KANTAR PUBLIC

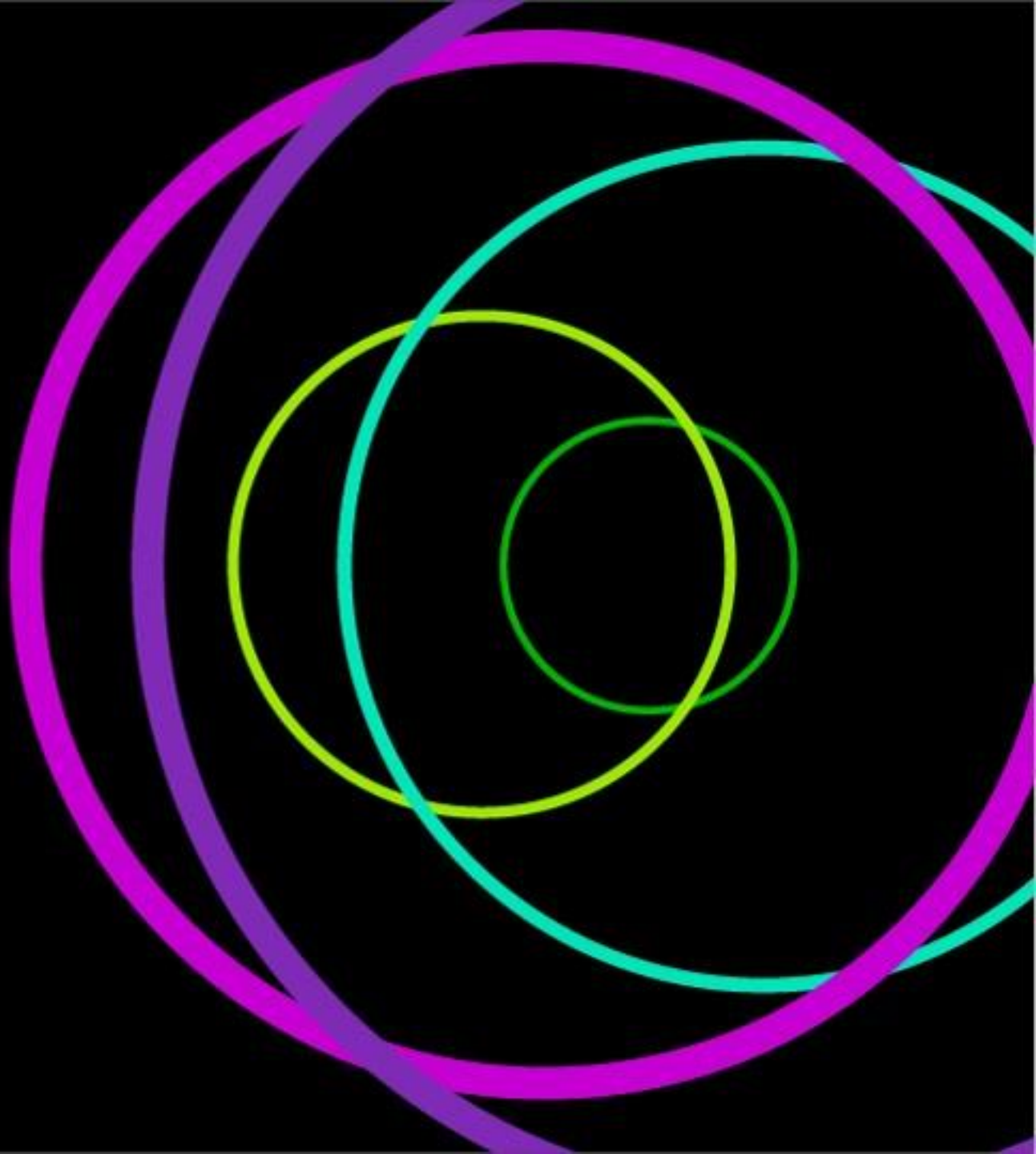
A behavioural approach to understanding and addressing woodburning

Final report

Nick Roberts & Maria Gafforio

November 2022

1
General Introduction



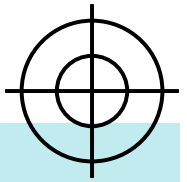
In 2020 Impact on Urban Health commissioned Kantar Public's Behavioural Practice to help them develop a campaign aimed at reducing the harms associated with indoor woodburning

Impact on Urban Health is a charity part of Guy and St. Thomas' foundation. IUH aims to address health inequality in urban areas, by researching topics like air pollution, children's mental health, and childhood obesity. It is especially active in London, particularly Southwark and Lambeth.

Impact on Urban Health

Kantar's Behavioural Practice is an independent social research organisation, specialising in behavioural science. The Behavioural Practice has helped various government departments and other organisations understand behavioural challenges and design interventions to address them.

BEHAVIOURAL PRACTICE



This work aimed to:

- **Better understand people's woodburning behaviour**, especially with woodburning stoves
- **Get a sense of the prevalence of the issue** at a national level, with a focus on urban areas (specifically London)
- **Identify opportunities for intervention**, by exploring existing behaviours, motivations, attitudes and beliefs
- **Inform a potential national campaign** aimed at reducing air pollution associated with woodburning at home.

Throughout the two years of working with IUH, we engaged with a range of stakeholders and partners to help inform our work

The key stakeholders group comprised:

- **Impact on Urban Health (IUH)**, a charity focused on addressing health inequalities in city
- **The Greater London Authority (GLA)**, the devolved regional governance body of Greater London
- **Global Action Plan (GAP)**, an NGO specialised in sustainable behaviour change
- Kantar Public and this key stakeholder group worked closely with **Dog Cat & Mouse** to develop creatives

Other partners who we worked with include:

- **Lambeth, Southwark, Camden and Islington councils**
- **Academics from the University of Nottingham, the University of Sheffield, and Imperial University**
- **The campaigning organisation Mums for Lungs**
- **Defra**
- **Other environmental initiatives, like Client Earth and the Clean Air Fund**

Together with IUH, we designed an iterative program of work based around the Kantar Public Behavioural Practice DEEP model

Mid-2020

DEFINE

To understand current state of knowledge and define desired outcomes for future work

- Evidence review – 6 documents including previous Kantar research into woodburning
- Stakeholder interviews – 5 stakeholders drawn from academia, government and industry
- Development of a problem statement, logic model and broad strategy to inform ongoing activity

Mid-2021

EXPLORE

To create insight into 'what works' to achieve desired outcomes and inform practical approaches to drive change

- Platform development – development of creative territories for testing in research
- Primary research – focus groups with burners and non-burners

Beginning 2022

EXECUTE

To develop and test a range of creative concepts & executions, to inform a campaign launch for Winter 22/23

- Appointment of a creative agency (DogCatandMouse) and development of creative
- Follow-up depth interviews (x8) with participants from the last round
- Creative development focus groups (x12) amongst burners and non-burners

Mid-2022

PROVE

Quantitative testing of lead routes in the Behaviour Change Lab

- Three-arms experiment testing 'Subvert the Lifestyle' and 'Dramatise the facts' vs control
- 1500 UK home-owners from major cities, with 89% from London.

Our overall aim was to develop campaign materials and guidance on how to communicate around woodburning for use by a wide coalition of stakeholders in this space

Campaign development *(delayed)*

- Initial plan for roll-out in winter 2022 – postponed until 2023 due to political considerations
- Post-launch evaluation of the campaign's reach and influence *(not within scope of this project)*

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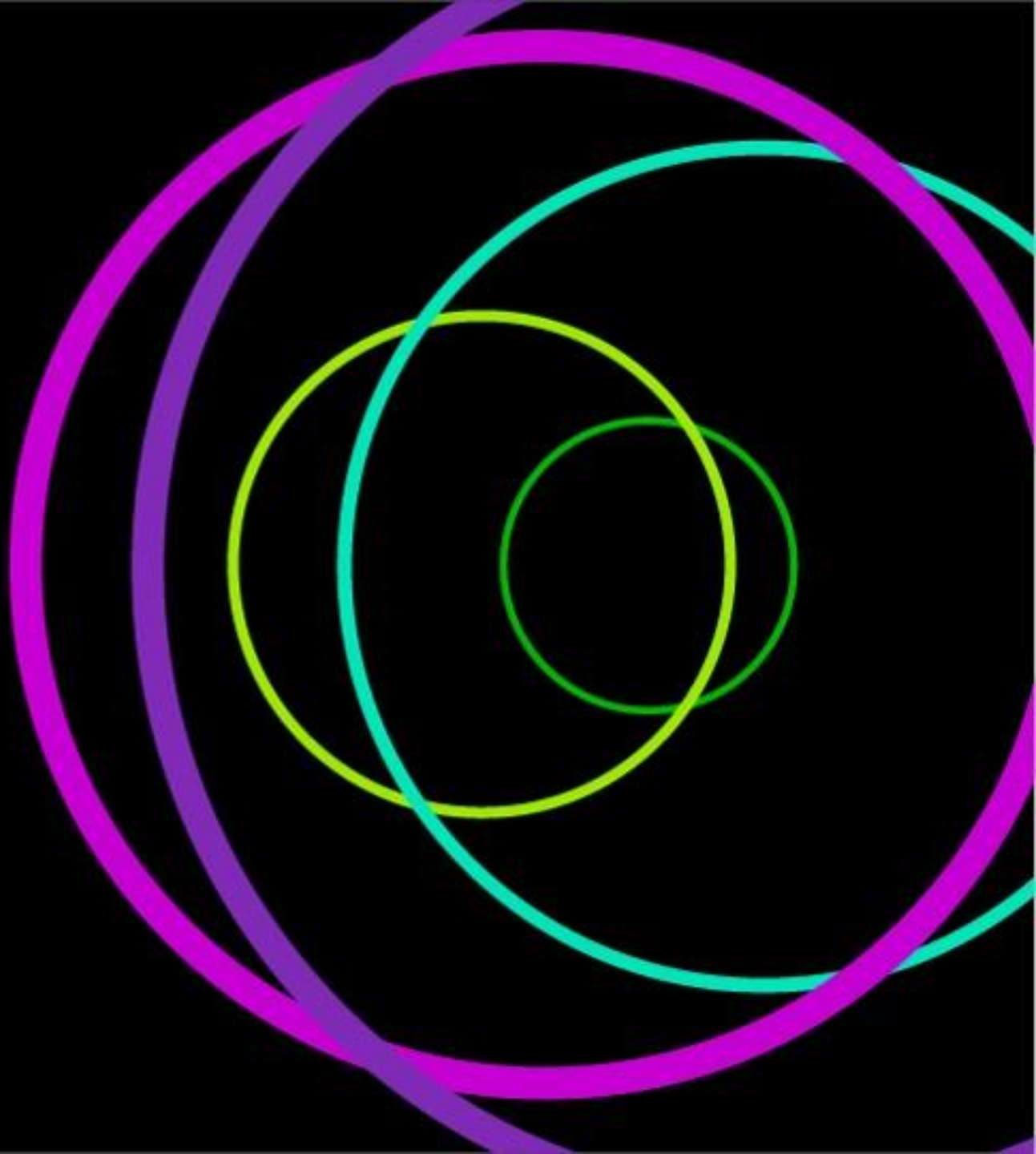
Strategic toolkit

- A summary of the key research insights and campaign assets
- A clear guide on how to communicate to the public around woodburning, in terms of e.g., messaging, tonality, and media channels.

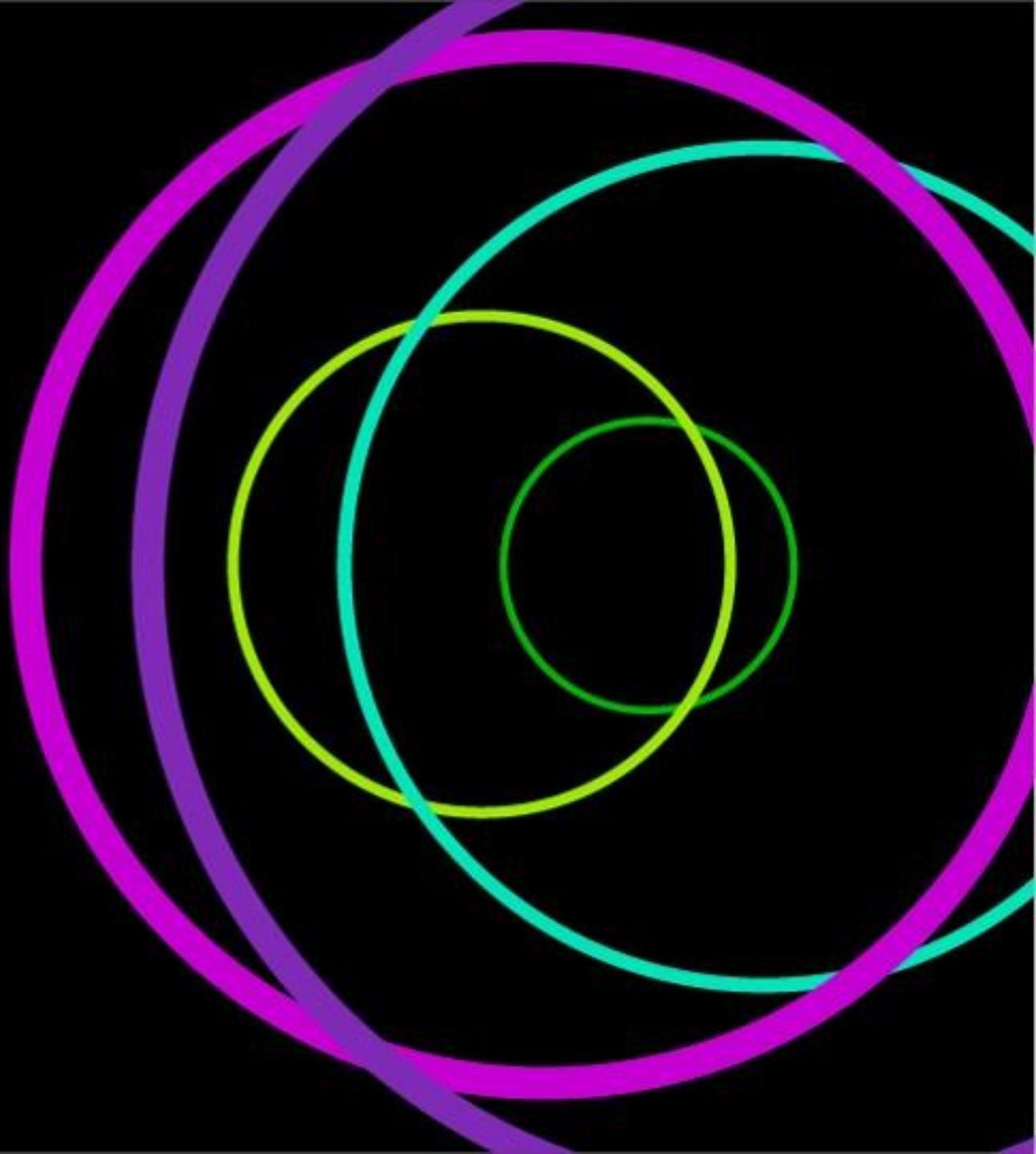
To be shared with and used by stakeholders such as:

ISLINGTON
Southwark Council
Camden
CLEAN AIR FUND
MUMS FOR LUNGS
global action plan
GREATER LONDON AUTHORITY
Lambeth
ClientEarth

2
The Define Stage



2.1 Background & Objectives

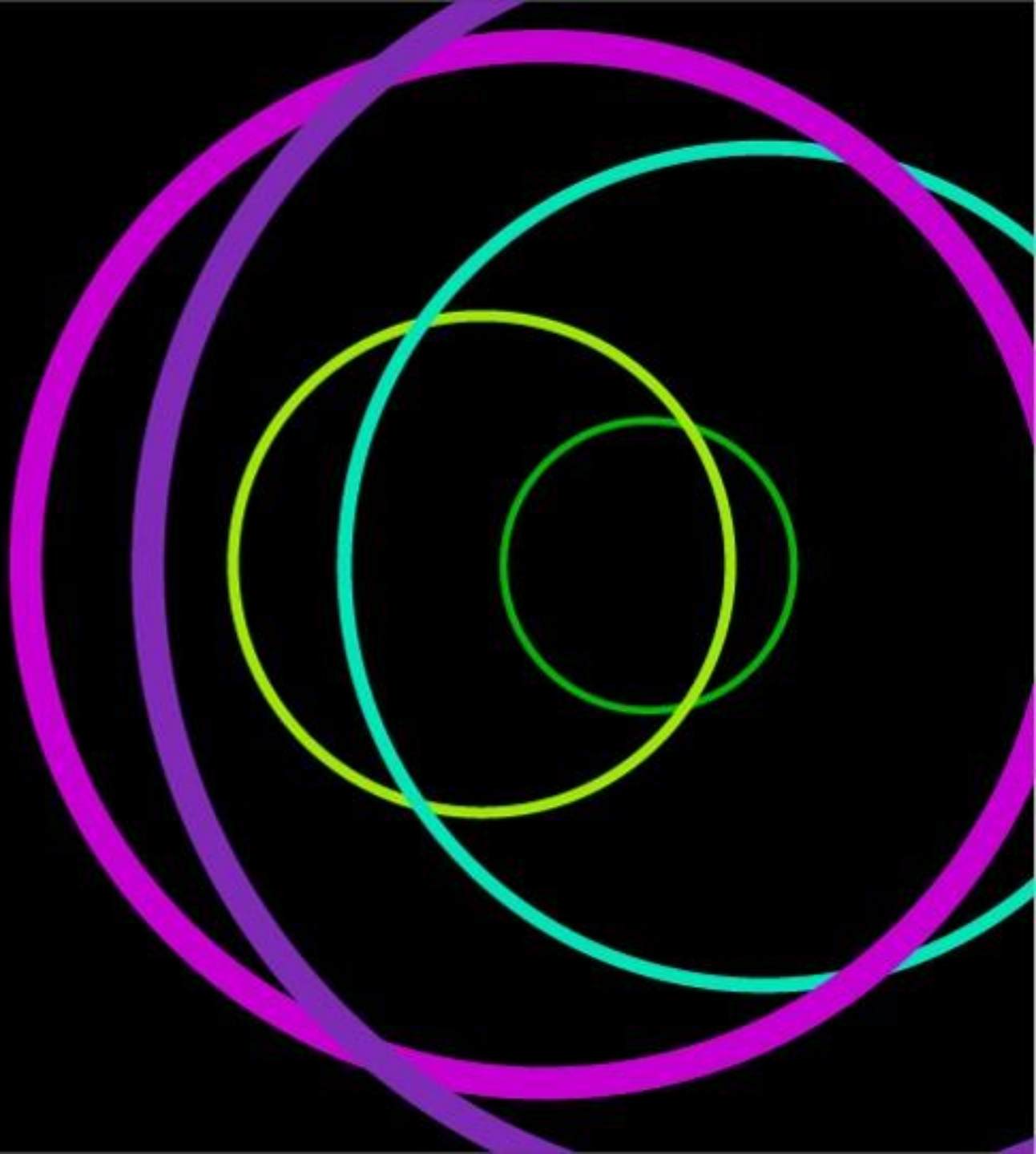


The first stage of the project – the Define phase – focused on getting an overview of the issue by reviewing the existing evidence and speaking to key stakeholders

Phase 1 – *to understand current state of knowledge and define desired outcomes for future work*

- Evidence review – 6 documents including previous Kantar research into woodburning
- Stakeholder interviews – 5 stakeholders drawn from academia, government and industry
- Development of a problem statement, logic model and broad strategy to inform ongoing activity

2.2
Headline Findings



Headline findings

1. **The evidence base around harms associated with domestic woodburning is still relatively young** – there is clear evidence of a link between the activity and increased rates of atmospheric PM2.5, and a recent UK study demonstrated increased indoor levels in homes using wood burners, but it is not possible at present to quantify risks

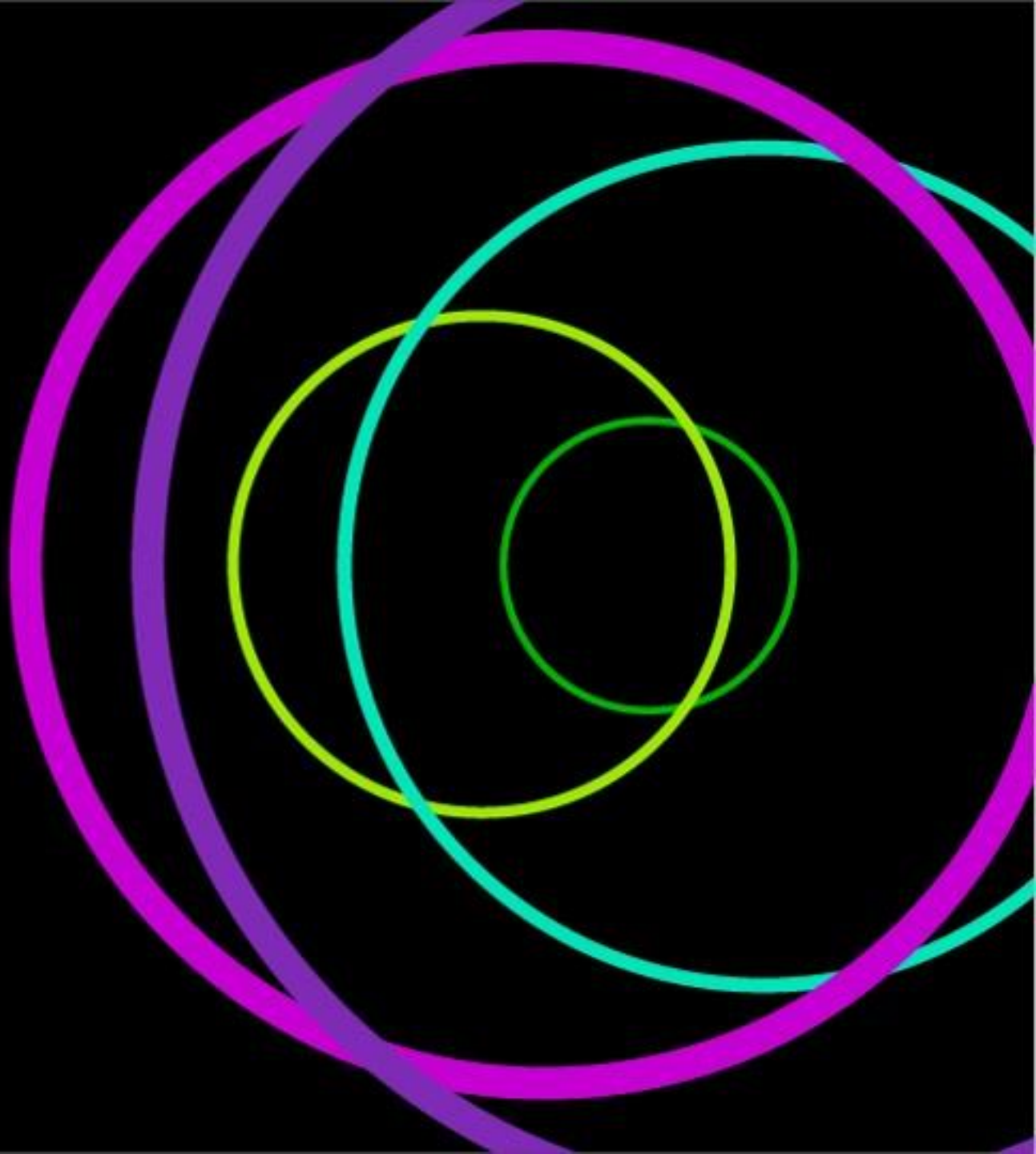
2. **There is low public awareness of the contribution of woodburning to air pollution and subsequent health risks** – and even when these are known they appear to be minimised due to associations of woodburning as a 'natural' or carbon-neutral activity or strong pre-existing associations between pollution and car use or industry

3. **The majority of those burning wood are doing so for aesthetic purposes, at least on some occasions, and as a secondary heat source** – only a relatively small proportion of primarily rural people burn out of necessity as a primary heat source

4. **Given the points above, government feel constrained from talking directly about health impacts** – their current 'Burn Better' campaign focuses on how to burn in less polluting ways but is seen by some to tacitly endorse the activity due to its absence of a strong message around health, as does the promotion of 'eco-stoves'

5. **Existing research has shown the messages relating to personal health are most likely to be effective at reducing burning behaviour** – however, amongst burners in particular there can be scepticism or defensiveness about messaging as it conflicts with existing practices and beliefs

2.3 Evidence Review & Stakeholder Interview Findings



The literature review* and stakeholder interviews encompassed a varied range of perspectives – and revealed how political the issue of woodburning is

Literature Reviewed	Stakeholder Interviews	Secondary Data Analysis
Kantar Public report for Defra (2020) "Burning in UK Homes and Gardens"	Government: Defra	Kantar Public data for Defra (collected 2018)
Research Works report for Defra (Oct 2020) "Developing and testing behavioural insight informed communication messages about domestic burning" (Qual)	Local Authority: Greater London Authority	
Defra (Oct 2020) "Domestic burning communications: Testing the effectiveness of behaviourally informed messages on increasing awareness about domestic burning in England" (Survey)	Grassroots Campaigning body: Mums for Lungs	
Gary Fuller (2018) *The Invisible Killer: The rising global threat of air pollution – and how we can fight back*	Academic Expert: Gary Fuller	
Hackney's Zero Emissions Network Interim Report (2020) "Fuel burning Engagement Project"	Industry body: The Stove Industry Alliance	
WHO (2015) "Residential heating with wood and coal: health impacts and policy options in Europe and North America"		

* Complete findings from the literature review can be found in Appendix A of this document

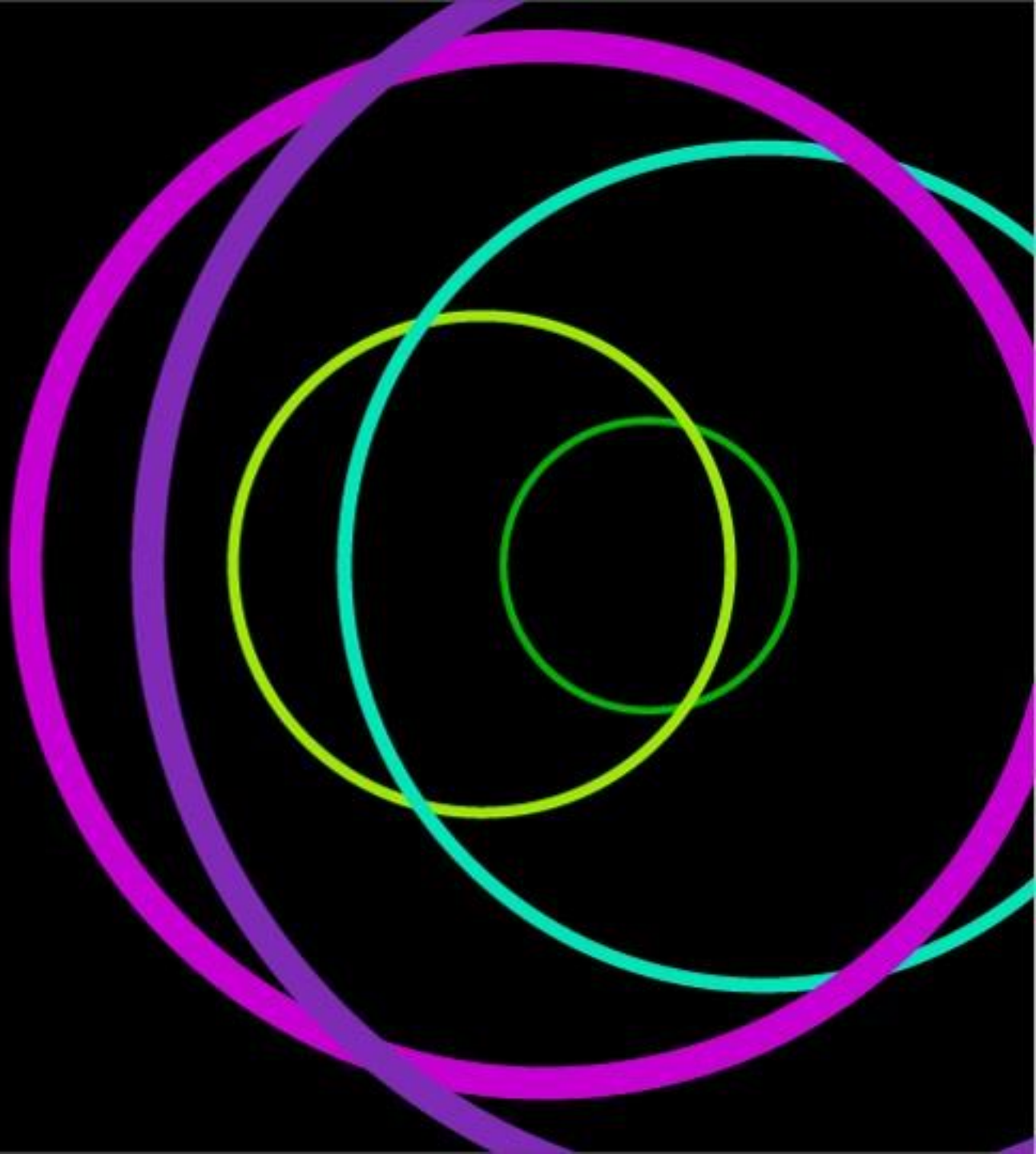
Summary of findings from the literature review and stakeholder interviews

IMPACT & AWARENESS	Measurement difficulties and inconsistencies in the impact of woodburning on health and the environment has hindered the cut-through of messages to the general population, with a majority unaware of the negative effects woodburning may have.
PREVALENCE	The majority of burners in the UK burn outdoors with few burning indoors. Rural areas have a higher proportion of indoor burners, but when population spread is taken into account there are twice as many indoor burners living in urban areas compared to rural areas. Covid-19 is suspected to have encouraged woodburning behaviour, but it is yet unclear in what way and by how much.
ASSOCIATIONS & MOTIVATIONS	The majority of burners are burning for aesthetic and pleasure reasons but do so infrequently compared to those burning to supplement their heat and who are more likely to have more engrained motivations for burning out of self-sufficiency and practicality. Both burners and non-burners hold positive and emotional associations with burning focusing on how fires make them feel as opposed to the process of burning. Non-burners are more likely to think burners do not think about the impact of burning around them and are more likely to be bothered by the smell, but very few do anything about it as half of non-burners still think burners have the right to burn in their own homes.
BEHAVIOURS	Not all burners have the same burning habits and behaviours with the data suggesting that some may have more confidence in their skills than others.
INTERVENTIONS	Most intervention attempts have focused on education and regulation, with limited success in other countries, so there is room to focus on the context and specific behaviours of woodburning as the next intervention point.

Summary of evidence gaps and areas in need of further exploration

IMPACT	There is a need for a systematic review of the evidence to help clarify discrepancies and inconsistencies in the measurement of PM particles, particularly indoors. Further *UK-based* evidence is also needed to help establish a causal relationship between the impact of *indoor* woodburning and health, while a robust analysis of the carbon life cycle of wood and how it is processed would help establish the true carbon footprint of woodburning.
AWARENESS	Given recent media coverage on the issue, awareness of the health impacts may have grown but research is needed to quantify the change and any resulting changes in attitudes towards woodburning.
PREVALENCE	There is scope to get a better understanding of prevalence across urban and rural sub-groups (although these would benefit from further clarification) and in London - secondary analysis carried out on the Defra Burning in UK homes data set did not allow a more in depth sub-group analysis due to small sample sizes. Covid-19 may have amplified the desire for aesthetics and strengthened traditions, but any lasting behavioural effects are yet to be researched robustly.
ASSOCIATIONS & MOTIVATIONS	There is a lack of evidence when it comes to associations people have with the act of woodburning and the process. How confident are burners in their set of skills? How important is it to them to be seen as a 'skilful burner'?
BEHAVIOURS	What are the specific moments and woodburning procedures/rituals taking place in each segments' particular context? And what are the barriers in their environment preventing them from burning properly? How are burners specifically educating themselves and what are the knowledge gaps?
INTERVENTIONS	Behavioural interventions have yet to be trialled in the UK, with few attempts having been successfully attempted elsewhere in the world.

2.4 Opportunities for Intervention



When it comes to addressing woodburning, we encountered wide variation in the range of actions that different groups were willing (or able) to make

Industry	Central Gov.	Local Gov. (GLA)	Campaigning orgs	Academics
Wish to increase sales and justify this via reference to environmental benefits, including via their own Clear Skies initiative	Concerned about health impacts but don't want to negatively affect those who burn out of necessity or act contrary to public opinion	Concerned about health impacts but don't have legislative power to enforce ban or resources to properly enforce	Very concerned about health impacts (e.g. cancer/asthma) and want government to take decisive action	Very concerned about health impacts although not overtly political and focused on developing evidence base
Promote sales of 'eco-stoves' constructed to current standards	**Encourage better burning behaviour**	**Encourage better burning behaviour and move towards stopping use**	**Push government to ban burning based on the health consequences**	**Careful not to take a political stance but feel that evidence suggests a need for strong action**
Wood is a low carbon heating source that is sustainable, gives self-reliance and helps with fuel poverty	*We can control the impact by ensuring that wood burners improve and educating users about how to burn better*	*Education campaigns risk encouraging uptake but the political will is not there for a ban and we already struggle to enforce existing legislation*	*Woodburning has serious health consequences for the community and is unnecessary and should therefore not be allowed*	*It is not my role to say what should be done but the evidence of harm is increasingly clear*

Whilst the evidence base around the health impacts of woodburning was still developing, the data we reviewed clearly pointed towards harm

Community health impacts

- Clear evidence of contribution of woodburning to atmospheric $PM_{2.5}$ compared to other sources and of impact of $PM_{2.5}$ on health
- Some dispute over specific comparative statistics – e.g. six times more particle pollution than a modern diesel lorry

Personal health impacts

- Until recently a lack of UK-based evidence on impact in-home – which is important as homes in UK different to other woodburning areas
- However, recent academic study show a clear increase in $PM_{2.5}$ in the homes of those using Defra certified burners
- As of yet no direct casual evidence between wood-burning and adverse health impacts but this is strongly inferred by available data

"No evidence of harm is not the same as evidence of no harm, and what little evidence there is points towards impacts… it is about where you place the emphasis, on the learnings or on the uncertainty"

(Gary Fuller)

Evidence clearly points towards negative health impacts but given how little research undertaken and inherent challenges with measurement there is scope for the available data to be interpreted and 'used' in different ways

However, we also noted that public awareness of harms was low - as well as the salience of the issue compared to other source of air pollution

Awareness

- Although air pollution is a growing issue for the public, evidence suggests that are still unaware of the potential impacts of woodburning
  - NB this may be starting to shift due to recent media coverage

Salience / relevance

- Even when there is awareness there is low salience to the issue compared to pollution from other sources where associations are more long-standing or in line with wider views - e.g. driving or industry
- Positive associations between woodburning and environmental benefits (which are reinforced by industry) or nostalgia, independence and natural living further ameliorate concerns around health impacts
- In addition to this, for much of the public woodburning is not a part of their lives and as it happens indoors it is relatively hidden from view

Social norm

- As such, there is a lack of wide social agreement at this stage that woodburning is harmful and should be banned or controlled
- Sale of wood-burners, association with 'natural' lifestyles and government campaigns to 'Burn Better' arguably reinforce the norm that it is ok to burn as long as it is done well

Alongside raising awareness there is a need to raise salience and establish new social norms, to legitimate controls and encourage organic behaviour change

Hence, we identified a need to first raise awareness and shift the narrative around woodburning, to then open up political space for further action

1 **Establish evidence base and grounds for action**

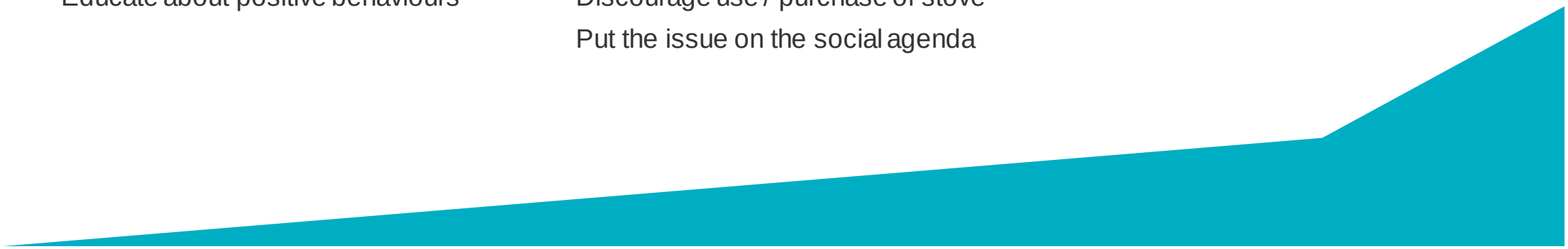
2 **Create awareness of harms and seed new social norms**

3 **Create political space for further controls**

Establish the evidence base
Regulate pollution at source
Educate about positive behaviours

Make negative impacts visible
Create an emotional link with harm
Discourage use / purchase of stove
Put the issue on the social agenda

Legislate further against use
Reinforce social norms



Public awareness of health impacts & support for wider action

The current work to address woodburning in the UK is only partially effective

INPUTS	Clean Air Act and legislations on sale of fuel and appliances	DEFRA approved eco-stoves and SIA's certification	'Burn Better' campaign	Local grassroot campaigning groups - e.g. Mums for Lungs
ACTIVITIES	Controlled sale of properly conditioned wood	Controlled sale of eco-stoves	National campaign on how to improve burning at home	Distribution of flyers to raise awareness
	Lacking enforcement of proper woodburning and smoke control zones	Can be interpreted as Defra tacitly supporting burning	No recommendation that people do not burn, and no communication of the specific health risks	Communication style often leads to animosity within neighbourhoods
OUTPUTS	Use properly seasoned wood or alternative fuels			
	Use of appropriate appliances in smoke control areas			Some hyperlocal awareness of the negative impacts of woodburning
IMMEDIATE OUTCOMES	Current burners continue to burn as normal but with better fuels and appliances			
				but uncertainty on the effectiveness
LONG TERM OUTCOMES	A reduction in particulate matter as a result of using properly seasoned wood and eco-stoves			
	A continued increase in burners as consumers can purchase DEFRA-approved eco-stoves			

By increasing effective messaging, greater impact could be achieved

INPUTS	Insight into credible and effective messaging	IUH budget and resources	Insight into current habits and behaviours and potential design solutions
	Partnership with the Clean Air Fund and local authorities (notably, the GLA and Lambeth council)		
ACTIVITIES	Local/national digital and physical campaigns on the impacts of woodburning		Physical interventions that enable better wood burning behaviour and act as a channel for campaign messaging or raise awareness of the impact on air quality
	Local/national PR campaigns		
OUTPUTS	Greater awareness of the negative health and environmental impacts	Reconsider the need to use or purchase woodstoves	Form better and conscientious wood burning habits – burning only if they need to
IMMEDIATE OUTCOMES	Reduction in woodburning frequency as measured by a population survey similar to the one done for DEFRA in 2018/19		
	Reduction in the uptake of new burners as measured by a reduction in sales		
LONG TERM OUTCOMES	Reduction in the increase in particulate matter related to burning	A societal push for government to be able to do more in this space – opening up political space for further legislation	Change in aspirational associations with woodburning as measured by attitudinal surveys

In terms of future activity, the evidence review suggested focusing on reducing the prevalence of burning for pleasure and/or preventing further take-up

PREVENTING TAKE-UP

Non-wood burners

- *Given lack of current financial or emotional investment, those who are yet to buy a stove may be more open to influence*
- *Potential for large future impact – although may be more challenging to quantify*
- *Opportunity to introduce friction to decision-making process about whether to invest in a wood burning stove*

REDUCE BURNING

Pleasure – 46% | **Function – 46%** | **Need – 8%**

- *Given prior investment reduction in use is more achievable than stopping entirely*
- *Majority of the audience burn on at least some occasions primarily for the aesthetic experience*
- *Opportunity to introduce friction to decision-making process about whether to burn on a given occasion*

This stage also suggested some broad considerations around motivations, tonality and messenger that any messaging should consider

Motivations

People are motivated by messages that appeal to their **own self-interest in relation to personal/family health** and – for some – economic advantages.

Message relating to **community health or environmental benefits are relatively less effective**

Tonality

Messages should take a **supportive adult-to-adult tone** and acknowledge that this is the start of a conversation

Messaging should be **practically focussed and offer solutions** alongside the problem

Anything perceived as **scaremongering risks backfiring**

Messenger

Government and commercial companies are most associated with this space and so have some credibility

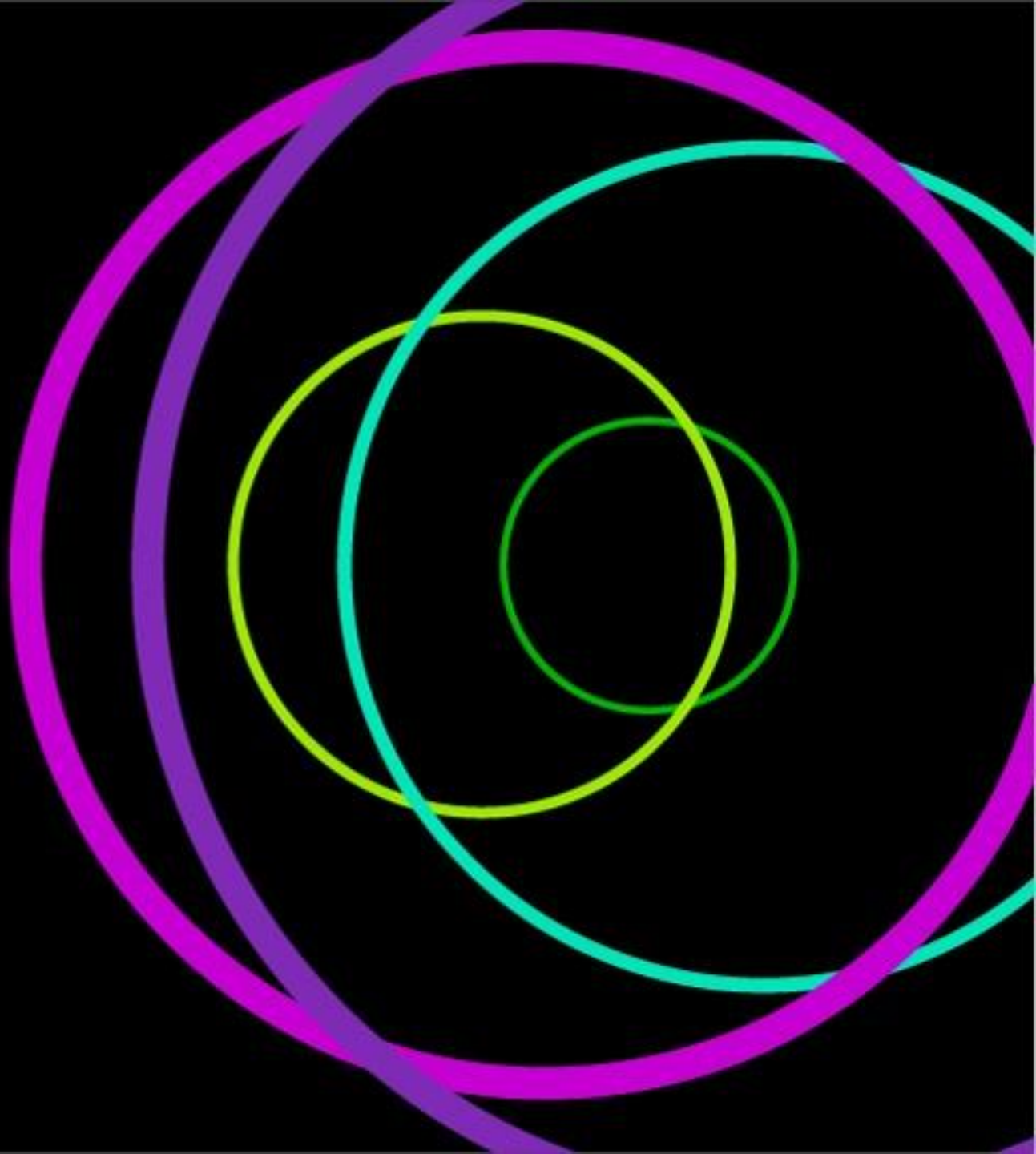
Public health officials and scientists are also likely to possess authority as messengers

Moments

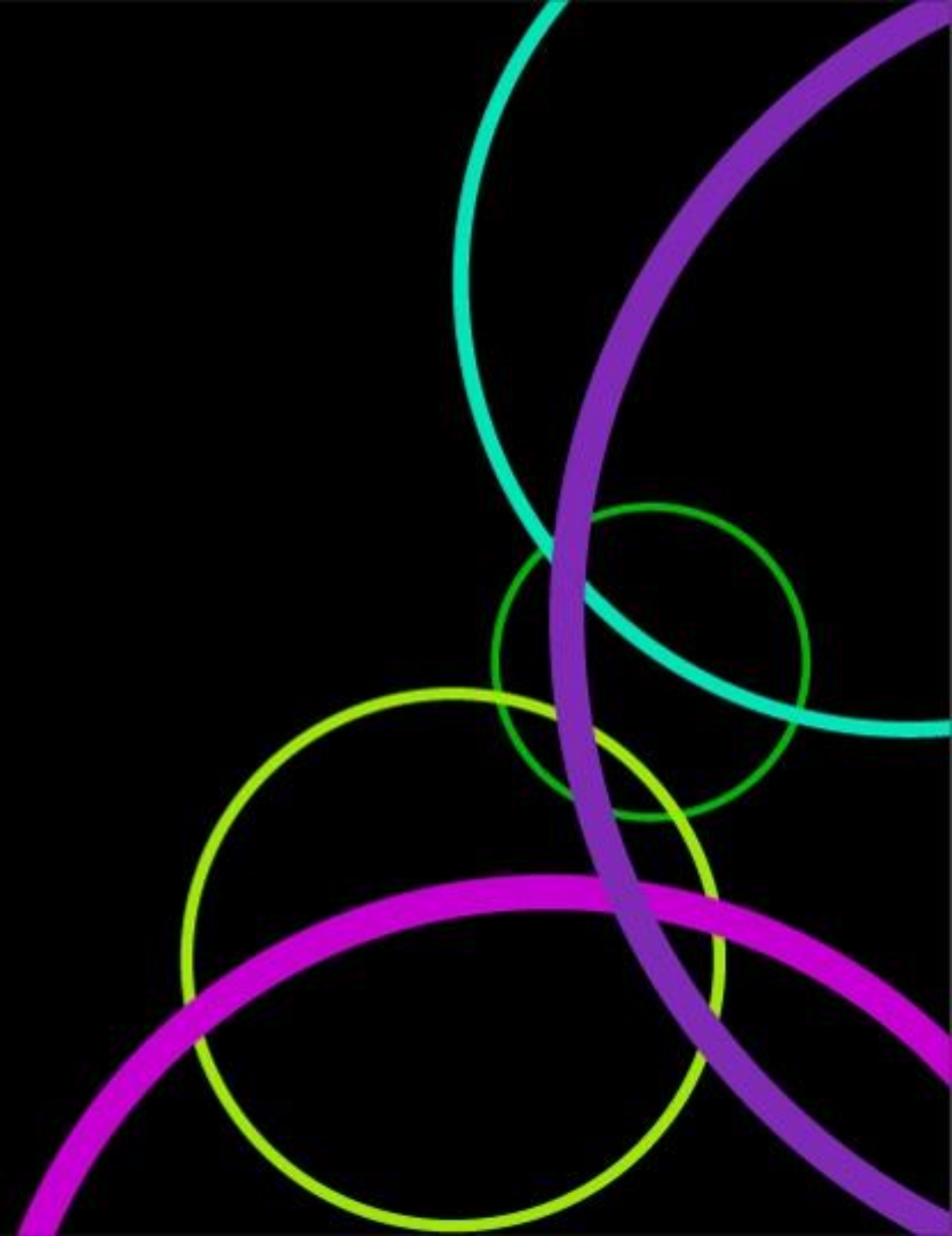
The majority of burning happens in the **autumn and winter months**, and any campaign should be focused on creating impact prior to or during this period

Research Works report for Defra (Oct 2020) - "Developing and testing behavioural insight informed communication messages about domestic burning" (Qual)
Defra (Oct 2020) - "Domestic burning communications: Testing the effectiveness of behaviourally informed messages on increasing awareness about domestic burning in England" (Survey)

3
The Explore Stage



3.1 Background and Objectives



The second stage of our project – the Explore phase – aimed to explore in more detail what kinds of message would work best at shifting attitudes towards woodburning

Phase 1 – *to understand current state of knowledge and define desired outcomes for future work*

- Evidence review – 6 documents including previous Kantar research into woodburning
- Stakeholder interviews – 5 stakeholders drawn from academia, government and industry
- Development of a problem statement, logic model and broad strategy to inform ongoing activity

Define

Explore

Execute

Prove

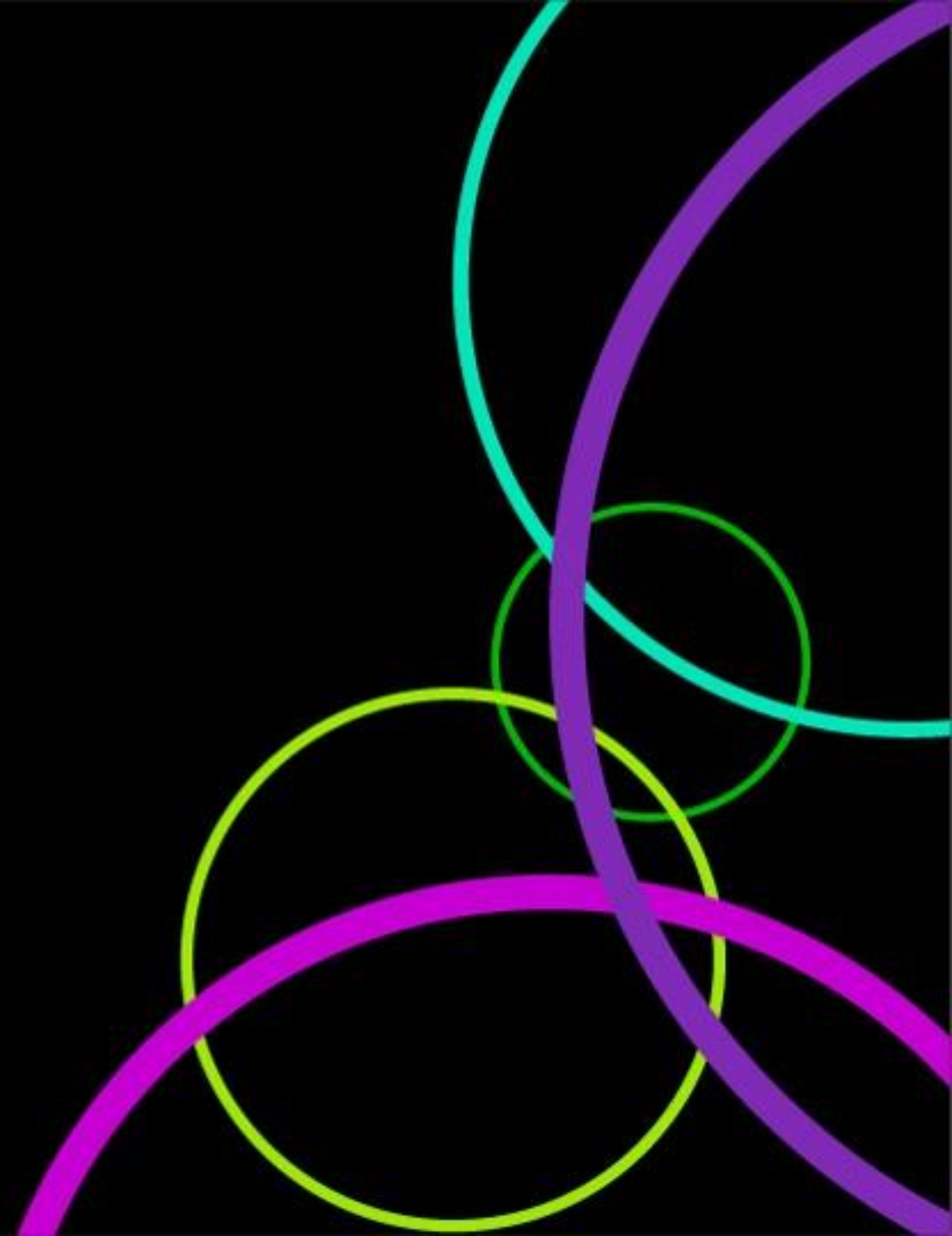
Phase 2 – *to create insight into 'what works' to achieve desired outcomes and inform practical approaches to drive change*

- Platform development – development of creative territories for testing in research
- Primary research – focus groups with burners and non-burners
- Toolkit development – creation of a practical tool to guide communications around woodburning

We did this by developing five creative platforms in collaboration with stakeholders, and testing them with an audience of burners and non-burners

As bad as… 	Futureproof your home 	Making the invisible visible 	An unfortunate truth 	Protect the vulnerable 
Use data to show the relative harm and contribution to air pollution **compared to other common categories** associated with air pollution **Five executions**, looking at findings from an **indoor air-quality monitoring campaign**, and comparing woodburning's emissions to **diesel trucks, cars, other transport and cigarettes**	Build **a case for the predicted short life span of wood burners** to suggest that they are **not a good investment**. Also, to **address 'low carbon' myths** around wood burning stoves **Three executions**, based on **heat pumps** and costs as **wood burners slowly become obsolete**, and **myth-busting** previously held ideas on woodburning as clean and sustainable	**Visually represent the smoke and harms** associated with woodburning, often with **evocative imagery**, so that its impact is more tangible and memorable **Three executions**, making the **smoke more visible in posters**, comparing emissions to **cigarettes**, and visualising pollutants released in relatable ways	Have **relevant and credible experts present evidence** around the health and environmental harms associated with wood burning, **acknowledging its positive associations and traditions** **Five concepts**, including messengers such as **Chris Whitty and David Attenborough** delivering the evidence, **alternative ways to create cosyness**, and appeals to **keep up with newly found science** about the harms of burning	Draw attention to **the impact of wood burning on children and the elderly**, and bring to life the health impacts it has on the vulnerable **Four executions,** focusing on various groups more likely to be harmed, the information of which was delivered through **flyers, billboards**, and in one example, **a case study**

3.2
Headline Findings



Headline findings

1. Although there was some concern across groups about air pollution in general, **awareness of the health impacts of woodburning were fairly low among both burners and non-burners**. Even when there was some awareness, **any impacts were typically seen to be minimal compared to other sources,** such as motor vehicles or industry.

2. Alongside this, burners and non-burners keen on a stove carried **strong emotional associations with woodburning. As such, responses from these groups were often very defensive**, with lots of cynicism around the intention of messages, suspicion of agendas, and defensive reactions to messages seen to be aiming to discourage wood burning.

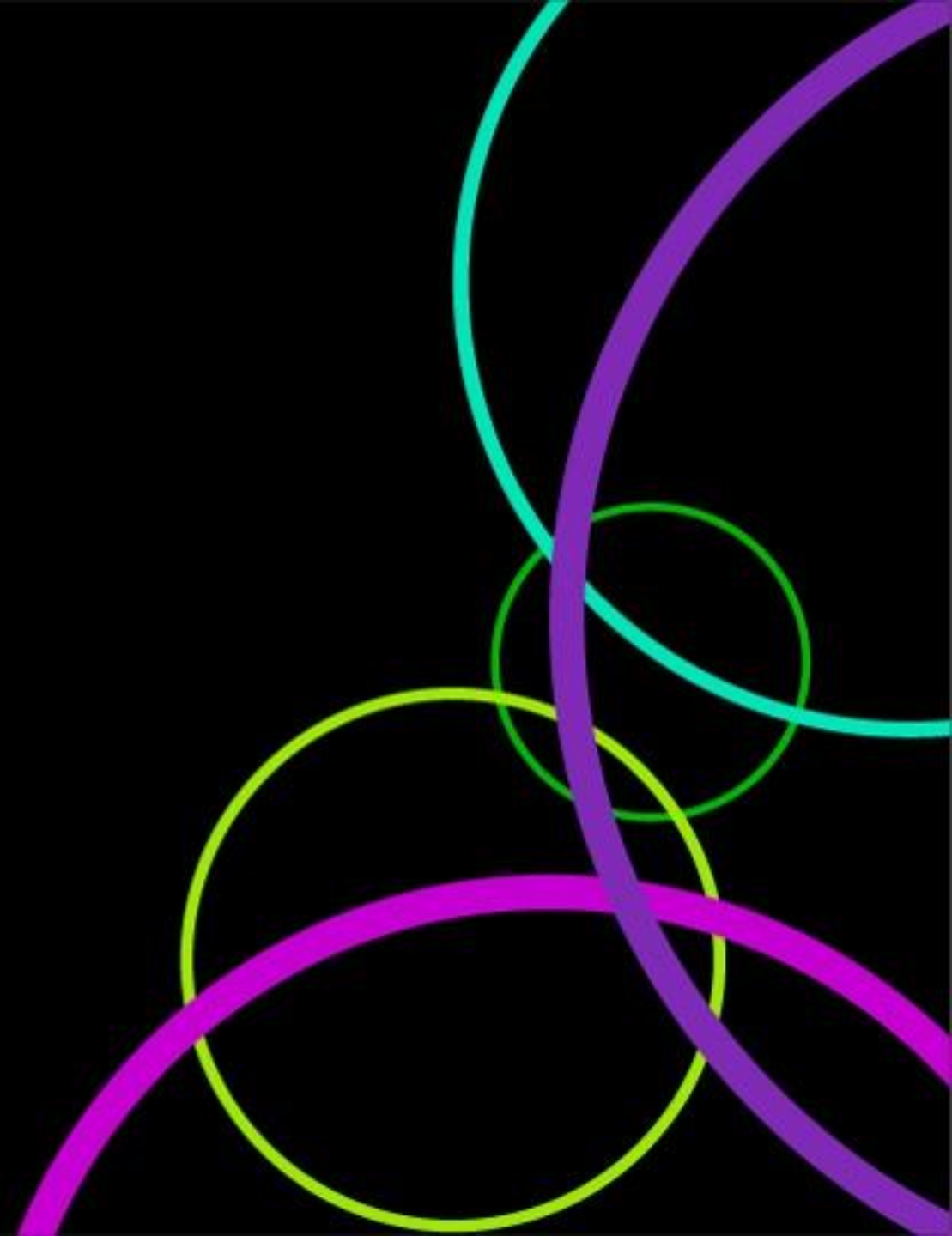
3. **Creative platforms that created a strong link between wood burning and air pollution in a way that didn't allow people to minimise the effects by reference to other categories worked best** at conveying the negative impacts of burning and impacting attitudes. These pre-empted the otherwise common argument that the impact of woodburning is minimal compared to other categories and **allowed respondents to come to their own conclusions about health impacts** without triggering defensiveness.

4. **Tonally, creative platforms that acknowledged that this is still a developing field with continually emerging evidence were better received**, were less likely to be seen as agenda driven and were therefore considered more credible. They also avoided creating a sense of shame, which could undermine engagement.

5. Across all groups, there was general distrust for government messaging due to potential conflicts of interest with the industry and an over-saturation of government health messaging related with Covid-19. Instead**, respondents preferred to have the message delivered by someone they could trust and/or that could weigh up the evidence** to help reach conclusions alongside the public. Here the NHS or independent third parties were mentioned positively (e.g. GPs, NGOs, academics, or popular documentary figures).

6. **Urban audiences were more open to messages about air pollution in general**, given the greater population density and use of cars etc. and we would recommend that any future campaign activity is focused specifically on urban areas to maximise impact.

3.3
Contextual Findings



As expected, both burners and non-burners held positive associations with woodburning

Woodburning is often seen as the focal point of the house and symbolises warmth, family, and friends so any approach to reduce burning would be challenging firmly held positive opinions

Among burners, woodburning is often a lifestyle that revolves around atmosphere and self-sufficiency

Most non-burners appreciate the appeal of a fire and for those with positive attitudes, it was seen as an aspirational item

Those with negative attitudes saw woodburning as a potential hassle and were more likely to spontaneously question the effects on health and the environment

+VE

-VE

For most burners and non-burners, the health risk was not salient and was often minimised compared to other activities or sources of air pollution

Woodburning was not naturally or immediately linked to harmful air pollution as it is with transport and industry, so burners and aspiring non-burners struggled to believe the health risks

Many grew up burning or have been doing so for years without experiencing direct health consequences – leading to a personal belief that woodburning is not bad for health

As such, any risks to health were not top of mind and when they were presented were typically seen to lack credibility, particularly amongst burners

Here both burners and non-burners typically believed transport or industry to be far bigger contributors to air pollution, saw woodburning as relatively benign in comparison and would often therefore minimise its impact

However, some attitudinally negative non-burners were more familiar with the harms due to recent news on the impacts of woodburning – suggesting that current media coverage is starting to cut through for some people

> *"Aren't planes more harmful than sitting in your living room with the woodburner on?"*
>
> *(Urban Functional Burner)*

> *"I'm well aware of [PM2.5]. If I thought that my living room was full of it when I lit the fire I would think twice, but I don't believe it is"*
>
> *(Rural Burner, ex-firefighter)*

For many burners and non-burners, woodburning was also seen as a personal choice and therefore not something non-burners felt compelled to challenge

Even when the harms of woodburning were acknowledged, the decision about whether to burn was seen as a personal choice

Both burners and non-burners expressed a regard for privacy and respect for personal judgement around the decision to have a wood burner

Even non-burners who had negative associations with burning felt that their neighbours should be free to choose and claimed that they would not interfere in most cases

- The exception to this was if the smoke began to obviously reach their own homes and they felt personally affected

> *"What I do is fine, but I wouldn't feel it my business to go and tell next door to not use [their wood burner]"*
>
> *(Rural Negative Non-burner)*

> *"I think if it was all the time, if [the smoke] was a constant smell every night, and you couldn't open your windows, then I possibly would [consider reporting it]"*
>
> *(Rural Negative Non-burner)*

When discussing impacts, air pollution was often conflated with carbon emissions as part of a view that woodburning is environmentally friendly

When discussing the environmental impact of woodburning on air pollution, burners and non-burners alike had a tendency to focus on carbon emissions, which could undermine take-up of the view that it is harmful to health

Initial conversations about the environmental impact of woodburning typically focussed on CO2 emissions, and a number of burners in the sample explained their decision to burn explicitly in terms of it being pro-environmental

- This pro-environmental stance could extend to other habits, such as collecting and burning scrap wood

By comparison, whilst some participants spontaneously mentioned PM2.5 (and others mentioned carbon monoxide) this was relatively less top-of-mind

As such, burners often considered their behaviour in the context of a whole range of other pro-environmental behaviours they felt were expected of them (e.g. not eating meat, not flying) and to justify their continuation on the basis that they couldn't avoid contributing to pollution in some way

More generally, given the positive environmental associations, news about stoves being bad for the environment or polluting could be confusing or jar with existing views, without a clear and specific reference to air pollution

> *"When you burn something, the smoke and ash it gives off is undesirable, in terms of carbon, in terms of general pollution of the atmosphere"*
>
> *(Aesthetic Rural Burner)*

> *"Like thinking woodburning is fine, which it's not, but it's still better than burning gas. But it's a different version of being bad, because it's a health concern, not an eco- or carbon concern"*
>
> *(London Burner)*

When researching the issue, respondents noted that there is a lot of conflicting information available online, reinforcing confusion

The majority of information online tends to be in support of burning, with few credible sources expressing otherwise

A number of participants reported recently coming across more articles about woodburning on the news and radio, but most failed to recall details

- The few who did recall such articles noted the use of hesitant language around the evidence, such as 'might' and 'could' – undermining the strength of the argument and any call to action

Respondents looking to buy a new stove recalled that the majority of online search results were positive about the environmental impacts, which tended to focus on Co2 contributions

- This perceived lack of information about the harms woodburning supported pre-existing emotional attachments and could undermine communication about harms

> *"I remember searching 'is gas better than woodburners?' and 'which is the most eco-friendly?' and I couldn't find a definitive answer. Some websites would say it's better to have a woodburner, because that produces less Co2 than gas central heating, but that might have been linked to someone who's selling [woodburners]"*
>
> *(Aesthetic Rural Burner)*

Awareness of new regulations was low and has had little impact on behaviour – and 'eco-stove' legislation could be seen to condone woodburning

Burners and non-burners interested in stoves were vaguely aware of changes to woodburning regulations, but details were not top-of-mind and there was no clear call to action

Changes in fuel regulations were not seen as relevant by most burners

Only a few burners who took pleasure from being knowledgeable in the ritual of burning knew about the new fuel sale regulations.

The majority of burners interviewed were collecting and treating their own wood and therefore felt the regulation was not relevant to them – but that it didn't require any action from them even if they were to buy fuel.

'Eco-stove' regulations were seen to support the view of burning as pro-environmental

Burners with stoves already installed were unaware of upcoming changes and were unconcerned seeing it as an improvement relating to Co2 emissions, rather than relating it to air pollution and health risks.

Non-burners interested in stoves were not aware of eco-stoves and the upcoming legislation, but saw the word 'eco' as a positive endorsement.

London burners were not clear on the meaning of smoke-control zones

Burners appeared to confuse smoke-control zones with London's ULEZ zone, describing it as a regulation to control overall air pollution in London.

However, despite the misunderstanding, the idea of air pollution regulation was supported by all London participants.

The perceived lack of a clear and consistent stance from government could lead to cynicism - or expectations of more robust action

Given the severity of health impacts, respondents questioned why government had not banned woodburning but instead introduced regulations focused on improving burning – prompting discussions on possible hidden agendas

The new regulations were seen to endorse woodburning – and did not therefore chime with expectations for action from government if woodburning really is harmful

Views on lack of consistency were further reinforced by perceptions that government had until recently supported woodburning as pro-environmental

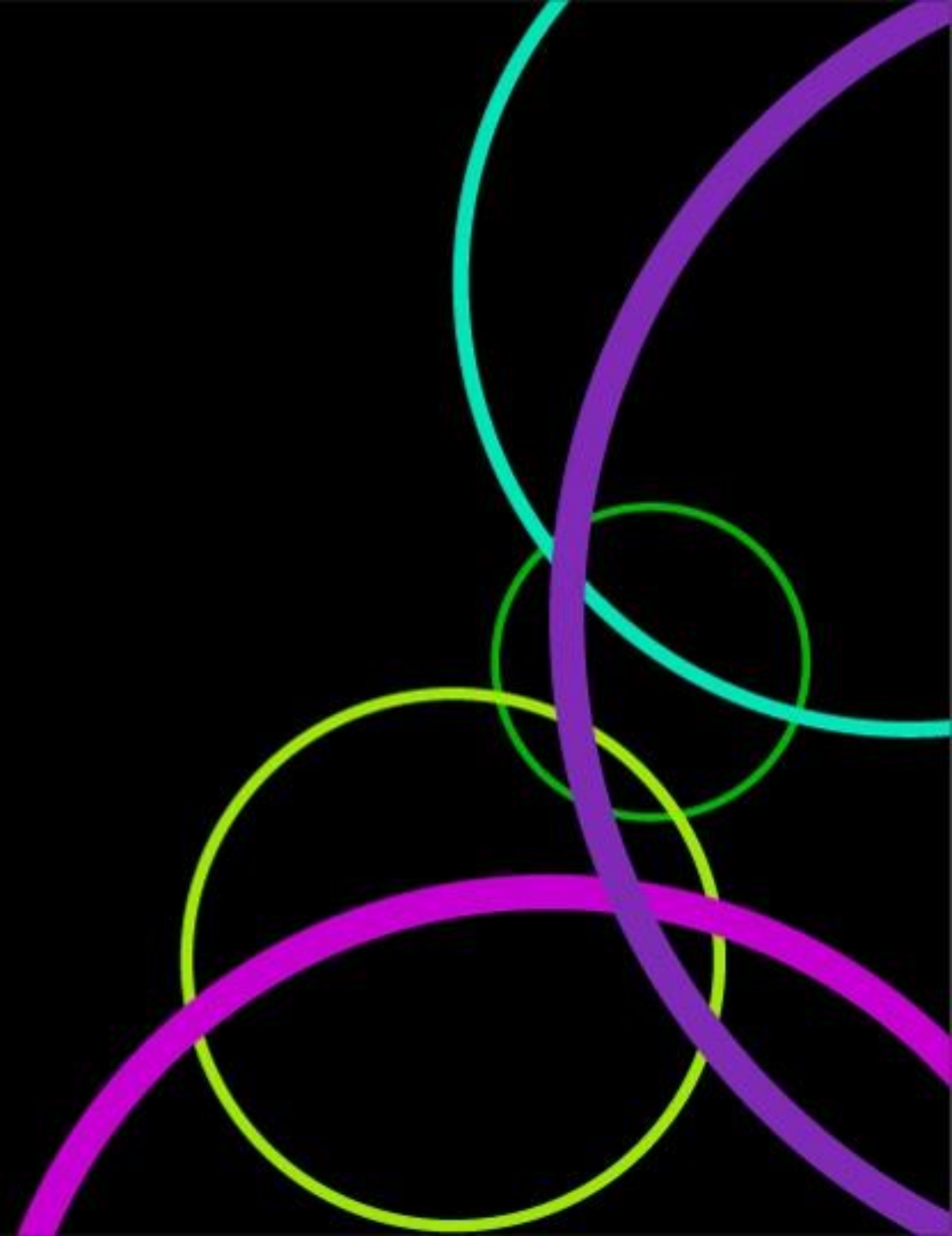
This perceived lack of consistency could reinforce pre-existing cynicism about government for some burners – and lead to claims that this new stance against woodburning was driven by some kind of 'agenda'

Others could question why government was not being directive if the health impacts are as bad as claimed – and felt that individuals should be better informed at the point of sale

> *"If it's so bad, why don't they just ban these stoves altogether?"*
>
> *(Rural Functional Burner)*

> *"I saw government directives, to put limits on the type of wood you could burn []. But I think prior to that, they were encouraging us to have woodburning stoves, a bit like the diesel fiasco. They got us all to buy diesel cars, and started to ban it"*
>
> *(Functional Rural Burner)*

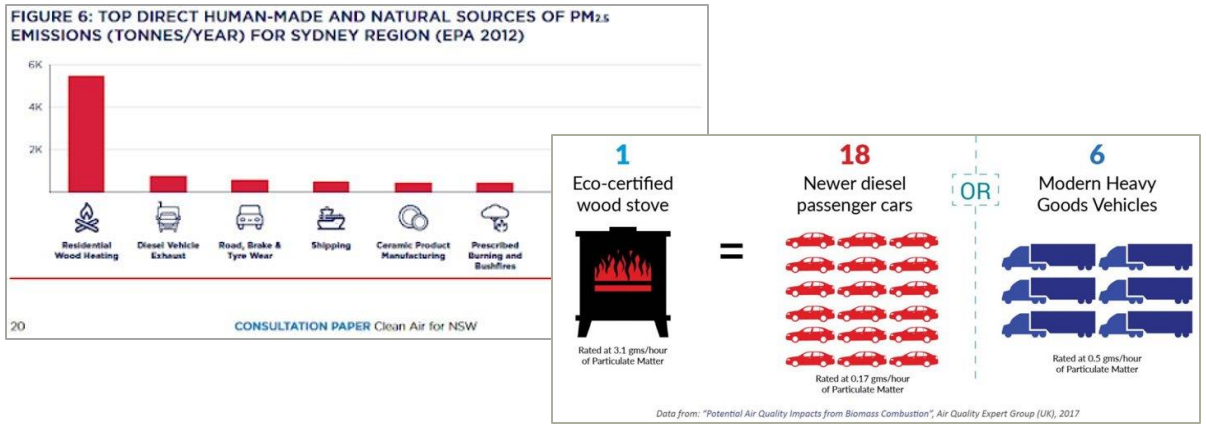
3.4
Overall Response to the Platforms



Due to low levels of awareness of harm and emotional attachments to wood burning, participants responded best to more fact-based approaches

Fact-based platforms were the most effective at engaging both burners and non-burners

Data helped challenge pre-conceptions that wood burning is harmless – and typically led to engagement and a desire to understand more



Here, the GLA's comparison to vehicle emissions was particularly effective as it created a relevant anchor point and pre-empted the otherwise common argument that the impact of woodburning is minimal compared to other known sources of air pollution

In contrast, emotion-based platforms generated strong push back and could be perceived as manipulative

Emotional communications were often labelled as 'scare mongering' and typically triggered defensiveness in burners

CASE STUDY ***"Freya, an eight-year-old girl from South London has just been admitted to hospital with lung disease due to air pollution.***

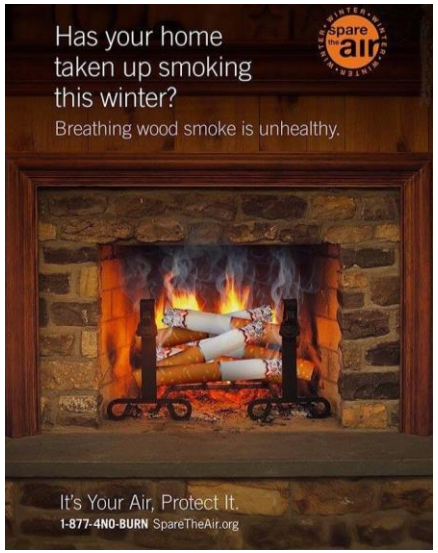
> *"If you're talking about harming a child, that's quite close to the bone I think, because obviously no one would choose to harm their own child."*
>
> *(Functional Rural Burner)*

In the absence of a pre-existing belief in harms, emotional claims were typically seen as agenda-driven and prevented further engagement or take-up of the data

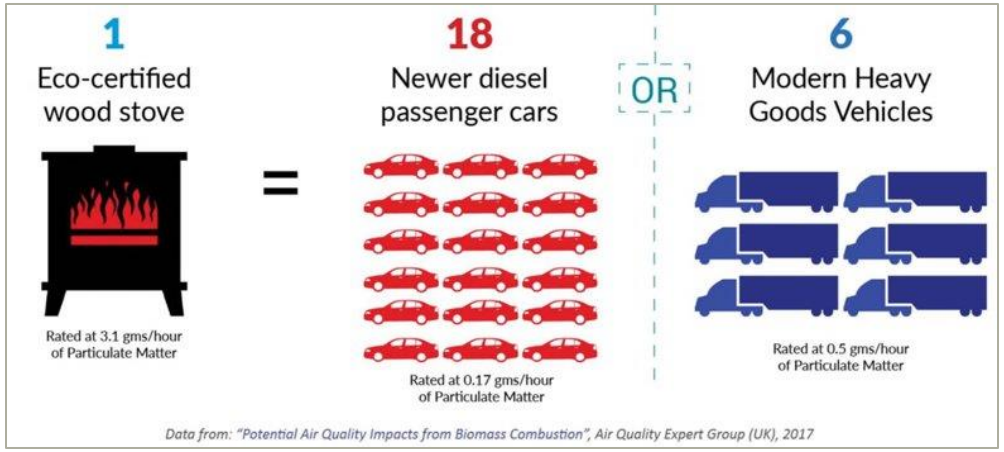
Contrary to previous research, platforms that performed best among burners and non-burners did not focus explicitly on the health impacts of woodburning

In contrast to previous research* suggesting explicit appeals to self-interest focused on health were best at changing burner motivations, our research found that dealing with the health consequences implicitly was more effective

An explicit focus on the consequences to health prior to first dispassionately establishing a very clear connection to air pollution prompted negative emotional reactions and were felt to lack credibility



In contrast, platforms that clearly established woodburning as a significant source of air pollution allowed burners and non-burners to come to their own conclusions about the health impacts



> *"[Slide about particulate air pollution] is bad news, but it's helpful"* (London Burner)

KANTAR PUBLIC

Research Works report for Defra (Oct 2020) - "Developing and testing behavioural insight informed communication messages about domestic burning" (Qual)
Defra (Oct 2020) - "Domestic burning communications: Testing the effectiveness of behaviourally informed messages on increasing aw areness about domestic burning in England" (Survey)

Tonally, messages were received best when they acknowledged the novelty of information - and could not be interpreted as blaming or shaming burners

An open and transparent tone, acknowledging a change in stance due to new scientific research, was felt to be most credible and convincing

Here, it could work well to acknowledge the fact that government had until recently supported wood burning for it's carbon-neutral qualities but had changed their stance due to new evidence about the harms of air pollution

Alongside this, it could help to acknowledge the emotional appeal of fire, given the strength of these associations

More generally, conversational tone was received more positively relative to a more declarative claim of the harms

A conversational tone was seen to acknowledge the idea that this is a live and developing area of knowledge, placing the messenger on a similar level to those receiving communications and therefore help to support engagement and perceptions of credibility

Importantly, this approach helped to avoid appearing to blame or shame burners, which could lead to a negative emotional response and undermine engagement

> *"I quite like that we recognize we were ill informed, and then some pivotal research proved the link."*
>
> *(London Burner)*

Government was generally not considered best placed to deliver messaging, due to general cynicism and saturation of Covid-19 health messages

Across all groups, there was a general distrust of messaging from central government

Across groups there was cynicism around the intentions of government–and many believed that claims were likely to be political or agenda-driven

Government has also become strongly associated with Covid-19, which has left people feeling over-saturated and disengaged

The idea of Chris Whitty delivering information on woodburning was badly received - and generated strong negative associations relating to Covid-19

More generally, there was resistance to being told what to do with regards to health by government, due to fatigue around ongoing social distancing measures

> *"It's just the usual messaging from the government, telling us we're all doomed"*
>
> *(Functional Rural Burner)*

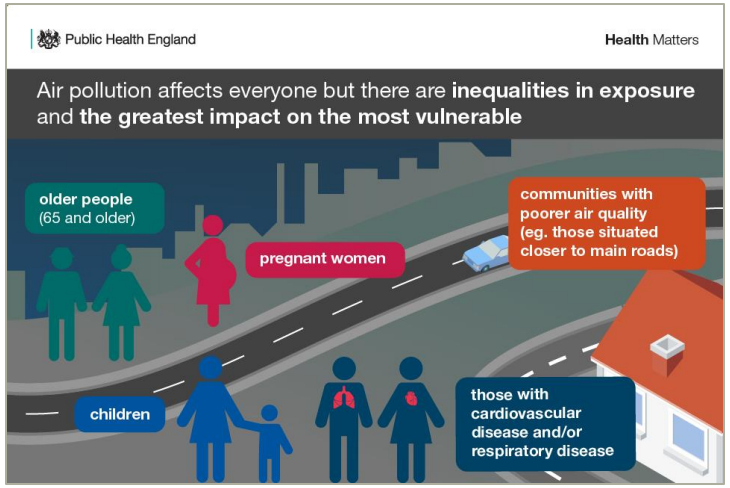
> *"Chris Whitty has only really been in the public eye because of Covid 19. People are a little bit bored of these health messages."*
>
> *(Negative London Non-Burner)*

Participants favoured messengers who were perceived as impartial and trustworthy and/or that could help them weigh up the evidence

Burners and non-burners were more receptive to messages being delivered by independent non-government parties with public-health interests

NHS, GPS, NGOs and academics were seen as trustworthy, and separate enough from the government to seem credible on this issue

Despite being a health authority, Public Health England was still too close to government to be well-received as a potential messenger



Celebrities, even if unrelated to health, could also be seen as effective messengers if trusted to weigh up the evidence and provide impartial guidance

Sir David Attenborough, although an environmental expert, was widely trusted around environmental issues and therefore seen as a credible messenger

Michael Mosley, television journalist, was also suggested as he was seen as an unbiased figure able to weigh up the evidence to come up with an objective conclusion alongside the public

Evocative imagery was typically considered over-the-top and unrealistic at present, but could have long-term potential to challenge positive associations

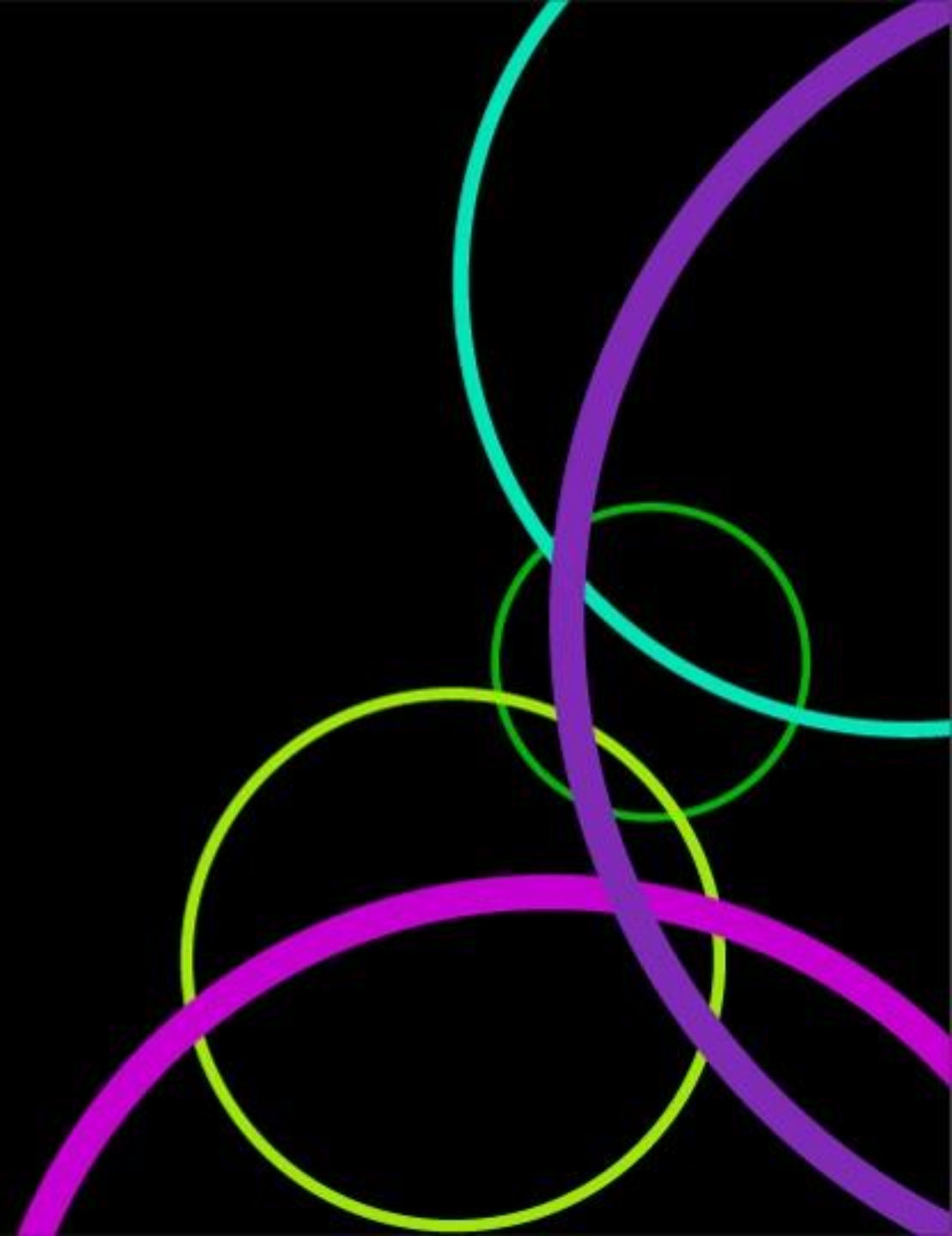
In the absence of a strong pre-existing association with air pollution, most imagery provoked negative responses, but they could offer a more emotional and visceral element to campaign once association is better established

Analogies of houses smoking cigarettes were seen as exaggerated by many, although the image was evocative and was recalled at the end of groups by some

Images trying to make invisible PM2.5 particles visible using illustrations of some were not convincing as they felt unrealistic and exaggerated compared to actual experiences

Here the smell of woodburning was seen a more realistic and relevant cue - helping to establish a clear link between the visceral experience of wood burning and harmful pollution, and disrupting current positive associations

3.6
Conclusions & Next steps



Findings reinforced the idea that non-burners are a more effective target for any initial campaign, as burners will take more time to change their views

Non-burners

Attitudinally

- Given lower levels of emotional investment, even those who were attitudinally positive were open to reassessing views, with perceptions of woodburners as an aspirational item in particular undermined
- For those who were already negative, materials reinforced negative views and belief that government should and will over the long-term need to introduce greater legislation

Behaviourally

- Some of those that were considering buying another stove said they would likely reconsider
- Although most still did not feel inclined to challenge other burners about it, some suggested that they would be most likely to do so using a 'Did you know?' approach leveraging fact-based data

Burners

Attitudinally

- Given current investment, positive attitudes were much more entrenched, although there was some shock around the relative contribution of woodburning that could start to prompt reconsideration
- For others, especially long-time burners and older men, there was general cynicism about the platforms and a 'doubling-down' belief that they could burn safely based on their own experience

Behaviourally

- Given existing habits around woodburning. the majority of the audience felt they would continue as they were with no change to behaviour
- At best, some (generally women) were left open to the idea of doing more research into the subject, especially if they had young family
- Others were open to the possibility of switching to alternative fuels, such as coal – suggesting a possible backfire effect to a focus on woodburning

Findings also suggested that a single-minded campaign focused on establishing the link to air pollution would be most effective as a first step

1

Establish woodburning as a significant source of air pollution relative to other known sources

Use data to denote woodburning as a considerable contributor to air pollution relative to vehicles or industry

Couch comparison in everyday terms that people can relate to – and relative to other forms of heating

2

Continue to build the salience of air pollution in general as a major public health issue

Air pollution is a growing issue of concern but is currently over-shadowed by concerns around carbon emissions

The harms related to woodburning will naturally become more salient as general concerns about air pollutions grow

3

Reinforce sentiments via explicit health information and evocative imagery (pending research)

Once the link to air pollution is clearly established, people are likely to become more open to explicit health information

At this point, evocative comms can be used strategically to help further disrupt associations – e.g. linking the smell of wood burning to inhaling PM2.5 particles

Allow individuals to come to their own conclusions about harm to increase engagement / ownership of knowledge and manage potential for negative pushback

NB given entrenched behaviour, there may be a need to continue with some kind of 'burn better' activity for burners – but strengthening the idea that best way to burn is not to do so at all

As it emerged that localisation is key, we advised to build traction and support by initially targeting urban areas where air pollution already is a concern

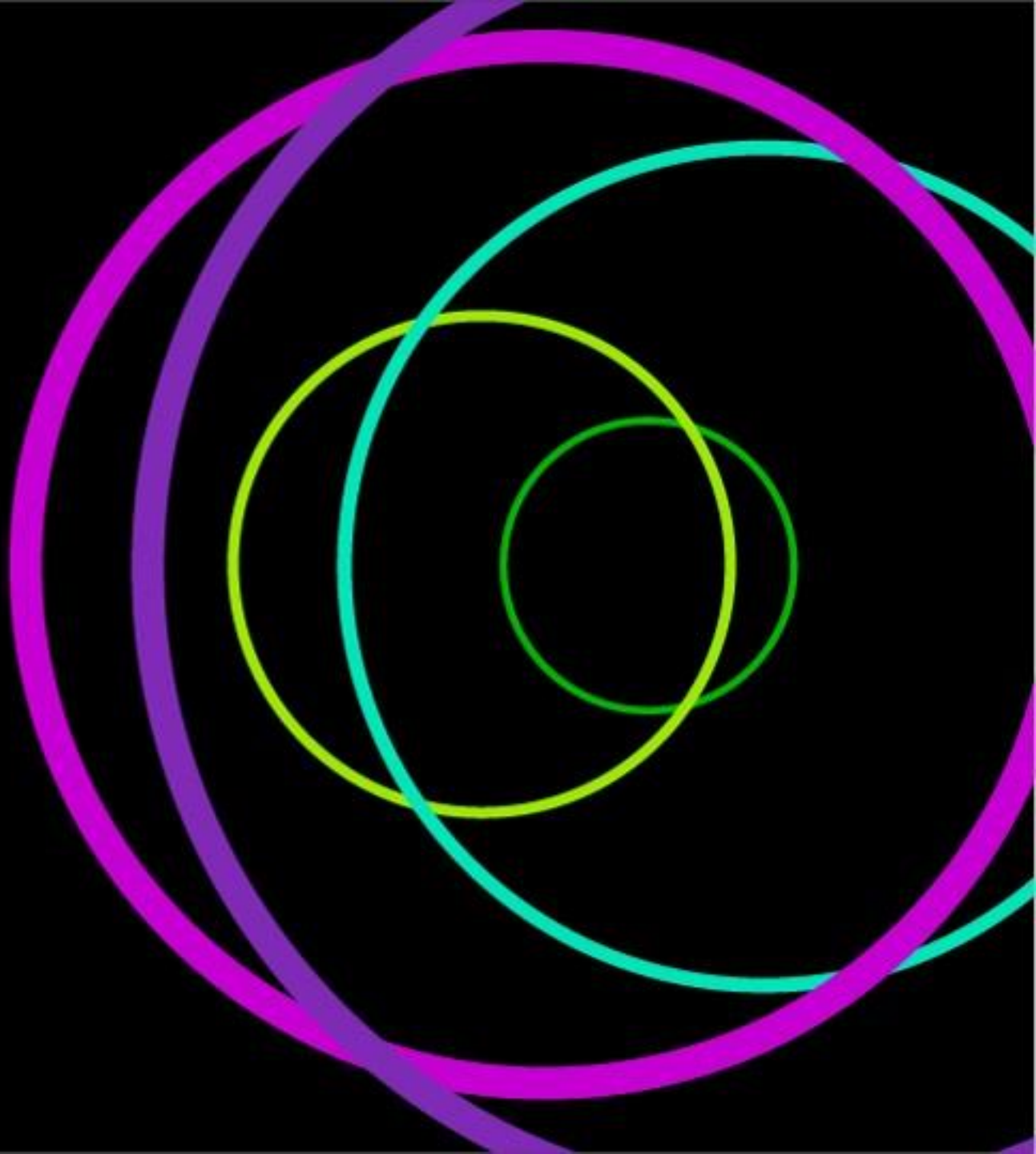
Urban audiences were more open to messages about air pollution in general, given the greater population density and use of cars, and we would recommend an initial focus on these audiences as traction builds around the issue

Those in urban areas were typically more concerned about the impact air pollution can have on the environment and their health due to the high number of cars and existing associations between traffic and air pollution

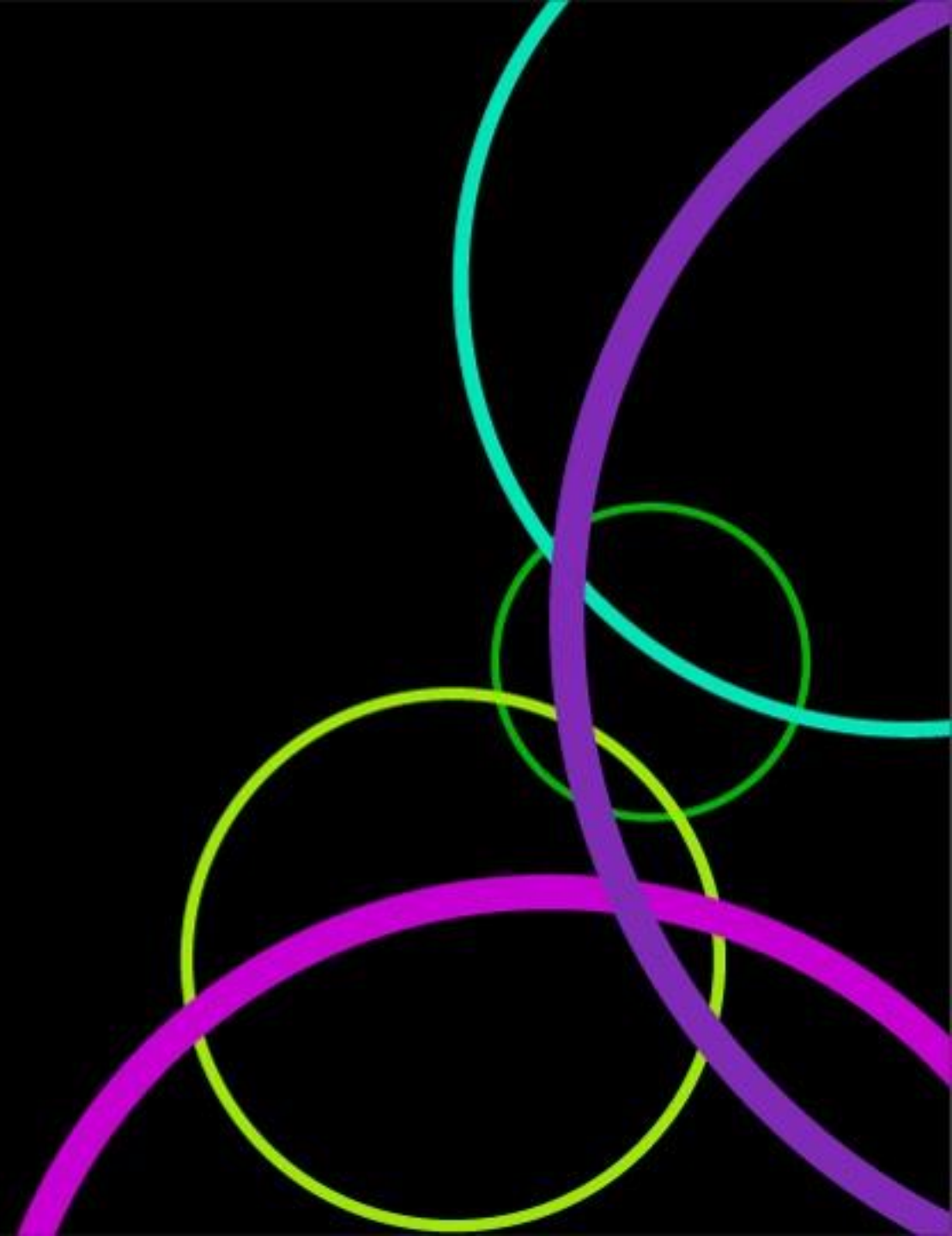
By contrast, woodburning was seen as more integral to rural culture and ways of living, with less existing air pollution and less potential for impact on others, leading to a sense that they shouldn't have to go through the same limitations as densely populated urban areas

Considering that 68% of indoor burners live in urban areas compared to 32% who live in rural areas, localised campaigns feel like the most effective approach at this early stage, starting with London

4
The Execute Stage



4.1 Background & Objectives



As part of the Execute phase, we used insights from the Explore phase to develop refined campaign concepts - which we then tested qualitatively

Phase 1 – *to understand current state of knowledge and define desired outcomes for future work*

- Evidence review – 6 documents including previous Kantar research into woodburning
- Stakeholder interviews – 5 stakeholders drawn from academia, government and industry
- Development of a problem statement, logic model and broad strategy to inform ongoing activity

Phase 2 – *to create insight into 'what works' to achieve desired outcomes and inform practical approaches to drive change*

- Platform development – development of creative territories for testing in research
- Primary research – focus groups with burners and non-burners

Define

Explore

Execute

Prove

Phase 3 – to develop and test a range of creative concepts & executions, to inform a campaign launch for Winter 22/23

- Appointment of a creative agency (DogCatandMouse) and development of creative
- Follow-up depth interviews (x8) with participants from the last round
- Creative development focus groups (x12) amongst burners and non-burners

Insights from previous phases informed the overall strategy as well as the brief for the creative agency to develop refined concepts for testing

Campaign Strategy:

Create a strong association between woodburning and air pollution, in relation to other known sources of pollution, to:

I. Raise awareness of the significant contribution that indoor woodburning makes to air pollution
II. Shift attitudes towards woodburning so that air pollution becomes a salient association
III. Create engagement with the issue and provide a platform for discussion
IV. Help to reduce the uptake of new indoor burners
V. In the longer term – open up greater space for political and legislative action

Audience:

Primary focus on preventing uptake focus amongst non-burners

Those who burn principally for pleasure / aesthetics (majority of 5% of those burning in London)

Tone of voice:

Conversational and avoiding 'blame & shame'

Acknowledging new information and shift in government stance

Understanding emotional appeal of fire

Media:

Digital-first campaign, supported by selective OOH

Budget also available for an additional multimedia or experiential element

Insights from previous phases informed the overall strategy as well as the brief for the creative agency to develop refined concepts for testing

Dramatise the facts

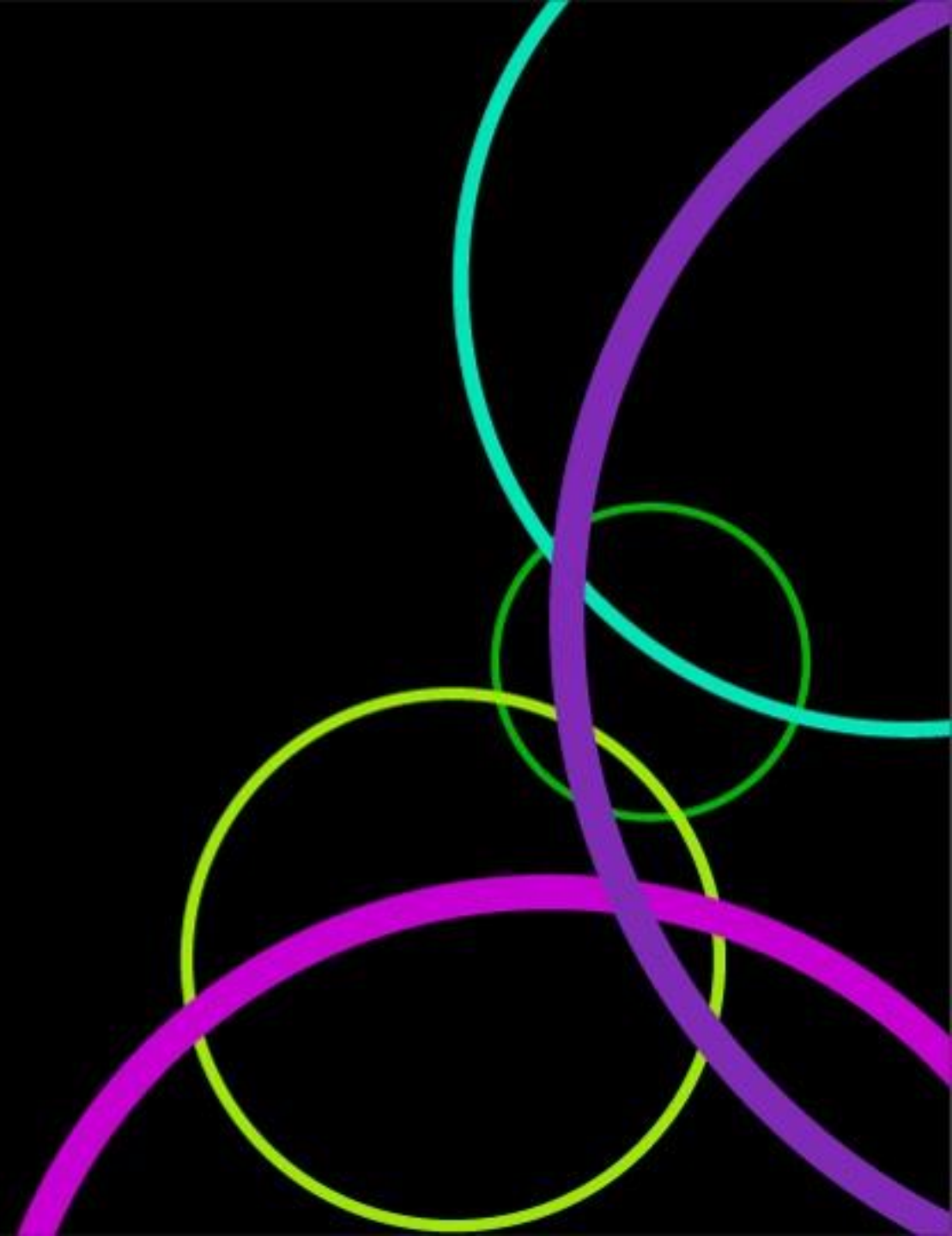
Subvert the lifestyle

Visualise the threat

Science has changed

Demonstrate the amount

4.2
Headline Findings



Headline findings

1. **The key audience groups for this work**: primary target of positive non-burners, and secondary audiences of current burners and neutral/negative non-burners, **all have very low awareness of the polluting impact of burners**. Most have **strong positive associations with burning but are open and keen to learn more** (e.g. don't dismiss harm-related messages) if engaged in the right way. **There is an additional challenge around rising energy prices** making burning more appealing than seen in previous research.

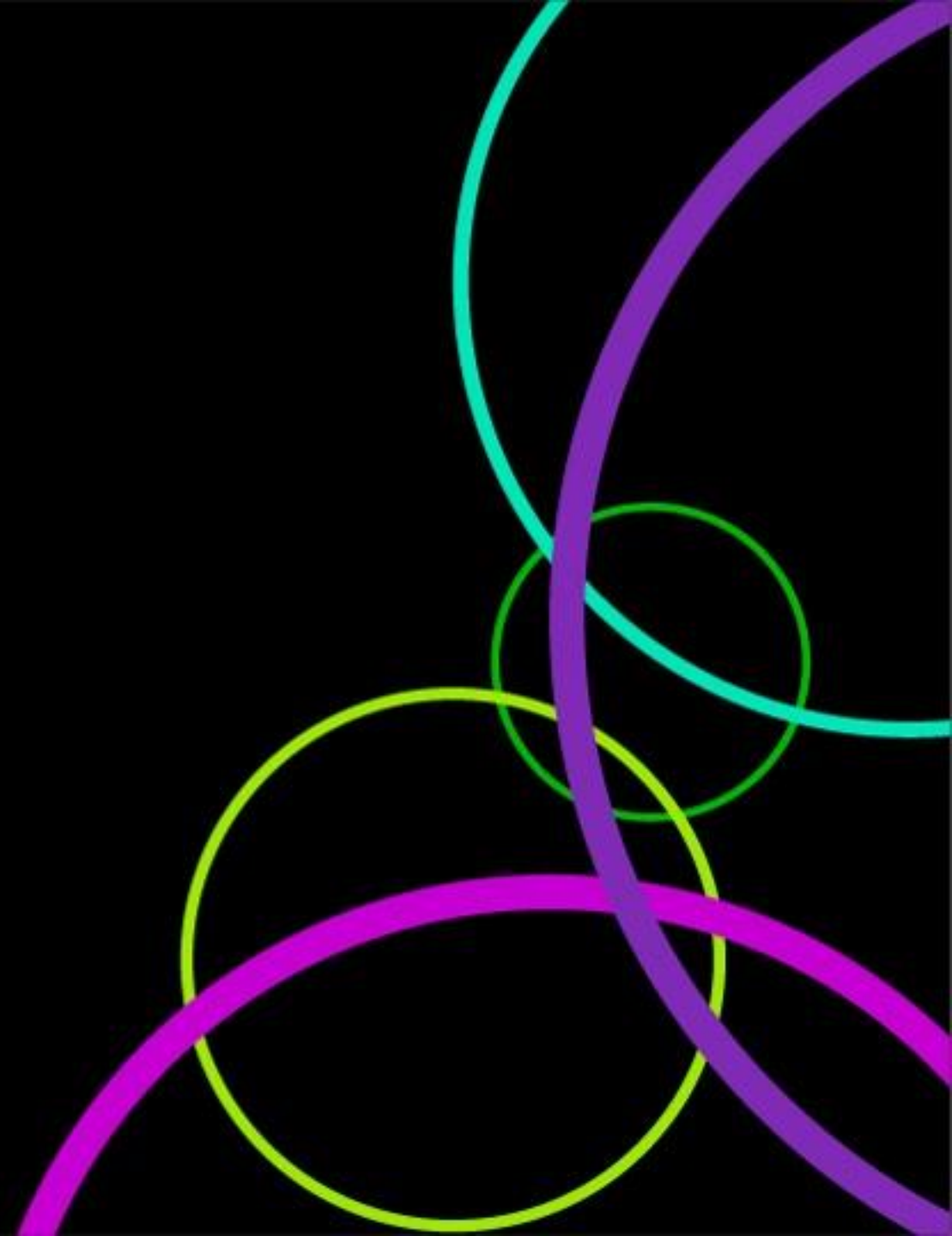
2. It will be crucial for the campaign to find the right balance, of an **approach can't be ignored** (strong message that creates an emotional connection) but **doesn't get dismissed out of hand** (especially messages which burners feel are personal attacks on them, feel too over-the-top). The strongest-performing routes shown across this stage do exist in this 'sweet spot'.

3. Of the 5 creative routes shown, **Dramatise the facts has the strongest overall idea and individual execution** in terms of getting across a **strong and powerful message** about the harms, reframing burning for all groups with a surprising but credible (when considered further) claim about pollution. **Showing the head-to-head HGV-burner comparison and the burner indoors** are particularly powerful and have better comprehension than other executions, and **we recommend taking the former forward**.

4. **The 'subvert the lifestyle'** route also has potential to be a powerful campaign: **thought provoking and shocking, and feels more precisely targeted at 'lifestyle' burners** mindset. There are some **optimisations required for this route around tone and clarity**, and with these we also recommend taking this idea forward.

5. The right **combination of messengers will be crucial to** the campaign for **breadth of coverage and credibility.** Explicitly **health-focused** organisations have the highest credibility and add further weight to the perception of burners as a public health issue demanding action. **Messengers also impact what audiences feel is the right tone** (a local government messenger has less 'permission' to be confrontational, aggressive).

4.3
Contextual Findings



Across most of the different audience groups we spoke to, there were consistent positive emotional associations with woodburners

Current burners	Positive non-burners (primary audience target)	Negative and neutral non-burners
• All own and regularly use a wood burning stove in their home • All 'lifestyle' burners (we excluded 'necessity burners' reliant on burning – although many did still claim that they burned to help save money)	• Actively considering or have an interest in purchasing a wood burner • Generally familiar with burners from the homes of friends or family, or in some cases holiday rentals	• **Negative**: active rejectors of wood burners • **Neutral:** undecided or have never considered purchasing a burner
• Associate burning with a lifestyle that revolves around atmosphere (warm, cosy, convivial) and with self-sufficiency • Burners acknowledge the hassle and responsibility, but also take pride in 'doing things properly' (e.g. good burning practice, avoiding danger)	• Very similar positive emotional associations as current burners • Stoves are an aspirational item capable of transforming a room or even a home	• Negative tend to see woodburning as a hassle and costly • Neutral have fewer strong associations than positive but still consider stoves aspirational

Alongside aspirational associations, functional considerations around costs emerged to have become more prominent than in previous stages

Explore stage research (2021):

- Cost savings sometimes mentioned by burners but rarely considered by non-burners when discussing benefits of purchasing a burner
- Cost more likely to be discussed as a barrier (cost of purchase and installation) than a potential upside

In these groups (May/June 2022):

- Cost of living, including spiralling energy prices, has made potential cost savings much more salient – and this is clearly an angle the Stove Industry is keen to push over the coming winter.
- Burning wood to save on central heating costs was raised spontaneously in almost every group (both burners and positive non-burners), suggesting that the public is likely to be receptive to messages about cost-savings.
- Some burners also discussed shifting from mostly 'lifestyle' burning towards more frequent burning as a primary heat source to save money towards the end of this burning season (and they expect this to be even more the case this winter with the price gap rise)

In contrast to previous discussions during the 'Explore' stage of research, impression that woodburning could help to save on heating costs starts to provide additional 'functional' motivations to burn

Consistent with previous research, findings indicated very limited awareness of the polluting impact of domestic wood burning

Current burners

- Most unaware of any health impacts (other than Carbon Monoxide) and assume burning is environmentally neutral at worst
- The minority of burners who have heard about pollution minimise impacts or justify behaviour – e.g. they 'burn right' (e.g. burn kiln-dried wood, keep the stove door closed) and see other less responsible burners as those who cause harm

Positive non-burners (primary audience target)

- Very little awareness of harms before pollution was discussed in the group (partly responsible for why they are 'positive')
- Many question: why there aren't more regulations or public discussion around burning if it so harmful?

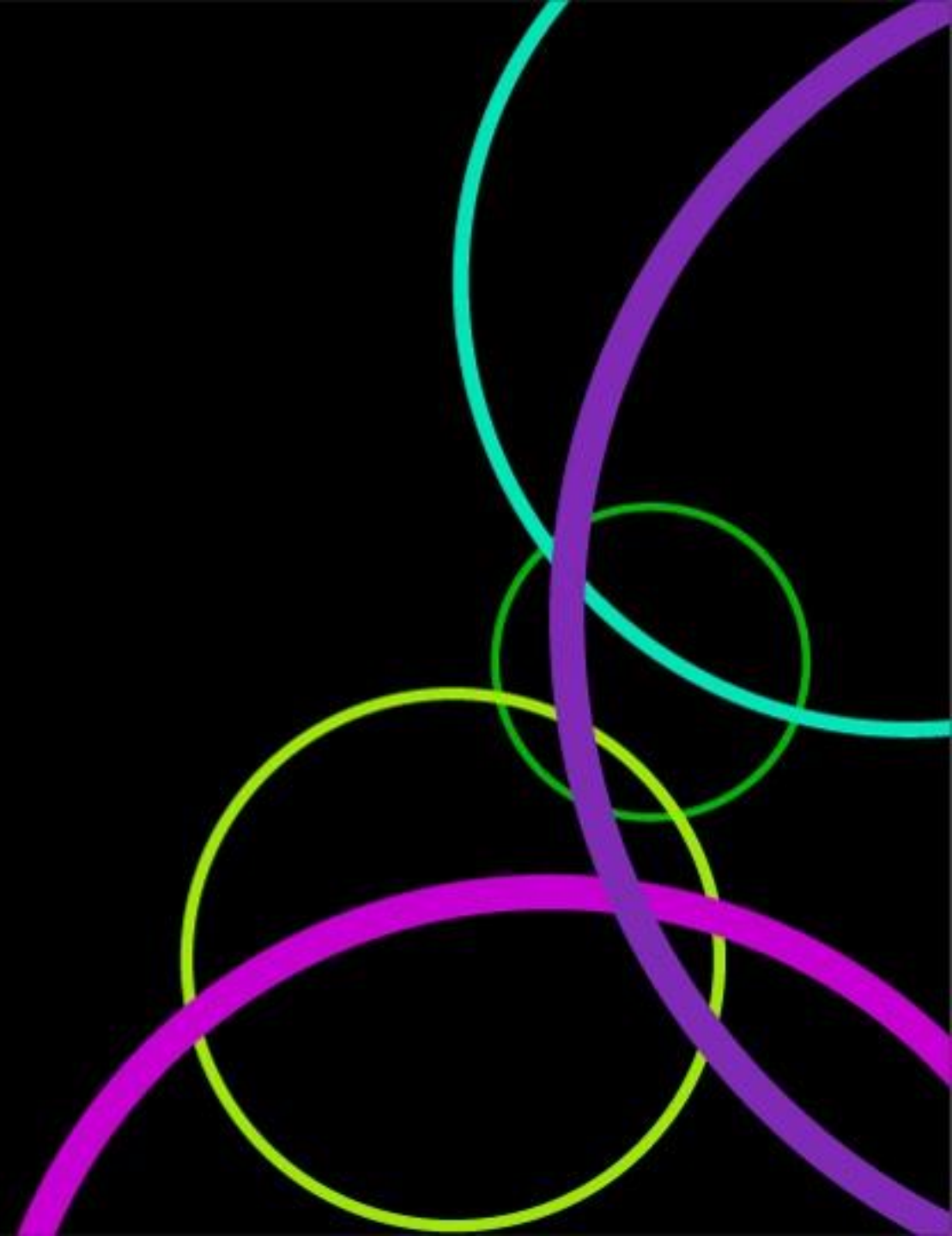
Negative and neutral non-burners

- More likely to have noticed news articles about the harms and pollution caused by wood burning, although still a minority
- May be more sensitive to pollution issues if their own personal health could be impacted - e.g. sufferers of asthma
- Negative non-burners were the most receptive to messages about harms, but had no intention to buy a burner anyway
  - ➢ We have considered this to avoid recommending approaches which only preach to the converted

In mixed groups, burners and non-burners learned about these harms together. This dynamic showed non-burners are understandably hesitant to appear judgemental to burners, **but** are not convinced by burners' attempts to dismiss the harms once the evidence is known.

Before materials were shown there were very limited associations between burning and harm – meaning the creative work was the first introduction to this theme for most participants.

4.4
Response to Creative routes



Burners and positive non-burners showed to be cautiously receptive once made aware of the impact, but a balance must be found to engage them

Too easy to ignore

- Communication is hampered by poor comprehension
- Do not generate an emotional response or engagement

'Demonstrate the amount'

'Sweet spot'

- Communicate 'new news' in a compelling and engaging way
- Create a strong emotional response without generating pushback

Some 'Dramatise the facts' and 'Subvert the lifestyle' executions

Too easy to dismiss

- Communicate new information but in a way that lacks credibility
- Create emotional withdrawal if perceived as an attack (burners) or for being too 'glib' or OTT (Positive non-burners)

Some 'Science has changed' executions

Messages relating to personal health and in-home pollution created the strongest responses - but were also met with considerable scepticism

- Messages stressing in-home pollution can be the most impactful, particularly for current burners, as they emphasise a personal risk to them and their families
  - ➢ This typically creates a strong desire to research further (although most feel they would not immediately change behaviour)
- However, at the same time these messages are also met with considerable scepticism – and so there would be a need for the evidence to stand up to close scrutiny
- By comparison, messages comparing woodburning to air HGVs can also be shocking and impactful, but place the stress on outside air pollution vs health, which is comparatively less impactful for burners in particular

Levels of harmful PM2.5 pollution are 3x higher in homes using wood burning stoves

Burning a wood stove for one hour gives off the same level of harmful air pollution as 18 diesel cars or 6 HGVs

Domestic woodburning contributes more harmful PM2.5 than road transport across the UK

The most effective approach may be to use a headline message about the amount of PM2.5 pollution created by the stove in comparison to known sources of pollution, and reinforce this with contextual cues to imply danger in the home

The ‘Demonstrate the amount’ route was at best considered powerful, thought-provoking, and easy to grasp

Dramatise the Facts

Overall response to the route	Optimisations
✓ **HGV comparison –** powerful first impression, shocking, creates a clear link to air pollution ✓ **Tone** strikes a good balance between driving impact whilst remaining bipartisan, creating engagement even amongst burners ✓ **Question** draw in the audience, allowing them to come to their own conclusions about harm ✓ **Very clear** and single-minded message and design aids communication × By contrast, executions showing the chimney/outdoor pollution were felt to be less powerful – primarily due to confusion over what is being shown	• Indoor context or the head-to-head comparison are felt to be more powerful executions • Clarity needed on ‘HGV’ – not understood by all without showing or using the word ‘lorry’ • Lorry itself could be made to seem more ‘dirty’ than current image • As with all routes, audiences expected to see a source to substantiate the claim and a call to prompt further action.

> *“I’m very surprised to know that the wood burner burns much more than a HGV, and I think it really makes you stop and think, you know?”*
>
> *(Non-Burner, Non-Burner Group)*

Executions showing the head-to-head comparison and the burner indoors had the highest impact

Dramatise the Facts

- Consistently felt to be striking, making the stove look sinister and threatening rather than cosy/homely
- Jarring size contrast has strong impact, creates shock
- Framing the harm as a question draws the audience in, creating engagement with the message and prompting many to say that they wish to find out more
- 'Six times more polluting' potentially needs clarification – e.g. increased clarity that this refers to air pollution

- Execution with the in-home setting feels more impactful than the chimneys, as the threat feels more personal/direct.
- Something more polluting than an HGV sat inside the family home is uncomfortable and prompts positive non-burners to reconsider
- 'Still want one?' is less effective a question than 'guess which one…'
- More likely to be dismissed by burners, or those familiar with stoves, as this doesn't reflect how burning actually occurs

This route was also tested with the alternative message: *"Domestic woodburning produces more harmful PM2.5 air pollution than all UK road traffic combined"* – this *was* also shocking, but felt to be less powerful as 'PM2.5' isn't understood and feels like a caveat.

‘Subvert the lifestyle’ was found to be thought-provoking and best executions positively subversive

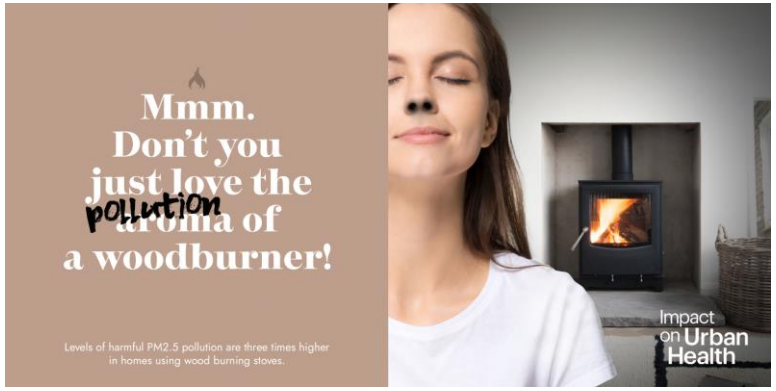
Subvert the Lifestyle

Overall Response

- ✓ The overall idea is surprising and impactful
- ✓ **Creates a strong double-take effect** and certainly is effective at disrupting the conventions, as intended
- ✓ **There is immediate clarity of message** about the danger of wood burners
- ✓ This route is felt to have **the most specific intended audience** (middle-class, lifestyle burners) where others feel more general (worth noting this did make it easier for burners to dismiss as ‘not people like me’)
- × **The tone is divisive** - some of the headlines and visual devices (e.g., the gas mask) provoke a strong defensive reaction which risks outright dismissal from burners and positive non-burners (too extreme, glib, “sarcastic” for a serious topic)

Optimisations

- The more confrontational, subversive tone caused audiences to assume the messenger would be a campaigning organisation (e.g. Extinction Rebellion) - **having a known health-focused messenger** (e.g. A&L UK) could therefore strengthen credibility
- **‘Harmful PM2.5’ is distracting** - audiences responded more positively to a simpler line about ‘harmful air pollution’
- Some headlines and the image showing the woman felt **too sarcastic/glib**
- At first glance, some executions **do risk looking appealing** and reinforcing aspirational status - the execution with the ‘danger’ tape over the stove most clearly avoids this issue



> *“I think what they’ve done in this one is really clever. Your first thought is how nice it looks then you realise something’s wrong…”*
> *(Positive Non-Burner)*

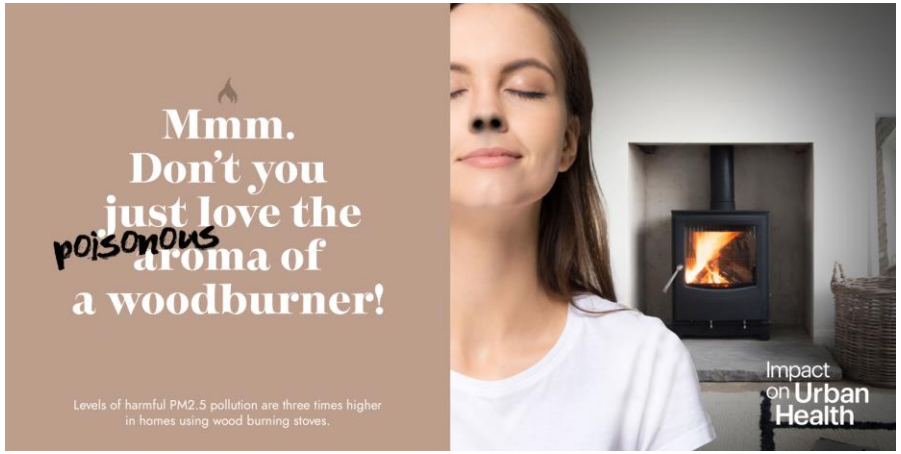
> *“Feels more aimed at a middle class couple who might want a stove to add value to their home.”*
> *(Burner, mixed group)*

The execution with the ‘danger’ tape had the strongest impact and cut-through of this route

Subvert the Lifestyle

- ✓ Tape is visually striking and obviously disrupts the aspirational image straight away – considered sinister but not over the top and is more obvious than the gas mask, which can also carry negative associations
- ✓ Graffiti text describing ‘pollution/pollute’ seen as soot from burning
- ✓ Tone doesn’t feel as glib/sarcastic as other executions in this route
- ✓ Claim around raised pollution levels **inside the home** is a powerful message and does prompt further action (more discussion later on)

We recommend taking an adapted version of this route forward.



Other executions have more offputting elements - e.g:

- × Seen as ‘attacking’ / making fun of a victim – jarring with a public health message
- × Nostrils full of smoke: easy to miss, jokey/ludicrous when noticed
- × ‘Poisonous’ felt too strong and not as accurate as ‘pollute’ / ‘polluting’
- × Burners also commented that the ‘aroma’ is not a particular positive of having a stove (vs e.g. an open fire) as the door is closed

The cigarette analogy in ‘Science has changed’ could be impactful, but for some the comparison was too far-fetched or unfairly demonises burning

Science has Changed

Overall Response	Implications
✓ The comparison is viscerally impact and some executions are also visually striking ✓ Implies a strong health risk and can help to generate a sense of personal jeopardy ✓ Imagery used disrupts the cosy in-home associations with burners × The comparison feels too farfetched for many non-burners - and offensive to some burners, causing them to dismiss the message outright × In the context of rising fuel prices, some felt the equivalence is false (heating the home is functional vs a personal choice) × For some, feels like an anti-smoking campaign at first glance × There is confusion and some pushback around perceived ‘attacks’ on scientists	• **We don’t recommend proceeding with this route in the next round of creative development** • Whilst the health message can be powerful, there are questions around the extent to which the evidence is able to support the comparison with smoking • Seen to ‘demonise’ burners, creating a moral equivalence with smoking, which is not seen to be fair and creates strong negative pushback

> *“It does make you think, but the comparison with cigarettes just doesn’t feel right to me. It feels like that’s going too far.”*
>
> *(Non-Burner, Mixed Group)*

‘Visualise the threat’ was not understood in its current form, but may be a potential approach for campaigns further down the line

Overall Response

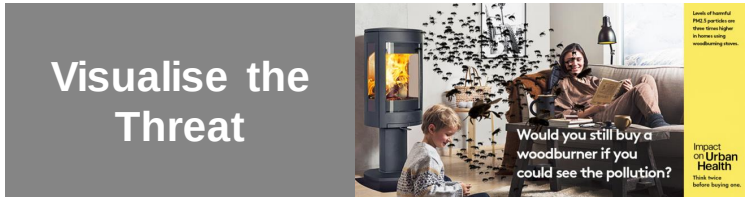
- ✓ Showing the ‘cosy’ domestic scene with the child is very striking and powerful, provoking a strong response, particularly from those with families.
- ✓ The idea of visualising pollution – when understood – can be seen positively
- ✓ Drawing the audience in with a question is also thought-provoking (although tonally here can feel somewhat sarcastic)

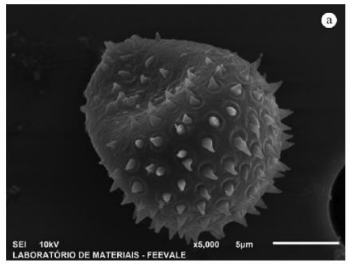
- × All groups struggled with comprehension: the use of insects to visualise the harm was not understood and felt too disconnected from burning to be a powerful analogy – especially coming to this with low incoming knowledge of harms
- × Lack of comprehension reinforced by a lack of understanding that pm2.5 is invisible, so questions around why visual doesn’t just show smoke?

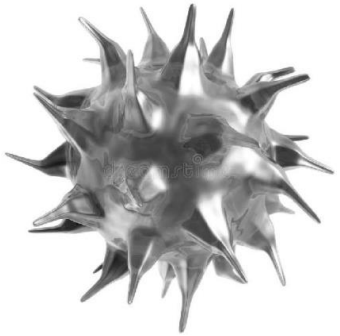
Overall this does not feel right for year one of the campaign – but if an effective way of visualising harmful pollution is identified, then could be a powerful approach for later in the process when focus of the campaign switches from education to a more single-minded focus on strengthening negative emotional associations

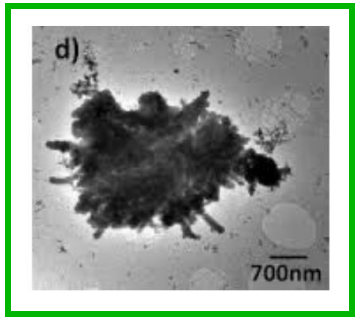
> “*I do think it’s good to try and turn that **cosy scene with the family upside down,** but I just find the wasps **too distracting**. It’s not making me think about the burner it’s making me think about the massive wasp flying to the child’s head…*”
>
> *(Neutral non-burner)*

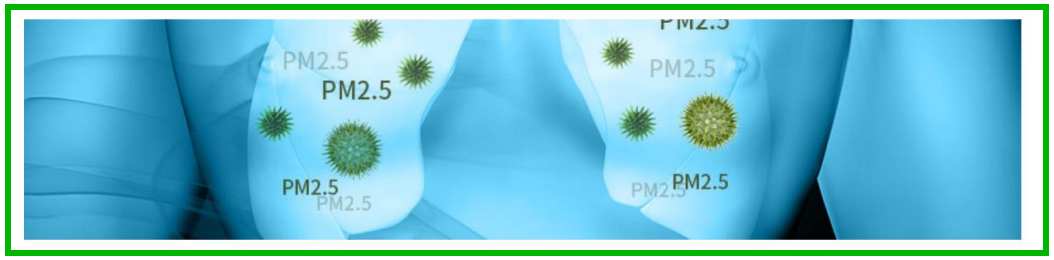
We also tested alternative visual representations of the threat created by woodburning











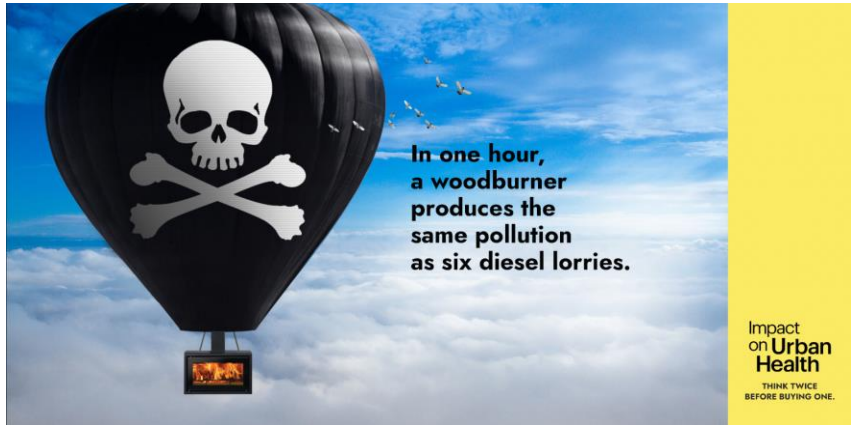
- Some alternative visuals to the insects were felt to be more effective and less distracting, with potential to increase the impact of this route
  - Particle ‘d’ (top right) was felt to look sinister and threatening whilst retaining a clear link to smoke
  - PM2.5 in the lungs (centre) – felt the most powerful and viscerally uncomfortable representation of harms of pollutants, although there is a strong pushback on anything that resembles Covid
- More abstract shapes and warning signs lacked visual impact and were considered too cartoonish or surreal

Overall, for this route to be effective, it feels like there is a need to first create a clear link between woodburning and air pollution to aid comprehension and feed engagement

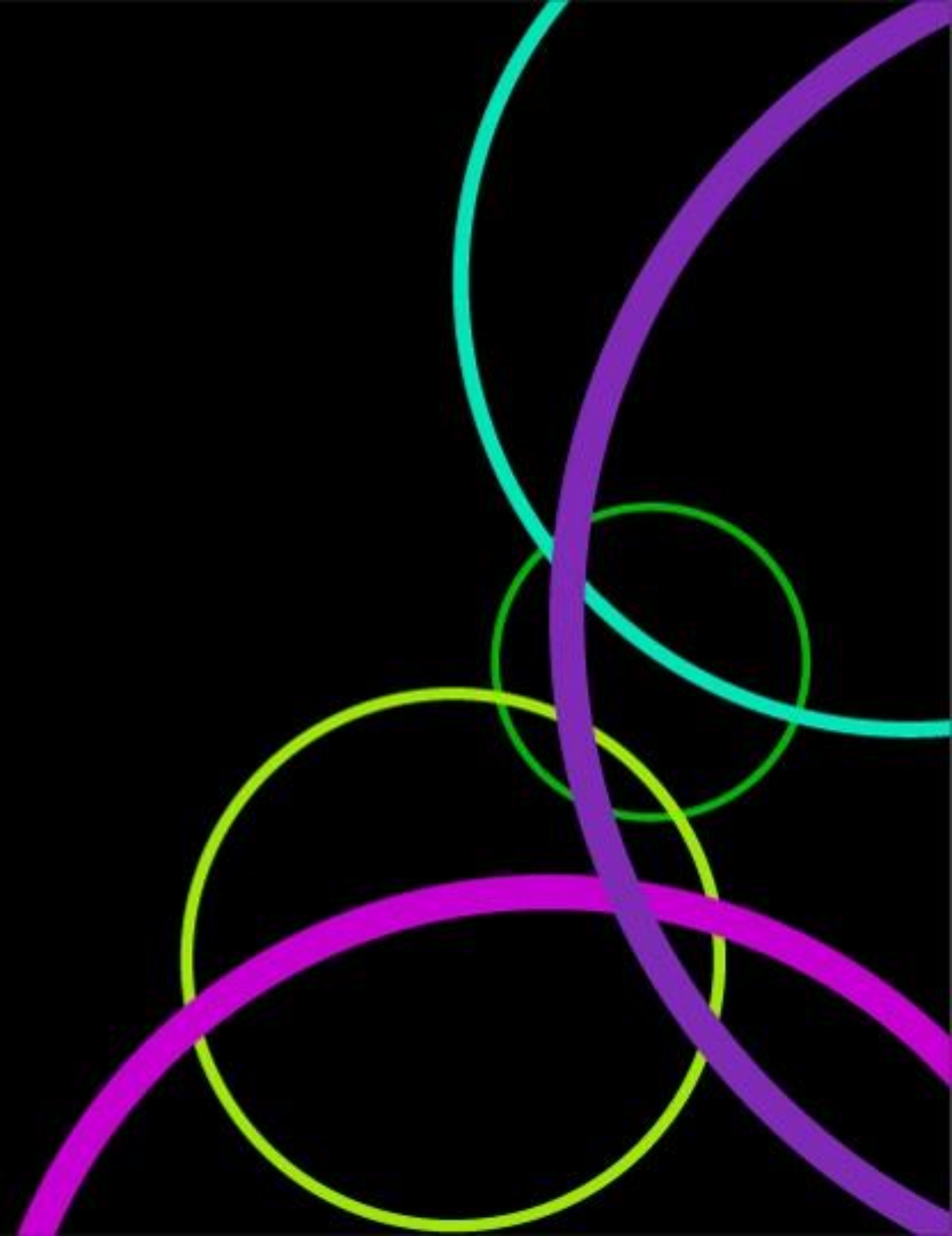
‘Demonstrate the Amount’ was felt to be difficult to understand and lacked the emotional impact of other routes

- Comprehension was a consistent issue with this route
  - Most felt that the link to woodburning was unclear, with the stove presented out of context
  - Audiences were also unsure of the role of balloons and did not see the link with traffic
- Compared to the routes, this route also did not create any strong emotional reaction, falling relatively flat across groups

NB This route was dropped after pilot testing to allow additional time to explore other creative routes in more depth.



4.5
Endlines & Branding



‘Be enlightened. Don’t light them.’ and ‘Please take care of our air’ consistently emerged as the strongest end-lines

Be enlightened. Don’t light them.

Please take care of our air.

- Both have a clear ‘ask’, giving the audience a sense of responsibility and prompting a behaviour change.
- Feel the most memorable of all the options
- Broadest appeal across audience groups: resonating with burners **and** non-burners (whereas).
- Both work across a range of creative ideas (feel the most flexible as we develop the campaign toolkit further)
- ‘Please take care…’ emerges as the slight favourite overall

Think twice before buying one.

Now you know, please say no.

Make your house non-smoking.

They don’t have a place in our homes.

Put them out.

- ‘[Please] think twice before buying one’ also had high impact and is targeted more precisely at the ‘primary’ audience – this does have potential as well, but does lose some of the power for prompting current burners to change behaviour
- Other lines were seen as less memorable or more limited to specific groups – with those asking burners to stop seen as unrealistic

Audiences were also keen to see some form of signposting to further information, or actions they could take to learn more

- **On the advert itself** audiences expect to see a web link, suggested search term, or QR code to a landing page
- **Search engine to 'do my own research' –** all are positive keen to feel in control of the research process rather than be lectured to. Search terms discussed include: 'wood burning and pollution' or 'wood burning danger'
- **Landing page with references** for the key claims, further reading and guidance for burners
- **Onward signposting to burn better campaign** would be welcomed and highly valued by burners, but don't recommend signposting to this from the advert itself, as can then think burning better removes any significant risk

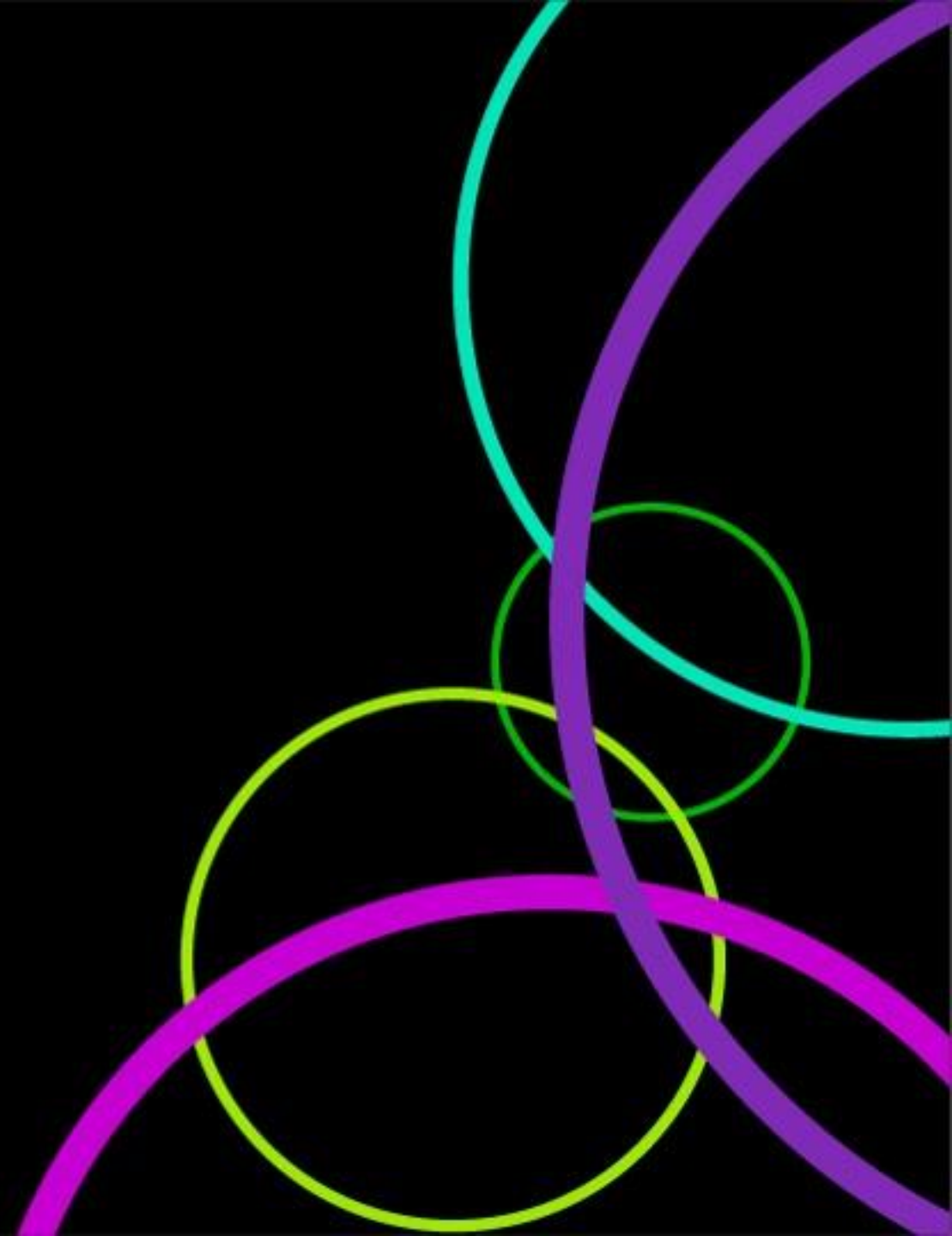
> *"**The first thing I'm going to do after this group is google burning and pollution** and start my own research! All of these ads need something that tells you, 'to find out more or if you're worried, go here for the facts…'"*
>
> *(Burner)*

There is a clear need to prompt audiences to 'learn more' in the right way due to the contested discussions and misleading/incomplete information about the impact of wood burning.

Having a broad range of messenger organisations, particularly health-related messengers, showed to be important to build credibility

- **The broad range of messengers (particularly health and environmental related) adds credibility** particularly key when delivering this new and surprising information
- **Health-focused (especially Asthma & Lung UK) are most powerful messengers,** reinforcing the implication of a health threat without the need to spell this out directly in the execution.
- **Others (environmental charities, Mayor / GLA) have strong multiplier effects as part of a broader coalition.** In particular, the Mayor & GLA add credibility from awareness of previous air quality work, but some cynicism from the most hostile audiences (e.g., references to diesel cars)
- **We also saw a strong desire for tact if the messenger is local government** – audiences felt that necessity burners at greater risk of fuel poverty this winter should not feel 'attacked' in this case

4.6
Conclusions & Next steps



On the back of the qual, we suggested taking forward these executions from ‘Dramatise the amount’ and ‘Subvert the lifestyle’ as these showed to have the strongest potential to meet our objectives across the key audience groups

- Simple and focused design aids clear communication and forges a link between woodburners and air pollution
- ‘Shocking’ comparison successfully suggests that woodburners are significant contributors to air pollution
- Framing around a question invites engagement and allows viewer to better ‘own’ new information and inferences about health impact

Greater focus on outside pollution

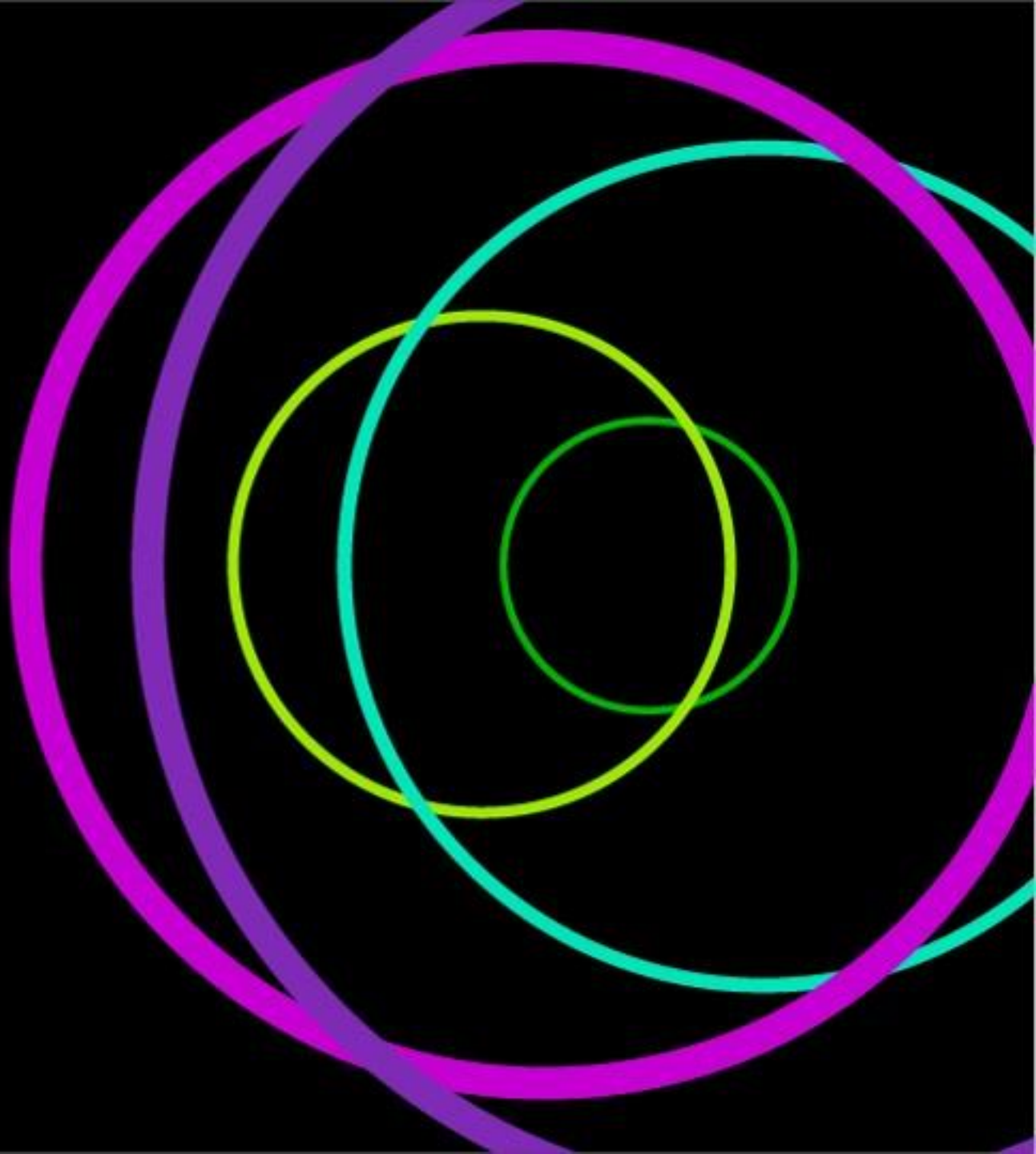
Is it possible to boost health cues (e.g. via sponsoring organisations)?

- Overall design clearly understood as a ‘subversive’ take on lifestyle magazine adverts
- Danger tape clearly signifies harm and in-home setting can suggest personal health impacts
- Seen to be focused specifically on those who burn as a lifestyle choice and to undermine aspirational status (meaning that some burners can dismiss)

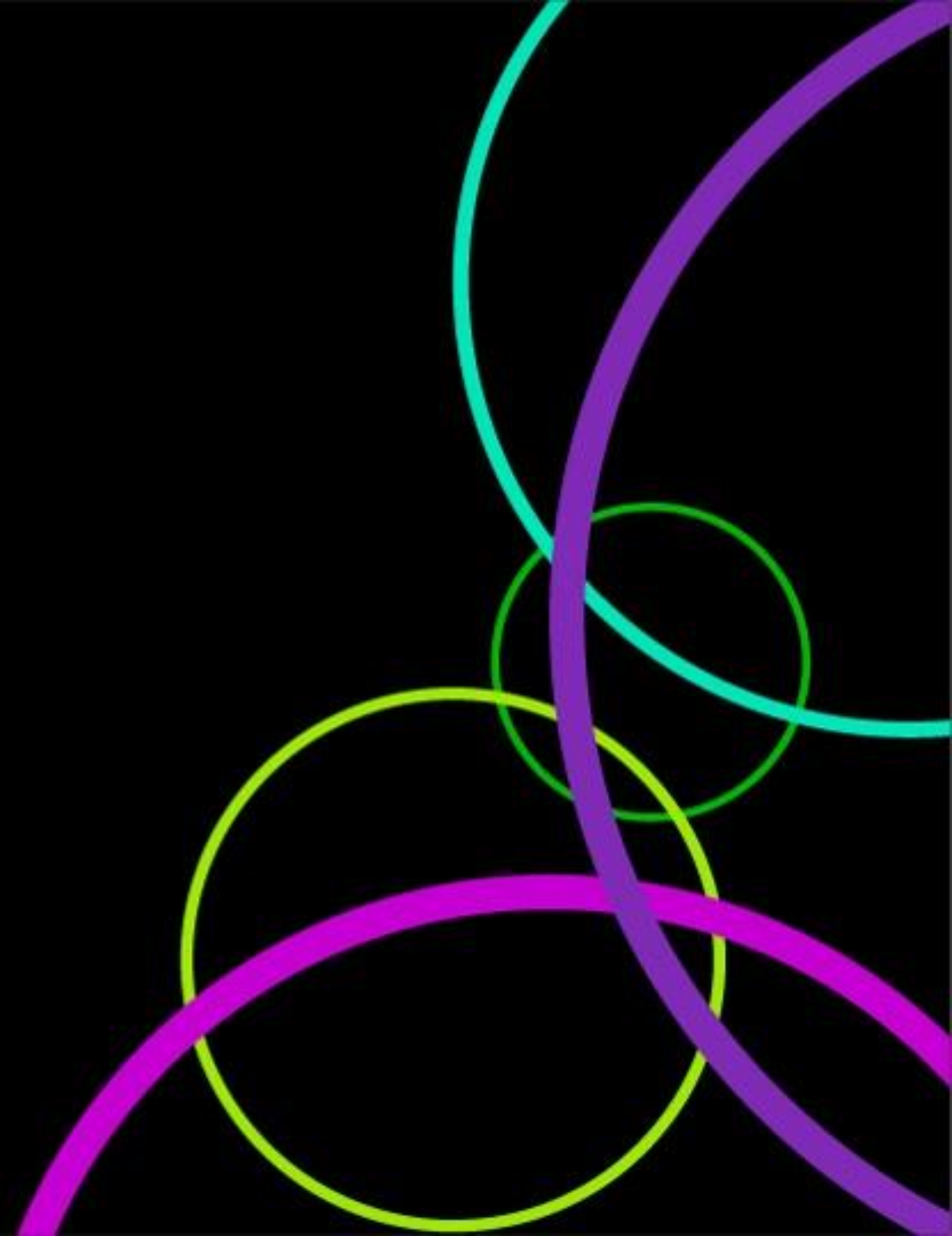
Greater focus on indoor pollution and health

Do claims about health stand up to scrutiny?

5
The Prove Stage



5.1 Background & Objectives



Finally, we carried out the Prove stage – which provided us with quantitative evidence as to what works

Phase 1 – *to understand current state of knowledge and define desired outcomes for future work*

- Evidence review – 6 documents including previous Kantar research into woodburning
- Stakeholder interviews – 5 stakeholders drawn from academia, government and industry
- Development of a problem statement, logic model and broad strategy to inform ongoing activity

Phase 2 – *to create insight into 'what works' to achieve desired outcomes and inform practical approaches to drive change*

- Platform development – development of creative territories for testing in research
- Primary research – focus groups with burners and non-burners

Define

Explore

Execute

Prove

Phase 3 – to develop and test a range of creative concepts & executions, to inform a campaign launch for Winter 22/23

- Appointment of a creative agency (DogCatandMouse) and development of creative
- Follow-up depth interviews (x8) with participants from the last round
- Creative development focus groups (x12) amongst burners and non-burners

Phase 4 - *Quantitative testing of lead routes in the Behaviour Change Lab*

- Three-arms experiment testing 'Subvert the Lifestyle' and 'Dramatise the facts' vs control
- 1500 UK home-owners from major cities, with 89% from London.

Based on Execute stage findings, we took forward ‘Subvert the lifestyle’ and ‘Dramatise the facts’, but with some tweaks in response to political concerns

Subvert the lifestyle.

Test amended in response to concerns about directing public around heat sources in context of energy & cost of living crisis

“*Warm your home with a woodburner*”

“*Complete your home with a woodburner*”

Dramatise the facts.

Immediate campaign launch tabled and text amended in response to concerns about undermining ULEZ communications

“*Guess which one pollutes more?*”

“*They both pollute. But which one is worse?*”

NB. The “Healthy air” logo is not of an actual organisation – we used it as placeholder for purposes of the research.

Our initial aim was to develop a campaign to be rolled out during winter 2022 - however due to concerns about the rising cost of living, a decision was made to postpone the campaign and focus on developing an information hub instead

Campaign roll-out

- Full campaign development by DCM
- Roll-out of the campaign in winter 2022, across several channels – from social media to billboards
- Post-launch evaluation of the campaign's reach and influence.

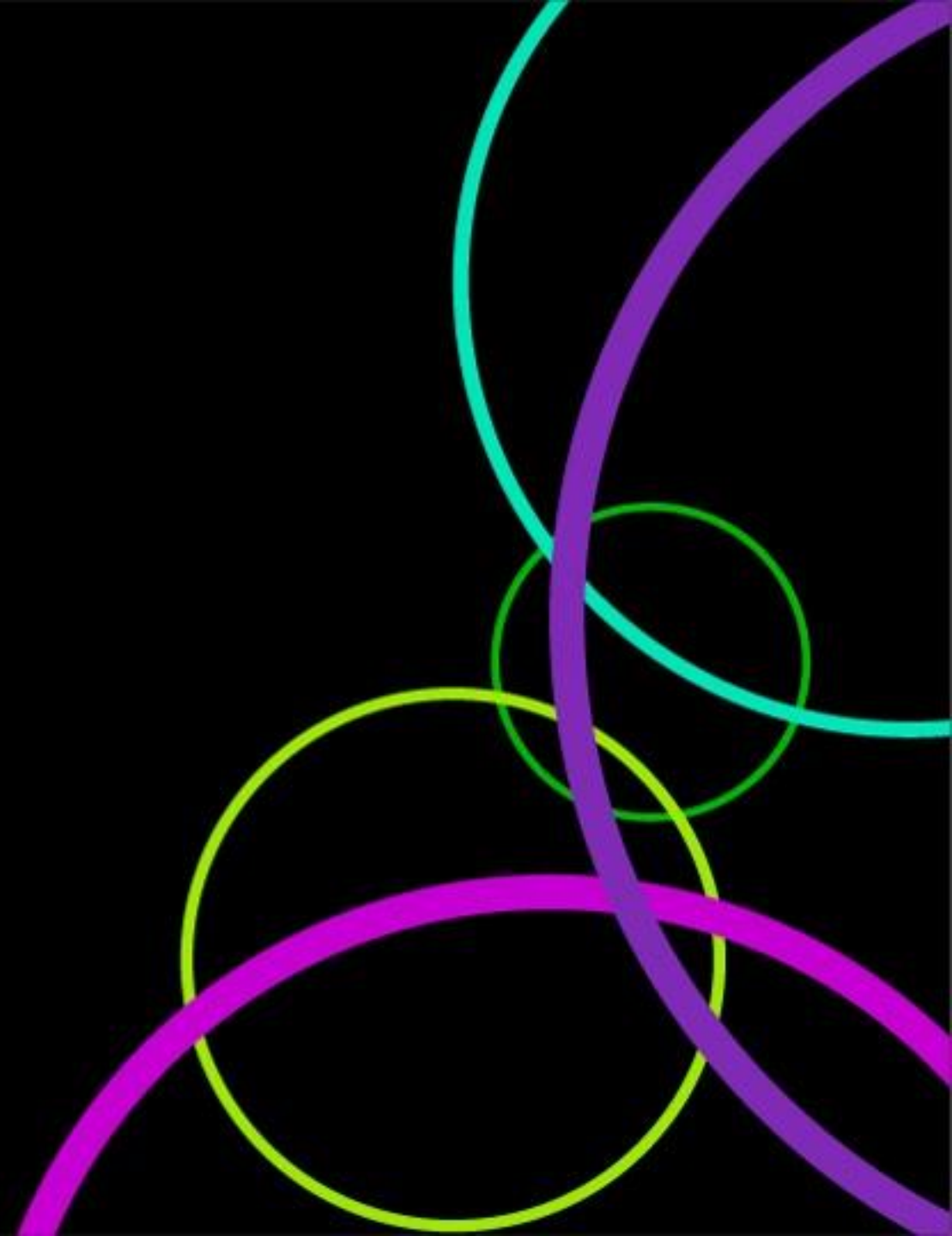
Information hub (GAP)

- A bespoke page on existing Clean Air Hub to provide information around the harms of woodburning
- Development of simpler communication concepts distributed via paid for digital channels and assets for local councils/other orgs to share on social media

Strategic toolkit

- A summary of the key research insights so far
- A clear guide on how to communicate to the public around woodburning, in terms of e.g., messaging, tonality, and media channels.

5.2
Headline Findings



Headline findings

1. **The 'Dramatise the facts' concept had a statistically significant impact on our primary outcome measure**, with those seeing this intervention 37% more likely to say they are concerned than in the control group

2. **This finding is supported by responses to secondary outcome measures**, including relative levels of concern around health & climate; relative ranking of indoor woodburning as a source of air pollution against other sources; and relative claimed likelihood of discussing the negative impacts of woodburning stoves with friends and family

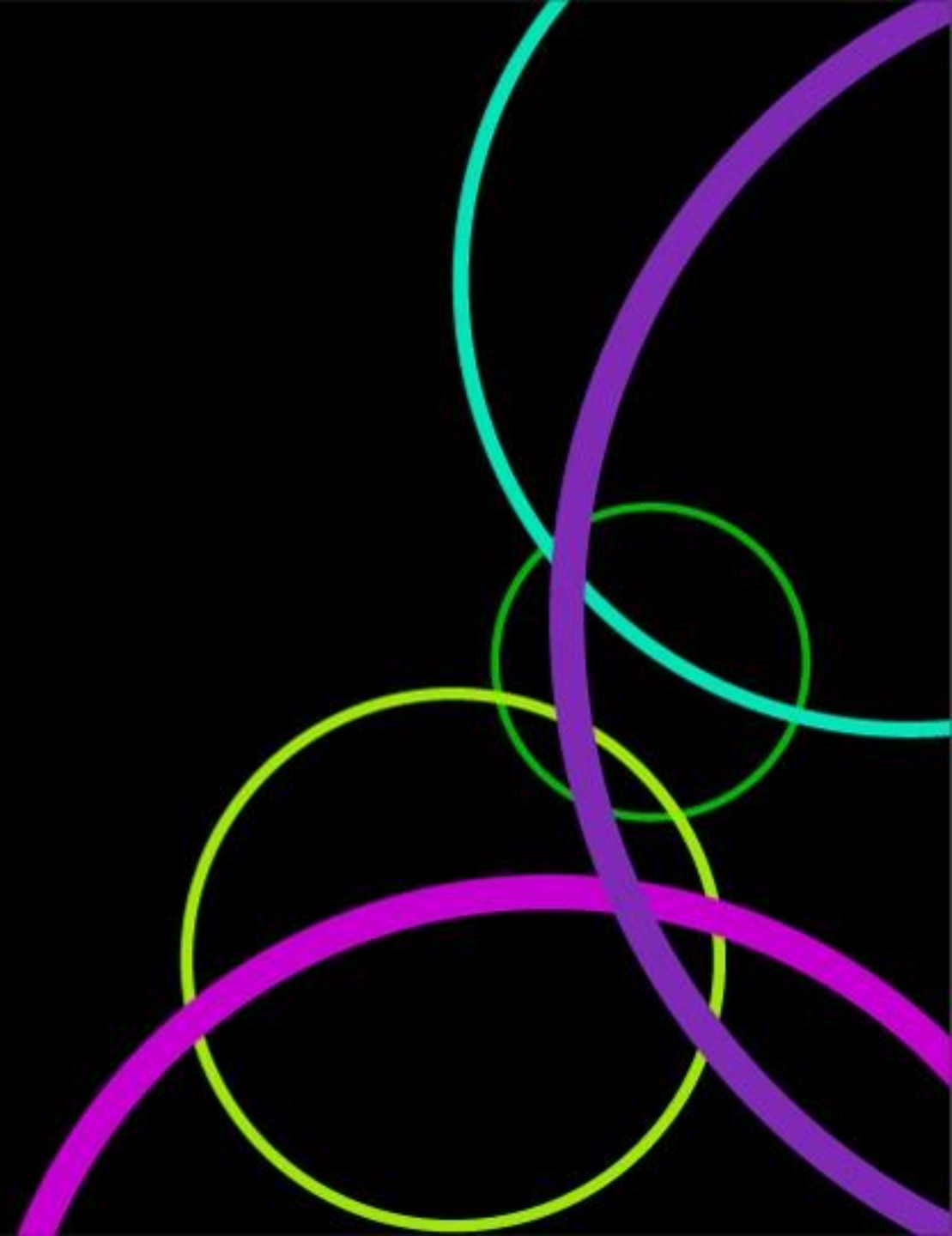
3. By contrast, **the 'Subvert the lifestyle' concept was not more effective than the control at changing attitudes towards woodburning** - this may to some extent be due to the format (Instagram rather than in a lifestyle magazine) and last minute changes to the copy in response to cost of living concerns

4. **The relative ranking of woodburning as a contributor to air pollution compared to other sources**, which was ranked lowest overall for all groups, including 'Dramatise the Facts', **is consistent with findings from the qualitative research** that there are low and entrenched levels of understanding of woodburning's true contribution

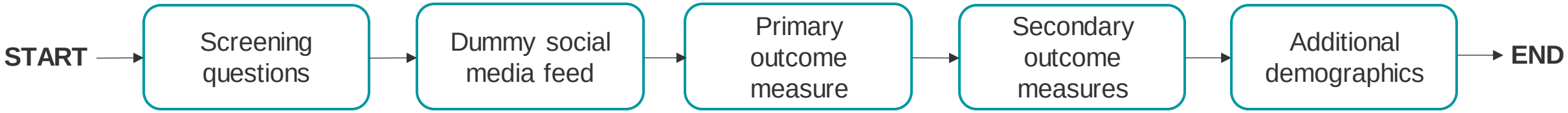
Headline findings

5	Of the 4 in 10 participants who reported themselves likely to follow up the link in the post, there was **a greater interest in finding out how woodburning affects air pollution than in understanding health impacts or finding out how to reduce impacts** – which is consistent with qualitative findings that creating this link is a first step towards further engagement
6	**Existing owners of woodburners in the sample were more likely than others to say that they are unconcerned about woodburning** and more likely to express intentions to purchase a woodburner in the next 12 months, which is consistent with findings from the qualitative research that this group is already invested in the behaviour and will be more challenging to impact via communications
7	Overall**, findings support the strategy emerging from the Explore stage to very clearly establish woodburning as a significant source of air pollution relative to other known sources**, prior to directly addressing health impacts, as an impactful way of building concern and engagement around the issue – although there was no difference in propensity to want to find out more or purchase intentions across groups
8	However, **findings also indicated a small potential backfire effect from the current iteration of 'Dramatise the facts'**, with the relative ranking of road traffic as a source of air pollution slightly lowered compared to other sources in response to the upranking of woodburning stoves as an issue

5.3
Methodology



We recruited 1,501 urban homeowners from Kantar's LifePoints panel - with a focus on London and quotas set for age and gender



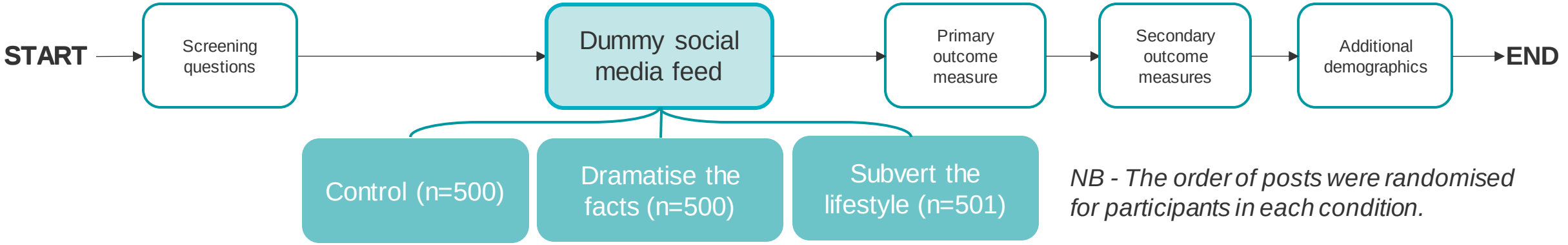
- The study population was UK homeowners aged 16-64 in London and other urban areas - older homeowners were excluded due to low coverage in online panel samples
- The sample (N = 1,501) was recruited from Kantar's LifePoints panel, with recruitment focused on panel members in London (76% of the final sample)
- We set parallel quotas to ensure the final sample would be representative of the target population with respect to age and gender, with quota targets derived from 2020-21 English Household Survey estimates
- Ineligible respondents or those from quotas that had already been filled were screened out at the start of the study

Quotas

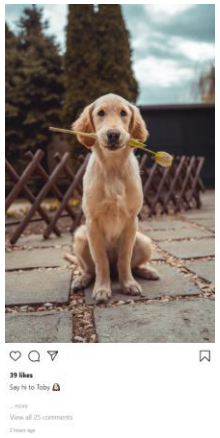
Gender	
Female	Male
50%	50%

Age				
16-24	25-34	35-44	45-54	55-64
1%	17%	24%	28%	30%

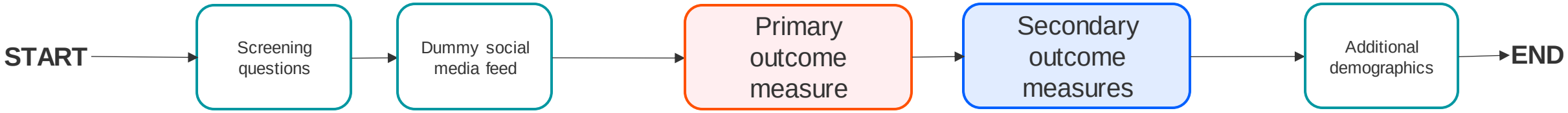
We randomly allocated participants to one of three arms, to determine which post would be shown within a dummy social media stream to mitigate response bias



NB - The order of posts were randomised for participants in each condition.



We then asked participants how concerned they were about the effect of woodburning stoves on air pollution, alongside a range of secondary measures, to uncover any differences between the treatment and control conditions



The **primary outcome measure** **was concern about woodburning**, measured on a seven-point Likert scale ranging from extremely unconcerned to extremely concerned.

Specifically, participants were asked:

"On a scale from 1 "Extremely unconcerned" to 7 "Extremely concerned" …

How concerned are you about the effect of indoor woodburning stoves on air pollution?"

The **secondary outcome measures** included:

- Participants' **attitude towards woodburning** and their belief on the **safety of indoor woodburning**
- Participants' concern on the **effect of indoor woodburning on health** and **the environment**
- How participants **rank the contribution of indoor woodburning to air pollution**, compared to other sources of air pollution
- **How informed** participants feel about indoor woodburning, their **knowledge** of indoor woodburning, whether or not they would like to **know more about woodburning** and whether or not they would **seek more information** about woodburning.

To ensure findings are correctly interpreted, it is important to note some limitations of online experiments as a methodology and of this study specifically

1 Longevity

The results we obtained were measured followed a single exposure. In the real world, people may be exposed multiple times over the course of a campaign with the aim of a persistent change in attitudes.

2 Context dependence

The results we obtained are contingent to the context in which fieldwork took place, so a change in context might lead to different results. In particular, fieldwork took place during a period of rising fuel prices with high levels of concern around cost of living.

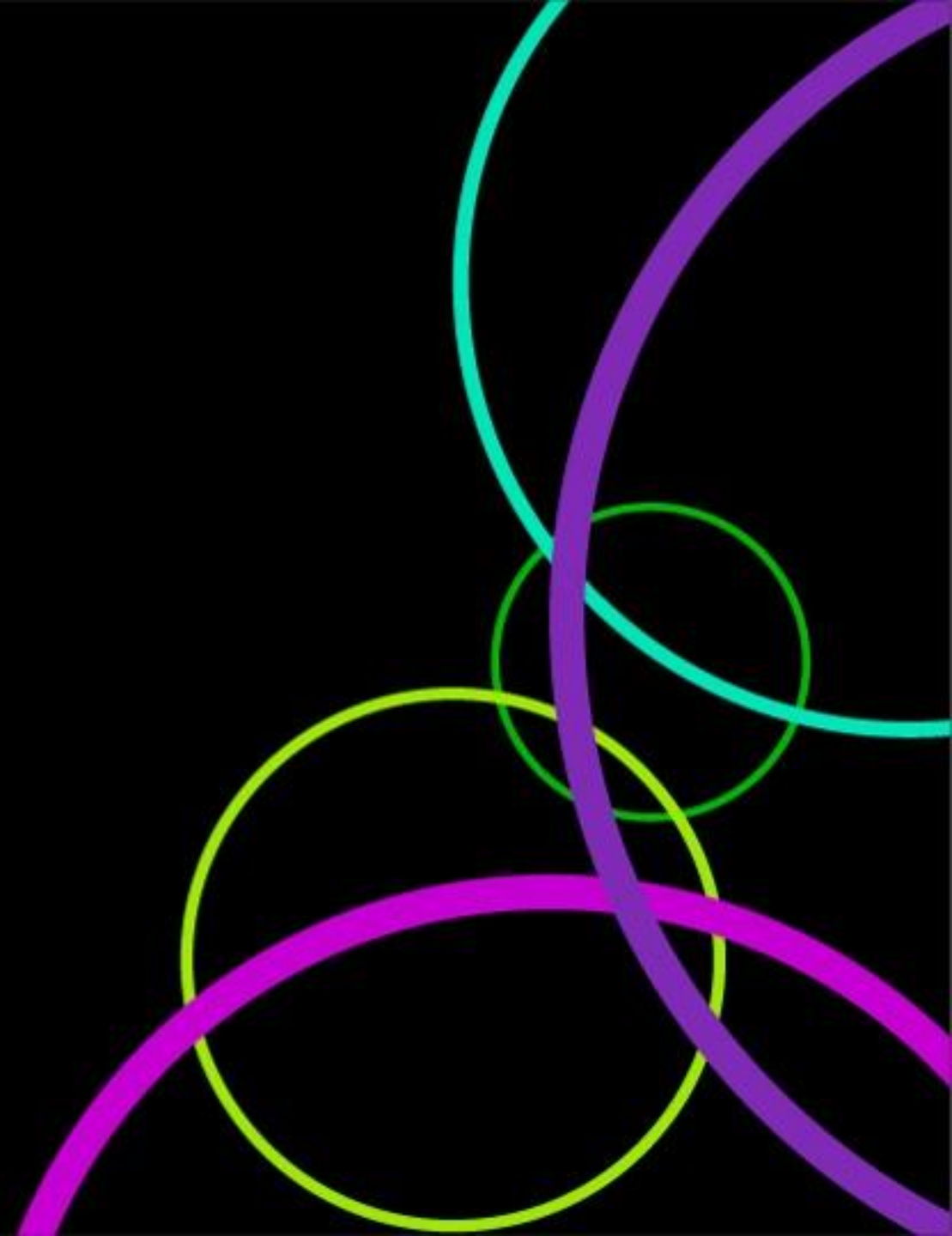
3 Online setting

While online studies always are an approximator of real life, in this context it may have played to the disadvantage of 'Subvert' specifically – which was designed to be most effective in a lifestyle magazine.

4 Sample

Findings from opt-in online panel samples should always be interpreted carefully, as they may not be fully representative of the target population (e.g. higher digital literacy). Furthermore, the sample did not include any adults aged 65+, for practical reasons.

5.4
Findings



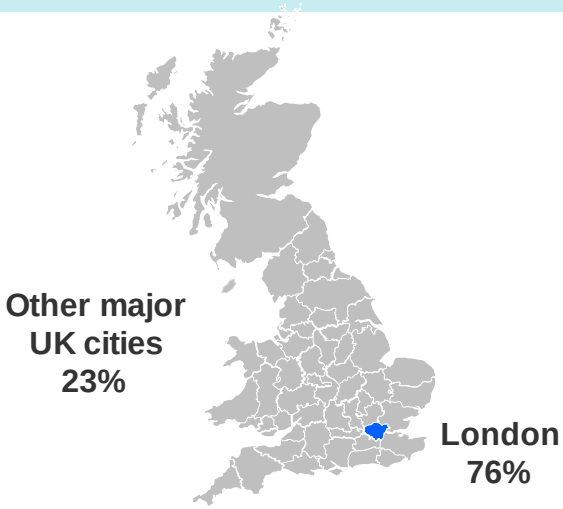
The demographics of respondents did not differ across experimental conditions* - only 122 (8%) respondents report owning a wood burner and the majority (85%) report being worried about the cost of living

Gender

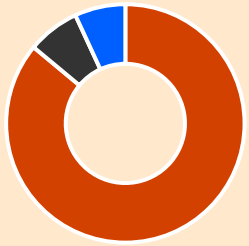
Female **50%**

Male **49%**

Average **age** was 46 years old



Worry about cost of living



Not worried **7%**

Indifferent **7%**

Worried **85%**

The modal **annual household income** bracket was £35,000 - £54,999

Whether they own a woodburner

Don't own **91%**

Own **8%**

I don't know **<1%%**

Prefer not to say **<1%%**

In terms of **frequency**, 56% of respondents who owned a woodburning stove burned at least once a week, and 34% once a month or less

Most popular **reasons for using woodburners** are that they are cheaper than other forms of heating (49%), and they make the home more pleasant (43%)

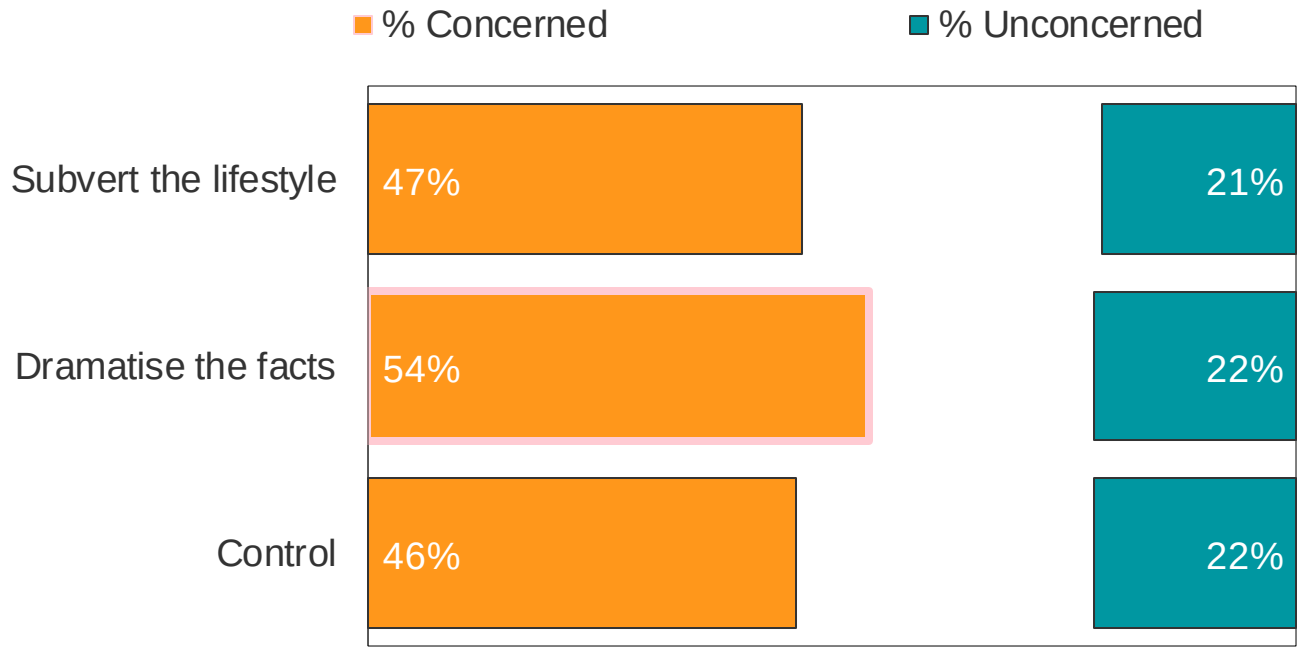
Total sample: n = 1501.

*see Appendix B for full sample breakdown

When prompted, around half of the sample reported concern about the effect of woodburning on air pollution – and this proportion was highest in the 'Dramatise' condition.

Q. How concerned are you about the effect of indoor woodburning stoves on air pollution?

- **More than half of respondents in the *'Dramatise'* said they were concerned about the effect of woodburning stoves on air pollution** (our primary outcome measure)
- A similar proportion of respondents said they were unconcerned across all groups



Total sample: n = 1501. Percentages calculated for each treatment group: Control (n = 500), Dramatise the facts (n = 500), Subvert the lifestyle (n = 501).

Participants in the ‘Dramatise’ condition were 37% more likely to report concern than those in the control, demonstrating a statistically significant impact of this communication

- By contrast, **the ‘Subvert’ treatment had no effect on concern about the effects of woodburning stoves on air pollution relative to the control**

Q. How concerned are you about the effect of indoor woodburning stoves on air pollution?

	% Concerned		
	Odds ratios	*CI*	*p*
Intercept	1.28	0.81 – 2.03	*0.282*
Dramatise the facts	**1.37**	1.07 – 1.76	***0.012***
Subvert the lifestyle	1.02	0.80 – 1.31	*0.872*
Age	0.99	0.98 – 1.00	*0.056*

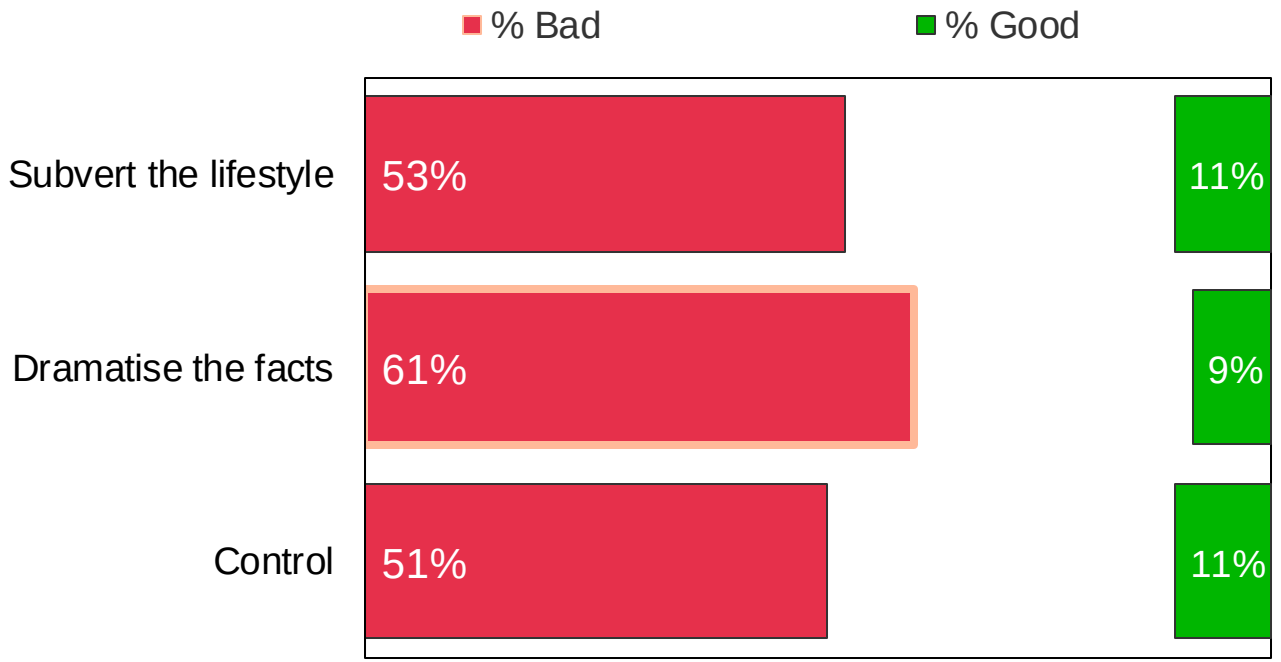
GLM with logit link function is used to estimate the probability a respondent reports being concerned about the effect of indoor woodburning stoves on air pollution (a response of 5, 6, or 7 on the Likert scale). Observations = 1501. Baseline group for comparing treatment group odds ratios is the control group. R^2 = 0.008

Total sample: n = 1501. Percentages calculated for each treatment group: Control (n = 500), Dramatise the facts (n = 500), Subvert the lifestyle (n = 501).

The majority of respondents said that woodburners in cities are a bad thing, with this proportion being highest in ‘Dramatise’

- **The proportion of respondents who thought woodburning stoves in cities are a bad thing was highest in the *‘Dramatise’* condition, supporting our primary outcome measure**

Q. Do you think indoor woodburning stoves in cities are a good thing or a bad thing?

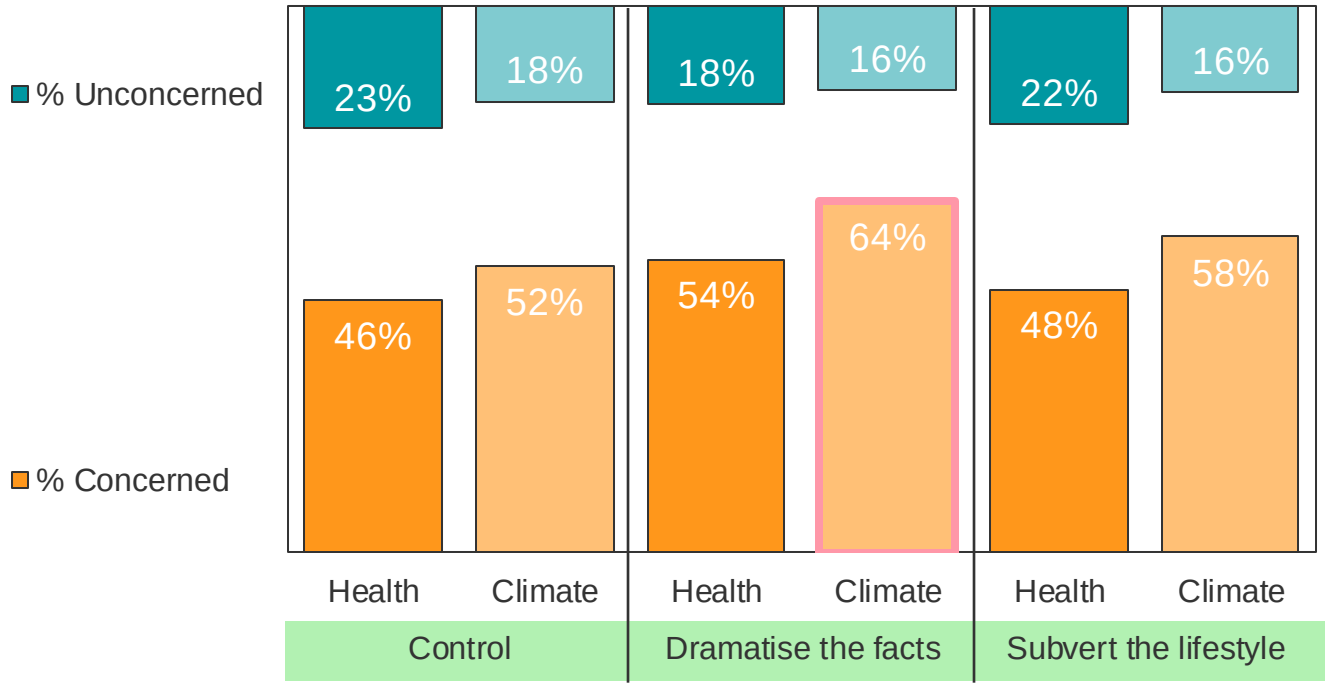


Total sample: n = 1501. Percentages calculated for each treatment group: Control (n = 500), Dramatise the facts (n = 500), Subvert the lifestyle (n = 501).

More people reported concern about the impact of woodburning on climate change, than on health – with those in the 'Dramatise' condition reporting the highest levels of concern for both

Q. How concerned or unconcerned are you about the effect of indoor woodburning stoves on people's health/climate change?

- **The highest levels of concern about the effect of woodburning stoves on both climate change and people's health were seen in the *'Dramatise'* treatment**



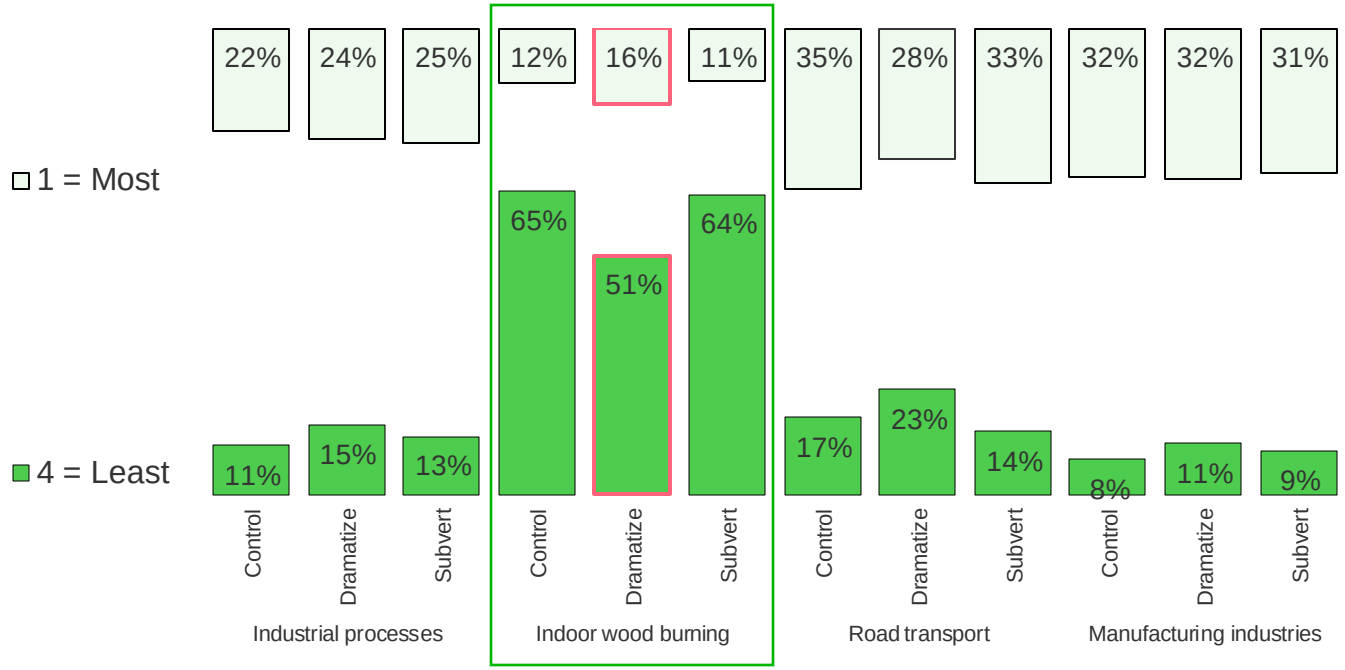
Results are consistent with a conflation of air pollution and climate as observed in qualitative research, with none of the treatments effectively mitigating this – and if true across the population shows a gap in public understanding

Total sample: n = 1501. Percentages calculated for each treatment group: Control (n = 500), Dramatise the facts (n = 500), Subvert the lifestyle (n = 501).

Indoor woodburning was consistently ranked as the lowest contributor of air pollution across conditions, although fewer people in 'Dramatise' ranked woodburning as the lowest contributor

Q. Please select the following sources in order based on how much you think they contribute to total Particulate Matter air pollution in the UK.

- Despite being the second highest source of PM 2.5 emissions in the UK in 2020*, over half of participants ranked indoor woodburning as the lowest contributor of small particulate matter, relative to other sources
- **Fewer respondents in the *'Dramatise'* treatment ranked indoor woodburning as the lowest relative contributor to PM air pollution than in any other group**



Results are consistent with a knowledge gap between actual and perceived contribution of indoor woodburning to air pollution as observed in qualitative research - and if true across the population highlights a need for continued education

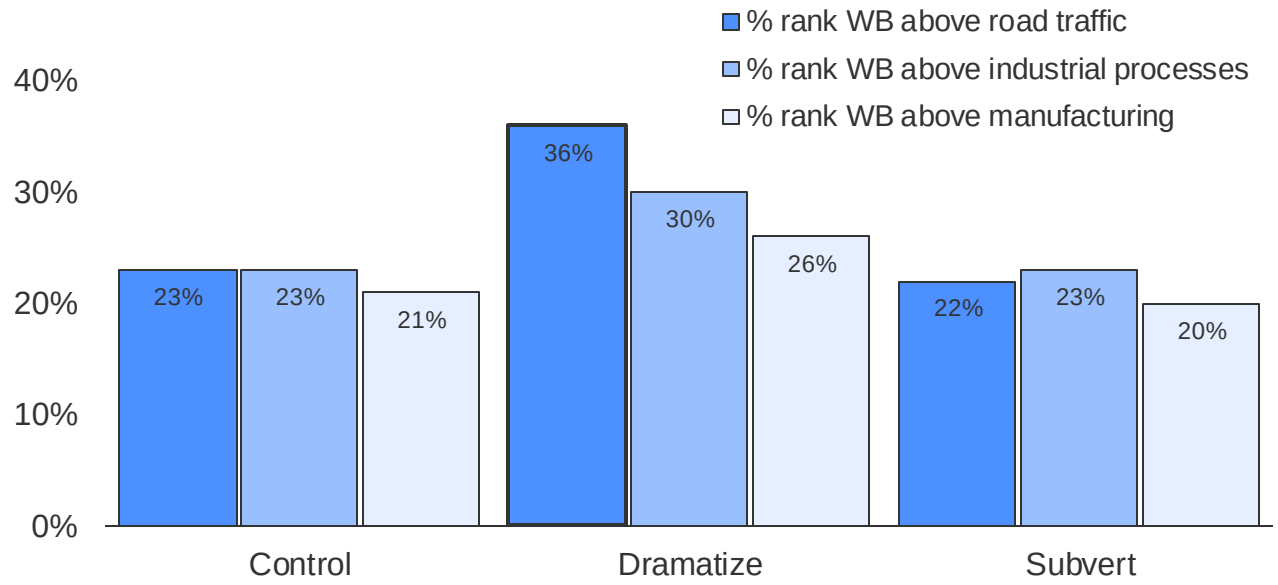
Total sample: n = 1501. Percentages calculated for each treatment group: Control (n = 500), Dramatise the facts (n = 500), Subvert the lifestyle (n = 501).

*Source: DEFRA. (2022). Emissions of air pollutants in the UK –Particulate matter (PM10 and PM2.5). GOV.UK. https://www.gov.uk/government/statistics/emissions-of-air-pollutants/emissions-of-air-pollutants-in-the-uk-particulate-matter-pm10-and-pm25

With the rise in salience of woodburning as a source of air pollution in the 'Dramatise' condition, other sources - particularly road traffic - were placed lower

Q. Please select the following sources in order based on how much you think they contribute to total Particulate Matter air pollution in the UK.

- Respondents in the *'Dramatise'* condition were more likely to rank indoor woodburning above road traffic than either industrial processes or manufacturing industries



Results suggest that 'Dramatise' had a slight backfire effect by minimising views on the relative contribution of road traffic relative to other sources, at the same time as impacting views on the relative role of woodburning

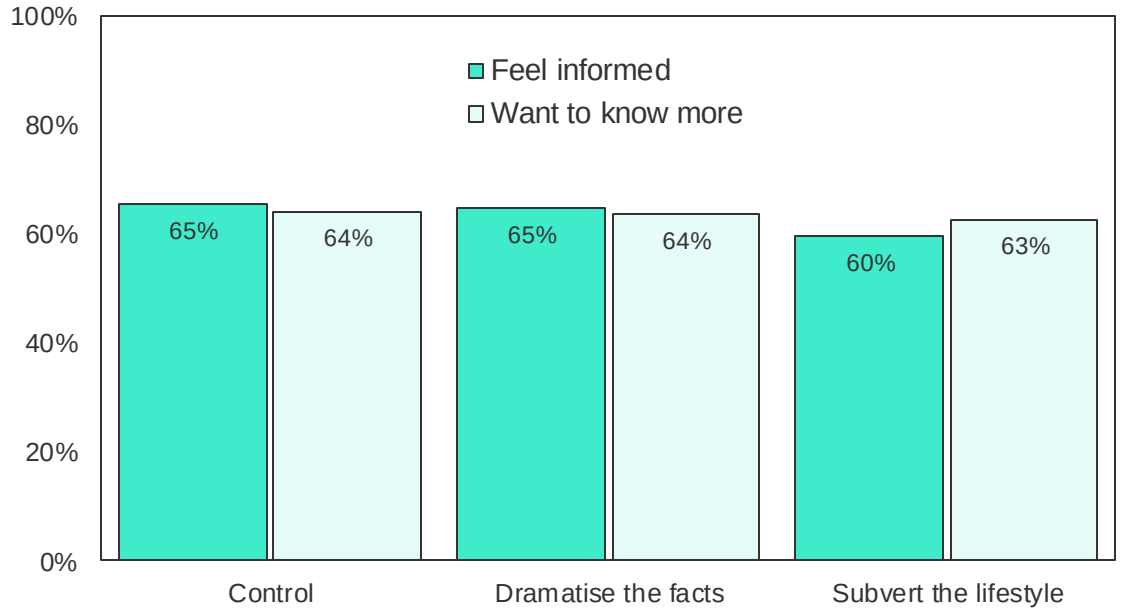
Total sample: n = 1501. Percentages calculated for each treatment group: Control (n = 500), Dramatise the facts (n = 500), Subvert the lifestyle (n = 501).

The majority of participants felt well informed about the overall effect of air pollution on health - and most still wanted to find out more

- More than 6 in 10 respondents felt fairly, or very well informed about the effects of air pollution on health
- Most respondents also wanted to know more about the effect of air pollution on health
- There was no difference in either across treatment groups

Q. How well informed do you feel, if at all, about the effect of air pollution on health?

Q. Would you like to know more about the effect of air pollution on health?



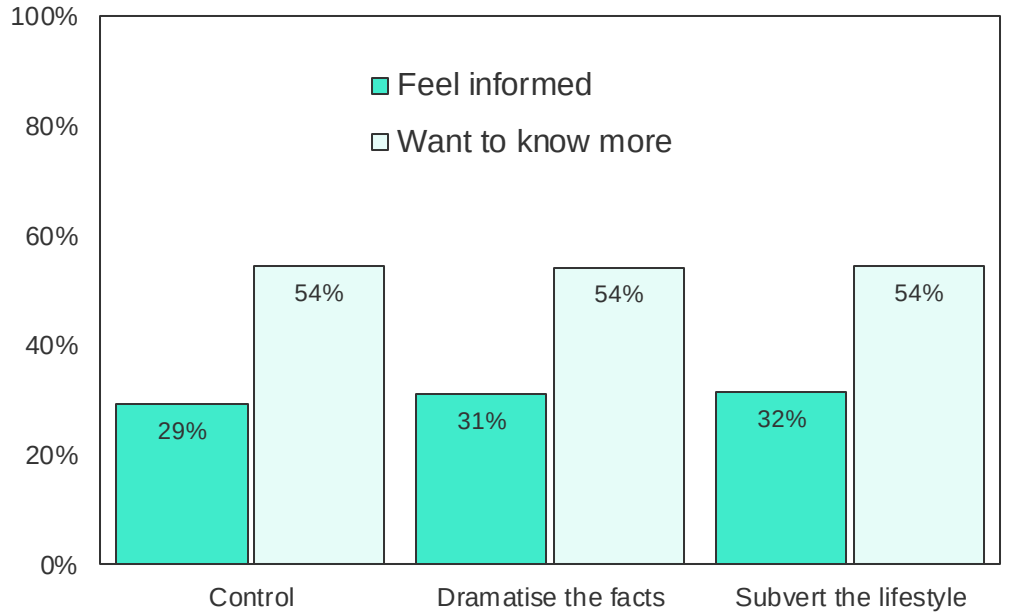
Total sample: n = 1501. Percentages calculated for each treatment group: Control (n = 500), Dramatise the facts (n = 500), Subvert the lifestyle (n = 501).

By contrast, most participants did not feel informed about the effect of indoor woodburning on air pollution – although again most expressed an appetite to find out more

- Only 3 in 10 respondents felt fairly, or very well informed about the effects of indoor woodburning on air pollution
- More than half of respondents wanted to know more about the effect of indoor woodburning on air pollution
- Again, there was no difference across treatment groups

Q. How well informed do you feel, if at all, about the effect of indoor woodburning on air pollution?

Q. Would you like to know more about the effect of indoor woodburning on air pollution?



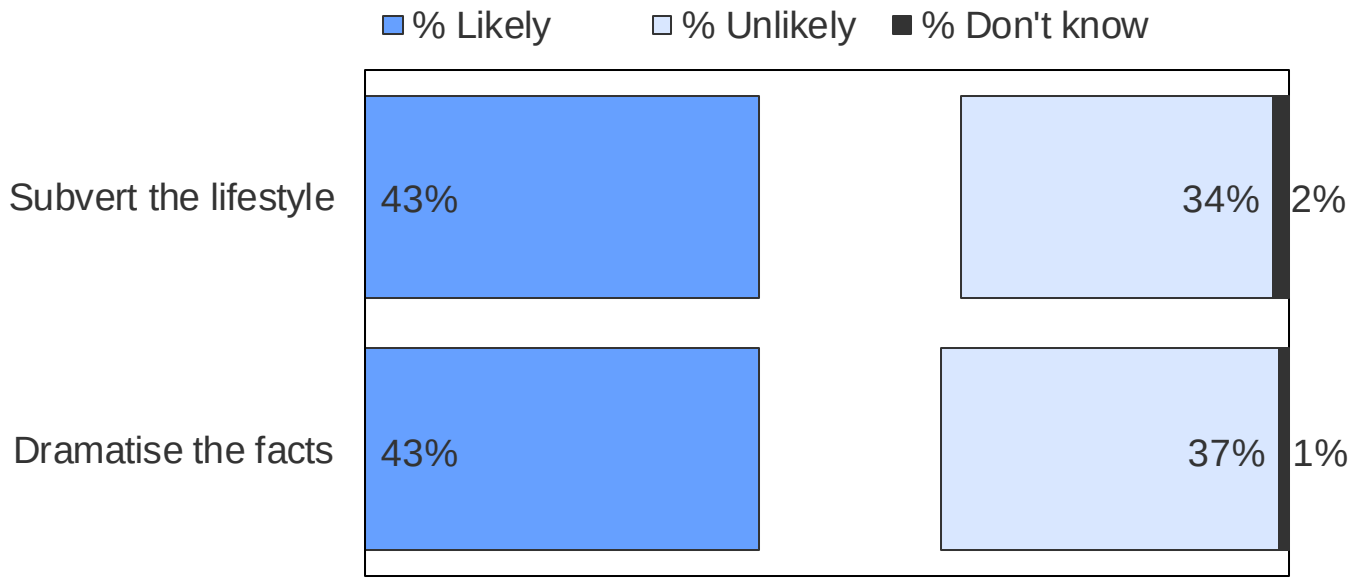
These results are consistent with findings from the qualitative research – and if they hold true in the population then they suggest space for informative communications

Total sample: n = 1501. Percentages calculated for each treatment group: Control (n = 500), Dramatise the facts (n = 500), Subvert the lifestyle (n = 501).

Just under half the participants reported being likely to visit the Clean Air Hub, to learn more about indoor woodburning's impact on air pollution

- 4 in 10 respondents reported to be likely or very likely to visit the web address in the post
- There was no difference in the likelihood of visiting the web address across treatments
- Of respondents who reported to be likely to visit the web address (n = 426), most hoped to find more information about how wood burning affects air pollution (79%)
  - Relative to information on health impacts (62%) or practical advice on decreasing air pollution (36%) / personal exposure to air pollution (34%)

Q. Earlier you saw the post shown below. If you saw this in real life, how likely or unlikely would you be to visit the web address shown in the post (cleanairhub.org.uk) to find out more about the impact of indoor woodburning stoves on air pollution?



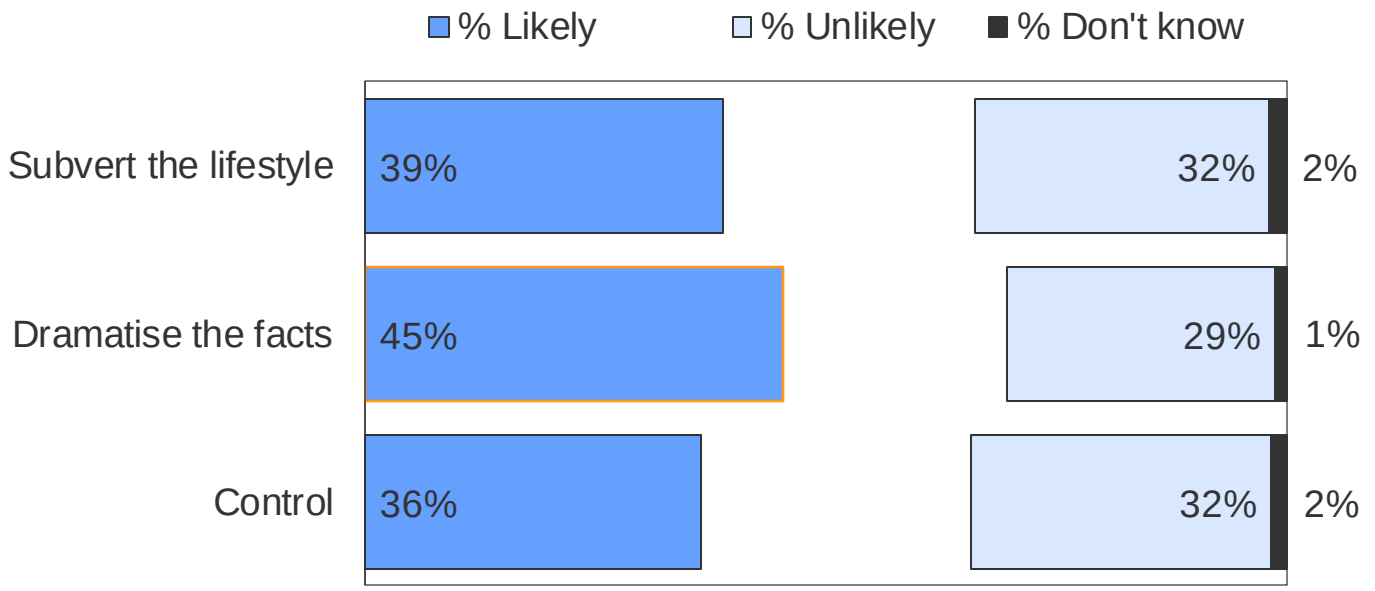
Results are consistent with qualitative finding that participants are most interested in learning about link between air pollution and woodburning before health effects or advice around behaviour

Only participants in a treatment group answered this question (n = 1,001).
Percentages calculated for each base: Dramatise the facts (n = 500), Subvert the lifestyle (n = 501).

Over a third of participants reported that they were likely to discuss the negative impacts of indoor woodburning after the survey

Q. After this survey, how likely or unlikely are you to discuss the negative impacts of indoor woodburning stoves with family and friends?

- Just under 4 in 10 of respondents said they were likely or very likely to discuss the negative impacts of woodburning stoves with friends and family
- **More of those in the 'Dramatise' treatment than in other groups claimed they were likely to discuss the negative impacts of woodburning after the survey with friends and family**

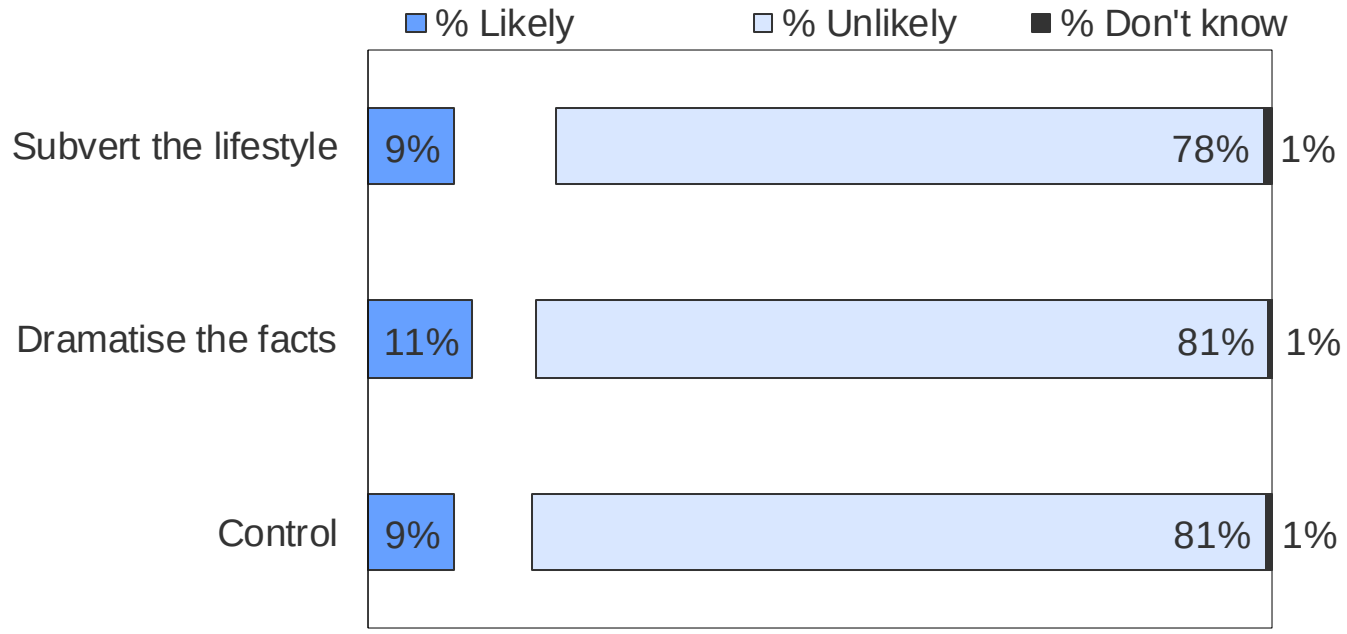


Total sample: n = 1501. Percentages calculated for each treatment group: Control (n = 500), Dramatise the facts (n = 500), Subvert the lifestyle (n = 501).

Around 1 in 10 of participants reported they would be likely to purchase a woodburning stove in the next year, with little difference across groups

Q. How likely or unlikely are you to buy an indoor woodburning stove in the next 12 months?

- Across all treatments, 8 out of 10 respondents report to be unlikely or very unlikely to buy a woodburning stove in the next 12 months
- There was no difference in purchase intent across treatment groups



Results suggest that neither of the interventions are at present having an impact on purchase intentions – and that those who are already invested in the decision may be less open to influence

Total sample: n = 1501. Percentages calculated for each treatment group: Control (n = 500), Dramatise the facts (n = 500), Subvert the lifestyle (n = 501).

A small percentage of the sample already owned woodburning stoves, and their responses reinforce the difficulty of changing woodburners' minds

- While making up only 8% of the sample, owners of woodburning stoves accounted for…
  - 13% of respondents who reported to be unconcerned about the effects of indoor woodburning stoves on air pollution
  - 39% of all respondents who reported intentions to purchase a woodburning stove in the next 12 months.

Q. How concerned are you about the effect of indoor woodburning stoves on air pollution?

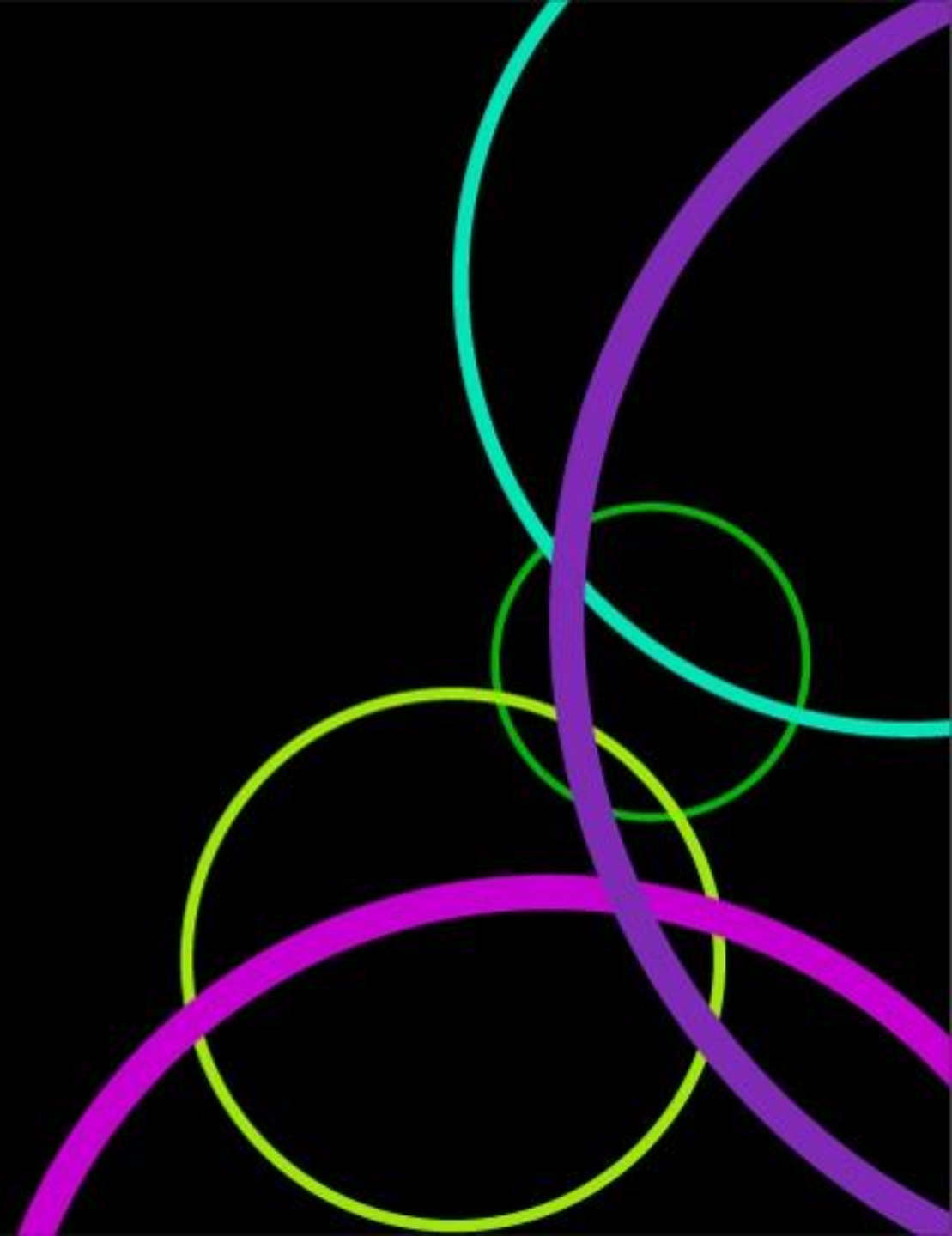
	Concerned (n = 734)	Neither (n = 444)	Unconcerned (n = 323)
Wood burner owner	9%	3%	**13%**
Non-owner	90%	97%	86%

Q. How likely or unlikely are you to buy an indoor woodburning stove in the next 12 months?

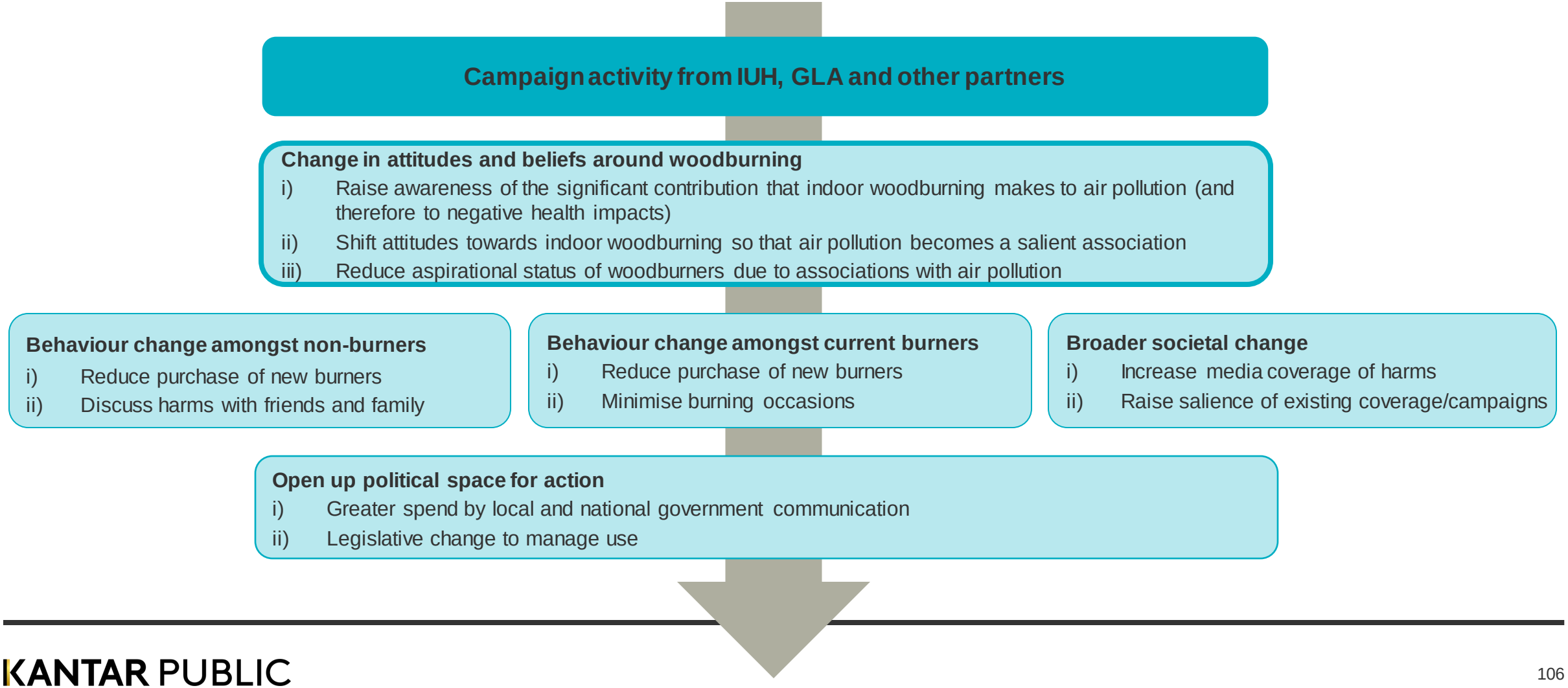
	Likely (n =148)	Indifferent (n=133)	Unlikely (n = 1200)	Don't know (n = 10)
Wood burner owner	**39%**	8%	4%	0%
Non-owner	61%	92%	96%	100%

Total sample: n = 1501. Percentages calculated for each response within each question. Wood burner owners make up 8% of the sample (n = 122).

6
Overall conclusions & implications



Evidence from across this work reinforces the need for a staged strategy to reducing the negative impacts of woodburning, with an initial focus on shifting attitudes and beliefs helping to drive behaviour change and open up space for political action



Evidence from across stages suggests a number of considerations for future activity relating to Context, Challenges, Content and Channel / Delivery

Context

1. **The evidence base around harms associated with domestic woodburning is still relatively young** – there is clear evidence of a link between the activity and increased rates of atmospheric PM2.5, and a recent UK study demonstrated increased indoor levels in homes using wood burners, but it is not possible at present to quantify risks

2. **The majority of those burning wood are doing so for aesthetic purposes, at least on some occasions, and as a secondary heat source** – only a relatively small proportion of primarily rural people burn out of necessity as a primary heat source

3. **The cost of living crisis and rising energy prices has created a greater focus on alternative heating sources** – this may mean that some of those burning primarily for aesthetic purposes come to see burning as a more functional activity, and is likely to continue for a number of year

4. **Government priorities around air pollution are currently focused on road traffic** – especially in London where promoting the ULEZ is a high priority for the coming year and there is therefore sensitivity around any activity that may undermine messaging around road traffic pollution

Findings from across stages suggests a number of considerations for future activity relating to Context, Challenges, Content and Channel / Delivery

Challenges

1 **Burners are generally very invested in their existing behaviour, financially, emotionally and habitually** – and it seems unlikely that messaging in the absence of legislation will prevent them burning, although there may be opportunities to influence behaviour to prevent the installation of new burners or minimise burning occasions

2 **More broadly many non-burners have positive associations with burning** – which is associated with warmth, homeliness, self-sufficiency and an aspirational lifestyle, creating a positive halo that can affect the reception of messages trying to highlight negative impacts

3 **Alongside this there is low public awareness of the link between woodburning and air pollution –** and even when some awareness of impacts are starting to filter through to the public, these are still minimised in relation to other better known sources of air pollution

4 **Given positive associations and low awareness of harms, there can be high levels of cynicism about messages stressing harmful impacts** – especially amongst burners but also some non-burners, who can act defensively and raise suspicions about the intention of messages or agendas of messengers

Findings from across stages suggests a number of considerations for future activity relating to Context, Challenges, Content and Channel / Delivery

Content

1. **Creative platforms that create a strong link between wood burning and air pollution relative to other categories that already have salience in this area work well –** as they pre-empt the otherwise common argument that the impact of woodburning is minimal compared to other categories.

2. **Appeals to personal health have the potential to be impactful but a direct focus on this in the absence of a pre-existing association between burning and air pollution can trigger defensiveness –** so in the short-term it may be better to focus on establishing this link and allowing individuals to draw their own conclusions about health

3. **Tonally, creative platforms that acknowledged that this is still a developing field with continually emerging evidence work well –** as they are less likely to be seen as agenda driven, are considered more credible and avoid creating a sense of shame, which could undermine engagement

4. **There may be potential to disrupt aspirational status with woodburning as a way to undermine positive associations –** although again messages intended to do this are likely to be more effective if they are building on a strong link between woodburning and air pollution for the public, and otherwise may risk lacking the clarity to cut through

Findings from across stages suggests a number of considerations for future activity relating to Context, Challenges, Content and Channel / Delivery

Channel and delivery

1. **Urban audiences were more open to messages about air pollution in general given the greater population density and use of cars** - and any future campaign activity is likely to be most effective when targeted at urban areas

2. **Activity is likely to be more effective when focused on non-burners, to prevent take-up and start to create new social norms around burning to open up space for wider action –** although burners should be seen as a secondary target and evidence suggests their reactions are more polarised given their existing investment

3. **The most trusted messengers were organisations perceived to be focused on public health such as the NHS or recognised charities with a health focus –** by contrast government messengers and campaigning organisations were less likely to have wide appeal and could be perceived as agenda-driven

4. **Given low levels of understanding of the link between woodburning and air pollution individuals were most interested in follow-up information describing how woodburning affects air pollution** – once this is established then there is likely to be a greater appetite for information focusing on health impacts

Dramatise the Facts was the most powerful at shifting attitudes, although there are political considerations around its use in the short-term

EVIDENCE

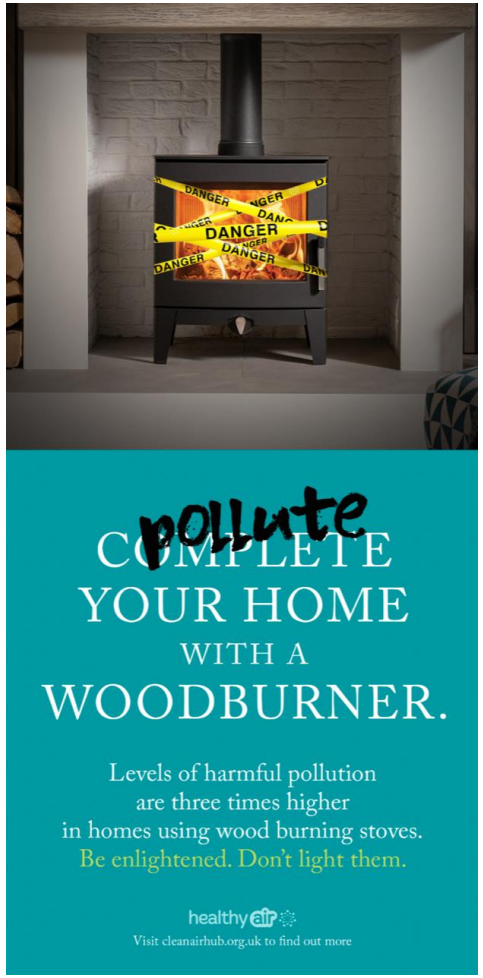
- Quantitative evidence demonstrated a significant impact on attitudes, with those seeing this intervention 37% more likely to say they are concerned about the effect of indoor woodburning stoves on air pollution
- This was supported by responses to secondary quantitative measures including relative levels of concern around health & climate; relative ranking of indoor woodburning as a source of air pollution against other sources; and relative claimed likelihood of discussing the negative impacts of woodburning stoves with friends and family
- Also performed best overall in qualitative research, delivering a very clear and impactful message via the direct comparison between a woodburner and HGV, both visually and via messaging

CONSIDERATIONS

- However, quantitative research also demonstrated some slight downranking of the impact of road traffic on air pollution comparative to other sources – and there are political concerns about the launch of this campaign in the context of the introduction of the ULEZ
- It is also worth noting that we have considered the possibility of adapting this route to compare woodburning against other known sources of air pollution such as industry, although at present the official headline statistics published by Defra place woodburning pm2.5 emissions below a combined category for 'Manufacturing industries and construction'

We recommend taking forward this route once political concerns around the launch of the ULEZ have abated (e.g. likely to be Autumn '23)

Subvert the Lifestyle was less effective in quant testing, but may have potential to disrupt positive associations once a link with air pollution is established



EVIDENCE

- Quantitative evidence did not find any significant impact on attitudes, with no shift in participants levels of concerns about the impact of indoor woodburning on air pollution
- However, qualitative findings from earlier stages did suggest some potential for impact, as the execution was considered to be thought-provoking and shocking, with the clear intent of undermining the kind of ads found in lifestyle magazines and the aspirational status that they promote for woodburning stoves
- It is worth noting, that in these groups participants had already been primed on the contribution of woodburning stoves to air pollution, which is likely to have impacted responses
- We also do not have qualitative evidence relating to the change of wording from 'Heat your home' to 'Complete your home', which was carried out in response to concerns about the cost of living crisis, but may have affected reception of the key message

CONSIDERATIONS

- Given the creative design of this ad, which replicates a lifestyle ad from a glossy magazine, its impact may be most powerful in a print format, where it its disruptive intent is better contextualised
- More generally, evidence suggests that takeout from this ad is likely to maximised if efforts have already taken place to cement the link between air pollution and indoor woodburning for the public
- In the context of a cost of living crisis and a turn to woodburning as a more affordable fuel source this winter (2022), this ad may also be perceived as shaming, potentially undermining concern or the reception of messages

We recommend taking forward this route at a later stage, to disrupt associations once there is already a clear link established between air pollution & indoor woodburning

In the short-term, IUH and GAP created a bespoke page designed to increase the awareness of the negative impact of indoor woodburning on air pollution

Primary objective: To increase knowledge of/creating connection between indoor woodburning and air pollution harm. *NB: we are not expecting behaviour change as a result of this campaign.*

Creative routes: "Surprising Facts" and "Nextdoor Fact-Telling Animals"

CTA of public advertisements: Visit the Clean Air Hub to find out more (linked to bespoke page).

3 Key Audiences:

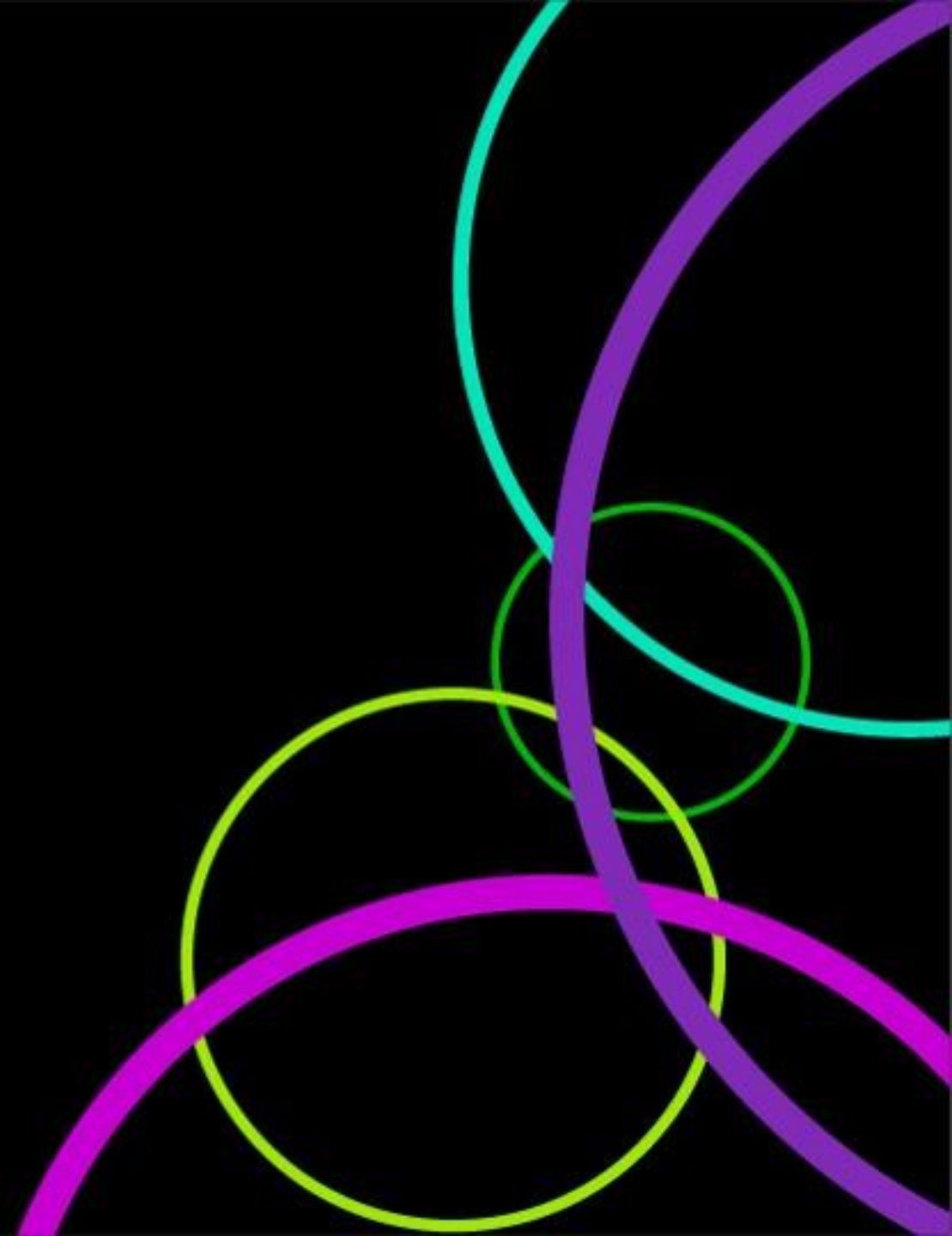
- Primary audience: Londoners who own wood burners/are potential buyers (likely higher seg AB)
- Secondary audiences:
  - People with children
  - Older people (60+)

Channels: Nextdoor and PPC – with the aim for amplification by partners

Final logic model

INPUTS	**Campaign Toolkit and campaign assets**	Budget and resources of IUH, GAP, GLA, LAs and other partners	Continued partnership working and coordination of activity
	Staged communication activities by campaign partners		
ACTIVITIES	Winter '22: **Fact-based digital campaign &** link to wood burning fact page on Clean Air Hub	From Autumn '23: **Dramatise the Facts**	Once link with PM2.5 established: **Subvert the Lifestyle** Other activities from campaign partners informed by toolkit
OUTPUTS	Public exposure to primary advertising and amplification by partners on social media	Visits to Clean Air Hub website	Press coverage of campaigns
SHORT TERM OUTCOMES	Increased awareness of the link between indoor woodburning and pm2.5 air pollution (and therefore of negative health impacts)	Greater salience and understanding of contribution relative to other sources	Disruption of aspirational associations with woodburner
INTERMEDIATE OUTCOMES	Reduction in the uptake of new burners as measured by a reduction in sales	Reduction in woodburning frequency as measured by national survey (e.g. Defra Burning in UK Homes and Gardens)	Greater press coverage of woodburning as an issue
LONG TERM OUTCOMES	Reduction in the increase in particulate matter related to burning	Greater public support for legislation to further restrict woodburning and prevent harms associated with air pollution	

Appendix A: Define stage literature review findings



Impacts

What is the evidence around the measurement of impact?

What we know	Evidence gaps	Behaviour change implications
A lack of standardised measurement creates some uncertainty around absolute levels and impacts — Different ways of indirectly measuring PM2.5 leads to variation in magnitudes — Woodburning PM2.5 can be discussed in proportional terms vs overall pollution but not in absolute terms Tests for emissions are not always accurate due to tests being carried out in ideal conditions that do not reflect reality Using cars as pollution reference points can be seen as misleading due to the difference in use and context The way environmental impacts are reported is disputed by the industry on the basis of: - Differences in the starting assumption of how much wood is used per year - Measurement inaccuracies making it hard to isolate PM2.5 particles produced from indoor woodburning - Lack of standardised measurement as a result of different or out of date equipment - Out of date data - based on older appliances	There is a need for a systematic review of the evidence to clarify discrepancies and inconsistencies.	Data can be subject to interpretation depending on what comparisons are made/reference points are used.

Impacts

What is the evidence around the health impacts?

What we know	Evidence gaps	Behaviour change implications
The impact of PM2.5 particles on health and the contribution of woodburning to PM2.5 levels is indisputable There is international and UK evidence supporting woodburning as a high contributor of PM2.5 pollution – Woodburning has been linked to 11% of California's annual average PM2.5 emissions (2012) and 19-28% of Finland's urban PM2.5 emissions and 31-66% for suburban emissions over the six-month cold season (2005-2009) – Wood and coal burning are estimated to create 40% of the UK's atmospheric PM2.5 There is also evidence to support the impact of woodburning on health in an indoor setting – PM particles have been recorded indoors even with properly operated modern woodburners – Recent research by Sheffield University has demonstrated indoor impacts in a UK setting	There is also little direct evidence establishing a causal relationship between the impact of woodburning and health indoors There is limited evidence of indoor impacts in the UK, which is important due to different home build qualities	PHE is reluctant to publish health messaging due to the lack of UK-centric evidence on the direct impact of indoor woodburning on an individual "It's difficult because it seems that behaviour change messaging would work really well in terms of saying 'you are hurting yourself and your immediate family through your burning' but the body of evidence that we have right now is not enough to confirm whether that is the case or not." (DEFRA)

WHO (2015) - "Residential heating with wood and coal: health impacts and policy options in Europe and North America"
Kantar Public report for Defra (2018) "Burning in UK Homes and Gardens"
Chakraborty R, et al (2020) Indoor Air Pollution from Residential Stoves: Examining the Flooding of Particulate Matter into Homes during Real-World Use. *Atmosphere*. 11(12):1326.

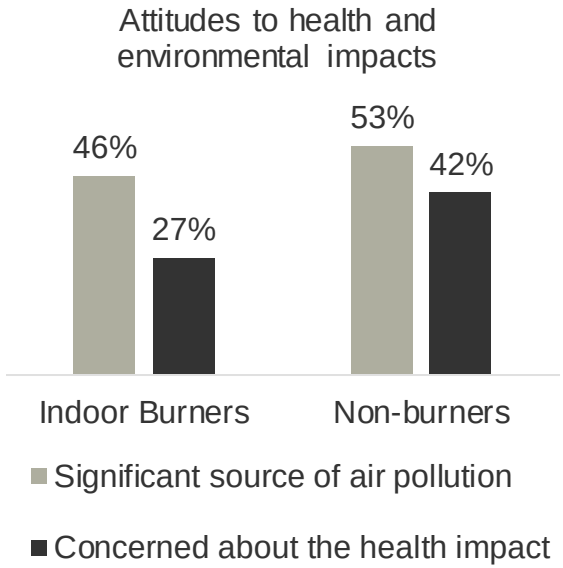
Impacts

What is the evidence around the environmental impacts?

What we know	Evidence gaps	Behaviour change implications
There is currently some dispute over the environmental impacts The stove industry strongly advocates the low carbon and sustainable properties of using wood as fuel in their messages to consumers This builds on government policy advocating and subsidising wood-burning as a renewable heating source in 2008 following the introduction of legally binding targets for greenhouse emissions. However, others argue that 'carbon neutral' claims do not take into account the true CO2 emissions involved in generating wood for woodburning - Carbon neutrality depends on replacing wood extracted, which may take many years - Even then, figures do not take into account energy used in the processing and transportation of wood	There is a need for a robust analysis of the carbon life cycle of the fuel and how it is processed.	Associations with 'natural' or 'carbon neutral' form the backdrop of awareness and justification for burners as part of the sustainable consumerism movement.

Awareness

What do people understand about health and/or the environmental impact of woodburning?

What we know	Evidence gaps	Behaviour change implications
Awareness of the negative impacts of woodburning on the environment and health is low – Overall, 21% were aware of both the negative environmental and health impacts of domestic burning; 44% were aware of neither. Moreover, 19% were aware of the negative health impacts; and 16% of the environmental impacts[1]  – Outdoor-only burners were more likely to be concerned about the health impacts (35%) than indoor burners. – Open fire burners recognise the negative effect of burning on air quality (52%) more than stove users (44%). – 41% of non-burners believe burners do not think about the impact of burning on those around them and are more likely to be bothered by the smell (15%) than burners (9%) – but very few take action.	Given recent media coverage around the issue, awareness of the health impacts may have grown since research was last carried out	Those that burn are less likely to acknowledge the negative impacts of their actions – Eco-friendly stoves will play a role in reassuring burners that they are safe and within environmental guidelines – Burners may be discounting the negative effects of burning compared to the immediate reward and pleasure they feel from burning Any reluctance or denial about the consequence of woodburning could potentially be addressed by leveraging the attitudes of non-burners – thereby redefining the social acceptability of woodburning

Kantar Public report for Defra (2018) "Burning in UK Homes and Gardens"
Defra (Oct 2020) Domestic burning communications: Testing the effectiveness of behaviourally informed messages on increasing awareness about domestic burning in England"
Stakeholder interviews with the SIA and Gary Fuller (Academic)

Awareness

What do people understand about health and/or the environmental impact of woodburning?

What we know	Evidence gaps	Behaviour change implications
Messaging designed to encourage burner's to seek out more information on the impacts of domestic burning were unsuccessful – suggesting an unwillingness to learn or change once behaviour is established. Reactions to messages highlighting burning as an issue were often emotional at first followed by scepticism due to their lack of awareness around the impacts. – New news - why haven't we heard before – Conflicts with existing knowledge / beliefs - e.g. traffic & industry as main source of pollutants; wood is natural; burning happens indoors so little effect on air pollution – General defensiveness		Raising awareness and educating is a start to changing behaviour but insufficient if not reinforced by other interventions. Careful consideration is required when creating an awareness campaign – calling out behaviours directly could cause burners to go on the defensive and retreat. – A simple 'Did you know?' fact approach could be enough to generate interest and start conversations

Research Works report for Defra (Oct 2020) - "Developing and testing behavioural insight informed communication messages about domestic burning" (Qual)
Defra (Oct 2020) - "Domestic burning communications: Testing the effectiveness of behaviourally informed messages on increasing aw areness about domestic burning in England" (Survey)

Prevalence

Who is burning wood and how much are they burning?

What we know	Evidence gaps	Behaviour change implications

Kantar's report for Defra is the most comprehensive record of burning prevalence
 	
Out of the 19% of burners in the UK, **8% burn indoors** and 14% outdoors.
– Of those burning indoors, 13% are in rural areas and 7% in urban areas.
– However, in absolute terms 68% of indoor burners live in urban areas compared to 32% who live in rural areas.
  – Urban = town or city with a population of at least 10,000
  – Rural = open countryside or area or village with a population of fewer than 10,000
 	
12% of burners in the UK live in London, with significantly more outdoor burners (15%) and significantly less indoor burners (5%) vs the rest of the UK
	Low incidence rates of woodburning make it challenging to get a robust reading of burning prevalence across a year
	
	Definitions of rural and urban areas are unclear and differ between countries -
	rural/urban classifications are not available for Northern Ireland and there are different definitions in England/Wales vs. Scotland
	
	Secondary analysis was carried out on the Defra Burning in UK homes data to get a more nuanced view of rural and urban settings as well London, but sample sizes were too small to get a reliable read
		The size of the target population will have an effect on the impact of an intervention – do we target the masses who potentially burn less frequently or the fewer but heavy burners?

Kantar Public report for Defra (2018) "Burning in UK Homes and Gardens"
Stakeholder interviews
Secondary Analysis of Defra data (2018)

Prevalence

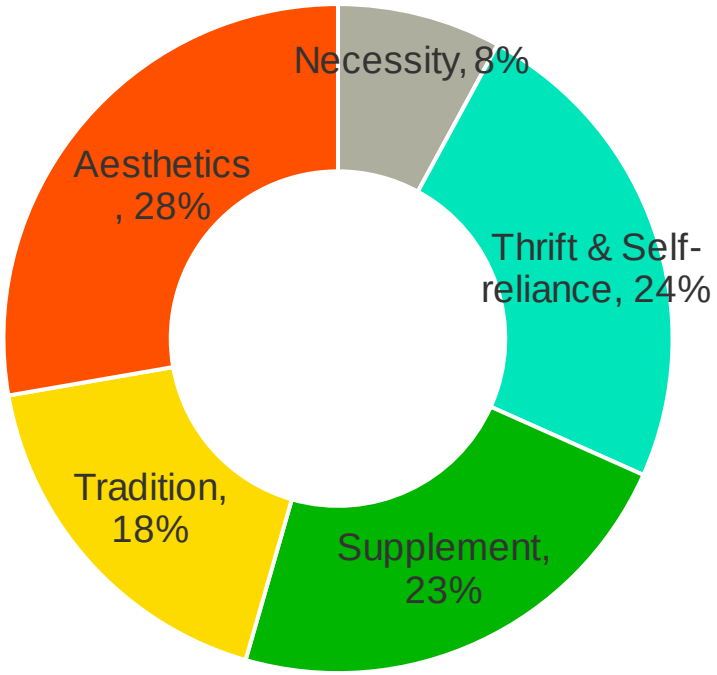
Who is burning wood and how much are they burning?

What we know	Evidence gaps	Behaviour change implications
FREQUENCY & USE The majority of burning occurs in winter (56%) 31% burn 3 to 5 days a week followed by 29% 6 or 7 days a week According to Gary Fuller, a leading academic in this field, there has been a move from primarily weekend only burning in the UK in 2009/10 to burning being distributed more evenly throughout the week in 2016, possibly as a result of those who have installed new stoves burning more frequently to justify their investment. Over the last five years the total number of appliances sold annually among the SIA members (which is estimated to cover c.80% of the market) has been relatively stable averaging at around 120,000. However, 2018 saw a sharp but unexplained increase in sales before going back down. However, as the sales are of more efficient stoves, levels of PM2.5 associated with woodburning have remained largely steady	Some speculate that increased time spent at home during the Covid pandemic will have increased use, although there is no evidence at present to support this	The Danish-led trend of 'Hygge' may explain part of the rise in sales in 2018 as people were more inclined to want to create a homely feel.

Kantar Public report for Defra (2018) "Burning in UK Homes and Gardens"
Gary Fuller (2018) - *The Invisible Killer: The rising global threat of air pollution – and how we can fight back*
Stakeholder interviews

Prevalence

Who is burning wood and how much are they burning?



Necessity:
- burning is the main source of heating (often, though not always, through lack of choice)
- less affluent
- more rural segment
- very experienced and frequent burners

Thrift & Self-reliance:
- burning to save money and for self-sufficiency
- little less affluent than the 'average' burner
- experienced and burns more than average.

Supplement:
- burning to supplement their main source of heating
- relatively inexperienced
- Likely to have installed their appliance recently

Tradition:
- burning out of a life style choice based on the family experience, nostalgia, identity and creating a homely atmosphere,
- usually an open fire
- relatively affluent
- largely English segment

Aesthetics:
- A life style choice - burning for social reasons and to create a homely atmosphere
- Affluent
- Largely English segment
- Burn the least

Prevalence - Who is burning wood and how much are they burning?

Segments – significant differences vs other indoor burners

	Aesthetics – 28%	Tradition – 18%	Thrift & Self-reliance – 24%	Supplement – 23%	Necessity – 8%
Grown up with a fire	Less likely than other segments to have grown up with a fire (72%)	More likely than other segments to have grown up with a fire (86%)			More likely thank other segments to have grown up with a fire (87%)
SEG	More likely to be from an ABC1 socioeconomic background (82%) driven by significantly more AB social grades (57%)		Less likely to be from an AB social grade (36%) but still 64% are form an ABC1 background		More likely to be from a C2DE social grade (49%)
Geography	More likely to live in England (83%) and in London (9%)	More likely to live in England (86%) Less likely to know whether they live in a smoke control area (38%)	Less likely to live in London (2%)		More likely to live in a rural area (43%)
Attitudes	Less likely to believe their burning has a positive impact on the local environment (69%)	More likely to be slightly concerned about the impact of their burning on the health and those around them (31%) More likely to have had an appliance already installed when they moved in (59%) More likely to seek advice from friends and family (26%)	More likely to believe their burning has a positive impact on the local environment (24%) More likely to purchase and install an appliance (61%)	More likely to purchase and install an appliance (60%)	More likely to be concerned about the impact of their burning on the health and those around them (40%) Less likely to see advice on woodburning practices (55%)

Associations

How do people think about burning?

What we know	Evidence gaps	Behaviour change implications
Overall, both burners and non-burners use emotional and positive language to describe burning – Woodburning is perceived to be a normal activity that has been done by society for many years – 55% of non-burners even saw it as a right for people to burn in their own homes. People are speaking aspirationally about burning, but do not necessarily associate it with affluence – reflecting the reality of those who do it out of necessity as well as the accessibility of it. – Only 13% of non-burners thought of domestic burning as an affluent activity, and 21% of those from DE social grades. There is a growing environmental association with an increasing number seeing it as a way of reducing their carbon footprint and being self-sufficient – an idea reinforced by the industry.	For non-burners, there is a lack of evidence around associations, although some evidence suggests that unfamiliarity with the process may mean there is no clear understanding of terms such as 'woodburning' – There is a sense that people may not be familiar with the terminology of burning We also don't know people's perceptions of their behaviours as burners (if they consider themselves to be a good or bad burner and under what criteria)	Woodburning is an entrenched habitual behaviour with positive associations – making it hard for people to see the negatives Fire and burning is processed emotionally – people seem to be taking value out of the feeling a fire brings rather than the process Understanding people's self-perceptions as woodburners and extent of confidence could provide a different angle to how people think about burning There is a contradiction between people saying they are aware that woodburning contributes to air pollution but then they admit they love their woodstoves - exposing some cognitive dissonance

"It is still seen as something that is positive for the low carbon agenda. It is something that is nice to have in your home. It provides a focal point for the family based on how Covid-19 has changed things - drawing families together around a focal point that isn't a black box in the corner of the room which is a positive thing" (The Stove Industry Alliance)

Kantar Public report for Defra (2018) "Burning in UK Homes and Gardens" Stakeholder interviews

Motivations

Why do people burn?

What we know	Evidence gaps	Behaviour change implications
INDOOR BURNING: Creating a homely feel is the strongest motivation among indoor burners (46%), and more than average among less frequent burners (54%), AB social grades (50%), and 35-54 year olds. The trend is true also of both rural and urban burners and more so for those living in London. Saving money and to heat just one room were the second most common motivations (22%).		There is a strong visceral and sensory attachment to fires which can act as a heuristic when deciding whether to burn or not.

Motivations vary strongly between segments

Table 7.4: Reasons for indoor burning by segment (% of indoor burners, multi-response allowed - PIT)

	Necessity	Thrift and Self-reliance	Supplement	Tradition	Aesthetics
Unweighted base	*89*	*231*	*218*	*160*	*242*
Don't have any choice	39%	0%	1%	0%	1%
Save money	9%	63%	23%	5%	3%
Avoid putting heating on	2%	18%	17%	10%	5%
Lot of waste wood to get rid of	6%	13%	3%	8%	1%
Control use of gas/oil/electricity	1%	15%	18%	3%	1%
To just heat one room	4%	12%	37%	41%	11%
Heating sometimes not enough	12%	6%	32%	7%	16%
Tradition / past experience	4%	4%	2%	26%	0%
Atmosphere	0%	1%	0%	7%	1%
To create a homely feel	14%	43%	13%	64%	78%
I love looking at a fire	10%	22%	12%	23%	29%

Key: Orange: significantly higher than all indoor burners; blue: significantly lower

OUTDOOR BURNING: Cooking food and BBQing was the greatest motivation (61%) - especially in London (83%) but less so in rural areas (56%).

This was followed by waste disposal (27%), especially in rural areas. However in London's the second motivation was for social reasons (24%)

Motivations

Why do people burn?

What we know	Evidence gaps	Behaviour change implications
Over the last five years sales in eco-design stoves has steadily increased and is expected to be the dominant stove on sale by next year. When purchasing an appliance, consumers prioritise the efficiency of the appliance (50%) followed by its design of it (37%). – Efficiency is more important than average to rural burners (57%), AB social grades (54%), and 35-44 year olds (76%); but notably less important than average to 16-24 year olds (47%), 25-34 (33%), 55-64 (46%), and 65+ (41%) – Secondary data analysis tenuously suggests that design may be more important to those residing in London (50%) However, nearly half of burners did not actively install their wood burner but rather moved into a home with one (48%), and secondary analysis suggests this is more so the case in London.	Covid-19 may have amplified the desire for aesthetics and strengthened traditions, but any lasting behavioural effects are yet to be researched robustly (sales were not positively or negatively impacted by Covid-19)  *Annual stove sales and installations over the last 5 years (Provided by the SIA)*	Appliance priorities differ by age - younger burners do not have as marked preferences when selecting appliances compared to older burners, while older burners are probably more likely to settle for what they are used to. Those choosing to install an appliance are more invested and engaged with burning best practice due to researching before buying, while those inheriting a stove are less engaged and likely to learn via custom and practice[1] – leaving room for bad habits to form. The disruption to everyday life and lockdowns is likely to have had an effect on people's habits – but how long-lasting the effect will be is uncertain.

Kantar Public report for Defra (2018) "Burning in UK Homes and Gardens"
Stakeholder interviews

Behaviours

How are people burning (and how far is this in line with best practice)?

What we know	Evidence gaps	Behaviour change implications
31% burning indoors were using open fires, while 58% were closed stoves. 86% used wood alone or in combination with another solid fuel, 58% burned wood alone, 25% burned wood and coal. Of those burning wood, 12% or possibly more had burnt waste wood. Insufficient sample in London to give representative rates but the data would suggest that London burners are: – Using open fires more than elsewhere (35%) – Burning to create a homely feel (61%) compared to urban (46%) and rural (47%) – Less likely to clean the chimney once a year (37%) vs. other urban areas (58%) – Mostly burning wood (73%) but more likely to burn coal (55%) vs. other urban areas (49%) In Hackney Borough, the typical burner burns for aesthetic and life style reasons - burning solid fuels on an open fire (45%) for up to 76 hours each year with wood logs being the most common fuel (45%). However only 65% were aware of the regulations surrounding solid fuel burning. 94% of non-burning residents expressed no intent to burn in the future with 66% citing no need to do so, 19% expressing environmental concerns, and 9% not liking the idea.	How are burners educating themselves on woodburning best practice? What are the knowledge gaps that burners currently have when it comes to woodburning best practice and fuel?	Behaviours are often entrenched habits especially amongst frequent burners How important is it to them to be considered a skilful burner? How are people burning at home, what are the moments? What are the efficacy and contextual barriers that are preventing them from doing it right? What is the action-intention gap here when it comes changing their behaviour? What is the most effective way to persuade and change habits – is it via education, persuasion or motivation? Any education campaigns need to be designed carefully and without tacitly supporting woodburning. The impact of open fire burning is a lot worse but may be easier to intervene (e.g. they are likely to be more occasional users, they haven't paid to install a modern woodburner, there are already laws in place to legislate for these)

Kantar Public report for Defra (2018) "Burning in UK Homes and Gardens"
Secondary Analysis of Defra data (2018)
Hackney's Zero Emissions Network Interim Report (2020) - "Fuel burning Engagement Project"

Behaviours

How are people burning (and how far is this in line with best practice)?

	Aesthetics – 28%	Thrift & Self-reliance – 24%	Supplement – 23%	Tradition – 18%	Necessity – 8%
Frequency	Infrequent burners – more likely to burn once or twice a year (11%) and up to 1 or 2 days a week (61%)	Frequent burners - more likely to burn autumn to spring (21%), between 3 and 7 days a week (81%) and for 9 to 24 hours (20%) More likely to have started burning 6-10 years ago (24%) (since 2018/19)	More likely to have started burning 2-3 years ago (24%) (since 2018/19)	Infrequent burner – more likely to burn less than once a week (21%) and less likely to burn year round (1%)	Frequent burners – more likely to burn year round (13%) for 6 or 7 days a week (58%) and for 9 to 24 hours (27%)
Use	More likely to use wood only (26%)	More likely to burn using a burner/stove/enclosed fireplace (83%) and less likely to use an open fire (14%) More likely to burn wood that they dried and seasoned themselves (37%)	More likely to burn wet/unseasoned wood (4%)	More likely to burn on an open fire (47%) More likely to burn wood logs and coal (22%)	Less likely to burn wood logs only (13%), but more likely to burn a wood mix and coal (39%) as well as wood logs and coal (19%)

Interventions

What has already been done and what evidence already exists for what works?

What we know	Evidence gaps	Behaviour change implications
IN THE UK **Central Government** - Clean Air Strategy 2019 - Domestic fuel legislation - Environment bill - Burn Better Behaviour Change Campaign (Oct/Nov 2020) - All new appliances sold through retail outlets need to meet eco-design emission standards (Plan for Jan 2022) **Local Government** - Training for staff to check on and enforce new cleaner fuel regulation - Asking for increased powers to make changes at a local level and enforce these - Few are raising awareness locally (Hackney, Brighton & Hove) **Civil Society Organisations** - Raising awareness locally on the health impacts of woodburning **Industry** - Clear Skies certification scheme (SIA) - Running campaigns among local governments on their interpretation of woodburning data and reports	The interventions listed here have been within the legislation and education space, but there seems to be a lack of evidence and trials around behavioural interventions in the UK.	A mix of messages from different parties hinders any step-change in people's attitudes towards woodburning

Interventions

What has already been done and what evidence already exists for what works?

What we know	Evidence gaps	Behaviour change implications

INTERNATIONALLY
- **Combination of interventions**
  - E.g. 'Isn't it time you gave up smoking?' (Tasmania) - an incentivised scheme that combined fuel switching via replacement of wood stoves with electricity, education campaigns, and enforcement of regulations to reduce the proportion of wood heated homes from 66% to 30%. The scheme reduces PM emissions by 40%. Later schemes focused on improving the way that people burn and had no measurable effect.
- **Heater exchange (Scrappage) schemes**
  - E.g. Exchange programme in the USA – switching older stoves with certified appliances or other heat sources over the course of 4 years. An effective way in generating change, but costly and likely to become outdated with new technology.
- **Educational campaigns**
  - E.g. USA's EPA 'burn wiser' national campaign – burn the right fuel, in the right way, and on the right appliance; as well as encourage switching to other energy sources and avoiding unnecessary combustion. However, generally education campaigns have been found to have moderate success in changing behaviour especially if they only provide information on risks without trying to affect the ingrained positive image of woodburning.
- **Social challenges**
  - "Are you a proper burner?" (New Zealand) – a local initiative challenging people to demonstrate they have the best woodburning techniques in their neighbourhood. Free kindling was provided as an example of proper fuel as well as 'kindling cracker' to facilitate making kindling. However, there was not evidence on the effectiveness of any of these interventions.
- **'No burn days**' (regulatory and voluntary) (USA) – no burning when certain weather conditions are met or when air pollution reaches critical levels.
- **District Heating** (Sweden) – distribution of residential heating from a centralized location
- **HEPA filtration** (Canada) – adding filters to burners helped significantly reduce PM levels indoors.
- **Regulatory emissions limits** – country wide standards on emissions
	Most interventions trialled internationally have found an effect on outdoor levels of PM but faced difficulties quantifying any change in indoor levels of PM	A combination of interventions has been shown to be most effective

WHO (2015) - "Residential heating with wood and coal: health impacts and policy options in Europe and North America"
Gary Fuller (2018) - *The Invisible Killer: The rising global threat of air pollution – and how we can fight back*

Interventions

What has already been done and what evidence already exists for what works?

What we know	Evidence gaps	Behaviour change implications
Defra's research into the effectiveness of behaviourally informed communications around the impact of woodburning and resulting changes in behaviour found that: – People are most motivated by messages that appeal to their own self-interest, particularly around health for them and their family – The economic advantages of burning correctly were also motivating for some people – By contrast, anything perceived as scaremongering was ineffective at changing motivations		

Research Works report for Defra (Oct 2020) - "Developing and testing behavioural insight informed communication messages about domestic burning" (Qual)
Defra (Oct 2020) - "Domestic burning communications: Testing the effectiveness of behaviourally informed messages on increasing aw areness about domestic burning in England" (Survey)

Interventions

What has already been done and what evidence already exists for what works?

What we know	Evidence gaps	Behaviour change implications
Messaging Approach There is no one-size-fits-all approach, with a need for different messages for burners and non-burners; and for different burners (particularly considering those relying on burning as their primary source of heat) Messages focused on self-interest are most motivating, particularly around health for them and their family, but also economic advantages of burning right for some people Messages about wider health impacts could get a defensive reaction – it is better to position burning as contributing to air pollution vs or being inclusive of burners in wider messaging - e.g. 'our health' Messages based around norming were felt to lack credibility without clear evidence (e.g. 'Most people are prepared to pay more to burn less polluting fuels') Clarifying that domestic burning creates a specific type of particle that is harmful to health can help address scepticism about impact relative to traffic or industry (e.g. 'a particular type of air pollution called particle air pollution')	There is a need to test variation of the framings used in this study (environmental, health and economic) as well as additional framings that could help persuade – e.g. playing on the idea that the impact is not well understood and that air pollution impacts compared to vehicle emissions is an amazing fact	

Research Works report for Defra (Oct 2020) - "Developing and testing behavioural insight informed communication messages about domestic burning" (Qual)
Defra (Oct 2020) - "Domestic burning communications: Testing the effectiveness of behaviourally informed messages on increasing aw areness about domestic burning in England" (Survey)

Interventions

What has already been done and what evidence already exists for what works?

What we know	Evidence gaps	Behaviour change implications
Messaging Execution TONE - messages should reflect that this is the start of an ongoing conversation, adult-to-adult conversation, informative & explanatory (e.g. did you know? vs bold statements), supportive vs directive, with clear steps for action CALL TO ACTION - There was a preference for messages that empower clear and easy to achieve actions to reduce impact (e.g. Easy steps to burn right; infographics) LANGUAGE - For non-burners, there is a particular need for language to be as descriptive as possible and assume no prior knowledge. APPEAL – Non-burners have a lack of engagement with the issue so there is a a need to draw people into conversation beyond headlines to build relevance (e.g. health consequences)	There is room to test more proactive and engaging messaging that goes beyond informing and offering solutions, but begins to persuade and change attitudes	

Research Works report for Defra (Oct 2020) - "Developing and testing behavioural insight informed communication messages about domestic burning" (Qual)
Defra (Oct 2020) - "Domestic burning communications: Testing the effectiveness of behaviourally informed messages on increasing aw areness about domestic burning in England" (Survey)

Appendix B: Experiment demographic data

Appendix B: Demographic data

	Subvert		Dramatise		Control	
	Mean / %	sd / n	Mean / %	sd / n	Mean / %	sd / n
Age	45.42	11.21	45.95	11.12	46.32	11.22
Gender						
Female	51.1%	256	47.6%	238	51.2%	256
Male	48.1%	241	52.0%	260	48.2%	241
Non-binary/Gender fluid	0.8%	4	0.2%	1	0.2%	1
Prefer not to say	-	0	0.2%	1	0.4%	2
Income						
£0 - £9,999	2.6%	13	3.2%	16	3.4%	17
£10,000 - £16,999	3.4%	17	5.2%	26	4.0%	20
£17,000 - £34,999	15.6%	78	14.0%	70	17.6%	88
£35,000 - £54,999	23.4%	117	24.0%	120	23.4%	117
£55,000 - £69,999	15.8%	79	15.2%	76	13.4%	67
£70,000 - £99,999	15.6%	78	14.2%	71	14.4%	72
£100,000 - £149,999	9.0%	45	8.4%	42	8.0%	40
More than £150,000	4.0%	20	5.0%	25	4.4%	22
Prefer not to say	10.8%	54	10.8%	54	11.4%	57
Cost of living						
Worried	84.0%	421	84.2%	421	87.6%	438
Neither	8.2%	41	8.2%	41	5.0%	25
Not worried	7.2%	36	6.4%	32	6.8%	34
Prefer not to say	0.6%	3	1.2%	6	0.6%	3

	Subvert		Dramatise		Control	
	Mean / %	sd / n	Mean / %	sd / n	Mean / %	sd / n
Ownership status						
Own	48.5%	243	46.4%	232	47.0%	235
Buying with loan/mortgage	47.9%	240	48.4%	242	48.4%	242
Part-own (shared ownership)	3.6%	18	5.2%	26	4.6%	23
Region						
London	73.9%	370	77.6%	388	76.2%	381
Other	26.1%	131	22.4%	112	23.8%	119
Number of usable bedrooms in home	2.94	1.00	2.89	1.12	2.80	1.00

	Subvert		Dramatise		Control	
	%	n	%	n	%	n
Own a wood burner						
Yes	7.0%	35	8.8%	44	91.2%	456
No	92.2%	462	90.2%	451	8.6%	43
I don't know	0.6%	3	0.8%	4	0.2%	1
Prefer not to say	0.2%	1	0.2%	1	-	0

The demographics of respondents did not differ across experimental conditions

Total sample: n = 1501. Percentages calculated for each treatment group: Control (n = 500), Dramatise the facts (n = 500), Subvert the lifestyle (n = 501).