

Microgeneration Government- Industry Contact Group (MGICG)

SAP and EPC Workshop

An event facilitated and reported upon by the
Energy Efficiency Partnership for Buildings



January 2013

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Background

The Microgeneration Government-Industry Contact Group (MGICG) Action Plan¹ comprises a total of 7 taskgroups all concerned with overcoming the non-financial barriers facing mass deployment of microgeneration technologies and implementation of the Government's Microgeneration Strategy. The core objective of 'Taskgroup 2: Energy Performance Certificates (EPCs)' is to create a regulatory environment and assessment framework that enables accurate representation of the contribution of microgeneration technologies to low carbon homes and buildings.

In light of the fact that the Standard Assessment Procedure (SAP) is the calculation method that sits behind the production of EPCs for new build domestic properties and that Reduced Data SAP (RDSAP) is used for producing EPCs for existing domestic properties, the EPC taskgroup naturally also concerns the SAP and RDSAP calculation methods themselves. The workstreams that fall within the EPC taskgroup are as follows:

Workstream	Outcomes	Deliverables
Collation and illustration of existing SAP issues affecting microgeneration technologies	The microgeneration sector aligned behind a single set of SAP issues	7. A final SAP issues paper, explaining existing inaccuracies and providing evidence
Development of proposed solutions to issues outlined in the final 'SAP issues' paper	The sector aligned behind an agreed set of detailed and workable recommendations for improving SAP and making it 'fit for purpose'	8a. A SAP recommendations paper, outlining how the issues outlined in the above mentioned 'SAP Issues' paper might be resolved. 8b. Agreed set of key 'asks' for the SAP consultation
Reconciliation of SAP with the Eco-Design Directive	SAP adapted to changing European policy environment and issues identified in advance of becoming a problem	9. Assessment of how changes to treatment of calculations could impact on SAP and recommendations as to how these changes should be accommodated
Alignment of Building Regulations review with overarching priority of accurate, fair and representative EPCs, underpinned by an effective carbon compliance tool	EPCs, building regulations and associated methodologies recognise and accurately represent the value of microgeneration. EPC before and after comparison showing a clearer and more accurate representation of the microgeneration contribution	10. Concrete policy recommendations fed into the Building Regulations review

In working towards the desired action plan outcomes, the MGICG compiled a SAP snag list and recommendations for consideration by the Government and the SAP contractor, BRE, in

¹ <http://goo.gl/aaGLX>

August 2011. 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 further this work, the Energy Efficiency Partnership for Buildings (EPPB) and the Micropower Council (MPC) produced an updated SAP snag list in December 2012 after further industry consultation. This in turn led to a microgeneration specific SAP workshop being convened in January 2013 for MGICG members, DECC, the SAP contractor, BRE and other relevant stakeholders to explore potential solutions and their viability.

An attendance list for the SAP workshop event is provided in Appendix 1.

Overview of the outstanding issues

It was felt by the MGICG, and both EPPB and MPC leading on the EPCs taskgroup, that with a revised snag list in place the issues with SAP are well understood and that little work was required to revisit these during the workshop. Instead, the issues were summarised and distributed ahead of the workshop in order to provide more of a solution seeking bias to the event.

However, 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 were 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 (EPPB). A shorthand summary of each of the issues is given beneath each of the headings overleaf.

Technology performance related	Evidence related
<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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.

A detailed description of each of these issues is given in Appendix 2.

Introductory Session

To kick the event off, a presentation was given by the SAP contractor, BRE to iterate the intended scope of SAP and a second presentation was given by Mark Crowther, Kiwa Gastec at CRE who provided a practitioners perspective on SAP. The full set of slides from the day have been uploaded to the EEPB website².

A number of important points were raised both during introductory presentations which are noted below.

Key points made by the presenters:

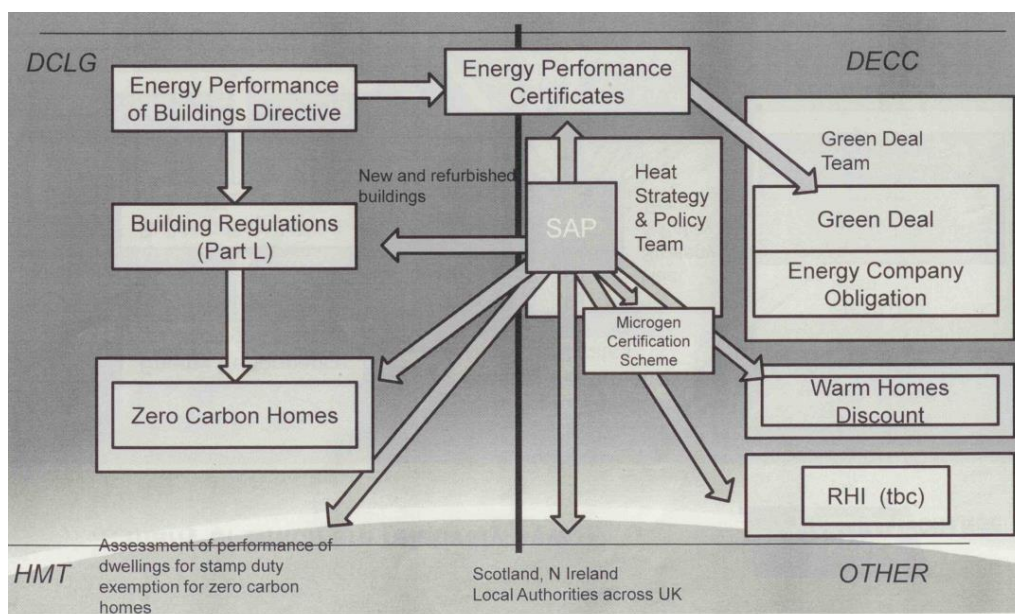
- BREDEM 8, the model behind SAP, is a monthly calculation method for the energy use in buildings originally developed in the early 1980's.
- SAP is:
 - The UK's national calculation methodology for the energy ratings of dwellings that calculates energy used for space heating, water heating, lighting, pumps and fans based on an assumed standard occupancy pattern.
 - Not a design tool and mustn't be used to specify measures and technologies.
 - Not a marketing tool (product claims such as "SAP approved" are not valid)
 - Intended to assess dwelling performance in a neutral manner, not favouring or incentivising particular technologies or products over others
 - Designed to be able to make comparisons between properties – 'SAP must be kept pure' and be used solely as a neutral and comparative means of rating properties.
- Reduced Data SAP (RDSAP) is not a 'version' of SAP. It is a series of inference algorithms/instructions that convert a smaller amount of survey data into the full dataset needed to do a normal SAP calculation. It was introduced to make it cheaper and quicker to do SAP ratings for existing buildings.
- The Green Deal Occupancy Assessment (OA) aims to reflect the occupants use of a dwelling. It is based on BREDEM and provides Green Deal Advisors the ability to amend the standardised occupancy and behaviour assumptions which are used in SAP assessments.

Audience comments:

- There are doubts about the validity of some of the assumptions made by RDSAP inference algorithms and also the data upon which some of the SAP parameters are based. Although SAP has been continuously reviewed, updated and developed, not all of the background data and evidence is in the public realm and open to wider scrutiny.
- Whilst it is accepted that for the purpose of property rating, standard occupancy parameters must be used, there is scope for better, more up to date and representative occupancy assumptions to be incorporated.

² <http://goo.gl/T0l1aa>

- Uses of SAP have extended beyond its original intention - house builders have to meet targets, and therefore SAP has an impact on the design specification.
- There are well founded concerns that house builders and those undertaking domestic refurbishments are being led by SAP and disregarding good practice and professional judgement in the process – for example hot water cylinders are often undersized, heat emitters incorrectly specified and insulation and ventilation strategies are not being developed in unison. This challenge needs ownership.
- Neil Witney (DECC) reported that four bids for SAP are currently out for tender:
 - for the national calculation methodology
 - for the database on how individual products will perform
 - for the software, and
 - for the assurance/integrity of the entire SAP development process
- Timing of the workshop presents an industry opportunity to influence DECC thoughts on SAP tender process. For example, what variables/additional options can providers bring in to the SAP process to make it more accurate and representative and more robust (and at what cost).
- The applications of SAP span many legal, policy and governance realms, illustrated by the DECC diagram given below. Managing these different uses and ensuring the application of SAP is fit for purpose in each instance is a growing challenge.



Following the presentations delegates split into two groups and participated in two 45 minute breakout sessions:

- 1) SAP Simplicity/Complexity vs. Design/Compliance
- 2) SAP Science - Show me the evidence

The titles of each of these sessions were pitched to provide umbrella headings to help steer debate toward pragmatic solutions. The remit of each breakout and the discussion had is detailed in the next sections of this report.

Breakout 1: SAP Simplicity/Complexity vs. Design/Compliance

The MGICG has identified a wide ranging number of SAP 'snags' over past 12 months which were consolidated and categorised in to four categories ahead of the workshop. This breakout session sought to challenge a broad range of the issues by exploring whether the underlying SAP calculation methodology is too complex to develop and enhance or whether it is actually too simplistic and does not sufficiently represent increasingly advanced technical solutions. In addition, the session aimed to explore whether the intended scope of SAP has become too broad and to what effect its growing list of applications above and beyond simple compliance calculation purposes has on the microgeneration industry.

Although these are significant questions to ask of SAP in a 45 minute breakout session, it was deemed an appropriate way to begin understanding plausible and pragmatic solutions to many of the issues presented within the MGICG snag list. The primary categories of issues this session was aimed at were the technology performance related issues, methodology and policy related issues and the occupancy and behaviour related issues. The following bullets were presented to initiate the breakout:

- Has SAP become too complex?
- Who are the users of SAP?
- Why is SAP being used the way it is and can it be better steered?
- Is there a need for 'industry approved' design tools as well as SAP for compliance purposes?

The themes that emerged during this breakout session are summarised below:

SAP Scope

Challenges

- Although it's documented, more accessible and digestible clarity is needed on what SAP is for i.e. to demonstrate compliance with a regulatory standard and rate properties; not to design and compare solutions.
- Despite arguments that SAP is not a design tool and isn't to be used to compare and specify measures, there are conflicting messages e.g. SAP modelling is used by Government to inform policy and the DCLG EPC Advisor for householders is SAP based.
- For industry, there are other activities occurring in parallel to SAP modelling - including MCS compliance and system design.
- Regardless of the fact that manufacturers have suitable design tools, SAP is still used for design because it dictates compliance. Developers and installers don't invest in certain microgeneration technologies if they don't impact the SAP rating favourably, nor will they change system and/or emitter sizes if it increases costs and has a little bearing on the SAP rating.
- Three points to the triangle on SAP design: complexity, accuracy and cost - a balance always needs to be struck between these three areas.
- Model is too simple for some academics and manufacturers; and getting too complex for some builders and practitioners to understand.

- How do we strike the balance between accuracy and cost of development?
- SAP currently attempts to serve too many functions and is becoming unwieldy.

Ideas

- It was discussed that there is considerable scope to improve communications about SAP and educate wider industry about what SAP is and is not. This could include guidance on other design tools available which highlight the limitations of SAP and the specific capabilities of more specialist software applications.
- Other improved means of communication could include provision of training courses/CPD at different levels (e.g. Level 1 - 'an introduction to SAP') and an agreed set of core messages communicated via the SAP contractor, MCS, DECC and other industry channels.
- The format of the official SAP document could be improved to read more like a user guide rather than a software design manual. Alternatively, both could exist in unison e.g. a SAP technical manual and a SAP user guide.
- Technology specific 'working practice' documents could co-exist with the SAP manual/user guide to provide detail specification considerations and to elaborate on the factors not being considered by SAP and that may have a bearing on the particular technology inputted.
- Work is needed to better understand who it is that predominantly uses SAP and what guidance and communication is needed for whom. SAP is not just used by qualified DEAs, GDAs and OCDEAs etc but also house builders, architects, consultants and so forth.
- There is scope to better dovetail SAP with design, specification and MCS certification procedures. For example, to take xml imports and exports of inputs and outputs and to better flag dependencies and next steps within the SAP process.
- If SAP is for compliance only, there is scope to build a complementary but separate 'energy saving model' in order to kill off inappropriate use of SAP. This could be founded on a 'householder performance database' fed by smart metered actual energy use to determine occupied heat loss coefficients (W/K per M2). Key challenge in this regard is that smart meters don't include metering of heat or gas.

Representation of occupancy

Challenges

- There is a big difference between assessing a dwelling and assessing the energy use of occupants. The interrelationship is very weak.
- SAP origins are new build Part L compliance and thus logical that occupancy is standard as modelling is done prior to homes being occupied.
- It is widely acknowledged that it is critical for Green Deal to take account of specific occupancies and heating patterns for golden rule to be modelled and met. Assessor training must reflect this complexity and SAP and/or the GD process must have means of factoring in when property owners / occupiers change during the GD loan payment period and energy use changes.

- The occupancy profiles currently used by SAP are considered unrepresentative and there appears to be little information about how they've been determined in the public realm.
- Performance of systems varies greatly depending on how householders operate them and occupy their buildings.
- The GD occupancy assessment is 'bolt-on' to gather information and inform the SAP calculation. It is not an integral part of SAP itself.
- Although not intended, SAP projections leave consumers with a degree of expectation with regards to savings/running costs. When this expectation is not managed and projections are not met in reality or because specific details such as location and occupancy have had a bearing, consumers feel confused, miss-led and let down.
- Renewable Heat Incentive (RHI) calculations and deeming.

Ideas

- As per 'energy saving model' idea, there is scope for the use of historical energy consumption data and on-going smart metering data to inform both tailored energy saving predictions and on-going review of Green Deal repayments and income from subsidies such as RHI and FIT.
- For example, a Green Deal could be recalibrated after the first year if the savings don't match those predicted. People will change behaviour if they can see real information about their energy use and how it affects their payments.
- The less sophisticated alternative is for a greater number of studies in to actual energy use/smart meter data to provide evidence and inform RDSAP.
- SAP could include a range for occupancy types as well as consumption types/scenarios, e.g. three figures for an inefficient, standard and efficient user. This could provide more honest energy use and energy saving projection ranges that would help manage expectations.
- Clearer consumer specific guidance and/or protection could do with being put in place to ensure consumers fully acknowledge the purpose of SAP and to prevent industry mis-selling.
- Wider research in to potential alternatives to the SAP calculation method could be commissioned by Government.

SAP Evolution

Challenges

- Who should cover costs of SAP development? Its application is required under the EU Energy Performance of Buildings Directive (EPBD) and is used to aid the implementation of Government policy but it's equally a market transformation tool that promotes energy efficiency and microgeneration and thus benefits industry.

- Today, new homes are built differently and to more stringent, low energy standards, therefore more up to date research is needed in order to understand how SAP should evolve to model these homes more accurately.
- There is a need to join up the consumer journey– i.e. what are the key policies and who are the stakeholders. For example, wasted opportunity should data from smart meters only be used for billing purposes by energy companies.
- Very few individuals in the country fully understand SAP, its origins and how it works.
- Technology development is so fast that SAP in its current form is always lagging behind reality.

Ideas

- SAP could adopt a new business model whereby SAP licence fees or income generated through the production/lodgement of EPCs could fund improvements.
- The amount of investment in SAP could be explicitly linked to the amount of investment it drives i.e. income is being generated through training of assessors, testing and validating products, producing EPCs etc, plus also has a bearing on Government expenditure through subsidy initiatives and is increasingly influencing property lets and sales.
- Energy suppliers are not often involved in SAP debates yet they hold substantial levels of energy use data and have a vested interest in more accurate modelling of pre and post improvement energy use. (Energy UK sent apologies prior to the workshop and were thus unable to shed further light on this).
- The SAP contractor could periodically produce an 'improvements wish list' based on both direct Government and industry requests and also its own experience working with the methodology. Through a tendering process some of this list could be outsourced or partnerships brokered to help make the improvements a reality sooner than would be possible through internal development and traditional less regular consultation processes.
- Whilst it is felt that the SAP Scientific Integrity Group provides a valuable means of reviewing SAP, its agenda could be more open and better informed by industry through clearer channels. Outside of consultation processes there are many that would make advisory comments on key aspects of SAP.

Assessment Process

Challenges

- The recommendation of certain measures by EPCs and Green Deal assessments is at the discretion of the assessor and it's not unusual for there to be misunderstanding as to the capabilities and limitations of certain options.
- Provision of training to assessors is presently insufficient if they are expected to make a judgement on the suitability of an ever growing spectrum of upgrade options.
- It is critical that assessors fully explain the limitations and intended purpose of SAP. Although this is taught at point of training it's not often delivered in reality.

- There is a significant onus on the assessor, yet they are not required to demonstrate low-carbon buildings expertise and are trained quickly and cheaply.

Ideas

- A degree of onus could be removed from the assessor if the SAP Appendix T element of RDSAP/Green Deal assessment was enhanced to capture more advanced technical 'rules' and to flag risks. For example conservation status, architectural features and access or structural constraints could all be additional SAP inputs that help better filter the viable options.
- More clarity is needed from Government and/or the SAP contractor with regards to the expectation of assessors. This in turn could inform the development and refinement of the training standards.
- A short concise 'guide to SAP' developed for both assessors and consumers. For assessors this may be given as part of the training literature and for consumers the guide may be handed as an additional piece of information to accompany the EPC.

Key SAP Parameters

Challenges

- Contacting DCLG, DECC and SAP contractor personnel regarding background information on key SAP parameters is extremely difficult and queries are occasionally ignored.
- Although information about how the carbon dioxide emission factors used in SAP has been published there remain concerns about the overall accuracy and transparency, particularly for biogenic fuels such as wood pellets.
- Politics stands in the way of fuel cost parameters within SAP and there is often a conflict between the internal Government projections and projections made by others.
- The 'traditional' review of SAP parameters every 3 years is not often enough given the pace of technical developments, fluctuations in carbon emission factors and volatility of fuel costs.

Ideas

- Both BRE / DECC confirmed that they will respond to questions seeking clarity regarding carbon emission factors.
- A clearly stated specific point of contact regarding SAP should be provided by the SAP contractor. Similarly, contact details for the chair or appointed leads sat on the SAP Scientific Integrity Group could be made available. A contract clause could include the requirement to respond to technical enquiries within x working days with means to report failure to comply set up.
- As per DECC fuel price projections, SAP could incorporate low, central and high fuel cost scenarios to allow EPCs to project both best and worst case cost benefit.
- Carbon emission factors, fuel prices and other key SAP parameters must be reviewed by the SAP contractor, Government and Industry more regularly than at present.

Breakout 2: SAP Science - Show me the evidence

This breakout session sought to challenge the concerns raised by MGICG members relating to the recognition and inclusion of certain technologies in SAP and what constitutes robust scientific evidence. In addition, the session aimed to explore how critical it is for innovators, manufacturers, suppliers and other supply chain players to have their wares recognised by SAP and what the repercussions are if they are not.

The primary issue category this session was aimed at was the evidence related issues but both occupancy and behaviour as well as technology performance related issues also bleed across. The following bullets were presented to initiate the breakout:

- Is guidance needed on what constitutes adequate evidence?
- How effective are products performance databases/Appendix Q?
- How can product testing be made more affordable?

The themes that emerged during this breakout session are summarised below:

Communication

Challenges

- Beyond the existing published material on the SAP Appendix Q website, it is felt that improved guidance and advice with regards to how products and systems, both new and existing, get in to SAP and its accompanying product performance databases is needed. It is critical for industry to fully understand this process and the requirements prior to investing heavily in testing programmes.
- Improved guidance on the full breadth of options, pathways and processes is needed.
- Direct contact with the SAP contractor to discuss and understand what has gone before, what the options are and what the potential challenges/limitations and hurdles are is difficult. It's considered time consuming and resource intensive for the contractor.
- There is a perceived conflict of interest - BRE as the current SAP contractor manages both the SAP model and does product testing. Although there are presently two other certified testing providers, this is not currently communicated well by Government or the SAP contractor.
- The SAP contractor often struggles to obtain elements of required information from inventors and manufacturers that are critical to the testing and validation process.
- In addition, during the testing process, manufacturers often make changes to their products which cause setbacks or delays.
- The SAP contractor, who also manages the product performance database and undertakes a lot of the testing, has the power to act as a gate keeper.

Ideas

- A review of the guidance provided on the BRE SAP website is needed.
- Create a more formalised, clear route for industry to follow - both when looking to introduce new technologies but also for when looking to propose new evidence, comments or suggestions concerning the SAP methodology.

- Agreement that action is needed to review Appendix Q guidance and that wider industry should be invited to pass comments on the existing guidance as part of the process.
- Government could consider the capacity any future SAP contractors have to respond to enquiries and the level of committed resource to such duties.
- It is critical for impartiality that all evidence submissions to SAP are channelled through the SAP Scientific Integrity Group.
- Independent 'case officers' could be assigned to disputes and testing programmes.
- MCS could have a more prominent role in acting as an intermediary between the SAP contractor and the microgeneration industry. For example, MCS technical working groups may have reporting lines in to the SAP Scientific Integrity Group.
- Multiple communication channels are necessary - it mustn't just be through a key individual, through certain working groups or through Government etc. alone.
- Greater transparency with regards to the Appendix Q testing process and requirements would be welcomed.

Constitution of Evidence

Challenges

- There is a lack of clear, consistent guidance and advice with regards to what constitutes adequate evidence when looking to propose changes or new technologies for SAP.
- Although it is widely accepted that SAP must remain scientifically robust, it is presently difficult and time consuming to consult with the SAP contractor as to what evidence would be acceptable.
- Many product manufacturers commission independent rigorous testing and validation work themselves but this tends not to be sufficient proof of performance for SAP.
- Are the testing methodologies used to satisfy the European Energy Related Products Directive (ErP) sufficient to be acknowledged by SAP, for example?
- Duplication of testing is frustrating and costly for the industry and there is a considerable amount of work that could be done to align existing mandatory test requirements with those required by SAP.
- Many existing testing methodologies do not fully represent annual consumption under 'ordinary' loads. They are often in place to test peak performance and maximum loads. What's more, the parameters used by SAP must be applicable to all houses but many field trials and test programmes don't consider this fully and insufficient data is gained.

Ideas

- As per previous idea concerning communication of formal testing and evidence gathering processes, guidance documentation could incorporate information about the importance of maintaining the scientific integrity of SAP and where the boundaries lie with regards to evidence.
- Part of bringing a product to market is putting it through the testing process for both compliance and commercial purposes. SAP should work with industry and strive to

align, merge or develop testing methodologies so that one test can serve multiple purposes.

- There could be guidance and a process for taking existing methodologies, studies and trials from other countries into account. It can be costly to re-invent or replicate and further consideration of what's already been done elsewhere is needed.
- Diversification of testing options and the involvement of more testing providers, including Universities, would be welcomed.

Technical Challenges

Challenges

- Presently differing types of heating controls are not included within SAP Q by the SAP contractor on the grounds that the savings they achieve are not proven. However, under the ErP/Eco-design directive 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).
- The rate of technical development often outstrips the rate at which testing standards are developed. This often leads to new testing regimes and standards having to be developed on the fly and at short notice.
- Proponents of a certain product cannot talk about "savings" unless they make clear what before/after they are comparing, e.g. how do people without heating controls manage their heating regime? In many instances household manage their boiler manually, so advanced controls will actually not achieve any saving. (UCL research has shown that houses with and without heating controls have no different heating energy consumptions)
- There are concerns for SAP with regards to the increasing presence of more dynamic technologies and controls i.e. integrated technologies, prioritised use of fuels and fuel sources, load management etc.
- SAP output for solar thermal installations deviates from the actual performance to an increasing extent with the size of the installation.
- For the modelling of many technologies, it is known that specifiers and installers routinely modify the SAP equations. Whilst this is difficult to police or prevent, it is felt more could be done to distinguish 'modelling' from compliance and rating.
- Does SAP represent technologies if different building typologies equitably? For example, halls of residence are very different to domestic properties in the way energy is used.

Ideas

- Further evidence regarding the effect more advanced controls have on energy use needs to be sought if we're to align with ErP/Eco-Design Directives.
- DECC smart control definitions need be developed along with prospective savings which should be recognised within SAP.
- A clearer framework/library of existing SAP recognised test standards is required, or if it already exists, it needs to be better publicised.

- Where test standards do not yet exist, accepted structures need to be put in place to effectively allow new standards to be developed or pulled together based on multiple existing standards. This could perhaps be best achieved through a more formal module based system, allowing new standards to be more flexibly composed based on the restructuring of existing modules.
- Static calculation vs. dynamic model may need to be considered. The University of Strathclyde have done good work on getting correlation between SAP, dynamic models and in-use data.
- As per ideas noted earlier in this paper, there is scope to develop an 'energy saving model' to work alongside SAP to better control the inappropriate use of SAP and its rating system.
- Comparability is needed with a wider range of in-use data.

Acknowledging Innovative Solutions

Challenges

- Investors often cling to the ingenuity of their idea, even if it does not stand up to scientific scrutiny. Innovative products must clearly demonstrate what core thermodynamic principle they are based on and how it will make the overall system and property more efficient.
- Under the current contract arrangement, the SAP contractor can have an initial meeting with an inventor, but anything from then would have to be paid for.
- Although SAP is not intended to support or promote the sale of energy saving products and has no intention to block or impede, it ultimately does because standard baseline parameters within SAP for many technologies are very low and products performance databases create a product ranking environment. This is healthy for driving innovation but conflicts with the ethos of SAP.
- Getting new products and solutions in to SAP and its products performance databases is costly and time consuming, especially where solutions are truly innovative and fresh to the market. This requirement to invest a disproportional amount sometimes prevents the best and most innovative solutions from becoming recognised by SAP.

Ideas

- Under a new contract and funding arrangement, emphasis could be laid on ensuring the SAP contractor has a greater capacity for providing innovators guidance at an affordable rate. This may be achieved through an 'innovation fund' built-up from income generated through EPCs and/or fees paid to the SAP contractor for introducing technologies to Appendix Q.
- As per idea noted earlier, independent case officers could oversee the proposals of new technologies and to make judgement based on the views of all stakeholders - the SAP contractor, testing provider, the innovator, manufacturer and any representative bodies.
- The 'energy saving model' discussed earlier could provide a degree of return to those that invest in having their specific products recognised by SAP by listing detailed specifications that recipients of the model output could act upon.

- Modelling standard energy efficiency measures better (incl. revising GD in-use factors) could provide greater benefit compared with getting to grips with brand new measures.
- Focus should be on innovative products/systems for existing stock rather than new build, as these will form a small percentage of the built environment in 2050.
- Further thought is needed on how SAP can be made more financially self-sustainable and for the system to become better resourced overall.

Final comments

As the workshop drew to a close, the facilitators presented a summary of the main challenges raised and delegates made the following final remarks:

- Government could look at the cost-recovery for SAP – the level of investment in maintaining SAP is currently insufficient. Switching to a new funding model that either involves a small surcharge on each EPC, involves the creation and licensing of an 'energy saving model' or that involves financial support from Government based on the level of investment SAP stimulates could all improve this.
- The providers of SAP based services, Energy companies and GD providers are all key stakeholders to engage with on the principles of SAP.
- Direct consultation and a workshop with the existing providers of SAP software and services would prove valuable as these all have considerable on the ground experience of using SAP in its current guise.
- Open discussion and industry engagement from Government and/or the SAP contractor on potential improvements to SAP Appendix Q would be welcomed.

Next Steps

The intention of the MGICG SAP workshop and this report has been to formally capture not just the challenges SAP faces but also to begin to highlight some potential ideas and solutions. Short term it is hoped that the report informs Government and its current SAP tendering activities. It is also hoped the findings help to inform the proposals and work plans being made by the current SAP contractor, BRE and any prospective SAP contractors. Beyond this, the MGICG, EEPB and the Micropower Council will continue to work together to provide a platform for future engagement on the matter of SAP in the microgeneration industry. If deemed appropriate by industry, this will comprise of a new specialist working group and an accompanying action plan to take forward key elements of this report.

Appendix 1: Attendees

Organisation	First Name	Surname
BEAMA	Kelly	Butler
BRE	John	Henderson
BRE	Brian	Anderson
CHPA	Ian	Manders
CIPHE	Keith	Westcott
DECC	Alan	Christie
DECC	Bruce	Young
DECC	Neil	Witney
DECC	Paul	Rochester
Energy Saving Trust	Ian	Cuthbert
Ground Source Heat Pump Association	David	Matthews
Heat Pump Association	Terry	Seward
Heat Pump Association	Tony	Bowen
HETAS	Robert	Burke
HHIC	Chris	Yates
HHIC	Roger	Webb
Kiwa Gastec at CRE	Mark	Crowther
Micropower Council	Emma	Piercy
MPC/Daikin	Graham	Wright
NES	Austin	Baggett
REA	Mike	Landy
REAL	Ciaran	Burns
Zero Carbon Hub	Tessa	Hurstwyn
EEPB (chair)	Mark	Brown
EEPB (event coordination)	Luke	Smith
EEPB (event coordination)	Mathias	Hessler

Appendix 2: Detailed description of identified SAP 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
Technology performance related	<p><i>Underestimation of heat pump COPs – flow temps, under floor & rad combinations, floor coverings</i> 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.</p> <p>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.</p> <p>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.</p>
Technology performance related and occupancy/behaviour related	<p><i>Misrepresentation of solar thermal performance for large arrays</i> 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.</p> <p>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.</p>
Evidence related	<p><i>Micro CHP</i> There is a lengthy and expensive testing procedure for micro CHP and an alternative is needed.</p>

Methodology related	<p>Fuel cost elements</p> <p>Is a 3-year running average of fuel costs an accurate and applicable method of demonstrating costs?</p>
Evidence related	<p>Potential contribution of secondary heating systems</p> <p>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.</p>
Occupancy/behaviour related	<p>Accuracy of occupancy profiles</p> <p>Occupancy profiles are currently considered unrepresentative and there appears to be little information about how they've been determined in the public realm.</p>
Occupancy/behaviour related	<p>TFA Occupancy calculation</p> <p>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 200m² 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.</p>
Evidence related and methodology related	<p>Communal heating</p> <p>As raised by the Zero Carbon Hub, treatment of communal heating needs updating in SAP - performance table are outdated and considered crude.</p> <p>Controls</p> <p>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.</p>
Evidence related and methodology related	<p>Appendix Q - Innovation bottle necks and complex, costly, restrictions</p> <p>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.</p>

Technology performance related and evidence related	<p><i>Carbon Emissions Factors</i></p> <p>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).</p> <p>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.</p> <p>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.</p>
Technology performance related	<p><i>ASHP plant size ratios in SAP Appendix Q</i></p> <p>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.</p>
Methodology related	<p><i>Products characteristics data file</i></p> <p>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:</p> <ul style="list-style-type: none"> - 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