Response to Ofgem Consultation: ECO2 Consultation: Deemed Scores

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Energy Action Scotland (EAS) is the Scottish charity with the remit of ending fuel poverty. EAS has been working with this remit since its inception in 1983 and has campaigned on the issue of fuel poverty and delivered many practical and research projects to tackle the problems of cold, damp homes. EAS works with both the Scottish and the UK Governments on energy efficiency programme design and implementation.

Introduction

The following comments relate to the Ofgem consultation on a proposed system to introduce a deemed scoring mechanism for the obligation period 2018-22. This seeks to simplify the estimation of cost/carbon savings resulting from energy efficiency measures (EEM) installed by obligated suppliers under the Energy Companies Obligation and replace the existing bespoke process involving a Standard Assessment Procedure (SAP) or Reduced data Standard Assessment Procedure (RdSAP) survey and calculation.

The change to a deemed scoring mechanism is driven by the necessity to respond to a number of operational concerns. These include the accuracy, consistency and robustness of the bespoke system which is currently provided by professional energy assessors, operating under Government approved schemes to produce Energy Performance Certificates (EPCs). This introduces one of the first conceptual dilemmas in that the RdSAP, originally introduced in 2008 to fulfil the EU Energy Performance of Buildings Directive (EPBD), was in itself designed to ensure the accuracy, consistency and robustness of EPCs between different assessors.

The main concerns for energy assessments in the context of ECO would appear to relate to the additional flexibility available within the RdSAP system which was introduced under the changes to that system brought about by the Green Deal. These changes were ironically to improve accuracy as the EPC was to be the key mechanism to determine the ‘Golden Rule’. This same flexibility offers assessors increased flexibility across a range of key performance determinants resulting in the observation that different assessors can produce significantly different results for the same property.

Another driver for change is that the current process underpinned by the front ended energy assessment means that the value of the EEM proposed or installed cannot be conclusively established until quite late on in the customer’s journey. This makes communication with property owners difficult, particularly where their contribution to any shortfall may be predicated on the value of any support that can be attracted from ECO. In short, the real value of ECO can be estimated only after the energy assessment and then only conclusively determined after extensive post installation compliance checking.

These are of course issues more suited to the wider question on the efficacy of a deemed scoring process over the existing bespoke methodology. This consultation does not address that question, the supposition in this case is that deemed scoring is the only solution to the underlying issues noted and the questions in this consultation are directed at establishing support for the proposed as an effective deemed scoring approach. Our response will therefore focus on each of the questions posed where we have useful comment to add.

However, to be clear, this does not in any way equate to our support for a deemed scoring solution as the only option to resolve the current challenges observed within the obligation.

Q1 - Do you agree with our selection of the key variables to use as the main inputs for calculating the deemed scores?

A. Strongly Disagree

Q2 - Do you agree with the method used in developing typical property archetypes in order to remove the need for measuring property dimensions?

A. Disagree

In order to confidently calculate an assessment, SAP requires data such as the floor area, volume, the area of heatloss elements, the thermal conductivity of those elements and the efficiency and control of a heating system to achieve the agreed standard heating regime.

Within the context of a deemed scoring approach there is the necessity to reduce the complexity of inputs and to remove the subjectivity and potential for gross error, from survey error to data input error. In short, to sacrifice bespoke accuracy for a more consistent general conformity. The geometry of a building is somewhat related to its built form and to the number of apartments therein. However, the overall dimensions of a building are often determined more by extraneous economic, social and political factors which change over time (Carmona et al. 2010). Thus the age of construction of the dwelling actually becomes a significant determinant of the heatloss elements.

e.g. the interwar period characterised by the expansion of social housing supported by Government funding requiring specific standards to be met following the recommendations within the 1918 Tudor Walters Report (Teymur et al. 1988)

This may differentiate mostly along public and private sector development financing. Therefore, it may be necessary to split dimension standards along those lines. However, it is highly likely that this differentiation may hold only for certain age bands of construction. In more recent age bands from the 1980's, building standards and building practice become more homogenised across tenures, and driven more by the availability of land and the housing market economy which was heavily influenced by the introduction of the 'right to buy' policy from the Housing Act 1980.

It is too simplistic to determine the dimensions of a property from just the number of bedrooms and its built form. There is quite a difference between the 1980's 'starter homes' built by companies like Barratt Homes (Goodchild et al. 1986) and the equivalent apartment sized home constructed to the 1961 Parker Morris standards (Authority 2006). The problem of adequate internal space continues today to be a subject of ongoing debate making comparisons over generational housing phases difficult (Robert-Hughes et al. 2011).

See Appendix A for full explanation of the issues in relation to building geometry, and the errors that will present themselves should the impact of age be ignored in the deemed values.

In RdSAP terms, the age of the building is also used to determine the net area of heatloss wall area. A range of equations are used differentiated by the age of construction, with the inferred area being calculated from the total floor area[1].

From a practical view point, in operating the deemed scoring process, some of the purported economy of this approach is cited as deriving from removing the reliance on requiring the services of a professional assessor in order to determine the inputs. In order for this to operate smoothly we would recommend that operators of the new system are provided with some basic training in order

[1] Table S4 - Appendix S: Reduced Data SAP for existing dwellings, RdSAP 2012 version 9.92.

to allow them to confidently differentiate between built forms, as not every property conforms to the regimented terraced housing archetype.

In addition to this, guidance will have to be provided to specifically cover the range of questions that will inevitably arise in relation to the definition of a ‘bedroom’. Both the English House Condition Survey and the Scottish House Condition Survey have their own guidance for assessors working for those surveys. In addition, SAP has its own views on what is a ‘habitable room’[2].

Further to this, guidance on identification of heating system will be required. Whilst the proposed deemed scoring system has only 6 full house systems and 3 room heating appliances to select from, operators of the deemed system will have to be able to recognise and categorise from the many potential systems in the stock.

Location factors in SAP

Since the introduction of RdSAP as the methodology to assess buildings for the EPBD the location of the property has had an impact on the space heating demand. This impact was simplified to a climate temperature region of which there were 21 across the UK, 9 of these in Scotland[3]. These regions allowed an annual external temperature profile to be incorporated within the space heating calculation. The SAP score itself was not affected by the location, and was always derived from an average climate location based around the East Pennines e.g. Nottingham. The regional variance does though have an impact on the calculation for environmental emissions and the cost of energy.

Since the introduction of version 9.92 in the RdSAP methodology in December 2014, this concept of performance variance by location was expanded to include for temperature, height above sea level, wind speeds and solar radiation varied by specific postcode district i.e. the outward code part of the full postcode. Thus overall performance of dwellings can be quite significantly affected by location if that location is in the extreme.

Table 1 - Impact of location on emissions and cost of energy

Location	CO_{2e}/year	Deviation	£/year	Deviation
Central London	5.983	-10.9%	1,040	-10.3%
Nottingham	*6.713*	-	*1,160*	-
Central Glasgow	7.218	7.5%	1,243	7.2%
Kemnay, Aberdeenshire	8.163	21.6%	1,399	20.6%
Dalwhinnie	10.594	57.8%	1,800	55.2%

RdSAP v9.92 software was utilised to generate a range of unadjusted property performance figures (see Table 1) for the same property[4] in various locations around GB. Nottingham is used as the nominal climate location for the UK, and represents the SAP average. The property is actually located in Kemnay. A densely populated location is modelled in Glasgow as representing a common

[2] S9.1 – Room Count, Appendix S: Reduced Data SAP for existing dwellings, RdSAP 2012 version 9.92.
[3] Appendix U – Climate data, SAP 2012 version 9.92.
[4] The property is a mid-1970’s detached 2-bedroom bungalow with a floor area of 75m^2 heating is supplied by an off-peak electric storage heating system.

sheltered Scottish location and Dalwhinnie is included to represent one of the most extreme climate locations in rural Scotland.

Whilst the deviation from the nominal location is within around 10% for both the London and central Scotland locations. Around a fifth more annual emissions and cost are experienced in its actual Kemnay location, and it is possible that similar properties in more exposed rural locations could be more than half again the emissions rate and cost for energy (see Dalwhinnie). For the more rural Scottish locations, the proposed omission of location factors would be a serious disincentive to carry out EEM to tackle fuel poverty in locations which demonstrably have a much greater issue with this problem. So within a future Scottish ECO context (2018-22), favouring work in the central belt (the central Glasgow location) over work in rural locations such as Aberdeenshire.

To put this another way, in order to realise the savings generated from EEM in four of the example properties in Kemnay, you would need to carry out the same to 5 properties in Nottingham. This clearly has implications for the economics of conducting large ECO projects in Scotland. Under a deemed scoring mechanism which ignores the climate, Scotland will be twice penalised. Firstly, due to the cost of delivery of EEM in rural Scotland being more expensive than similar works in urban and city locations, and secondly by not gaining on the savings calculations recognising the colder more severe climate leading to more expensive delivery costs to meet the obligated targets.

3 - Do you agree with the approach to accounting for all primary heating sources present in the housing stock?

A. Strongly Disagree

4 - Do you agree that we have appropriately accounted for heating systems present in the housing stock either as an input for the deemed scores or in Table 1?

A. Strongly Disagree

The second dilemma in relation to this proposed deemed scoring route is that the baseline data is derived from the English House Condition Survey (EHCS), and so is unlikely to fully represent the proportion and nature of heating systems in Scotland e.g. gas fired systems in England are 85.3% and in Scotland mains gas fired systems are 78%. Electricity as the main heating fuel is 8.6% in England and 13% in Scotland. Oil fired systems represent 3.6% of properties in England and 6% in Scotland[5].

Building standards in Scotland changed in May 2007 to require that all new and replacement boilers would need to be condensing boilers. The same regulation was effectively brought into force in England in April 2005. This means that the deployment of condensing boilers into the retrofit market has been around in England for 11 years, enough time for earlier less efficient models to have been replaced with more modern higher efficiency models. In Scotland though, the policy has been in place for 9 years. This differential in time may only be a few years, but it means that non-condensing boilers are potentially still within operational service and that the early condensing boilers are likely to be still functioning.

We would therefore dispute the view that all gas and oil boilers should be assumed as 83% efficient. If we are to consider the future ECO scheme as being one which targets the fuel poor, it is very likely that those homes experiencing fuel poverty will have heating systems that are characterised by a high cost per useful kWh as a consequence of a high unit cost for fuel and/or a low system efficiency.

<u>Heating Controls</u>

[5] Figures derived from EHCS 2013 - Table DA7104 and SHCS2014 – Table 5

“49% of households with central heating (9,600 thousand households out of 19,700 thousand) report having a full set of central heating controls defined as a thermostatic radiator valves (TRVs), a central timer, and room thermostats. This figure has been rising over recent years, but is uneven across demographic groups.” (Munton et al. 2014)

Heating improvement actions since this report published early in 2014 will have moved this situation onwards, the same report suggests this is 5% per year. We can therefore assume that at best, full central heating to be at around 60% in 2016. In any case, adopting the default position to be full heating controls (timer, room stat and TRV’s) from a statistically valid point is heavily skewing the effect of this element within the overall population. Adopting a best case scenario evidenced by a 60% majority will penalise those properties in the population that have a poor control set, and again we would argue that the homes most at risk of fuel poverty are likely to be in that 40%.

Further to this, the evidence from the Energy Follow-Up Survey (EFUS) reported by (Munton et al. 2014), suggests that “where households do vary on which heating controls they have, it is in the proportion reporting a room thermostat (77%), a radiator control (67%) or a TRV (66%).” Therefore, the variance in heating control is on how systems regulate their operation in relation to the temperature of the indoor environment. From a SAP view point, this is the more important control group in terms of regulating the cost to deliver the standard heating regime. The fact that nearly a quarter of all homes in England reported having no room thermostat is perhaps the most important statistic of all. If this is the only variable that could reasonably be incorporated within the deemed scoring approach, then this would go quite some way to representing that important differentiation in heating performance across the stock.

Storage Heating

Traditionally in Scotland rooms within a dwelling are not all heated from electric storage appliances. In particular, the bedrooms of a dwelling quite often only have access to user controlled direct acting panel/convector heaters. It is not unusual to find the distribution of storage to direct acting appliances within the property to be approximately 60:40. For Table 5 in section 5.12 of the deemed scoring proposal, this would put the majority of Scottish installations into the 66% scoring range and never in the 100%, even in cases where the property has been considered to have had a new full electric storage heating system installed.

Additional to this, guidance will have to be provided in order to ensure that the assessment of % of property treated is consistent. Three possible scenarios present themselves in this:

an assessment of the floor area of each room heated with a storage appliance over the total floor area without fixed heating or unheated.

a count of the number of rooms heated by a storage appliance over the total number of rooms (habitable and non-habitable) in the property.

a count of the number of habitable rooms heated from a storage appliance over the total number of habitable rooms.

Specifically designed heating tariffs, sometimes referred to as ’24 hour’ tariffs and associated with dynamic teleswitching apparatus to control the off-peak times for the heating circuits have been common in some parts of Scotland. Within the ‘Scottish Hydro Electric’ public electricity supply (PES) area, Total Heat Total Control (THTC). In the ‘ScottishPower’ PES area a similar dynamic system, ComfortPlus Control, which though not as prolific as the Hydro Total Heat Total Control tariff, effectively operates as automatic charge controls. This arrangement of tariff led control for storage systems is not the normal in England and we would dispute the reliance on automatic charge controls for the default storage heated properties.

Although not specifically stated within the BRE Client Report, we assume that off-peak electric heating is modelled within the deemed scoring proposal as having a 'Dual' tariff. Which for the SAP calculation purpose, will default to a 7 hour off peak tariff[6]. Two other SAP tariffs can have a significant impact on the cost of energy required for space and water heating. An 18-hour tariff for electric wet systems and a 24-hour tariff for heating only dedicated dynamically teleswitched circuits. Making the assumption that all off-peak electric heating systems are charged as if on Economy 7 is considered to be quite a serious error in the provision of an EPC.

NB there has been a recent trend to installing 'infra-red' panel heaters connected to the E10 tariff. Clarity will need to be provided to users as to how these should be interpreted under any proposed deemed scoring route. They are electric room heaters on an off-peak tariff, however they have no effective thermal storage capacity.

<u>Note on Table 4 – Proxy heating systems to be used for rare heating types</u>

Special condition 18[7] for independent gas networks not connected to the national distribution grid. These should be considered as mains gas.

Heat pumps should only be considered as equivalent to mains gas if they have a seasonal performance factor of 2.5 or better.

Biomass appliances "Wood central heating" and "Wood room heating" should under <u>no circumstance</u> ever be considered as having the same carbon savings as "solid".

5 – Do you agree that the deemed scores include all main measure types?

A. Agree

6 – Do you agree with our proposals for differentiating within measure types?

A. Disagree

7 – Are there any measure types where you think that further differentiation is warranted? If so, please clarify which measure type could benefit from further differentiation and suggest an approach.

Yes

8 – Are there any areas where you could benefit from further guidance in using deemed scores?

Yes, NB we have already commented on some of these areas. It is our considered opinion that operators of the deemed scoring process, if these are not to be DEA/EPC Assessors, will need close support and training to be able to classify the wide range of physical building attributes in the stock. In addition, a wide range of heating systems/appliances will also require to be resolved to the narrow range of 6 whole house systems and 3 room heating appliances.

This consultation on deemed scoring fails to address the more important question in relation to assessing the impact of EEM in the stock. This section, and the questions associated are all predicated on the assumption that the approach taken in determining the baseline position for the

[6] See 12.4.3 Electric systems, SAP 2012 version 9.92.
[7] https://www.ofgem.gov.uk/ofgem-publications/50140/7940-independentnetworksopenletter.pdf

stock is correct. In short, that we assume the values listed in Table 5 of the BRE Client Report are accepted without question. This is not a position that we would support for the following reasons.

We have already discussed at length the issues in relation to the deemed defaults for heating systems and controls in the previous sections. We do not have an issue with approaching the task of creating a deemed scoring method by reference to the condition of the stock as described by the national housing condition survey. This is in fact the most prudent data set in which to describe the current energy profile of the stock, and in the absence of more specific information on stock characteristics e.g. EFUS, it is an acceptable data source.

We would of course prefer to see a deemed scoring matrix which is to be used against the Scottish stock to use the Scottish House Condition Survey as its baseline and for the default U-values and heating characteristics to be reflective of the Scottish condition. We do not view the reliance on English housing data as an analogue for energy efficiency in Scottish housing as being robust in many areas, some of which we have reflected upon in comments regarding heating systems.

The Scottish Government commissioned some very relevant research for the purpose of assessing the impact of a policy to regulate energy efficiency in the private sector (REEPS)[8]. This research established that in order to fully account for the variance of characteristics in the stock, that as a minimum 355 archetypes would be required. The proposed deemed scoring model has 30 property categories defined by built form and the number of bedrooms. Additionally, these 30 types are further categorised by 9 heating systems, making a total of 270.

This suggests that the REEPS research conducted by the Scottish Government could easily be adapted for a Scottish deemed scoring methodology without significantly increasing the burden of the operation of such a deemed method on obligated suppliers i.e. it would appear to be only marginally more complex to classify properties against 355 than 270. We appreciate that suppliers would prefer to use the same deemed scoring method over the period 2018-22 regardless of whether this is to fulfil targets under ECO [England/Wales] or ECO [Scotland]. We understand that this would make the operational costs of delivering ECO north and south of the border less expensive and in theory should reduce the burden of pass on costs to comply with the obligation for customers.

However, we would counter this with the view that adoption of a less representative scoring mechanism for Scotland will mean that more properties in Scotland will have to be treated to meet the obligation, and that in itself will have a burden on suppliers which perhaps outweighs the administrative saving for the operation of a single scoring mechanism. We do not raise this issue in ignorance of the very positive outcome which is more EEM delivered in Scotland. In fact, if the burden of financing ECO was not a pass on cost to consumers, and instead was delivered from general taxation, then adoption of a less representative scoring method would be advantageous in Scotland.

It is our opinion that the consumer who ultimately pays for delivery of ECO will be subsidising an inefficient system which should be designed to better reflect the impact of their indirect investment.

Populations and subsets

The average values as derived from analysis of the EHCS data assume that the subset of properties that can be treated under ECO, i.e. a technical potential to be improved and qualification of the person in occupation, are equally distributed. No hypothesis testing of this has been provided with

[8] http://www.gov.scot/Publications/2015/11/2513

the BRE Client Report, and so at this stage we cannot be confident that the baseline starting averages would be a robust representation of the energy performance of the subset of ECO eligible properties. In simple terms, properties which are likely to be eligible for measures will not express median characteristics derived from the total stock.

In some ways this assertion has already been recognised in the scoring methods for each measure type. E.g. the baseline U-value for lofts is given in Table 5 as 0.36 W/m^{2}K (~125mm), however in order for a loft insulation measure to result in a saving which would make this attractive, the starting U-value used is not 0.36, Table 10 suggests that this should be for the purpose of estimating savings, be changed to 0.696 (~50mm).

Multiple measures

Our example of the loft insulation raises another more prudent point and which is the third dilemma of the deemed scoring method. When simplifying the calculation method, how do you account for the impact of already installed measures? It would appear that the answer to this is to ignore it. This is quite a deviation from the strict guidance for the current ECO scoring.

In the example of the above loft insulation measure. If a property was to be scored for both loft insulation and wall insulation. The savings for the loft would be scored as if the starting U-value was 0.696 W/m^{2}K. When subsequently scoring for the wall insulation, this would not be on the basis that the property now had 270mm of loft insulation, it would be carried out on the basis that it was at the assumed population average i.e. 0.36 W/m^{2}K. Under this methodology, if you carry out a heating replacement measure and two insulation measures it may actually be possible for some property types to save more carbon emissions than they originally were emitting.

Whilst this extreme outcome may be rare, the reality of this method does in effect subsidise or incentivise the idea of carrying out multiple measures, which is in itself a positive outcome. However, we must be mindful that benchmarking future ECO performance against historical £/lifetime carbon saving would not be robust without considerable adjustment for these uplift anomalies.

It has been suggested by Ofgem already that in multiple measure scenarios, that the insulation measures would be scored in recognition of any new heating system. Some relevant observations on this point:

The perceived wisdom on whole house EEM is that it is advisable to carry out the fabric measures first as the new heating system should be sized to account for the insulated thermal performance.

The timing of heating measure installs (internal work) and insulation work (often external work) can be affected by the weather. Also recipients of EEM may insist that in the run up to the heating season, that the heating system improvements are carried out first.

Under the proposed deemed scoring method, it will not matter whether heating or insulation is carried out first. Assume that the property in question has an inefficient old gas fired back boiler. In scoring the impact of loft and wall insulation, this will equate to the ‘Gas boiler’ category and so is assumed to be 83% efficient with full controls, and not 60-65% and little control as you would expect for that type of appliance. Now assume that the scoring is being carried out for the fabric measures post heating upgrade. In this case both the loft and wall insulation will be scored against a property with the new boiler system which under the methodology will be 83% efficient with full controls. So no difference.

Solid Wall Insulation

Recognition needs to be given to the relevance of Table 6 for any wall type, receiving external or internal wall insulation where the as built wall type is either cavity wall, stone wall and the very wide range of 'system built' types that are not in themselves a solid construction. The terminology "solid wall" in this case does not help in relation to the categorisation. Again this would be an issue to cover in training of the users of the methodology.

For insulation thickness – the RdSAP convention should apply:

"If insulation is multifoil or foam insulation the thickness is entered as double the actual thickness."[9]

For stone walls, the calculation of the 'Starting U-value' should be carried out under the principles outlined in S5.1.1. *NB when calculating the effective U-value of a stone wall type, this should include an adjustment to improve the U-value if wall has dry-lining or lath and plaster (see S5.1.2)*[9].

Cavity Wall Insulation

There is a very significant performance gap between the pre and post 1983/4 cavity construction. Taking the view that all cavities equate to a starting U-value of 1.272 W/m^{2}K will have the impact of reducing the effective annual savings for 1950-70's cavity constructed dwellings by approx. 0.25 tonnes per year. The same methodology applied to cavity constructed dwellings in the age band 1984-91 would have the impact of inflating the savings by approx. 0.5 tonne per year.

Arguably the more modern age band does not require wall insulation as it is already quite energy efficient. This principle of setting a threshold where the EEM has little or no benefit is widely accepted where the measure is loft insulation, i.e. little or no real benefit where the level of insulation is already more than 125mm. However, this methodology will provide the same benefits across all dwellings with a fillable cavity regardless of the age of construction and therefore completely ignore the starting U-value and take a very different approach to that established for roof insulation.

We do not support this approach, and recommend that at the very least there are two options to take where the starting U-value is determined by the average U-value pre 1983/4 and the average U-value post 1983/4. Whilst this will clearly increase the number of values in the methodology for this measure, it would only add one additional category for identification purposes.

In reference to Table 8, we agree that there should be recognition of two thermal conductivities for standard and high performance insulation materials. However, observed cavity widths in England are often narrower than those in Scotland. The prevalence of areas with high driving rain indices in Scotland have resulted in the tradition of cavity construction favouring a wider cavity of between 75-100mm.

[9] S5 Constructional types and U-values, Appendix S: Reduced Data SAP for existing dwellings, RdSAP 2012 version 9.92.

Table 2 - Calculated U-values for Cavity Constructions

Fill type	Cavity Width	Drylining?	U-value
n/a	65mm	Yes	1.33
n/a	65mm	No	1.55
0.04	65mm	Yes	0.48
0.04	75mm	Yes	0.43
0.04	100mm	Yes	0.34
0.033	65mm	Yes	0.42
0.033	75mm	Yes	0.37
0.033	100mm	Yes	0.3

Table 2 shows U-values as calculated to the conventions outlined under BRE BR443 and using version 2.04b of the BRE's own U-value calculator software. This shows that there would be little benefit to looking at specific 'after' CWI values for a 75mm cavity i.e. that the weighted average as referenced in Table 8 is somewhere between the calculated value for 65-75mm. However, where there is a case for further differentiation would be in cases where the cavity width was nearer 100mm.

NB in addition cavity constructions up to the mid 1970's can be further improved with basic drylining with a starting value of 1.33 W/m^{2}K.

For 0.04 W/mK CWI materials where the actual cavity gap is 100mm, the improvement on the assumed 'after' wall U-value is approx. 25%.

For 0.033 W/mK CWI materials where the actual cavity gap is 100mm, the improvement on the assumed 'after' wall U-value is approx. 24%.

We would suggest that this performance gap is sufficient to warrant an additional categorisation for an extra wide cavity.

Accounting for the additional benefit from treating a wider cavity, increases on average savings are around 10%. This may not at first appear to be a worthwhile dimension to add to the deemed scoring method i.e. the added complexity for accounting purposes and the requirement for additional evidential requirements will increase the administrative burden. However, there is a marginal increase in material cost for treating wider cavities. So to avoid this type of property being less attractive to treat, there should be a mechanism to neutralise this added cost.

As the impact of this mechanism can be predicted (~10%) this could be handled by a post calculation uplift rather than creating a specific set of pre calculated savings across the range.

Room-in-roof Insulation

Dwellings with habitable rooms built into the roof space are complex, varied and surprisingly not uncommon in both rural and urban locations in Scotland. Where assessors are producing EPCs for sale or rent, we will often advise that the default RdSAP geometric model for rooms-in-roof would be sufficient for that purpose. However, where this is being used to score savings for ECO, we will always advise that extended data is collected for this, the assumed room-in-roof model is inadequate for that purpose.

A starting point of 0.696 W/m^2K (i.e. 50mm) for the roof elements is not going to make this kind of measure very attractive. The difficulty in accessing roof room elements (with the possible exception of the flat ceiling areas) makes this kind of measure more of a building project than a simple loft retrofit. The sloping and vertical sections of the roof room are normally required to be removed internally in order to be able to install the insulation. It is in essence, more akin to an internal wall insulation activity, not loft insulation

This type of measure should be treated in the same way as flat roof insulation. If the sloping and vertical sections already have 50mm insulation on them, it will often just not be worth the savings generated by increasing that compared to the cost of installation.

Whilst we would be happy to view tackling the flat ceiling element of a room-in-roof to be akin to that of a simple loft void, it is worth noting that the residual head space in these areas can be limited, and that often new hatches do have to be cut in the ceiling in order to access them. In addition, it is not uncommon to find dormer projections in a roof room which have a flat roof rather than a pitched structure.

We do not believe that savings attributed to roof rooms should be tackled under a deemed scoring methodology. There are too many complex and varied elements across the stock to be generalised in this way.

11 - Do you agree with the proposal to use ‘percentage of property treated’ to identify whether 100% of a score should be claimed?

A. Disagree

Clearly where possible, measure should be applied to 100% of the property. But there are many valid reasons as to why this is not possible.

NB BRE have already provided comment in the past in relation to a previous proposed simple proportionate method for handling the percentage of a property treated, a copy of which should be available via Ofgem[10]

[10] https://www.ofgem.gov.uk/sites/default/files/docs/2013/07/bre-response-on-percentage-of-measure-installed-consultation.pdf

We agreed with BRE in 2013 that there are very valid technical reasons as to why simply halving the savings for 50% of the job does not work from a SAP point of view. U-value as a representation of thermal conductivity is not a linear relationship, if it was, then you could theoretically get to the point where further improvements to the U-value resulted in zero or even a negative energy flow. This is clearly nonsense.

We do not agree that the savings should simply be apportioned pro rata of the proportion of the measure installed. We do however believe that banded savings could be produced for a range of proportions e.g. 85-100% could be treated as being 100%, 60-85% could be pre-calculated using the already established alternative wall method under RdSAP to represent a score where a third of the element has not been treated.

Bearing in mind though, if there are mixed measures, e.g. cavity wall in the front of a building and external wall in other exposed areas, that this should perhaps just be treated as having 100% of the majority measure installed. A similar approach can be taken for flat and pitched roofs.

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Appendix A – Geometry Matters

3 bedrooms, 2 storeys, end-terrace property constructed in 1987, space and water heating is provided by a non-condensing gas fired combination boiler controlled by a programmer and TRVs.

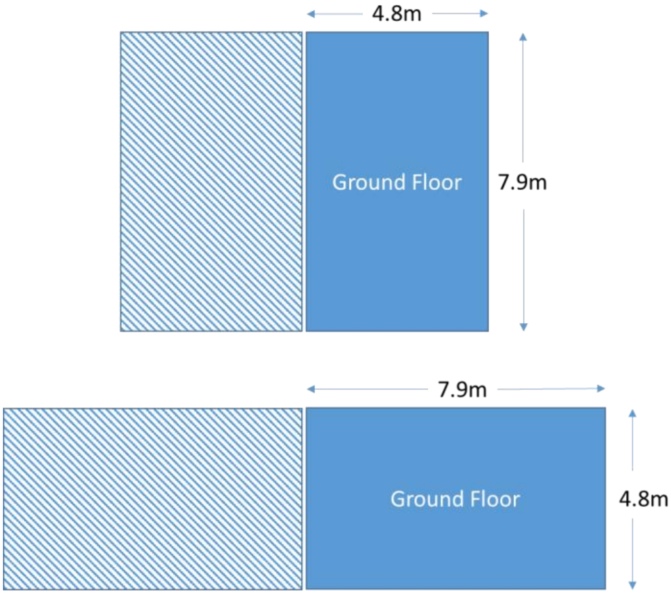

Figure 1- End terrace arrangements

The first diagram in Figure 1 shows the actual arrangement of the property with its neighbour, the upper floor has the same dimensions as the ground floor. Total floor area is 75.84m^2, with an exposed perimeter of 17.5m on each level. The gross wall area is 87.15m^2.

The second diagram shows an alternative arrangement for the same property. This is not so common in the more modern post 1980's age bands of construction, as it will tend to reduce the number of properties in a terrace which can face on to the main road. However, in the 1950-60s post war housing areas, this is not uncommon.

In this arrangement, the total floor area is exactly the same, however the exposed perimeter is 20.6m on each level, and the gross wall area is 102.59m^2. This means that the wall area in this property is 18% greater than the arrangement with the longer gable wall.

The diagram in Figure 2 shows a mid-terrace arrangement which is a 2 bedroom, 2 storey property constructed in 1955, space and water heating is provided by a condensing gas fired combination boiler and controlled by an ErP class V external weather compensated programmable room thermostat.

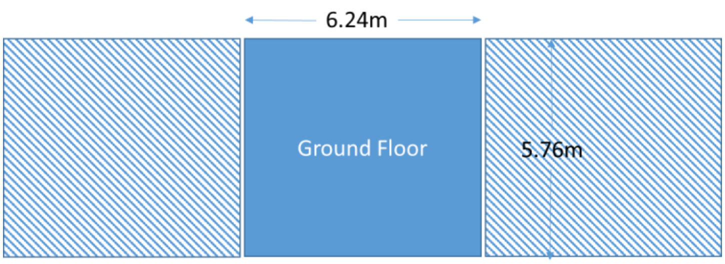

Figure 2- Mid terrace property

Installing cavity wall insulation in the property shown in Figure 1 will have different costs depending upon the length of the gable wall. Clearly the more attractive version of the property will be the one with the longer gable wall as both properties will under the proposed deemed scoring route, net the same savings.

Focussing on the generalisation of construction age and comparing the savings generated from both under the proposed deemed scoring method for cavity wall insulation (0.04 W/mK), we find that a 3 bed end terrace with a gas boiler will generate carbon savings of 0.724 tonnes per year. A 2 bed mid terrace property with a gas boiler will generate carbon savings of 0.399 tonnes per year. All things being equal, this is the sort of results that you would expect.

However, these are not theoretical properties, and they exist in the real world, and have been assessed for cavity wall insulation. The savings for the end terrace came out at 0.247 tonnes per year and the older mid terrace property would net savings of 0.601 tonnes per year.

For the end terrace property, the deemed scoring method over estimates the savings modelled directly under RdSAP by nearly 3 times the actual. For the mid terrace property, savings are reduced by around a third.