Updated comparison of PHPP with SAP 2012
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This section gives a summary of some of the key metrics that have previously been identified as using different assumptions between SAP and PHPP, subsequently causing differences in the ultimate energy use predictions. While other differences may exist in the way data is input into each tool, such as different ways of calculating the treated floor area or representing thermal bridging ψ values, these have been excluded here as ultimately equivalent inputs can be made for these parameters in each tool. The metrics presented here therefore reflect main assumptions in the respective tools that will ultimately influence the energy calculations. This is not intended to be a detailed analysis of the effect of the calculation differences, but instead serve to highlight changes that have been introduced in SAP 2012 relative to PHPP.

Metric	Changes	Reference/ further information
Climate data	SAP now contains regional climate data (essentially the same climate regions as present in PHPP), which is used for some calculations, including energy use, costs and overheating risk. However, average UK data along with other normalised factors are still used for the calculation of the Fabric Energy Efficiency (FEE) parameter, TER, DER, SAP and EI ratings for comparability across the whole country. For an equivalent specific space heating demand metric to PHPP, a separate calculation would need to be carried out on the presented space heating energy demand kWh data.	Standard Assessment Procedure (2012 version) document. http://www.bre.co.uk/ filelibrary/SAP/2012/SAP-2012_9-92.pdf
Occupancy rates	The occupancy rate assumptions have been revised, which will prevent over-estimation of occupancy in larger dwellings. The new calculations were shown to be a good fit with average household occupancy data from English House Condition Surveys. However, it is noted that the 'scatter' of occupancy data across households is large.	STP 09/NOFA01, 'A review of the relationship between floor area and occupancy in SAP', http://www.bre.co.uk/ filelibrary/SAP/2012/STP09-NOFA01_Occupancy_and_floor_area.pdf
Internal gains	Internal gains have now been reduced compared to earlier versions of SAP, but are still linked to occupancy rates (which themselves have been revised – see above). Actual impact compared to PHPP will vary depending on the size of the dwelling and subsequently the anticipated occupancy rate.	STP 09/AUX01, 'Review of auxiliary energy use and the internal heat gains assumptions in SAP', http://www.bre.co.uk/ filelibrary/SAP/2012/STP09-AUX01_Auxiliary_energy__use_and_internal__gains.pdf
Hot water usage assumptions	Hot water usage is linked to occupancy rates, (which themselves have been revised – see above). In addition, the core calculation relating to hot water usage has reduced from 27 litres per person plus 39 litres to 25 litres per person plus 36 litres. This is still a higher assumption than in PHPP but was shown to give good correlation	STP 09/DHW01, 'Analysis of the EST's domestic hot water trials and their implications for amendments to BREDEM and SAP', http://www.bre.co.uk/ filelibrary/SAP/2012/STP09-

	with EST field trials in the UK.	DHW01_Analysis_of_EST_DHW_data.pdf
Primary pipework loss	Calculations have been amended to account for partially insulated pipework to some extent, although simplified example scenarios are still utilised for reference so the results will inevitably be less accurate than PHPPs representation. (A specific comparison analysis between the two methods has not been made.)	STP 11/DHW02, 'Primary Pipework Loss', http://www.bre.co.uk/filelibrary/SAP/2012/STP11-DHW02_Primary_Loss.pdf
Emission factors for renewables	SAP now uses 'system' emission factors throughout the calculations rather than 'marginal' emission factors for renewable electricity (i.e. for PV). Hence SAP will no longer over-reward the use of renewable electricity. CO_2 emission factors still vary between each tool.	STP 11/CO204, 'Proposed carbon emission factors and primary energy factors for SAP 2012', http://www.bre.co.uk/filelibrary/SAP/2012/STP11-CO204_emission_factors.pdf
Thermal mass	A thermal mass parameter has been introduced into SAP to aid with overheating calculations. Custom calculations can be input, but default values are still available for design purposes. (A specific comparison analysis between the SAP and PHPP methods has not been made.)	Standard Assessment Procedure (2012 version) document. http://www.bre.co.uk/filelibrary/SAP/2012/SAP-2012_9-92.pdf
Windows – frame factor	In SAP, the frame factor for windows can be input for individual windows or groups of similar windows, which will be important where window types and areas differ on different facades. Conservative default values are however available. Input of actual frame factors should facilitate more accurate solar gains calculations.	Standard Assessment Procedure (2012 version) document. http://www.bre.co.uk/filelibrary/SAP/2012/SAP-2012_9-92.pdf
MVHR	In SAP, in use factors are applied to the specific fan power and heat exchanger efficiency to allow for installation inefficiencies compared to laboratory test conditions of units. These factors are anticipated to change in future to take account of in-use performance verification of such systems in practical studies. Currently, different in use factors are applied if the system is installed under a Competent Person Scheme (i.e. systems will not be penalised so much). These factors will inevitably have a significant impact on the forecast MVHR unit efficiency compared to PHPP.	Standard Assessment Procedure (2012 version) document. http://www.bre.co.uk/filelibrary/SAP/2012/SAP-2012_9-92.pdf