Microgeneration Government Industry Contact Group

SAP Snag List – as updated following industry engagement, December 2012

Introduction

In August 2011, the Microgeneration Government-Industry Contact Group (MGICG) compiled a SAP 'snag' list and recommendations for consideration by the Government and the SAP contractor, BRE. Both Government and BRE jointly responded to these concerns in a stakeholder response note in December 2011, which also incorporated comments from the Zero Carbon Hub and the Heating and Hot Water Industry Council. In order to discuss the responses and potential solutions to the issues raised in the original snag list, the MGICG has organised a technical, microgeneration specific, SAP workshop to be held January 30th attended by DECC, BRE and industry professionals familiar with SAP.

Summary of the outstanding issues

In a bid to consolidate and categorise the outstanding SAP issues (following the responses made to the snag list in December 2011, and consultation on SAP2012 held between January and March 2012) ahead of the workshop, the following four categories have been identified:

- Technology performance related issues
- Required evidence related issues
- SAP Methodology and policy related issues
- Occupancy and behaviour related issues

Some issues remain outstanding from the original MGICG snag list and some have arisen as a result of further industry engagement undertaken by the Micropower Council and the Energy Efficiency Partnership for Buildings (EEPB). All issues have been listed beneath each of the headings below as deemed appropriate;

Technology performance related	**Evidence related**
• No flexibility of radiator flow temps to optimise heating system specification and performance. • Not possible to model both radiators & under floor heating together for optimisation of heating system performance. • Under-floor heating system coverings – wood vs. concrete reaction times impacting CoPs. • ASHP plant size ratio limit of 2 – compressor sizing and efficiencies not acknowledged. • Carbon emission factors – validity & accuracy. • Misrepresentation of SHW performance – solar storage volume factors and array sizing.	• Lengthy and expensive testing procedures for some technologies e.g. PAS67 for Micro CHP. • Heating controls - impact and benefits of 'smart controls'. • Limited guidance on what constitutes the 'evidence' necessary to change SAP parameters e.g. communal heating characteristics. • Innovation bottleneck at SAP Appendix Q – high cost, complex and lengthy testing. • Representation of supplementary heating systems capable of providing greater than 10% of space heating load.
Methodology related	**Occupancy/behaviour related**
• Accuracy and applicability of 3-year running average fuel cost data. • Accuracy and applicability of TFA occupancy calculation. • Static vs. Dynamic in light of technical evolution – integrated controls, multiple fuel sources, load management etc. • More comprehensive products characteristics data file desired i.e. SHW, cylinders, secondary heating appliances and controls.	• Misrepresentation of SHW performance – hot water per person per day cap and tank sizing. • Occupancy profiles outdated. • Occupancy based on TFA leading to underestimated occupancy.

Detailed description of the issues

Below is an updated list of SAP 'snags' that concern microgeneration technologies, arising from the original MGICG snag list and more recent issues raised following engagement led by the Micropower Council and the Energy Efficiency Partnership for Buildings. Where potential solutions have been raised, they have been listed also.

Issue category	**Issue description**	**Considerations**
Technology performance related	***Underestimation of heat pump COPs – flow temps, under floor & rad combinations, floor coverings*** Different under floor heating system coverings deliver different reaction times and default values for radiator flow temperatures will rarely affect the optimum efficiency for any one property. Wood coverings are currently treated as the best option in SAP even though the insulating effect of wood actually delivers lower Coefficients of Performance than other alternative floor coverings. For instance, concrete covering allows for more effective distribution of low temperatures and therefore better Coefficients of Performance. SAP also does not allow the benefits of various different permutations to be accurately represented e.g. SAP does not currently allow for under floor heating downstairs and radiators upstairs, preventing the highest level of efficiency from being achieved in some cases. Similarly, heat pump performance factors should better recognise the influence of low temperature heat emitters. SAP should also acknowledge the use of buffer tanks in heat pump systems. Industry acknowledges these issues may be perceived as 'system design' related but the concerns more broadly relate to the need for accurate representation of heat pump technologies vs. conventional systems in SAP.	Allow a fixed range of radiator flow temperatures. This could enable SAP to reflect the manufacturer's recommendations and acknowledge preferred operating parameters. Heat Emitter Guide for Domestic Heat Pumps details the permutations industry would like SAP to acknowledge so as to allow for optimisation of overall performance and enable heat pumps to compete with alternatives in the SAP model. Short term solution to floor coverings may be to remove the differentials all together to create a level playing field.
Technology performance related and occupancy/ behaviour related	***Misrepresentation of solar thermal performance for large arrays*** SAP output for solar thermal installations deviates from the actual performance (measured using TSol, for example) to an increasing extent with the size of the installation. As a general rule, the greater the capacity of the domestic solar thermal installation, the greater the deviation of the measured performance using SAP from the performance using other types of established energy assessment software. Both deeming the domestic hot water per person per day using the SAP assumptions for large arrays (very low demand) and inputting sensible hot water use figures causes similarly significant inaccuracies. It is thought that the low demand stems partly from the Part G hot water per person per day cap linked to the SAP underestimation of occupancy based on TFA.	The industry view is that the inaccuracies are present because SAP is not a polynomial fit for solar thermal. Work with the REA is on-going to understand the parameters causing the discrepancy and whether the issue is solely occupancy assumption related. Incorporation of solar storage volume factors would be welcomed.
Evidence related	***Micro CHP*** There is a lengthy and expensive testing procedure for micro CHP and an alternative is needed.	An opportunity to review the PAS67 test procedure with industry, with a view to reducing the test costs, would be welcomed.

Methodology related	***Fuel cost elements*** Is a 3-year running average of fuel costs an accurate and applicable method of demonstrating costs?	Fuel cost element applicable to policy elements but not compliance. For discussion at the workshop.
Evidence related	***Potential contribution of secondary heating systems*** SAP restriction that secondary heating systems can only provide up to 10% of the space heating load in a property. However, some secondary systems (e.g. wood-burning stoves) can supply more than this limit, particularly in better insulated properties. Increasing the limit could strengthen the case for solid fuel heating appliances, particularly in rural areas off the gas grid where wood is readily available and thus the economics stack up compared with LPG or heating oil.	Desirable to have increased functionality of SAP in this regard and allow larger 'secondary heating' systems to contribute more than 10%. Perhaps could be solved with Appendix Q to recognise some solutions and/or improve 'additional heating system' option rather than secondary element.
Occupancy/ behaviour related	**Accuracy of occupancy profiles** Occupancy profiles are currently considered unrepresentative and there appears to be little information about how they've been determined in the public realm.	The research gone in to determining occupancy profiles should be made public for wider scrutiny.
Occupancy/ behaviour related	***TFA Occupancy calculation*** Occupancy based on the floor area provides a low total occupancy assumption. Using the TFA calculation, a small 3 bed property will have a different occupancy level compared to a large 3 bed property, however, in reality occupancy levels are unlikely to be any different. Seemingly inaccurate figures arise for larger properties also - a floor area of 200m^2 gives an occupancy level of 3.001 but these sorts of areas will be large properties of 4 bedrooms or more. This impacts everything from internal gains, water use and total energy consumption. Little information about how these assumptions are determined in the public realm.	The research in to occupancy and floor area, based on 32,000 dwellings, should be made public for wider scrutiny. Changing demographics, tenure specific differences and property type and age may be deemed overlooked.
Evidence related and methodology related	***Communal heating*** As raised by the Zero Carbon Hub, treatment of communal heating needs updating in SAP - performance table are outdated and considered crude. ***Controls*** With respect to ERPD/Eco-design for water heaters: the working model for Lot 2 gives credit for the inclusion of smart control (relating to hot water production to water usage patterns). Other concerns arise when considering the increasing presence of more dynamic technologies and controls i.e. integrated technologies, prioritised use of fuels and fuel sources, load management etc. Static calculation vs. dynamic model may need to be considered. DECC smart control definitions should be developed along with standardised savings/recognition within SAP.	The need for robust comprehensive evidence is acknowledged but there is limited guidance on what constitutes the 'evidence' necessary to change SAP parameters. With such guidance on all matters, evidence may be more forthcoming. For example, DECC and industry holds large bodies of evidence concerning communal heating systems. Further evidence regarding controls must be sought if we're to align with ERPD/Eco-design.
Evidence related and methodology related	***Appendix Q - Innovation bottle necks and complex, costly, restrictions*** There are a number of products that have been brought to market that claim to achieve carbon reductions, however these can never be acknowledged through SAP, in particular Appendix Q. Innovators are required to invest a disproportionate amount of money in order to be recognised in the market.	Testing routes need to be clarified and processes simplified where possible - particularly for the benefit of SMEs. Bottlenecks may be overcome and costs reduced by establishing guidance and quicker routes for products in to SAP. Diversification of testing options by involving another UKAS accredited testing body or Universities would also be welcomed.

Technology performance related and evidence related	***Carbon Emissions Factors*** There are serious concerns over the accuracy and transparency of the carbon dioxide emission factors used in SAP, particularly for biogenic fuels such as wood pellets. Given the new inclusion of transport in the calculation, an important point is now raised – that of the difference between fuels produced in the UK and those imported. There will clearly be significant differences in the transport related emissions between the two, yet SAP does not currently differentiate. It would be inappropriate to use an average so we suggest that different values should be provided for domestic and imported fuels (though clearly even within the latter there could be wide variations). It is crucial for the whole industry that the figures in SAP are representative of the market reality as they influence the choices made by customers. Indeed for transparency we believe that BRE's methodology must be openly published, as well as the detailed assumptions that underlie the calculations for each fuel in SAP. Given that the markets involved are often international, it is vital that further UK schemes such as SAP are aligned as far as possible with other UK sustainability regulation, such as the Renewable Obligation and others. Where differences are unavoidable, industry must be able to understand how these numbers were derived and why such differences have occurred.	The industry would like to see the detailed basis on which BRE has calculated the proposed carbon emissions factors and have the opportunity to provide alternative data where specialists believe that these are required. A joined up approach with the EU Renewable Energy Directive, its calculation methodology, the fossil fuel comparator and various other established rules is essential.
Technology performance related	***ASHP plant size ratios in SAP Appendix Q*** The ASHP plant size ratio (PSR), which distinguishes the relationship between heat pump output (kW) at the tested ambient temperature (-5 C) and the buildings calculated heat loss (kW), currently uses the value of 2 as an upper limit i.e. the heat pump output can only be twice the requirement of the calculated heat loss. This limit is seen to disadvantage more innovative heat pumps that incorporate an inverter driven compressor and fan, which enables the systems to adjust speed to suit the buildings heating requirements accurately and operate more efficiently in scenarios where PSR is over 2. More inefficient fixed speed units are seen to be unfairly benefitting from the issue.	It is acknowledged that in the infancy of Appendix Q, the decision was made to go for a PSR of 2, but in hindsight this generalisation goes against the purpose of introducing a product specific calculation process and needs to be altered to encourage innovation and technical correctness. Particularly in light of the imminent launch of Green Deal and RHI which is to incentivise ASHP technologies.
Methodology related	***Products characteristics data file*** SAP Appendix Q provides a mechanism for claiming improved values for specific products and provides the much needed practical method of getting specific innovative products recognised by SAP. Although the associated Product Characteristics Data File has come on a great deal in recent years, it is felt this could be expanded upon further to include additional technologies, as long as there are industry agreed methodologies and systems for testing them. Additional technologies that could be added to the database could include: - Solar Hot water systems – selectable by manufacturer / model / size - Secondary heating appliances - as per suggestion made previously - Hot water cylinders and declared loss factors - from selectable manufacturer information - Controls - selectable by manufacturer and to demonstrate improved performance over defaults	Alongside this recommendation, the microgeneration industry supports the Zero Carbon Hubs recommendation of regular review of all SAP default values to ensure that they provide an incentive for continued improvement of products.