27 January 2017

Energy Saving Trust submission:
Proposed changes to Government's Standard Assessment Procedure (SAP)

Energy Saving Trust is pleased to respond to the Business, Energy and Industrial Strategy (BEIS) consultation on proposals to amend the Standard Assessment Procedure (SAP)

Energy Saving Trust is the leading, impartial sustainable energy organisation. We work on behalf of governments and businesses across the UK providing services in the area of data, assurance, grant and loan administration, consumer engagement and advice.

For BEIS the Energy Saving Trust delivers the telephone-based Energy Saving Advice Service in England and Wales. We also undertake other research and awareness-raising work for the department on a project-by-project basis. Prior to the coalition government, for over 15 years, the Energy Saving Trust ran national energy advice services as a grant-funded organisation.

In Scotland the Energy Saving Trust is a principal delivery partner of the Scottish Government for home energy efficiency. We run comprehensive local and national advice and support programmes.

Public engagement on energy is at the heart of our work. In total each year the Energy Saving Trust handles just under half a million energy efficiency advice calls on behalf of UK and Scottish governments. Energy Saving Trust has a unique relationship with the public around energy saving and renewable energy and our response reflects that.

Question 2: Should we keep the current set of heating patterns set out in SAP or move to using two heating periods every day of the week? Please provide supporting information for your view.

On the basis of the evidence provided in "CONSP:01" that changing the heating temperatures and patterns to reflect EFUS data would result in only a marginal difference in overall modelled energy consumption (2.3 – 5.8%) we do not think that a change is required.

Furthermore to be consistent with previous heating patterns assumed in earlier versions of SAP and for modelling adequate heat requirement in calculations for fuel poverty we support keeping the current heating pattern assumptions.

Question 4: Do you agree with the proposal to change the way that lighting is calculated in SAP?

Overall we agree with the principle of taking into account the lighting "requirement" of a home and using calculations that give better scores to lighting that is adequate and efficient. On the whole, the proposed approach appears to take into account all of the relevant factors that would affect this. However, in certain rooms in a house, such as small utility rooms or walk in wardrobes, the lighting requirement may not be as high as in more occupied areas. It may be helpful in the calculation to only account for areas such as hall-ways, kitchens, bath rooms, living and bedrooms so as not to promote the additional light fittings in rooms that do not require as much light.

Question 5: Do you agree with the proposal to remove the default values in Table K1, review default values as proposed, and recognise Certified Thermal Details and Products schemes? Do you agree with the proposal in due course to amend the default y-value to 0.2?

Yes. We agree that this appears to be a sensible approach and one that would encourage greater attention to be paid to thermal bridging in new dwellings.

Question 7: Do you agree with the proposal to change the default U-values for walls for existing buildings in RdSAP?

Based on the evidence presented, as well as similar research undertaken by the Energy Saving Trust into the thermal performance of solid walls we think that the proposed amendments look reasonable.

Question 8: Do you agree with the proposal to amend the hot water methodology in SAP?

We strongly support the inclusion of shower flow, shower heating fuel and bath installation as a factor affecting the domestic hot water use calculation in SAP. Energy Saving Trust has made significant efforts over the years to promote the energy saving benefits of hot water saving devices, such as low flow rate shower and low volume baths and sinks.

Question 15: Do you agree with the approach to adjust the carbon savings where solar PV electricity is used in the home to heat water or where it is put into battery or other storage? Do you have a view on the correct export tariff for PV electricity exported to the grid? Do you have ideas on how solar thermal space heating, or storage of solar PV or hot water through a battery or other medium can be modelled?

We agree that the proposed approach for handling homes with an immersion heater diverter appears sensible in principle, but we are concerned about the increased use of parameters that are not evidence based.

The utilisation factor, currently proposed at 0.9, needs to take account of all the times when the PV system is generating surplus but the hot water cylinder is already at the highest permitted temperature. We are not aware of any evidence that supports or refutes the proposed figure, but a precautionary approach would suggest starting with a lower figure, to be increased if and when supporting evidence becomes available. This would avoid any risk of official figures, based on unsupported assumptions, being used by commercial companies to overstate the financial benefit from installing their product.

Other energy storage technologies, such as batteries, are likely to have much more significant and varied storage limitations, leading to lower in use factors that are even harder to predict without field trial level evidence. Field trials would also provide evidence of actual charge and discharge cycle losses, which will also be needed to calculate financial savings and CO_2 costs. Without that level of evidence it is difficult to see how such technologies could be accounted for in SAP.

The proposed formula for immersion heater diverters includes another unsupported factor - β - the proportion of total generation that is used within the dwelling without being diverted. This factor has stood at 50% for many years, without any evidence or theoretical argument to support it. There is very little evidence of actual in-home use and export proportions for PV systems, but what evidence there is suggests a lower figure.

Two DECC publications have provided evidence for this figure - **Energy usage in households with Solar PV installations** (December 2014) and **Annex B: Electricity use in households with solar PV** (June 2015). These two reports summarise analysis carried out on two data sets from the National Energy Efficiency Data-Framework (NEED), comparing actual electricity imports before and after installation of a PV system, and comparing that reduction with the change in imports for equivalent houses that did not install PV.

These assessments do not tell us the figure for in-home use directly, but they do tell us the average reduction in electricity bills that PV installers have achieved in practice. The figure is far lower than that suggested by assuming 50% is used in the home, suggesting an average annual bill saving of around £70 per year rather than the circa £250 per year we would expect if 50% were used in the home and all other factors remained the same.

Actual export figures have been monitored in an independent trail for a different home energy technology – micro combined heat and power (mCHP). The Micro-CHP Accelerator Final Report (Carbon Trust 2011) showed that on average 35% of total generation was used in the home, and the remainder exported. Direct operational comparison between different technologies is not always informative, but:

- The mCHP systems monitored were configured to operate during periods of significant heating demand, meaning generation was likely to coincide with times when the house was occupied. By comparison, PV generates when the sun shines irrespective of occupancy, and

so we would expect a higher proportion of mCHP generation to be used in the home than for an equivalent PV system.

- The mCHP systems monitored had a rated output of 1kWe, compared to average PV installation sizes of 3.5 kWp or more. Greater peak output implies greater likelihood of instantaneous output exceeding instantaneous on-site demand, again suggesting that mCHP systems would use a higher proportion in the home than PV.

These factors combined suggest we should expect PV in-home usage to be less than 35%, and certainly that 50% is an unsafe assumption.

We have also heard anecdotal evidence from a small number of callers to the Energy Saving Advice Service expressing surprise at the lack of any dramatic reduction in electricity bills following a PV installation. We have not been able to verify these individual observations.

It may be that some of this under performance is due to a rebound effect, where PV system owners make inappropriate decisions on how they use electricity following installation, leading to an increase in total electricity use and a reduction in the net bill savings. However, in the light of this evidence, and the lack of any evidence that we have seen to counter it, we believe that continuing to assume 50% in-home use is unsupportable, supports mis-selling of the technology and distorts the development of Government policy. This issue has implications for a number of factors outside the scope of this consultation, but it impacts directly on two elements of Question 15.

The proposed formula for calculating energy usefully diverted to an immersion heater includes a factor β that we know is too high, and an in use factor that may well be too high. These errors could cancel each other out to an extent, but that is no argument for continuing with a known false assumption.

Analysis from the two DECC reports mentioned above suggests a figure for β of less than 20%, if we assume the reduction in bills gives an accurate representation of the in-home usage. If we assume other factors may be at play too, then a slightly higher figure may be more realistic but, given the results of the Carbon Trust report, we do not see any argument for assuming a figure higher than 25%.

At the Energy Saving Trust, we assume a fixed figure of 450 kWh per year used in the home, rather than a percentage of generation. This is an average figure taken from the DECC reports. We prefer to use a fixed figure rather than a percentage of generation, as there is no theoretical reason for assuming a linear relationship between generation and in-home use. Also, given the scale of typical domestic PV installations and the resulting scale of annual generation compared to annual use, significant variation in in-home use is unlikely to occur based purely on variations in system size or output.

Export Tariff

We are not sure why the retail cost of electricity was ever applied to the assumed exported fraction, nor why this should be considered to make “logical sense”. We are not aware of any circumstances in which an electricity supply company would pay the retail price for any exported electricity, other

than there being an old electricity supply meter that was capable of running backwards during export, and the electricity supplier being unaware of this.

Our experience from speaking to householders with PV systems not registered for FITs is that, if your electricity supplier is not obliged to pay you the FIT Export Tariff for your exported electricity, then you will not be able to find an electricity supplier who is prepared to pay you anything for it. We understand this will be different for owners of larger installations, but we have not heard from a single domestic scale system owner who has been able to sell their surplus outside of the FIT system.

Domestic PV installations will therefore attract one of the following rates for exported electricity, at 2016/17 prices:

- The FIT export tariff for post 2012 installations – currently 4.91 p/kWh
- The FIT export tariff for pre 2012 installations – currently 3.48 p/kWh
- Nothing at all, if the system is not FIT eligible for some reason

We cannot speculate what rate any system might attract in the future, other than to assume that any future scheme or arrangements is likely to aim at an export rate similar to the average wholesale cost of electricity so as not to distort the electricity market unduly. We would therefore argue that the assumed value of exported electricity in SAP should be set at the current FIT export rate, or very close to it.

How this figure is then used to calculate export income is also dependent on how the exported amount is calculated. The vast majority of domestic PV installations currently have export deemed at 50%, as export meters are rarely installed at this scale. However, the smart meter roll out is likely to lead to a dramatic increase in the number of metered systems, with the vast majority of current and future PV systems metered for export by the end of 2020.

There is therefore an argument for calculating export payments based on the new export rate and the new value for β, as described above. This would lead to an increase in export payments compared to sticking with the 50% figure, although the figure would still be considerably lower than the current calculation based on retail electricity prices. Of course, this can only be considered if the more fundamental issue of calculating bill savings using an incorrect β figure is also addressed. Until both bill savings and exports are calculated on a realistic basis, all SAP figures for PV will be misleading. Any attempt to accommodate the impact of electricity diversion systems will inevitably be inaccurate unless this more fundamental flaw is corrected first.

Question 18: Do you have any evidence on the technology costs used in RdSAP?

Energy Saving Trust in partnership with Rickaby Thompson Associates are presently undertaking research for BEIS to obtain detailed information on the costs of insulating walls and roofs[1]. The research will procure quotes from industry for complete insulation work specifications (including assessment, installation plus additional equipment and labour costs). We envisage that this will

[1] Costs for Insulating Non-Standard Cavity Walls and Lofts [Available from: https://www.contractsfinder.service.gov.uk/Notice/c877cf6c-b8b2-44ee-bdad-1d36057859c6]

produce more precise estimates for the costs of wall and roof insulation, following best practice guidance. The findings from the results will be available in Spring 2017.

Question 19: Do you have any evidence to update the assumptions that SAP makes about heating controls?

At present the draft consultation edition of SAP 2016 has the same assumptions about the effect installing a room thermostat and TRVs as in SAP 2012. Table 4c and 4e state that for gas and oil central heating systems without thermostatic control of room temperature operate with efficiency 5% lower and an internal temperature 0.6 degrees higher than a system with these controls.

Whilst we would promote the installation of controls that allow the householder to specify the internal temperature of their home, we have evidence that suggests there are cases where it is unlikely that the installation of these controls will contribute to a reduction in energy consumption. The EST / DECC field trial of heating controls showed that in a significant proportion of the homes monitored heating controls were not able to contribute to savings because homes did not have the thermal performance to reach the set point temperature on the controls[2].

It may be technically challenging to include in the model, but we would propose considering a calculation that only applied a reduction in energy consumption thanks to these heating controls once a home has reached a certain level of thermal performance by reducing heat loss (both from drafts and poor insulation).

[2] Department of Energy and Climate Change (2010) *In-situ monitoring of efficiencies of condensing boilers – TPI control project extension [Available from* https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/47962/1149-condensing-boilers.pdf]