DATABUILD
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Upper Hunter Wood Smoke Community Research Project

Final report prepared for the
NSW Environment Protection Authority

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1 Executive Summary

Databuild Research and Solutions was commissioned by the NSW EPA to conduct research on community attitudes towards wood smoke in the Upper Hunter. The purpose of this research was to provide insights into public attitudes about the impact of wood smoke, understand households' heating choices and recommend measures to help the NSW EPA and Muswellbrook and Singleton councils develop initiatives to reduce particle emissions from wood smoke. Wood heater use in the Upper Hunter towns of Muswellbrook and Singleton is relatively high and previous interventions have had limited impact.

The research addressed five objectives among wood heater users living in and around Muswellbrook and Singleton:

1. Understanding public attitudes about the impact of wood smoke and other forms of particle pollution
2. Understanding what factors influence household heating choices
3. Investigating reasons that prevent consideration of cleaner heating options
4. Identifying any need for energy efficiency audits and advice on cleaner forms of heating and insulation
5. Developing region-specific education tools that target different segments of the community, including different socio-economic and age groups

In order to achieve these objectives a combination of qualitative and quantitative methodologies was used. These were supplemented by a brief literature review.

Research was conducted in three phases, each informing the next.

1. In-depth qualitative research with stakeholders (ten interviews) and householders (four group discussions) in the Upper Hunter. This phase focused on identifying existing knowledge, attitudes and behaviour around wood heaters and wood heater interventions. The findings helped guide the development of the questionnaire used in phase two.
2. A quantitative survey with 203 wood heater users in and around Muswellbrook and Singleton. This phase focused on measuring the incidence of specific knowledge, attitudes and behaviours identified in the first phase. It included establishing levels of interest in specific interventions and incentives to change behaviour around wood heaters.
3. Follow-up in-depth, qualitative research comprising two group discussions with wood heater users in Muswellbrook and Singleton. This phase focused on assessing messages on wood smoke to help guide the development of a communication strategy addressing wood smoke in the Upper Hunter.

Wood heater owners' attitudes about the impacts of wood smoke are very different from those relating to other forms of particle pollution in the Upper Hunter. Attitudes about wood smoke are characterised by lack of awareness of the risks and reluctance to change current methods of heating, while mining, power stations, diesel trucks and trains tend to be seen as the only real sources of air pollution in the area.

A combination of rational and emotional factors influence household heating choices in the Upper Hunter in favour of continued use of wood heaters, making it difficult to move to cleaner forms of heating such as electricity and gas. The research has identified a number of barriers that make it complex and challenging to initiate behaviour change among wood heater users in the Upper Hunter. These include:

- Wood being a free or low cost and accessible resource for many in the region
- Limited heating choices in the Upper Hunter due to lack of town gas
- The cost of alternative heating such as electricity or bottled gas
- The strong attachment many feel to heating their homes with wood
- Lifelong habits and entrenched attitudes around wood heaters and their use
- Lack of awareness and / or acceptance that wood smoke has negative heath impacts and belief even that wood heaters and wood smoke are benign
- The view that other forms of particle pollution from coal mines, power stations, trains and diesel trucks are more problematic
- The difficulty experienced by some in understanding the relatively technical nature of some information on wood smoke pollution and its health impacts

The research found negligible interest in energy efficiency audits or advice on cleaner forms of heating and insulation as these were seen as interfering in household choices. Similarly, there is low interest in switching to other forms of heating. Only 4% of respondents in the household survey were interested in replacing their wood heater with an alternative. This increased to 11% if a discount were offered to replace their wood heater with a different form of heating.

While the figures on willingness to switch to a different form of heating reflect consistency of opinion across the sample, small but important differences in awareness and attitudes were identified among the Upper Hunter community. This enabled the sample of wood heater users who participated in the research to be divided into four segments each representing a different mind-set around wood smoke. The segments were:

- '**Oblivious'** , who don't understand that wood smoke is harmful to human health
- '**Rejecters'**, who don't accept that wood smoke is harmful to human health
- '**Rationalisers'**, who don't consider any harm caused by wood smoke to be of concern or as bad as that caused by mining (and other industrial sources of particle pollution) in the Upper Hunter
- '**Conditional Accepters'**, who are prepared to listen and even change their behaviour around wood heaters as long as they are convinced that it is worthwhile and that any change is not too onerous.

1.1 Implications for future action

The segmentation based on the research into the Upper Hunter community attitudes towards wood smoke can be used to help guide the development of region-specific education tools and highlights the value of:

- A range of different initiatives tailored to meet the needs of the heterogeneous community of wood heater users in the Upper Hunter

- Rolling out the various initiatives at the same time, due to different people having different attitudes and behaviours towards wood heaters.

The research provided insights into the type of behaviour change approach which might be most appropriate and effective. A multi-pronged strategy comprising four components is suggested, each targeting wood heater users at a different stage of the behaviour change journey:

- **Myth busters**: focusing on increasing awareness of the negative impact of wood smoke on health by challenging misconceptions. It is important that existing views are acknowledged and addressed in a meaningful and tangible way so wood heater users are more likely to relate to and be convinced by messages about the harmful effects of wood smoke
- **Call to action**: focusing on encouraging short term behaviour change by making it easy to improve the way wood heaters are used and maintained. For example, providing contact details of chimney sweeps so it is easier for people to get their flues professionally cleaned on a regular basis
- **Testimonials**: enabling longer-term behaviour and attitudinal change by providing case studies that demonstrate changes made by different members of the Upper Hunter community and the benefits that such changes have brought about. It is anticipated that case studies can be developed with the assistance of a small number of potential 'ambassadors' identified during the research as being more willing that most to undertake change around wood heaters
- **Smarter use**: highlighting the benefits of taking small steps initially, such as smart heating of one's home, as the groundwork for encouraging larger ones to be taken and enabling longer-term behaviour change.

The research indicated that a communication campaign encouraging optimal operation of wood heaters is more likely to be embraced by the community than simply trying to encourage wood heater users to switch to alternative forms of heating.

Such a communication campaign would explain:

- The existence and nature of the wood smoke problem
- What specific health impact wood smoke has on wood heater users and the surrounding community
- The role of wood heater users in addressing the problem
- Practical ways for wood heater users to go about making changes.

Due to the view in the Upper Hunter community that the mines, power stations and associated transport issues are a bigger problem than wood heaters, messages on wood heaters need to be communicated in the context of other government actions that aim to reduce particle pollution; otherwise wood heater users will feel that they are being unreasonably singled out.

The communication campaign should be tailored to target different segments of the community – starting from the most willing to listen ('Conditional Accepters' and the 'Oblivious') and progress to those least willing to listen ('Rationalisers' and 'Rejecters'). The majority of residents are likely to be reached via local newspapers and radio, which emerged as the most effective media for communicating with a rural audience.

An important target across all of these segments is households in townships that keep their wood heaters alight around the clock during the winter. The issue of keeping fires smouldering overnight need to be explained as well as discouraged.

It will be easier and more motivating for the Upper Hunter community to respond to a communication campaign that keeps a very practical focus, on how wood heater users can respond to / act on the information they are given.

The complex communication task and the extremely challenging environment highlights the need for a behaviour change campaign or intervention that could be implemented by local councils but would be designed by communication specialists (in, for example, advertising or public relations). To be effective, the campaign will need to:

- Grab people's attention
- Be easy to understand
- Be credible and convincing
- Be relevant – tell the Upper Hunter community what it means to them
- Present simple, straightforward ways that wood heater users can take positive action
- Build awareness and community capacity for future change given the current resistance to change.

2 Introduction

The NSW EPA (EPA) is committed to finding a suitable approach to address the impacts of wood smoke in the Upper Hunter. However, not enough is known about community attitudes towards wood smoke pollution and household heating choices to inform effective interventions. The EPA has undertaken wood smoke reduction initiatives in the Upper Hunter in the past, such as the Wood Smoke Reduction Program during the 2013 and 2014 winters. The program did help raise awareness of local communities about wood smoke impacts but there is still scepticism in the community about the value of considering wood smoke given the extent of coal mining in the area and associated air quality impacts.

The objectives of this study were to:

1) Understand public attitudes about the impact of wood smoke and other forms of particle pollution
2) Understand what factors influence householders' heating choices and investigate the reasons that prevent them from considering other cleaner heating options
3) Identify whether there is a need for energy efficiency audits and advice on cleaner forms of heating and insulation
4) Estimate the potential number of households that could be willing to upgrade their heating options and the level of economic incentives required
5) Develop region-specific education tools that target different segments of the community, including different socio-economic and age groups.

As presented in Section 3 the approach to the work followed a tailored, mixed method approach of both qualitative and quantitative research involving the following steps:

- A preliminary phase comprising a desktop review of relevant literature
- Phase 1 comprising an initial qualitative study with both stakeholders and community members based in the Upper Hunter
- Phase 2 consisting of a quantitative study with 203 householders with wood heating in Muswellbrook and Singleton
- Phase 3 being follow-up qualitative research with householders with wood heating in Muswellbrook and Singleton

The remainder of this report is structured as follows:

- Section 3 presents an overview of the methodology used
- Section 4 discusses the findings from each of the three phases of work in relation to each of the research objectives
- Section 5 discusses options for the development of wood smoke mitigation interventions
- Section 6 presents the conclusions and recommendations of the study.

3 Methodology

A phased approach was employed to allow each phase of research to feed into and inform the subsequent phases. In summary, the project involved the following steps:

Preliminary Phase

i. Project inception
ii. Desktop review of relevant literature
iii. Methodology development and agreement with the EPA

Phase 1: Initial qualitative research with the community:

i. Ten in-depth interviews with local government, community and industry stakeholders conducted between Wednesday 8th July and Wednesday 22nd July 2015.
ii. Four focus groups with householders in Muswellbrook and Singleton in July 2015.

Phase 2: Quantitative community survey:

i. Interim review and discussion with EPA and agreement on quantitative research approach
ii. 203 quantitative telephone interviews with a representative sample of householders with wood heating in Muswellbrook and Singleton.

Phase 3 Follow-up qualitative research with the community:

i. Two follow up mini groups, each comprising 4-5 respondents, with a sample of Muswellbrook and Singleton based respondents who completed the quantitative survey

Table 1 ***Research phases and objectives***, below, indicates how each element of the study addressed the research objectives.

Copies of the questionnaire and topic guides are appended along with the materials used as stimulus in Phase Three.

Table 1 Research phases and objectives

Research objectives	Preliminary phase: Literature review	Phase 1: Stakeholder interviews	Phase 1: Focus groups with community	Phase 2: Community survey	Phase 3: Qualitative: focus group & interviews
Explore public attitudes about impacts of wood smoke and other forms of particle pollution	✓	✓	✓✓	✓	
Investigate influencers of households' heating choices and barriers to use of alternative heating options	✓	✓	✓✓	✓	
Ascertain need for energy efficiency audits and advice on alternatives to wood heaters	✓	✓	✓	✓	
Estimate potential number of households willing to upgrade heating and level of economic incentives required				✓✓	
Develop region-specific education tools targeting different segments of the community	✓				✓✓

In reality all research phases covered each objective to some degree, but some were more focussed on specific methods/objectives.

4 Literature review summary

4.1 Purpose

The purpose of the literature review was:

1. To review other government wood smoke management interventions
2. To use the above to inform the focus and approach to take for this research

A bibliography is provided in Appendix 1.

4.2 Summary findings

4.2.1 Review of Government wood smoke management interventions

The major wood smoke management[1] intervention in Australia identified in the literature review was from Launceston, Tasmania as summarised below:

Context

Launceston is the second largest city in Tasmania that is located in the Tamar Valley. The major source of particle pollution in Launceston is wood smoke from residential wood heaters. During winter months topographical and meteorological conditions limit air dispersion and air pollution concentrates around the city area. Since air quality monitoring began in 1992, exceedences of the national Air Quality Standards were recorded during winter months.

Launceston City Council started responding to concerns about air quality by conducting education campaigns from 1992 until 2001. However, substantial air quality improvements occurred only as a result of the Federal Government $2.05 m program in 2001-04.

Detail

The Wood heater Emission Management Program for the Tamar Valley[2] suggested that the greatest net reduction in PM may be realised by the simultaneous implementation of targeted education and wood heater replacement programs. Consequently, a wood heater replacement program began in late 2001. It offered an incentive of up to $500 for residents to change from wood heating to another cleaner heating type. Targeted education program began at the commencement of winter in 2002. Specific measures comprised:

- An incentive scheme to replace wood heaters with cleaner forms of heating. Approximately $1m was allocated for a wood heater buy-back program. The local electricity retailer also strongly advertised their products to get residents to switch to electric heaters.
- A targeted education campaign aimed to identify households with consistently smoky heaters and encourage the users to learn better wood heater operation and maintenance. The education team comprised two full time employees and two volunteers that undertook observations of smoky chimneys. Households that had excessively smoky chimneys were offered

[1] Johnston, Hanigan, Henderson & Morgan, 2012. *Evaluation of interventions to reduce air pollution from biomass smoke on mortality in Launceston, Australia: retrospective analysis of daily mortality, 1994-2007*
[2] Scoping Study, Atech Group, 2001

assistance and advice in reducing wood smoke as a first step. Warning letters were sent to households if they haven't improved operation of their heaters.

- Wider education campaign including media advertising by the local council and school based education program.

Impact

Annual mean concentration of PM_{10} before the intervention was 23.7 µg/m3; this was down to 18.4 µg/m3 after the intervention. There was also a significant decrease in the wintertime mean concentration of PM_{10}, from 43.6 µg/m3 before the intervention period to 27.0 µg/m3 after the intervention.[3]

There was a general trend towards reduced cardiovascular and respiratory mortality throughout Tasmania during the study period, with the greatest magnitude observed for cardiovascular mortality. The reduction in respiratory mortality rates during winter months was larger in Launceston than in Hobart and the rest of Tasmania. There was measurement and adjustment for known and measurable factors e.g. age, - temperature, humidity, and respiratory epidemics. But it was more challenging to separate the changing prevalence of factors such as smoking and diabetes.[4]

A NSW Parliament Upper House Inquiry into the performance of the NSW Environment Protection Authority noted that when the number of households using wood-burning stoves in Launceston fell from 66% to 30%, wintertime particulate pollution fell by 40%. Deaths from cardiovascular diseases in winter fell by 20% and respiratory deaths by 28%[5].

Overall, the wood heater interventions in Launceston achieved measurable improvements, in that particular location and community. The Upper Hunter project has investigated attitudes and potential responses to interventions in terms specifically `of the Upper Hunter location and community, in order to inform development of relevant and effective future interventions.

[3] Johnston, Hanigan, Henderson & Morgan, 2012. *Evaluation of interventions to reduce air pollution from biomass smoke on mortality in Launceston, Australia: retrospective analysis of daily mortality, 1994-2007*
[4] Ibid.
[5] NSW Parliament Upper House Inquiry Performance of the NSW Environment Protection Authority - 2014

5 Research findings

5.1 Public attitudes about impacts of wood smoke and other forms of particle pollution

Stakeholder interviews

This section describes and explains stakeholders' perceptions of the impact of wood smoke and other forms of particle pollution. Stakeholders interviewed included:

- Members of the Upper Hunter Air Quality Advisory Committee (UHAQAC), one of which is also a representative of NSW Health
- Representatives of Muswellbrook and Singleton Councils
- Member of the Newcastle Community Consultative Committee on the Environment (NCCCE)
- Hunter Communities Network Group
- Hunter Environment Lobby
- Wood heater salesperson

During the interviews stakeholders expressed their own opinions and reflected upon those of the Upper Hunter community in general. This highlighted that the stakeholders live in the same community and are concerned members of the community, with the focus of their concern being air quality in general and pollution from mines, rather than wood smoke in particular.

The overwhelming view amongst stakeholders interviewed during Phase One is that the Upper Hunter community tend not to regard wood smoke as an air quality issue. Stakeholders attribute this partly to lack of awareness of the impact of wood smoke and also reluctance to acknowledge the harmful effects of wood smoke. This is consistent with feedback the EPA has had through previous initiatives such as the wood smoke reduction program.

Even members of the Upper Hunter Air Quality Advisory Committee (UHAQAC) reported being "shocked" upon finding that wood smoke is a significant air quality issue in winter months. Stakeholders consider it likely that the wider community would be similarly unaware, as they are perhaps less aware of and less interested in air quality issues in general.

Despite there being evidence that wood smoke is as harmful as other sources of air pollution, this is counter-intuitive in the Upper Hunter and stakeholders (accurately) perceived there to be widespread unwillingness amongst the community to accept that wood smoke can have an impact when there are other polluters such as the mining industry and the power stations, which are more obvious. For example, stakeholders were often under the impression that, because they are surrounded by coal mines, householders "*do not care*" what they do at home as *"they are putting up with dirty air anyway and are angry that we are trying to cut back on wood (as a heating source) when it should be coal".* For this reason householders are thought to be unable to fully acknowledge the impact that they, as individuals, have and believe more should be done to tackle pollution from other sources such as coal.

While some stakeholders now view wood smoke as a significant issue that requires attention (e.g. those representing the UHAQAC and Public Health) others still regard wood smoke as lower down the list of priorities around air quality (e.g. the Hunter Communities Network Group and the Upper Hunter Environment Lobby).

Exploration of past initiatives and efforts to address wood smoke revealed that some stakeholders believed that these strategies were 'controversial' to the community. They were not well received by some members of the community due to the (perceived or real) scale of pollution that householders can see is coming from elsewhere and their sense that the initiatives did not sufficiently recognise these more major pollution sources.

Some stakeholders felt strongly that householders do not like feeling that 'blame' is being placed on them whilst other contributors of air pollution are, in their eyes, 'getting away with it'. Therefore, in order to tackle attitudes about wood smoke a broader approach, which tackles these issues head on, is thought to be needed. This reflects lack of awareness among some stakeholders of the EPA's work with coal mines and other industry to minimise air pollution in the Upper Hunter.

In particular, many stakeholders felt that to influence community attitudes and enable wood smoke to be recognised as an issue, a number of knowledge gaps need to be addressed. These include:

- The nature and extent of the problem of wood smoke compared to other sources of pollution (past studies were regarded with some scepticism and not regarded as credible)
- The drawbacks of wood heaters, using them incorrectly and how this can impact on health
- The nature of the benefits of alternatives to wood heaters and of using wood heaters properly. The view of many stakeholders was that people may be more likely to at least consider changing (their source of heating or the way they use their wood heater) if they understand that there are benefits to alternatives that will not impact on their quality of life.

While only one stakeholder reported having replaced their wood heater with an alternative heating source, the trigger to do so presents an opportunity to set an example among the wider community. This stakeholder suffered from asthma and was advised that her wood heater might aggravate this condition. She acknowledged that her asthma had improved since replacing her wood heater and that, while others may also benefit from doing the same, there is considerable reluctance among many wood heater owners to do such a thing. This highlights the need for an evidence-based approach to encouraging behaviour change among wood heater users of the Upper Hunter. Case studies built around testimonials by local residents provide an opportunity here.

Phase One focus groups with householders in Muswellbrook and Singleton

This section describes and explains respondents' attitudes about the impact of wood smoke and other particle pollution in the Upper Hunter.

It became clear from the focus groups conducted during Phase One that many wood heater owners are attached to their wood heaters for a range of emotional and rational reasons, for example, the pleasant ambience created by a live fire and easy access to free fuel. The perception of wood as a natural, renewable source of fuel and that use of fallen limbs helps clear farmland reinforces beliefs that wood heaters are all good. Indeed, the positives attributed to wood heaters are felt to easily outweigh any drawbacks with many questioning or defending wood heaters and wood smoke against any apparent criticism.

This highlights how difficult it is to bring about behaviour change around wood heaters in the Upper Hunter. A step-by-step approach is needed to influence and sustain changes in mind-sets, attitudes and behaviour.

Attitudes towards the impact of both wood smoke and other forms of particle pollution appear to be driven by what is known (and not known), long-held beliefs and years of experience around wood heaters. Such habits lead to support of the use of wood heaters and rejection of any notion that they are harmful. For example, wood heaters represent a long-standing method of heating homes in the area so they must be good.

The fact that wood heaters have aesthetically pleasing, economic and social benefits (such as bringing households together 'around the fire') as well as functional qualities means that owners have an emotional, as well as rational, attachment to them. Wood heaters are considered to be a benign, natural source of heating that is more environmentally friendly than alternatives.

Finally, and critically, wood smoke is not 'known' to be associated with any serious problems. This reflects that the smoke issue is largely invisible and is only around for four months of the year (unlike industrial pollutants which are present year round). Furthermore, many do not even consider the impact of smoke outside of their homes; *"If there is no smoke inside it's okay"*.

It is apparent that health messages about the risks of wood smoke have not reached many and are often deemed insignificant in the context of other local sources of air pollution. There is widespread feeling among the community that wood smoke is being unfairly singled out for impacting negatively on air quality in the Upper Hunter. This highlights the importance of communicating that wood smoke is being considered and addressed alongside emissions from coal mines and power stations as well as the large number of diesel trucks and trains servicing the mines.

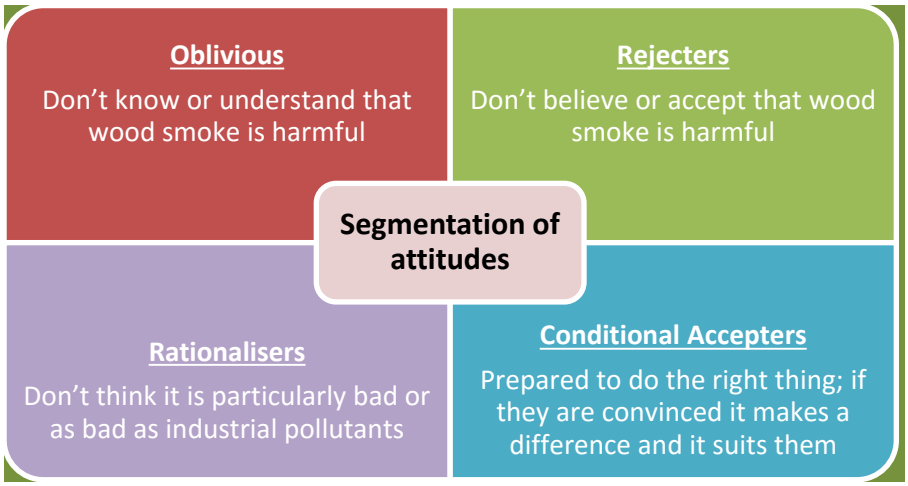
While there was considerable consistency in respondents' awareness of, and attitudes towards, wood smoke, there was also a lot of variation among respondents. Indeed, the sample could be segmented according to:

- Level of awareness of the impact of wood smoke on air quality and
- Attitudes towards the (relative) impact of wood smoke on air quality.

So, perceptions of the contribution made by wood smoke to air quality tends to be driven by what is known, how well information is understood and degree of willingness to assimilate such information. In turn this is influenced by the extent to which new information about wood smoke challenges long held beliefs and / or suggests a need to modify lifestyle.

Attitudes of householders were segmented into four groups, as shown in ***Figure*** 1***: Segmentation of attitudes towards wood smoke.*** Figure 1 shows the name given to each segment and corresponding mind-set in relation to wood smoke. In considering these segments, it is important to bear in mind that they are not mutually exclusive, so most people will be a combination of at least two segments although one will dominate.

Figure 1 Segmentation of attitudes towards wood smoke



In terms of targeting the Upper Hunter community with initiatives designed to reduce wood smoke the 'Conditional Accepters' represent the most receptive to information about wood smoke and behaviour change around wood heaters while 'Rejecters' are likely to be the least receptive. At least some in the 'Oblivious' segment can probably be relied upon to become 'Conditional Accepters' once they have become more aware of, for example:

- The negative contribution that wood smoke makes to air quality and impact on human health, as well as
- The variety of benefits that householders can enjoy as a result of improving the operation of a wood heater.

Meanwhile, those in the 'Rationalisers' segment may become more receptive to information and initiatives encouraging behaviour change once issues such as:

- The extent and severity of the impact of wood smoke on human health are successfully communicated and
- The nature and extent of the contribution of wood smoke to air quality is effectively differentiated from that of emissions from mines and power stations.

The quantitative survey tested the relative prevalence of these segments and the findings are included in the following section.

Quantitative community survey

This section outlines the incidence of community attitudes about the impacts of wood smoke and other forms of particle pollution. Further detail is provided in the full report on Phase Two of the research which can be found in Appendix 6.

Through the Phase Two quantitative survey of householders with wood heating in Muswellbrook and Singleton, it was found that more than 60% of respondents believed that particles from wood smoke are less harmful than those from diesel trains, trucks, power stations or mines. This reaffirms the indications from the Phase One interviews and focus groups, that there is reluctance within the community to accept that wood smoke can be harmful when compared to other sources of air pollution. However, more encouragingly, some also acknowledge that while there is nothing they can do about other air pollutants they can do something about the impact of wood smoke.

The lack of awareness regarding the impact of wood smoke was evident in the high levels of neutral or don't know / refused responses to a number of statements in the survey. For example, more than a third of respondents (36%) didn't know that it is the small particulate matter in wood smoke that causes health problems. Older respondents (aged 60 years and over) were more likely to disagree that particles in the smoke coming out of their chimney could be harmful to their families and neighbours. However, this same cohort was also, on average, less likely to agree that there was something they could do about the impact of wood smoke.

The potential to measure the size of each of the four segments identified in Phase One of the study was investigated during Phase Two. This involved analysing responses to a set of questions exploring attitudes towards wood smoke to ascertain an idea of the relative size of each of the segments displayed in ***Figure*** 1***: Segmentation of attitudes towards wood smoke.*** Findings from this analysis can be summarised as follows[6]:

- One third (35%, n=71) were allocated to the 'Oblivious' group based on their responses (don't know / refused) to one or more of the statements in question 15 of the Phase 2 survey (see questionnaire in Appendix 3 and report on Phase 2 in Appendix 6)
- Just over one-quarter (28%, n=56) were classified as 'Rationalisers' whilst slightly less than a fifth were classified as 'Rejecters' or 'Conditional accepters' (19% and 18% respectively)
- When looking at whether respondents were identified as only meeting the criteria for a single group, this occurred in 44% of cases. The dominant group under this analysis were the 'Oblivious' and made up 23% of the total survey participants
- 24% of respondents were identified as meeting the criteria for more than group (i.e. two, three or four of the groups), however there was no clear relationship between any of the four groups for respondents allocated to more than one.
- The remaining third (32%) of respondents were not easily placed in any of the groups. This is likely to be a reflection of the fact that the survey did not include a question relating directly to the mind-set for each segment, i.e. 'which of the following statements best describes the way you feel about wood smoke?'

[6] Respondents were allocated to a segment if they responded one or more times in line with the criteria for that segment. Respondents could be allocated to more than one segment. A full detail of this analysis is shown in Appendix 6.

Phase 3 focus groups with householders with wood heaters in Muswellbrook and Singleton

This section provides insights into respondents' attitudes about the impact of wood smoke and other particle pollution in the Upper Hunter as expressed in response to the range of messages shown in this phase of the research. The focus of Phase Three was on obtaining feedback on current and potential communication relating to wood smoke. While the intention was for this feedback to help guide the development of future initiatives for encouraging behaviour change around wood heaters in the Upper Hunter, it also helped reinforce the depth of resistance to any apparent move to limit use of wood heaters in the community.

So, like their counterparts in the Phase One focus groups, many Phase Three respondents also displayed considerable reluctance to believe or accept that wood heaters emitted potentially harmful smoke. Even when evidence to the contrary was presented, such as in an article published in the British Medical Journal (*Evaluation of interventions to reduce air pollution from biomass smoke on mortality in Launceston, Australia: retrospective analysis of daily mortality, 1994-2007*, *FH Johnston, IC Hanigan, SB Henderson, Geoffrey G Morgan,* BMJ 2013; 346:e8446), many found it difficult to accept that wood heaters could have a negative impact on their health.

This reflects the fact that most tend to think that they operate their wood heater correctly. It therefore highlights the fact that a number of wood heater users are unaware that they may be doing anything wrong in the way they use and / or operate their wood heater. It also represents one of the fundamental challenges for developing a behaviour change campaign addressing wood heaters in the Upper Hunter – to bring it to people's attention, in a palatable way, that they may not be using their wood heater correctly, as well as suggesting acceptable alternatives.

Some were not aware of the particulates that wood smoke contains and when shown evidence that wood smoke could be harmful to their health, some had extreme views that further demonstrated the attachment to their wood heaters; *"If I am going to die of something then I may as well die from wood smoke in my house"*.

So, rather than learn from information that challenges existing beliefs and habits, a typical response is often to find fault in the information and defend current practices. This indicates the need for future initiatives to avoid having any kind of 'out' so that its credibility can remain intact and it has more potential to achieve its goal of motivating intention to modify behaviour.

5.2 Influencers of households' heating choices and barriers to use of alternative heating options to wood heaters

Stakeholder interviews

This section describes stakeholders' perceptions of:

- What influences the heating choices of the Upper Hunter community as well as
- Barriers to use of alternative heating options to wood heaters.

Three key drivers emerged from interviews with stakeholders in Phase One;

- **Rising cost of utilities** – a number of stakeholders felt that the community would respond well to alternatives that would save them money, both in terms of installation of the technology and running costs. Anything that would involve higher cost would not be welcomed. This reflects the apparently rational use of wood as a cheap source of fuel when the cost of electricity and gas is increasing. However, even if the cost of alternative sources of heating was to decrease, many are likely to continue using wood as a source of fuel because of the strength of their emotional attachment to wood heaters
- **Rise in unemployment** – multiple stakeholders reported that a recent rise in unemployment seems to be playing a role in how people decide to heat their homes. For example, unemployment in the Upper Hunter had increased over the past twelve months and the proportion of the high earning population had decreased. Those people that were used to higher wages, and the standard of living that those wages used to cover, are now finding themselves without that income. This can lead to dependence on cheaper sources of fuel for home heating and many in the Upper Hunter are known to have access to free or cheap timber to keep their wood heaters going throughout the cold winters experienced in the region.
- **Nostalgia and tradition** - wood heaters are recognised by stakeholders to be nostalgic, traditional and 'socially desirable' among many in the Upper Hunter. Stakeholders acknowledged that those who have grown up with wood heaters are particularly likely to struggle to change, especially the older community who tend to be 'stuck in their ways'. This was also felt to be true of those people who have historically lived on the land with plenty of access to timber which makes wood heaters considerably cheaper to operate. For example, it was deemed important that governments are aware that *"humans and fire go back a long way. A fire means warmth, friendship and food. So there needs to be awareness that that is what a fire means to people".*

These points reinforce the strength and complexity of attachment that many have to wood heaters. They also highlight the need for behaviour change initiatives around wood heating to acknowledge and address both the rational and emotional commitment many in the Upper Hunter have to keeping things the way they have been for a long time especially when there doesn't appear to be a good enough reason to change.

Phase 1 focus groups with householders in Muswellbrook and Singleton

This section outlines the factors that influence heating choices and identifies barriers to the use of alternative heating options from the perspective of wood heater users in the Upper Hunter. Insights gleaned from analysis of these influencers and barriers are also included in order to provide guidance for moving forward.

From the Phase One focus groups with wood heater users in the Upper Hunter it emerged that the principal influencers on household heating choices appear to be:

- Convenience - if a wood heater is already present in the home then it is more likely to be used than replaced simply because it is easier to do so. It is often also convenient to source the wood to fuel the heater for those who live on, or have access to, nearby properties
- Affordable - wood heaters are the most economical to run in terms of fuel compared to electricity or bottled gas, and cheaper to purchase and install than a suitable alternative, e.g. reverse cycle air conditioning
- Efficient - a wood heater is able to heat most if not all of the home. By contrast, other heaters tend to be designed to heat a single room.
- Versatility - as well as using the wood heater to heat the house, some also used it to heat water and dry clothes. A small number of respondents reported that some wood heaters are used to cook on by people living in parts of the Upper Hunter not connected to mains electricity
- Property maintenance – accessing free fire wood in the form of fallen branches simultaneously assists in keep the farm / property, on which the trees grow, clear and tidy
- Experience – particularly the older population who have grown up with wood heaters and don't even consider an alternative. However, increasing age and / or infirmity can present an opportunity to move to an alternative form of heating that is lower maintenance.
- Aesthetically pleasing – wood heaters are strongly associated with creating a warm, homely atmosphere and sound, as well as being considered a social focal point as they bring the family together and make guests "*reluctant to return to the city*."
- What 'fits' with life in the country – wood heaters are part of life in the Upper Hunter and help differentiate the homes from their counterparts in the city.
- Environmentally friendly – wood is known to be a renewable resource and when fallen timber is used as fuel, wood heaters are considered a more sustainable form of heating than alternatives.

In terms of barriers to replacing wood heaters with alternatives:

- Overall there was little apparent willingness to even consider replacing wood heaters with an alternative form of heating among those represented in the focus groups. This was primarily because of the strong attachment most appear to have to their wood heaters and the lack of affordable or appealing alternatives.
- There are a number of knowledge gaps regarding the impacts of wood smoke that would need to be addressed before attitudes towards and / or behaviour around wood heaters are likely to change. Information that wood smoke is a pollutant appears to lack credibility among the Upper Hunter community due to an apparent lack of supporting evidence for such claims particularly in the context of mining and power stations impacting air quality.

Furthermore, the majority don't appear to be aware of the significance of the smaller size of particulate matter in wood smoke compared to that in other sources of air pollution. This reflects the defensive response of many in the community to information suggesting that wood smoke contributes to poor air quality in an environment heavily affected by mining and power stations.

- In terms of their experience and behaviour, the Upper Hunter community as represented by those participating in the focus groups reported not having any direct or indirect experience of the adverse effects of wood smoke, i.e. they haven't heard of anyone's health suffering as a result of exposure to wood smoke. This, coupled with the fact that wood heaters meet both rational and emotional needs, makes them the preferred option for heating homes. Despite this, there was some acknowledgement that wood heaters may be less appealing to certain groups, for example:
    - younger people – wood heaters are sometimes considered to be too much hassle for them
    - the elderly and people living with disabilities for whom managing a wood heater would be too difficult
    - people who reside in town who may not have direct access to free wood
    - people who are new to the area or who haven't grown up with a wood heater and are therefore not confident in using one
    - people who suffer from asthma as they may be better informed about, and more sensitive to, the causes of respiratory problems.

The influences of household heating choices and barriers to the use of alternative heating opportunities mentioned in the Phase Three groups were consistent with those emerging from the focus groups in Phase One.

Many in the Upper Hunter community have grown up with wood heaters in their childhood homes, some of which were farms. Such a history with wood heaters tends to play a big role in the attachment many have to their heaters. For example, the presence of a wood heater can even drive choice of home, make some prepared to get up in the middle of the night to tend to the wood heater to ensure it didn't go out.

However, there were examples of acknowledgment that if there were better, cheaper and more efficient ways to heat their home then they would make a transition. Such alternatives need to be brought to the attention of wood heater users in the Upper Hunter if they are to be expected to consider them.

The research highlighted the fact that people who have grown up on and / or live on properties rather than in townships are the most resistant to moving away from wood heaters as their primary source of heating.

Quantitative community survey

The two most common reasons cited by respondents of the Phase Two quantitative survey were:[7]

1. Respondents liked the type of heat that wood heaters provide and the way it heats the house
2. Free and/or easy access to timber.

5.3 Demand for energy efficiency audits and advice on alternatives to wood heaters

This section outlines the extent to which the Upper Hunter community is interested in energy efficiency audits and level of interest in advice on alternatives to wood heaters. This objective was primarily addressed in the Phase Two quantitative survey and was touched on briefly in the stakeholder interviews in Phase One.

The strength with which wood heater users in Phases One and Three rejected any initiative that may suggest replacement of wood heaters with alternatives meant that it was not covered in the focus groups.

Desktop review

Areas for improvement inferred from this study include:

- Common **operational** causes of excessive smoke (some of which may be underpinned by an inappropriately sized heater having been installed):
    - owners putting in insufficient kindling
    - use of wood that is too wet or heavy
    - too much firewood being placed in the heater
    - owners trying to burn a single large log
    - firewood being placed in a sub-optimal way, especially where an incorrectly placed log blocks the air supply to the base of the fire
    - owners turning the air control to slow burn too soon after light-up or refuelling
    - owners adding firewood without opening the air control
    - owners leaving the fuel-loading door ajar
    - (unattended) overnight burning

- Common **installation** or **maintenance** issues that cause excessive smoke:
    - the heater flue being clogged with creosote and needing to be swept.
    - flue length being too short to draw sufficient air for proper combustion of the fuel
    - poor location of heater and/or flue; a heater will perform better (including in terms of reduced smoke emissions) when located towards the centre of the property and not against an outside wall
    - DIY repairs leaving the heater with missing components or components incorrectly installed.

[7] Survey respondents were asked ”What is the main reason you use wood heating”

Stakeholder interviews

This section outlines stakeholders' perceptions of the value of energy efficiency audits and advice on alternatives to wood heaters as well as community interest in these initiatives.

The majority of stakeholders felt that audits of this kind would be valuable and therefore a good idea;

"...the more people that understand the ways, means and options available to them the better. This type of personalised engagement is more effective than a website that no one knows about".

This reflects the more rational approach that stakeholders adopt when considering wood smoke. However, it is unclear whether this view would resonate with the wider community who have a fundamentally emotional (rather than rational) attachment to their wood heaters. Therefore, a quintessentially rational tactic such as an energy efficiency audit may not be the most effective means of encouraging behaviour change.

Some council–based stakeholders felt that householders would not respond well to people entering their homes and telling them how to heat their property. This view was based on the result of a previous attempt to provide sustainability audits as take up was very low.

Wood heater users in the Upper Hunter seem more likely to consider energy efficiency in general and audits in particular in the longer term, once they have a better understanding of both the impact of wood smoke and the connection between wood heaters and energy efficiency.

Phase 1 focus groups with householders in Muswellbrook and Singleton

This section describes and explains respondent's current use and maintenance of wood heaters and opportunities for improving both. As indicated earlier, this was focused on due to respondent reluctance to consider alternatives to wood heating and, as improved operation provides at least some opportunity for minimising particle emissions it was more expedient to establish how to support better use of wood heaters than explore how to encourage use of alternatives.

Most respondents believed that they know both how to correctly use and maintain their wood heaters and the benefits of doing so. However, once made aware that they may not be using it as well as they thought they were, there was a degree of willingness to acknowledge a potential need to change the way they use and maintain their wood heaters.

For most of the participants, in order to make a change, it needs to be brought to their attention that they might be doing something wrong or at least sub-optimally. The types of things some were (sometimes inadvertently) doing wrong include:

- Putting large, new logs on the fire before "shutting it down" overnight
- Using wood that is not properly dry or seasoned
- Using wood that is too big to start a fire
- Relying solely on soot removal products to clean the flue.

It was felt to be important that messages, and the ways of disseminating information on the correct use and maintenance for a wood heater, need to be:

- User-friendly, e.g. easy to understand and relevant to the lives of the Upper Hunter community,
- Easily accessed via local newspapers and radio or at the point of sale of both wood heaters and wood
- Either enabling the user to maintain the heater themselves or making outsourcing of maintenance easy and affordable.

Quantitative community survey

This section specifies the level of demand (or lack of) for energy efficiency audits among the Upper Hunter as well as the proportion of the community interested in advice on alternatives to wood heaters.

Even though the survey question relating to energy efficiency audit was worded in a relatively user-friendly way as a "Free 'heating efficiency check' for your home to help you get good value for money from your heaters" more than three quarters (77%) claimed that they were not at all interested in it.

In terms of willingness to accept information about operating and maintaining a wood heater, more than 70% of respondents indicated that they were not interested in any of the information suggested. The highest level of interest was recorded for the following two topics, with 28% of respondents at least somewhat interested in finding out more about:

- What a fire can look like and what it means for heat generation and air pollution
- How to properly maintain a wood heater to keep it in best condition and ensure it is safe and efficient to use.

Respondents in Singleton were significantly less likely to be interested in information regarding the do's and don'ts of air flow control and how to properly maintain a wood heater to keep it in the best condition and ensure it is safe and efficient to use than respondents in the Muswellbrook area. In terms of where members of the community might like their information to come from:

- Brochures delivered to the letter box or articles in the local newspaper or on radio were most preferred by over half of the respondents (59% and 53% respectively)
- Business type sources such as via the Council website or brochures (46%) or through retailers who stock and sell wood heaters (42%) were also relatively popular choices
- Community based sources such as local community organisations or information stalls at local markets were nominated by a quarter of respondents (25%)
- The least preferred options were workshops run by wood heater suppliers or sellers (18%) or workshops held at the library (13%).

Phase 3 focus groups with householders with wood heaters in Muswellbrook and Singleton

This section focuses on the key insight obtained in Phase Three regarding advice on alternatives to wood heaters. That insight was that in order for such advice to be meaningful to the communities of Muswellbrook and Singleton it would need to:

- Relate to specific heaters or types of heating in order for it to be sufficiently tangible for them
- Provide a comparison of performance and efficacy in terms of the size and type of space that can be heated by such an alternative
- Indicate the cost differential between the alternative and a typical wood heater in relation to purchase price and operating costs
- Promote the benefits to the household and community.

5.4 Willingness to upgrade heating and incentives required

This section outlines respondents' preparedness to upgrade their heater and the size and type of any incentive required to encourage them to do so as measured in the Phase Two Community Attitudes Survey. As indicated earlier, there was a general lack of willingness to upgrade their heating. As a result, only a tiny minority (4%) were really in a position to consider incentives to do so. This suggests that incentives to upgrade are revisited once willingness to do so is greater.

Quantitative community survey

Almost all (96%) of the survey respondents indicated that their wood heater was their preferred method of heating their home. Six respondents stated the opposite – these six were spread evenly across both LGAs and all lived in the main town centres. Half of these six stated that their preferred type of heating was electric reverse cycle air conditioning while two others preferred gas heating and one nominated changing to a new efficient wood heater. Reasons that they wished to change their wood heater included:

- Wood heaters are too much work and a new heater would be easier to use and maintain
- They were moving house or in the process of doing home renovations
- Efforts to be more energy efficient

While the numbers are small, the above reasons do provide some guidance as to how consideration of alternatives might at least be placed "on the agenda" of more wood heater users in the Upper Hunter.

Five of the six respondents were not planning on making the change in the future while one indicated that they didn't know. Reasons preventing respondents from making the change included:

- They already have another heating source
- They like their current heater
- Don't own the house
- Partner doesn't want to change
- Cost associated with getting / running a new heater.

These reasons need to be acknowledged and addressed in messages designed to inform and advise the Upper Hunter community about the wood smoke issue. Doing this will encourage the community to relate to and, ultimately accept, consideration of alternatives. For example, 'we understand that you love your wood heater, but if you put it out at night, you will reduce the amount of wood you burn / money you spend / fine particles you breathe / dust in your house etc.'

Of the incentives described to the respondents through the survey, 36% of respondents (72) were interested in one or more of the incentives. These respondents were asked how they would prefer to receive the discounts presented as possible incentives and who they thought should fund the incentives:

- Approximately four in ten of the respondents (42%) said they would prefer a rebate that could be claimed with a receipt. A similar number (40%) preferred a voucher that could be used at selected businesses, while a further one in ten of the respondents (11%) would be happy with either option
- Responses regarding who should provide the funding for incentives were relatively consistent across the two LGAs. One third of respondents nominated NSW Government (33%) while almost as many suggested local government (29%) and a similar number indicated they didn't know (29%)
- Respondents who were interested in a discount to replace their wood heater with a different form of heating (n=22) indicated how much money they would need to be offered to consider replacing the wood heater. Two-thirds of this group (n=15) suggested that they didn't know. Of the remaining seven respondents, dollar values were suggested between $200 and $5,000 with an average value of $2,701.

The somewhat ambiguous nature of the findings on incentives reinforces the fact that they are not yet in a position to make meaningful suggestions about what might trigger action. It will probably be worth revisiting this element of behaviour change once the community:

- Has a better understanding of the impact of wood smoke and reasons to change their heating source
- Is more aware of the range of alternative forms of heating available to people in the Upper Hunter
- Is across the purchase and running costs of alternatives.

5.5 Education tools

This section describes the insights gleaned from the two mini-groups that comprised Phase Three. The purpose of this final phase was to obtain feedback on strategies for encouraging behaviour change around wood heaters that emerged as having some potential from earlier phases.

However, Phases One and Two highlighted the entrenched nature of wood heater owners' beliefs and how resistant many are to change. This limited the amount and variety of potentially motivating strategies that were considered worthwhile assessing in Phase Three.

Nevertheless, in order to optimise the output from the two focus groups in this final phase, the following materials[8] were included so that feedback on them could provide useful guidance on the development of wood smoke mitigation interventions.

- EPA brochure 'Stay warm breathe easy' Wood Smoke Reduction Program
- Messages about the health impacts of wood smoke presented as myths and responses to them
- Figures / graphs from the *Upper Hunter Valley Particles Characterization Study* showing seasonal variation in the contribution of wood smoke to particle emissions in both Muswellbrook and Singleton
- Abstract of an article 'Evaluation of interventions to reduce air pollution from wood smoke on mortality in Launceston' published in the British Medical Journal
- Photographs and messages about avoiding overnight or day burning / smouldering of wood heaters and overloading with wood and shutting the air supply immediately
- Discounts on the cost of a flue cleaning service and / or to replace your wood heater with another form of heating.

Responses to most of the messages in these materials were very defensive as illustrated in repeated attempts of many to discredit the information with which they were presented. This sort of reaction is typical when the audience does not like what they see / hear especially when it challenges their preconceived ideas. When shown any of the above, there was a tendency to find fault, question its validity, divert attention away from the facts and generally assume that it was not true. Examples are provided in ***Table 3: Positive feedback and suggested improvements*** for each of the materials presented to focus group participants next to the specific materials towards which criticisms were directed. Going forward, it is clear that messages designed to help drive behaviour change need to be as unambiguous, watertight and tangible as possible in order to discourage people from looking for an 'out' that lets them disregard or discredit the information.

While responses were generally sceptical, there was at least one respondent per group who was more willing to take on board the message being communicated. These tended to be in the 'Conditional Accepter' or 'Oblivious' segments: while they might not have been aware of certain facts about wood smoke they at least have a reasonably open mind to accepting new information that may have implications for their wood heater use. Similarly, some messages emerged as being more compelling than others (as outlined in ***Table 3: Positive feedback and suggested improvements***) and the 'ideal' brochures created by respondents provide guidance as to which messages are likely to be more successful at initiating behaviour change.

As well as refuting much of the information on wood heaters some 'Rejecters' clearly misinterpreted that which did not fit with their world view on wood heaters. This suggests the need to present information in a way that is very easy to understand as well as difficult to argue with. While this may not succeed in convincing all, it will help it to be compelling to more.

Information presented did not seem to be sufficiently tangible, impactful or meaningful to encourage many to sit up and take notice let alone consider taking action. The facts and figures presented did not appear to capture the imagination of respondents in a way that encouraged

[8] Copies are in Appendix 5

behaviour change. What appeared to be lacking was a case study or testimonial which showed incontrovertibly that a typical local household had benefited from changing their wood heater (or the way it is operated) or somehow suffered as a result of not making such a change.

Response to some messages and concepts (i.e. discounts for maintenance / upgrades or replacing wood heaters) was so polarised as to suggest that there would be some value in having a multi-pronged approach to affecting behaviour change around wood heaters in the Upper Hunter, i.e. a campaign comprising multiple different elements, each appealing to different types of wood heater owners, in other words developing a range of messages targeting different community segments/groups.

In summary, feedback on the messages highlights the fact that a behaviour change strategy on wood smoke in the Upper Hunter needs to include a substantial communication campaign. Furthermore in order for such communication to be effective, it needs to:

- Grab their attention - Be impactful in content and presentation in order to be noticed and paid attention to
- Be easy to understand - Be user friendly, i.e. easy to understand and relevant to wood heater users living in the Upper Hunter
- Be credible and convincing - Provide 'watertight' information supported by evidence to prove points made so that it is not easy for the target audience to find pick holes in the messages provided
- Tell them what it means to them - Include a clear call to action so that the target audience knows what they need to do as a result of becoming aware of a particular piece of information
- Enable them to do what they need to do - Provide the tools to enable and support action on the part of the Upper Hunter community so that it is easy and motivating to act, e.g. providing contact details for chimney sweeps so they can get their flue professionally cleaned on a regular basis.

Table 3: Positive feedback and suggested improvements

Material and overview	Positive feedback	Room for improvement
EPA Brochure Some had this brochure before as it had been delivered to their letterbox by the council. Whilst its impact seems to have been minimal, it does seem to have had a positive result with a few. For example, one ('Conditional Accepter') was triggered to get her chimney swept for the first time in three years.	The question and answer format encourages reading. The sections headed 'What you can do' and 'Tips for a good fire…'had the most appeal as it is implicit within them that it is ok to continue using one's wood heater. As such they provide a fundamentally positive message. References to a condition such as asthma help make the information on the health effects of wood smoke pollutants suitably specific and meaningful. They also provide information that is useful to the reader. The bullet point format is user-friendly. It provides a call to action in terms of what the wood heater owner can do to minimise the wood smoke issue. It suggests who to contact for further information on the issue. The colourful presentation was appreciated by some as an effort to be aesthetically pleasing.	The stark contrast between the smoky house and the non-smoky house on the front cover was felt to suggest that wood heaters are bad and not having a wood heater is good. This was also deemed likely to contribute to something of an 'us and them' scenario between those in a community that do have a wood heater and those who don't. Wood smoke is not discussed in the context of other air pollutants in the Upper Hunter although reference to 'fine particles' does help differentiate wood smoke from other sources of air pollution – it could be made more explicit by: • Clarifying and emphasising the difference between, and significance of, fine particles emitted by wood smoke and those emitted by other sources. This will help with the credibility and validity of messages about wood smoke in an environment where other influencers on air quality can dominate Lack of clear guidance on how to improve the way one uses and maintains their wood heater such as provision of contact details for chimney sweeps, approved wood sellers, practical 'how to' guidance on operating and maintaining a wood heater. Useful additions to 'Tips for a good fire' suggested by respondents include: • Stacking wood from front to back and explaining how this helps with air flow • Explaining why smaller logs are preferable to large • The importance of not overloading or burning rubbish or coal The information about wood smoke is so negative as to be considered scaremongering and the 'solution' ('What you can do', etc.) is given much less prominence than the 'problem'.

Material and overview	Positive feedback	Room for improvement
		The controversial nature of the topic and recalcitrant views held about it lead to some messages being rejected as lacking credibility, e.g., 'A poorly operated wood heater…can cause high levels of these pollutants around your home and neighbourhood.' was sometimes responded to thus*: "This will cause some but - NO! - most is from smog from mines in the Upper Hunter".* A typical response to 'Fine particles in smoke can cause short-term irritations in the eyes, nose and throat…' was that *"I have more problems from coalmine dust than wood dust [sic]".* No rationale is given as to why one should only use small logs. With some being convinced that it is preferable or acceptable to use large logs, it is not sufficient to assume that all wood heater owners will accept advice without question. Similarly, overnight smouldering is not addressed in a sufficiently compelling way to encourage 'die hard' smoulderers to change their ways. In short, while this sort of information appears to have potential with some (in segments like 'Oblivious' and 'Conditional Accepters') it isn't enough to convince many. Most importantly, apart from providing advice on use and maintenance, it doesn't suggest possible courses of action for wood heater users who already use and maintain their heater correctly (or at least think they are). There is felt to be a limited range of heating alternatives for Upper Hunter residents who do not have access to town gas and who consider electric heating unaffordable (operation more than upfront costs).

Material and overview	Positive feedback	Room for improvement
Message 1 about the health impacts of wood smoke: ***'Wood smoke is natural so it must be ok'*** A realistic myth which is challenged reasonably successfully. Feedback on the information which challenges this myth highlighted the value of acknowledging existing viewpoints and then providing some sort of rationale to support the challenge to it.	***'Even though humans have burned wood since the beginning of time, scientists have only recently discovered just how hazardous wood smoke pollution is to our health'*** Is one of the most credible responses to any 'myth' as it acknowledges what people already think and explains that issues with wood smoke have only just been discovered. It specifies that the risk is to our health and indicates that the hazard is not minor. ***'The negative health effects of residential wood smoke have been linked to a range of health problems that include diminished lung function, respiratory and cardiac problems.'*** Describes the impact of wood smoke in a suitably specific way. ***'The reality is: if you can smell wood smoke, you're breathing pollution that is hazardous to your health.***' Communicates the issue succinctly, personally and impactfully.	***'While the wood smoke pollution is especially dangerous for those with existing health conditions, children, and the elderly, it is hazardous to the health of all human beings.'*** Is not sufficiently specific about the impact of wood smoke. Appears to single out wood smoke in isolation from other sources of air pollution. It is not sufficiently specific about the impacts of wood smoke on health. The claim is felt to be at odds with respondents' own experience. As such it seems extreme rather than credible.
Message 2 about the health impacts of wood smoke: ***'Aren't there more important pollution sources to worry about?'*** A realistic myth which is not particularly successfully challenged although a minority did get the point about proximity. Feedback on the information which challenges this myth highlighted the need to direct people towards the focus of messages being on the		***'Unlike highly regulated industrial sources of pollution, wood burning occurs right in the neighbourhoods where we live—sometimes right next door. This means that people can be subjected to levels of hazardous pollution from wood heaters that are far higher than from any other pollution source.'*** This assumes that the target is aware that the messages about the risks of wood smoke relate to the smoke that comes out of their chimney and that they care about that. Some focus on the heater itself and the inside of the house at the expense of consideration of

Material and overview	Positive feedback	Room for improvement
smoke that comes out of their chimneys rather than / as well as any smoke within their homes. The importance of being user-friendly in general and using very simple language in particular in order to aid communication of messages. How resistant many are to accepting a different viewpoint and the subsequent need for messages to be very compelling, e.g. significant, meaningful and watertight, 'news'.		the neighbourhood. Others, typically those who did not participate in the research, are thought not to care about what they burn or how it might impact others. It doesn't provide sufficient evidence to support the claim or challenge the myth. The reference to regulation of industrial sources is not explicit enough.
Message 3 about the health impacts of wood smoke: *'Wood smoke dissipates, so what's the problem?'* A realistic myth that is challenged reasonably successfully. Feedback on the information which challenges this myth highlighted the fact that the credibility of a message is proportional to the ease with which respondents could understand it. This in turn increases the likelihood of the target considering what the message might actually mean for them.	***'Most of the harmful pollutants in wood smoke don't dissipate quickly. They hang around at ground level for a few days.'*** A credible message to many who admit to seeing the visible effects of wood smoke. So, it fits with their experience. ***'On cold winter days (when people tend to burn wood) the problem is even worse, because the weather conditions create temperature inversions that put a lid over the lower atmosphere, trapping hazardous pollutants close to ground level'.*** This was accepted by some who acknowledged and understood the effect of temperature inversions on wood smoke.	***'The fine particle pollutants in wood smoke are so small that they infiltrate even the most well-insulated homes. Scientific studies have shown that particle pollution levels inside homes reach up to 70% of the pollution levels outdoors.'*** This appeared to lack credibility, seemingly because particle pollution levels insides their homes is not something they can see. It is also felt to be negligible compared to what may infiltrate their homes from other sources of air pollution like mines, trucks, trains and power stations.
Figures / graphs from the Upper Hunter particles study The graphs show the annual and seasonal contributions of PM factor for Muswellbrook and Singleton from different sources of air pollution. The main message is that there is a much more marked contribution to wood smoke during the	One participant stated that the results didn't surprise her as *"everybody uses wood fires in winter".*	Other participants were much less willing to accept the results presented in the graph as fact. Many were in total disbelief and described the graph as 'untruthful'. Meanwhile others appeared distracted by the other, non-wood smoke, sources of particle pollution which were unfamiliar (e.g. secondary sulphate) or unexpected (e.g. sea salt). So, they questioned what they were rather than accepting the message that wood smoke

Material and overview	Positive feedback	Room for improvement
winter months.		is the biggest single source of PM in both towns in winter.
British Medical Journal article abstract Results of the study showed that when there was less air pollution from wood smoke, there were less premature deaths in men from cardio-vascular, heart or respiratory problems.		Despite being a respected, trustworthy source it was met with scepticism and disbelief. For a lot of participants it raised more questions than it answered, for example, why it only affected men and whether there was a difference between smokers and non-smokers.
Photograph showing: A flue that is almost completely blocked with creosote from smouldering gases in the smoke of slow-burned wood.	The image of the blocked flue was impactful and successful at communicating effectively to some (e.g. Conditional Accepters).	The amount of creosote in the flue was thought to be so extreme that many thought the image was of a flue that had not been cleaned for over a decade and that the wood fire to which it is attached is probably not properly used. It doesn't explicitly say that 'this can / will happen' if you leave your wood burner smouldering overnight. As such, they were able to distance themselves from the message.
Photograph showing: A wood burning heater that is overloaded with wood.		Few seemed willing to identify with the message (not to overload with wood or shut down the air supply immediately) because the wood heater was an atypical design and the amount of wood is excessive.
Discounts on the cost of a flue cleaning service / replacing wood heater	The idea of making it cheaper to use the services of chimney sweeps or even upgrading to a better wood heater has some potential among those who understand the benefits of doing so. While most don't appear to be ready to consider replacing their wood heater yet, once people are ready to purchase an alternative to a wood heater, it seems logical that they would welcome a discount on the purchase price at least.	Some would rather clean the flue themselves than pay anything to a professional flue cleaner. This reflects the determination of many in country areas to be as independent as possible. There was considerable reluctance to consider discounts on the cost of replacing a wood heater as so few were willing to think about moving to an alternative form of heating. The on-going running costs, rather than purchase price, were reported as more of a barrier to switching to other forms of heating. The price and type of alternative forms of heating needs to be known before the size of incentives can be suggested by respondents.

6 Options for the development of wood smoke mitigation interventions, including assessment of their viability

6.1 Understanding behaviour change

This section briefly outlines steps to practically implement a behaviour change strategy and has informed our recommended approach to developing a strategy for behaviour change to reduce air pollution from wood smoke in the Upper Hunter for the EPA.

There are a number of theories on how to enact behaviour change both at an individual and organisational level[9]. Behaviour change first requires creating an environment that prompts an individual to contemplate change – they must recognise the problem or opportunity and see activity that tells them that things need to change or are indeed changing around them. At this point individuals have not yet made a commitment to undertake change. At best they may have an intention to change. The second step is to translate this intention into a *modest* behavioural change.

The aim at this point is to deliver some small amount of knowledge that gets an individual "skilled up" and equipped to take an individual action in relation to their wood heater. In terms of reducing air pollution from wood smoke in the Upper Hunter this may be enacting actions coming out of a 'Wood Heater Toolkit'. Or it may be something more subtle, for example just the act of looking at the toolkit.

The third step sees the individual take action which is the signal that they are prepared to modify their behaviour. They do this because of the investment they have already made to understand and contemplate the problem and identify potential solutions. It is at this third and actionable step that we see individual and subsequently the wider community move to sustainable change.

Table 4: Steps in developing a behaviour change strategy, overleaf, sets out the behavioural change steps, the insights gained through the research and potential outcomes for the EPA to address the issue of wood smoke in the Upper Hunter.

[9] Daymark Reputation and Issues Management

Table 4: Steps in developing a behaviour change strategy

Behavioural change step	What insights have been gleaned	Strategies developed
Overarching Strategy	The target is segmented regarding awareness of and attitudes towards wood smoke. As a result, different members of the target audience are at different stages of readiness for behaviour change interventions. Most need to be convinced of the: • Nature and significance of the negative impact of wood smoke on health • Relevance and benefit of addressing wood smoke particle emissions in an environment with a lot of mining	A multi-pronged campaign comprising four broad elements all presented simultaneously and comprising: • Awareness raising • Interventions to enable short-term behaviour change • Testimonials and case studies to demonstrate benefits of behaviour change • Interventions to foster long-term behaviour change
1. Awareness raising	• Who awareness raising activities need to be targeted at • How, when and where people receive information about wood heaters and / or air quality • Messages that are likely to work best to raise awareness about the need for change	• Wood heater owners in towns prioritised by segment: 'Conditional Acceptors', then 'Oblivious'. then 'Rationalisers', and possibly, 'Rejecters' • Facts and figures delivered to homes from local councils and /or UHAQAC, when seasonally appropriate along with opportunities to up skill wood heater use and contacts to outsource maintenance tasks • Provide evidence that is as incontrovertible as possible (making it almost impossible to find an 'out' / respond defensively); tangible information, in the form of case-studies or testimonials that fit with people's own experience which makes it difficult for them to reject it

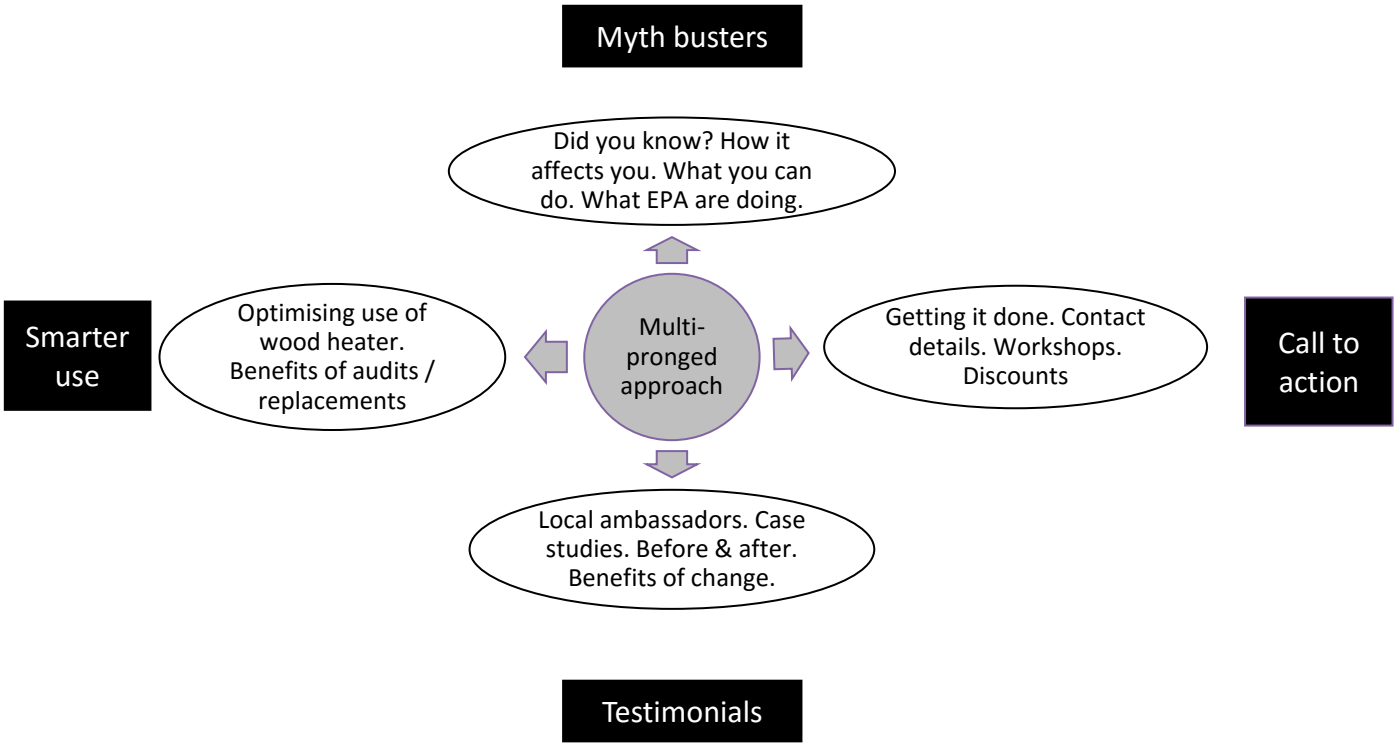
Behavioural change step	What insights have been gleaned	Strategies developed
2. Identifying first steps and the barriers to change	• Understanding the barriers to 'skill up' on the changes needed • What simple, small steps are possible • Identification of the steps most likely to be taken to enact behaviour change • How to create an enabling environment for the change - along with an understanding of what needs to happen in the community to allow those steps to be taken	• Addressing lack of awareness that wood heater users may be able to improve the way they operate their wood heater, tackling reluctance to acknowledge the need to change and overcoming some inertia around changing habits • Explaining the importance and benefit of having the flue of wood heaters professionally swept once a year, promoting the contact details of all local chimney sweeps and offering discounts on the price in a way that conforms with government protocols. • Explaining the importance and benefit of using dry, seasoned logs, promoting the contact details of approved wood sellers • Explaining the importance and benefit of optimising the operation of a wood heater (i.e. consistently using and maintaining it properly) and making workshops for up skilling available for those willing to participate in them • Encouraging those who keep their wood heaters burning 24 hours a day 7 days a week to reduce the hours of burning by explaining the benefits such as saving money. Providing a range of messages targeting different members of the Upper Hunter community who are at varying stages of readiness to change behaviour around wood heaters. Adopting a multi-pronged approach as explained below and outlined overleaf in Figure 2: Multi-pronged approach to addressing wood heater use in the Upper Hunter. This could be supported by initiatives that aim to optimise the way people use and maintain wood heaters rather than trying to encourage them to switch to alternative methods of heating. This is a useful approach for the wood heater user, because it enables consideration and addressing of the range of factors that contribute to the harm associated with wood heater use in a more acceptable way to wood heater users in the Upper Hunter. Providing information, up-skilling and discounts should foster an environment where wood heater owners feel supported and enabled to do the right thing. This may include making it known that industrial sources of air pollution are also being tackled, fostering informed consent (in relation to wood heater use), demonstrating the benefits to the householder of changing the way they use / maintain their wood heater, or upgrading / replacing their wood heater. This involves a user-friendly, non-confrontational approach to the provision of information and opportunities for up skilling or upgrading (or even choosing an alternative to wood heating).

Behavioural change step	What insights have been gleaned	Strategies developed
3. Demonstrating that change is happening and the nature and extent of subsequent benefits	• How to capture the change which is happening at an individual and community level and the benefits this is having on the air quality	Strategies to communicate outcomes from behaviour change: • This will be important for providing evidence to sceptical wood heater users that behaviour change by residents of Singleton and Muswellbrook has improved the air quality. • It could involve working with UHAQAC and local councils to provide meaningful 'before and after' data to illustrate what difference has been made to air quality as a result of any behaviour change around wood heaters implemented by owners.

6.2 Multi-pronged approach to address impacts of wood smoke

Adopting a multi-pronged approach to addressing the wood smoke issue in the Upper Hunter offers a 'smorgasbord' of strategies from which those in different segments or stages in the behaviour change process can pick and choose. Each strategy meets a different need at each stage in the behaviour change process and comprises awareness raising ('Myth busters'), short term behaviour change ('Call to action') long term attitude modification ('Testimonials') and long-term behaviour change ('Smarter Use'). It is critical for the success of each strategy that information is compelling, succinct, credible, motivating. Awareness-raising needs to occur before doing anything about introducing the concept of changes to heating.

Figure 2: Multi-pronged approach to addressing wood heater use in the Upper Hunter



6.2.1 'Myth busters'

The first step towards wood heater users changing the way they use and maintain their wood heater involves increasing awareness and understanding of the rationale for doing so. For example:

- That wood smoke is harmful
- The way in, and extent to, which wood smoke impacts negatively on people
- That there are a number of different courses of action that wood heater owners can take to alleviate the problem
- The courses of action include relatively minor and inexpensive changes to what they are already doing
- That the EPA is addressing all sources of air pollution in the Upper Hunter not just wood heaters

6.2.2 Call to action

Once wood heater users are aware that they can and should do something about the way they use or maintain their wood heater they need to be encouraged to do so and it needs to be made easy for them to take that action. N.B. some are already at the stage to act.

In order to help convert knowledge into action, wood heater owners need to be encouraged to undertake a specific task. Part of the encouragement process also enables wood heater users to take action. For example:

- Providing contact details for chimney sweeps and recommended wood sellers
- Offering free workshops on the use and maintenance of wood heaters
- Providing a discount voucher towards the cost of getting their flue cleaned

Uptake is likely to be greater if wood heater owners understand how they will benefit from participating in any of the above. Benefits are more meaningful when they are tangible, e.g. you will be able to heat your home more effectively and cheaply if your chimney is professionally cleaned.

6.2.3 Testimonials

One of the most effective ways of encouraging behaviour change of this kind is via the use of case studies which include a testimonial from a local ambassador.

Testimonials are flagged as a longer term strategy as they can take time to develop as:

- Suitable ambassadors need to be sourced (although we did come across some potential candidates in the stakeholder interviews and focus groups)
- Changes need to be negotiated and undertaken before any benefits can be identified and communicated

These can be used to compare before and after scenarios such as what difference has been made by replacing a wood heater with an alternative sources of heating. Various different testimonials can be developed to communicate differences pre and post wood heater in terms of the impact the change has on:

- Energy bills
- Room temperature and throughout the home
- The cleanliness of the house / frequency it needs to be cleaned
- Time and effort spent sourcing and chopping wood for busy, older or people with a disability
- The health of members of the family who have breathing or heart problems

For example, if there is evidence to support the claim that replacing a wood heater with a cleaner alternative can help with asthma (as mentioned in section 5.1 in relation to one of the stakeholders interviewed) that message could be used in a testimonial to communicate the health effects of wood smoke and benefits of replacing a wood heater to influence more people.

Additionally, this same approach can be used to demonstrate the benefits, from the perspective of a local wood heater owner, of, for example:

- Making change(s) to the way they use their wood heater
- Increasing the frequency of maintaining their wood heater
- Using a professional to install, clean or otherwise maintain their wood heater
- Checking that they buy their wood from a reputable seller who only supplies dry, seasoned wood

6.2.4 Smarter use

Some, more major types of behaviour change around wood heaters will be made sooner by some than by others. However, most respondents seemed to be unlikely to do any of the following in the near future:

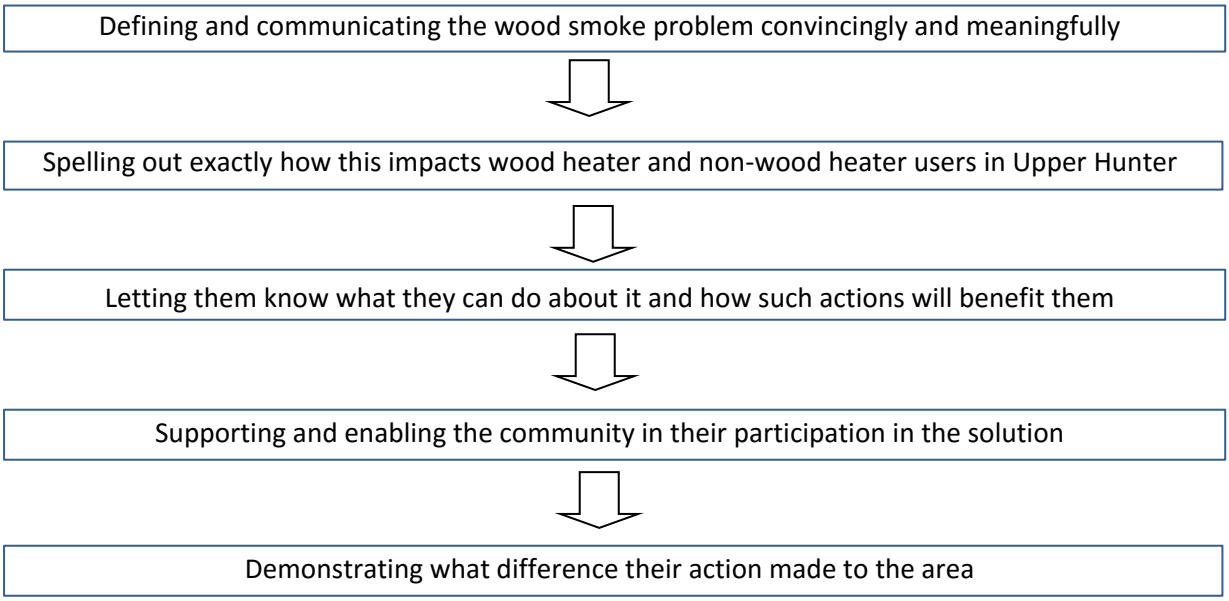
- Agree to an energy efficiency audit being undertaken on their home
- Upgrade to a better wood heater
- Replace their wood heater with an alternative source of heating

While a minority are open to considering these types of behaviour change others will become so once they have been convinced of the benefits of, for example, replacing their wood heater.

The most pragmatic approach at this stage would be to attract wood heater users to the idea of major change by convincing them of the benefits of relatively minor changes to optimise the use of their wood heater. This would also include optimal maintenance and use of dry, seasoned wood. Such users would therefore start to become ‘smarter users’ of wood heaters. Once such relatively minor changes have been made, wood heater users may become more inclined to more major changes to which many are currently so resistant. The way in which energy efficiency audits, upgrading or replacing wood heaters is positioned will be critical to uptake. For example, it may be more appealing:

- To describe an energy efficiency audit as a strategy for helping wood heater users make financial savings
- To promote other forms of heating as more effective and efficient at heating homes
- To focus on both the emotional and rational gains achievable by replacing wood heaters with alternatives, e.g. peace of mind about health, cleaner, easier, instant gratification with a focus on lifestyle rather than the environment.

In summary, it is clear that the Upper Hunter community need to have a better understanding of the problem with wood smoke before they are able to embrace becoming involved in the solution by:



6.3 Disseminating information

The most effective way of communicating with the Upper Hunter community was reported by respondents to be through local newspapers and radio stations. These forms of media have good reach in rural areas and provide a way to take the message to wood heater users that are largely unwilling to go out of their way to find out about this topic.

As such they provide a useful means of raising awareness as well as an opportunity for sharing case studies and testimonials once they have been developed.

Local councils emerged as a good source for information on this topic as well as providing a useful means of disseminating information via:

- Rates notices – which are only suitable for brief messages as wood smoke messages need to be printed on the notice in order to attract attention
- Letter-box drops of brochures for more detailed information
- Website / offices for further information if sought out
- Workshops on, for example, wood heater use and maintenance for those interested in attending

Respondents also identified point-of-sale of both wood heaters and wood as appropriate places for disseminating information on wood smoke and wood heater use.

7 Conclusions

Public attitudes about the impacts of wood smoke are very different from those relating to other forms of particle pollution in the Upper Hunter. While there is serious concern about pollution from coal mining, attitudes to wood smoke are characterised by lack of awareness of the risks and reluctance to change current methods of heating homes.

- While some know nothing, those who have heard / hear that wood smoke has health impacts don't always believe that it is true, with some rationalising that even if it is a problem it doesn't seem to be that bad and air pollution from mines, trucks, trains and power stations in the area is much worse. However there is a minority who have a more open mind about learning about the effects of wood smoke
- The general lack of awareness about EPA actions to address other forms of particle pollution, makes wood heater owners critical of the organisation's efforts to minimise wood smoke pollution. They dismiss it as inappropriate and finger pointing

A number of factors influence household heating choices in favour of continued use of wood heaters and make it very difficult to switch users to cleaner forms of heating and insulation. For example:

- Wood heaters have been an integral part of living in the Upper Hunter for many years
- Fuel (wood) is available free to those who either live on or have access to properties
- Wood heaters are considered the most efficient and cost effective means of home heating
- Wood heaters are considered more versatile than alternatives
- The appearance, smell, sound and ambience of wood heaters is regarded as far superior to alternatives
- Wood heating is connected to childhood memories which some want to rekindle
- It is seen as expensive to replace and run any alternative to a wood heater
- Most see no apparent or convincing enough reason to change what they are currently doing
- There is no town gas in the area and bottled gas is expensive
- The only real alternative (reverse cycle air conditioning) is considered unaffordable and unappealing

There is currently a negligible appetite for energy efficiency audits or advice on cleaner forms of heating and insulation as these are seen as unreasonable interference. This may change with increased awareness of the impacts of wood smoke and assistance with behaviour change.

Only 4% of respondents in the household survey were interested in replacing their wood heater with an alternative. This increased to 11% if offered a discount to replace their wood heater with a different form of heating.

Segmenting the sample by attitudes about wood smoke emerged as being more meaningful for guiding the development of region-specific education tools. Segments identified were: 'Oblivious', 'Rejecters', 'Rationalisers' and 'Conditional Accepters'.

Overall, a complex behaviour change task is made more challenging by entrenched attitudes, behaviours and beliefs about wood smoke compared to other forms of particle pollution, low incomes, and reluctance to accept or act on messages (relating to the impacts of wood smoke, suggestions that they might be able to improve the way they use and maintain their wood heater and consideration of alternative heating options).

8 Implications for Future Actions

The research provided insights into the type of behaviour change initiative which might be most appropriate and effective. This involves a multi-pronged strategy comprising a campaign consisting of four components, each targeting wood heater owners at a different stage in the decision making process involved in behaviour change:

- **Myth busters**: Did you know? How it affects you? What you can do? What the EPA is doing across industry and residential air pollution sources. This should reach the majority
- **Call to action**: Contact details for wood and chimney sweeps, workshops to up skill and discounts for maintenance. This could encourage some to get something done.
- **Testimonials**: Targeting local ambassadors (identified in the research) to develop case studies underpinned by a before and after approach focusing on the benefits of behaviour change. This may encourage some to modify their attitudes and think about changing.
- **Smarter use**: Converting improved use of wood heaters into consideration of efficient heating audits and interest in upgrades or alternatives to wood heating. This is likely to reach a minority.

The strong attachment between owners and their wood heaters calls for the strategy to improve operation of wood heaters rather than encourage the use of alternative forms of heating.

The target should prioritise the most willing to listen ('Conditional Accepters' and the 'Oblivious') and progress to those least willing to listen ('Rationalisers' and 'Rejecters').

The message should focus on the existence and nature of the wood smoke problem, what specific impact it has on wood heater users and the surrounding community and what they can do about it.

The strategy requires separate short and long term goals with the former focusing on awareness quick fixes to use of wood heaters and the latter on more major behaviour change and, ultimately attitude change.

By using local facts and figures, people etc., the focus will be kept on Muswellbrook and Singleton and perceived relevance strengthened.

The rationale for the EPA or council to be communicating a message about wood smoke and encouraging appropriate behaviour change needs to be as clear and compelling as possible in order to overcome complacency and inertia.

By keeping a very practical focus, e.g. on how wood heater owners can respond to / act on the information they are given, it will be easier and more motivating to change.

Local newspapers and radio are the most effective media for communicating with a rural audience.

The complex communication task ahead and the extremely challenging environment for which education tools need to be provided, highlights the need for communication specialists (in, for example, advertising or public relations) to drive the development of intervention strategies.

9 Bibliography

The documents included in the literature review component of the research were:

1. OEH 2012, Who cares about the Environment in 2012? Available at http://www.environmnet.nsw.gov.au/resources/communities/130265WC12Rpt.pdf

1. EPA 2013, Upper Hunter Air Particles Action Plan available at Http://www.epa.nsw.gov.au/resources/aqms/130158uphuntap.pdf

2. OEH 2013, Upper Hunter Valley Particle Characterisation Study available at http://www.environment.nsw.gov.au/aqms/uhaqmnfpcs.htm

3. AECOM 2014, Wood Smoke Control Measures, Cost Benefit Analysis available at http://www.epa.nsw.gov.au/resources/woodsmoke/wood-smoke-control-measures.pdf

4. Atech Group Pty Ltd 2001, Woodheater Emissions Management Program for the Tamar Valley – Scoping study available at http://www.environment.gov.au/archive/atmostphere/airquality/publications/tamar/index.html

5. Johnston, Hanigan, Henderson & Morgan, 2012, Evaluation of interventions to reduce air pollution from biomass smoke on mortality in Launceston, Australia: retrospective analysis of daily mortality, 1994-2007 available at http://www.bmj.com/content/346/bmj.e8446

6. NSW EPA 2010, *Woodsmoke: Resources for councils and other local authorities* available at http://www.epa.nsw.gov.au/woodsmoke/resources.htm

7. Todd, JJ 2008, *Woodheater Operation and Firewood Parameters: Australia,* prepared for the Australian Department of the Environment, Water, Heritage and the Arts available at http://www.environment.gov.au/atmosphere/airquality/publications/woodheater-operation.html

8. Senate Inquiry 2013 – Impacts on health of air quality in Australia http:/www.aph.gov.au/Parliamentary_Business/Committees/Senate/Community_Affairs/Completed_inquiries/2010-13/airquality/report/index

9. NSW Parliament Upper House Inquiry Performance of the NSW Environment Protection Authority (Inquiry) http://www.parliament.nsw.gov.au/prod/parlment/committee.nsf/0/743BDB8875807D85CA257CFC002142D1

10 Appendix 1: Topic guides for Phase One focus groups

Introduction

- Thank them for coming
- Explain that purpose of group is to explore life in the Upper Hunter, air quality, wood smoke and heating
- Explain there are no right or wrong answers we are just interested in their opinions, encourage all to participate

Warm up

- Introduce themselves, describe their household structure and a sentence on how they would describe life in Muswellbrook / Singleton to someone who has just moved to the area

Social norms in the Upper Hunter

- What are some of the things people might like about living in Muswellbrook / Singleton
- What are some of the things people might not like about living in Muswellbrook / Singleton
- Imagine that you have a new neighbour who is new to the Upper Hunter. You are getting to know them and they ask your advice on fitting in to the neighbourhood
    - what are some of the dos and don'ts that you'd share with them
    - to what extent would you say there is a strong "community" feel or degree of "neighbourliness"
    - how does that manifest itself – what do people say and do that indicates that they
        - care / don't care about their community - how can a newcomer tell
        - are neighbourly / unneighbourly – how can a newcomer tell

Air quality in the Upper Hunter

IF NOT RAISED PREVIOUSLY

- How would you describe the quality of the air in the area
    - what is it about the air that makes you describe it in that way
    - to what extent is air quality an issue for people in the area PROBE FULLY

Air quality and wood smoke

ACKNOWLEDGE AND PARK COAL DUST ARGUMENTS AS NECESSARY

IF NOT RAISED PREVIOUSLY ASK / OTHERWISE PROBE AS APPROPRIATE

- To what extent do people feel that wood smoke impacts on air quality in the area
    - what, if any, differences are there between the impact of wood smoke and that of other pollutants on air quality / the way it affects people
    - what sorts of things can increase the impact of wood smoke / fires on air quality
    - what sorts of things can decrease the impact of wood smoke / fires on air quality
    - to what extent are there dos and don'ts about using a wood heater (per se / in this area)

PROBE AWARENESS, ATTITUDES AND BEHAVIOUR AROUND CONCERNS ABOUT AIR QUALITY & / OR CONSIDERATION FOR OTHERS AND…

- What else, if anything, (apart from concern for air quality / other people) impacts on the way people use their wood heater
- What is the main thing that drives efforts to reduce the amount of wood smoke

Wood heater use

IF NOT ALREADY APPARENT FROM PREVIOUS DISCUSSION ASK

- How would you describe the way you
  - use your wood heater
    - what, if anything can be done to operate it in a way that optimises its energy efficiency
    - what, if anything can be done to operate it in a way that minimises wood smoke
  - maintain your wood heater
    - what, if anything can be done to maintain it in a way that optimises its energy efficiency
    - what if anything can be done to maintain it in a way that minimises wood smoke
  - determine when your wood heater needs to be repaired / replaced
    - how can you tell when its energy efficiency is deteriorating / has deteriorated and what can be done when this is noticed / how long before action is taken
    - how can you tell when the amount of wood smoke it is emitting is increasing and what can be done when this is noticed / how long before action is taken

- Thinking back to that new neighbour who came to you for advice, they tell you this is the first time they have had a wood heater what advice would you give them on:
  - using it
    - How can they operate it better to minimise wood smoke
  - maintaining it
    - How should they maintain the heater and chimney in order to minimise wood smoke
  - knowing when it needs repairing / replacing
    - What to ask repair / sales person to minimise wood smoke

Initiatives to drive behaviour change

ACKNOWLEDGE AND PARK COAL DUST ARGUMENTS AS NECESSARY

- What, if any, programs are you aware of to encourage householders in this area to minimise wood smoke?
  - what can you tell me about the program (if any mentioned)
  - what do you think about that method of trying to get householders to minimise wood smoke (if any mentioned)
- What do you think would be a better idea

BREAK INTO SMALL TEAMS TO DESIGN A PROGRAM. CAPTURE ELEMENTS OF PROGRAM ON FLIPCHART:

- Aim of program - what it wants to achieve
- Objectives of program - how it intends achieving its aim
- Slogan for program - tagline for program
- Organisation behind program – and level of profile they have for program
- Target for program - who it wants to encourage to take action
- Call to action for target - what it wants target to do
- Rationale or benefit for target / community – driver / reason for target to take action
- Incentive (if any) for target to change the way they use / maintain, or to replace their wood heater - what reason it offers target to take action

EACH TEAM REPORTS BACK TO GROUP

- What sort of things do you think would help such a program achieve its aim?
- What sort of things do you think would hinder such a program from achieving its aim?
- What do you think would be a better way of encouraging householders in this area to reduce wood smoke?

Summary

Now that we've seen and heard these different ways of trying to improve the quality of life of the community (or alternative benefit as per issues raised by participants) by reducing small particles from the air in the Upper Hunter, what do you think the priority should be in reducing wood smoke?

11 Appendix 2: Stakeholder topic guide Phase One

Core questions

Introduction

- Explanation of research objectives / rationale for interviewing them:
    - understanding Upper Hunter community attitudes about the impacts of wood smoke and other forms of particle pollution
    - understanding their opinion on householder's heating choices and investigating the triggers and barriers to alternative heating options
    - their opinion on the benefit of conducting household energy efficiency audits and providing advice on heating and insulation
    - include identifying approaches to effective education tools to encourage people to reduce wood smoke emissions by better operation and maintenance of their heaters and / or encouraging householders to use alternative heating

- Conversational nature of the interview
- Permission to record, reassurance for confidentiality, etc.

Warm up

- Nature of organisation represented, their role within it and their association with wood smoke in the Upper Hunter.

Wood Smoke in Upper Hunter

- Exploration of their perceptions of the issue
    - in terms of the nature and extent to which wood smoke is thought to impact on air quality and correspondent impact on health
    - in isolation and comparison to other, local, factors such as coal dust

The Upper Hunter Community

- Exploration of their perceptions of householders in the Upper Hunter
    - in terms of demographic /socioeconomic profile as well as other factors like property type and age
    - and how this impact on heating choices, perceptions of the impact of wood smoke on air quality and willingness to change heating type

Addressing the impact of wood smoke

- Feedback on what they think could or should be done to address the impact that wood smoke has on air quality in the Upper Hunter and their rationale for this
    - this will also be related to the wider context of other initiatives (e.g. talking about actions to deal with the coal dust), i.e. in order to mitigate potential negative reaction/ ignoring of the issue
- Awareness and perceptions of any initiatives to address this issue
- Perceptions of what may be appropriate / effective in the Upper Hunter and rationale

Supplementary questions for:

- Local Council representatives:
  - specific issues relating to either Muswellbrook or Singleton, i.e. differences between them
  - heating choice influences
  - experience of previous interventions and perceived reasons for degree of take-up
  - key target areas for householder research
  - initial exploration of interventions and opportunities/barriers presented by them.

- Other state or territory Government representatives
  - policy context and experience to date
  - learnings from other similar interventions
  - possible future interventions
  - broad details of approaches to delivery.

- Consumer group, business group and lobby representatives
  - in-depth exploration of public attitudes, key issues and challenges
  - awareness and understanding of wood smoke as an issue
  - how to approach wood smoke issues in the context of coal dust

- Supply-chain representatives
  - understanding the home heating market and prevalence of wood heating types in different households etc. Understanding heating choices and their reasons for them, identifying property type issues and constraints.
  - exploring aspects of interventions which could involve the supply chain (e.g. as a channel to market and influencer of heating choices).

12 Appendix 3: Telephone survey questionnaire Phase Two

Good morning/afternoon/evening. My name is _____ from Hunter Research Foundation. We are currently surveying households about living in the Upper Hunter and home heating. Your telephone number was selected at random from the White Pages.

IF RESPONDENT ASKS FOR MORE DETAIL

The outcomes of the survey will be used to provide information to residents in the Upper Hunter about efficient home heating

Could I speak to an ADULT IN YOUR HOUSEHOLD WHO DECIDES WHAT TYPE OF HEATING IS USED?

1. Yes 2. No 3. No heating used in this house

IF NO or NO HEATING SKIP TO THANKS

REPEAT INTRODUCTION IF REQUIRED

You are invited to take part in the survey and your answers will be confidential. This interview may be monitored for quality and training purposes.

Are you happy for me to continue?
[INTERVIEWER: IF RESPONDENT REFUSES, OFFER FREECALL]
1. PROCEED
2. NO - REFUSAL
4. Not Now SPOKE TO RESPONDENT - CALLBACK ARRANGED
6. RESPONDENT UNSUITABLE (EXPLAIN IN COMMENTS)
66. RESPONDENT UNAVAILABLE FOR SURVEY PERIOD (COMMENTS)
14. LANGUAGE PROBLEM 8. NOT IN AREA\QUOTA DONE
[Give Free call if requested - 1800 082 238 9am to 8pm NSW time Mon to Fri]

Q1. How many heaters do you have in your household?

7. None
1. One
2. Two
3. Three or more [9. REFUSED]

IF Q1=7 SKIP TO THANKS

Q2. Thinking about the heating you use most often, what type is it?

[RESPONSE TO BE UNPROMPTED – INTERVIEWER TO USE CODES BELOW WHERE APPLICABLE OTHERWISE TYPE IN RESPONSE]

1. Electric reverse cycle ducted
2. Electric reverse cycle not ducted
3. Electric (other)
4. Gas ducted
5. Gas (other)
6. Wood combustion / wood stove / pot belly
7. Wood open fire
8. Pellet heater
9. OTHER (please specify)

IF Q2 NOT EQUAL TO 6 OR 7 OR 8
That completes our call today.
SKIP TO THANKS

Q3. Could you please tell me which town or suburb you live in?
[FULL LIST OF TOWNS, SUBURBS, VILLAGES, LOCALITIES IN THE MUSWELLBROOK AND SINGLETON AREA WILL BE SHOWN FOR INTERVIEWER TO USE CODES HOWEVER ONLY THE FOLLOWING RESPONSES WILL BE PROGRAMMED TO CONTINUE THE SURVEY – MUSWELLBROOK, SINGLETON OR SUBURBS IN SINGLETON TOWNSHIP]

1. Combo
2. Darlington
3. Dunolly
4. Glenridding
5. Gowrie
6. Hunterview
7. McDougalls Hill
8. Muswellbrook
9. Obanvale
10. Redbournberry
11. Singleton
12. Singleton Heights
13. Wattle Ponds

88 OTHER (please specify) 99 REFUSED

IF NOT MUSWELLBROOK, SINGLETON OR SUBURBS IN SINGLETON TOWNSHIP

That completes our call today.
SKIP TO THANKS

Current Usage and Maintenance

Q4a. Since the start of this winter, how many days per week on average have you been running your wood heater?

Q4b. How many of those days would be weekdays Monday – Friday?

Q4c. And how many of those days would be on Saturday or Sunday?

Q4d. On weekdays, Monday - Friday, how many hours per day would you typically have your wood heater lit?

Q4e. On a Saturday or Sunday, how many hours per day would you typically have your wood heater lit?

Q4f. What type of fire wood would you normally use in your wood heater?
[RESPONSE TO BE UNPROMPTED – INTERVIEWER TO USE CODES BELOW WHERE APPLICABLE OTHERWISE TYPE IN RESPONSE]

1. Dry, well-seasoned wood
2. Wood just purchased
3. Wood collected previous year
4. Any wood available
5. OTHER (please specify)

Q4g. And where do you normally get your fire wood from? (unprompted)
[RESPONSE TO BE UNPROMPTED – INTERVIEWER TO USE CODES BELOW WHERE APPLICABLE OTHERWISE TYPE IN RESPONSE]

1. Fire wood supplier
2. Service station or market
3. Collect own wood
4. OTHER (please specify)

Q5. Next I would like to ask you to indicate how often you do the following using a scale that includes Always, Often, Sometimes or Never. When using your wood heater, how often do you ……?

1. Always
2. Often
3. Sometimes
4. Never [8. DON'T KNOW 9. REFUSED]

[ITEMS BELOW WILL BE RANDOMISED FOR EACH RESPONDENT]

a. Use seasoned, dry wood
b. Have the flue checked and cleaned yearly by a professional
c. Leave the wood heater burning overnight
d. Use soot removal products such as 'Soot Loose' to clean the flue instead of cleaning by a professional
e. Burn small amounts of rubbish in the heater
f. Close the air flow straight after reloading the heater

INFORMATION NEEDS

Q6. On a scale of 1 to 4 where 1 is not at all and 4 is very interested, how interested would you be in receiving information about……..?

1. Not at all
2. Somewhat interested
3. Quite interested
4. Very interested [8. DON'T KNOW 9. REFUSED]

[ITEMS BELOW WILL BE RANDOMISED FOR EACH RESPONDENT]

a. The best way to start a fire including tips on kindling and safe fire starter products
b. The dos and don'ts of air flow control
c. How to tell if wood is dry and seasoned
d. How to get the best value out of your wood by using it in the most efficient and effective way
e. What a fire can look like and what it means for heat generation and air pollution
f. How to find a professional to check and/or clean your flue
g. How to properly maintain your wood heater to keep it in best condition and ensure it is safe and efficient to use

Q7. If you wanted to know more about using your heater which of the following sources of information would you use ……?

1. Yes 2. No 8. Don't know

[ITEMS BELOW WILL BE RANDOMISED FOR EACH RESPONDENT]

a. Local community organisations
b. Information stalls at local markets
c. Articles in the local newspaper or on radio
d. Council website or brochures
e. Brochures delivered to your letterbox
f. Workshops at the library
g. Retailers who stock and sell heaters
h. Workshops run by heater suppliers or sellers

Wood Heater Preference and Replacement

Q8. What is the main reason you use wood heating?

[RESPONDENTS CAN PROVIDE UP TO THREE RESPONSES - RESPONSES TO BE UNPROMPTED – INTERVIEWER TO USE CODES BELOW WHERE APPLICABLE OTHERWISE TYPE IN RESPONSE]

1. Heater already in the home
2. Heater given to them or purchased cheaply or free
3. Free / easy access to timber
4. Like the type of heat provided / heats the house well
5. Like the look, smell, ambience
6. Can also cook or heat water
7. Have grown up with this type of heater
8. Environmental considerations / wood a renewable sustainable resource
9. Recommendations from friends or heating experts
10. Easy to use and maintain
11. Energy efficient
88. OTHER (please specify)

Q9. How long have you had your current wood heater?

1. Less than five years
2. 5 to 15 years
3. More than 15 years
8. DON'T KNOW / CAN'T RECALL

Q10. Is your current wood heater your preferred way to heat your home?

1. Yes 2. No 8. Don't know 9. Refused

IF Q10=2

Q11. (If it is not your preferred way) what type of heating would you prefer to be using?

[RESPONSE TO BE UNPROMPTED – INTERVIEWER TO USE CODES BELOW WHERE APPLICABLE OTHERWISE TYPE IN RESPONSE]

1. Electric reverse cycle ducted
2. Electric reverse cycle not ducted
3. Electric (other)
4. Gas ducted
5. Gas (other)
6. Pellet heater
7. New, efficient wood heater
8. Wood (other)
88. OTHER (please specify)
99. DON'T KNOW

IF Q10=2

Q12. Assuming you were able to change your heating to <Q11 RESPONSE>, what is the main reason you would change?

[RESPONSE TO BE UNPROMPTED – INTERVIEWER TO USE CODES BELOW WHERE APPLICABLE OTHERWISE TYPE IN RESPONSE] THIS QUESTION WAS APPLICABLE TO ONLY 6 RESPONDENTS AND THE CODING FRAME WAS NOT READ OUT. THE FRAME APPEARS ONLY ON THE SCREEN FOR INTERVIEWERS TO USE IF MENTIONED BY RESPONDENTS IN THEIR ANSWER TO THIS QUESTION.

RESPONSES MAY BE APPLICABLE TO OTHER TYPES OF HEATING ALLOWABLE FROM THE PRECEDING QUESTION (Q11) E.G. GAS, PELLET HEATER, NEW EFFICIENT WOOD HEATER.

1. Wood becoming more expensive or hard to get
2. Sick family member
3. Wood heater not good for my and/or my neighbours health
4. New heater given to us or purchased cheaply or free
5. Like the type of heat provided / heats the house well
6. Have grown up with this type of heater
7. Environmental considerations / wood a renewable sustainable resource
8. Recommendations from friends or heating experts
9. Wood heater too much work / New heater easier to use and maintain
10. Moving house / doing home renovations
11. Energy efficient
88. OTHER (please specify)

_____

IF Q10=2

Q13. Are you planning on making the change to <Q11 RESPONSE> in future?

1. Yes 2. No 8. Don't know 9. Refused

IF Q13=1

Q13a. When are you planning to do this?

1. Within the next year
2. In 1 to 5 years
3. In more than 5 years
9. DON'T KNOW

IF Q13=2 OR 8

Q13b. What is preventing you from making the change?

[RESPONDENTS CAN PROVIDE UP TO THREE RESPONSES - RESPONSES TO BE UNPROMPTED – INTERVIEWER TO USE CODES BELOW WHERE APPLICABLE OTHERWISE TYPE IN RESPONSE]

1. Cost of purchasing the heater
2. Cost of running the heater
3. No mains gas in the area
4. Don't own the house
5. Need to find out more about it
6. I like my current heater
88. OTHER (please specify)

Incentives

Q14. On a scale of 1 to 4 where 1 is not at all and 4 is very interested, how interested would you be in the following…?

1. Not at all
2. Somewhat interested
3. Quite interested
4. Very interested [8. DON'T KNOW 9. REFUSED]

[INCENTIVES BELOW WILL BE RANDOMISED FOR EACH RESPONDENT]

a. A free 'heating efficiency check' for your home to help you get good value for money from your heaters
b. A discount on the cost of a flue-cleaning service

c. A discount on the costs to remove your wood heater and install a non-wood burning heater in your home
d. A discount to replace your wood heater with a different form of heating

IF Q14b, Q14c or Q14d EQUAL TO 2 OR 3 OR 4

Q14e. Would you prefer to receive the discount as …

1. A rebate that you can claim online or by mail with a copy of your receipt OR
2. A voucher that you can use at selected businesses.

[NOT READ OUT 3. BOTH 4. NEITHER 8. DON'T KNOW 9. REFUSED]

IF Q14a, Q14b, Q14c or Q14d EQUAL TO 2 OR 3 OR 4

Q14f. Who do you think should provide the funding?

[RESPONDENTS CAN PROVIDE UP TO THREE RESPONSES - RESPONSES TO BE UNPROMPTED – INTERVIEWER TO USE CODES BELOW WHERE APPLICABLE OTHERWISE TYPE IN RESPONSE]

1. NSW Government
2. Local government / Council
3. Power stations
4. Mines
88. OTHER (please specify)
99. DON'T KNOW

IF Q14d EQUAL TO 2 OR 3 OR 4

Q14g. How much (money) would need to be offered for you to consider replacing your wood heater?

$ _____ [NOT READ OUT 8888. DON'T KNOW 9999. REFUSED]

Attitudes to Wood Smoke

Q15. On a scale where 5 is strongly agree and 1 is strongly disagree, please rate your level of agreement with the following statements?
[PROMPT FOR DEGREE OF AGREE OR DISAGREE]

1. Strong disagree
2. Disagree
3. Neither
4. Agree
5. Strongly agree [8. DON'T KNOW 9. REFUSED]

[ITEMS BELOW WILL BE RANDOMISED FOR EACH RESPONDENT]

a. Wood smoke is a problem even in areas with a lot of other air pollutants
b. It is the small particulate matter in wood smoke that causes health problems
c. Particles from wood smoke are less harmful than from diesel trains, trucks, power plants or mines
d. There is no point worrying about wood heaters with all the power stations and mines in the area
e. There is not much I can do about other air pollutants but I can do something about the impact of wood smoke
f. Particles in the smoke coming out of the chimney can be harmful to my family and my neighbours' health

Demographics

QQ Could you please confirm which of the following best describes your household?

1. Living at home with parents
2. COUPLE / SINGLE PERSON with no dependent children
3. Family with AT LEAST 1 CHILD UNDER 18 YEARS LIVING AT HOME
4. Family with ONLY ADULT CHILDREN LIVING AT HOME (ALL OVER 18 YEARS)
5. Live with other people (not parents)

[NOTE: FAMILY CAN INCLUDE SINGLE PARENT]

QQ And do you...?

1. Own your accommodation WITH a mortgage or loan (includes owned by self, partner or family)

2. Own your accommodation WITHOUT a mortgage or loan (includes owned by self, partner or family)

3. Rent your accommodation from a private landlord

4. Rent from Housing NSW or another social housing provider like Compass

5. Live rent-free

6. Board [8. DON'T KNOW 9. REFUSED]

QQ [OBSERVE - Ask only if necessary - Are you male or female?
1. Male 2. Female [9. REFUSED]

QQ Could you tell me how old you are? [OVER 90=95]
[INTERVIEWER - ENTER ACTUAL AGE IF GIVEN]
IF REFUSED ASK - What age group are you? [READ OUT]

1. 18-24
2. 25-29
3. 30-39
4. 40-49
5. 50-59

6. 60-69
7. 70 and over

[9. REFUSED - DON'T READ OUT]

QQ What is the highest education you have completed?

1. Primary school
2. Left high school - no certificates
3. Still at high school
4. School certificate/intermediate certificate
5. Higher school certificate/leaving certificate
6. Trade qualification
7. Other TAFE/vocational qualification
9. Undergraduate diploma
10. Associate diploma
11. Bachelor's degree
12. Post graduate university degree

Other (specify) [99 = REFUSED]

QQ What is the approximate YEARLY before tax income of everyone living in your household?

[I.E. GROSS HOUSEHOLD INCOME: INCLUDES ALL INCOME STREAMS E.G. WAGES, PENSIONS, ALLOWANCES, RENTAL INCOME].

[READ SCALE]

1. $10,000 AND UNDER
2. $10,001 TO $20,000
3. $20,001 TO $40,000
4. $40,001 TO $60,000
5. $60,001 TO $80,000
6. $80,001 TO $100,000
7. $100,001 AND OVER

8. UNSURE

9. REFUSED

RECRUIT FOR FOCUS GROUP

SELECT IF AGE<?? Or LGA=?? [CRITERIA TO BE DISCUSSED. MAYBE WE ASK EVERYONE AND REVIEW BEFORE CONTACTING PEOPLE TO PARTICIPATE]

QQ Later this year we are holding discussion groups to speak further with people in the Upper Hunter about preferences for heating homes. The discussions are informal get-togethers with about 8 people which will last up to 2 hours. Refreshments are provided and participants will be paid a fee of $50. Would you be willing to take part in one of the discussions groups?

1. Yes 2. No

IF NO SKIP TO THANKS

Once the dates for the discussion groups have been finalised we will contact you again to confirm your participation.

What is the best telephone number for us to call you back on?
And do you have an email address?

(If no email prompt for mailing address)

And your name (first and surname)

That completes the survey; thank you for your time. Just to remind you my name is ..... calling from Hunter Research Foundation and we very much appreciate your participation.
[HRF CONTACT: Vanessa James - Survey supervisor - Free call 1800 355 534]

13 Appendix 4: Topic guide Phase Three

Introduction

Explain purpose of group is to obtain feedback on air pollution and choosing heating options.

Encourage full participation and candour in the feedback. Reassure for confidentiality.

Participant introduction

First name only introduction, household structure, how they like to use their wood heater and how they learned how to use it.

Brochure feedback

HAND EACH RESPONDENT A COPY OF EPA'S 'STAY WARM BREATHE EASY' BROCHURE. OBTAIN INDIVIDUAL, WRITTEN RESPONSES BEFORE DISCUSSING FEEDBACK AS A GROUP.

- What did you think overall and why is that?
- Who is it targeting – degree of relevance to you personally?
- What is it trying to say?
    - how clearly is it saying it / ease of understanding?
    - how effectively is it saying it / how motivating it is?
- What, if anything, did it tell you that was new / interesting?
    - and what, if any, difference does it make knowing that and why (PROBE IMPACT ON HUMAN HEALTH AND WOOD SMOKE POLLUTION PROBLEM IN THE UPPER HUNTER)
- What, if anything does the brochure seem to want the reader to do?
    - how likely are you to do that and why?
    - IF NOT - What would you need to see/hear in order for you to do that
- Has anyone seen this brochure before today?
    - if so, where did you come across it?
    - did you look at it / read it or not and why?
    - what did you think about it/what it said?
        - what difference if any did it make when you read that?
- Where would you expect / like to come across a brochure on this topic and why?

Trusted sources of information

- What difference does it make that the brochure is produced by the EPA and why?
- If it was produced by another organisation (PROBE FOR TYPE OF ORGANISATION AND MENTION HEALTH PROFESSIONALS) what, if any, difference would it make to the message?
- Who do you trust to provide information on:
    - the impact of wood smoke on health
    - the degree of the wood smoke pollution in the area
    - best practice for wood heater operation and maintenance

- A brochure is one way of providing information, what other sources of information are you interested in for this topic (PROBE WEBSITES, RADIO, LOCAL PRESS)

Impact of Wood Smoke

The brochure contained some information about the impact of wood smoke on human health. Now we're going to look at some other info relating to wood smoke that I'd like your feedback on

Health

SHOW MESSAGES ABOUT HEALTH HAZARDS, PROXIMITY TO POLLUTION SOURCE, SMOKE HANGING AROUND + HEALTH FIGURES ON MORTALITY FROM PM10.

ROTATE ORDER SHOWN. INDIVIDUAL WRITTEN RESPONSES PRIOR TO DISCUSSION ADDRESSING E.G:

- Overall reaction
- What do you think it is trying to say
- Who do you think it is aiming the message at
- How easy is it to understand the message
- What difference does it make to you

Air Quality

- I'm also interested in your feedback on some information on wood smoke pollution in the Upper Hunter

SHOW FIGURES/GRAPHS FROM UPPER HUNTER PARTICLES STUDY, E.G. IN MUSWELLBROOK WOOD SMOKE CONTRIBUTES ANNUALLY 30% OF PARTICLE EMISSIONS, BUT 62% IN WINTER. IN SINGLETON CORRESPONDING FIGURES ARE 14% AND 38%

- Overall reaction
- What do you think it is trying to say
- Who do you think it is aiming the message at
- How easy is it to understand the message
- What difference does it make to you

Wood heater operation and maintenance practices

Now we're going to look at some information about wood heater operation and maintenance practices
SHOW PHOTOS AND MESSAGES ABOUT AVOIDING OVERNIGHT OR DAY BURNING / SMOULDERING OF WOOD HEATERS + OVERLOADING WITH WOOD AND SHUTTING THE AIR SUPPLY IMMEDIATELY

- Overall reaction?
- What do you think it is trying to say?

- Who do you think it is aiming the message at?
- How easy is it to understand the message?
- What difference does it make to you?

THEN (BRIEFLY) REINFORCE GOOD WOOD HEATER OPERATION/MAINTENANCE PRACTICE BY SHOWING MESSAGES (USE SEASONED, DRY WOOD, HAVING THE FLUE CHECKED AND CLEANED YEARLY BY A PROFESSIONAL, NOT BURNING SMALL AMOUNTS OF RUBBISH) AND OBTAINING QUICK RESPONSE

Encouraging behaviour change around wood heaters

BUILDING ON PHASE 2 FINDINGS…

- Some people have expressed an interest in a DISCOUNT ON THE COST OF A FLUE-CLEANING SERVICE, what about you?
    - what would be the best format for that discount? (PROBE REBATE, VOUCHER ETC)
    - and how much of a discount? (write down)
- Some people have expressed an interest in a DISCOUNT TO REPLACE THEIR WOOD HEATER WITH ANOTHER FORM OF HEATING, what about you?
    - what would be the best format for that discount? (PROBE REBATE, VOUCHER ETC)
    - and how much of a discount?(write down)

Brochure redesign

PROVIDE TOOLS (A3 PAPER, SCISSORS, PASTE) AND MULTIPLE COPIES OF STIMULUS PREVIOUSLY SHOWN (INCLUDING BROCHURE, MESSAGES, PHOTOS, STATS/GRAPHS)

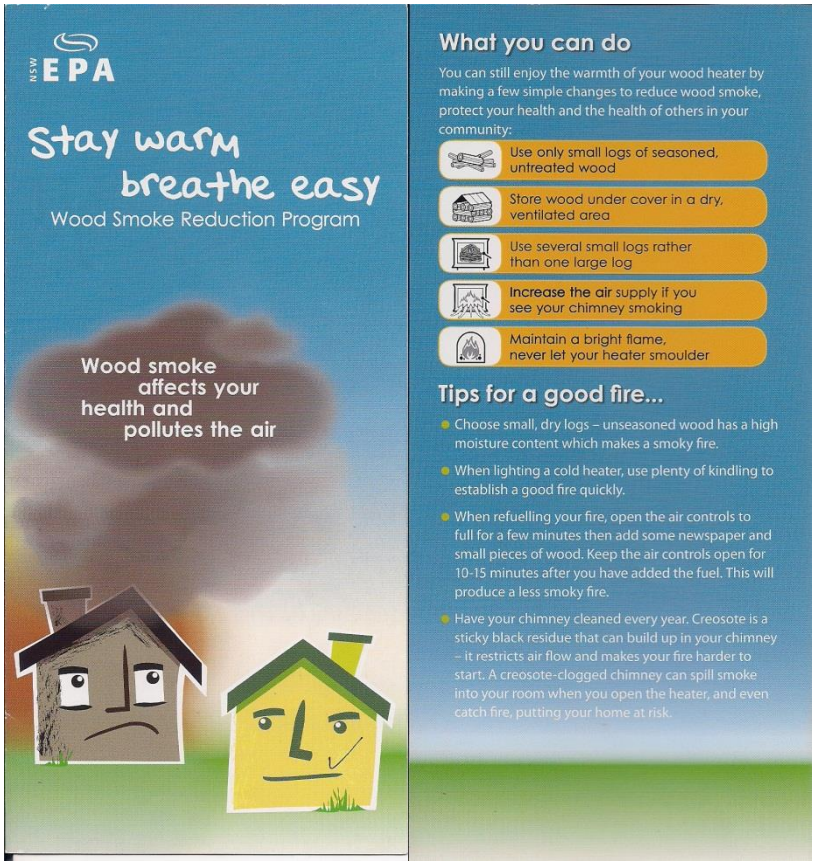
Thinking about the brochure we discussed earlier on, break into small groups (2-3 people per subgroup) and redesign it in a way that you think makes it more effective. Things you might think about include:

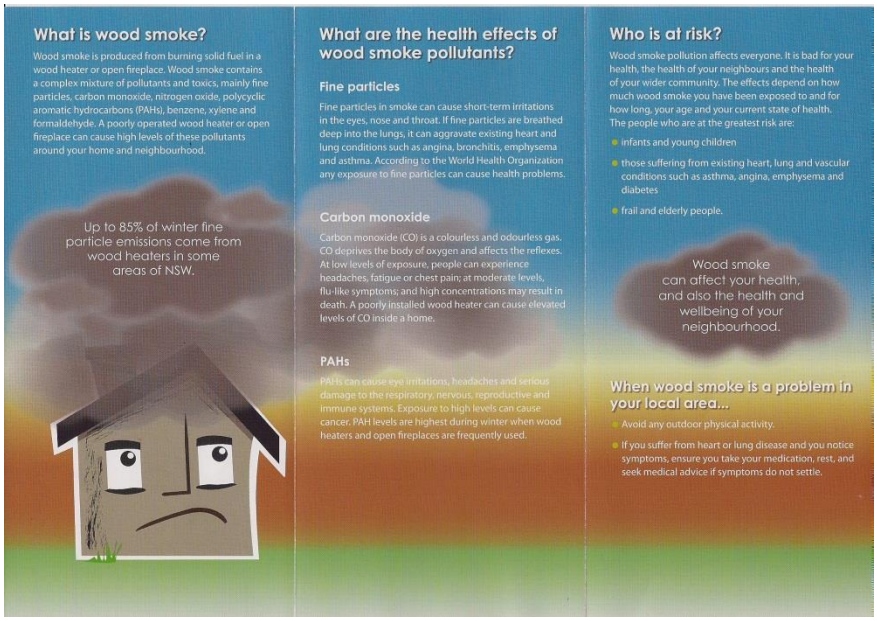
- What you would say
- How you would say it
- Facts & figures you'd include
- The call to action you would include
- What (size of financial / other) incentive you would offer to encourage wood heater owners to do what you want them to do

Call to action

- Imagine that you are the council / EPA and have to take responsibility for minimising wood smoke in Singleton/ Muswellbrook, what would you do?

14 Appendix 5: Stimulus material shown in Phase Three





Myth 1: "Wood smoke is natural, so it must be okay"

a) Even though humans have burned wood since the beginning of time, scientists have only recently discovered just how hazardous wood smoke pollution is to our health.

b) The negative health effects of residential wood smoke have been linked to a range of health problems that include diminished lung function, respiratory and cardiac problems.

c) While the wood smoke pollution is especially dangerous for those with existing health conditions, children, and the elderly, it is hazardous to the health of all human beings.

d) The reality is: if you can smell wood smoke, you're breathing pollution that is hazardous to your health.

Myth 2:"Aren't there more important Pollution sources to worry about?"

Unlike highly regulated industrial sources of pollution, wood burning occurs right in the neighbourhoods where we live—sometimes right next door. This means that people can be subjected to levels of hazardous pollution from wood heaters that are far higher than from any other pollution source.

Myth 3: "Wood smoke dissipates, so what's the problem?"

a) Most of the harmful pollutants in wood smoke don't dissipate quickly. They hang around at ground level for a few days.

b) On cold winter days (when people tend to burn wood) the problem is even worse, because the weather conditions create temperature inversions that put a lid over the lower atmosphere, trapping hazardous pollutants close to ground level.

c) The fine particle pollutants in wood smoke are so small that they infiltrate even the most well insulated homes. Scientific studies have shown that particle pollution levels inside homes reach up to 70% of the pollution levels outdoors.

Result of overnight (or day) burning / smouldering of wood heaters

Creosote comes from smouldering gases in smoke of slow burning wood. The flue may become almost completely blocked as shown below.

Over (loading) with wood and shutting the air supply immediately

Muswellbrook

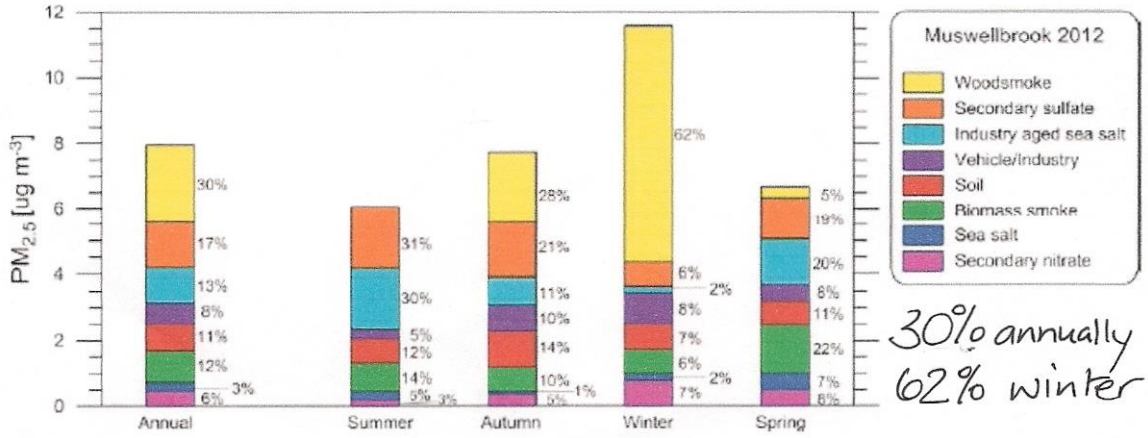


Figure 2 Annual and seasonal contributions of the PMF factors to $PM_{2.5}$ in Muswellbrook

Singleton

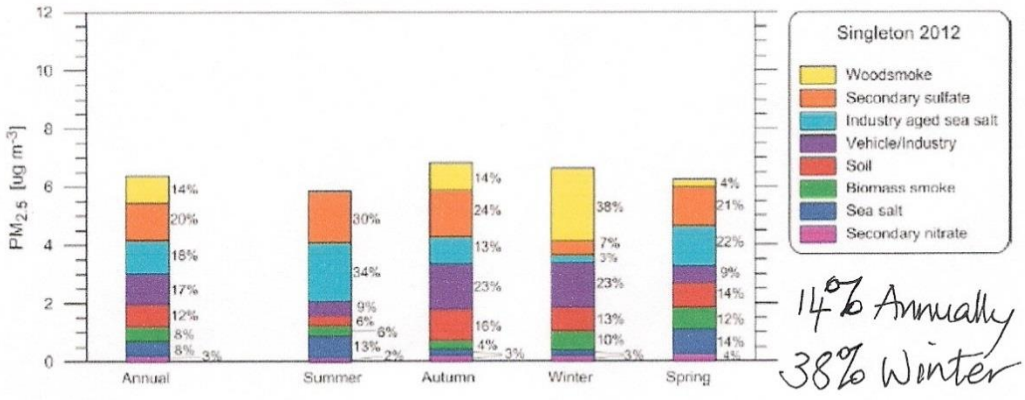


Figure 1 Annual and seasonal contributions of the PMF factors to $PM_{2.5}$ in Singleton

Evaluation of interventions to reduce air pollution from wood smoke on mortality in Launceston (1994-2007)

Objective To assess the effect of reducing air pollution from wood smoke on mortality (deaths).

Design Age analysis of deaths applied to intervention (Launceston) and control community (Hobart).

Setting Central Launceston, where coordinated strategies were implemented to reduce pollution from wood smoke and central Hobart, a comparable city where there were no specific air quality interventions.

Participants 67 000 residents of central Launceston and 148 000 residents of central Hobart.

Interventions Community education campaigns, enforcement of environmental regulations, and a wood heater replacement programme to reduce ambient pollution from residential wood stoves started in the winter of 2001.

Main outcome measures Changes in daily all cause, cardiovascular, and respiratory deaths during the 6.5 year periods before and after June 2001 in Launceston and Hobart.

Results

Average daily wintertime concentration of PM_{10} (particulate matter with particle size of less than 10 micrograms in diameter) fell from 44μg/m^3 (micrograms per cubic meter) during 1994-2000 to 27 μg/m^3 during 2001-07 in Launceston. The period of improved air quality was associated with small non-significant reductions in annual deaths. In males the observed reductions in annual deaths were larger and significant for all cause (−11.4%), cardiovascular (−17.9%), and respiratory (−22.8%) mortality. In wintertime reductions in cardiovascular (−19.6%) and respiratory (−27.9%) deaths were of borderline significance (males and females combined). There were no significant changes in deaths in the control city of Hobart.

Conclusions Decreased air pollution from wood smoke was associated with reduced annual premature deaths in males and with reduced cardiovascular and respiratory mortality during winter. So, a clear health impact, in the form of a reduction in the number of premature deaths, was observed as a result of reduced wood smoke.

Summary of article published in the British Medical Journal

15 Appendix 6: Phase 2 Quantitative Survey Report

UPPER HUNTER WOOD SMOKE COMMUNITY RESEARCH PROJECT

HUNTER RESEARCH FOUNDATION

Hunter Research Foundation is an independent research organisation committed to delivering innovative and high-quality survey and research solutions to individual clients.

Hunter Research Foundation

ABN 91 257 269 334

Established 1956

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Author: Ruth McLeod

Prepared for: Databuild Research & Solutions

Executive Summary

This report presents the results of a household survey conducted by Hunter Research Foundation (Hunter Research, HRF) on behalf of Databuild Research & Solutions. The survey was the second phase of the Upper Hunter Wood Smoke Community Research Project being conducted by Databuild for the NSW Environment Protection Authority (EPA).

The objectives of the Upper Hunter Wood Smoke Community Research Project were to:

- Explore public attitudes about impacts of wood smoke and other forms of particle pollution
- Investigate influencers of households' heating choices and barriers to use of alternative heating options
- Ascertain need for energy efficiency audits and advice on alternatives to wood heaters
- Estimate potential number of households willing to upgrade heating and level of economic incentives required
- Assessment of how people use and maintain their wood heaters (additional objective included from the outcomes of Phase 1).

To provide quantitative data to address these objectives a telephone survey was conducted with randomly selected households in the Muswellbrook and Singleton local government areas (LGAs) during August-September 2015 with a preference for households located in the two main town centres. Interviews were conducted with a decision maker from the household and topics included:

- Wood heating usage and maintenance
- Willingness to accept information about using wood heaters
- Preference for alternate heating choices and willingness / barriers to change
- Incentives to change
- Attitudes to the impact of wood smoke.

In total 203 interviews were completed with households using wood heating, representing a response rate of 76 per cent.

Key findings included:

- The most common form of home heating in the Muswellbrook and Singleton LGAs was electric reverse cycle air-conditioning used by 31 per cent of households. Wood combustion heating or open fires were used by more than a quarter (27%) of households and approximately half of these households (14%) were located in the main town centres of the two LGAs.
- Four in ten of the wood heaters in households surveyed were more than 15 years old and the most popular reason nominated by more than seven in ten respondents (71%) for using wood heating was they liked the type of heat it provided and the way it heated the house. The next most common response provided by slightly more than a third of the respondents (35%) was free and/or easy access to timber.
- On average, the households had their wood heaters lit on 5.7 days each week during winter with four of those days being weekdays. Across the week, heaters were lit for an average of 93.6 hours and slightly more than a third of households interviewed (34%) indicated they had their wood heater lit 24 hours per day, 7 days week.
- The majority of respondents (96%) always use seasoned, dry wood in their heaters and 85 per cent of respondents indicated that they never burn small amounts of rubbish.

However more than half of the respondents (57%) indicated that they never have the flue check and cleaned yearly by a professional.

- A relatively low level of interest was expressed by respondents for receiving information about using their wood heater with more than seven in ten indicating they were not interested in any of the information suggested. The highest level of interest recorded, with 28 per cent of respondents at least somewhat interested, was for finding out more about what a fire can look like and what it means for heat generation and air pollution; and how to properly maintain your wood heater to keep it in best condition and ensure it is safe and efficient to use.
- Slightly more than half of the respondents indicated that brochures delivered to the letter box or articles in the local newspaper or on radio were the most preferred ways to receive information if they wanted to know more about using their heater. The next most preferred were business-type sources such as via Council website or brochures (46%), or through retailers who stock and sell heaters (42%). Community based sources such as via local community organisations or information stalls at local markets was nominated by a quarter of respondents (25%). The least preferred options were workshops run by heater suppliers or sellers (18%), or workshops held at the library (13%).
- For nearly all of the respondents (96%) wood heating is the preferred way to heat their home.
- There was a very low level of interest by respondents for incentives to change to a different form of heating or use their heating more efficiently with average interest being between not at all and somewhat interested. The highest level of interest was for a discount on the cost of a flue-cleaning service with almost one third of respondents (32%) at least somewhat interested. The lowest level of interest was for a discount on the costs to remove wood heaters and install a non-wood burning heater in the home with less than nine per cent of respondents showing any interest in this incentive.
- Of the respondents who would consider an incentive, approximately four in ten (42%) said they would prefer a rebate that could be claimed with a receipt. A similar number (40%) preferred a voucher that could be used at selected businesses, while a further one in ten of the respondents (11%) would be happy with either option. A small proportion (7%) stated they didn't know or didn't prefer either option.
- Responses regarding who should provide funding for incentives were relatively consistent across the two LGAs. One third of respondents nominated NSW Government (33%) while almost as many suggested local government (29%) and a similar number indicated they didn't know (29%).
- Respondents who were interested in a discount to replace their wood heater with a different form of heating (22 respondents) were asked how much money they would need to be offered to consider replacing the wood heater. Two-thirds of this group (15 respondents) indicated they didn't know. Of the remaining seven respondents, dollar values were suggested between $200 and $5000 with an average value of $2071.
- Responses to a series of statements regarding attitudes to the impact of wood smoke from heating included high levels of neutral responses (neither agree nor disagree) or don't know / refused responses. This may indicate a reluctance or inability to respond due to a lack of awareness regarding the issues raised in the statements. The statement having the highest level of neutral or don't know / refused responses was that it is the small particulate matter in wood smoke that causes health problems.

Table of Contents

1 Introduction

This report presents the results of a household survey conducted by Hunter Research Foundation (Hunter Research, HRF) on behalf of Databuild Research & Solutions. The survey was the second phase of the Upper Hunter Wood Smoke Community Research Project being conducted by Databuild for the NSW Environment Protection Authority (EPA).

The objectives of the Upper Hunter Wood Smoke Community Research Project were to:

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- Ascertain need for energy efficiency audits and advice on alternatives to wood heaters
- Estimate potential number of households willing to upgrade heating and level of economic incentives required.

The survey program was developed after the initial Phase 1 literature review and qualitative consultation program undertaken by Databuild. An additional objective for the survey was included from the outcomes of Phase 1:

- Assessment of how people use and maintain their wood heaters, with a view to initiatives aimed at improving the way people use and maintain wood heaters in households where replacement is unlikely.

Section 2 of this report details the research methodology used in undertaking the representative telephone survey with householders who use wood heating in the Muswellbrook and Singleton local government areas (LGAs). Section 3 provides the results of the survey program with concluding observations in Section 4.

The outcomes from the survey program will inform Databuild's further qualitative consultation program and development of recommendations in conjunction with the EPA.

2 Methods

The research methods were designed to provide quantitative data to address the objectives of the Upper Hunter Wood Smoke Community Research Project. A survey using Computer Aided Telephone Interviewing (CATI) technology was used to interview a random sample of householders who use wood heating in the Muswellbrook and Singleton LGAs. Telephone surveys achieve substantially higher response rates than other delivery methods, minimise self-selection respondent bias, and enable use of techniques to include the views of hard-to-contact respondent groups.

15.1 Questionnaire design

The questionnaire was designed by Hunter Research and Databuild in consultation with the EPA.

The questionnaire included initial screening questions to identify households with wood heating within the towns of Muswellbrook and Singleton, identify a decision maker within the household, and provide confirmation that participation in the survey was voluntary and that answers would be confidential.

The main section of the questionnaire included closed questions with defined responses (e.g. Yes/No), open-ended questions where respondents provided an unprompted response and rating scales.

Topics incuded:

- Wood heating usage and maintenance
- Willingness to accept information about using wood heaters
- Preference for alternate heating choices and willingness / barriers to change
- Incentives to change
- Attitudes to the impact of wood smoke.

The questionnaire also collected demographic data on the respondent's gender, age, education, home ownership, household composition and household income range, and was used to create an elibility list for participating in future discussion groups regarding home heating.

The questionnaire was programmed onto the Hunter Research CATI system, and piloted to ensure that the wording was appropriate and the question flow logical.

A copy of the questionnaire is included in Appendix 1.

15.2 Sample design and data collection

The sample frame comprised all households in the Muswellbrook and Singleton LGAs. The sample was randomly selected from the White Pages listing and included both landline and mobile telephone numbers.

The screening questions narrowed the sample to include households within more densely populated areas of the LGAs. These areas were initially identifed as being within the two main town centres and were defined by the following suburbs and localities: Combo, Darlington, Dunolly, Glenridding, Gowrie, Hunterview, McDougalls Hill, Muswellbrook, Obanvale, Redbournberry, Singleton, Singleton Heights, Wattle Pond**.**

During the interview period, the sample definition was expanded to include households in larger villages outside of the town centres to ensure sufficient interviews were completed. In total 203 completed interviews were achieved with 87 households in Muswellbrook and 116 in Singleton.

A sample size of 200 yields a sample variation of +/- 7.1 per cent at a confidence level of 95 per cent, given a response probability of 50 per cent. In practical terms, this means that if 50 per cent of the randomly selected

respondents in the sample answered "yes" in a yes/no question (the result with the highest possible variation in statistical accuracy), the true proportion of the population who would answer "yes" (if all were surveyed) would lie between 42.9 per cent and 57.1 per cent, 95 times out of 100.

15.2.1 Sampling strategies

Strategies to maximise the representativeness of the final sample included:

- Priority to mobile phone numbers listed in the White Pages in sample selection to increase contact with mobile phone only households and younger households (18-40 years).
- Up to 6 attempts were made, at different times and on different days, to contact the randomly selected number.
- Once contacted and identified as a household with wood heating, up to a further 5 attempts were made, at different times and on different days, to contact a decision maker and complete the interview. This meant that, in some cases, up to 11 attempts could be made to complete an interview for a selected number.

15.2.2 Data collection and quality control

The survey was conducted by Hunter Research's trained and experienced interviewers from its dedicated on-site CATI facility in Maryville (Newcastle) between Thursday 27 August and Wednesday 16 September 2015.

The CATI programming and quality control processes used by Hunter Research ensure interviewers do not skip introductory statements that provide information to participants and seek consent. Interviewers must enter participant responses into the CATI system and these responses are then used to navigate the multiple pathways of introductory scripts. Ongoing monitoring of interviewer performance by Team Leaders and Supervisors ensures interviewers read CATI scripts exactly as written. Hunter Research interviewers are highly skilled in survey techniques and employed on the basis that departure from CATI scripts or skipping required statements is considered to be a serious breach of employment.

The data was collated in a secure database. Hunter Research complies with the Australian Privacy Principles provided under the *Privacy Amendment (Enhancing Privacy Protection) Act 2012*. All collected interview data is kept separate from information that could be used to identify individuals. That is, data containing telephone numbers and names, if applicable, is kept in one password protected database while all survey data kept in a separate password protected database. Although an ID number links the datasets, the project's researchers are the only people to have access to both passwords.

15.2.3 Response rate

The survey achieved an overall response rate of 76 per cent with respondents identified as living in households with wood heating within the nominated suburbs or localities.

Details of the outcomes of all telephone contacts for the survey are provided in Appendix 2.

15.3 Data analysis

After the data was checked, cleaned, and verbatim open-ended responses were coded, it was imported into the Statistical Package for Social Sciences (SPSS) for analysis by Hunter Research's statistical team.

The first level of analysis produced frequency distributions for all questions and concepts being tested. The second level of analysis identified statistically significant differences between location and age groups. Statistical testing was applied to both mean scores and frequency distributions to reliably identify significant differences.

15.3.1 Mean ratings

In the survey respondents were asked to indicate: how often they undertake activities related to the use and maintenance of wood heaters, how interested they would be in information about using their wood heater, how interested they would be in a series of incentives and how strongly they agreed or disagreed with statements about the impacts of wood smoke. The following rating scales were used, respectively, for these questions:

Scale name	Component	Code value
Frequency	Always	1
	Often	2
	Sometimes	3
	Never	4
Interest	Not at all	1
	Somewhat interested	2
	Quite interested	3
	Very interested	4
Agreement	Strong disagree	1
	Disagree	2
	Neither	3
	Agree	4
	Stongly agree	5

Note that a *neither* score of 3 out of 5 in the agreement scale suggests a 'neutral' opinion, that is, neither agree nor disagree with no strong feelings either way.

Average (mean) ratings were calculated by assigning the value to each of the components within the scale and excluding all *don't know* and other non-scale responses. The following table provides an example for calculating a mean rating.

Rating	No. points	No. responses	Calculation: no. points x no. responses	Mean rating
Strongly disagree	1	12	1 x 12 = 12	The mean is calculated by dividing 520 by the number of responses using the 1 to 5 scale (in this case 203-9=194): 644/194
Disagree	2	58	2 x 58 = 116	
Neither	3	19	3 x 19 = 57	
Agree	4	66	4 x 66 = 264	
Strongly agree	5	39	5 x 39 = 195	
Don't know Refused	Not included in calculation	9	Not included in calculation	
Total		203	644	**Mean = 3.3**

In this manner a mean rating of 1 would indicate that all respondents who provided a rating *strongly disagreed* with the specified statement; conversely, a mean of 5 would indicate that they all *strongly agreed* with it.

When reviewing the detailed results it is important to consider:

- the distribution of ratings, since this may be masked in the mean score. For example, ratings which are evenly spread over a scale may yield the same mean as those which are relatively polarised at either end of the scale
- the level of non-response, that is, the number of don't know and refused responses.

15.3.2 Statistical analysis

Statistical significance was generally measured at the 95 per cent confidence level. Note that a significant difference referred to in Section 3 means a statistically significant difference.

The following tests were applied to determine statistically significant differences in responses between LGAs, households in and out of town centres and respondents aged less than 60 or 60 plus:

- Analysis of variance and Mann-Whitney U – statistically significant results indicate a difference in the mean ratings which is considered to be a 'true' difference and not a difference attributable to chance.
- Chi-square analysis – a statistically significant result indicates a difference in the frequency of responses which is considered to be a 'true' difference and not a difference attributable to chance.

15.4 Home heating

The initial screening questions in the survey provided a profile of the use of home heating and the location of households with wood heating in the Muswellbrook and Singleton LGAs.

The results presented in Table 1 indicate that:

- The most common form of home heating in the Muswellbrook and Singleton LGAs is electric reverse cycle air-conditioning used by 31 per cent of households. This usage is slightly higher in Singleton than in Muswellbrook.
- Wood combustion heating or open fires are used by more than a quarter (27%) of households as their main source of heating across the two areas.
- Of the households using wood heating, approximately half were located in suburbs identified as part of the main town centres of Muswellbrook or Singleton. This suggests that across the two LGAs one in seven households (14%) are located in the town centres and use wood as their main source of heating.

Table 1 Home heating in Muswellbrook and Singleton

Responses *	Local government area		TOTAL
	Muswellbrook	Singleton	
Heating used most often in the household			
Electric reverse cycle ducted	28.3%	32.4%	30.7%
Electric reverse cycle not ducted	28.7%	23.6%	25.7%
Wood combustion / open fire	26.2%	27.2%	26.6%
Gas	5.9%	5.9%	5.9%
Electric – other	5.3%	5.9%	5.6%
Other heating type	0.9%	1.2%	1.2%
No heating	4.7%	3.9%	4.3%
Total	100.0%	100.0%	100.0%
Households with wood heating and identified location			
Live in main town centres	16.3%	13.2%	14.5%
Live out of town	9.5%	13.8%	12.0%
Total	25.8%	27.0%	26.5%

***** Percentages based on interviewing undertaken using random selection of households across the Muswellbrook and Singleton LGAs (n=763).

The survey aimed to conduct full interviews with decision makers in the households identified as having wood heating and located in the town centres. However the geographic criteria was expanded during the interview period to also include households in larger villages outside of the two centres to ensure sufficient interviews were completed.

As shown in Table 2 more than three quarters of the interviews (77%) were completed in the town centres. Slightly more than half of the interviews (57%) were conducted with householders in Singleton with the remaining 43 per cent completed in Muswellbrook.

Table 2 Location of households in survey

Responses **	Local government area		TOTAL
	Muswellbrook	Singleton	
TOTAL (n=203)	**42.9%**	**57.1%**	**100.0%**
Household in the survey sample with wood heating			
Live in main town centres	78.2%	75.9%	76.8%
Live in villages out of town	21.8%	24.1%	23.2%
Total	100.0%	100.0%	100.0%

****** Percentages based on total full interviews completed with respondents who met the selection criteria i.e. decision maker in household with wood heating and live within study area. The study area was expanded in the last week of interviewing to include larger villages outside of the town centres.

15.5 Wood heating usage and maintenance

15.5.1 Usage

Respondents who met the selection criteria were asked how long they have had their current wood heater and to identify the main reasons they use wood heating. The outcomes from these questions are shown in Tables 3 and 4. Findings include:

- Four in ten of the wood heaters were more than 15 years old and this was consistent across the two LGAs.
- The most popular reason nominated by more than seven in ten respondents (71%) for using wood heating was they liked the type of heat it provided and the way it heated the house.
- The next most common response provided by slightly more than a third of the respondents (35%) was free and/or easy access to timber. Other responses included liking the look and smell of a wood fire (24%), the heater already in the home (21%) and being energy efficient (21%).

Table 3 Use of current wood heater

Had current wood heater	Local government area		TOTAL
	Muswellbrook	Singleton	
Less than five years	24.1%	17.2%	20.2%
5 to 15 years	34.5%	41.4%	38.4%
More than 15 years	40.2%	41.4%	40.9%
Don't know / Can't recall	1.1%		0.5%
Total	100.0%	100.0%	100.0%

Note: Blank cell indicates no response in category

Table 4 Reason for using wood heating

Main reason use wood heating ^	Local government area		TOTAL
	Muswellbrook	Singleton	
Like the type of heat provided / heats the house well	74.7%	69.0%	71.4%
Free / easy access to timber	32.2%	36.2%	34.5%
Like the look, smell, ambience	18.4%	28.4%	24.1%
Heater already in the home	20.7%	20.7%	20.7%
Energy efficient	27.6%	15.5%	20.7%
Cost consideration / cheaper	13.8%	9.5%	11.3%
Have grown up with this type of heater	4.6%	10.3%	7.9%
Can also cook or heat water	5.7%	8.6%	7.4%
Easy to use and maintain	10.3%	5.2%	7.4%
Not using mains electricity	1.1%	2.6%	2.0%
Reason not specified	2.3%	1.7%	2.0%
Heater given to them	0.0%	1.7%	1.0%
Environmental considerations / wood a renewable resource	1.1%	0.9%	1.0%

^ Percentages sum to more than 100% as respondents were able to provide multiple responses.

Respondents provided estimates of the number of days per week, including weekdays and weekends, on which their wood heater had been running since the start of this winter.

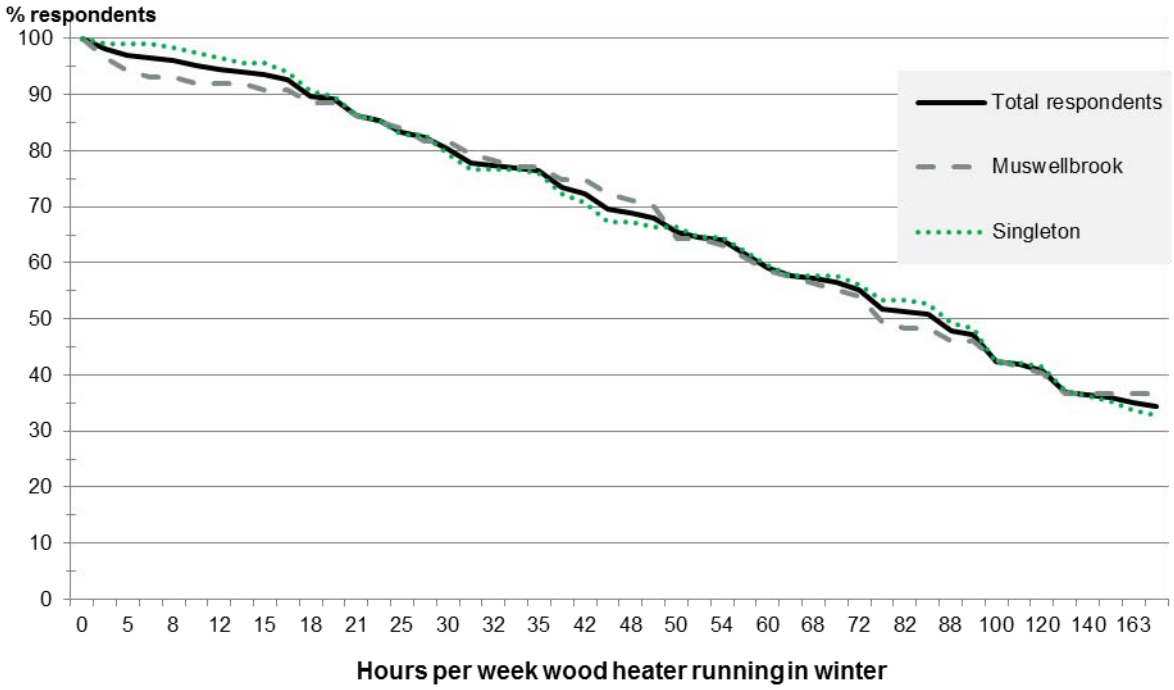
Estimates were also provided by respondents for the number of hours per days they would typically have their wood heaters lit. These responses were then used to calculate an estimate of total hours per week usage for each household and average usage by days and hours. Table 5 contains the average usage and Figure 1 provides a cumulative graph of the total hours per week by percentage of households.

- On average, the households have had their wood heaters lit on 5.7 days each week with four of those days being weekdays.
- Across the week, heaters were lit for an average of 93.6 hours.
- 90 per cent of households had their wood heaters lit for up to ten hours per week, while 50% were lit for more than 80 hours each week. Slightly more than a third of households interviewed (34%) indicated that they have their wood heater lit 24 hours per day, 7 days week (168 hours per week).
- The total weekly and average usages were consistent across the two LGAs.

Table 5 Average wood heater usage

Usage per week	Local government area		TOTAL
	Muswellbrook	Singleton	
Average number of **DAYS per week** wood heater used			
Weekdays (Monday to Friday)	4.1	4.0	4.0
Weekend days (Saturday to Sunday)	1.7	1.8	1.7
Total days per week	5.8	5.7	5.7
Average number of **HOURS per week** wood heater used			
Weekdays (Monday to Friday)	64.0	64.3	64.1
Weekend days (Saturday to Sunday)	29.4	29.6	29.5
Total hours per week	93.3	93.9	93.6

Figure 1 Weekly wood heater usage



15.5.2 Behaviour

Respondents were asked to indicate how often they do a series of tasks related to the use and maintenance of their wood heater. Frequency ratings were converted to a four-point scale where 1 is always and 4 is never. The results presented in Table 6 and 7 indicate that:

- The majority of respondents (96%) always *use seasoned, dry wood* in their wood heaters.
- On average, respondents indicated that they often *leave the wood heater burning overnight* and *close the air flow straight after reloading*. However the frequencies indicate that there is a wide range of behaviour related to these two aspects which range from always to never.
- More than half of the respondents indicated that they never *have the flue check and cleaned yearly by a professional* (57%). A similar number stated they never *use soot removal products instead of cleaning by a professional* (54%).
- More positively, 85 per cent of respondents indicated that they never *burn small amounts of rubbish in the heater*.
- Responses across the two LGAs were similar however responses from respondents living within or outside the main town centres differed with respect to *close the air flow straight after reloading*. Respondents outside the town centres were significantly less likely to close the airflow after reloading, indicating on average they do so only sometimes.
- Respondents aged 60 years and over were significantly less likely to *leave the wood heater burning overnight* than younger respondents. They were also more likely to *have the flue check and cleaned yearly by a professional*.

Table 6 Wood heater use and maintenance behaviour

Usage and maintenance	Mean rating	Frequency				
		Always	Often	Sometimes	Never	Don't know
Use seasoned, dry wood	1.1	95.6%	2.0%	2.0%		0.5%
Leave the wood heater burning overnight	2.1	51.7%	8.4%	20.7%	19.2%	
Close the air flow straight after reloading the heater	2.6	29.6%	14.8%	14.8%	37.4%	3.4%
Have the flue checked and cleaned yearly by a professional	3.0	24.6%	6.4%	9.4%	57.1%	2.5%
Use soot removal products such as 'Soot Loose' to clean the flue instead of cleaning by a professional	3.1	18.7%	10.3%	13.8%	54.2%	3.0%
Burn small amounts of rubbish in the heater	3.8	0.5%	1.5%	12.8%	85.2%	

Note: Blank cell indicates no response in category

Table 7 Wood heater use and maintenance behaviour by location and age

Usage and maintenance	Mean rating	Local government area		Located …		Age	
		Muswell brook	Singleton	In town	Out of town	18-59 years	60 + years
Use seasoned, dry wood	1.1	1.1	1.1	1.1	1.1	1.1	1.0
Leave the wood heater burning overnight	2.1	2.1	2.1	2.1	1.9	1.9	2.4
Close the air flow straight after reloading the heater	2.6	2.5	2.7	2.5	3.0	2.5	2.8
Have the flue checked and cleaned yearly by a professional	3.0	2.9	3.1	2.9	3.3	3.2	2.7
Use soot removal products such as 'Soot Loose' to clean the flue instead of cleaning by a professional	3.1	3.1	3.0	3.1	2.9	3.1	3.1
Burn small amounts of rubbish in the heater	3.8	3.9	3.8	3.9	3.8	3.8	3.9

Note: Shaded cell indicates significant difference at 95% confidence level

15.6 Information needs

Respondents were asked how interested they would be in receiving a range of information about operating and maintaining a wood heater. Responses as shown in Table 8 were converted to a four-point scale where 1 is not at all and 4 is very interested.

- A relatively low level of interest was expressed by respondents with more than seven in ten indicating they were not interested in any of the information suggested. The average responses were all between somewhat interested and not at all.
- The highest level of interest was recorded for the following two topics with 28 per cent of respondents at least somewhat interested in finding out more about:
  - *What a fire can look like and what it means for heat generation and air pollution*
  - *How to properly maintain your wood heater to keep it in best condition and ensure it is safe and efficient to use.*
- The mean ratings in Table 9 indicate respondents in Singleton were significantly less likely to be somewhat interested in information regarding *the do's and don't of air flow control* and *how to properly maintain your wood heater to keep it in best condition and ensure it is safe and efficient to use* than respondents in the Muswellbrook area.

Table 8 Information on using and maintaining a wood heater

Information topic	Mean rating	Level of interest				
		Not at all	Somewhat	Quite	Very	Don't know
How to properly maintain your wood heater to keep it in best condition and ensure it is safe and efficient to use	1.6	71.9%	8.9%	10.8%	8.4%	
What a fire can look like and what it means for heat generation and air pollution	1.5	70.9%	12.3%	7.9%	7.4%	1.5%
The do's and don'ts of air flow control	1.5	74.4%	6.4%	10.8%	7.9%	0.5%
How to get the best value out of your wood by using it in the most efficient and effective way	1.5	74.9%	6.4%	7.9%	10.3%	0.5%
How to find a professional to check and/or clean your flue	1.3	80.8%	9.9%	3.9%	5.4%	
The best way to start a fire including tips on kindling and safe fire starter products	1.3	84.2%	5.9%	4.4%	5.4%	
How to tell if wood is dry and seasoned	1.3	85.7%	3.9%	5.4%	4.9%	

Note: Blank cell indicates no response in category

Table 9 Information on using and maintaining a wood heater by location and age

Information topic	Mean rating	Local government area		Located …		Age	
		Muswell brook	Singleton	In town	Out of town	18-59 years	60 + years
How to properly maintain your wood heater to keep it in best condition and ensure it is safe and efficient to use	1.6	1.7	1.4	1.6	1.5	1.5	1.6
What a fire can look like and what it means for heat generation and air pollution	1.5	1.7	1.4	1.5	1.4	1.5	1.5
The do's and don'ts of air flow control	1.5	1.7	1.4	1.6	1.4	1.5	1.5
How to get the best value out of your wood by using it in the most efficient and effective way	1.5	1.6	1.5	1.6	1.4	1.6	1.5
How to find a professional to check and/or clean your flue	1.3	1.4	1.3	1.4	1.2	1.4	1.3
The best way to start a fire including tips on kindling and safe fire starter products	1.3	1.4	1.2	1.3	1.3	1.3	1.4
How to tell if wood is dry and seasoned	1.3	1.4	1.2	1.3	1.3	1.3	1.3

Note: Shaded cell indicates significant difference at 95% confidence level

All respondents were then asked which of a series of sources they might use if they did want to know more about using their heater. The responses in Table 10 indicate that:

- *Brochures delivered to the letter box* or *articles in the local newspaper or on radio* were most preferred by slightly more than half of the respondents (59% and 53% respectively).
- The next most preferred were business-type sources such as via *Council website or brochures* (46%), or through *retailers who stock and sell heaters* (42%).
- Community based sources such as via *local community organisations* or *information stalls at local markets* was nominated by a quarter of respondents (25%).
- The least preferred options were *workshops run by heater suppliers or sellers* (18%), or *workshops held at the library* (13%).

Table 10 Preferred information source

Preferred source of information	Yes	No	Don't know
Brochures delivered to your letterbox	58.6%	41.4%	
Articles in the local newspaper or on radio	52.2%	47.3%	0.5%
Council website or brochures	45.8%	52.7%	1.5%
Retailers who stock and sell heaters	41.9%	57.6%	0.5%
Local community organisations	24.6%	75.4%	
Information stalls at local markets	24.6%	74.9%	0.5%
Workshops run by heater suppliers or sellers	17.7%	82.3%	
Workshops at the library	13.3%	85.2%	1.5%

Note: Blank cell indicates no response in category

15.7 Replacement of wood heating

To investigate possible interest in replacing wood heating, respondents were asked if their current wood heater was their preferred way to heat their home. The findings shown in Table 11 indicated that wood heating was the preferred choice for 96 per cent of households who are already using wood heating. Only three per cent (6 respondents) stated that it was not their preferred choice. These respondents were spread evenly across the two LGAs and all lived in the main town centres.

Table 11 Preference for wood heating

Current wood heater preferred heating	Local government area		TOTAL
	Muswellbrook	Singleton	
Yes	96.6%	95.7%	96.1%
No	3.4%	2.6%	3.0%
Don't know		1.7%	1.0%
Total	100.0%	100.0%	100.0%

Note: Blank cell indicates no response in category

The respondents for which wood heating was not the preferred choice were then asked a series of questions regarding possible replacement.

- Half (3 respondents) indicated that their preferred type of heating was electric reverse cycle ducted air-conditioning while two others preferred gas heating and one person nominated changing to a new efficient wood heater.

- When asked what are the main reasons they would like to change, respondents indicated that:
  - Wood heaters are too much work / new heater is easier to use and maintain (3)
  - They like the type of heat provided / heats the house well (1)
  - Moving house / doing home renovations (1), and
  - Being energy efficient (1).
- The majority of respondents (5) were not planning on making the change in future while one indicated they didn't know.
- Reasons preventing respondents from making the change included:
  - Already has another heating source (2)
  - I like my current heater (2)
  - Don't own the house (1)
  - Partner doesn't want to change (1)
  - *Cost of running the new heater (1)*.

15.8 Incentives to change

All respondents were asked to indicate how interested they would be in a series of incentives to change to a different form of heating or use their heating more efficiently. Ratings were converted to a four-point scale where 1 is not at all and 4 is very interested. The results presented in Table 12 indicate that:

- The level of interest across the four incentives was on average between not at all and somewhat interested.
- The highest level of interest was for a *discount on the cost of a flue-cleaning service* with almost one third of respondents (32%) at least somewhat interested.
- The lowest level of interest was for a *discount on the costs to remove your wood heater and install a non-wood burning heater in your home*. Less than nine per cent of respondents showed any interest in this incentive.

Table 12 Interest in incentives

Incentive	Mean rating	Level of interest				
		Not at all	Somewhat	Quite	Very	Don't know
Discount on the cost of a flue-cleaning service	1.6	67.0%	12.3%	7.9%	11.3%	1.5%
Free 'heating efficiency check' for your home to help you get good value for money from your heaters	1.4	76.8%	9.9%	4.4%	8.4%	0.5%
Discount to replace your wood heater with a different form of heating	1.2	89.2%	6.9%	2.0%	2.0%	
Discount on the costs to remove your wood heater and install a non-wood burning heater in your home	1.1	91.1%	4.4%	2.0%	2.0%	0.5%

Note: Blank cell indicates no response in category

In total 36 per cent of the respondents (72 respondents) were interested in one or more of the incentives. These respondents were asked how they would prefer to receive the discounts presented as possible incentives and who they thought should fund the incentives. Responses shown in Tables 13 and 14 indicate:

- Approximately four in ten of the respondents (42%) said they would prefer a rebate that could be claimed with a receipt. A similar number (40%) preferred a voucher that could be used at selected businesses, while a further one in ten of the respondents (11%) would be happy with either option. A small proportion (7%) stated they didn't know or didn't prefer either option.
- Responses regarding who should provide funding for incentives were relatively consistent across the two LGAs. One third of respondents nominated NSW Government (33%) while almost as many suggested local government (29%) and a similar number indicated they didn't know (29%).
- Respondents who were interested in *a discount to replace your wood heater with a different form of heating* (22 respondents) were asked how much money they would need to be offered to consider replacing the wood heater. Two-thirds of this group (15 respondents) indicated they didn't know. Of the remaining seven respondents, dollar values were suggested between $200 and $5000 with an average value of $2071.

Table 13 Access to incentive discounts

Access to discount	TOTAL (n=72)
A rebate that you can claim online or by mail with a copy of your receipt	41.7%
A voucher that you can use at selected businesses	40.3%
Both options - the rebate or voucher	11.1%
Neither option	2.8%
Don't know	4.2%
Total	100.0%

Table 14 Funding incentive discounts

Funding source ^	Local government area		TOTAL (n=72)
	Muswellbrook	Singleton	
NSW Government	31.3%	35.0%	33.3%
Local government / Council	28.1%	30.0%	29.2%
Organisations wanting change / Conducting surveys like this	3.1%	2.5%	2.8%
Power stations		2.5%	1.4%
Mines	3.1%		1.4%
Federal Government		2.5%	1.4%
Private enterprises generating greenhouse gas emissions		2.5%	1.4%
Householder	3.1%		1.4%
Product retailer	3.1%		1.4%
Don't know	31.3%	27.5%	29.2%

Note: Blank cell indicates no response in category.

^ Percentages sum to more than 100% as respondents were able to provide multiple responses.

15.9 Attitude to smoke from wood heating

To assess attitudes to the impact of wood smoke from heating, respondents were asked to indicate their level of agreement or disagreement with a series of statements shown in Tables 15 and 16. Responses were made on a five-point scale where 1 was strongly disagree and 5 was strongly agree.

- On average, the highest level of agreement was registered for the following statements with more than six in ten respondents agreeing or strongly agreeing with the statements:
  - *Particles from wood smoke are less harmful than from diesel trains, trucks, power plants or mines*
  - *There is not much I can do about other air pollutants but I can do something about the impact of wood smoke.*
- The mean ratings for the remainder of the statements were grouped around the neutral point on the scale of neither agree nor disagree. The statement *Wood smoke is a problem even in areas with a lot of other air pollutants* had exactly the same proportion of respondents (40%) who agreed / strongly agreed with the statements as disagreed / strongly disagreed.
- All statements had high levels of neutral responses or don't know / refused responses. This may indicate a reluctance or inability to respond due to a lack of awareness regarding the issues raised in the statements. The statement having the highest level

of neutral or don't know / refused responses was *It is the small particulate matter in wood smoke that causes health problems*. More than a third of respondents (36%) responded in this way.

- Older respondents aged 60 years and over were more likely to disagree with the statement that *Particles in the smoke coming out of the chimney can be harmful to my family and my neighbours' health*. However this cohort were also on average less likely to agree with the statement *There is not much I can do about other air pollutants but I can do something about the impact of wood smoke*.

Table 15 Attitudes to wood smoke

Statement	Mean rating	Evaluation					
		Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Don't know/ Refused
Particles from wood smoke are less harmful than from diesel trains, trucks, power plants or mines	3.8	3.0%	8.4%	9.4%	43.3%	18.7%	17.2%
There is not much I can do about other air pollutants but I can do something about the impact of wood smoke	3.6	3.0%	13.8%	14.3%	58.1%	9.4%	1.5%
There is no point worrying about wood heaters with all the power stations and mines in the area	3.3	5.9%	28.6%	9.4%	32.5%	19.2%	4.4%
Wood smoke is a problem even in areas with a lot of other air pollutants	3.0	5.4%	34.5%	12.3%	35.0%	4.9%	7.9%
It is the small particulate matter in wood smoke that causes health problems	2.8	6.9%	29.6%	11.8%	25.1%	2.5%	24.1%
Particles in the smoke coming out of the chimney can be harmful to my family and my neighbours' health	2.7	10.3%	36.5%	11.8%	26.6%	2.0%	12.8%

Table 16 Attitudes to wood smoke by location and age

Statement	Mean rating	Local government area		Located …		Age	
		Muswell brook	Singleton	In town	Out of town	18-59 years	60 + years
Particles from wood smoke are less harmful than from diesel trains, trucks, power plants or mines	3.8	3.8	3.8	3.9	3.7	3.7	3.9
There is not much I can do about other air pollutants but I can do something about the impact of wood smoke	3.6	3.6	3.6	3.5	3.7	3.7	3.4
There is no point worrying about wood heaters with all the power stations and mines in the area	3.3	3.2	3.4	3.3	3.4	3.2	3.5
Wood smoke is a problem even in areas with a lot of other air pollutants	3.0	3.0	3.0	3.0	3.0	3.0	3.0
It is the small particulate matter in wood smoke that causes health problems	2.8	2.6	3.0	2.8	2.9	2.8	2.9
Particles in the smoke coming out of the chimney can be harmful to my family and my neighbours' health	2.7	2.7	2.7	2.7	2.8	2.8	2.5

Note: Shaded cell indicates significant difference at 95% confidence level

Appendix 6.1 Questionnaire

Upper Hunter Wood Smoke Community Research Project Telephone Survey Questionnaire

Good morning/afternoon/evening. My name is _____ from Hunter Research Foundation. We are currently surveying households about living in the Upper Hunter and home heating. Your telephone number was selected at random from the White Pages.

IF RESPONDENT ASKS FOR MORE DETAIL

The outcomes of the survey will be used to provide information to residents in the Upper Hunter about efficient home heating

Could I speak to an ADULT IN YOUR HOUSEHOLD WHO DECIDES WHAT TYPE OF HEATING IS USED?

1. Yes 2. No 3. No heating used in this house

IF NO or NO HEATING SKIP TO THANKS

REPEAT INTRODUCTION IF REQUIRED

You are invited to take part in the survey and your answers will be confidential. This interview may be monitored for quality and training purposes.

Are you happy for me to continue?

[INTERVIEWER: IF RESPONDENT REFUSES, OFFER FREECALL]

1. PROCEED
2. NO - REFUSAL
4. Not Now SPOKE TO RESPONDENT - CALLBACK ARRANGED
6. RESPONDENT UNSUITABLE (EXPLAIN IN COMMENTS)
66. RESPONDENT UNAVAILABLE FOR SURVEY PERIOD (COMMENTS)
14. LANGUAGE PROBLEM 8. NOT IN AREA\QUOTA DONE

[Give Freecall if requested - 1800 355 534 9am to 8pm NSW time Mon to Fri]

Q1. How many heaters do you have in your household?

8. None
4. One
5. Two
6. Three or more [9. REFUSED]

IF Q1=7 SKIP TO THANKS

Q2. Thinking about the heating you use most often, what type is it?

[RESPONSE TO BE UNPROMPTED – INTERVIEWER TO USE CODES BELOW WHERE APPLICABLE OTHERWISE TYPE IN RESPONSE]

10. Electric reverse cycle ducted
11. Electric reverse cycle not ducted
12. Electric (other)
13. Gas ducted
14. Gas (other)
15. Wood combustion / wood stove / pot belly
16. Wood open fire
17. Pellet heater
18. OTHER (please specify)

IF Q2 NOT EQUAL TO 6 OR 7 OR 8
That completes our call today.
SKIP TO THANKS

Q3. Could you please tell me which town or suburb you live in?
[FULL LIST OF TOWNS, SUBURBS, VILLAGES, LOCALITIES IN THE MUSWELLBROOK AND SINGLETON AREA SHOWN FOR INTERVIEWER TO USE CODES HOWEVER ONLY THE FOLLOWING RESPONSES WERE PROGRAMMED TO CONTINUE THE SURVEY – MUSWELLBROOK, SINGLETON OR SUBURBS IN SINGLETON TOWNSHIP]

14.Combo
15.Darlington
16.Dunolly
17.Glenridding
18.Gowrie
19.Hunterview
20.McDougalls Hill
21.Muswellbrook
22.Obanvale
23.Redbournberry
24.Singleton
25.Singleton Heights
26.Wattle Pond
88 OTHER (please specify) 99 REFUSED

IF NOT MUSWELLBROOK, SINGLETON OR SUBURBS IN SINGLETON TOWNSHIP

That completes our call today.
SKIP TO THANKS

Current Usage and Maintenance

Q4a. Since the start of this winter, how many days per week on average have you been running your wood heater?

Q4b. How many of those days would be weekdays Monday – Friday?

Q4c. And how many of those days would be on Saturday or Sunday?

Q4d. On weekdays, Monday - Friday, how many hours per day would you typically have your wood heater lit?

Q4e. On a Saturday or Sunday, how many hours per day would you typically have your wood heater lit?

Q4f. What type of fire wood would you normally use in your wood heater?
[RESPONSE TO BE UNPROMPTED – INTERVIEWER TO USE CODES BELOW WHERE APPLICABLE OTHERWISE TYPE IN RESPONSE]

6. Dry, well seasoned wood
7. Wood just purchased
8. Wood collected previous year
9. Any wood available
10. OTHER (please specify)

Q4g. And where do you normally get your fire wood from?
[RESPONSE TO BE UNPROMPTED – INTERVIEWER TO USE CODES BELOW WHERE APPLICABLE OTHERWISE TYPE IN RESPONSE]

5. Fire wood supplier
6. Service station or market
7. Collect own wood
8. OTHER (please specify)

Q5. Next I would like to ask you to indicate how often you do the following using a scale that includes Always, Often, Sometimes or Never. When using your wood heater, how often do you ……?

1. Always
2. Often
3. Sometimes
4. Never [8. DON'T KNOW 9. REFUSED]

[ITEMS BELOW RANDOMISED FOR EACH RESPONDENT]

g. Use seasoned, dry wood
h. Have the flue checked and cleaned yearly by a professional
i. Leave the wood heater burning overnight
j. Use soot removal products such as 'Soot Loose' to clean the flue instead of cleaning by a professional
k. Burn small amounts of rubbish in the heater
l. Close the air flow straight after reloading the heater

Q6. On a scale of 1 to 4 where 1 is not at all and 4 is very interested, how interested would you be in receiving information about……..?

1. Not at all

2. Somewhat interested
3. Quite interested
4. Very interested [8. DON'T KNOW 9. REFUSED]

[ITEMS BELOW RANDOMISED FOR EACH RESPONDENT]

h. The best way to start a fire including tips on kindling and safe fire starter products
i. The dos and don'ts of air flow control
j. How to tell if wood is dry and seasoned
k. How to get the best value out of your wood by using it in the most efficient and effective way
l. What a fire can look like and what it means for heat generation and air pollution
m. How to find a professional to check and/or clean your flue
n. How to properly maintain your wood heater to keep it in best condition and ensure it is safe and efficient to use

Q7. If you wanted to know more about using your heater which of the following sources of information would you use ……?

1. Yes 2. No 8. Don't know

[ITEMS BELOW RANDOMISED FOR EACH RESPONDENT]

i. Local community organisations
j. Information stalls at local markets
k. Articles in the local newspaper or on radio
l. Council website or brochures
m. Brochures delivered to your letterbox
n. Workshops at the library
o. Retailers who stock and sell heaters
p. Workshops run by heater suppliers or sellers

Q8. What is the main reason you use wood heating?

[RESPONDENTS CAN PROVIDE UP TO THREE RESPONSES - RESPONSES TO BE UNPROMPTED – INTERVIEWER TO USE CODES BELOW WHERE APPLICABLE OTHERWISE TYPE IN RESPONSE]

12. Heater already in the home
13. Heater given to them or purchased cheaply or free
14. Free / easy access to timber
15. Like the type of heat provided / heats the house well
16. Like the look, smell, ambience
17. Can also cook or heat water
18. Have grown up with this type of heater
19. Environmental considerations / wood a renewable sustainable resource
20. Recommendations from friends or heating experts
21. Easy to use and maintain
22. Energy efficient
89. OTHER (please specify)

Q9. How long have you had your current wood heater?

4. Less than five years
5. 5 to 15 years

6. More than 15 years
10. DON'T KNOW / CAN'T RECALL

1.

Q10. Is your current wood heater your preferred way to heat your home?

1. Yes 2. No 8. Don't know 9. Refused

IF Q10=2

Q11. (If it is not your preferred way) what type of heating would you prefer to be using?

[RESPONSE TO BE UNPROMPTED – INTERVIEWER TO USE CODES BELOW WHERE APPLICABLE OTHERWISE TYPE IN RESPONSE]

9. Electric reverse cycle ducted
10. Electric reverse cycle not ducted
11. Electric (other)
12. Gas ducted
13. Gas (other)
14. Pellet heater
15. New, efficient wood heater
16. Wood (other)
89. OTHER (please specify)
100. DON'T KNOW

IF Q10=2

Q12. Assuming you were able to change your heating to <Q11 RESPONSE>, what is the main reason you would change?

[RESPONSE TO BE UNPROMPTED – INTERVIEWER TO USE CODES BELOW WHERE APPLICABLE OTHERWISE TYPE IN RESPONSE]

12. Wood becoming more expensive or hard to get
13. Sick family member
14. Wood heater not good for my and/or my neighbours health
15. New heater given to us or purchased cheaply or free
16. Like the type of heat provided / heats the house well
17. Have grown up with this type of heater
18. Environmental considerations / wood a renewable sustainable resource
19. Recommendations from friends or heating experts
20. Wood heater too much work / New heater easier to use and maintain
21. Moving house / doing home renovations
22. Energy efficient
89. OTHER (please specify)

IF Q10=2

Q13. Are you planning on making the change to <Q11 RESPONSE> in future?

1. Yes 2. No 8. Don't know 9. Refused

IF Q13=1

Q13a. When are you planning to do this?

4. Within the next year
5. In 1 to 5 years
6. In more than 5 years
11. DON'T KNOW

IF Q13=2 OR 8

Q13b. What is preventing you from making the change?

[RESPONDENTS CAN PROVIDE UP TO THREE RESPONSES - RESPONSES TO BE UNPROMPTED – INTERVIEWER TO USE CODES BELOW WHERE APPLICABLE OTHERWISE TYPE IN RESPONSE]

7. Cost of purchasing the heater
8. Cost of running the heater
9. No mains gas in the area
10. Don't own the house
11. Need to find out more about it
12. I like my current heater
89. OTHER (please specify)

Q14. On a scale of 1 to 4 where 1 is not at all and 4 is very interested, how interested would you be in the following……..?

1. Not at all
2. Somewhat interested
3. Quite interested
4. Very interested [8. DON'T KNOW 9. REFUSED]

[INCENTIVES BELOW RANDOMISED FOR EACH RESPONDENT]

e. A free 'heating efficiency check' for your home to help you get good value for money from your heaters
f. A discount on the cost of a flue-cleaning service
g. A discount on the costs to remove your wood heater and install a non-wood burning heater in your home
h. A discount to replace your wood heater with a different form of heating

IF Q14b, Q14c or Q14d EQUAL TO 2 OR 3 OR 4

Q14e. Would you prefer to receive the discount as ……

3. A rebate that you can claim online or by mail with a copy of your receipt OR

4. A voucher that you can use at selected businesses.

[NOT READ OUT 3. BOTH 4. NEITHER 8. DON'T KNOW 9. REFUSED]

IF Q14a, Q14b, Q14c or Q14d EQUAL TO 2 OR 3 OR 4

Q14f. Who do you think should provide the funding?

[RESPONDENTS CAN PROVIDE UP TO THREE RESPONSES - RESPONSES TO BE UNPROMPTED – INTERVIEWER TO USE CODES BELOW WHERE APPLICABLE OTHERWISE TYPE IN RESPONSE]

5. NSW Government
6. Local government / Council
7. Power stations
8. Mines
89. OTHER (please specify)
100. DON'T KNOW

IF Q14d EQUAL TO 2 OR 3 OR 4

Q14g. How much (money) would need to be offered for you to consider replacing your wood heater?

$ _____ [NOT READ OUT 8888. DON'T KNOW 9999. REFUSED]

Q15. On a scale where 5 is strongly agree and 1 is strongly disagree, please rate your level of agreement with the following statements?

[PROMPT FOR DEGREE OF AGREE OR DISAGREE]

1. Strong disagree
2. Disagree
3. Neither
4. Agree
5. Strongly agree [8. DON'T KNOW 9. REFUSED]

[ITEMS BELOW RANDOMISED FOR EACH RESPONDENT]

g. Wood smoke is a problem even in areas with a lot of other air pollutants
h. It is the small particulate matter in wood smoke that causes health problems
i. Particles from wood smoke are less harmful than from diesel trains, trucks, power plants or mines
j. There is no point worrying about wood heaters with all the power stations and mines in the area

k. There is not much I can do about other air pollutants but I can do something about the impact of wood smoke
l. Particles in the smoke coming out of the chimney can be harmful to my family and my neighbours' health

DEMOGRAPHICS

QQ Could you please confirm which of the following best describes your household?

1. Living at home with parents
2. COUPLE / SINGLE PERSON with no dependent children
3. Family with AT LEAST 1 CHILD UNDER 18 YEARS LIVING AT HOME
4. Family with ONLY ADULT CHILDREN LIVING AT HOME (ALL OVER 18 YEARS)
5. Live with other people (not parents)

[NOTE: FAMILY CAN INCLUDE SINGLE PARENT]

QQ And do you ...?

1. Own your accommodation WITH a mortgage or loan (includes owned by self, partner or family)

2. Own your accommodation WITHOUT a mortgage or loan (includes owned by self, partner or family)

3. Rent your accommodation from a private landlord

4. Rent from Housing NSW or another social housing provider like Compass

5. Live rent-free

6. Board [8. DON'T KNOW 9. REFUSED]

QQ [OBSERVE - Ask only if necessary - Are you male or female?
1. Male 2. Female [9. REFUSED]

QQ Could you tell me how old you are?
[INTERVIEWER - ENTER ACTUAL AGE IF GIVEN]
IF REFUSED ASK - What age group are you? [READ OUT]
1. 18-24
2. 25-29
3. 30-39
4. 40-49
5. 50-59
6. 60-69
7. 70 and over
[9. REFUSED - DON'T READ OUT]

QQ What is the highest education you have completed?

1. Primary school

2. Left high school - no certificates

3. Still at high school

4. School certificate/intermediate certificate

5. Higher school certificate/leaving certificate

6. Trade qualification

7. Other TAFE/vocational qualification

9. Undergraduate diploma

10. Associate diploma

11. Bachelors degree

12. Post graduate university degree

Other (specify) [99 = REFUSED]

QQ What is the approximate YEARLY before tax income of everyone living in your household?

[I.E. GROSS HOUSEHOLD INCOME: INCLUDES ALL INCOME STREAMS E.G. WAGES, PENSIONS, ALLOWANCES, RENTAL INCOME].

[READ SCALE]

1. $10,000 AND UNDER
2. $10,001 TO $20,000
3. $20,001 TO $40,000
4. $40,001 TO $60,000
5. $60,001 TO $80,000
6. $80,001 TO $100,000
7. $100,001 AND OVER
8. UNSURE
9. REFUSED

RECRUIT FOR FOCUS GROUP

QQ Later this year we are holding discussion groups to speak further with people in the Upper Hunter about preferences for heating homes. The discussions are informal get togethers with about 8 people which will last up to 2 hours. Refreshments are provided and participants will be paid a fee of $50. Would you be willing to take part in one of the discussions groups?

1. Yes 2. No

IF NO SKIP TO THANKS

Once the dates for the discussion groups have been finalised we will contact you again to confirm your participation.

What is the best telephone number for us to call you back on?

And do you have an email address?

(If no email prompt for mailing address)

And your name (first and surname)

That completes the survey; thank you for your time. Just to remind you my name is ..... calling from Hunter Research Foundation and we very much appreciate your participation.

[HRF CONTACT: Vanessa James - Survey supervisor - Freecall 1800 355 534]

Appendix 6.2 Response Rate

	No.	No. as % of total	No. as % of eligible
Ineligible			
Call back - exhausted attempts	163	5.9%	
No answer	174	6.3%	
Respondent unsuitable	889	31.9%	
Answering machine	446	16.0%	
Not in survey area	54	1.9%	
Business number	34	1.2%	
Disconnected number	673	24.2%	
Engaged/busy signal	7	0.3%	
Fax/data line	27	1.0%	
Unavailable for survey period	50	1.8%	
Total ineligible	2517	90.4%	
Eligible			
Completed interviews	203	7.3%	**76.3%**
Household refusal	39	1.4%	14.7%
Personal refusal	15	0.5%	5.6%
Terminated	9	0.3%	3.4%
Total eligible	**266**	**9.6%**	**100.0%**
Total (eligible + ineligible)	**2783**	**100.0%**	

Response rate of 76 per cent achieved with respondents identified as living in households with wood heating within the nominated suburbs or localities.

Appendix 6.3 Respondent Demographics

	No.	%
Gender		
Male	76	37.4%
Female	127	62.6%
Age		
18-29	7	3.4%
30-39	22	10.8%
40-49	36	17.7%
50-59	54	26.6%
60-69	54	26.6%
70 and over	30	14.8%
Education		
Primary school	2	1.0%
Left high school - no certificates	11	5.4%
School certificate / Intermediate certificate	53	26.1%
Higher school certificate / Leaving certificate	16	7.9%
Trade qualification	34	16.7%
Other TAFE / Vocational qualification	47	23.2%
Undergraduate diploma	3	1.5%
Associate diploma	4	2.0%
Bachelors degree	19	9.4%
Post graduate university degree	12	5.9%
Refused	2	1.0%
Household Composition		
Living at home with parents	4	2.0%
Couple / Single person with no dependent children	120	59.1%
Family with at least 1 child under 18 years living at home	55	27.1%
Family with only adult children living at home (all over 18 years)	21	10.3%
Live with other people (not parents)	1	0.5%
Don't know	2	1.0%

	No.	%
Household Income		
$10,000 and under	6	3.0%
$10,001 to $20,000	26	12.8%
$20,001 to $40,000	21	10.3%
$40,001 to $60,000	14	6.9%
$60,001 to $80,000	11	5.4%
$80,001 to $100,000	15	7.4%
$100,001 and over	57	28.1%
Unsure	17	8.4%
Refused	36	17.7%
Housing Ownership		
Own your accommodation with a mortgage or loan	84	41.4%
Own your accommodation without a mortgage or loan	96	47.3%
Rent your accommodation from a private landlord	13	6.4%
Rent from housing NSW or another social housing provider like Compass	2	1.0%
Board	2	1.0%
Don't know	1	0.5%
Refused	5	2.5%
TOTAL	**203**	**100.0%**

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