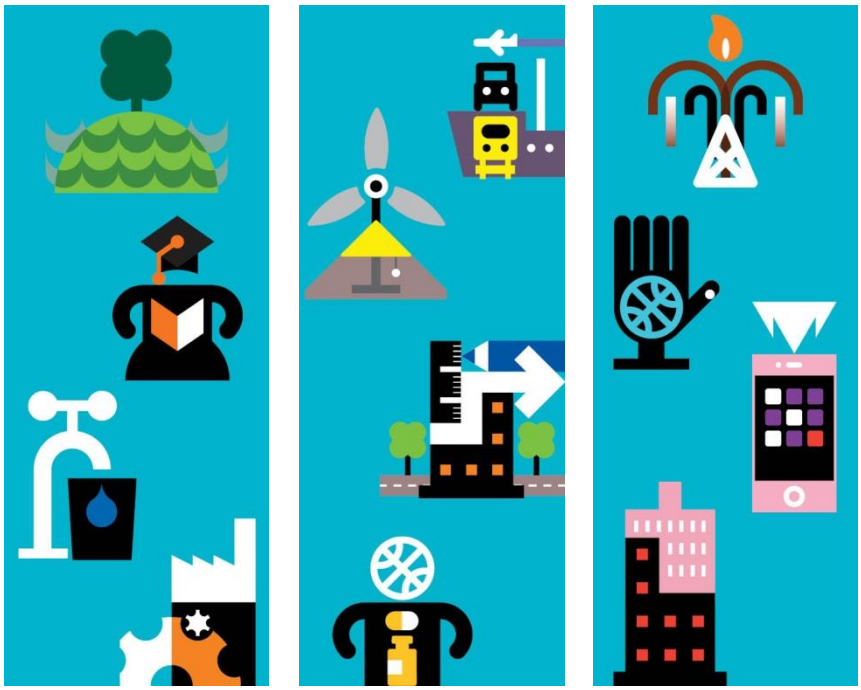

Justification for non-standard lifetime

Chimney Sheep

August 2016

Department of Energy and Climate Change

Mott MacDonald

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3 Whitehall Place. London. SW1A 2AW

Mott MacDonald, Victory House, Trafalgar Place, Brighton BN1 4FY, United Kingdom
T +44 (0)1273 365 000 **F** +44(0) 1273 365 100 **W** www.mottmac.com

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Contents

Executive Summary

This report has been produced by Mott MacDonald for the Department of Energy and Climate Change (DECC) as part of the Energy Entrepreneurs Fund Incubation Support Programme.

Chimney Sheep Limited has developed the Chimney Sheep range of woollen draught excluders for chimneys, which come in a variety of sizes and are inserted into a chimney flue using a plastic handle. They are made from Lake District Herdwick sheep wool and designed to be easily removable so that the fireplace can still be used.

Around 30,000 units have been sold to date, principally to private individuals through the company's website.

As the Chimney Sheep draught excluder is not a permanent fixture there is a requirement to understand its length of life as well as the way that it is used by customers, so that the carbon and cost saving credentials of a Chimney Sheep draught excluder can be calculated over its lifetime.

The objective of this report is to develop the case and reach a conclusion on the appropriate non-standard lifetime to apply to the Chimney Sheep draught excluder, which is not designed for permanent installation.

Ofgem has cited a number of criteria which we have considered in making our assessment of an appropriate lifetime for the Chimney Sheep; these are listed below:

- Durability;
- Maintenance;
- Warranty/Guarantee;
- Obsolescence;
- Customer Behaviour;
- Industry Practice.

The research was based on publically available information and a Chimney Sheep user survey which was conducted between January and March 2016.

Based on our analysis we conclude that that the scenarios and associated lifetimes shown in the Table below and explained in the following text are appropriate to apply to the Chimney Sheep.

Scenario	Details	Proposed Life of Chimney Sheep
Ornamental fireplace	Installed and not removed during lifetime.	20 years
Occasional use of fireplace	Up to 10 cycles of removal / replacement per year	20 years
Heavy use of fireplace	Up to 50 cycles of removal / replacement per/ year	10 years

In the event that Chimney Sheep Limited were not able to establish the full profile of Chimney Sheep usage and removal / replacement cycles according to the user scenarios identified, Mott MacDonald would recommend that a nominal lifetime of ten (10) years is assigned, based on the worst case scenario of 'heavy use' of the fireplace in which the Chimney Sheep is installed.

Concerning the ornamental fireplace scenario: the default lifetime applied by Ofgem to equivalent insulation products that are supplied without a guarantee is currently two years. To be accredited with the full 25 – 42 years lifetime that is normally applied to wall insulation, for example, Ofgem requires:

- Guarantee in place to ensure that in the event of failure within 25 years the product will be repaired or replaced;
- That a quality control system is in place to provide confidence that the item is unlikely to fail within the proposed lifetime, if longer than 2 years.

Taking the points in turn, we advise that Chimney Sheep Limited investigate the terms of guarantees that it is able to offer against the user profile scenarios (ornamental fireplace, occasional use and heavy use).

With respect to quality control, it is expected that the findings from investigations currently being conducted by BBA (British Board of Agréments) to confirm that an appropriate quality control system is in place to provide comfort that the Chimney Sheep will not fail within two years. We would advise however, that Chimney Sheep Limited discuss with Ofgem the quality control criteria required and check that the BBA analysis will report results in terms that Ofgem will be able to base a decision upon.

Conclusions expressed in this report about the life of the Chimney Sheep are predicated on an assumption of reasonable use such as may be made by householders who have invested effort to seek out and purchase the Chimney Sheep themselves. The sample group for the Chimney Sheep user survey may be assumed to comprise such users, being themselves purchasers of the product (that is, the product has not been issued free by a third party organisation).

The possibility must be considered that householders who are issued with a Chimney Sheep for free by a third party (energy supplier, local authority or housing association for example), may not treat the product with the same level of care or optimise its use in the same way as a self-motivated purchaser is likely to. This would have the potential to reduce the lifetime of the Chimney Sheep and in turn the financial and CO_2 savings delivered by the Chimney Sheep. We therefore recommend that if the Chimney Sheep were to be offered free to a group of householders, that a survey be conducted to establish the user behaviour of the that group after a reasonable period of use, and the estimated lifetime and expected savings of the Chimney Sheep be updated accordingly.

1 Introduction

This report has been produced by Mott MacDonald for the Department of Energy and Climate Change (DECC) as part of the Energy Entrepreneurs Fund Incubation Support Programme.
Chimney Sheep has developed woollen draught excluders for chimneys. Products come in a variety of sizes and are inserted into a chimney flue using a plastic handle as shown below in Figure 1.1.

Figure 1.1: Chimney Sheep in situ

Source: Chimney Sheep

They are made from Lake District Herdwick sheep wool and designed to be easily removable so that the fire place can still be used. Chimney Sheep are manufactured in a number of sizes and shapes to fit the majority of flues in the UK and an example of the Chimney Sheep is shown below in Figure 1.2.

Figure 1.2: Example of Chimney Sheep

Source: Chimney Sheep

The Chimney Sheep works by being a little larger than the flue so that it can grip the flue wall and hold itself in place. As the material from which the Chimney Sheep is constructed is compressible the amount of overlap in the flue is not critical to performance as it can fit into a range of gaps.

Around 30,000 units have been sold to date, principally to private individuals through the company's website and the company has been awarded support under the Department of Energy and Climate Change's Energy Entrepreneurs Fund programme to undertake testing and certification activities to open up new markets.

As the Chimney Sheep draught excluder is not a permanent fixture there is a requirement by Ofgem to understand its length of life as well as the way that it is used by customers so that the carbon and cost saving credentials of a Chimney Sheep draught excluder can be calculated over its lifetime.

Ofgem has identified a number of criteria that it requires to be addressed in accepting justification of non-permanent installations such as the Chimney Sheep; these are listed below:

- Durability:
  How does the Chimney Sheep, or its components, degrade over time? How will exposure to extreme ranges in temperature, storage in damp conditions, etc. affect the lifetime of a measure? How long can the products be expected to operate within design specifications without need for repair?

- Maintenance:
  Will the Chimney Sheep, or any of its components, require maintenance? Will any of the Chimney Sheep's components require replacement? What are the implications of a lack of/improper maintenance?

- Warranty/Guarantee:
  Does the Chimney Sheep come with a Warranty/Guarantee? What is its duration? What does it cover?

- Obsolescence:
  Is the Chimney Sheep likely to become obsolete to the user while it is still in working order and thereby not achieve further carbon or cost savings? For instance, a long-life boiler might become obsolete if a new, more efficient heat source comes onto the market.

- Customer Behaviour:
  To what degree are the benefits of the Chimney Sheep dependent on customer behaviour? For example, householders may not choose to fit the Chimney Sheep.

- Industry Practice:
  How does industry treat products like the Chimney Sheep? Did it receive a lifetime under CERT and CESP? If so, what was it and why was it awarded that lifetime? Does it receive a lifetime under Green Deal? If so, what is it and why was it awarded that lifetime?

The remainder of this report discusses each of these criteria in turn, in relation to the lifetime of the Chimney Sheep and provides conclusions about the reasonable lifetime to attribute to the product.

The research was based on publically available information and a Chimney Sheep user survey which was conducted between January and March 2016. This survey was designed and administered online using Snap Professional surveys. This was distributed by Chimney Sheep via both social media and email. A total of 135 valid responses were received, and the resulting data was analysed using SPSS statistical analysis software.

2 Durability

A number of tests and trials have been conducted to date and are planned for the future in relation to the durability of the Chimney Sheep in use.

2.1 Tests already conducted

The following tests have been successfully completed on the Chimney Sheep to date, using test facilities approved by the BBA or UKAS (United Kingdom Accreditation Service):

- Reaction to Fire - BS EN 13501-1:2007 +A1:2009 Fire classification of construction products and building elements;
- BSRIA (Building Services Research and Information Association) - Test methodology for determining energy cost & CO_2 savings using Chimney Sheep.

2.2 BSRIA Testing

As part of the DECC EFF programme support BSRIA (the leading independent UK laboratory for testing and performance verification of a wide range of building services products) was commissioned to determine the energy and carbon savings from the use of the Chimney Sheep draught excluder. Lifecycle tests were conducted as part of these BSRIA trials and are documented in the 'Report for determining the energy and CO_2 savings using the Chimney Sheep'. The lifecycle tests were designed to determine how effective the Chimney Sheep is at reducing air flow (i.e. draughts) after it was removed and replaced a number of times by the householder.

The main objective was to identify how many times the Chimney Sheep can be inserted and removed before it begins to deteriorate. A test cycle is defined as a single insertion of the Chimney Sheep into the chimney and subsequent removal of the Chimney Sheep.

Table 2.1 below shows the Chimney Sheep's effectiveness at blocking the flow of air up the flue (Blockage Factor) at various numbers of cycles.

Table 2.1: Chimney Sheep effectiveness at blocking airflow at various numbers of cycles

Test Cycle	Blockage Factor (%)	Difference in Blockage Factor from 1st Cycle (%)
1	93.4	0
40	94.7	+1.3
300	91.6	-1.8

The results of the testing concluded that the lifetime of the Chimney Sheep is 10 years based on:

- 300 test cycles having been conducted; and
- The assumed maximum number of cycles that a home owner would conduct in a year to light fires, being 30.

It is noteworthy that there was only a very small reduction in effectiveness of the Chimney Sheep after 300 cycles, of less than 2% blockage factor. The Chimney Sheep is shown to still be an effective chimney draught excluder after 300 cycles having retained a solid shape with only the perimeter of the device showing signs of fraying or damage, as shown below in Figure 2.1.

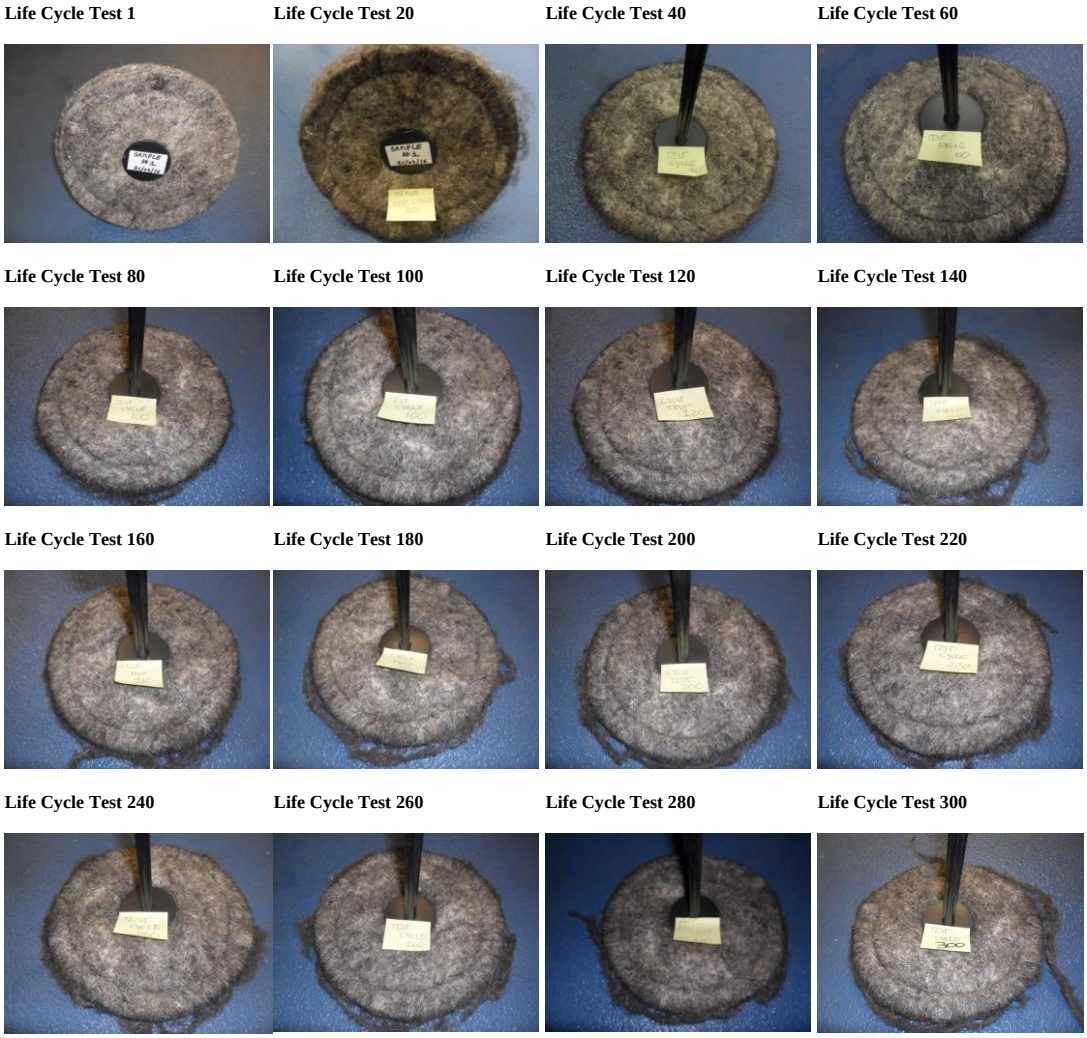
Figure 2.1: Difference between Chimney Sheep at start of BSRIA trial and after 300 cycles

Source: BSRIA

In the absence of test data for the Chimney Sheep beyond 300 cycles it is difficult to speculate what may happen in terms of the rate at which it may continue to fray or show more significant signs of damage. As such we have postulated that the point at which the Chimney Sheep ceases to be an effective draught excluder is when it becomes difficult to fit due to the extent of fraying of the edges. A very conservative estimate would be that this point would be approached at around twice as much fraying as was experienced at 300 cycles.

Figure 2.2 below shows the degree of fraying exhibited by the Chimney Sheep as it went through the testing process.

Figure 2.2: BSRIA lifecycle test evolution



Source: BSRIA

Due to the robust construction of the Chimney Sheep, and the manner in which it is fitted into a flue (that is, it is slightly “oversized” in relation to the flue in order for it to grip the sides and effect a seal) the fraying at 300 cycles is considered to be largely cosmetic and near-insignificant in terms of performance. In terms of the rate of degradation, the condition of the Chimney Sheep at 300 cycles is not significantly worse than that at 200. As such we would estimate that the Chimney Sheep could reasonably undergo another 200 cycles (500 cycles in total) and still operate effectively as a chimney draught excluder. It is considered highly unlikely that before this point, any lack of rigidity from use and fraying of the outer edge would make it difficult to achieve a secure fit of the Chimney Sheep in the flue.

As such we consider that a likely worst case scenario for the number of times that a Chimney Sheep can be inserted and removed from the chimney before some users might find it difficult, and seriously consider purchasing a new felt head is 500 cycles.

We note that this is a relatively pessimistic estimate judging from the condition of the Chimney Sheep after 300 cycles noting the relatively small amount of fraying and the general structural integrity of the device. It is felt, however, that given that the test was carried out by a competent installer in a test rig designed for ease of installation that a less competent installer working at a less comfortable position might experience degradation of the Chimney Sheep more quickly. Such a user might therefore consider that the Chimney Sheep has reached the end of it life earlier than would the competent installer with dedicated test rig.

BBA has also been commissioned to conduct a number of tasks to allow it to provide certification to allow Chimney Sheep to join national insulation scheme and to sell to utilities. These tests include durability in use tests, but are expected to take more than one year to complete. The informal results of the initial test for deformation in use indicate that there was no deformation to report which seems positive. It is expected that a more formal report on the subject will be available during late Summer 2016.

2.3 Tests still to be conducted

As part of the assessment required for the Chimney Sheep to be awarded a BBA certificate a number of other assessments will be conducted by BBA or with BBA involvement, namely:

2.3.1 With BBA involvement:

- Biological resistance - Determination of mould fungus growth - to Austrian Standard ÖNORM B 6010 clause 3.22 (withdrawn July ’15) or similar (to be agreed by the BBA).
- Biological resistance - Determination of the resistance to attack by vermin (insects, moths, Anthrenus) to ISO 3998 - Short-term test (withdrawn February ’02) or similar (to be agreed with the BBA).
- Biological resistance - Determination of the resistance to attack by vermin (insects, moths, Anthrenus) - Long term test – 6 months - to Annex D of CUAP 12.01/02cl2 - In-situ formed loose fill thermal insulation material and / or acoustic insulation material made of vegetable or animal fibres – July ’09 or similar (to be agreed with the BBA).
- Retention of chemical additives on fibres – Handling Test.
- The sample is evaluated to Annex F of the CUAP 12.01/02cl2 - In-situ formed loose fill thermal insulation material and / or acoustic insulation material made of vegetable or animal fibres – July ’09 or similar and then re-evaluated for Reaction to Fire and Biological resistance. The % loss after handling is then determined.

2.3.2 By BBA:

- An Assessment of the Chimney Sheep with regard to fitness for the purpose(s) for being used as a temporary draft excluder fitted in active chimneys that can be removed and re-inserted many times.
- An Assessment of the Chimney Sheep’s compliance with Statutory Regulations, etc., including, but not restricted to, a detailed review with respect to means of ventilation and air supply of the various national Building Regulations.

- An evaluation of the existing data / reports / calculations as specified in the tests conducted to date, see section2.1 for details.
- As assessment of the Chimney Sheep product range to establish the 'worst case' samples to be used for testing and other work performed under this contract.
- An assessment of the technical performance / requirements of the plastic handle, including fire performance.
- A series of tests to BBA test specifications to establish:
  - Abrasion resistance – to determine a typical life expectancy due to wear;
  - Shrinkage due to wet / dry cycling;
  - Shrinkage due to dry heat.
- Detailed discussions with BSRIA regarding the testing report in connection with Test methodology for determining energy cost & CO_2 savings using Chimney Sheep[1].
- An Assessment of production quality control, including an audit at the Chimney Sheep Assembly facility.
- A postal and on-line review of performance via known Chimney Sheep users.

On the basis of successful completion of these assessments and tests by the BBA the process for awarding a BBA certificate to Chimney Sheep will be commenced.

At the date of this report, only the following tests have been conducted as detailed in the associated BBA Report[2]:

- Dry heat shrinkage;
- Shrinkage at specified temperature and humidity; and
- Loss of fibre upon handling.

It is therefore noteworthy that although the Chimney Sheep has been a commercial product for several years and has been tested and assessed in several areas, an appreciable amount of testing that will clarify the durability of the Chimney Sheep and the appropriate lifetime that the Chimney Sheep should be credited with, is yet to be conducted. As such, the findings of this report are predicated on the assumption that BBA testing and analysis finds no obvious flaws in the Chimney Sheep as a product and we are provided with a degree of confidence from the results of the initial BBA tests.

We would recommend that the findings of this report are re-assessed once the BBA tests and assessments have been completed to confirm that the results of this report have not been undermined by subsequent finding from the BBA investigations.

[1] Draft BSRIA Report. Dr. Arnold Teekaram. Test methodology for determining the energy cost and CO_2 savings using Chimney Sheep. Version 5. A. Date 26 August 2015.

[2] British Board of Agrement Test Report 59079. Chimney Sheep Limited – Chimney Sheep draught excluders. Date 17 June 2016. Job No. T9 57079 (S2 57792).

2.4 Feedback from respondents

A sample of survey respondent comments relating to reduction of performance due to removing and re-installing is provided below:

> *'… . even though it has been removed and replaced there is no sign after 3 years of any deterioration of its sealing efficiency.'*
>
> *'… . we haven't left it in place for 1-3 years though we've owned it for that amount of time, we take it out each summer. However, it has reduced draughts every time we've re-fitted it over that time, which I think maybe the point of your question - this is a reusable Sheep and remains just as effective over the nearly 3 years we've had it.'*
>
> *'See previous answer. If I remove it, I feel draughts, if I put it back in, I don't.'*
>
> *'The efficiency remained the same. Age doesn't appear to have reduced its working.'*
>
> *'It has the same effect now as it did when we first installed it. We often take it out to light the fire and then slot it back into place the next day (after the fire has cooled down again). We have been doing this ever since we first got it.'*
>
> *'It does not seem to have distorted or deteriorated.'*
>
> *'I believe that there is no reduction in the efficiency over time.'*
>
> *'Exactly the same as when we put it in place between having a fire - it reduced the draught caused by the draw from the chimney where the open fire is. … .When there is no fire, the draught from the chimney when the door is opened is reduced.'*

Based on the feedback from respondents we have not been presented with any evidence that indicates that the BSRIA findings for the effectiveness of the Chimney Sheep have been overstated in its claims of 10 years lifetime based on 30 cycles/ year, although we do assess the reasonable number of cycles to employ in section 0.

3 Maintenance

Ofgem criterion question: Will the Chimney Sheep, or any of its components, require maintenance? Will any of the Chimney Sheep's components require replacement? What are the implications of a lack of/improper maintenance?

There is limited maintenance required for the Chimney Sheep as it is such a simple device and it is likely that maintenance would be by cleaning or (occasionally) replacement of the felt pad, shown below in Figure 3.1

Figure 3.1: Example of Chimney Sheep

Source: Chimney Sheep

Of 10,000 Chimney Sheep sold/year only 20 replacement heads were sold.

The Chimney Sheep website provides some detail about how to care for the Chimney Sheep[3].

This text explains what not to do to avoid loss of performance, i.e. advice regarding tumble drying and reversing to insert from the other direction and survey respondents indicate that:

> *'It is easy to turn the Sheep over and reattach it to the handle, so it is always just as effective as it was when we first got it. I don't see how we survived before!'*
>
> *'Draught was near to stopped by the Chimney Sheep, and has stayed that way even when it has been taken out for cleaning and put back, which is done once every 4/5 months.'*

[3] https://chimneysheep.co.uk/how-to-use

> *'It has stayed in shape, so after I remove it to clean grit and soot from the top of it I can replace it to give the best possible fit in my very awkward chimney. It has retained its strength and rigidity and so it continues to do its job.'*

Only one example was identified of the Chimney Sheep requiring repair:

> *'I believed it was worth refitting it to see if I could further improve its effectiveness. Sadly, the hanging plastic rod snapped off when doing this, so I found it very difficult to reinsert the Chimney Sheep into the chimney.'*

The Chimney Sheep product requires no maintenance aside from occasional checks for possible cleaning; the survey results identify no more onerous requirements on the part of users. There are a number of examples where the recommended maintenance checks have not been conducted and there has been no detrimental impact on the performance of the Chimney Sheep.

The survey identified one example where the plastic handle snapped in use making the Chimney Sheep difficult to use and consider that Chimney Sheep Limited may wish to investigate potential strategies to mitigate this such as making the handle more robust or providing a no quibble/ low cost replacement for broken handles.

4 Warranty/ Guarantee

Ofgem criterion question: Does the Chimney Sheep come with a Warranty/Guarantee? What is its duration? What does it cover?

Chimney Sheep Limited does not currently provide a warranty or guarantee. We understand from discussions with Chimney Sheep Limited that there have been very few returns and replacements are made without demur. Chimney Sheep Limited feels that if warranties were to be offered, 5 years of 'normal' use would be a reasonable expectation and that a Chimney Sheep should have 10+ years of physical life.

There are a variety of chimney flue draught excluder competitors to Chimney Sheep and the warranties offered are detailed in Appendix A. The longest offering from the competitors is 5 years on professionally installed and maintained chimney throat insulating devices. The nominal offering of 1 year for the chimney balloon is potentially indicative of reasonable life if the device is repeatedly installed and removed.

We have also assessed the lifetime associated with other insulation devices (loft insulation, cladding, etc.) that have received Ofgem support based on the BBA assessments from their website[4]. The lifetime of permanent insulation devices tends to be the same duration as the lifetime associated with the building material they are installed in.

The default lifetime applied by Ofgem to equivalent insulation products that are supplied without a guarantee is currently two years. To be accredited with the full 25 – 42 years lifetime that is applied to most wall insulation for example, Ofgem requires:

- Guarantee in place to ensure that in the event of failure within 25 years they will be repaired/ replaced;
- That a quality control system is in place to provide confidence that the item is unlikely to fail within the proposed lifetime if longer than 2 yrs.

For cavity and solid wall insulation the following methods of providing a 25 year guarantee are available:

- Cavity Insulation Guarantee Agency[6]; and
- The Solid Wall Insulation Guarantee Agency[7].

Taking the Ofgem stance on wall insulation as the precedent we note that the lifetime of the Chimney Sheep could be limited to 2 years even if BSRIA and BBA evidence were to indicate that a longer lifetime is reasonable.

[4] http://www.bbacerts.co.uk/your-search-results/?search_type=cert&keywords=insulation&src=s

[6] https://ciga.co.uk/the-ciga-guarantee/

[7] http://www.swiga.co.uk/who-is-swiga/why-do-i-need-a-guarantee

5 Obsolescence

Ofgem criterion question: Is the Chimney Sheep likely to become obsolete to the user while it is still in working order and thereby not achieve further carbon or cost savings? For instance, a long-life boiler might become obsolete if a new, more efficient heat source comes onto the market.

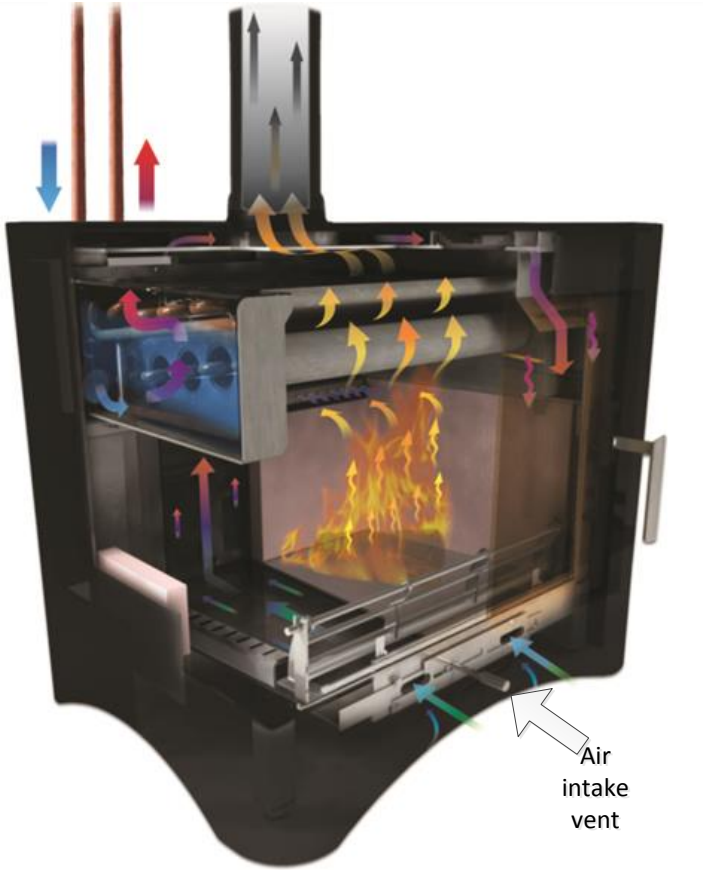
We have identified likely potential routes to obsolescence or redundancy for the Chimney Sheep and the main modes are below:

- Proliferation of wood/ multi fuel burning stoves – potential for users to upgrade their heating to wood burners making the Chimney Sheep obsolete.
- Block off chimney – implement a more permanent chimney blocking solution.
- Adopting another flue blocking option – Implement an alternative chimney flue blocking solution.

5.1 Proliferation of wood burners

A simple representation of the air flow in a wood burning stove is shown below in Figure 5.1.

Figure 5.1: Wood burner air flow



Source: http://www.bowlandstoves.co.uk/acatalog/EvoAirflow.jpg

There is an air intake vent which can be closed when the wood burning stove is not lit, and as closing this vent stops air being drawn up the chimney flue this has the same effect as installing a Chimney Sheep. The scenario under consideration in this case is that a Chimney Sheep has been purchased for a specific chimney and that a wood burner has subsequently been installed making the Chimney Sheep obsolete.

David Spencer at the Stove Industry Alliance:

> *"180,000 wood-burners were installed last year [2012], with close to one million homes in Britain now having one [04 Feb 2013]. The National Association of Chimney Sweeps says business has increased 40 per cent over the past couple of years as a result of this stove mania"*[8].

However, the main factor that rules out many households for wood-fuelled heating is the space to store the material.

> *"Wood is only attractive to people who have the space to store it, and many of those places are rural and off the gas grid anyway," said Brian Horne, of the Energy Savings Trust. "Urban houses and flats are usually ruled out for this reason."*

Brian Horne, of the Energy Savings Trust[9] also said:

> *'… . large homes in rural areas without access to gas will benefit most from switching to wood fuelled heating.'*

In essence, there is a strong trend towards wood burning stoves and they are considered to have appreciable benefits, but with an installation cost in the order of £1,500 minimum and potentially as much as £4,000[10] they are not a cheap option.

There were no respondents in our survey who indicated that having purchased a Chimney Sheep subsequently purchased a wood burning stove making their Chimney Sheep redundant.

5.2 Block off chimneys

We have also investigated the potential for chimneys to be blocked off, particularly by Housing Associations. This may involve:

1. Cleaning the chimney;
2. Sealing at the internal fire place;
3. Filling the flue with vermiculite;
4. Capping off chimney.

[8] http://www.telegraph.co.uk/lifestyle/interiors/9839432/Everyone-loves-a-wood-burning-stove-but-are-they-bad-for-us.html

[9] http://www.telegraph.co.uk/finance/personalfinance/energy-bills/11050580/Could-you-earn-a-65pc-return-from-a-wood-burning-biomass-boiler.html

[10] See http://www.gr8fires.co.uk/articles/wood-burning-stove-costs for further details

It is noted that there are cheaper measures involving just fitting a cap (flue ventilator) on the chimney pot and a vent plate at the rear of the fire place; also there are more expensive measures including the removal of the chimney and making good the tiling on the roof that has been exposed by the removal of the chimney breast.

There are a number of reasons for blocking off chimneys which are summarised below:

- UK legislation
  Legislation introduced by various governments has increased the number of housing association properties which are likely to block off chimney[11].

- Chimney fire risk
  Housing authorities consider open fires to be a chimney fire risk, due to the lack of control over tenants burning green wood, failing to sweep regularly, the potential for birds to nest and have fire lit underneath their nest etc. so some housing associations currently have a policy to block off when the opportunity arises.

- Structural risk
  That unused chimneys, especially when blocked at the bottom have the potential to draw in additional moisture through the flue and cause structural damage.

There was only one respondent to our survey that mentioned blocking of chimneys:

> *'We've had the flat refurbished and insulated. We noticed we were still getting cold drafts. We found the Chimney Sheep online and thought that would be a good way of sealing the chimney without blocking it off permanently. Once it was fitted we left it in place and we notice that the room stays warmer longer."*

[11] The Clean Air Act (1956) introduced 'smoke control areas' in some towns and cities in which only smokeless fuels could be burned. Section 20 which states that 'if on any day smoke is emitted from a chimney of any building within a Smoke Control Area, the occupier of that building shall be guilty of an offence'. In certain metropolitan areas, from 1956, it is has been an offence to use a chimney in a domestic property.

The Decent Homes Standard (2001) underpinned the Decent Homes Programme brought in by the Blair government. A target was set for social landlords to make all of their stock decent by 2010. To meet the decent home standard, a home must meet four criteria. The fourth criterion standard stated that stock 'must provide a reasonable degree of thermal comfort which has been interpreted to requires dwellings to have both effective insulation and efficient heating.'

Coalition Government policy (2010 – 2015) on providing decent homes includes a requirement for social housing to be reasonably insulated.

5.3 Installation of alternative flue blocking methodologies

There are a number of alternative flue blocking methodologies available which can be categorised as devices that:

- Seal off the fire place itself, such as the fire place draught excluder and fireplace heat saver; and
- Seal the chimney throat itself, such as Fire Genie, Chimney Balloon and Chimella.

Further details of these devices are included as Appendix A.

There are a number of references to other flue blocking methodologies within the responses received from the survey which are included below:

> *'We notice our living room is much warmer with the Chimney Sheep in. Even a day after having a fire we notice when it is not been replaced. It is much better than a balloon which is harder to take in and out.'*
>
> *'We have a round chimney opening and live in a fairly windy location. We no longer have the effects of wind gusts coming down the chimney. Also the sheep is very secure - it has not moved from its installation location despite occasional very high winds. We used to use a chimney balloon but this was constantly deflating and relocating in high winds.'*
>
> *'I have 2 Chimney Sheep in my downstairs rooms. The dining room had a terrible draught from chimney before. I used to have a chimney balloon but feel the Chimney Sheep is better at stopping the draught.'*
>
> *'… . I researched chimney balloons before I bought the sheep and reviews either said they were rubbish or that they deflated. The sheep has stayed where I put it and kept its shape. It is a thick and robust piece of wool which stays firm.*

There were no comments from the respondents that indicate that any other chimney draught reduction device has been utilised after the Chimney Sheep was purchased.

Based on the survey responses we feel that a user, having purchased their Chimney Sheep, is unlikely to make it obsolescent by implementing another device or the more expensive and permanent chimney blocking methodology such as a wood burning stove or fully blocking off their chimney.

This said, we note the proliferation of wood burning stoves in the UK and the drive to permanently block off chimneys, particularly in the Housing Association sector.

6 Customer Behaviour

Ofgem criterion question: To what degree are the benefits of the Chimney Sheep dependent on customer behaviour? For example, householders may not choose to fit the Chimney Sheep.

To assess Chimney Sheep customer behaviour we conducted an online survey between January and March 2016 using the questions shown in Appendix B.

The BSRIA methodology and Ofgem accreditation only relates to financial and carbon saving where the costs associated with an alternative source of heating, i.e. central heating, are being saved due to reduction of heat loss up the chimney. Only two survey respondents reported having an open fire and no other source of heating.

It should be noted that the survey sample is relatively small compared to the overall Chimney Sheep customer base (with circa 30,000 units sold to date). A sample of 135 provides a margin of error of +/- 8.4% (based on a viewpoint shared by 50% of respondents at a 95% confidence level), meaning that responses could vary to this extent if the survey were to be repeated. This has an inverse correlation to sample size, with this reducing as sample sizes increases; therefore a larger sample size would have a lower margin of error.

There is a possibility that householders who do not themselves invest in seeking out and purchasing a Chimney Sheep might not treat the Chimney Sheep with the same level of care, or try to obtain similar benefits. The sample group for the Chimney Sheep user survey however, may be assumed to comprise householders who have invested an effort to seek out and purchase the Chimney Sheep, being themselves purchasers of the product (that is, the product has not been issued free by a third party organisation). We would advise therefore, that if the Chimney Sheep is offered for free to a user group (as a Housing Association might do, for example) that a survey is conducted to establish the user behaviour of the user group after a reasonable period after implementation and the estimated lifetime and expected savings of the Chimney Sheep updated accordingly.

The majority of survey respondents (96%; 129/135) live in houses as opposed to flats, and around 65% (88/135) are located in rural areas with the remainder, around 35% (47/135) being located in urban locations. The duration of ownership of Chimney Sheep of the respondents ranges from less than one month to more than 3 years with over half of respondents (58%; 79/135), having owned their Chimney Sheep for more than one year. There were more than 90% (122/135) that have owned their Chimney Sheep for more than 3 months and so ,with the survey being conducted January – March 2016, have experienced at least a portion of the winter season.

The majority of respondents have gas fired central heating making up around 86% (116/135) and those with oil heating making up around 4% (5/135), and electric heating representing 7.4% (10/135).

Based on the survey results we consider that there are two main Chimney Sheep user scenarios:

1. The ornamental fireplace – The Chimney Sheep once installed is not removed as the fireplace is not used as an open fire.

2. The working open fire – The Chimney Sheep is removed and re-installed to allow the fireplace to be used as an open fire.

The ornamental fireplace

Of the total of 135 respondents, around three fifths indicated that they had removed their Chimney Sheep at some point since installation (59%; 79/135), whilst around two fifths of respondents had not removed the product (42%; 56/135).

Those who had not removed the product to date were then asked whether they intended to do so in the future; with most indicating that they did not plan to remove this (45/56).

The survey results therefore indicate that a third of respondents (33%; 45/135) have not and do not intend to remove the Chimney Sheep from their chimney.

The working open fire

The survey results indicate that around 66% (88 /135) have already (79/135) or intend to (11/135) remove the Chimney Sheep from their chimney.

Of those who have, or intend to, remove their Chimney Sheep, around 10% (13/135) stated that they have or intend to remove the Chimney Sheep for reasons other than to light the fire. The reasons ranged from cleaning, servicing flue, removing in summer for ventilation and having purchased the wrong size of Chimney Sheep.

Over half of respondents who had, or intended to remove their Chimney Sheep indicated that this was in order to light a fire (77/135).

Almost half of those who had removed their Chimney Sheep in order to light a fire (36/67) and all of those who planned to in the future (10/10) indicated that they would do so between one and ten times per year:

> *'… . Mostly, we use gas central heating but do like to have a fire in very cold weather as well as the central heating (which we turn down a little then).'*

The remaining 31 respondents who had previously removed their Chimney Sheep in order to light a fire indicated that they generally do so more than ten times a year

There are a few comments that indicate that once the Chimney Sheep is installed that the need to light a point source of heat such as a gas fire is reduced as the room is warmer and so additional heating from the open fire is not required:

> *'My front room is still draught free, so much so I have had no need to light the fire.'*

'It has been so efficient that even in the coldest weather we have not felt the need to light the gas fire for extra warmth-which is why we have never needed to take it out.'

'We used to turn the gas fire on just to counter the cold draughts that were coming down the chimney. The Chimney Sheep stopped the cold draughts so we never need to light the fire anymore.'

The survey recorded one example of high use of a fireplace in which a Chimney sheep has been fitted:

'My old open fire is normally only used from 21.00 - 12.00 midnight September to May. Morning and afternoon heating is provided by radiators connected to oil fired Rayburn boiler. … . During the warmer summer I don't light a fire at all …'

This scenario of daily use between September and May (8 months of the year) amounts to around 240 cycles per year.

We consider that this frequency of fireplace usage where a Chimney Sheep has been installed to be relatively unusual, as it is not corroborated as normal use elsewhere in the survey results. Where the Chimney Sheep is removed at all (which it has not been by 42% of respondents), the most typical pattern implied by the survey results is that of occasional removal for fire lighting (at weekends, for example) and chimney maintenance / cleaning of the Chimney Sheep itself. As such, we consider that a reasonable usage estimate for the heavy usage scenario, lighting open fire more than ten times/year, is 50 times/ year based on:

- Lighting fire on Saturday and Sunday every week between October and March (6 months of the year); and
- Winter holidays such as Christmas Day.

How the Chimney Sheep is used

Of those that stated that they had already removed their Chimney Sheep more than 70% replaced the Chimney Sheep within a day. Comments provided by respondents were also provided as part of the survey:

'after the fire goes out the cold draughts return so we get the Sheep back in as soon as we can.'

'… . Can notice immediately if we've forgotten to replace it after lighting a fire. Very easy to put back in place.'

'Provided that you remember to replace the item the next morning after the fire has gone out it works perfectly.'

'If the 'sheep isn't fitted as soon as the fire is cold then we start to notice the cold draughts again. Once it is back in place then the cold draughts stop.'

'If I don't put the Chimney Sheep back in the chimney then my wife starts to complain about cold feet. I put the sheep back in and she's happy again.'

'I notice at once if the sheep is not in place as the room is significantly colder without it and the draught is immediately obvious.'

'Chimney Sheep continued to do its job and still does, if we forget to put it back up the chimney you can feel the draught in the room as the air rushes up the chimney.'

As such we consider that it is reasonable to assume a standard mode of Chimney Sheep use that involves:

- The Chimney Sheep being installed at all times when other heating source is being used to heat the property;
- That the Chimney Sheep is replaced within a day of having used the fire; and
- That there are two distinct cases of the working fireplace:
  - Light use – up to 10 (ten) removals and installations of the Chimney Sheep per year;
  - Heavy use – up to 50 (fifty) removals and installations of the Chimney Sheep per year.

It should be noted that the results presented herein represent the views of a sample of 135 Chimney Sheep customers, with a subsequent margin of error of 8.4%, therefore care should be taken when generalising these to the wider population. These findings do however provide a useful initial indication of customer behaviour, which could be explored further in more extensive customer research, and an opportunity to collate qualitative feedback regarding individual customers' levels of satisfaction to date.

We would recommend that Chimney Sheep Limited seek customers' permission for follow up contact at the point of sale in future, so that ongoing customer engagement may be undertaken to form a greater understanding of customers' experiences and perceptions of the product - which, based on this initial feedback is largely positive.

7 Industry Practice

Ofgem criterion question: How does industry treat products like the Chimney Sheep? Did it receive a lifetime under CERT and CESP? If so, what was it and why was it awarded that lifetime? Does it receive a lifetime under Green Deal? If so, what is it and why was it awarded that lifetime?

Chimney Sheep does not currently have an assigned lifetime under the Carbon Emission Reduction Target (CERT) or Community Energy Saving Programme (CESP). Nor does it have a lifetime associated with the Green Deal.

8 Discussion

Chimney Sheep Limited has developed woollen draught excluders for chimneys, which come in a variety of sizes and are inserted into a chimney flue using a plastic handle. They are made from Lake District Herdwick sheep wool and designed to be easily removable so that the fire place can still be used.

Around 30,000 units have been sold to date, principally to private individuals through the company's website.

As the Chimney Sheep draught excluder is not a permanent fixture there is a requirement to understand its length of life as well as the way that it is used by customers so that the carbon and cost saving credentials of the product can be calculated over its lifetime.

The objective of this report is to develop the case and reach a conclusion on the appropriate non-standard lifetime to apply to the Chimney Sheep draught excluder, which is not designed for permanent installation.

Ofgem has cited a number of criteria which we have considered in making our assessment of an appropriate lifetime of the Chimney Sheep; these are listed below:

- Durability.
- Maintenance.
- Warranty/Guarantee.
- Obsolescence.
- Customer Behaviour.
- Industry Practice.

The research was based on publically available information and a Chimney Sheep user survey which was conducted between January and March 2016.

8.1 Durability

As part of the DECC EFF programme support BSRIA (the leading independent UK laboratory for testing and performance verification of a wide range of building services products) was commissioned to determine the energy and carbon savings from the use of the Chimney Sheep draught excluder. BSRIA concluded that a lifetime of 10 years was appropriate for the Chimney Sheep based on:

- 300 test cycles (extracting and re-inserting the Chimney Sheep) having been conducted; and
- 30 cycles per year of extraction and re-insertion being the assumed maximum number of cycles that the Chimney Sheep would normally be subjected to (in order for the home owner to light fires).

Based on the feedback from respondents to our user survey we have not been presented with any evidence that indicates that the BSRIA findings for the effectiveness of the Chimney Sheep has been overstated in its claims of 10 years lifetime.

It is though noteworthy that although the Chimney Sheep has been a commercial product for several years and has been tested and assessed in several areas, an appreciable amount of testing that will clarify the durability of the Chimney Sheep and the appropriate lifetime that the Chimney Sheep should be credited

with, is yet to be conducted. As such, the findings of this report are predicated on the assumption of BBA testing and analysis finding no obvious flaws in the Chimney Sheep as a product. Chimney sheep Limited has been provided with a degree of confidence by the successful results of the initial BBA tests.

We would recommend that the findings of this report are reassessed once the BBA tests and assessments have been completed to confirm that the results of this report have not been undermined by subsequent finding from the BBA investigations.

8.2 Maintenance

The Chimney Sheep product requires no maintenance aside from occasional checks for possible cleaning; the survey results identify no more onerous requirements on the part of users. There are a number of examples where the recommended maintenance checks have not been conducted and there has been no detrimental impact on the performance of the Chimney Sheep.

The survey identified one example where the plastic handle snapped in use making the Chimney Sheep difficult to use and consider that Chimney Sheep Limited may wish to investigate potential strategies to mitigate this such as making the handle more robust or providing a no quibble/ low cost replacement for broken handles.

8.3 Warranty/ guarantee

The default lifetime applied by Ofgem to equivalent insulation products that are supplied without a guarantee is currently two years. To be accredited with the full 25 – 42 years lifetime that is applied to most wall insulation for example, Ofgem requires:

- Guarantee in place to ensure that in the event of failure within 25 years they will be repaired/ replaced;
- That a quality control system is in place to provide confidence that the item is unlikely to fail within the proposed lifetime if longer than 2 yrs.

For cavity and solid wall insulation the following methods of providing a 25 year guarantee are available:

- Cavity Insulation Guarantee Agency; and
- The Solid Wall Insulation Guarantee Agency.

We consider that it would not be unreasonable for Ofgem to apply the same criteria to the Chimney Sheep, i.e. while test results may demonstrate that the product exhibits the required level of durability, Ofgem will require a form of guarantee to be comfortable to endorse the lifetime of the Chimney Sheep.

8.4 Obsolescence

We have identified potential routes to obsolescence or redundancy for the Chimney Sheep:

- Installation of wood/ multi fuel burning stoves – effectively removing the need for a Chimney Sheep in the flues of fireplaces where such stoves are installed.
- Blocking off of chimneys – permanent chimney blocking solutions in some housing stock making the Chimney Sheep obsolete in those cases.
- Adopting another flue blocking option – alternative chimney flue blocking solutions used instead of a Chimney Sheep.

8.4.1 Domestic stoves/ wood burners

There were no respondents in our survey who indicated that having purchased a Chimney Sheep, they subsequently purchased a wood burning stove making their Chimney Sheep obsolete.

It is noted that the installation of a wood burning stove obviates the need for a draught excluding device only in the flue of the fireplace which is replaced by, or hosts the stove. Most homes which have a fireplace have more than one flue, so the installation of a wood burning stove does not necessarily mean that there is no need or application for a Chimney Sheep elsewhere in the property.

8.4.2 Blocking the flue

There was only one respondent to our survey who mentioned blocking of chimneys, and in that case only in terms of how the Chimney Sheep was a better option than permanently blocking off the chimney.

8.4.3 Installation of alternative methodologies

There are a number of references to other flue blocking methodologies within the responses received from the survey, but no comments that indicated that any other chimney draught reduction device has been utilised after the Chimney Sheep was purchased.

Based on the survey responses we feel that a user, having purchased a Chimney Sheep, is unlikely to make it obsolescent by implementing another device or a more expensive permanent solution such as blocking or removing the chimney.

While some Housing Associations are opting for permanently blocking chimneys, this is not a universal solution in the social housing sector.

8.5 Customer Behaviour

Based on the survey results we consider that there are two main Chimney Sheep user scenarios:

- The ornamental fireplace – The Chimney Sheep once installed is not removed as the fireplace is not used as an open fire.
- The working open fire – The Chimney Sheep is removed and re-installed to allow the fireplace to be used as an open fire.

8.5.1 The ornamental fireplace

The survey results indicate that a third of respondents (45/135) have not and do not intend to remove the Chimney Sheep from their chimney.

8.5.2 The working open fire

The survey results indicate that around 66% (88 /135) have already (79/135) or intend to (11/135) remove the Chimney Sheep from their chimney.

Of those who have, or intend to, remove their Chimney Sheep, around 10% (13/135 respondents) stated that they have or intend to remove the Chimney Sheep for reasons other than to light the fire. The reasons ranged from cleaning, servicing flue, removing in summer for ventilation and having purchased the wrong size of Chimney Sheep.

Over half of respondents who had, or intended to remove their Chimney Sheep indicated that this was in order to light a fire (77/135).

Almost half of those who had removed their Chimney Sheep in order to light a fire (36/67) and all of those who planned to in the future (10/10) indicated that they would do so between one and ten times per year:

> *'… . Mostly, we use gas central heating but do like to have a fire in very cold weather as well as the central heating (which we turn down a little then).'*

The remaining 31 respondents who had previously removed their Chimney Sheep in order to light a fire indicated that they generally do so more than ten times a year

There were a few comments that indicate that once the Chimney Sheep is installed that the need to light a point source of heat such as a gas fire is reduced as the room is warmer and so additional heating from the open fire is not required.

The survey recorded one example of high use of a fireplace in which a Chimney sheep has been fitted:

'My old open fire is normally only used from 21.00 - 12.00 midnight September to May. Morning and afternoon heating is provided by radiators connected to oil fired Rayburn boiler. … . During the warmer summer I don't light a fire at all … .'

This scenario of daily use between September and May (8 months of the year) amounts to around 240 cycles per year.

We consider that this frequency of fireplace usage where a Chimney Sheep has been installed to be relatively unusual, as it is not corroborated as normal use elsewhere in the survey results. Where the Chimney Sheep is removed at all (which it has not been by 42% of respondents), the most typical pattern implied by the survey results is that of occasional removal for fire lighting (at weekends, for example) and chimney maintenance / cleaning of the Chimney Sheep itself –. As such, we consider that a reasonable usage estimate for the heavy usage scenario, lighting open fire more than ten times/year, is 50 times/ year based on:

- Lighting fire on Saturday and Sunday every week between October and March (6 months of the year); and
- Winter holidays such as Christmas Day.

8.5.3 How the Chimney Sheep is used

Of those that stated that they had already removed their Chimney Sheep more than 70% replaced the Chimney Sheep within a day. Comments provided by respondents were also provided as part of the survey which indicated that it was in the users' best interest to replace the Chimney Sheep as soon as possible after the fire has been extinguished.

As such we consider that it is reasonable to assume a standard mode of Chimney Sheep use that involves:

- The Chimney Sheep being installed at all times when other heating source is being used to heat the property;
- That the Chimney Sheep is replaced within a day of having used the fire; and
- That there are two distinct cases of the working fireplace:
  - Light use – up to 10 (ten) removals and installations of the Chimney Sheep per year
  - Heavy use – up to 50 (fifty) removals and installations of the Chimney Sheep per year

It is noted that whereas the "heavy use" scenario of 50 cycles per year is higher than the assumption of a typical 30 cycles per year used by the BSRIA in its assessment, that the heavy use scenario may be assumed to apply to a minority of Chimney Sheep users, on the basis that the fewer than one in four respondents extract and replace their Chimney sheep more than 10 times per year.

9 Conclusions

Based on our analysis we conclude that that the scenarios and associated lifetimes shown in Table 9.1 and explained in the following text are appropriate to apply to the Chimney Sheep.

Table 9.1: Various Chimney Sheep scenario lifetimes

Scenario	Details	Proposed Life of Chimney Sheep
Ornamental fireplace	Installed and not removed during lifetime.	20 years
Occasional use of fireplace	Up to 10 cycles of removal / replacement per year	20 years
Heavy use of fireplace	Up to 50 cycles of removal / replacement per/ year	10 years

1. **Ornamental fireplace scenario**
   In the event that the Chimney Sheep is properly installed and left in situ, we have not been presented with evidence that the Chimney Sheep would not have the same lifetime as the life of the chimney throat in which it is installed. This could potentially be over 100 years and so due to the uncertainty associated with deterioration of the Chimney Sheep in the chimney flue over this time and there being no examples of a Chimney Sheep having been installed for periods of more than 10 years we can only reasonably propose a life of 20 years, but would advise that this is reassessed when the full results from the BBA trials are provided.

2. **Occasional use – up to 10 cycles/yr**
   In this case we assume a novice user that is not well practiced at changing their Chimney Sheep and is therefore only given credit for a life of 300 cycles before their Chimney Sheep loses rigidity and requires replacement due to environmental conditions in the flue over the 30 years lifetime that this equates to. As previously, due to the uncertainty associated with deterioration in the chimney flue over this time and there being no examples of a Chimney Sheep having been installed for more than 10 years we can only reasonably propose a life of 20 years, but would advise that this is reassessed when the full results from the BBA trials are provided.

3. **Heavy use – up to 50 cycles/yr**
   In this case we are assuming a more practiced installer who changes their Chimney Sheep frequently and is therefore given credit for 500 cycles, which equates to a lifetime of 10yrs. Once again we advise that this is reassessed when the full results from the BBA trials are provided.

In the event that Chimney Sheep Limited is not able to establish the full profile of Chimney Sheep usage and removal / replacement cycles according to the user scenarios identified and, that a single lifetime for the Chimney Sheep were required, Mott MacDonald would recommend that a nominal lifetime of ten (10) years is assigned, based on the worst case scenario of ‘heavy use’ of the fireplace in which the Chimney Sheep is installed.

Given the potential Ofgem requirement in respect of a guarantee, we would advise that Chimney Sheep Limited investigate the term of guarantee that it is able to offer against the defined user profile (ornamental fireplace, occasional use and heavy use).
With respect to quality control, we would expect the findings from the BBA investigations to confirm that and appropriate quality control system is in place to provide comfort that the Chimney Sheep will not fail

within two years, but we would advise that Chimney Sheep Limited discuss with Ofgem the quality control criteria required and check that the BBA analysis will report results in terms that Ofgem will be able to base a decision upon.

Our conclusions about the life of the Chimney Sheep is predicated on reasonable use by a competent user, such as the respondents to our user survey, who have purchased the product themselves and are therefore likely to treat the Chimney Sheep with respect to obtain as much value as possible from the device, particularly for the heavy user group. There is a possibility that householders who do not themselves invest in seeking out and purchasing a Chimney Sheep might not treat the Chimney Sheep with the same level of care, or try to obtain similar benefits. We would advise therefore, that if the Chimney Sheep is offered for free to a user group (as a Housing Association might do, for example) that a survey is conducted to establish the user behaviour of the user group after a reasonable period after implementation and the estimated lifetime and expected savings of the Chimney Sheep updated accordingly.

10 Recommendations

Based on our research and analysis, we recommend that Chimney Sheep Limited consider the following:

- To reassess once BBA results are delivered and look into giving a guarantee/ warranty to provide Ofgem with appropriate levels of comfort about the lifetime of the Chimney Sheep;
- That a survey is conducted to establish the user behaviour in the event that a user group receives the Chimney Sheep for free and the estimated lifetime and expected savings of the Chimney Sheep provided within this report updated accordingly;
- To investigate potential strategies to mitigate broken handles such as making the handle more robust or providing a no quibble/ low cost replacement for broken handles.

Appendices

Appendix A. Alternative products / warranties and guarantees

These are split into two discrete types based on the chimney draught excluding methodology employed:

- External sealing; and
- Chimney throat sealing.

A.1 External sealing types

A.1.1 Fireplace draught excluder

Figure A.1: Fireplace draught excluder

Retail price EUR 80 – 95. Offers a money back guarantee but no warranty for the life of the component.

http://www.fireplacedraughtexcluder.com/

A.1.2 Fire Place Heat Savers

Figure A.2: Fireplace Heat Savers

Aside – BSRIA have conducted a similar report for this company - http://fireplaceheatsaver.co.uk/downloads/BSRIA%20Report%2050631-1%20Edition%202.pdf

Delivered cost - £80

Offer a 7 day guarantee for unused items, but no guarantee over the lifetime.
http://fireplaceheatsaver.co.uk/downloads/Terms%20&%20Conditions%20EFS%20Ltd.pdf

http://fireplaceheatsaver.co.uk/home.html

A.2 Chimney throat sealing devices

A.2.1 Fire Genie

Figure A.3: Fire Genie

A moveable damper that fits into the throat of the chimney, so just needs to be opened when the fire is lit and when the fire is not lit the damper is closed. Requires professional installation and annual maintenance, advised to be done when chimney is swept.

Has a two year warranty that can be extended to 5 years. Price of the unit and extension of warranty not available.

http://fire-genie.com/

A.2.2 Draught Stop

http://chimneydraughtstop.ie/

Very similar sounding product to the fire genie. Costs EUR 250 supplied and installed. 5 year guarantee
http://chimneydraughtstop.ie/benefits/

A.2.3 Chimney Snug

http://www.chimneysnug.com/

A seal that fits into the fireplace when the fire is not lit as shown below.

Figure A.4: Chimney Snug

Cost £19.99 - http://www.lake-renewable-energy.com/chimney-snug-draught-excluder-1560-p.asp

Not clear that any warranty is offered with this product.

A.2.4 Chimney Balloon

Figure A.5: <Insert Figure Title here>

http://www.chimneyballoonstore.co.uk/

Inflatable balloon that is inserted into the chimney throat and inflated. Costs between £19.99 and 22.99 depending on size and shape.
http://www.chimneyballoonstore.co.uk/index.php?main_page=index&cPath=11

The product description talks about being able to leave in place for years http://chimneyballoon.co.uk/The-Balloon/

Warranty is mentioned in the conditions of use for the site.

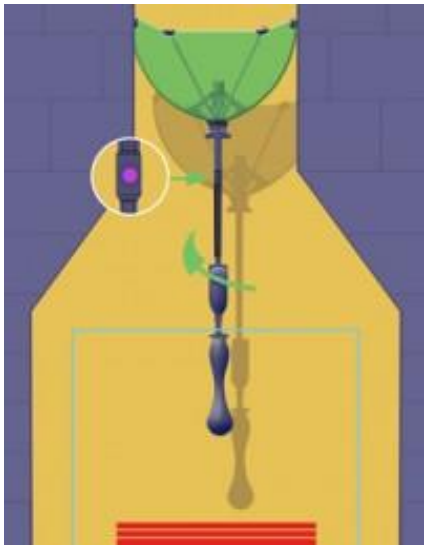
http://www.chimneyballoonstore.co.uk/index.php?main_page=conditions

The actual guarantee is for 1 year except for wear and tear but they expect that it will last for 5 years.

http://chimneyballoon.co.uk/The-Balloon/FAQs/

A.2.5 Chimella

Figure A.6: Chimella



An umbrella type device that fits into the chimney throat and is opened to make seal.

Offer a 30 day return service. http://www.chimella.com/about-chimella/service-quality/

No obvious life-time guarantee.

A.3 Conclusion

The Chimney throat sealing devices, which are the most similar to the Chimney Sheep methodology provide a limited indication of the expected lifetime of the devices. The longest offering is 5 years on professionally installed, and probably maintained, chimney throat insulating devices. The nominal offering of 1 year for the chimney balloon is potentially indicative of reasonable life if the device is repeatedly installed and removed.

Appendix B. Customer survey questions