

# SAP 2012 IN A NUTSHELL

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*The consultation version of the SAP 2012 methodology was published by the Department of Energy and Climate Change (DECC) on January 4th 2012. This article from Dyfrig Hughes of National Energy Services (NES) summarises the key changes. NES operates the NHER EPC Accreditation scheme. For further information: see [www.nesltd.co.uk](http://www.nesltd.co.uk). The consultation period ends 28 March 2012.*

## Overview

The proposed changes to SAP for 1 April 2013 are far less extensive than those for SAP 2009, and in the main are 'behind the scenes' changes that will affect the outputs but will have little impact on the assessment process. There are some changes to data collection for thermal bridging and hot water, but no big surprises. This is not to say that the changes are insignificant, as there are big changes to the way carbon emissions are calculated and a revised procedure affecting the output of solar thermal and PV systems. Regional variation for space heating demand has also been added, although this will not affect SAP / EI or building regulations outputs.

This document aims to summarise the key changes, and to direct the reader to the consultation documents themselves.

The key ten proposed changes in a nutshell are as follows:

1. **Thermal Bridging** - a further 19 junctions have been added giving a new total of 42 junctions to consider; all reference to confidence factors has been removed
2. **Hot water** - the degree to which primary pipework has been insulated can now be varied
3. **Carbon emissions** – these now include transportation of fuel and are 3 year rather than 5 year averages; a 15 year average is also output
4. **Regional weather** – the costs and savings quoted on the EPC will become sensitive to geographical location; climate regions are now defined by postcode
5. **Solar thermal and PV outputs** - a revised way of calculating solar radiation; revised collector losses for solar thermal systems
6. **Boiler efficiency & controls** – manufacturers declaration no longer an option for individual boilers at the as built stage; revisions to the calculation procedure particularly for solid fuel
7. **Heat pumps** – default efficiencies substantially lower than in SAP 2009
8. **PV on blocks of flats connected to landlord supply** – individual flats will get carbon benefit but no SAP benefit or cost saving on the EPC
9. **Community heating** – two more control options; CO2 emission offset for biomass community CHP to carry forward in all cases if FEE target is met
10. **Other calculation changes** – fuel prices and primary energy factors have been revised; slight changes to default U values for openings; WWHRs assumption changes

## 1. Thermal Bridges

Detailed calculation of losses from non-repeating thermal bridges became compulsory in SAP 2009, if a default 'y' value of  $0.15 \text{ W/m}^2/\text{°C}$  was to be avoided. The changes in SAP 2012 are mainly to address issues identified during the practical application of SAP 2009. Some of these are currently covered in SAP Conventions (e.g. dormers) but some are junctions that were previously ignored (e.g. roof ridges). There are a total of 19 additional junctions, giving a new total of 42. The other change is that all reference to confidence factors has been removed i.e. there is no reference to the application of a factor of 0.02 or 25% to psi values in the absence of on - site quality assurance checks. See Draft SAP 2012 Appendix K, pages 75 – 77.

## 2. Hot Water

In SAP 2009 software the only question regarding primary pipework (the pipework connecting the boiler to the hot water cylinder) is 'Is it insulated', with a Yes / No response. The draft SAP 2012 introduces four options: (a) uninsulated (b) first 1 m from cylinder insulated (c) all accessible pipework insulated and (d) fully insulated pipework. There is a specific question in the consultation documents asking if this approach is supported. There is also a question asking if, in a future version of SAP (probably SAP 2015), the length of both primary and secondary pipework should become variables affecting SAP outputs. This would go some way towards addressing previous criticisms of SAP as compared to Passivhaus (PHPP) software.

The default heat losses from storage combi boilers are also increased, in the light of recent trials.

## 3. Carbon and other Emissions

Significant changes are proposed to how CO<sub>2</sub> emissions will be calculated in SAP 2012, as compared to SAP 2009.

Firstly, emissions from transportation of fuel will be taken into account.

Secondly, the average values used will be calculated over 3 years rather than 5 years.

Thirdly, the same 'system' average emission factor is to be applied to electricity imported from and exported to the grid. In SAP 2009, the value used for imported electricity was  $0.517 \text{ kg CO}_2 \text{ per kWh}$  and for exported  $0.529 \text{ kg CO}_2 \text{ per kWh}$ . By contrast in SAP 2012, a value of  $0.522 \text{ kg CO}_2 \text{ per kWh}$  is used for both.

Fourthly, the impact of the other 'greenhouse gases' - methane (CH<sub>4</sub>) emissions and Nitrous Oxide (N<sub>2</sub>O) – is accounted for in the emission factors.

The combined impact of these changes is a relative increase in emission factors between SAP 2009 and SAP 2012 of 217% for biodiesel, 39% for wood pellets, 18% for anthracite, 7% for both oil and gas and 1% for electricity.

## 4. Regional weather

National Energy Services has since the 1990s championed the use of calculations that are sensitive to regional variations in climate when assessing fuel running costs, CO<sub>2</sub> emissions and energy consumption. NHER software has always provided regional outputs as an 'add on' to the standard SAP calculation.

SAP 2009 introduced regional variations into the SAP calculation for the newly incorporated cooling assessment. However, space heating demand continued to be based upon average UK weather.

In 2010, NES provided the Zero Carbon Hub with a special version of our NHER SAP 2009 software to facilitate research into the impact of allowing space heating to vary with location for regulatory and EPC purposes. See pages 37 to 41 of the following report:

[www.zerocarbonhub.org/resourcefiles/CC\\_TG\\_Report\\_Feb\\_2011.pdf](http://www.zerocarbonhub.org/resourcefiles/CC_TG_Report_Feb_2011.pdf)

Regional variation was subsequently introduced for space heating for one calculation only, namely the Renewable Heat Incentive for display on Energy Performance Certificates (EPC). The RDSAP 9.91 update due in April 2012, takes this one step further by making the running cost estimates and savings displayed on the existing dwelling EPC sensitive to geographical location.

The proposed SAP 2012 retains the principle of keeping the SAP / EI and Regulatory outputs independent of region. The cooling calculation also becomes insensitive to region, to match heating. However, running cost estimates and savings will in SAP 2012 become sensitive to region.

To facilitate this, a new Appendix has been added to SAP: 'Appendix U - Climate data'. This provides tables giving the following mean values by month by region:

- External temperature at sea level
- Wind speed (for calculating infiltration rate)
- Solar radiation on a horizontal plane
- Solar declination (by month only)
- Representative latitude (by region only)

The height above sea level is assumed to be 50m for all regions.

A way is also incorporated of deriving the geographical region from the postcode.

## 5. Solar Thermal and PV Outputs

Improved calculation procedures are included in the draft SAP 2012, for assessing the output from solar thermal and solar PV systems. This firstly takes into account the regional data described in 4. above and secondly incorporates a new calculation procedure described in Appendix U or calculating the solar radiation for a given orientation and tilt. It is possible in the draft SAP 2012 to specify the actual tilt rather than select predefined options 0, 30,45,60,90 degrees.

There is also a change to the way heat losses from solar thermal panels are calculated.

In general the changes will make the output of the systems closer to reality and as a general guide one would expect the output to increase in southerly latitudes and decrease in northerly latitudes. The changes are considered to be especially important within the context of Green Deal and FITs where consumers will be making informed choices to invest on the basis of the savings presented on the EPC and elsewhere.

## **6. Boiler Efficiency & Controls**

The first change here is that the Manufacturers Declared option for entering boiler efficiency will be removed in SAP 2012, for As Built submissions. This means that the only alternative to SAP default efficiencies will be to select a boiler listed on the Products Characteristics database.

Secondly, it is proposed that weather compensators and enhanced load compensator will only be selectable as control options via the Products Characteristics Database. The term 'time and temperature zone control' will also be extended to include communicating TRV systems with a central controller, subject to certain conditions being met.

There have also been changes to the procedures by which boiler manufacturers are to assess the efficiencies of boilers to be added to the Products Characteristics database. Allowance has been made for the possibility that, in future, gross efficiency values for gas and oil boilers will be supplied. There is also a new procedure for calculating the seasonal efficiency of solid fuel boilers.

## **7. Heat Pumps**

When heat pumps were eventually added by manufactures to the Products Characteristics Database, some of the efficiencies were lower than the default efficiencies assumed by SAP. This resulted in some assessors using the default values in preference. It is proposed to correct this in SAP 2012 by reducing the default values. For example, the drop in efficiency for three example electric heat pumps is as follows:

- ground to water or air - from 320% to 230%
- water to water - from 300% to 230%.
- air to water or air - from 250% to 230%

There is also a change to the way the calculations are done for exhaust air heat pumps. This is to account for the fact that a higher air flow rate may be required through the ventilation system than would apply without the heat pump system. This is likely to increase the associated energy consumption.

## **8. PV on blocks of flats connected to landlord supply**

Where PV panels on blocks of flats are connected to the landlord supply, currently the impact is apportioned between each individual flat. This is acceptable for building regulations purposes but is misleading for recipients of the EPC, as there is in practice no direct benefit to the householders. It is proposed in the draft SAP 2012, that only the carbon emissions are apportioned between each individual flat; the SAP rating for the individual flats will be unaffected by the presence of the PV panels.

## 9. Community heating

There are two additional control options for community heating systems in SAP 2012; these are “Flat rate charging, programmer and at least two room thermostats “ and “Charging system linked to use of community heating, programmer and at least two room thermostats”.

In SAP 2009, total CO<sub>2</sub> associated with community systems fuelled by biomass was generally not allowed to be a negative amount. In the draft SAP 2012, this value can be allowed to go negative if the dwellings served by the community scheme have a high standard of energy efficiency. This is taken to be the case if the fabric energy efficiency (FEE) of the dwelling conforms with the requirements of building regulations.

## 10. Other calculation changes

The 3 year average fuel prices assumed in the SAP calculation and the primary energy factors used to display primary energy on the EPC have both been revised.

The default U value of a double-glazed wood or PVC – U frame air filled window (low-E, en = 0.2, hard coat) has changed from 2.3 to 2.2.

The assumptions made in estimating the water throughput from showers for Waste Water Heat Recovery systems has been amended.

## Conclusion

SAP 2012 contains no bombshells for housebuilders, as did SAP 2009 where the need to insulate and seal party walls was introduced alongside the need to pay serious attention to non-repeating thermal bridges. However, there are changes that will have a significant impact. However, the full impact will not become clear until seen in software, within the context of Part L 2013 The Part L changes are covered by National Energy Services in a separate paper: see [www.nesltd.co.uk](http://www.nesltd.co.uk).

## Further Information

The consultation documents can be accessed at: [www.bre.co.uk/sap2012](http://www.bre.co.uk/sap2012)

The first document to look at is “Background and Consultation Questions”; this provides some explanation of the thinking behind the main changes, as well as specific questions that DECC want responses to. It also discusses issues being considered for SAP 2015. The second document is a marked up version of the draft SAP 2012 document itself, with the additions / amendments highlighted in red. There are also six background documents on the web site detailing how the changes were arrived at.

The Part L1A 2013 consultation software, cSAP, can be accessed here: [www.2013ncm.bre.co.uk](http://www.2013ncm.bre.co.uk)

**National Energy Services:** Web: [www.nesltd.co.uk](http://www.nesltd.co.uk) Tel: 01908 672787.