value** has been replaced by the worksheet **PER**.
Drop-down lists	The input values in the drop-down menus introduced in PHPP 8 are now completely based on numbers or IDs which are independent of the language used in the PHPP. Among other things, this allows error-free data exchange between different translations of the PHPP.
Input assistance	In order to facilitate input, there is a new structure of row-by-row Error messages and Warnings (red+blue writing) at the right edge of all worksheets, as well as additional assistance and instructions in the worksheet **Check**.
Header row	The header row of all calculation worksheets has been standardised. The current results of the PHPP calculation can be seen here at any time.
Columns for variants	In each calculation worksheet there are columns on the far left (these may be hidden) in which it can be specified which parameters are used in the worksheet.
designPH	designPH has been developed further and is now also available for 3D data input.

The following worksheets have been completely restructured or amended:

Verification	Input of general project data has been redesigned.
	Input of general project data has been redesigned and expanded.
	Assessment according to the PER method and the resultant categories

has been added to the worksheet **Verification**.

Internationally applicable criteria are now available for verification of EnerPHit retrofits.

Internal heat gains of residential buildings are adopted depending on building size, they are higher in the case of smaller dwelling units.

The criteria for the cooling demand and the cooling load have been reviewed and are now also applicable for non-residential buildings with higher internal loads. Frequency of overheating and excessively high humidity now represent relevant criteria for verification.

NEW:

Variants

This worksheet allows input of design variants or refurbishment steps. The results of each variant are calculated and displayed in parallel in the upper part of the worksheet.

Input of variant parameters can be done in a differentiated manner and according to the components of the building which are group according to different aspects of buildings, combining several individual data inputs.

NEW:

Comparison

The energy demand and the cost-effectiveness of two design variants can be compared in the worksheet **Comparison**. In doing so, it can be chosen whether this comparison considers the entire building or just a specific component of the building.

NEW:

Check

As mentioned before, an overview of Error messages is provided here so that it is immediately clear where your PHPP calculation needs to be adapted or improved.

In addition, plausibility warnings make it possible to find critical points in the project planning or input and rework these if necessary.

Overview

This worksheet has been redesigned; the information available here is automatically generated by the PHPP calculation to a large extent.

Climate

Selection of the climate data sets has been restructured. Quality approved climate data sets for certification are identified by a specific ID number.

The climate data sets have been supplemented with information about the regional availability of renewable energy sources (PER factors).

A secondary calculation allows the search for the geographically nearest climate data sets stored in the PHPP.

U-Values

The input of U-values has been supplemented with automatic adoption of heat transfer resistances in accordance to information about the building component and the heat transfer situation.

Areas

The selection of U-values of the building components has been restructured so that U-values as well as thermal bridges of certified wall, construction or floor slab systems can be selected.

For verification of Passive House buildings and EnerPHit retrofits, building components for which exemptions apply can be identified.

For building components and thermal bridges, rating of critical levels of

	thermal protection with reference to comfort or structural integrity is shown through coloured indicators.
Components	This worksheet has been supplemented with pre-entered thermal bridges of certified connection details, characteristic values of entrance doors and shower drain-water heat recovery systems.
Windows	Rating of thermal comfort provides information about compliance with the comfort criteria of all windows for the heating case.
	The energy balance of transmission heat losses and solar gains of windows during the heating period are now presented in graphical form, differentiated according to the points of the compass.
Shading	The frequency of use of temporary shading in summer is automatically calculated, the user only has to enter the reduction factor for completely closed shading elements.
Ventilation	In principle, a distinction can now be made between pre-defined window ventilation, a purely exhaust air system and a ventilation system with heat recovery.
DHW+Distribution	This worksheet has been restructured and improved.
	Input is now possible for 5 distribution pipes including their conductances within and outside of the building envelope. Additionally, entry of cooling distribution pipes has been added.
	The requirement for domestic hot water for showers and for other uses is now entered separately and can be determined in detail using a secondary calculation.
	Heat recovery systems can be entered for hot drain-water from showers.
	Storage losses can be estimated by entering data for several storage tanks. Input of storage tanks for the worksheets **HP** and **SolarDHW** has been combined in this worksheet.
SolarDHW	Selection of storage tanks now takes place in the worksheet **DHW+Distribution** instead.
	The system-specific PER factors are determined in this worksheet.
PV	5 different PV systems can now be entered.
	The alignment of the areas can be adopted automatically by allocating a PV area to building envelope areas.
Electricity	An average lighting efficiency is entered instead of the share of energy efficient lighting.
PER	This worksheet replaces the previous worksheet **PE Value**.
	The worksheet allows input of a primary and secondary heat generator and the coverage for heating and domestic hot water.
	Besides showing the final energy demand for heating, cooling, domestic hot water and household electricity, dependent on the energy source, the effective PER factors are determined by calculating them

together with a biomass budget, and the PER specific value for the building.

Alternatively, the PE specific value and the CO_2-equivalent emissions of the building are also determined depending on PE factor profiles that are to be chosen and which take into account the nationally or regionally differing specific values, which can be entered by the user if required.

HP	Input of storage tank data now takes place in the worksheet **DHW+Distribution** instead.
District Heating	Determination of the PER factors for district heating based on the degree of efficiency of the heating network and CHP plants.
Data	In the worksheet **Data**, different PE factor profiles are implemented which must be selected in the **PER** worksheet for determining the PE specific value in accordance with the conventional PE value method. Individual PE value profiles can also be entered in the case of deviating national or regional specific values.

In addition, the PHPP 9 contains four additional tools (separate Excel files):

PHPP Tools	The following tools have been combined in an external file:
	Import/Export interface
	Import from PHPP8
	Profile settings
	Insertion of additional of rows
PHeco	Calculation sheet for determination of profitability of energy efficiency measures for buildings. This worksheet can be directly linked with the worksheet **Variants** so that the calculation results in the PHPP are available on a column by column basis for different variants.