



Cambridge City Council Cabinet

Date: Tuesday, 24 June 2025

Time: 5.30 pm

Venue: Council Chamber, The Guildhall, Market Square, Cambridge, CB2 3QJ [access the building via Peashill entrance]

Contact: democratic.services@cambridge.gov.uk, tel:01223 457000

Agenda

- 1 Welcome and Introduction to Cabinet
- 2 Apologies
- 3 Declarations of Interest
- 4 Minutes of the Executive held on 10 February 2025 (Pages 5 - 12)
- 5 Public Questions

KEY DECISIONS

- 6 Expansion of the Smoke Control Area to cover the whole city (excluding permanent residential moored vessels) (Pages 13 - 106)

Cabinet is being asked to approve revoking the existing Smoke Control Areas (SCAs) which only covers a limited area of the city, and implement a single, city-wide SCA, excluding permanent residential moored vessels at this time. These changes are expected to contribute to a sustained reduction in PM_{2.5} emissions, leading to improved air quality and better health outcomes for everyone living in or visiting Cambridge.

- 7 Procurement of Contractor(s) to deliver energy efficiency and associated works to Council homes (Pages 107 - 124)

Approval for the tendering and award of contract(s) to deliver energy

efficiency and associated maintenance works to Council homes.

NON-KEY DECISIONS & UPDATE REPORTS

- 8 Verbal Update on Public Health Contract for Tier 1 & 2 Services

Update on bid submission process and next stages (healthy eating and physical activity; weight management)

Cabinet Members: Holloway (Chair), Wade (Vice-Chair), Bird, Moore, Nestor, Smart, A. Smith, S. Smith, Thornburrow and Todd-Jones

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accepted. All questions submitted by the deadline will be published on the meeting webpage before the meeting is held.

Further information on public speaking will be supplied once registration and the written question / statement has been received.

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THE EXECUTIVE

10 February 2025

9.06 - 9.16 pm

Present: Councillors Davey (Chair), Gilderdale (Vice-Chair), Bird, Holloway, Smart and S. Smith

Other Councillors present: Councillor Bennett

Officers Present:

Chief Operating Officer, Corporate Group: Jane Wilson

Chief Financial Officer, Corporate Group: Jody Etherington

Committee Manager: Claire Tunnicliffe

Meeting Producer: Boris Herzog

FOR THE INFORMATION OF THE COUNCIL

25/1/Exec Apologies

Apologies were received from Councillors Moore, Thornburrow and Wade.

25/2/Exec Declarations of Interest

Name	Item	Interest
Councillor Bird		Personal: Sits on the Board of the Cambridge Investment Partnership (CIP).
Councillor S Smith		Personal: Sits on the Board of the Cambridge Investment Partnership (CIP).

25/3/Exec Minutes

The minutes of the meeting held on 22 October 2024 were approved as a correct record and signed by the Chair.

25/4/Exec Public Questions

There were no public questions.

25/5/Exec HRA Budget-Setting Report (BSR) 2025/26

Recommendations of the Executive, which met on 10 February 2025, are set out in the Housing Revenue Account (HRA) Budget Setting Report (BSR) 2025/26 which went to meeting of the Housing Scrutiny Committee held on 4 February 2025.

Unless otherwise specified, all references in the recommendations to appendices, pages and sections relating to the Budget-Setting Report can be found via the Council agenda page:

[Agenda for Council on Monday, 24th February, 2025, 6.00 pm - Cambridge Council](#)

The Chief Finance Officer reminded Members that the recommendations were now to full Council.

Councillor Bennett said the following:

- i. As the Executive Councillor for Housing had noted 60% of tenants received some sort of state benefit help but some were still struggling financially.
- ii. It was important to highlight the work of Council's Financial Inclusion Officers who could support tenants to maximise their social security benefits and assist with accessing other funds. Encouraged Councillors to make a referral if they knew of any individuals who required support.
- iii. The Council's Financial Inclusion Officers were extremely knowledgeable and did an outstanding job.

The Executive **resolved unanimously** to:

Review of Rents and Charges

- a) Recommend that full Council approve that council dwellings rents for all social rented and social shared ownership properties be increased in line with government guidelines, with an increase of 2.7%, being inflation as measured by the Consumer Price Index (CPI) at September 2024 of 1.7%, plus 1%. Rent increases will take effect from 1 April 2025. This equates to an average rent increase of £3.37 per week.
- b) Recommend that full Council approve that affordable housing rents, inclusive of service charge, are also increased by 2.7% in line with the increase for social rents. This equates to an average rent increase of £5.06 per week.

- c) Recommend that full Council approve that rents for affordable shared ownership properties are increased by RPI as at September 2024, 2.7% plus 0.5%, as allowed for in the lease requirements for these properties.
- d) Recommend that full Council approve that garage and parking space charges for 2025/26 are increased by inflation at 2.7%, in line with dwelling rents, and approve changes in charges for parking permits, as set out at table 10 on page 28 of the attached Housing Revenue Account Business Plan Update and Budget Setting Report 2025/26.
- e) Recommend that full Council approve the proposed service charges for Housing Revenue Account services and facilities, as shown in Appendix D of the attached Housing Revenue Account Business Plan Update and Budget Setting Report 2025/26.
- f) Recommend that full Council approve the proposed leasehold administration charges for 2025/26, as detailed in Appendix D of the attached Housing Revenue Account Business Plan Update and Budget Setting Report 2025/26.
- g) Recommend that full Council approve that service charges continue to be recovered at full estimated cost, as detailed in Appendix D of the attached Housing Revenue Account Business Plan Update and Budget Setting Report 2025/26, recognising that local authorities should endeavour to limit increases to inflation as measured by CPI at September 2024 (1.7%) plus 1%, wherever possible.

HRA Revenue

- h) Recommend that full Council approve (with any amendments) the revenue savings, pressures and bids set out at Appendix F of the attached Housing Revenue Account Business Plan Update and Budget Setting Report 2025/26.
- i) Recommend that full Council approve the resulting Housing Revenue Account revenue budget as summarised at table 5 on page 20 of the attached Housing Revenue Account Business Plan Update and Budget Setting Report 2025/26.

Housing Capital

- j) Recommend that full Council approve the capital bid set out at Appendix F of the attached Housing Revenue Account Business Plan Update and Budget Setting Report 2025/26.
- k) Recommend that full Council approve the updated Housing Capital Investment Plan as shown at Appendix E of the attached Housing Revenue Account Business Plan Update and Budget Setting Report 2025/26.
- l) Recommend that full Council approve the proposed approach to financing the Housing Capital Investment Plan as set out at table 11 on page 31 of the attached Housing Revenue Account Business Plan Update and Budget Setting Report 2025/26.

Treasury Management

- m) Recommend that full Council approve the revised need to borrow over the life of the Business Plan, to sustain the proposed level of capital investment, which includes delivery of the 10 Year New Homes Programme.
- n) Recommend that full Council recognise that the constitution delegates Treasury Management to the Chief Finance Officer (Part 3, para 5.11), with Part 4F, C16 stating; 'All executive decisions on borrowing, investment or financing shall be delegated to the Chief Finance Officer, who is required to act in accordance with CIPFA's Code of Practice for Treasury Management in Local Authorities'.
- o) Recommend that full Council recognise that the decision to borrow significantly to build new homes impacts the council's ability to set-aside resource to redeem the HRA Self-Financing debt at the point at which the loan portfolio matures, resulting in a need to re-finance debt at the point of maturity.

General

- p) Recommend that full Council approve inclusion of a capital budget for Disabled Facilities Grant expenditure and associated grant income from 2025/26 onwards, based upon 2024/25 net grant awarded, with delegation to the Chief Finance Officer to approve an in year increase or decrease in this budget in any year, in direct relation to any increase or decrease in the capital grant funding available for this purpose, as received from Cambridgeshire County Council through the Better Care Fund.
- q) Recommend that full Council approval of delegation to the Chief Finance Officer, as Section 151 Officer, to determine the most appropriate use of any additional Disabled Facilities Grant funding, for the wider benefit of the Shared Home Improvement Agency.
- r) Recommend that full Council approve delegation to the Director of Communities to review and amend the level of fees charged by the Shared Home Improvement Agency for Disabled Facilities Grants and repair assistance grants, in line with any recommendations made by the Shared Home Improvement Agency Board.
- s) Recommend that full Council approve delegation to the relevant Director, in consultation with the Chief Finance Officer, to draw down resource from the ear-marked revenue reserve or capital reserve for potential debt redemption or re-investment, for the purpose of open market land or property acquisition or new build housing development, should the need arise, in order to meet deadlines for the use of retained right to buy receipts or to facilitate future site redevelopment.

t) Recommend that full Council approve delegation to the Chief Finance Officer to make any necessary technical amendments to detailed budgets in respect of recharges between the General Fund and the HRA.

25/6/Exec General Fund Budget Setting Report 2025/26 to 2029/30

Recommendations of the Executive, which met on 10 February 2025, are set out in the Budget Setting Report which went to Strategy & Resources Scrutiny Committee also held on 10 February before the meeting of the Executive.

The Executive noted the summary of changes on the General Fund revenue positions which had been highlighted at the Strategy & Resources Scrutiny Committee.

Unless otherwise specified, all references in the recommendations to appendices, pages and sections relating to the Budget-Setting Report which can be found via the Council agenda page:

[Agenda for Council on Monday, 24th February, 2025, 6.00 pm - Cambridge Council](#)

As the meeting immediately followed the meeting of the Strategy and Resources where the Budget-Setting Report had been scrutinised there was no further debate, and the Chair went straight to the vote.

The Executive **resolved unanimously** to:

General Fund Revenue Budgets:

a) Recommend to Council for approval the revenue pressures and bids shown in Appendix D(a) and the revenue savings and increased income shown in Appendix D(b).

b) Recommend that Council confirms delegation to the Chief Finance Officer of the calculation and determination of the council tax taxbase which is set out at Appendix A(a).

c) Recommend that Council approves the increase to the city council share of council tax for 2025/26 at 2.99%, and the updated council tax levels as set out on page 17 of the attached Budget Setting Report 2025/26.

Note that the council's preceptors (Cambridgeshire Police & Crime Commissioner, Cambridgeshire & Peterborough Fire Authority,

Cambridgeshire County Council and Cambridgeshire & Peterborough Combined Authority) will meet to confirm their precepts on or before 13 February 2025, following which the formal council tax calculation will be carried out for approval by Council.

d) Recommend that Council delegates authority to the Chief Finance Officer to reallocate budgets between services in relation to corporate and/or departmental restructuring, and any reallocation of support service and central costs in accordance with the CIPFA Service Reporting Code of Practice for Local Authorities (SeRCOP).

General Fund Capital Plan:

e) Recommend that Council approves the capital proposals set out at Appendix E(a), the revised capital plan set out at Appendix E(c), and the revised capital funding approach set out on page 28 of the attached Budget Setting Report 2025/26.

f) Recommend that Council approves the Capital Strategy 2025/26 attached at Appendix H.

General Fund Reserves:

g) Recommend that Council note the impact of budget proposals upon General Fund unallocated reserves, as set out on page 34 of the attached Budget Setting Report 2025/26.

h) Recommend that Council note the key risks to the council's financial sustainability highlighted in the table on pages 30-31 of the attached Budget Setting Report 2025/26.

i) Recommend that Council approve in principle a contribution to the Civic Quarter Development Reserve equivalent to the net underspend against budget for the 2024/25 financial year (currently forecast at £4.0 million).

j) Recommend that Council approve the transfers to earmarked reserves totalling £6.602 million in 2025/26 as set out on pages 32-33 of the attached Budget Setting Report 2025/26.

Section 25 Report:

k) Recommend that Council note the Chief Finance Officer's Section 25 Report, covering the robustness of estimates and adequacy of reserves, included at section 7 of the attached Budget Setting Report 2025/26.

Treasury Management Strategy:

l) Recommend that Council approves the Treasury Management Strategy 2025/26 attached at Appendix G, including the prudential and treasury management indicators set out at Annexe C.

m) Recommends that Council approves a change to the maturity structure prudential indicator, such that all new borrowing will have a maturity of at least 5 years (rather than the previous 10 years), as explained at paragraph 3.8 of Appendix G.

Other:

n) Recommend that Full Council reconfirm that the incomes below will be disregarded (if above the £10 statutory disregard) when calculating entitlement to housing benefit and/or council tax reduction. These schemes are often called local or modified schemes:

- War disablement pension
- War widow, widower or surviving civil partner pension
- Armed Forces Independence Payment

Note that the estimated cost to the council for payments of housing benefit made under the local scheme is £1,777.50 and for council tax reduction less than £50.

o) Recommend that Council note the Equality Impact Assessment in Appendix F covering all General Fund budget proposals.

p) Recommend that Council note the schedule of proposed fees and charges for 2025/26 in Appendix I(i) and Confidential Appendix I(ii)

The meeting ended at 9.16 pm

CHAIR

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**REPORT TITLE: Expansion of the Smoke Control Area to cover the whole city
(excluding permanent residential moored vessels)**

To:

Cabinet

24th June 2025

Report by:

Jo Dicks, Environmental Quality & Growth Team Manager

Tel: 01223 457892 Email: jo.dicks@cambridge.gov.uk

Wards affected:

City Wide

Director Approval: Director Sam Scharf confirms that the report author has sought the advice of all appropriate colleagues and given due regard to that advice; that the equalities impacts and other implications of the recommended decisions have been assessed and accurately presented in the report; and that they are content for the report to be put to Cabinet for decision.

1. Recommendations

1.1 It is recommended that Cabinet:

Approve revoking the existing Smoke Control Areas (SCAs) and implementing a single, city-wide SCA, excluding permanent residential moored vessels.

2. Purpose and reason for the report

2.1 Under the Local Air Quality Management (LAQM) regime, Local Authorities are responsible for monitoring air quality and contributing to national targets, including the reduction of Particulate Matter (PM_{2.5}). In Cambridge, solid fuel burning is the largest single source of PM_{2.5} emissions, accounting for 40% of the total. According to the Public Health Outcomes Framework, 51 deaths in Cambridge in 2023 could be attributed to particulate air pollution (latest available data).

The primary legislation governing emissions from solid fuel burning is the Clean Air Act 1993, which includes provisions for Smoke Control Areas (SCAs). Within an SCA, smoke emissions are prohibited unless smokeless fuel is used, or the appliance is approved by DEFRA. The existing SCAs in Cambridge, established in the 1960s and 70s, cover only a small portion of the city and exclude the majority of residential properties, limiting their effectiveness to control emissions.

To assess the potential impacts and benefits of expanding the SCA to cover the entire city, Cambridge City Council commissioned independent experts, *Air Quality Consultants Ltd*. Their report evaluated the environmental, health, and socio-economic impacts of such an expansion, including the implications of including or excluding permanently moored vessels.

The report concluded that expanding the SCA citywide would result in a net societal benefit, primarily from health improvements due to reduced air pollution and greenhouse gas emissions. These benefits were found to outweigh the associated costs, which include the financial burden on homeowners and vessel owners to switch fuels or upgrade appliances, as well as implementation and enforcement costs for the Council. The socio-economic analysis highlighted that few residents rely solely on solid fuel for heating and hot water. Most use wood-burning stoves for leisure or to supplement other heating methods. However, evidence suggests this is not the case for residents of moored vessels, who are more dependent on solid fuel, may have lower incomes and be more vulnerable.

Following agreement at the Environment & Community Scrutiny Committee on 26th September 2024, a public consultation was held from 27 January to 20 April 2025. A total of 776 responses were received, with approximately 55% in favour of expanding the SCA and 40% opposed. Supporters cited health and environmental benefits, while opposition focused on concerns about impacts on low-income households, personal freedom, scepticism about air pollution levels, and resource prioritisation by the council. In parallel, targeted engagement was conducted with the boating community. The findings of the consultation and wider targeted engagement supported the findings of the report, that

with the exception of the boating community most residents are not solely dependent on solid fuel and that for most burning solid fuel is a personal choice.

Based on the findings of the independent report, public consultation, and targeted engagement, the recommendation is to revoke the existing SCAs and establish a single, citywide SCA. However, permanently moored vessels should be excluded from the expansion at this time due to the disproportionate impact on this group. The Council will continue to engage with the boating community to explore viable alternatives and seek funding to support a transition to more sustainable heating solutions.

3. Alternative options considered

- 3.1 Domestic burning is currently the largest source of PM_{2.5} emissions in Cambridge, a trend that continues to rise due to the increasing popularity of wood-burning stoves. The current SCAs in Cambridge offer only limited control over emissions from solid fuel burning, primarily due to their restricted geographical coverage. Some university college fireplaces are exempt under the existing SCA's. While expanding the scope of SCAs could help address this issue, it is acknowledged that such changes may have a negative impact on some residents.

Amendments to the Environment Act 2021 have enabled local authorities to extend SCAs to include permanently moored vessels, following appropriate consultation. Although the people on these vessels represent a small proportion of the population, a disproportionate number of smoke-related complaints received by Environmental Health relate to them. It is therefore reasonable to consider their inclusion in any proposed SCA amendments.

Evidence gathered through the SCA Impact Study, public consultation, and engagement with the boating community indicates that, aside from those on permanently moored vessels, few residents rely solely on solid fuel for heating. For most, it is a matter of personal choice. Including permanently moored vessels in the expanded SCA could therefore result in disproportionate negative impacts on this group. All the university colleges were contacted as part of the SCA impact study. From the responses received

limited use of solid fuel was reported. All colleges who responded were contacted when the consultation went live. Of the colleges that responded no objections were received. No exemptions are recommended.

Recommendation: We recommend expanding the SCA to cover the entire city with no exemptions, while excluding permanently moored vessels at this stage. We also propose continued engagement with the boating community to explore viable alternatives to solid fuel heating, with a view to potentially revisiting their inclusion in five years.

Alternative Options:

1. Have no SCA
2. Retain the existing SCAs without any changes.
3. Expand the SCA to cover the entire city with specific exemptions in place
4. Expand the SCA to include permanently moored vessels.

4. Background and key issues

4.1 Driver for Change

Under the Local Air Quality Management (LAQM) regime, Local Authorities are responsible for monitoring air quality and supporting national targets, including the reduction of fine particulate matter (PM_{2.5}). Although Cambridge has recently lifted its Air Quality Management Area due to falling nitrogen dioxide (NO₂) levels, research shows that there is no safe level of air pollution. We will continue to monitor key pollutants including NO₂, PM_{2.5} and PM₁₀, identifying interventions to deliver continued air quality improvements.

The primary pollutant of concern from solid fuel combustion is PM_{2.5}—particles less than 2.5 micrometres in diameter. In this district, solid fuel burning is the largest single source of PM_{2.5} emissions, accounting for an estimated 40% (35 tonnes) of total emissions in 2021. Of this, wood burning contributes the majority—approximately 76%.

There is robust evidence linking PM_{2.5} exposure to serious health impacts, including premature mortality, allergic reactions, and cardiovascular diseases. According to the

Public Health Outcomes Framework, 51 deaths in Cambridge in 2023 could be attributed to particulate air pollution (latest available data).

The Environment Act 2021 introduced legally binding national targets for PM_{2.5}, as set out in the Environmental Target Regulations (2023). These include:

- A maximum annual mean concentration of 10 µg/m³ nationwide by 2040, with an interim target of 12 µg/m³ by January 2028.
- A 35% reduction in average population exposure by 2040, with an interim target of 22% by January 2028, both relative to a 2018 baseline.

The *National Air Quality Strategy: Framework for Local Authority Delivery* outlines how local authorities should use their powers to reduce PM_{2.5} emissions from sources within their control. This includes a strong focus on domestic burning and the review of Smoke Control Areas (SCAs).

The recently adopted *Greater Cambridge Air Quality Strategy (2024)* sets out actions for continued air quality improvements, aligning with World Health Organization (WHO) air quality guidelines. The strategy includes interim targets and actions such as consulting on the expansion of SCAs. For context, the WHO guideline for annual average PM_{2.5} is 5 µg/m³, while the current DEFRA-estimated background level for Cambridge is 10 µg/m³.

4.2 Smoke Control Areas (SCA)

Cambridge currently has three SCAs, established during the 1960s and 1970s. These areas primarily cover the central, southern, and western parts of the city. Exemptions are included for certain fireplaces associated with Cambridge University Colleges. The extent of these SCAs is illustrated in **Appendix A**.

SCAs are designated under the Clean Air Act 1993 and serve as a key tool for managing emissions from solid fuel combustion. The Environment Act 2021 introduced amendments to the Clean Air Act, extending its provisions to include both domestic and commercial premises within SCAs. Local authorities also have the option, following public consultation, to expand the scope of SCAs to cover permanently moored vessels such as canal and river boats.

Within an SCA, specific regulations apply regarding smoke emissions from building chimneys, as well as the types of appliances and fuels that may be used. The primary goal of SCAs is to reduce air pollution by limiting smoke emissions from domestic and commercial sources.

Importantly, the designation of an SCA does not prohibit the use of solid fuels. Residents and businesses can continue to use solid fuel, provided they comply with the regulations.

This includes:

- Using an approved (exempt) appliance, or
- If using a non-approved appliance, burning only authorised 'smokeless' fuels, such as manufactured solid fuels (MSFs) or anthracite.

There are different types of authorised fuels that are considered 'smokeless' and appropriate for burning in a SCA. Fuels that are inherently smokeless are anthracite, semi-anthracite and low volatile steam coals. It is worth noting that some authorised MSF's are made from wood-based materials but differ significantly from solid wood. To check whether a fuel is approved for use in an SCA:

- *Look at the packaging:* Approved fuels typically display a text such as "Authorised for use in smoke control areas."
- *Use the official DEFRA website:* Visit <https://smokecontrol.defra.gov.uk/fuels-php/england/> and enter the name of your fuel in the search bar. If it appears in the list, it is considered an authorised smokeless fuel.

The use of unauthorised fuels, such as solid wood, is only permitted in approved appliances.

It is important to note that SCAs regulate emissions from internal chimneys only. Therefore, outdoor burning activities such as bonfires, fire pits, chimineas, and outdoor pizza ovens are not covered by these regulations. Many people mentioned outdoor smoke in their consultation feedback, so it will be included in the upcoming campaign to help change behaviour and cut emissions.

4.3 Supporting Evidence

4.3.1 Smoke Control Area Impact Study (2024)

Cambridge City Council commissioned an independent study by *Air Quality Consultants Ltd* to assess the potential impacts of expanding the Smoke Control Area (SCA) to cover the entire city, including the inclusion of permanently moored vessels. The full report is available in **Appendix B**. Key findings include:

➤ Air Quality & Health

- Residential solid fuel burning is the primary source of PM_{2.5} emissions in Cambridge.
- Expanding the SCA citywide could reduce PM_{2.5} emissions by 69% (18.9 tonnes), compared to just 4% under the current SCA boundaries, when compared against the baseline of no SCA's.
- This reduction would lead to fewer premature deaths and would lower risks of respiratory and cardiovascular diseases such as lung cancer, heart disease, and asthma.
- Overall health and indoor air quality would improve for both residents and visitors.

➤ Socio-Economic Impact

- While there are associated costs for households (e.g. switching fuels, upgrading stoves) and for the Council (implementation and enforcement), the long-term health and environmental benefits outweigh these costs.
- Data shows that very few households rely solely on solid fuel for heating. The majority use it for supplementary heating or personal preference.
- Approximately 1,300 households would experience a change in their living or working conditions if the SCA were expanded citywide.

➤ Permanent Residential Moored Vessels

- Although there are only around 70 licensed permanently moored vessels, they account for a disproportionately high number of smoke-related complaints.
- This group includes a higher proportion of individuals with protected characteristics including low income, disability, and older age, and could be disproportionately affected by the proposed changes.

4.3.2 Public Consultation on Smoke Control Area Expansion (26 January – 20 April 2025)

A total of 776 responses were received (772 via Citizen Lab and 4 via hard copy). The consultation was widely promoted across multiple platforms. A full summary is provided in **Appendix C**. Headline results include:

- 55% of respondents supported the expansion, citing health and environmental benefits.
 - 40% opposed the proposal, raising concerns about:
 - Increased costs and impact on low-income households
 - Belief that air pollution is not a significant issue in Cambridge
 - Environmental concerns about smokeless fuels
 - Perceived overreach of council powers and restriction of personal freedoms
 - Inclusion of permanent residential moored vessels - while inclusion remained the most supported option, the proportion of neutral responses rose to 15% (compared with only 5% when asked about the expansion in general).
 - Supporters emphasised equal treatment of all residents and the health impact of smoke on river users.
 - Opponents cited concerns about affordability, practical challenges, and perceived targeting of a vulnerable group.
 - Even among supporters, there was recognition of the need for practical support to facilitate the transition.
- **Additional Insights**
- Responses confirmed that most residents are not solely dependent on solid fuel heating.
 - The use of wood-burning stoves and open fires is largely a matter of personal choice.
 - Questions were raised about potential exemptions for historic buildings and cultural events (e.g. university colleges, historic pubs), however it is worth noting that no university colleges objected to the proposal (currently exempt).

4.3.3 Engagement with Boat Owners

There are 70 licensed permanently moored vessels on the River Cam within the city. Boat owners were directly contacted and encouraged to participate in the consultation. Information was also shared with the National Bargee Travellers Association and Cam Boats, both of which submitted responses. See **Appendix D** for a full summary of the results. In parallel, Council officers conducted targeted engagement with the boating community, including a separate questionnaire and follow-up interviews to better understand the potential impacts.

- 31 responses were received (approx. 44%), though the actual response rate may be higher due to some vessels being unoccupied.
- The findings confirmed that this group has a higher prevalence of protected characteristics, particularly disability, and low income.
- While some already use smokeless fuel as their primary source of heating (approx. 54% of survey respondents), there are significant practical challenges, including:
 - Suitability of DEFRA-approved stoves
 - Suitability of smokeless fuel in all possible circumstances
 - Managing heat in confined spaces without insulation

Eight follow-up interviews provided deeper insight into these challenges. The conclusion was that including permanently moored vessels in the SCA would likely have a disproportionately negative impact on this community, despite the health and environmental benefits.

However, continued engagement is strongly recommended to explore practical support and transition pathways, recognising that this group also faces heightened health risks from indoor air pollution due to solid fuel use in confined spaces.

Oxford City Council are trialling three electric '[eco-moorings](#)', funded through a £193,000 DEFRA Air Quality Grant in partnership with the Canal and River Trust. These moorings provide boaters with a clean energy alternative and reduce reliance on diesel engines, generators and wood burners for their day-to-day energy needs.

5. Corporate plan

5.1 [Corporate plan 2022-27: our priorities for Cambridge - Cambridge City Council](#)

Many air quality improvement measures also support the Council's climate change objectives. Whilst burning wood can be considered carbon neutral if using locally sourced sustainable timber, the move to expand the SCA is predicted to contribute to lower CO₂ emissions, most notably from behavioural change, helping Cambridge progress toward its climate targets as outlined in Priority 1.

The *Smoke Control Area Impact Study* was commissioned to assess the potential effects on households if the SCA were expanded. Findings from the study, supported by public consultation and targeted engagement with the boating community, confirm that only a small number of households rely exclusively on solid fuel for heating and hot water. For most, its use is a matter of personal choice or a supplementary source. The environmental and health benefits of reducing solid fuel use are considered to outweigh the impacts on these individuals.

Engagement with the boating community further highlighted that permanently moored vessel owners are more likely to be on low incomes and have a higher prevalence of protected characteristics. Including this group in the SCA regulations could therefore result in a disproportionately negative impact, which would be contrary to the Council's commitment to equity and inclusion under Priority 2.

Recommendation: In light of these findings, it is recommended that permanently moored vessels be excluded from the proposed SCA expansion. Continued engagement with this community is advised to explore practical and equitable pathways to reduce solid fuel use over time.

6. Consultation, engagement and communication

6.1 Public Consultation

A public consultation was conducted between 26 January and 20 April 2025, receiving a total of 776 responses. The consultation was widely promoted across the city through a variety of channels, including:

- Social media platforms
- Press Release
- Bus stop advertising and Cambridge United Newmarket Road billboard
- Local newspapers
- *Cambridge Matters* magazine
- City-wide posters and leaflets distributed to community buildings, GP surgeries, supermarkets, and garage forecourts

To support accessibility and engagement, a weekly drop-in session was held at the Customer Service Centre (CSC) throughout the consultation period. This provided an opportunity for residents to ask questions or receive assistance in completing the consultation.

In addition, statutory stakeholders and key organisations—such as the National Bargee Travellers Association—were directly informed of the consultation. A full summary of responses is available in **Appendix C**.

6.2 Targeted Engagement with Moored Vessel Residents

Alongside the city-wide consultation, a targeted questionnaire was distributed to residents of the approximately 70 licensed permanently moored vessels within the district. The aim was to better understand the potential impacts of the proposed changes on this community and the practicalities of compliance.

- 31 responses were received, representing a response rate of approximately 44% (though this may be higher due to some vessels being unoccupied).
- Eight one-to-one interviews were also conducted to explore in greater depth the day-to-day implications of the proposed changes.

This targeted engagement provided valuable insights into the unique challenges faced by this group and informed the overall recommendations. A full summary of this work is available in **Appendix D**.

6.3 **Process and Timeline for Delivering a City Wide SCA**

Since Cambridge City Council has already consulted on this, the process to revoke existing SCAs and declare a new city-wide SCA should take around six months.

Revoking Existing SCAs:

- Our current SCAs were declared before 1980, so we must follow the Clean Air Act 1993 (Part 3, Schedule 5).
- We must notify DEFRA, publish notices in the *London Gazette* and a local paper for two weeks, and allow six weeks for objections.
- DEFRA then reviews any objections and makes a decision, which can take up to two months.

Declaring a New City Wide SCA:

- Once DEFRA approves the revocation, we can begin the process to declare a new SCA.
- This involves advertising the intention for two weeks and allowing six weeks for objections.
- We'll also promote the changes more broadly as part of a public campaign.
- After the objection period, the new SCA order is declared.

Although these are separate processes, we aim to align them so there's no gap in enforcement. The revocation order will be prepared in advance but won't take effect until the new SCA is ready.

6.4 **Next Steps and Ongoing Support**

Should the proposal to expand the Smoke Control Area be approved we will implement a comprehensive awareness and education campaign for residents and businesses. This will focus on:

- Advertising notices separately for both the revocation of the existing SCA orders and the declaration of a new city wide order as per legislation requirements and best practice
- Ensuring residents and businesses understand the changes and what they mean for them
- Promoting “better burning” practices, including the use of appropriate fuels and proper stove maintenance. This also includes tackling outdoor smoke, which, although covered by different legislation, was highlighted as an important issue in public feedback.

When complaints are received, the Council will adopt a proportionate and education-first approach, aiming to resolve issues through awareness and support. Enforcement will be considered only as a last resort. Our Enforcement Policy which was updated following the Environment Act 2021 amendments can be viewed at: www.cambridge.gov.uk/smoke-pollution

It is also recommended that officers continue to work closely with the boating community to explore practical and equitable options for transitioning away from solid fuel use, recognising both the environmental and health benefits and the unique challenges faced by this group.

7. Anticipated outcomes, benefits or impact

- 7.1 The primary aim of the proposed expansion of the Smoke Control Area (SCA) is to drive long-term behavioural and environmental change. Under the new regulations:
- All new wood-burning stoves within the city will be encouraged to be DEFRA-compliant, ensuring they meet stricter emissions standards.
 - Where new non – complaint stoves are installed only authorised smokeless fuel should be burnt
 - For existing non-compliant stoves, only authorised smokeless fuels should be used to minimise particulate emissions.

Over time, the benefits of this policy will grow as public awareness increases around the health impacts of solid fuel burning, the advantages of responsible burning practices, and as infrastructure and support mechanisms evolve to facilitate cleaner alternatives. These changes are expected to contribute to a sustained reduction in PM_{2.5} emissions, leading to improved air quality and better health outcomes for everyone living in or visiting Cambridge.

To measure the effectiveness of the policy, the Council will continue to conduct ongoing air quality monitoring across the district. This will be complemented by tracking complaint data to assess public response and identify areas requiring further support or intervention.

8. Implications

8.1 Relevant risks

Consideration of potential impact on a small number of residents

It is important to note that 5.7% of respondents (44 individuals) reported heating setups in their home that might not meet the proposed SCA rules if the expansion goes ahead.

While it is understood that some of these responses are likely to be from residents of permanent moored vessels who would not be affected under the current recommendation, some residents indicated solid fuel as their primary source of heating. On further analysis some of these respondents appear to also have gas or electric heating which suggests a preference for solid fuel rather than sole dependency.

However, it is important to acknowledge the possibility that a small number of residents may genuinely rely on solid fuel as their only source of heating and hot water. If this is the case, and complaints are received following implementation, it is expected that Council officers will respond in a reasonable and proportionate manner, offering support and guidance to help affected residents explore alternative heating options.

This approach ensures that the policy is implemented fairly, with sensitivity to individual circumstances, while still progressing toward the broader environmental and public health goals.

8.2 Financial Implications

Responding to complaints about smoke falls under the work programme of Environmental Health. These changes would streamline how smoke complaints are dealt with as they would all fall under a single legislation (with the exception of outdoor smoke complaints e.g. bonfires which would continue to be dealt with under smoke statutory nuisance). The existing officer resource would continue to respond to these complaints.

8.3 Legal Implications

Under the Environment Act 2021, local authorities in England have enhanced powers to designate and enforce Smoke Control Areas (SCAs). This includes:

Designating Smoke Control Areas (SCAs)

- Declare new SCAs or amend existing ones to include additional areas such as moored vessels or specific buildings.
- Consult with the public and relevant stakeholders (e.g. heritage groups) before expanding SCAs.
- Exempt certain buildings or vessels from SCA rules if justified.

Enforcing Smoke Control Rules

The Environment Act 2021 amended the Clean Air Act to:

- Streamline enforcement by making breaches of SCA rules a civil offence rather than a criminal one
- Allow local authorities to issue financial penalties (civil penalties) for:
 - Emitting smoke from a chimney in an SCA.
 - Using unauthorised fuels or non-exempt appliances.
 - Emissions from moored vessels, if included in the SCA

8.4 Equalities and socio-economic Implications

Public Health data indicates that in 2023, an estimated 51 deaths in Cambridge could be attributed to particulate air pollution. This figure is derived using the total number of deaths in the city and the Public Health Outcomes Framework fraction for mortality due to particulate air pollution. Currently, PM_{2.5} is recognised as the most appropriate metric for assessing the health impacts of air pollution.

Improving air quality is known to deliver significant health benefits, particularly for:

- Children
- Older adults
- People with disabilities (by helping to prevent or mitigate conditions such as asthma, coronary heart disease, stroke, lung cancer, chronic bronchitis, and diabetes)
- Pregnant individuals (by reducing the risk of low birth weight)

In addition, research has shown strong links between exposure to air pollution and socioeconomic deprivation, and between deprivation and ethnicity, highlighting the importance of addressing air quality as a matter of health equity.

An Equality Impact Assessment (EqIA) has been completed and is included as **Appendix E**. The protected characteristics most relevant to this proposal are:

- Age
- Disability
- Low income

The decision not to include permanently moored vessels in the proposed expansion of the Smoke Control Area is supported by the findings of the EqIA. This group includes a higher-than-average proportion of individuals with the above protected characteristics, and inclusion could result in disproportionate negative impacts, contrary to the Council's equality objectives.

It is essential that any education and awareness campaigns associated with the proposed changes are inclusive and accessible, ensuring that all communities—

particularly those with protected characteristics—fully understand the changes and how they may affect their behaviour.

8.5 **Net Zero Carbon, Climate Change and Environmental implications**

Rating: Low Positive

The proposal is to revoke the existing Smoke Control areas (SCA) that cover only a small area of the city and replace with a single city wide SCA. You can still burn in a SCA but DEFRA approved stoves or smokeless fuel need to be used to reduce smoke emissions, reducing PM_{2.5} emissions and offering a net positive health benefit. Whilst burning wood can be considered carbon neutral if using locally sourced sustainable timber, the move to expand the SCA is predicted to contribute to lower CO₂ emissions, most notably from behavioural change and improved burning techniques.

Alongside the changes to the SCA boundary we will continue to promote and raise awareness and understanding on the environmental and health impacts of burning solid fuel, promoting 'Better Burning' to reduce emissions.

8.6 **Procurement Implications**

N/A

8.7 **Community Safety Implications**

N/A

9. **Background documents**

Used to prepare this report, in accordance with the Local Government (Access to Information) Act 1985

- 9.1 1. Local Air quality Management Policy guidance (PG22), August 2022
[England \(exc. London\) Policy Guidance | LAQM \(defra.gov.uk\)](#)
2. Local Air Quality Management Technical Guidance (TG22), August 2022
[UK Regions \(exc. London\) Technical Guidance | LAQM \(defra.gov.uk\)](#)

3. Air Quality Strategy: Framework for Local Authority Delivery
www.gov.uk/government/publications/the-air-quality-strategy-for-england
4. Air Quality Annual Status Report 2023
www.cambridge.gov.uk/air-pollution-measurements
5. Greater Cambridge Air Quality Strategy (2024)
www.cambridge.gov.uk/media/i3eh0kvd/greater-cambridge-air-quality-strategy-2024.pdf
6. COMEAP Annual Report 2022
www.gov.uk/government/publications/comeap-annual-report-2022
7. COMEAP Response to publication of WHO Air Quality Guidelines
[COMEAP statement: response to publication of the World Health Organization Air quality guidelines 2021 - GOV.UK \(www.gov.uk\)](http://www.gov.uk/government/publications/comeap-statement-response-to-publication-of-the-world-health-organization-air-quality-guidelines-2021)
8. World Health Organisation Air Quality Guidelines (2021)
www.who.int/news-room/questions-and-answers/item/who-global-air-quality-guidelines
9. [D01 Fraction of Mortality attributable to Particulate Air Pollution data](#)

10. Appendices

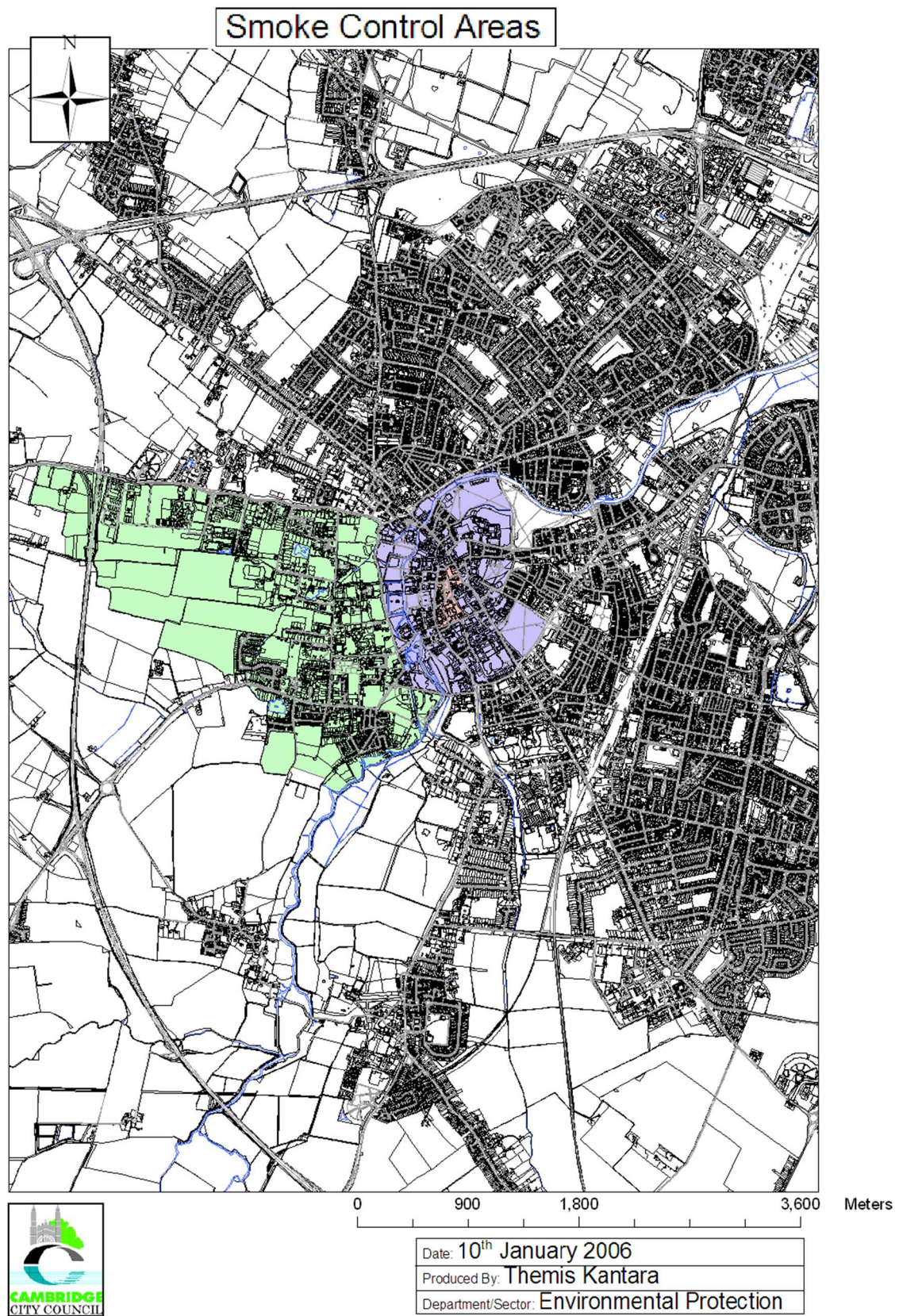
- 10.1
 - A. Maps of existing Smoke Control Areas
 - B. Smoke Control Area Impact Study 2024
 - C. Public Consultation – Summary of Responses
 - D. Engagement with Boating Community Report
 - E. Equality Impact Assessment

To inspect the background papers or if you have a query on the report please contact:

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Appendix A: Existing Smoke Control Areas



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Report

Smoke Control Area Impact Study 2024

Final Report

For Cambridge City Council

28 August 2024

Document Control

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Client:	Cambridge City Council
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02	12/07/2024	Final report including responses to comments received from client on 09/07/2024
03	18/07/2024	Final changes following discussion with client 16/07/2024
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Contents

1	Executive Summary	1
2	Introduction	4
3	Approach	8
4	Air Quality Assessment	19
5	Health Impact Assessment	28
6	Socio-Economic Assessment	34
7	Summary and Conclusions	44

Tables

Table 3-1: Assumptions in the bottom-up approach: Domestic Properties	12
Table 3-2: Assumptions in the bottom-up approach: Boats	13
Table 3-3: Health impact pathways captured, and key input assumptions (all associated with exposure to PM _{2.5})	15
Table 3-4 Fuel price data	17
Table 4-1: Baseline PM _{2.5} Solid Fuel Burning Emissions in Cambridge (all figures tonnes per annum)	19
Table 4-2: Baseline parameters	20
Table 4-3: Emissions Reductions under Scenario 1	21
Table 4-4: Emissions Reductions under Scenario 2	21
Table 4-5: Emissions Reductions under Scenario 2a	22
Table 4-6: Emissions Reductions under Scenario 3	22
Table 4-7: Emissions Reductions under Scenario 3a	23
Table 4-8: Emissions Reductions under Scenario 4	23
Table 4-9: Emissions Reductions under Stove Assumption Sensitivity Scenario (Baseline)	24
Table 4-10: Summary of Emissions reductions from scenarios modelled	25
Table 5-1: Damage costs of changes in air pollution (benefits associated with reductions in air pollutant emissions are expressed as positive numbers) (£000k), relative to the baseline, per annum	28
Table 5-2: Scenario health impacts (benefits associated with reductions in air pollutant emissions are expressed as negative numbers), relative to baseline	29
Table 6-1 Results of cost analysis (£/annum) – costs are presented as positive values	34
Table 6-2 Cost-benefit analysis of policy scenarios (negative values are benefits, positive values are costs, all impacts are per annum for a representative year, expressed in £2022 prices)	35
Table 6-3: Outputs of the sensitivity analysis – shows NPV for typical year of impacts, expressed in £2022 prices	38

Table 6-4: Split of households using two or more types of central heating (not including renewable sources), in LSOAs located in the Cambridge Local Authority area, split by IMD decile	39
Table 7-1: Summary multi-criteria analysis of scenarios	45

Figures

Figure 2-1 UK annual emissions of PM _{2.5} by major emission source (1990, 2005, 2021, 2022) ²	4
Figure 2-2 NAEI (2021) PM _{2.5} sector emissions for Cambridge City Council area. *Note: 'Domestic Solid Fuel Burning' and 'Other non-industrial combustion' form category '02 non-industrial combustion plants' in the NAEI – they have been separated here to highlight emissions from domestic solid fuel burning.	5
Figure 2-3 PM _{2.5} emissions from '02 Non-industrial combustion plants' by fuel source (tonnes, per cent) ³	6
Figure 4-1 Summary of changes to PM _{2.5} emissions across Cambridge in the modelled policy scenarios relative to the Baseline	25
Figure 4-2 Summary of changes to PM _{2.5} emissions across Cambridge in the modelled policy scenarios relative to total PM _{2.5} emissions	26
Figure 5-1: Split of monetised damage costs by impact pathway – Scenario 3	29
Figure 6-1: Cost-benefit analysis of policy scenarios (negative values are benefits, positive values are costs, all impacts are per annum for a representative year, expressed in £2022 prices)	36

1 Executive Summary

Burning of solid fuels for heating in homes and commercial buildings is an important source of air pollution, which when exposed to, carries significant detrimental impacts for human and environmental health. In the UK, PM_{2.5} emissions decreased by 72% between 1990 and 2022¹. The major drivers for this were the reduction in the burning of coal for power generation, and improved emission standards for transport and industrial processes. In recent years, the rate of reduction in annual emissions of PM has slowed, with decreases in emissions from certain sectors being offset by increases in emissions from wood burning in domestic settings and from solid fuel burning by industry³. Hence, burning of solid fuels in homes and businesses is becoming an increasingly important source as emissions reduce from other sources. In the Cambridge City Council area, domestic solid fuel burning is estimated to account for 40% of total PM_{2.5} emissions, with wood burning making up the majority of the domestic total.

One of the key policy mechanisms to tackle pollution from burning of solid fuels for heat has been Smoke Control Areas (SCA), which restrict the type of fuels that can be burned and the type of appliance used. Cambridge has three existing SCAs covering the central and western areas of the city, established during the 1960s. Cambridge City Council commissioned Logika Group to undertake this study to assess the effects of amending its existing SCAs (extending or removing) in terms of changes in pollutant emissions, health and socio-economic considerations. The following scenarios were considered:

- **Baseline:** This estimated emissions in Cambridge from domestic premises and river vessels based on the current SCA boundary.
- **Scenario 1:** This looked at the changes in emissions and impacts if all moored residential boats are also included in SCA rules, with no change to the current SCA boundary for residential properties.
- **Scenario 2:** This extends the SCA boundary to become a city-wide SCA (and continues to exclude the moored residential boats).
- **Scenario 3:** This is the same as Scenario 2 (extend SCA boundary to become a city-wide) but includes moored residential boats in SCA rules.
- **Scenario 4:** This estimates what emissions in Cambridge might have been if the existing SCAs had not been declared (this is similar to, but not the same as, removal of the existing SCA).

The analysis performed uses the most up-to-date and robust data and approaches and follows relevant best-practice guidelines for the assessment of associated effects. The methodology has been developed on the basis of the expertise of the project team and has been discussed and agreed with the Council. That said, there are limitations and uncertainty in the assessment and assumptions made, in both the baseline and the scenarios. The most important uncertainty relates to the resulting behaviour change of households and moored vessels if the SCA is expanded. Hence sensitivity tests have been run around the scenarios above, **looking at 25% non-compliance with the SCA**, and also testing the sensitivity of some of the baseline assumptions.

Residential emissions are the largest single source of emissions of PM_{2.5} in Cambridge and **the majority of properties are currently outside of the SCA**. Expanding the SCA city wide (Scenario 2) is estimated to have a large positive effect on emissions from solid fuel burning, resulting in a 69% reduction (18.9

¹ <https://www.gov.uk/government/statistics/emissions-of-air-pollutants/emissions-of-air-pollutants-in-the-uk-particulate-matter-pm10-and-pm25#:~:text=Annual%20emissions%20of%20PM2.5,65%20thousand%20tonnes%20in%202022.>

tonnes) of PM_{2.5} from domestic solid fuel burning overall. Even with 25% non-compliance assumed, there is still predicted to be a significant (61%) reduction in overall PM_{2.5} emissions from solid fuel burning. Moored river vessels represent a much smaller contribution to overall emissions, and **current assumptions are that most are already likely to be burning Manufactured Solid Fuel (or MSF, which is a compliant fuel under SCA rules, meaning that they would not need to change behaviour in response to an extension of the SCA to cover moored vessels).** Therefore Scenario 1, which only includes moored vessels, achieves a much smaller reduction in PM_{2.5} emissions of 2% (0.52 tonnes). Scenario 3, the expansion of the SCA, including moored vessels, provides the greatest benefit, but is very similar to Scenario 2 due to the small contribution that moored vessels make. Scenario 4 shows that the current SCA delivers a benefit of around a 4% reduction in PM_{2.5} emissions from domestic solid fuel burning (1.1 tonnes).

These reductions in air pollutant emissions will deliver **positive benefits for human and environmental health**, with the size of effects moving in line with the size of the emission reductions – hence Scenarios 2 and 3 will deliver a significantly greater benefit than Scenario 1. A wide (and increasing) range of health conditions are linked to air pollution exposure, and reducing emissions will reduce the risk of lung cancer, stroke, ischemic heart disease, asthma, respiratory hospital admissions and deaths attributable to air pollution. These benefits can be expressed in monetary terms using ‘damage costs’, which capture associated changes in health care costs, ‘productivity’ benefits and the value people place on their own good health. When valued in this way, **Scenarios 2 and 3 deliver a societal benefit valued at £1.6m each year, in comparison to £44,000 per year for Scenario 1.** By comparison, analysis of **Scenario 4 suggest that the existing SCA delivers a societal benefit of around £93,000 per year** for Cambridge residents (i.e. a benefit that could be lost should the SCA be removed).

These monetised health impacts have been combined into a wider assessment of the **socioeconomic effects** of adjusting the SCA. Where possible, the impacts of the Scenarios have been quantified and captured in a cost-benefit analysis comparing the benefits of the scenarios against the costs. The costs to home and vessel owners of switching fuel or upgrading stoves, and to the Council with implementation and enforcement are greatest under Scenarios 2 and 3; **Scenario 3 is estimated to carry a cost of £250,000 per annum relative to Scenario 1 which would cost around £15,000 per year.** Overall, all scenarios to extend the SCA are estimated to deliver a ‘net benefit to society’ – in other words, the health improvements from reduced air pollution and benefit of greenhouse gas emission reductions outweigh the combined costs to the Council and owners of homes and moored vessels. The size of the net benefit delivered rises in line with the size of air quality benefits, hence **Scenarios 2 and 3 deliver the largest net benefit in the order of £2.8m per year, with a ratio of benefits-to-costs or 12-to-1.** Scenario 4, the existing SCA, was not subject to quantitative analysis given uncertainty around what would happen should an SCA be removed, however expert judgement suggests it is likely that the costs of removing the SCA in terms of the air pollutant benefits lost (i.e. increased emissions) and higher GHG emissions would outweigh any benefits in terms of fuel cost savings, hence delivering an overall disbenefit for society.

While increasing the coverage of the SCA results in a net benefit to society, it is important to consider **additional impacts and risks that have not been quantified and captured in the cost-benefit analysis.** For households, there may be some practical implications of switching, such as search costs of finding new fuel sources, the need to allow access to the home to upgrade stoves, and installation risks – however there is no evidence to suggest these risks are significant overall. This is particularly the case as based on census data, **there are no (or very few) households using wood or other solid fuel as their only source of heating, and those who do use solid fuels are typically not in the more deprived deciles of the Index of Multiple Deprivation (IMD).** That said, the implications for **moored vessel owners** appear more consequential, in particular as **85% (~60 boats) use solid fuel as their primary heating source.** As a group, evidence suggests moored vessel owners may have relatively lower incomes (A Canal and River Trust survey found that 27% of boaters declared an income under £20,000/year, and 43% under £30,000/year) and hence alternative options may be less affordable for some. Furthermore, this group

tend to be more vulnerable (i.e. more likely to be elderly or have a disability or long-term health conditions) and vessels tend to be less well-insulated. Hence there is a greater risk that moored vessel owners may face difficulties affording to comply with the SCA, which in turn may have a detrimental impact on living standards amongst a more at-risk group.

Overall, the assessment presents either Scenario 2 or 3 as the preferred option. Analysis shows that benefits of expanding the SCA outweigh the costs, and there is predicted to be a net benefit to society of extending the SCA to the whole of Cambridge, driven by improvements to health. These findings are however dependant on behaviour change driven by the SCA which is uncertain and unlikely to be the full extent modelled, albeit costs and benefits will scale in line with the response and a net positive impact is likely even where response is lower than modelled here. As such, awareness-raising information campaigns and/or enforcement will be important to ensure the SCA succeeds in achieving behaviour change. Further work such as a city-wide survey may be helpful for better understanding burning behaviour and potential behaviour change related to extension of the SCA. Inclusion of river vessels in the SCA would deliver an additional net benefit and could achieve a significant impact on emissions from a more visible source (although the additional benefit as a whole is relatively small). There are however some additional risks and concerns for this small group of affected citizens, including higher economic vulnerability and risks from changes in living conditions. The data relating to proportions of river vessels burning wood and coal products, and the appliances which are being used is also more uncertain than for residential properties. Therefore, where Scenario 3 is pursued, additional engagement with moored vessel owners is recommended to further explore solid fuel burning activity within this group, as well as the potential impacts and risks to this group, and complementary measures should be considered where potential issues are identified to mitigate risks for vulnerable boat owners where possible.

2 Introduction

2.1 Context

Burning of solid fuels for space and water heating in homes and commercial buildings is a source of air pollution. Emissions from solid fuel burning contribute to elevated concentrations of Particulate Matter (PM) in the atmosphere. PM, both in the form of PM₁₀ and PM_{2.5}², has many different sources, both natural and anthropogenic. These can be grouped into primary sources, where the particles are emitted directly into the atmosphere, or secondary sources, where the particles are formed from precursor gases through chemical reactions in the atmosphere. Sources of primary anthropogenic emissions include road and non-road vehicles, industrial activities, power stations, domestic heating, and shipping. Natural sources of particles include sea salt. The formation of secondary particles happens over hours to days, thus secondary PM is found downwind (sometimes tens or hundreds of kilometres) of the sources of emission. Reducing exposure to PM is particularly challenging, given the variety of sources, and contributions from secondary components.

In the UK, PM_{2.5} emissions decreased by 72% between 1990 and 2022³. The major drivers for this long-term decrease were the reduction in the burning of coal for power generation, and improved emission standards for transport and industrial processes. However, in recent years the rate of reduction in annual emissions of PM has slowed, as shown in Figure 2-1. Considerable decreases in emissions from certain sectors have been largely offset by increases in emissions from wood burning in domestic settings and from solid fuel burning by industry³. Hence, burning of solid fuels in homes and businesses is becoming an increasingly important source as emissions reduce from other sources.

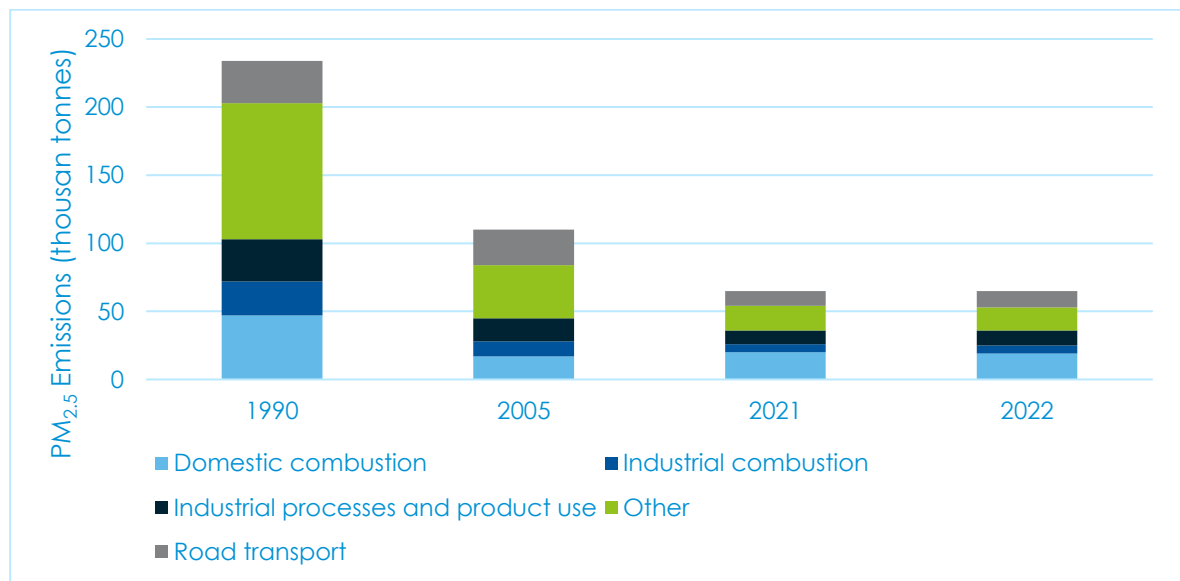


Figure 2-1 UK annual emissions of PM_{2.5} by major emission source (1990, 2005, 2021, 2022)³

² PM₁₀, or coarse particles, are particles that are less than 10 microns (µm) in diameter. PM_{2.5}, or fine particles, are particles that are less than 2.5 µm in diameter and hence are a subset of PM₁₀

³ <https://www.gov.uk/government/statistics/emissions-of-air-pollutants/emissions-of-air-pollutants-in-the-uk-particulate-matter-pm10-and-pm25#:~:text=Annual%20emissions%20of%20PM2.5,65%20thousand%20tonnes%20in%202022.>

Concentrations of PM_{2.5} tend to be greatest in urban environments in the southern and eastern areas of the UK due to a variety of factors, including higher population density, weather conditions and greater exposure to pollution sources from mainland Europe.

In the Cambridge City Council area, it is estimated that total primary PM_{2.5} emissions from all sectors is 87 tonnes per annum⁴. The 2021 National Atmospheric Emissions Inventory (NAEI)⁵ breaks this down into 11 categories, as shown in Figure 2-2 (note: the figure splits out category '02 non-industrial combustion plants' into its separate components 'Domestic Solid Fuel Burning' and 'Other non-industrial combustion' form to highlight emissions from domestic solid fuel burning).

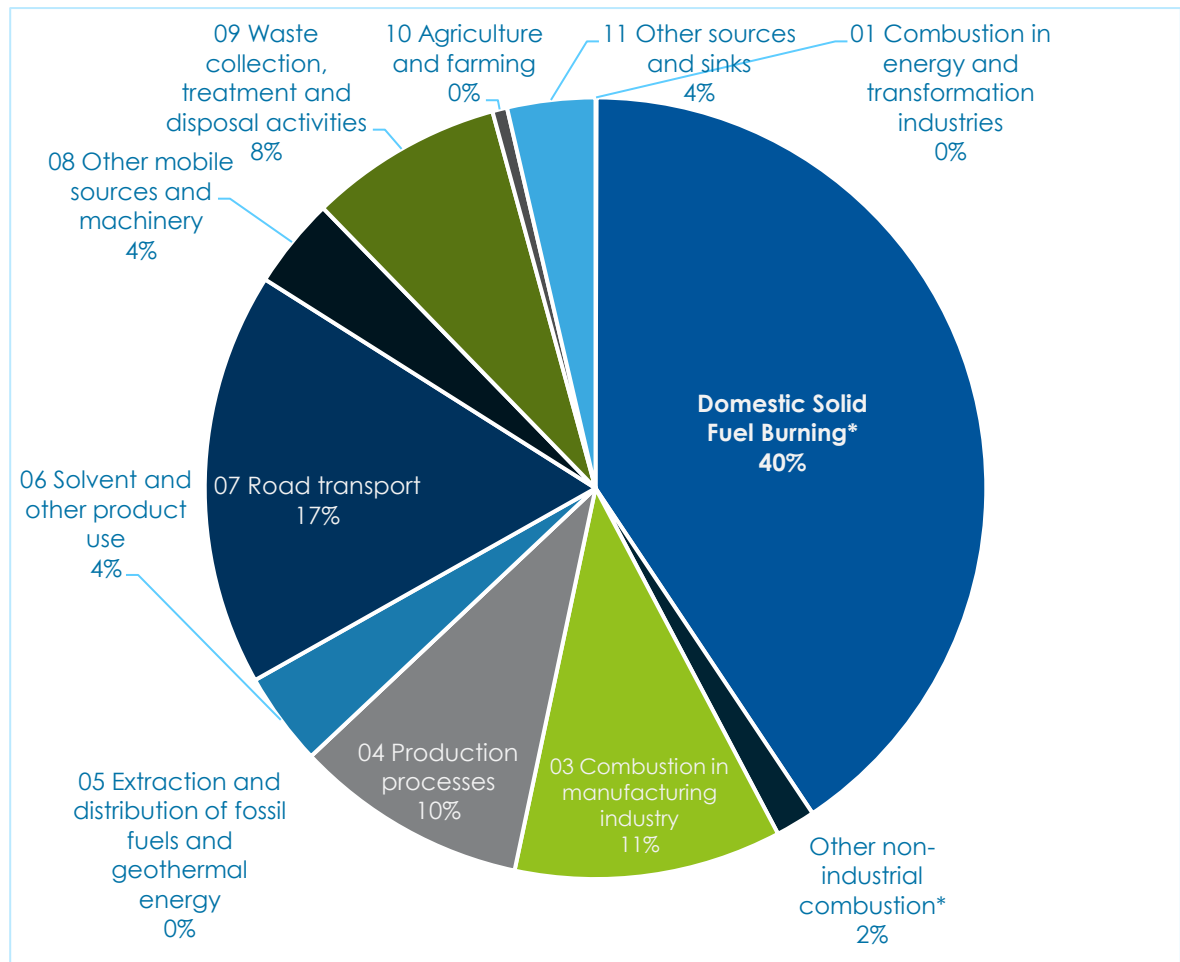


Figure 2-2 NAEI (2021) PM_{2.5} sector emissions for Cambridge City Council area. *Note: 'Domestic Solid Fuel Burning' and 'Other non-industrial combustion' form category '02 non-industrial combustion plants' in the NAEI – they have been separated here to highlight emissions from domestic solid fuel burning.

Domestic solid fuel burning is the largest single source of PM_{2.5} emissions in the Cambridge City Council area, contributing 35 tonnes in 2021, (40%) of total PM_{2.5} emissions. Of which, the largest contributing source is from burning wood (76%), compared to relatively small contributions from solid smokeless fuels (SSF), as shown in Figure 2-3. Domestic wood burning hence represents a large proportion of primary emissions of PM_{2.5}, and hence one which should be addressed.

⁴ Summed across 63 1km by 1km grid squares with data from the 2021 National Atmospheric Emissions Inventory

⁵ Available via interactive map: <https://naei.beis.gov.uk/emissionsapp/>

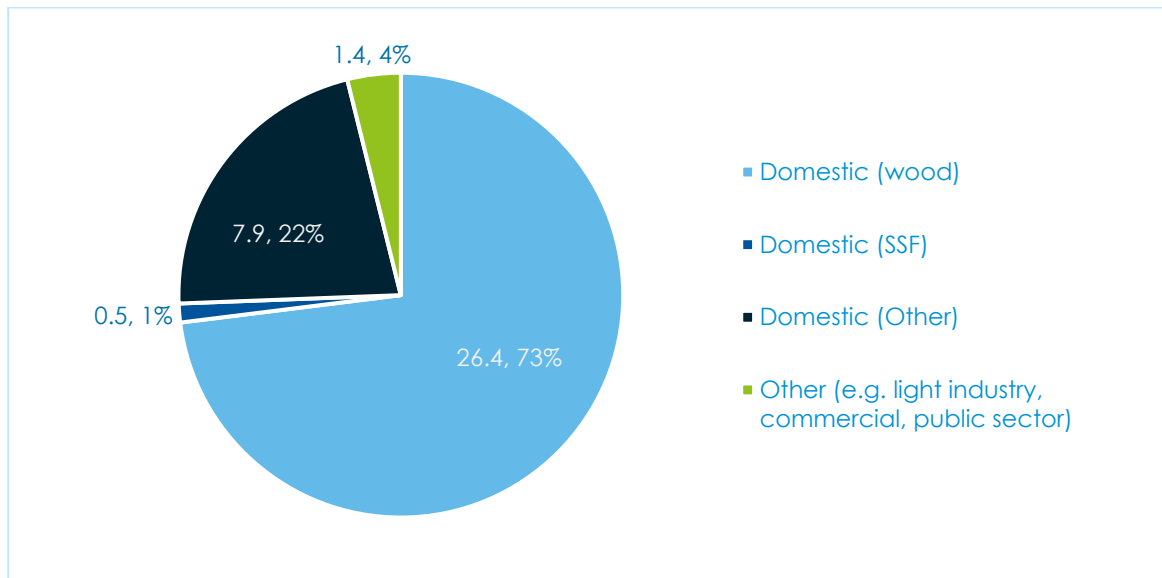


Figure 2-3 PM_{2.5} emissions from '02 Non-industrial combustion plants' by fuel source (tonnes, per cent)⁴

One of the key policy mechanisms to tackle pollution from burning of solid fuels for heating purposes are Smoke Control Areas (SCAs). A SCA requires that households and businesses within the area use either an approved appliance (boiler, stove, etc) or an approved solid fuel (e.g. certain types of Manufactured solid fuels (MSFs) or anthracite) – fuels not approved (e.g. wood) can only (legally) be used in an approved appliance. SCAs are mandated through the Clean Air Act (originally 1956, most recently 1993, and as amended by the Environment Act 2021), and are declared through an order made by the Local Authority (s18, CAA 1993). They can be applied to all or a defined part of the Local Authority's area and the order may vary how the provisions of the Act are applied, e.g. through the specification of building classes or appliance which can be included. One of the changes introduced through the Environment Act 2021 is the potential to include residential, moored river vessels within SCAs.

Cambridge has three existing SCAs covering central and western areas of the city which were established during the 1960s. A map of the current areas can be found on the Cambridge City Council website⁶, although very limited information is available regarding the rationale underpinning their original design and declaration. There were a handful of exemptions in one of the original orders (dated 6th November 1961) for fireplaces in buildings owned by the University; these have been confirmed as either replaced by modern heating systems or used infrequently for celebratory events.

2.2 Study aim and scope

Cambridge City Council commissioned Logika Group to undertake this study to explore changes to its existing SCA regime, in order to potentially reduce the air quality (and health) impacts of solid fuel burning across the city. This study has quantified the effects of different options which consider amending the SCA in Cambridge to encompass the whole of the Local Authority Area, and to incorporate moored boats within the designation. The effects on emissions, health and socio-economic considerations are set out in the following sections.

⁶ <https://www.cambridge.gov.uk/media/3454/smoke-control-area-map.pdf>

The approach taken follows the following steps:

- Question 1: Establish the number of households and moored residential vessels burning solid fuels and an emissions baseline;
- Question 2: Calculation of air quality impacts of policy scenarios;
- Question 3: Health impact assessment of air quality impacts; and
- Question 4: Socio-economic assessment of policy scenarios.

Air pollution can be quantified in terms of the emissions (the amount of pollutants released into the atmosphere from a source, usually defined in terms of tonnes) or concentrations (the amount of a pollutant in a given volume of air at a given location) of pollutants. This report focusses on emissions. Emissions are related to concentrations, but not in a linear way, due to the effects of meteorology and atmospheric chemistry. Typically, converting emissions to concentrations is achieved by running atmospheric models. However, such modelling and estimates of population exposure add a further level of uncertainty into the study outcomes and were not in the scope of this study. Nonetheless, whilst health impact evidence and approaches associate exposure to air pollutant concentrations with adverse health outcomes, well-established methodologies have been produced to allow policy evaluation based on emissions only⁷. This study draws on these approaches to produce robust and comparable outputs for the different scenarios.

This study has focused on quantifying the impacts of changes in solid fuel burning on PM_{2.5} and has not modelled the impacts on other pollutants (e.g. Nitrogen Oxides NO_x). This approach was deemed appropriate because the underlying evidence base linking air pollutant exposure to health effects attributes the most significant effects to changes in PM_{2.5} relative to other pollutants. Hence, only quantifying the impacts associated with PM_{2.5} will still capture the vast proportion of the effects of the change in air pollution. Should other pollutants also have been included, this would not substantially increase the overall benefits assessed and hence is unlikely to have an impact on the overall results of the study.

The following sections of the report are structured as below:

- **Section 2** sets out the study approach including modelling methodology.
- **Section 3** presents the results of the air quality assessment.
- **Section 4** presents the results of the Health Impact Assessment.
- **Section 5** presents the results of the socio-economic assessment including overall costs and benefits of policy scenarios.
- **Section 6** presents a summary and conclusions.

⁷ <https://www.gov.uk/government/publications/assess-the-impact-of-air-quality/air-quality-appraisal-damage-cost-guidance>

3 Approach

3.1 Policy Scenarios Assessed

The policy scenarios assessed are presented below:

- **Baseline:** Current SCA coverage, no moored vessels
- **Scenario 1:** Current SCA coverage, with moored vessels
- **Scenario 2:** City-wide SCA, without moored vessels
- **Scenario 3:** City-wide SCA, with moored vessels
- **Scenario 4:** This estimates what emissions in Cambridge might have been if the existing SCAs had not been declared (this is similar to, but not the same as, removal of the existing SCA).

3.2 Baseline emissions calculations

3.2.1 Domestic

Quantifying emissions associated with solid fuel burning in domestic and commercial premises has several challenges:

- Types of appliance used to burn solid fuel vary enormously (from open fires to sophisticated pellet-fed wood boilers), with widely varying emissions profiles;
- Activity data is incomplete, with limited information on quantities of fuel used, and in the case of wood, fuel condition (e.g. moisture content);
- Domestic heating appliances do not require any form of registration, and so the number of appliances is uncertain; and
- Emissions factors also have uncertainty associated with them and are updated on a regular basis, for example through the NAEI.

Two approaches were explored to overcome these challenges – a top-down approach based on NAEI emissions, and a bottom-up approach based on other sources of information (e.g., surveys). The two approaches were compared and a decision taken on which approach to use for the assessment of the policy scenarios.

Top-down

Gridded emissions from different source categories are contained in the NAEI⁸. The NAEI contains estimates of emissions to air of a variety of pollutants, split by sources and geographical area. This includes estimates of emissions from solid fuel burning on a 1km by 1km grid, disaggregated by fuel type, as presented in Figure 2-3. The gridded data for Cambridge have been used to estimate the difference in emissions per household between residents currently inside and outside the SCAs.

⁸ <https://naei.beis.gov.uk/>

Bottom-up

Data on domestic solid fuel burning behaviours has been derived largely from the Burning in UK Homes and Gardens Survey⁹, undertaken by Kantar on behalf of Defra, in 2018 and 2019 (hereafter referred to as the Kantar Survey). This survey provides data regarding the prevalence of solid fuel burning for the 'East of England' specifically, split for *some (but not all)* categories (e.g. split by appliance type is not available at regional level), split between urban and rural areas, and split between activity within SCAs and outside SCAs (both of the latter two splits are at England level). There are also some data on appliance type, such as the split between open fire or closed appliance, with additional information on broad categories of installation date for closed appliances.

OS AddressBase¹⁰ data has been used to estimate the numbers of properties within and outside of the existing and expanded SCA boundaries.

Calculations were undertaken for emissions from properties within the SCAs and outside of the SCAs (further detail on the specific data and assumptions used are outlined in Section 3.2.5). The calculations utilised the number of properties within and outside of the SCAs, multiplied by the proportions of properties burning wood or coal-like products, multiplied by a typical quantity of solid fuel burned per year. Adjustments were made to convert house coal to manufactured solid fuel (MSF, also known as smokeless coal) based on energy outputs of the different fuels. The total numbers of properties burning solid fuels were then split by appliance type (for wood and coal-like products), and emission factors applied for each appliance and fuel type.

NAEI emission factors were used for combustion (wood and coal-like products) in open fires and for three types of closed stoves. Further detail on stove types is included in Section 3.2.5. It should be noted that for PM_{2.5} the NAEI currently uses the same emission factors for wood on any given appliance regardless of the moisture content, which is thought to lead to significant variation in the quantity of PM_{2.5} emitted. However, as a SCA does not stipulate a requirement for moisture content of wood, this will not affect the emissions changes calculated between policy scenarios. Note that other sources of emission factors are available, such as the EMEP Guidebook published by the European Environment Agency¹¹. However, it was concluded that, while the EMEP Guidebook offers a more extensive range of emission factors for small scale and domestic combustion, the resolution of the input data meant that there was little to be gained from this. In addition, using the NAEI emission factors makes the emission estimates produced more comparable to other UK-based results (including the NAEI itself).

3.2.2 Commercial

The restrictions under SCAs also apply to commercial properties and there is therefore the potential for emissions reductions from businesses in sectors such as hospitality (in particular hotels, pubs, and restaurants), which may burn solid fuel. Commercial properties have not been included in the calculations for a number of reasons as follows:

- Using data available in the NAEI on a 1km by 1km basis, the commercial emissions make a small contribution (2%) to the current total emissions outside of the SCAs in Cambridge;
- Due to the relatively few commercial establishments compared to residential properties, the reduction from these sources is likely to be small (and certainly within the uncertainties of other assumptions);

⁹ https://uk-air.defra.gov.uk/library/reports?report_id=1014

¹⁰ <https://www.ordnancesurvey.co.uk/products/addressbase>

¹¹ <https://www.eea.europa.eu/publications/emep-eea-guidebook-2023>

- There is no basis for estimating what the reductions may be, in contrast with domestic properties where data from the Kantar survey can be used to demonstrate domestic solid fuel burning practices inside and outside SCAs; and
- On a per-grid-cell basis, the emissions in the NAEI for commercial solid fuel burning are higher within the current SCAs than outside. Therefore, where we apply our approach of adjusting emissions outside SCAs based on what is currently observed inside SCAs, this would result in calculating an increase in emissions if the SCA is extended, which is the opposite of what should happen in practice.

Omitting commercial emissions from the calculations could marginally underestimate the benefits in policy Scenarios 2 and 3. This should be taken in context of some of the other assumptions which may overestimate the benefits, which are discussed later in the report, and in some cases tested through sensitivity tests.

3.2.3 Moored River Vessels

Assessing emissions from solid fuel burning from moored river vessels is highly uncertain; heating appliances are often non-standard and it can be difficult to establish patterns of use. Broadly, the number of moorings in Cambridge was multiplied by the proportion of vessels assumed to be burning solid fuels, followed by assumptions on proportions of vessels burning different types of fuel (MSF and wood). These figures were then multiplied by an assumption of quantity of MSF or wood burnt per year per boat, assuming conventional or high efficiency stoves, using boat-specific emissions factors for these stove types.

In 2017, the Canal and Rivers Trust commissioned a study to establish emission factors for UK river and canal traffic. Emission factors were developed for solid fuel heating appliances used on vessels (as well as for the engines which are not relevant for this project). We have used these emission factors, which are specific to river vessels and therefore differ from the emission factors used from the NAEI for residential properties, for our present analysis. These have been combined with assumptions outlined in Section 3.2.5 relating to activity to produce emissions estimates for moored vessels from solid fuel burning for heating purposes only.

Data for solid fuel burning activity (e.g. quantity of fuel used) on moored vessels is scarce. In some cases assumptions have been derived from the Canal and River Trust Boater Census Survey 2022¹². In other cases, where no data exist, online blogs¹³ have been used (for example to estimate the average amount of MSF used per year to heat a boat). These are assumptions which could be refined further through discussion with the boating community in Cambridge.

3.2.4 Behavioural response and scenario tests

There are a number of potential behavioural responses to the designation of a SCA. If the household or boat owner is burning MSF, this is still allowable within any appliance, and hence behaviour is unlikely to change. If burning wood, if the household or boat owner has a stove which is Defra exempt, then again, no behaviour change would be required. If the household or boat owner is burning wood on an appliance which is not Defra exempt, but can burn multiple fuel types, the response could be to change from burning wood to burning MSF without an upgrade of appliance. Further response could entail an upgrade of stove to continue to burn wood, or stopping burning altogether.

¹² <https://canalrivertrust.org.uk/boating/boating-news-and-views/boating-news/boater-census-survey-2022>

¹³ For example <https://www.canalworld.net/forums/index.php?/topic/55406-how-much-coal/> and <https://www.canalworld.net/forums/index.php?/topic/113482-narrowboat-heating-whats-best/>

There are several key challenges for the scenario testing:

- Households have limited awareness of SCAs and often limited knowledge on precisely what fuels they are burning, what appliance they are using, and whether they comply or not with a SCA¹⁴;
- It is unclear as to how people would respond to an expanded SCA, and how fuel burning habits would change;
- Breaches of SCAs are difficult to enforce, requiring evidence that emitted smoke is due to non-exempt fuels being used on non-approved appliances; and
- Estimating behaviour change for moored vessels comes with its own sets of uncertainties, as very little data exist around types of stoves on boats, specific emissions factors for boats, and what fuel is being burnt.
- Hence, defining what the behavioural response of households and moored vessels would be to the different SCA policy options is highly uncertain, as is defining the level of enforcement required to elicit a given response. To facilitate the analysis, we have made a number of assumptions based on existing evidence, expert judgement of the project team, and discussions with Cambridge City Council. These assumptions are summarised below.

Domestic properties: all properties moving into the SCA will have the same assumptions as those made for properties currently within the SCA. In other words, the proportions of households burning wood or coal-like products, the split of appliance types, and compliance with the regulations will change such that they are the same as for properties already within the existing SCAs.

Moored vessels: half of those burning wood on a non-compliant stove will transition to burning MSF, and half will upgrade their appliance.

Given the uncertainty, these assumptions are also subject to sensitivity analysis to test whether the results of the analysis and conclusions drawn would change under different assumptions.

In comparison to the baseline (i.e. current SCA coverage, no moored vessels) changes in PM_{2.5} emissions have been calculated for the following scenarios:

- Scenario 1: Current SCA coverage with moored vessels
- Scenario 2: City-wide SCA without moored vessels – incorporating Sensitivity Test with 25% non-compliance
- Scenario 3: City-wide SCA with moored vessels – incorporating Sensitivity Test with 25% non-compliance
- Scenario 4: This estimates what emissions in Cambridge might have been if the existing SCAs had not been declared (this is similar to, but not the same as, removal of the existing SCA). Sensitivity test on the assumption of stove types in homes in Cambridge.

3.2.5 Assumptions and key data points used in the estimation of numbers burning solid fuels and emissions

Assumptions and key data points used to estimate the number of households and moored vessels burning solid fuels, their behavioural response under the scenarios, and resulting emissions changes are outlined in the tables below. All assumptions used have been discussed and agreed with

¹⁴ This is based on responses to the survey being run to update the Kantar survey, but has not been published at the time of writing.

Cambridge City Council. It is recognised that these assumptions could be updated once the survey of solid fuel use being undertaken by IPSOS¹⁵ on behalf of Defra is published, or by using more local information should this become available in the future (for example any future surveys on solid fuel use across the residential or boating sectors).

Table 3-1: Assumptions in the bottom-up approach: Domestic Properties

Description	Value	Unit	Rationale
PM _{2.5} emission factors from the latest NAEI (2021) – no separation between wood moisture content (i.e. dry / seasoned / wet)	Several (8 different emission factors; wood and MSF across 4 appliance types)	kt/TJ	This is the latest that is available from the NAEI. The SCA regulations do not differentiate between burning dry/seasoned/wet wood. Updates to the next NAEI are anticipated to have different emission factors for wood condition.
Number of households inside / outside current SCAs from OS AddressBase	3,832 inside / 63,053 outside current SCAs within CCC boundary	Number of Households	Selected all address points that were classed as 'residential' to be comparable to the Kantar data (i.e., including flats etc. as the Kantar data provides a % of all households that are burning)
Proportions of households burning wood inside / outside SCA	3.1% inside SCAs / 5.5% outside current SCAs	% of households	Inside SCA metric taken from 'SCA' figures from Kantar data. Outside SCA taken from 'average urban' figures from Kantar data (as 'outside SCA' also includes rural)
Proportions of households burning coal-like products inside / outside SCA	1.4% inside SCAs / 2.3% outside current SCAs	% of households	As per row above
Amount of wood burnt per burning household	1.06	Tonne /household	Calculated from Kantar data (East of England)
Amount of coal-like products burnt per burning household	1.75	Tonne /household	Same as row above, but Kantar data provides coal products consumption including house coal (approx. 9%). Applying same method as above would work out at 1.53 tonnes per household. However, as house coal is now unavailable for domestic use due to the ban on sales under the Domestic Solid Fuel Regulations, we have converted this 9% of house coal to MSF based on energy in the fuel (require more MSF to have the same heat output as house coal)
Household compliance with	Inside SCA: 0% wood on an open	Appliance % split	Simplified approach based on installation dates. 'Basic' stoves

¹⁵ A new survey (led by IPSOS and supported by AQC) has been commissioned by Defra to update the Kantar study and includes a specific hospitality sector survey. The results are not yet publicly available.

Description	Value	Unit	Rationale
current SCA regulations (i.e., full compliance means no burning of wood on an open fire or non-compliant stove within SCA)	fire, 100% on stoves. Of stoves: 0% on basic, 27% on upgraded, 73% on EcoDesign. Outside SCA: 24% wood on open fires, 76% on stoves. Of stoves, 18% on basic, 18% on upgraded, 64% on EcoDesign.		assumed to be installed pre-2000, 'Upgraded' installed 2000-2009 and EcoDesign assumed to be installed post 2009. Kantar data only has information on installation dates, not on exempt versus non-exempt stoves. Potentially underestimates current emissions and potentially overestimate emissions reductions. This is explored further in a sensitivity test.
Burning of coal-like products (MSF) by appliance	No difference in profile inside/outside SCAs. 36% on an open fire, 64% on stoves. Of stoves, same as wood outside SCA distribution (18%, 18%, 64%)	Appliance % split	The fuel itself is classed as 'smokeless' and is exempt from SCA regulations – it does not matter what appliance is used.
Determining usage on compliant / non-compliant stoves. NAEI classifications of stoves (for emission factors): 'Basic', 'Upgraded' and 'EcoDesign'.	'Basic' assumed not exempt appliance; 'Upgraded' assumed exempt; 'EcoDesign' assumed exempt.	Appliance % split	Simplified approach based on installation dates. A sensitivity test on the baseline has been included which assumes that 25% of post 2000 installations are non-exempt appliances and 30% of pre 2000 appliances (or 'unsure') are exempt.

Table 3-2: Assumptions in the bottom-up approach: Boats

Description	Value	Unit	Rationale
Number of moorings	70	Number of boats	There are currently 70 moorings available in Cambridge and there is a waiting list for spaces, therefore assumed full capacity.
Proportion of boats with solid fuel burning stoves	85%	%	Canal and River Trust Survey of Boating Community suggests 66% of boats nationally burning solid fuel. Increased this value to 85% as there are no electric hook ups in Cambridge.
Proportion of boats burning MSF/ wood	75% MSF, 25% wood	% Split	Based on boating blogs, professional judgement, discussion with Cambridge City Council
MSF consumed per boat per annum	1,500	kg/boat	Based on 2x25 kg bags of MSF per week in winter and additional burning in summer (at a much

Description	Value	Unit	Rationale
			lower rate) – based on boating blogs/ discussions
Wood consumed per boat per annum	3,167	kg/boat	Based on same energy output required by MSF, converted to wood
Split between conventional stoves and high efficiency stoves (Defra exempt)	100% conventional stoves	% split	Based on professional judgement – very little incentive until now for boating community to install high efficiency stoves
Compliance of stoves on boats (to reflect categories which we have emission factors for)	Conventional Stove = not exempt High Efficiency Stove = Exempt	% Split	There are only 2 types of stoves that we have emission factors for, so seems logical to apply the exempt / non-exempt split amongst these.
Boating emission factors based on report for Canal and River Trust	MSF (1.6), wood on a conventional stove (14.1), wood on a high efficiency stove (5.4)	g PM _{2.5} / kg fuel	Only boating specific figures for emissions we are aware of: split between 'conventional' stoves and 'high efficiency' stoves

3.3 Health Impact Assessment

There is substantial evidence linking air pollutant exposure to a range of negative human health outcomes, including different respiratory and cardiovascular illnesses, and an increased mortality risk.

The health impacts have been monetised using Defra's air pollutant damage costs¹⁶. These are summary estimates which aggregate key impacts associated with air pollution, expressed per tonne of emission. For the analysis, the 'PM_{2.5} domestic' damage cost is selected. This is also applied to emissions from moored vessels, given no specific damage cost is available for inland waterway emissions, but these are assumed to have similar proximity to population given the location of emissions.

We have quantified the impacts of changes in PM_{2.5} emissions from the scenarios described above - the health impact assessment has focused on PM_{2.5} as this is the fraction of particulate matter for which Defra's air pollutant damage costs are defined. However, the damage costs combine the health impacts of changes in both PM_{2.5} and PM₁₀ as the impacts of both are combined in the PM_{2.5} damage cost, so the impacts of both will also be captured in this analysis.

In applying the Defra damage costs, this also implicitly carries through the underlying assumptions made in the construction of the damage costs. Importantly, this includes the relationship between the emission of the air pollutant and resulting concentration. In other words, the health impact analysis implicitly assumes that exposure to pollution from domestic burning in Cambridge is the same as exposure to the average unit of PM_{2.5} emitted from domestic burning anywhere in the UK. It is not possible to test the robustness of this assumption without detailed concentration modelling specifically for Cambridge, which was not in the scope of this study – however, applying the damage costs in this way follows Defra's best-practice appraisal guidance for assessments of this size and sensitivity to the damage costs is tested as part of our sensitivity analysis.

¹⁶ <https://www.gov.uk/government/publications/assess-the-impact-of-air-quality/air-quality-appraisal-damage-cost-guidance>

The health impacts captured by the damage costs can be split out by applying the underlying approaches, data, and methods used to derive the damage costs. Hence, the assessment of individual health impacts is fully consistent with Defra's damage costs and underpinning the Committee on the Medical Effects of Air Pollution (COMEAP) guidance, and hence follows UK best practice appraisal guidance.

The quantified outputs present changes in life-years lost, deaths, respiratory hospital admissions, and incidence of ischemic heart disease, stroke, lung cancer and asthma in children. The assessment captures the relative impact of the scenarios and the health burden of baseline emissions. The table below summarises the key inputs to the calculations captured in the analysis.

Table 3-3: Health impact pathways captured, and key input assumptions (all associated with exposure to PM_{2.5})

Impact pathway	Output metric	Concentration response function (change per 10 µgm ⁻³)*	Baseline health outcome (all ages, cases per 100,000)	Monetary valuation of health endpoint (£ per output metric, 2022 prices)
Mortality (associated with chronic exposure)	Life years lost (LYL) / deaths	8% (RR)	858	£50,600 per LYL
Respiratory hospital admissions	# Admissions	0.96% (RR)	1,995	£9,800
Ischemic heart disease (IHD)	# New cases (incidence)	7% (RR)	171	£72,000 per Quality adjusted life year (QALY), applied to discounted QALY over duration of the disease
Stroke	# New cases (incidence)	11% (RR)	133	
Lung cancer	# New cases (incidence)	9% (RR)	78	
Asthma in children	# New cases (incidence)	1.48 (OR)	461	

Notes: *RR = relative risk, where concentration response functions (CRFs) are presented as a percentage change per 10 µgm⁻³ change in PM_{2.5}; OR = odds ratio, where CRFs are presented as the change in odds ratio per 10 µgm⁻³ change in PM_{2.5}.

3.4 Socio-Economic Assessment

3.4.1 Quantitative assessment

In response to the SCA, those burning non-compliant solid fuels (i.e., wood) on a non-compliant appliance can either: upgrade to an exempt appliance, switch to a compliant fuel, or stop burning. Each carries with it a different set of impacts and consequences for the household or vessel owner.

Fuel and utility cost changes: Those who change fuel or stop burning face several effects: a fuel cost saving of the fuel no longer burnt, a fuel cost increase of any new fuel burnt, and a change in 'utility' (either the difference between burning the new relative to existing fuel, or the lost utility from no longer burning the existing fuel). Utility refers to the intangible, non-monetary benefit that people derive from burning fuel. This captures the pleasure or ambience effect of burning, and also includes any heat and warmth benefit delivered by the solid fuel (where this is not replaced by other heating options).

The emissions modelling has captured the change in fuel consumption of wood (not compliant in SCAs) and MSF (compliant in SCAs) across the different policy scenarios assessed. This shows that the overall consumption of both wood and MSF reduces in response to Scenarios 2 and 3. Hence for MSF, the increase in consumption from fuel switching is outweighed by the reduction from those who stop burning all together. Even though MSF is a compliant fuel and there is no legal requirement to stop burning, the modelling approach results in a reduction in fuel consumption due to the different behavioural profile inside relative to outside an SCA, as outlined in Table 3-1.

By assuming the solid fuel burning behavioural profile that currently exists within the SCAs is applied to residential properties outside the SCAs, the air quality assessment effectively presents a combined response of those who switch fuel and those who stop burning. One limitation therefore for the subsequent economic modelling of fuel cost and utility effects is it is not possible to separate the change in fuel consumption between those who switch fuel and those who stop burning.

A second limitation in assessing these effects is it is not possible to estimate the total utility effect of burning solid fuels that may be lost. In theory, the utility benefit must be at least as great as the fuel cost (otherwise people would not burn solid fuels in the first place). However, no data or methods exist to suggest how much greater the utility benefit is, over and above the fuel costs. In the absence of a better methodology, for those that stop burning, we assume the utility benefit is equal to the fuel cost savings – as such the net impact is zero for those that stop burning. Overall, this understates the costs of stopping burning.

In summary:

- We do not know what proportion of households switch fuel or stop burning;
- For those that switch, we can cost the difference in fuel costs associated with the switch – this implies an increase in costs as MSF is generally more expensive than wood (also accounting for the higher energy density of MSF relative to wood); and
- For those that stop burning, we cannot capture the utility lost, and can only assume this is at least as great as the fuel costs. These impacts offset, leaving no net impact to stop burning. This understates the costs.

For each policy scenario, we combine the two approaches above for those households that stop burning and those that switch fuel in a way that demonstrates the most 'conservative' (i.e. highest) cost. We do so by assuming: (a) 100% of the reduction in wood consumption is switched to MSF – in which case we capture the maximum net cost of fuel switching; (b) the remaining fuel consumption change is those who stop burning – this carries a net neutral cost (noting this does not capture the utility effect). In practice, not all those burning wood will switch to MSF, as such this will overstate the net cost of fuel switching. However, we cannot capture the utility effect of those who stop burning, and the quantitative analysis will understate this impact. By adopting these assumptions, we present the most conservative quantitative estimate of costs for comparison to the benefits.

For those that switch fuel, the changes in fuel use of the different policy scenarios as calculated under the emissions assessment are combined with fuel prices sourced from the Nottingham Energy Partnership¹⁷. The fuel prices used are shown in the table below. Prices were sense checked against fuel prices used in a recent Impact Assessments by the Scottish Government (presented as the price sensitivity below)¹⁸.

¹⁷ Energy Cost Comparison — Nottingham Energy Partnership (nottenergy.com)

¹⁸ 3. Business and Regulatory Impact Assessment - Impacts of the sale of house coal and the most polluting manufactured solid fuels: report - gov.scot (www.gov.scot)

Table 3-4 Fuel price data

Fuel	Price (£/tonne)	Price Sensitivity (£/tonne)
Wood (kiln dried logs)	365	389
MSF	667	406

Investment costs: Those that upgrade to a compliant stove face a one-off cost associated with this upgrade (see point below on 'investment costs') but are assumed not to change fuel consumption and hence face no associated ongoing costs. Investment costs for the installation of new Defra-exempt stoves driven by policy scenarios were calculated by combining the number of new stoves purchased (as calculated under the emissions modelling) with an average cost of an EcoDesign stove including installation costs, sourced from a targeted review of literature and online sources^{19,20,21,22,23}. An average cost for an EcoDesign stove (the only type of stove that is legally possible to purchase and are also exempt in SCAs) and installation was determined to be £1,500. It is assumed that those choosing to purchase a new stove already have a flue and so there are no additional costs associated with flue installation. Investment costs were annualised with an assumed stove life of 10 years and discount rate of 3.5%²⁴, for comparison with the single year of emissions impacts assessed.

No data was found regarding the costs of EcoDesign stoves for boats. Hence the analysis assumes the same upgrade costs for boats as for houses.

The analysis assumes that non-compliant stoves are upgraded with new compliant stoves, however in practice other options may be available. This includes potential retrofit options, which may be considerably cheaper than the cost of a new stove. It was decided to not include these costs due to uncertainty around the proportion of stoves which could technically be retrofitted and the likelihood of retrofits being the chosen behavioural response. As such, investment costs may be slightly overstated if there is uptake of retrofits rather than new EcoDesign stove purchases.

There will be **implementation costs** for the Council associated with enforcement (i.e. in terms of additional enforcement officer time) and information campaigns. It is not known precisely what the implementation costs will be. Through discussion with the Council, an assumed cost of £50,000 was included as an illustrative estimate of overall implementation costs.

Greenhouse gas (GHG) impacts driven by the change in quantities of fuels burned were calculated using GHG emissions factors from the European Monitoring and Evaluation Programme (EMEP) guidebook and NAEI, applied to the fuel consumption changes calculated under the emissions modelling. These were then monetised using carbon prices from the Department for Energy Security and Net Zero's (DESNZ) guidance²⁵. Note, the analysis of GHG emissions effects only captures changes in Scope 1 emissions (i.e. those associated directly with the burning of the fuel). It does not

¹⁹ <https://www.yorkshirestoves.co.uk/wood-burning-stove-installation/#:~:text=Whether%20you're%20looking%20to,installation%20from%20just%20%C2%A31769>

²⁰ <https://www.checkatrade.com/blog/cost-guides/log-burner-install-cost/>

²¹ <https://www.directstoves.com/our-blog/the-ultimate-guide-to-wood-burning-stove-installation-costs-in-2023/>

²² <https://www.minster-stoves.co.uk/wood-burning-stove-installation-cost-estimator/>

²³ <https://www.thecosystovecompany.co.uk/how-much-does-it-cost-to-install-a-wood-burning-stove/>

²⁴ In line with the discount rate for social cost-benefit analysis recommended by the HM Treasury Green Book: <https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government/the-green-book-2020>

²⁵ <https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal>

capture possible Scope 3 (or 'lifecycle') effects of the fuel, which would also capture emissions associated with sourcing, transportation and other aspects of the fuel. Scope 3 emissions were not in the scope of the analysis and are challenging to estimate, in particular given uncertainty around the source of the wood burnt. Lifecycle emissions can vary widely depending on source, for example between wood foraged locally and wood pellets imported to the UK.

The outputs of the quantitative cost analysis and monetised greenhouse gas emissions impacts were combined with the monetised benefits of the air quality impacts calculated in the health impact assessment to calculate an overall **net present value** (NPV) and **benefit:cost ratio** (BCR) of the different policy scenarios. These summary metrics present the overall balance of benefits and costs of a scenario, relative to the baseline – i.e. where the NPV is positive or the benefit:cost ratio greater than one, the benefits of the scenario outweigh the costs and would indicate an overall positive change for society.

3.4.2 Qualitative assessment

A range of important effects could not be captured quantitatively in the analysis, either due to a lack of data on the effects of the SCA, or a lack of methodologies and approaches to quantify the effects.

Burning solid fuels can have a significant impact on **indoor air quality**, with an additional detrimental impact on health that is not captured by the assessment of changes in ambient air quality, as presented above and captured using the damage costs. Although there is growing awareness of this risk, the evidence base is more nascent and approaches to quantify effects (in particular that reliably identify additional impacts over ambient exposure) are not well established. These effects were considered further through targeted literature review to elaborate the nature and potential size of effects.

Compliance with the SCA will have varying impacts on the household or vessel owner depending on their specific circumstances. More specifically, where those affected can afford to switch to an alternative means of heating (e.g. through fuel switch or upgrading stoves), this is unlikely to have an impact on the living conditions of the dwelling. However, where households or vessel owners cannot afford to switch to a viable alternative, this may impact on living conditions, with consequent impacts for health. The assessment has considered in further detail **where the compliance costs could fall** between different types of households, by reviewing different data sources which provide insight into the demographic profile of solid fuel users. Robustly quantifying **impacts associated with changes in living conditions** (e.g. reduced temperature, increased levels of damp,) was not possible as data is limited on current conditions and changes in heating patterns in response are uncertain. Furthermore, there is no established approach to quantifying impacts. That said, the consequences of such changes have been elaborated through targeted literature review.

Finally, the **practical implications of changing heating practices** were explored through a targeted literature review to identify potential effects and challenges for domestic users, and moored vessels that are not captured in the quantitative analysis, e.g. the learning required for new heating systems, and availability of different fuels.

4 Air Quality Assessment

4.1 Baseline

Table 4-1 presents baseline PM_{2.5} emissions (representing current emissions, i.e. without any further intervention) from solid fuel burning in residential properties and moored river vessels in Cambridge. This presents the results from the top-down and bottom-up approaches.

The bottom-up estimate for residential emissions could be assumed representative of the current year, although it is recognised that the Kantar survey used to quantify the baseline represents conditions in 2018, and wood burning stove use has been increasing²⁶ in recent years. It should also be noted that emissions factors, on which these estimates are based, are reviewed and refined at regular intervals. Those used in the calculations below are based on the current NAEI (2021) for residential properties, and for moored vessels from a boating-specific report published in 2017.

The top-down approach utilised the 2021 NAEI and represents the sum of 1km by 1 km grid squares across Cambridge that were designated as largely inside or outside the current SCAs. As uniform grid squares do not perfectly align with the extent of the current SCAs, there is likely to be some error associated with this approach.

Table 4-1 compares the top-down and bottom-up approaches. Table 4-1 shows that the majority of emissions from solid fuel burning in Cambridge are from residential properties outside of the current SCAs. Emissions from moored vessels and residential properties inside the SCAs make up a relatively small proportion of total emissions. There is good agreement with the two methods, and we have therefore used the bottom-up approach for subsequent analysis given this: (a) can be amended more easily in the future as the assumptions are potentially refined, and (b) can be used as the basis of a more robust economic assessment.

Table 4-1: Baseline PM_{2.5} Solid Fuel Burning Emissions in Cambridge (all figures tonnes per annum)

Emissions Source	Baseline PM _{2.5} Emissions (tonnes pa) using bottom-up approach	Baseline PM _{2.5} Emissions (tonnes pa) using top-down approach (NAEI)
Residential – Inside SCA	0.50	0.61
Residential – Outside SCA	26.22	27.34
Moored vessels (stationary, for heating purposes only)	0.77	n/a
Total	27.48	27.95

Table 4-2 details the assumed baseline data on number of households and moored vessels using specific solid fuels and appliances, inside and outside the current SCAs.

²⁶ For example: <https://www.bbc.co.uk/news/uk-england-bristol-63241940>

Table 4-2: Baseline parameters

Parameter	Inside SCA	Outside SCA
Number of Properties	3,832	63,053
Number of Properties Burning Wood	119	3,485
Number of Properties Burning Coal-like Products	55	1,474
Number of Properties Using Open Fire (Wood)	0	821
Number of Properties Using Open Fire (Coal-like Products)	20	529
Number of Properties Using Basic Stove (Wood)	0	480
Number of Properties Using Basic Stove (Coal-like Products)	6	170
Number of Properties Using Upgraded Stove (Wood)	32	480
Number of Properties Using Upgraded Stove (Coal-like Products)	6	170
Number of Properties Using EcoDesign Stove (Wood)	87	1703
Number of Properties Using EcoDesign Stove (Coal-like Products)	22	604
Number of Moored Vessels ²⁷	-	70
Number of Moored Vessels Burning Wood	-	15
Number of Moored Vessels Burning Coal-like Products	-	45

4.2 Scenario Tests

4.2.1 Scenario 1: Current SCA Coverage with Moored Vessels

The modelled change in Scenario 1 is that the SCA regulations are extended to moored vessels, in addition to the current SCAs for residential properties. The behavioural change assumptions for this scenario are that: of the 25%²⁸ of boats which are assumed to burn wood, half change to burning MSF and half upgrade their stove to an exempt appliance (the baseline assumes that all boats do

²⁷ Assumed all using standard appliances, all closed stoves (only emission factors available specific to boats for conventional and high-efficiency stoves)

²⁸ Note that 75% of boats which use solid fuel are assumed to be already burning MSF (which they can legally carry on doing).

not have an exempt appliance). Table 4-3 shows that of the moored vessel emissions there is a reduction of 67% relative to the baseline. However, overall, this scenario reduces PM_{2.5} emissions from solid fuel burning in Cambridge by only 2%. In summary, there is a relatively large impact of the SCA regulations on emissions from moored vessels relative to existing emissions from moored vessels, but as this is a small proportion of total emissions, there is only a small impact relative to the total baseline emissions.

Table 4-3: Emissions Reductions under Scenario 1

Emissions Source	Baseline PM _{2.5} Emissions (tonnes pa)	Scenario 1 PM _{2.5} Emissions (tonnes pa)	Scenario Impact (tonnes pa) (% relative to baseline)
Residential (total)	26.71	26.71	±0 (0%)
Moored vessels (stationary, for heating purposes only)	0.77	0.25	-0.52 (-67%)
Total	27.48	26.96	-0.52 (-2%)

4.2.2 Scenario 2: City Wide SCA without Moored Vessels

This scenario only influences emissions from residential properties, while the emissions from moored vessels remains as in the baseline. This scenario assumes that the 63,053 properties currently outside of the SCAs are now covered by a city-wide SCA. The behavioural assumptions, such as numbers of households burning and appliance types used, that were assumed for households under the existing SCA are applied to households newly captured in the extended area. See Table 3-2 for assumptions in full, but there is a reduction in the proportion of properties burning solid fuel (including wood), there is no burning wood on open fires, and it is assumed that all stoves used are exempt (i.e. non-compliant stoves are upgraded). Table 4-4 shows that of the residential emissions (which make up a large proportion of overall emissions), there is a reduction of 71%. Overall, this scenario reduces PM_{2.5} emissions from solid fuel burning in Cambridge by 69%.

Table 4-4: Emissions Reductions under Scenario 2

Emissions Source	Baseline PM _{2.5} Emissions (tonnes pa)	Scenario 2 PM _{2.5} Emissions (tonnes pa)	Scenario Impact (tonnes pa) (% relative to baseline)
Residential (total)	26.71	7.85	-18.86 (-71%)
Moored vessels (stationary, for heating purposes only)	0.77	0.77	±0 (0%)
Total	27.48	8.62	-18.86 (-69%)

4.2.3 Scenario 2a: Sensitivity Test Assuming 25% non-compliance

Scenario 2a provides a sensitivity test assuming 25% non-compliance across the properties which are currently outside of the SCAs if a city-wide SCA was established (i.e., 25% will continue to burn wood on open fires and 25% will not upgrade non-compliant stoves). Table 4-5 shows that instead of a 71% reduction in residential emissions as shown in Scenario 2, a 62% reduction in residential emissions is observed (and a 61% reduction in overall solid fuel burning emissions).

Table 4-5: Emissions Reductions under Scenario 2a

Emissions Source	Baseline PM _{2.5} Emissions (tonnes pa)	Scenario 2a PM _{2.5} Emissions (tonnes pa)	Scenario Impact (tonnes pa) (% relative to baseline)
Residential (total)	26.71	10.02	-16.69 (-62%)
Moored vessels (stationary, for heating purposes only)	0.77	0.77	±0 (0%)
Total	27.48	10.79	-16.69 (-61%)

4.2.4 Scenario 3: City Wide SCA with Moored Vessels

Scenario 3 combines Scenarios 1 and 2 by applying the assumptions for increasing coverage of the SCA to include both city-wide residential properties and moored vessels across the Cambridge area. This therefore combines the emissions reductions in both Scenarios 1 and 2. The result is an overall 71% reduction in PM_{2.5} emissions from solid fuel burning, as shown in Table 4-6.

Table 4-6: Emissions Reductions under Scenario 3

Emissions Source	Baseline PM _{2.5} Emissions (tonnes pa)	Scenario 3 PM _{2.5} Emissions (tonnes pa)	Scenario Impact (tonnes pa) (% relative to baseline)
Residential (total)	26.71	7.85	-18.86 (-71%)
Moored vessels (stationary, for heating purposes only)	0.77	0.25	-0.52 (-67%)
Total	27.48	8.10	-19.38 (-71%)

4.2.5 Scenario 3a: Sensitivity Test Assuming 25% non-compliance

Scenario 3a provides a sensitivity test assuming 25% non-compliance across the properties which will be covered by the expanded SCA (as per Scenario 2a), as well as an assumed 25% non-compliance amongst moored vessels (i.e. of the boat owners remaining burning wood, half upgrade their stove and half do not). Scenario 3a (Table 4-7) shows that instead of a 71% reduction in total emissions as shown in Scenario 3, an overall 62% reduction in total emissions is observed, which is still a substantial reduction.

Table 4-7: Emissions Reductions under Scenario 3a

Emissions Source	Baseline PM _{2.5} Emissions (tonnes pa)	Scenario 3a PM _{2.5} Emissions (tonnes pa)	Scenario Impact (tonnes pa) (% relative to baseline)
Residential (total)	26.71	10.02	-16.69 (-62%)
Moored vessels (stationary, for heating purposes only)	0.77	0.35	-0.42 (-54%)
Total	27.48	10.38	-17.11 (-62%)

4.2.6 Scenario 4: No SCA

This scenario assumes that the residential properties which are currently in the SCA are no longer subjected to the requirements of a SCA. As such, this applies the behavioural assumptions made for households currently outside of the SCA to all properties in Cambridge (i.e. including those within the existing SCA). In practice, this is not a realistic assumption as residents would be very unlikely to downgrade stoves (i.e. remove a compliant EcoDesign stove and install a non-compliant basic stove), but is estimated to provide an indication of the current effect of the SCA on PM_{2.5} emissions. Table 4-8 shows that if the current SCA was revoked there would be a 4% increase in PM_{2.5} emissions from solid fuel burning. This increase is all from residential properties, as moored vessels are currently outside of the SCAs no change is assumed for these solid fuel users.

Table 4-8: Emissions Reductions under Scenario 4

Emissions Source	Baseline PM _{2.5} Emissions (tonnes pa)	Scenario 4 PM _{2.5} Emissions (tonnes pa)	Scenario Impact (tonnes pa) (% relative to baseline)
Residential (total)	26.71	27.81	+1.10 (+4%)
Moored vessels (stationary, for heating purposes only)	0.77	0.77	±0 (0%)
Total	27.48	28.58	+1.10 (4%)

4.3 Other Sensitivity Tests

4.3.1 Stove Exemptions

One of the assumptions around which there is greatest uncertainty is the proportion of different stove types used within households and moored vessels in Cambridge. There is no available information that we are aware of, either nationally or locally, on the proportion of stoves currently in use which are classed as Defra exempt. Hence, assumptions about upgrades of stoves when residents move into the SCA is also highly uncertain. The key data sources that do exist include:

- The Kantar survey, which has information (nationally) on the date at which stoves have been installed (split into pre-2000, 2000-2009 and post 2009); and
- The NAEI emissions factors for stoves, which are based on the following categories of closed stove: 'Basic', 'Upgraded' and 'EcoDesign'.

For the baseline we have assumed that pre-2000 installations are 'Basic', those installed between 2000-2009 are 'Upgraded', and Post 2009 installations are 'EcoDesign'. In addition, 'Basic' are assumed to be not exempt appliances, while 'Upgraded' and 'EcoDesign' are assumed to be Defra exempt (i.e. those households with the latter 2 categories of stove would not need to upgrade stoves to be compliant with a SCA).

There are a number of issues with these assumptions, not least that there have been Defra exempt appliances since the Clean Air Act came into force in 1956, and therefore the date of installation is not necessarily a good indicator of a compliant stove or not. However, in terms of emissions, installation date is likely to be a better indicator (i.e. stoves are getting progressively cleaner) and if residents moving into an SCA upgrade their stove, it is likely that they can now only buy an EcoDesign stove²⁹. Hence from the perspective of calculating emissions, these assumptions seem reasonable. Because of these uncertainties, this sensitivity test is based on the assumption that 25% of post 2000 installations are not exempt appliances, and 30% of pre 2000 appliances (or classed as 'unsure' in the Kantar Survey) are exempt appliances. Table 4-9 shows that with these altered assumptions, there would be a 16% increase in PM_{2.5} emissions from residential wood burning in the baseline, or a 15% increase when compared to the overall baseline of solid fuel burning emissions in Cambridge. This sensitivity on the baseline emissions/stoves means that, if this were to be the case, there would be more opportunity for emissions savings from upgrading of non-compliant stoves in the policy scenarios.

Table 4-9: Emissions Reductions under Stove Assumption Sensitivity Scenario (Baseline)

Emissions Source	Baseline PM _{2.5} Emissions (t/a)	Stove Assumption Sensitivity Scenario PM _{2.5} Emissions (t/a)	Scenario Impact (t/a) (% relative to baseline)
Residential (total)	26.71	30.90	+4.19 (+16%)
Moored vessels (stationary, for heating purposes only)	0.77	0.77	±0 (0%)
Total	27.48	31.67	+4.19 (+15%)

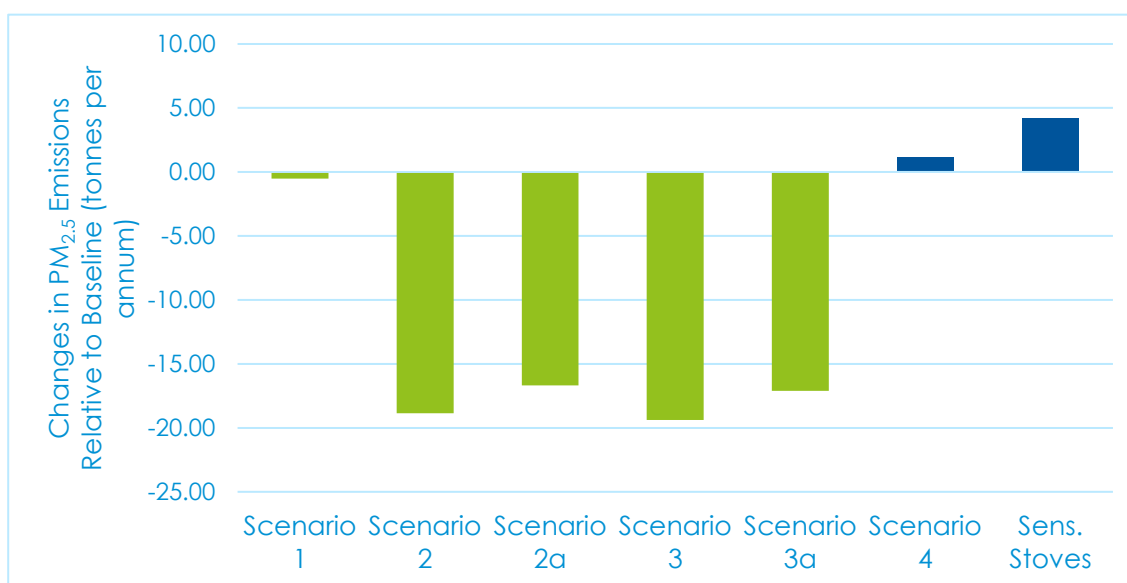
4.4 Summary

The Air Quality Assessment has presented the likely changes in PM_{2.5} emissions under four main policy scenarios, including incorporating moored river vessels into the SCA, and increasing the extent of the SCA to capture all domestic properties within the whole Cambridge area. In addition, sensitivity tests have been run looking at 25% non-compliance with the SCA and also testing the sensitivity of the assumption of stove types in the baseline. The table below presents a comparison of all the scenarios, including the impact in terms of emissions (tonnes of PM_{2.5} per annum) and percentage change relative to the baseline.

²⁹ The EcoDesign Regulation (EU) 2015/1185 24/5/201 for solid fuel space heating appliances came into force in the UK on 1st January 2022. All stoves manufactured from that date onwards must comply with the requirements of EcoDesign.

Table 4-10: Summary of Emissions reductions from scenarios modelled

Scenario	PM _{2.5} Emissions (tonnes pa)	Scenario Impact (tonnes pa) (% relative to baseline)
Baseline	27.48	NA
1. Current SCA coverage, including moored vessels	26.96	-0.52 (-2%)
2. City-wide SCA coverage, no moored vessels	8.62	-18.86 (-69%)
2a. As per Scenario 2 with 25% non-compliance	10.79	-16.69 (-61%)
3. City-wide SCA coverage, with moored vessels	8.10	-19.38 (-71%)
3a. As per Scenario 3 with 25% non-compliance	10.38	-17.11 (-62%)
4. No SCA	28.58	+1.10 (4%)
Stove Assumption Sensitivity	31.67	+4.19 (+15%)

**Figure 4-1 Summary of changes to PM_{2.5} emissions across Cambridge in the modelled policy scenarios relative to the Baseline**

The overall difference (relative to the baseline) in PM_{2.5} emissions modelled using the 'bottom-up' approach across the range of policy scenarios is presented in Figure 4-1. Scenarios 1 to 3a all result in a reduction of PM_{2.5} emissions. Meanwhile Scenario 4 and the sensitivity test on stove types result in an increase in PM_{2.5} emissions. The largest reduction in emissions occurs in policy Scenario 3 (19.4 tonnes per annum) which simulates a city-wide extension of the SCA and inclusion of moored vessels. The sensitivity tests assuming a proportion of non-compliance with the regulations (Scenarios 2a and 3a) still result in a significant reduction in PM_{2.5} emissions.

The overall change in PM_{2.5} emissions under the core policy scenarios relative to total PM_{2.5} emissions³⁰ across Cambridge is shown in Figure 4-2. The reductions in PM_{2.5} emissions are significant under policy Scenarios 2 and 3; by implementing a city-wide SCA it is estimated that PM_{2.5} emissions could reduce by 21.8% (Scenario 2), and by 22.4% (Scenario 3) if moored vessels are also included in the SCA. These represent substantial reductions in primary PM_{2.5} emissions across the Cambridge area.

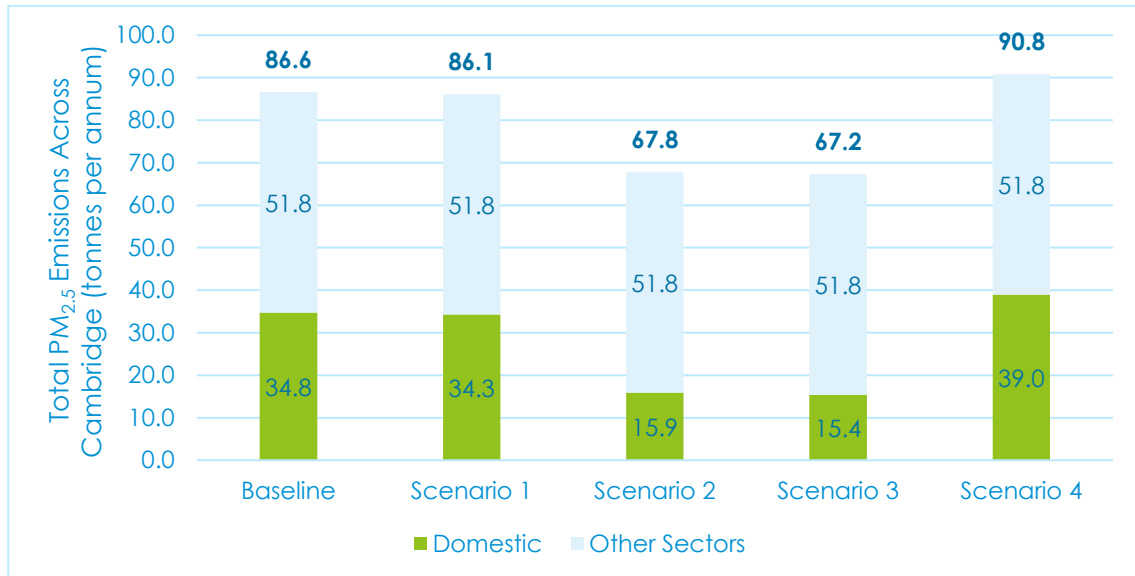


Figure 4-2 Summary of changes to PM_{2.5} emissions across Cambridge in the modelled policy scenarios relative to total PM_{2.5} emissions

Residential emissions represent a large proportion of overall emissions from solid fuel burning (in comparison to commercial premises and moored vessels) and the majority of properties are currently outside of the existing SCAs in Cambridge. Hence, expanding the SCA to incorporate all properties in the Cambridge City area (as under Scenario 2 and Scenario 3) is estimated to have a large effect on emissions from solid fuel burning. The reduction in emissions stems from the consequent assumed reduction in numbers of properties burning solid fuels, as well as a reduction in burning on open fires and stove upgrades for wood burning. The majority of baseline emissions and emissions savings are driven by wood burning (both a higher number of properties burning wood and higher emissions per kg of fuel burnt). Even with 25% non-compliance assumed (i.e., as under Scenario 2a), there is still predicted to be a significant (61% in the case of Scenario 2a) reduction in overall PM_{2.5} emissions from solid fuel burning.

Moored river vessels represent a much smaller contribution to overall emissions, and current assumptions are that most are already likely to be burning MSF. Therefore, relatively few boat owners would need to change behaviour in response to an extension of the SCA to cover moored vessels. For both these reasons the impact of bringing moored boats into the SCA is therefore much less than for residential properties. However, despite this, there is potential for a proportionally large reduction in emissions emanating specifically from moored river vessels (67% in Scenario 1) if they were brought into the SCA. This is because PM_{2.5} emissions from wood burning are much higher than for MSF per unit of fuel, so any reduction in wood burning will have a relatively large positive effect on emissions. In the baseline, although only 25% of solid fuel burning river vessels are assumed to be burning wood, this makes up 86% of overall moored vessel emissions.

³⁰ 2021 NAEI used for emissions of all sectors. Total domestic emissions as a subset of the '02 Non-industrial combustion plants' sector. Changes presented in Figure 4-2 subtracted from NAEI totals.

It is accepted that there are large uncertainties in the assumptions, in both the baseline and policy scenarios. There are particular uncertainties in relation to the behaviour change if the SCA is expanded. It is assumed that residents being captured in the newly declared SCA adopt the same behaviour as those who currently fall within the existing SCA, and that these changes occur when it is declared (i.e. reductions in proportions of properties burning, burning wood on open fires ceases, and changes to stoves where burning still occurs). However, sensitivity tests to explore a scenario of 25% non-compliance with the SCA regulations still show substantial reductions in emissions (62% for Scenario 3a relative to the baseline for properties and moored vessels), adding further evidence to the case for expanding the SCA.

Some of the uncertainties are likely to overestimate the emissions reductions (for example assuming full compliance with the SCA and that people will change behaviour as per those within the current SCA), while some assumptions are likely to underestimate the benefit (such as not including commercial emissions). However, even though some will potentially increase emissions in both the baseline and scenarios, and some will potentially decrease emissions, they will not necessarily act proportionally across the baseline and scenarios. For example, uncertainty about the assumption relating to the split between appliance types, will have different effects in the baseline, where the majority of properties are outside of the SCA, than in a scenario whereby it is assumed that all properties are compliant with the SCA (and hence have a different appliance split).

5 Health Impact Assessment

5.1 Health impacts of policy scenarios (Quantitative)

Each scenario will deliver a change in air pollutant emissions, which will have associated consequences for human and environmental health. The changes in emissions and associated impacts have been monetised using the Defra air pollutant damage costs – the results are presented in Table 5-1. All impacts are expressed as a change relative to the baseline.

Table 5-1: Damage costs of changes in air pollution (benefits associated with reductions in air pollutant emissions are expressed as positive numbers) (£000k), relative to the baseline, per annum

Scenario	1 Existing SCA, with moored vessels	2 City-wide SCA, without moored vessels	2a 25% non- compliance sensitivity test on Scenario 2	3 City-wide SCA with moored vessels	3a 25% non- compliance sensitivity test on Scenario 3	4 No SCA
Monetised damage costs (£2022 prices)	44	1,600	1,410	1,640	1,480	-93

Scenarios 1-3 each delivers a human and environmental health benefit relative to the baseline. This moves in line with the size of the emissions reductions achieved. The scenario with the most significant impact is Scenario 3, which is estimated to deliver a benefit valued at £1.64 million per annum in human and environmental health improvement.

Scenario 4, which simulates the removal of the existing SCA, demonstrates that the current SCA is providing a human and environmental health benefit with a value of approximately £93,000 per year (capturing health care cost savings, improved productivity, and the additional benefit to individuals themselves of improved health).

These monetised damage costs capture a range of different underpinning impacts on human and environmental health. The figure below presents the split of the overall monetised damage cost values by their individual impact pathway – this is presented for Scenario 3 only, but all scenarios follow the same pattern of results. By far the most important impact in the damage costs is the impact of mortality risk (comprising 57% of the overall impact valuation). This is followed by the morbidity pathways asthma (in children), stroke and ischemic heart disease. Respiratory hospital admissions show a 0% contribution – this is rounded down from a very small figure, which in turn is driven by the relatively low valuation relative to other health endpoints (i.e. one hospital admission incurs a much lower cost relative to say a case of asthma or death).

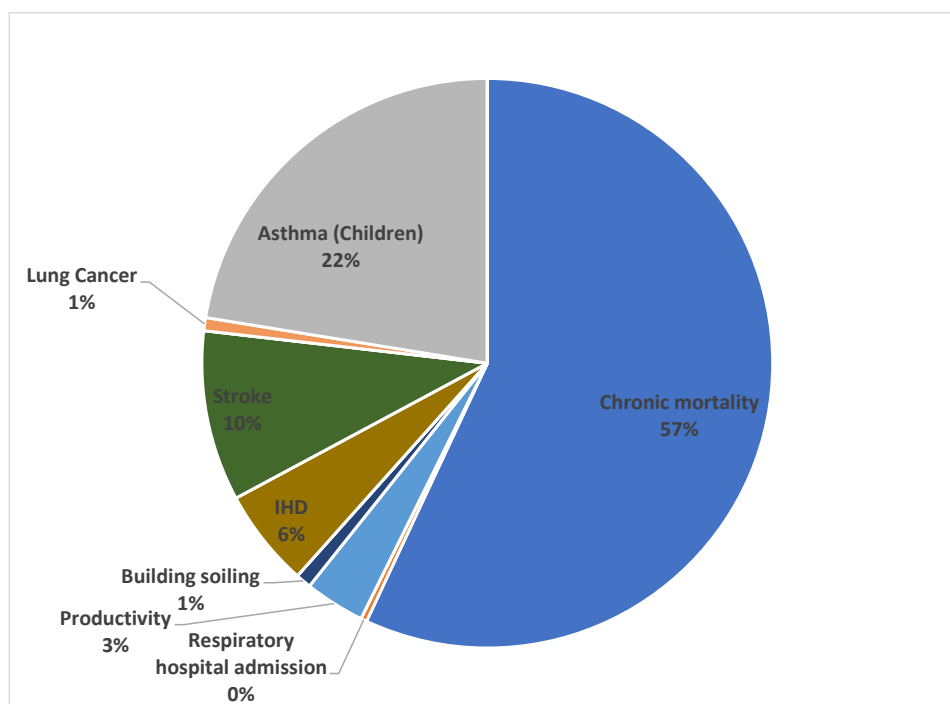


Figure 5-1: Split of monetised damage costs by impact pathway – Scenario 3

Table 5-2: Scenario health impacts (benefits associated with reductions in air pollutant emissions are expressed as negative numbers), relative to baseline

Impacts	Unit	Scenarios					
		1 Existing SCA, with moored vessels	2 City-wide SCA, without moored vessels	2a 25% non- compliance sensitivity test on Scenario 2	3 City-wide SCA with moored vessels	3a 25% non- compliance sensitivity test on Scenario 3	4 No SCA
Mortality*	Deaths	-0.05	-1.77	-1.57	-1.82	-1.61	0.10
Mortality*	LYL	-0.49	-17.96	-15.90	-18.46	-16.29	1.05
Respiratory hospital admission	HA	-0.02	-0.57	-0.50	-0.58	-0.51	0.03
IHD	#cases	-0.01	-0.35	-0.31	-0.36	-0.32	0.02
Stroke	#cases	-0.01	-0.43	-0.38	-0.44	-0.39	0.03
Lung Cancer	#cases	-0.01	-0.21	-0.18	-0.21	-0.19	0.01
Asthma (Children)	#cases	-0.02	-0.63	-0.56	-0.65	-0.57	0.04

Note: *Mortality effects are expressed using two alternative metrics – these are separate ways of expressing the same effect and are not two separate, additional impacts.

The table above presents some of the key human health impacts which are captured by the damage costs, expressed instead in terms of health outcomes rather than monetised values as presented above. It is important to note that the damage costs do not capture all health effects that have been linked to air pollutant exposure - exposure is also associated with other human health effects which are not quantified here, including diabetes, cardiovascular hospital admissions and chronic bronchitis.

Each scenario has a range of associated effects, which again move in line with the magnitude of emissions change observed. The scenario which delivers the greatest benefit is Scenario 3, which equates to:

- 1.8 fewer deaths each year associated with air pollutant exposure, with an associated reduction in life years lost (LYL) of 18.5 – i.e. 18.5 years of life³¹ are gained for each year of emissions reductions;
- Reduction in 0.6 hospital admissions per year for respiratory conditions associated with air pollution exposure – i.e. one less hospital admission every 1 year and 9 months;
- Reduction in 0.36 new cases of ischemic heart disease each year – i.e. one less new case every 2 years and 9 months;
- Reduction in 0.44 new stroke cases each year – i.e. one less stroke case every 2 years and 3 months;
- Reduction in 0.21 new lung cancer cases each year – i.e. one less new lung cancer case every 4 years and 8 months; and
- Reduction in 0.65 new asthma cases in children per year – i.e. one less new case of asthma in children every 1 and a half years.

As is common in assessments of this nature (e.g. city-level analyses considering the effects of changing policies targeting air pollution), when analysed individually the calculated health impacts appear small. It is important to note that these figures present 'statistically attributable' impacts associated with the change in air pollution, based on the methodologies drawn from the underlying epidemiological evidence base, for the purpose of policy assessment. In practice, specific health outcomes can very rarely be attributed solely to changes in air pollution – in fact changes in air pollution will benefit all citizens to some extent and will have an influence on the risk and severity of all health outcomes with which air pollution has been associated (e.g. reducing air pollution will have some impact on all cases of lung cancer, rather than simply reducing one case every 4 years or so as quantified here for Scenario 3).

5.2 Health impacts of policy scenarios (Qualitative)

5.2.1 Indoor air quality impacts

Evidence has shown that solid fuel use has a significant negative impact on indoor air quality, as demonstrated by the review of indoor air quality undertaken by the Air Quality Expert Group (AQEG)³². It has been linked to increased levels of a range of pollutants in the indoor environment,

³¹ These years of life gained are spread across those who experience a reduction in exposure to air pollution – in this case the impacts will predominantly be gained by Cambridge residents. This figure is a representative figure of the total statistically attributable impact across affected population – in practice it is not possible to know how many people will benefit and to what extent. I.e. there could be a large benefit to a smaller population, or a smaller effect spread across a larger population.

³² https://uk-air.defra.gov.uk/library/reports?report_id=1101

including PM, carbon monoxide, oxides of nitrogen, volatile organic compounds (VOCs), sulphur dioxide (especially in relation to coal-based fuels) and polycyclic aromatic hydrocarbons (PAHs)³³. A paper by Chakraborty *et al.* (2020)³⁴ identified that significant increases in indoor air pollution are observed, even when Defra-approved stoves were used. These included an average increase of 196% in levels of PM_{2.5} between times when the stoves were in use and when they were not. This increase is likely to be far higher when using an open fire, where less efficient combustion is also likely to give rise to a higher proportion of PAHs (a group of chemicals which contains many known carcinogens).

The risk of heightened levels of pollution indoor is exacerbated by the fact the UK population spends 80-90% of its time indoors³⁵. A report by the WHO in 2015³⁶ analysed the potential health impacts of indoor air pollutants from solid fuel heating, and also demonstrated the health benefit (including lower cardiovascular and respiratory mortality) that could be obtained through upgrading appliances to more efficient versions (e.g. more modern stoves) or non-combustion heating options.

It should be noted that indoor air quality in moored vessels has also been shown to be negatively impacted by solid fuel use. This is in addition to emissions from cooking (as with fixed households) and from the diesel engine (used either in propulsion or to charge batteries)³⁷.

The impacts of indoor air pollution on health have not been captured in the quantitative assessment of the impacts (and benefits) of changing SCA coverage in Cambridge for three key reasons. Firstly, indoor air quality is far more variable than outdoor air quality, both over time and between locations. Activities common indoors, including cooking, using candles or incense^{38,39}, or even people moving about, can give rise to peaks in measured concentrations of pollutants such as PM_{2.5} which would be seen as extreme in outdoor environments. Equally, a lack of such activity can see concentrations drop to very low levels, below the outdoor background level (especially if windows are closed). Added to the differences in activity in different households, this would mean any "average" concentration carries an extremely high level of uncertainty. Furthermore we do not have data on indoor concentrations of pollutants in either burning or non-burning households.

Secondly, the damage coefficients used to estimate the health impacts of air pollution on populations correlate (usually) to measured outdoor concentrations with population level health outcomes. However, these populations will spend the majority of their time indoors, and thus the coefficients include indoor exposures to a certain extent (the variability in such exposures, for the reasons set out above, are not accounted for). Thus, calculating a separate health impact for indoor exposures could represent a "double counting" of effects.

Finally, Indoor air quality has been subject to increased interest and research in recent years. However, the field is still less developed than for outdoor air pollution and while some attempts have been made to quantify its impacts on health, these are not sufficiently robust to allow inclusion here.

³³ https://uk-air.defra.gov.uk/assets/documents/reports/cat09/2211011000_15062022_Indoor_Air_Quality_Report_Final.pdf

³⁴ <https://www.mdpi.com/2073-4433/11/12/1326>

³⁵

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/831319/VO_statement_Final_12092019_CS__1_.pdf

³⁶ <https://iris.who.int/handle/10665/153671>

³⁷ <https://www.islington.gov.uk/-/media/sharepoint-lists/public-records/environmentalprotection/information/adviceandinformation/20222023/indoor-pollution-on-canal-and-river-boats.pdf>

³⁸ <https://ineris.hal.science/ineris-01863023/document>

³⁹ <https://pubmed.ncbi.nlm.nih.gov/23288671/>

5.2.2 Changes in living and working conditions

Residential

By extending the SCA to cover properties in the wider city area, it is expected that households will change their behaviour if they are currently burning wood on an open fireplace, or on a stove which is not on Defra's exemptions list. It is anticipated that the changes will largely be felt by three broad groups of households:

- those who need to burn wood as it is their only heating source;
- those who burn on occasions for the aesthetic pleasure and comfort of a solid fuel fire; or
- those who burn wood to subsidise another form of central heating⁴⁰.

To assess the proportion of households who fall into these respective groups, data from the latest (2021) Census⁴¹ has been extracted. While there was not a direct question relating to wood burning, information on the types of central heating systems installed is available. In the Cambridge Local Authority District (LAD) **89.7%** of households heat their homes with a single-fuel central heating system that is not reliant on solid fuels (i.e., mains gas, bottled gas, electricity, oil, renewable energy, or district/communal heat networks). Meanwhile the Census data indicates that **7.8%** of households have two or more types of central heating, but **0%** of households are reliant on wood or solid fuel only for central heating.

This data therefore indicates that no (or very few) households fall into category 1 (above), i.e. using wood or another solid fuel as their only source of heating. This is encouraging; it is anticipated that no household will be without a means to heat their property if the SCA is extended. This therefore indicates that the changes in living conditions will be concentrated on those households who currently burn for pleasure and/or to subsidise another form of central heating. The likely behavioural options are therefore to a) stop burning entirely and rely on the other form of heating already available to the household, b) upgrade the appliance on which the burning is taking place or c) change from wood to a compliant solid fuel, e.g. MSF.

Based on the Census data, approximately **4,918** (7.8%) households outside the current SCA boundary could have an open fire or solid fuel burning appliance as a secondary form of heating, and therefore fall into categories 2 and 3 (above). This compares well with the modelled estimate of households currently outside the SCA using wood and coal-like products (4,959), based on the Kantar survey. Using the model estimates, this equates to 3,485 households subsidising central heating systems with wood burning, of which **821** households are likely to be using an open fire, and **480** on a stove which is not exempt. This corresponds to a total of 2.1% of households currently outside the SCA boundary.

While 2.1% of households is relatively few in the context of the whole city, this equates to 1,301 households feeling a change in their living and/or working conditions. The potential impact on households in terms of changes in living conditions is also dependent on how affordable different alternatives are, and hence importantly ties to the socio-economic situation of the household – this is explored further in Section 6.3. Another aspect of households changing burning behaviour is whether some households have a preference for a non-compliant wood stove providing heat to the property (e.g. in a primary room, with other secondary sources elsewhere) – this is explored further as part of the 'fuel and utility cost' discussion in the quantitative analysis.

⁴⁰ Note that there may be a significant overlap between groups two and three.

⁴¹ <https://www.ons.gov.uk/census/maps/choropleth/housing/type-of-central-heating-in-household/heating-type/two-or-more-types-of-central-heating-not-including-renewable-energy?lad=E07000008>

Moored Vessels

A previously outlined, information on burning behaviours on river boats is relatively sparse and/or spatially aggregated compared to the data available for residential behaviours. It is currently estimated that of the 70 houseboat moorings available in Cambridge, 85% use solid fuel as their primary heating source (~60 boats), of which it is assumed 75% use MSF and 25% use wood (~15 boats). All appliances are currently assumed to not be exempt. Therefore, if moored vessels are included within the SCA, 15 moored vessels will need to change their burning behaviours. It is anticipated that half those currently using wood on a not exempt appliance would switch fuels to MSF (~7.5 boats), and half would upgrade their appliance (~7.5 boats). Compared to the number of residential households that will be required to change their behaviours (1,301), the number of houseboats impacted is relatively few. Additionally, there is no ban on burning in general so the SCA regulations should result in either a fuel switch or stove upgrade. However, if there are misinterpretations of the regulations and/or teething issues with becoming accustomed to burning differently, the effects may be felt more acutely for these Cambridge residents; houseboats are typically less well insulated than traditional brick buildings and the choice of appropriate exempt stoves may be more limited. Changes in living and working conditions are explored further in Section 6.43.

5.3 Summary

A wide (and increasing) range of health conditions are linked to air pollution exposure, and reducing emissions will reduce the risk of lung cancer, stroke, ischemic heart disease, asthma, respiratory hospital admissions and deaths attributable to air pollution. Reductions in air pollutant emissions under the scenarios will therefore deliver positive benefits for human and environmental health, with the size of effects moving in line with the size of the emission reductions – hence Scenarios 2 and 3 are estimated to deliver a significantly greater benefit than Scenario 1. These benefits can be expressed in monetary terms using 'damage costs', which capture associated changes in health care costs, 'productivity' benefits and the value people place on their own good health. When valued in this way, Scenarios 2 and 3 deliver a societal benefit valued at £1.6m each year, in comparison to £44,000 per year for Scenario 1. By comparison, analysis of Scenario 4 suggest that the existing SCA delivers a societal benefit of around £93,000 per year for Cambridge residents (i.e. a benefit that could be lost should the SCA be removed).

These quantified impacts capture the change in exposure to ambient air pollution, but they do not completely capture the additional effect of changes in exposure to indoor air pollution. Evidence has shown that solid fuel use has a significant negative impact on indoor air quality, a risk that is heightened by the fact people spend the majority of their time indoors. The impact of the SCA scenarios on indoor air pollution and health cannot be quantified as robust approaches are not available to do so. The impact of the scenarios will depend on the behavioural response of each affected household, but it is reasonable to assume the scenarios will deliver some improvement for some households (i.e. where households stop burning and/or switch to a non-solid fuel heat source).

A further impact on health could come through changes in living conditions as households and vessel owners respond to the SCA. The data available suggests almost no households solely relies on solid fuel as the only source of heat - this is encouraging as it is anticipated that no household will be without a means to heat their property if the SCA is extended. Hence whether households experience a change in living conditions is likely to be closely related to whether there are affordable options available such that they can retain an adequate level of heat – this is considered in further detail in the next section. By comparison, the majority of vessels use solid fuel as a primary heating source, and boats are typically less well-insulated than brick homes – hence the potential risk is greater for boat owners but will also be tied to their socio-economic situation and how they respond to being captured in the SCA.

6 Socio-Economic Assessment

6.1 Quantitative analysis

Table 6-1 presents the results of the quantitative socio-economic analysis.

Table 6-1 Results of cost analysis (£/annum) – costs are presented as positive values

Cost impact	Scenario 1 Existing SCA, with moored vessels	Scenario 2 City-wide SCA, without moored vessels	Scenario 2a 25% non- compliance sensitivity test on Scenario 2	Scenario 3 City-wide SCA with moored vessels	Scenario 3a 25% non- compliance sensitivity test on Scenario 3
Fuel and Utility Cost	£912	£62,600	£62,600	£63,500	£63,500
Investment Costs	£1,350	£132,000	£98,800	£133,000	£99,800
Implementati on costs	£12,800	£50,300	£50,300	£50,300	£50,300
TOTAL	£15,100	£245,000	£212,000	£247,000	£214,000

There is a modelled increase in combined **fuel and utility cost** associated with all scenarios. As presented in Table 6-1, the net fuel and utility cost is approximately £1,000 per annum under Scenario 1, compared to a cost of around £63,000 per annum under all other scenarios. As discussed in the methodology Section 3.4.1, we cannot split out the observed changes in fuel consumption from the emissions modelling between affected households and vessels that switch fuel and those that stop burning. As such, the estimated impacts attempt to capture several underlying impacts associated with one or both of these behavioural responses, namely: fuel cost savings (i.e. a benefit) from fuel no longer burnt, additional fuel costs from any new fuel burnt, and a loss in utility (i.e. the amenity value of burning) either associated with a fuel switch or from stopping burning altogether. As previously outlined, data does not exist to quantify the full utility loss – our approach assumes this is equal to (and hence offsets) the fuel cost saving, and hence understates the overall utility cost. To somewhat balance this underestimation, the approach therefore adopts an assumption that is likely to overstate the additional costs of fuel switch from wood to MSF, namely that all the observed reduction in wood consumption is fuel switch to MSF, maximising the net cost associated with fuel switch (in practice, not all the reduction in wood consumption will be fuel switch, and hence this cost is somewhat overestimated). It is noted that this is not a perfect approach as it is not possible to judge whether the overestimation of fuel switching costs under or over accounts for the underestimation of utility costs. That said, it is insightful to demonstrate the potential order of magnitude of effects, relative to other impacts. **Investment costs** associated with purchases of new EcoDesign stoves are estimated to be £1,350⁴² on an annualised basis in Scenario 1, associated with a small number (~7.5) of boats upgrading their appliance. Costs associated with purchasing of EcoDesign stoves in houses in Scenario 2 are estimated to be £132,000 on an annualised basis. In Scenario 3, costs of upgrading stoves purchased in boats and residential properties together is estimated to be £133,000 on an annualised basis (this is the sum of Scenarios 1 and 2, but appears different due to rounding). There are uncertainties surrounding these costs, largely due to the unknown behavioural response of how many people will choose to upgrade their stove as a result of being 'moved into' a SCA. Additionally, it is unknown whether full compliance will be achieved; as explored in Scenarios 2a and 3a,

⁴² This presents the cost of upgrading the 7.5 assumed non-compliant stoves in moored vessels, annualized over 10 years – this is not the total (unannualized) cost of upgrading.

investment costs are lower as a result of the 25% non-compliance as fewer people upgrade from an open fire or non-compliant stove.

Implementation costs are estimated to be the same for Scenarios 2 and 3 (and the sensitivities around these scenarios in terms of non-compliance) , with the exception of Scenario 1, where enforcement of the SCA for boats only is expected to use only a quarter of the time that would be required under a more expansive scenario. These are estimated based on costs presented by previous studies, refined through discussion with Cambridge City Council as to the likely enforcement and information campaign costs associated with implementation (see Section 3.4.1).

Impacts on **greenhouse gas emissions**⁴³ were calculated resulting from the change in quantities of wood and MSF burned. As a result of Scenario 1 extending the SCA to moored vessels only, a small increase of 2 tCO₂e is estimated (with an equivalent monetised social cost of £450 per annum). Scenario 2 results in a reduction in GHG emissions of 4,997 tCO₂e, with a monetised societal benefit with a value of £1,340,000 per annum. Scenario 3 also results in a reduction of 4,995 tCO₂e which has an associated monetary value of £1,340,000 per annum. Scenario 1 is estimated to lead to an increase in GHG emissions whereas Scenarios 2 and 3 lead to a decrease, due to the variance in energy density of wood and MSF and due to the assumed behavioural responses. Under Scenarios 2 and 3, some households 'stop burning' and overall there is an estimated reduction in burning of wood and solid fuel, delivering a GHG emission reduction. Under Scenario 1, vessels are not assumed to 'stop burning' and hence all vessels either 'switch fuels' from wood to MSF or upgrade stove (with the latter having no impact on GHG emissions as it is assumed there is no impact on fuel consumption). Whilst the tonnage reduction of wood burned outweighs the tonnage increase in MSF, the higher relative energy (and hence emissions) density of MSF relative to wood leads to a small net increase in emissions in this case. Non-compliance sensitivity analyses presented in Scenarios 2a and 3a do not impact on the estimated GHG emissions savings under Scenarios 2 and 3 respectively as it is assumed the non-compliance is amongst those that upgrade stoves only, hence no difference in the quantity of fuels burned is assumed.

The **overall impacts of policy scenarios (i.e. the Net Present Value, or NPV)** combining monetised impacts of changes in emissions, associated health benefits, and the cost analysis including impact on greenhouse gas emissions, is summarised in Table 6-2 and the figure below.

Table 6-2 Cost-benefit analysis of policy scenarios (negative values are benefits, positive values are costs, all impacts are per annum for a representative year, expressed in £2022 prices)

Impact	Scenario 1 Existing SCA, with moored vessels	Scenario 2 City-wide SCA, without moored vessels	Scenario 2a 25% non- compliance sensitivity test on Scenario 2	Scenario 3 City-wide SCA with moored vessels	Scenario 3a 25% non- compliance sensitivity test on Scenario 3
Fuel and utility Costs	£912	£62,600	£62,600	£63,500	£63,500
Investment Costs	£1,350	£132,000	£98,800	£133,000	£99,800
Air pollution impacts	£43,900	£1,600,000	£1,410,000	£1,640,000	£1,450,000
Implementation Costs	£12,800	£50,300	£50,300	£50,300	£50,300
Greenhouse Gas Emissions	£451	£1,340,000	£1,340,000	£1,340,000	£1,340,000

⁴³ As presented above, the GHG emissions assessment focuses only on change in Scope 1 emissions, and does not capture the Scope 3 (lifecycle) impacts.

NPV	-£28,400	-£2,800,000	-£2,550,000	-£2,740,000	-£2,580,000
BCR	2.8	12.0	13.0	12.1	13.1

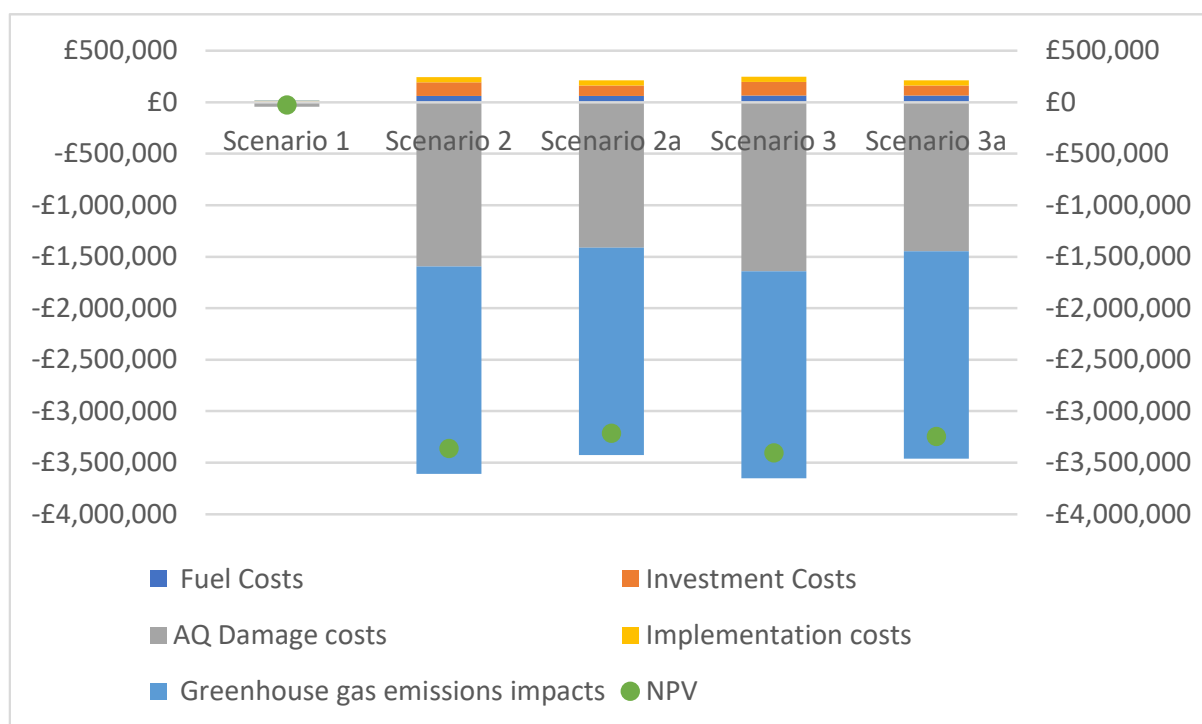


Figure 6-1: Cost-benefit analysis of policy scenarios (negative values are benefits, positive values are costs, all impacts are per annum for a representative year, expressed in £2022 prices)

Scenario 1 has the smallest magnitude of impacts, which is to be expected considering its scope is limited to only moored vessels. In this scenario, the ratio of benefits to costs (BCR) are lower (2.8) as heating systems on boats are primary heat sources and therefore all moored vessels are assumed to upgrade stove or switch fuel in response to the SCA – these behavioural responses carry a higher cost in the analysis relative to 'stop burning'. Furthermore, the assumed implementation costs are proportionally higher (noting that there is significant uncertainty around these figures which are included for illustration). Scenario 1 is also the only scenario which observes an increase in greenhouse gas emissions, as MSF has a higher greenhouse gas emission factor than wood.

Scenarios 2 and 3 (including the non-compliance sensitivities around these scenarios) have a large positive BCR and larger overall net benefits. This result is due to the value of improvements in health impacts from reduced PM_{2.5} emissions and reduced greenhouse gas emissions outweighing cost increases from fuel use, investment costs and implementation costs. It is important to note (as discussed in the methodology) that there is uncertainty in the assessment, in particular around the changes in fuel costs – our adopted approach is likely to overestimate the fuel switching costs, but understate the utility lost from those who stop burning (i.e. the loss of pleasure or ambience), and it is unknown whether the former offsets the latter. That said, given the extent to which overall benefits outweigh the costs, it is deemed unlikely that the utility lost not captured would be significant enough to change the overall result of a net positive impact for society. There is only a small difference in the outcomes of Scenario 3 compared with Scenario 2 (12.1 BCR and 12.0 respectively) given the difference is driven by whether moored vessels are included in the SCA, which has a relatively limited impact (as described in Scenario 1).

The non-compliance sensitivity analyses (Scenario 2a and 3a) have a higher NPV and more positive BCR than Scenario 2 and Scenario 3, respectively. These non-compliance sensitivities assume that 25% of those burning on an open-fire or non-compliant stove choose to not upgrade their stove and not comply with the legal SCA regulations (i.e. non-compliance is focused only on those that would have upgraded stove, and does not reduce compliance amongst those that stop burning or switch fuel). This highlights that the purchasing of new stoves to replace an old non-compliant stove or an open fire is assumed in the modelling to be a relatively high-cost way of complying with the SCA, relative to stop burning or switching fuels. However, it is important to note that assumptions made to facilitate the analysis – e.g. we assume only one cost for all stove upgrades, whereas in practice there will be a multitude of choices and options for upgrade. Furthermore, where non-compliance occurs this could occur amongst those that would have upgraded stove and those that switched fuels or stopped burning. While limited, the sensitivity test does serve to show that even with a lower compliance rate, overall the SCA is still likely to deliver a net benefit for society.

6.2 Economic sensitivity analyses

There are several limitations and uncertainties around the analysis. As discussed above, a key uncertainty relates to the behavioural response of households and moored vessels who now need to comply with an expanded SCA – this is explored through Scenarios 2a and 3a. Further sensitivity analyses were conducted to explore uncertainties in the methodology applied to quantify the socio-economic impacts:

- Investment costs: a 25% higher and lower cost was assumed for installation of a new EcoDesign stove;
- Fuel prices: alternative fuel prices were used from the Scottish government impact assessment;
- Air pollutant damage costs: uncertainties exist in the damage costs related to the size of impact associated with exposure, the strength of evidence between exposure and effect and the valuation of health endpoints. High and low damage costs were taken from Defra's appraisal guidance;
- Carbon prices: a high-low bound is applied based on DESNZ's appraisal guidance.
- The results are presented in the table below, relative to the outputs of the core analysis.

As can be seen from the table above, none of the sensitivity tests change the overall result and the key conclusions drawn from the sensitivity analysis. I.e. under no sensitivity test does the net present value change from a net benefit to a net cost – in all cases all scenarios are still estimated to deliver a net overall benefit for society. Hence the results of the study are robust to these key uncertainties in the socio-economic analysis methodology.

The sensitivity test with the largest effect is the low and high range around the air pollution damage costs. Under the low damage cost, the NPV of Scenarios 2 and 3 reduces from around £2.7m net benefit per annum, to around £1.7m net benefit per annum. Hence even taking the low bound to monetise the benefit associated with changes in air pollution, the scenarios are still anticipated to deliver a net benefit overall. This result is also likely to be resilient to the uncertainty around the implicit emissions-to-concentrations relationships carried through from using national-average damage costs (i.e. by applying the Defra UK average 'domestic' damage costs, the analysis implicitly assumes that exposure to air pollution from domestic emissions in Cambridge is equivalent to exposure to an average unit of emission anywhere in the UK). Exposure to emissions from domestic sources in Cambridge would need to be significantly below the UK average to impact on the overall cost-benefit results for the scenarios.

Table 6-3: Outputs of the sensitivity analysis – shows NPV for typical year of impacts, expressed in £2022 prices

	Scenario 1 Existing SCA, with moored vessels	Scenario 2 City-wide SCA, without moored vessels	Scenario 2a 25% non- complianc e sensitivity test on Scenario 2	Scenario 3 City-wide SCA with moored vessels	Scenario 3a 25% non- complianc e sensitivity test on Scenario 3
Core analysis	-£28,400	-£2,700,000	-£2,550,000	-£2,740,000	-£2,580,000
Low investment cost	-£28,800	-£2,730,000	-£2,570,000	-£2,770,000	-£2,600,000
High Investment cost	-£28,100	-£2,660,000	-£2,520,000	-£2,700,000	-£2,550,000
Alternative fuel prices	-£32,700	-£2,990,000	-£2,840,000	-£3,030,000	-£2,870,000
Low damage cost	-£1,780	-£1,730,000	-£1,690,000	-£1,740,000	-£1,700,000
High damage cost	-£99,800	-£5,290,000	-£4,840,000	-£5,400,000	-£4,930,000
Low carbon price	-£28,600	-£2,020,000	-£1,870,000	-£2,060,000	-£1,900,000
High carbon price	-£28,200	-£3,370,000	-£3,210,000	-£3,410,000	-£3,250,000

6.3 Distributional analysis of costs

6.3.1 Residential

As outlined in Section 5.2.2, the 2021 Census⁴¹ indicates that no residential dwellings in the study area rely solely on wood or another solid fuel as their primary source of central heating. Therefore, it is reasonable to assume that wood burning is supplementary, either for aesthetic purposes, or to offset the use of other heating fuels (and associated costs).

To understand who may be impacted by the SCA extension, the demographic profile of Cambridge has been investigated. In Cambridge, 7.7% of the population was classed as 'income-deprived' in 2019, placing Cambridge as the 248th most income-deprived local authority out of the 316 local authorities in England, according to the Office for National Statistics (ONS)⁴⁴. Therefore, households in Cambridge are, on average, less deprived than those in the average local authority in England.

Going further, we have overlaid ONS census data on household heating systems with Index of Multiple Deprivation (IMD) at the Level of Lower Super Output Area (LSOA) to explore the levels of solid fuel burning in each IMD decile⁴⁵. As explored above, very few households in the Cambridge area are reported to rely solely on wood or other solid fuels as their only heat source – for the analysis we have assessed the proportions assigned as using 'two or more types of central heating (not including renewable energy)'. The number of households in each LSOA is compared to the IMD decile rank, with 1 being the most deprived and 10 being the least deprived.

The number of households and proportion of all households in this category falling in each decile are shown in Table 6-4. From the table it appears that those using two or more types of central heating (a proportion of which includes solid fuels) appears to be concentrated amongst less deprived households: no households in the most deprived income decile use two or more types; only 5% of all

⁴⁴ <https://www.ons.gov.uk/visualisations/dvc1371/#/E07000008>

⁴⁵ IMD is often split into deciles, where each LSOA is assigned to one of ten deciles which nationally rank all LSOAs according to their relative level of deprivation

households using two or more types fall in the bottom two deciles; and only 15% fall in the bottom three deciles. Two caveats to this analysis are: (a) this is performed at LSOA level, and there will be variation in deprivation within an LSOA, so we cannot precisely identify the level of deprivation of each specific household using solid fuel; and (b) this analyses households using two or more types of central heating, a proportion of which will and will not use solid fuel as a source.

Table 6-4: Split of households using two or more types of central heating (not including renewable sources), in LSOAs located in the Cambridge Local Authority area, split by IMD decile

IMD decile	# of households	% of all households using two or more types of central heating (not including renewable sources)
1 (most deprived)	0	0%
2	142	5%
3	261	10%
4	124	5%
5	612	23%
6	395	15%
7	231	9%
8	345	13%
9	280	10%
10 (least deprived)	304	11%

The finding that those burning wood are likely to be less vulnerable households is somewhat corroborated by other sources. For example, the Kantar survey found that the majority of indoor burners nation-wide were relatively affluent in comparison with non-burners, however it also found that 22% of indoor burners (at national scale) found it difficult or very difficult to meet their energy costs⁴⁶. Furthermore, a survey run by the London Wood Burning Project⁴⁷ (LWBP) suggested that households burning wood in London are more likely to be: younger (i.e. under 40), property owners, living in houses (rather than flats or other), higher earners (i.e. >£60,000) and working full-time.

The costs outlined above to upgrade appliances are therefore likely to fall largely on relatively affluent households. However, there should be attention directed to those who are using solid fuel appliances while struggling to meet their energy costs, as they are unlikely to be able to afford a new appliance and may therefore face the decision of complying with regulations, or not being able to adequately heat their homes. In Cambridge, based on the demographic profile of residents, this is likely to be less of an issue than elsewhere in England.

6.3.2 Moored Vessels

While Section 6.3.1 indicates that the demographic profile of solid fuel burners in residential properties in Cambridge is that of a relatively affluent population where solid fuel burning is not the sole source of heating, the same does not necessarily apply to the population living on river vessels at moorings

⁴⁶

<https://sciencesearch.defra.gov.uk/ProjectDetails?ProjectID=20159&FromSearch=Y&Publisher=1&SearchText=AQ1017&SortString=ProjectCode&SortOrder=Asc&Paging=10#Description>

⁴⁷ The results of the survey are, as yet, unpublished. These were provided through direct communication between the study and LWBP teams.

throughout Cambridge. As outlined in a statement by the National Bargee Travellers Association⁴⁸, most boats are heated using a solid fuel stove, while some are heated using a diesel heater, and few use electricity or bottled gas for heating. This is supported by the Canal and River Trust 2022 Census¹² which identified most boaters had a solid fuel stove (66.6%) while fewer had diesel heaters (53.3%), gas boilers (17.3%), or electric heating (9.3%). Hence moored vessels are more likely to rely solely on solid fuel as their primary heat source.

Demographic information regarding the boating population is relatively sparse, but there are some metrics which indicate the population is likely to be more acutely impacted than the rest of the Cambridge population. The Canal and River Trust 2022 Census¹² found that 33.7% of boaters report that their day-to-day activities are limited because of a long-term health problem or disability, which is significantly higher than the national average (17.8%). Additionally, the majority of respondents (70.3%) declared that they receive a pension or pension credit, indicating an older population of boaters compared to the rest of Cambridge. In comparison, the 2021 Census⁴⁹ identified 11.5% of the population in Cambridge was above 65 years of age. The same Canal and River Trust census also asked boaters about the issues and challenges associated with living on a boat, of which: 21.7% responded 'employment and work', 16.5% 'accessing financial services' and 11.6% 'accessing financial help (e.g. benefits)'.

Furthermore, as part of a boat licence consultation⁵⁰, a Canal and River Trust survey identified that: 53% of boaters stated that their household income was below £40,000, 43% stated their household income was below £30,000, and just over a quarter (27%) stating their household income was below £20,000. By comparison, 34% of all UK households reported gross income below £32,000 and 15% less than £19,000 in 2020⁵¹.

Therefore, extending the SCA to include moored vessels may have a more acute impact on boat residents than those in traditional properties in Cambridge area; they are likely to be more reliant on solid fuel burning as their primary source of heating, and they are more likely to be an older population with additional health demands. There is some evidence to suggest boat residents are also likely to be relatively lower income or suffer from additional financial challenges.

6.4 Practical implications of changing heating practices

6.4.1 Residential

The above has indicated that no (or very few) household will be left without a primary source of heating, assuming the data from the 2021 Census is correct; 0% of households in the study area reported to rely on solid fuel as their main heating source⁵². The remainder of this section therefore focusses on the implication for those households who burn solid fuels for either aesthetic reasons or to supplement their main heating source for economic reasons. For these groups, there are three main behavioural responses:

⁴⁸ Written evidence submitted by the National Bargee Travellers Association (NBTA) (WIN0022)

<https://committees.parliament.uk/writtenevidence/123477/pdf/#:~:text=The%20NBTA%20estimates%20that%20there,no%20further%20breakdown%20of%20population.>

⁴⁹ <https://www.ons.gov.uk/visualisations/censusareachanges/E07000008/>

⁵⁰ <https://canalrivertrust.org.uk/refresh/media/original/48475-boat-licence-review-equality-impact-assessment.pdf>

⁵¹ See Gross banded income, UK, financial year ending 2020, here:

<https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/incomeandwealth/adhocs/14140bandedequivaliseddisposableincomeandnonequivalisedgrossincomeukfinancialyearending2020>

⁵² Noting this might be slightly above absolute zero, but rounded down in the census results.

- Change fuel, e.g. from wood to MSF;
- Change appliance, e.g. from an open fireplace or non-compliant stove to a compliant stove; and

Stop burning altogether or burn less. For example, by adjusting duration of burning events, frequency of burning events, or reduced heat output during burning events (e.g. through restricting air flow in a stove or constructing a smaller fire).

The cost implications of the first two options have been included in the cost analysis above. In practical terms, the implications of changing from wood to MSF may mean that a new fuel supplier is needed, especially if the wood used is foraged or obtained through non-market means (which would also imply a higher cost implication). This would require time and effort to find a new supplier, and potential additional travel time and distance, and challenges in transporting fuel back to the home where suppliers are located further away than existing sources. Changes in fuel storage are also likely, although MSF will occupy a smaller volume than the equivalent amount of wood for the same energy output. There is also likely to be a loss in aesthetic value which may in turn lead to a reduction in burning for those where this is a primary reason for burning.

Changing appliances will clearly have a short-term disruptive impact on those households which choose to do so, as it is likely to require physical changes within the home. Thereafter, the practical implications are minimal, assuming the installation is undertaken correctly. There is a risk that installations are undertaken incorrectly, to save costs and/or because those undertaking the work are insufficiently skilled (including DIY installations). This could lead to reduced indoor air quality, including a risk of carbon monoxide poisoning, if flue gases are allowed to escape into living rooms. There is also a risk of damage to chimneys if flue liners are incorrectly installed or if no flue liner is installed. This in turn could lead to an increased fire risk, especially if the chimney is not swept regularly (although this risk is also true for correctly installed appliances especially if they are operated incorrectly).

Stopping burning or reduced burning is likely to mean that there is increased use of other heating fuels. This is of greater significance for those households using solid fuels to supplement their main heating source (usually for economic reasons). Anecdotal evidence⁵³ suggests that the increase in energy prices prompted by Russia's invasion of Ukraine led to a significant increase in households using solid fuel to offset their main heating fuel (usually gas). This includes using solid fuel appliances to heat one room. However, solid fuel costs, both wood and MSF, also increased at that time, and an analysis undertaken for Global Action Plan suggests that using solid fuel heating in this way may not result in net cost savings⁵⁴. Focussing heating on one room can also be achieved through varying thermostatic controls on central heating radiators, although this is less convenient and may not be available e.g. in private rented accommodation. It is therefore not clear whether the increase in gas (or other heating fuel) use implied by a reduction in solid fuel as a supplementary heating fuel will result in a net cost increase for households.

There may be circumstances, especially in lower income households, where the main central heating system is insufficient to heat the house, especially under extreme weather conditions, and that stopping the use of solid fuel may lead to colder homes. This in turn can lead to condensation, mould growth, and other adverse health outcomes. There are already funds available to low income households to improve insulation and improve the efficiency of heating systems, but access to these will be limited, especially in private rented accommodation. There is, therefore, a risk that extending the SCA could exacerbate fuel poverty for some households.

⁵³ Likely to be confirmed when the results of the recent survey on domestic burning undertaken by Ipsos for Defra are published.

⁵⁴ Relight my fire? (globalactionplan.org.uk)

Furthermore, attempts to reduce, but not cease, solid fuel use may result in the incorrect use of appliances, such as through overly restricting air flow in stoves. This could result in a more “smoky” burn, increasing both PM emissions and fouling of the chimney. If the chimney is not swept regularly, this could result in an increased fire risk and, in extreme circumstances, blockage of the flue and leakage of flue gasses (including carbon monoxide) into the living spaces.

6.4.2 Moored Vessels

The practical implications for moored vessels are slightly different, in that solid fuel is nearly always the main heating fuel. Moreover, moored vessel occupants are more likely to be lower income households and thus more vulnerable to price fluctuations in living and energy costs. Moored vessels are also typically poorly insulated, which can make them more sensitive to changes in heating system. The costs of moving from non-compliant to compliant stoves and/or from wood fuel to MSF have been included in this analysis. However, this may underestimate the costs, especially where the wood currently used is foraged or acquired through non-market means. In such cases, the need to switch to MSF may give rise to or exacerbate issues of fuel poverty. The need to use MSF rather than wood may also introduce issues of supply, with the risk of shortage of fuel during particularly cold spells.

Some moored vessel occupants may choose to opt for diesel heaters rather than either upgrading a solid fuel heater or switching fuel. We have not undertaken a cost analysis of solid fuel heating versus diesel heating, but the practical implication may mean increased noise for local residents (and other moored vessels) and an increase in diesel emissions, which have not been considered in this analysis.

6.5 Summary

The monetised health impacts have been combined into a wider assessment of the socioeconomic effects of adjusting the SCA. Where possible, the impacts of the scenarios have been quantified and captured in a cost-benefit analysis comparing the benefits of the scenarios against the costs. The costs to home and vessel owners of switching fuel or upgrading stoves, and to the Council for implementation and enforcement are greatest under Scenarios 2 and 3 (highest cost is Scenario 3 of £250,000 per annum), with Scenario 1 carrying an estimated cost of around £15,000 per year.

Overall, all scenarios to extend the SCA are estimated to deliver a ‘net benefit to society’ – in other words, the health improvements from reduced air pollution and benefit of greenhouse gas emission reductions outweigh the combined costs to the Council and owners of homes and moored vessels. The size of the net benefit delivered rises in line with the size of air quality benefits, hence Scenarios 2 and 3 deliver the largest net benefit in the order of £2.8m per year, with a ratio of benefits-to-costs of 12-to-1. Scenario 4 which tested the benefits of the existing SCA was not subject to complete quantitative assessment given uncertainty around what would happen should an SCA be removed. However expert judgement suggests it is likely that the costs of removing the SCA in terms of lost air pollutant benefits (i.e. emissions would increase) and higher GHG emissions would outweigh any benefits in terms of fuel cost savings, hence delivering an overall disbenefit for society should the existing SCA be removed.

While increasing the coverage of the SCA results in a net benefit to society, it is important to consider additional impacts and risks that have not been quantified and captured in the cost-benefit analysis. For households, there may be some practical implications of switching, such as search costs of finding new fuel sources, the need to allow access to the home to upgrade stoves, and installation risks – however there is no evidence to suggest these risks are significant overall. That said, the implications for moored vessel owners appear more consequential. As a group, evidence suggests moored vessel owners may have relatively lower incomes and hence alternative options may be less affordable for some. Furthermore, this group tend to be more vulnerable (i.e. more likely to be elderly or have a disability or long-term health conditions) and vessels tend to be less well-insulated. Hence there is a

greater risk that moored vessel owners may face difficulties affording to comply with the SCA, which in turn may have a detrimental impact on living standards amongst a more at-risk group.

7 Summary and Conclusions

7.1 Overall assessment conclusions and recommendations

The overall conclusions of the study are summarised in Table 7-1, which presents the analysis in a multi-criteria analysis, intended to aid comparison between the scenarios and visually present the key benefits and risks of each policy option.

All scenarios result in a net benefit, with extending the SCA to the whole of Cambridge and including moored vessels in the designation providing the largest net impact (Scenario 3). This is driven by health benefits from the reduction of PM_{2.5} emissions, which include a reduction of annual deaths by ~1.8 as well as improvements in other health outcomes associated with a reduction in exposure to ambient air pollution. This scenario will also deliver additional indoor air quality improvements with associated health benefits, which are not captured in the quantitative analysis due to a lack of established methodology to do so.

While all the policy scenarios result in a net benefit to society, it is important to consider additional impacts that have not been monetised. These include the distributional impacts of where changes in fuel costs and investment costs fall in society. While burning of solid fuel in domestic properties is mostly a secondary heat source used by households who are likely to be more affluent, this is not the case with moored vessels. Solid fuel is typically the primary heat source for vessels and boat residents are more likely to be lower income, be older or have a pre-existing medical condition or disability. Furthermore, vessels are likely to be less insulated and more at risk of cold, damp, and resulting mould. Therefore, Scenario 1 and (part of) Scenario 3 risks impacting on a group who may be less able to afford to respond to the SCA in a way that maintains their living conditions, and may be more susceptible to the associated health risks.

Overall, the assessment presents either Scenario 2 or 3 as the preferred option. This study has demonstrated that the monetised benefits of expanding the coverage of the SCA outweigh the costs, and there is predicted to be a net benefit to society of extending the SCA to the whole of Cambridge driven by improvements to health. These findings are, however, dependant on behaviour change in response to the SCA, which is uncertain in practice, and there is no precedence for such a change elsewhere in the UK. As such, awareness-raising information campaigns and/or enforcement will be important to ensure the SCA succeeds in achieving the potential changes in burning behaviours, and in turn, reductions in PM_{2.5} emissions. Further work such as a city-wide survey may be helpful for better understanding burning behaviour and potential behaviour change related to extension of the SCA.

Inclusion of moored vessels in the SCA would deliver an additional net benefit and could achieve a significant impact on emissions from a more visible source (although the additional benefit in terms of overall emissions is relatively small).¹ There are however some additional risks and concerns for this small group of affected citizens, including higher economic vulnerability and risks from changes in living conditions. The data relating to proportions of river vessels burning wood and coal products, and the appliances which are being used is also more uncertain than for residential properties. Therefore, where Scenario 3 is pursued, additional engagement with moored vessel owners is recommended to further explore solid fuel burning activity within the group, as well as potential impacts and risks to this group, and complementary measures should be considered where potential issues are identified to mitigate risks for vulnerable boat owners where possible.

Table 7-1: Summary multi-criteria analysis of scenarios

Scenario	1	2	3
Emissions impacts (tonne reduction versus baseline per annum / % reduction versus baseline)	-0.52 (-2%)	-18.86 (-69%)	-19.38 (-71%)
Health impacts (£000k monetised effects / # deaths avoided per annum)	44 -0.05 deaths	1,600 -1.77 deaths	1,640 -1.82 deaths
Cost-benefit analysis	£28,000 NPV benefit Benefit Cost Ratio: 2.8	£2.7m NPV benefit Benefit Cost Ratio 12.0	2.7m NPV benefit Benefit Cost Ratio 12.1
Indoor health benefits	Potential benefits for indoor air pollution for moored vessels, although evidence on indoor pollution is less established	Potential benefits for indoor air pollution in households, although evidence on indoor pollution is less established	Potential benefits for indoor air pollution in moored vessels and households, although evidence on indoor pollution is less established
Distribution of costs	Costs fall on a small number (~15) of vessel owners and users. Boat users are more likely to be lower income	Households burning solid fuels (~3,500) do so as a secondary heating source and more likely to be affluent	Costs fall on a small number (~15) of vessel owners and users. Boat users are more likely to be lower income
Changes in living conditions	Vessels tend to be less well insulated. If alternatives are less affordable, there could be a risk for living conditions where residents stop/reduce burning, such as cold, damp and mould	Given majority of households burn for pleasure and/or are less deprived (and can likely afford replacements), risk of households living in colder, damper homes with mould are lower. Other initiatives exist to help ensure homes are adequately heated.	There is a risk that the small number of households living in moored vessels may experience a disproportionate worsening of living conditions (see Scenario 1). Risk for households is assessed to be negligible (Scenario 2)
Practical implications	Need to find alternative fuel source, which may be less convenient. Stove upgrades require access to the moored vessel.	Need to find alternative fuel source, which may be less convenient. Stove upgrades require access to the property. Small risk of incorrect installation.	Need to find alternative fuel source, which may be less convenient. Stove upgrades require access to the property or moored vessel.

Key	Large disbenefit / risk	Disbenefit / risk	Neutral	Benefit	Large benefit
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7.2 Caveats and limitations of assessment

- The air quality baseline is uncertain, for reasons set out in Section 3.2, including: Types of appliance used to burn vary enormously, activity data is incomplete, domestic heating appliances do not require registration, and emissions factors have uncertainty.
- Behavioural assumptions in response the SCA are uncertain, e.g. how many people stop burning fuel, switch fuels, upgrade their stoves, or are non-compliant. In this study, responses are based on the Kantar survey and behaviour inside and outside SCAs (which also informed the NAEI), assuming that those outside the current SCA will behave like those inside an SCA once the zone is extended. This is uncertain and reality may be different. In addition, modelling undertaken for this study has assumed that behaviour change is instant with introduction of the policy, however in reality the shift may be more gradual and be helped by information campaigns.
- A single year of analysis has been conducted, presenting one year of annualised costs and air quality impacts. In reality, air quality benefits will be experienced not just in a single year but over several years, and as such air quality benefits are under-represented.
- Modelling has been done on the basis of fuels that are legally permitted to be sold (i.e. MSF). In reality, there may be a proportion of people burning house coal. In this instance, benefits of the modelled analysis are understated as there will be greater benefit from swapping to compliant fuel.
- There is uncertainty in relation to the compliance of existing stoves prior to introduction of the policy and therefore the necessity of upgrading, as well as which stoves will be purchased and their cost. Additionally, there may be the possibility of retrofitting stoves which would be cheaper and as such investment costs overstated.
- Health benefits associated with air quality improvements are estimated by utilisation of the latest damage costs. There are a wide range of detrimental health effects associated with exposure to air pollutants, of which only some are captured and quantified in the damage costs. Furthermore, only the effects associated with exposure to PM have been assessed here and not other pollutants. Both these factors will lead to an underestimation in the size of the air pollution benefits achieved. Use of the Defra damage costs also implicitly assumes the average exposure to a unit of domestic emissions in Cambridge is the same as that of the average

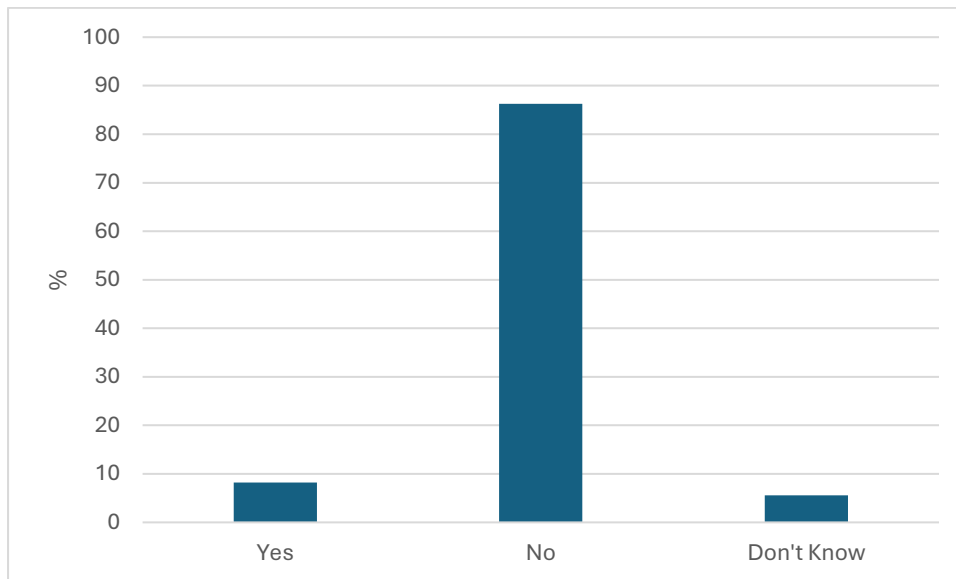


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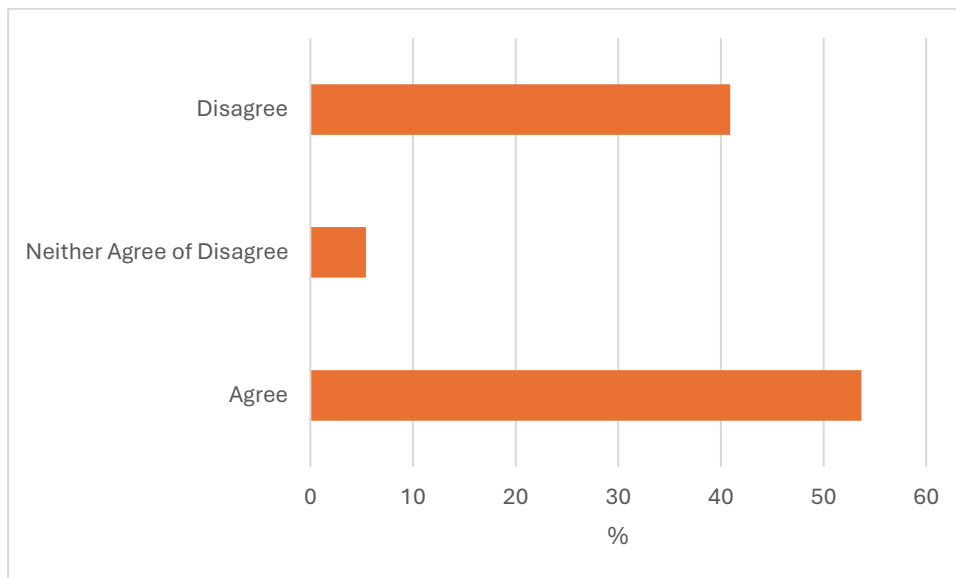
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Appendix C: Public Consultation - Summary of Responses

Q1: Do you live inside the existing SCA? (772/772)



Q2: Do you agree with the proposal to expand the existing smoke control areas to cover the entire district of Cambridge? (772/772)



Q3: Why do you agree with the proposal? (414/414)

Of those that supported the proposal approx. 45% cited the primary reason as they were concerned about impact on theirs or others health, 21.5% consider air pollution a problem in Cambridge or generally concerned about the environment (19%), with approx. 13% citing annoyance. Of the remaining 1.5% whilst typically more specific

concern still focussed around impacts on health and wider impacts on the environment.

Q4: Why do you disagree with the proposal? (316/316)

Of those respondents that are opposed to the expansion approx. 41% is around concerns about increased costs of both fuel and upgrades and concerns about supply of suitable smokeless fuel. There is a significant view that air pollution is not a concern in Cambridge (11.5%), burning solid fuel is sustainable (14%) and the problem is not bad enough to curtail peoples freedom (28%) and taking away the pleasure a solid fuel stove provides and that focus should be centred on more important issues, most notably congestion and emissions from cars. Of the remaining 5.5% who responded to 'other' again answers were more personal or specific but focussed around increased costs, curtailing personal freedom unnecessary and question of whether air pollution is a problem in Cambridge and the councils use of powers and priorities. The issues of practicalities of enforcement was also raised.

Q5: Do you have anything to add about the proposal? (optional) (324/772)

Note: Bonfires / fireworks and role they play is raised frequently across general answers both for and against

Respondents expressed a wide range of opinions on the proposal to expand the smoke control area. A significant number of responses highlighted concerns about the impact on low-income residents, particularly those living on houseboats, who rely on wood and coal for heating and may not have affordable alternatives

Many respondents argued that vehicle emissions and traffic congestion are more pressing sources of pollution that should be prioritized over wood burning

There was also a call for more evidence and clarity on the health impacts of wood smoke compared to other pollutants

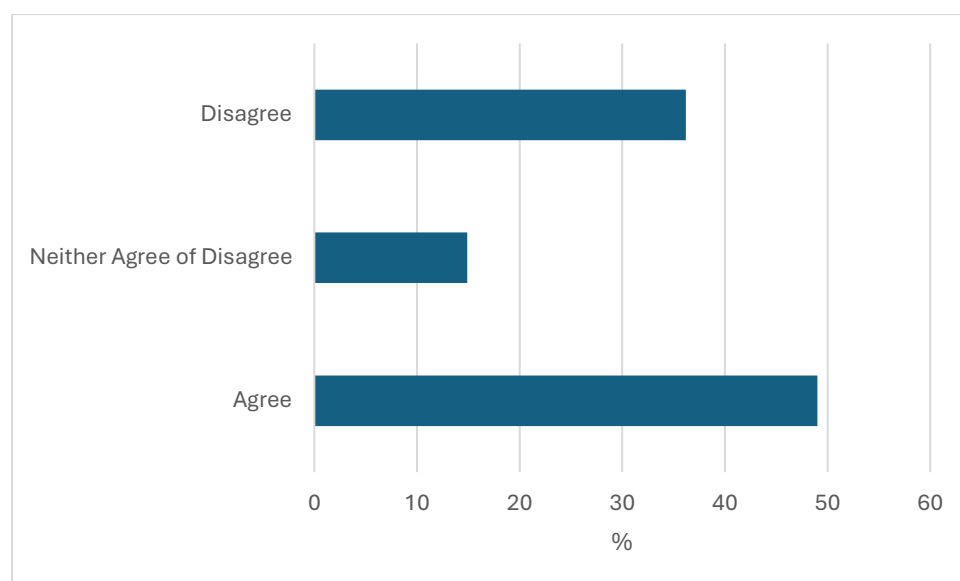
Some respondents supported the proposal, citing health concerns and the need to improve air quality, especially for vulnerable groups like children and those with respiratory issues

Several responses suggested that any changes should be accompanied by financial support or incentives for residents to transition to cleaner heating options

There were also calls for better enforcement of existing smoke control regulations and more public education on the health risks associated with wood burning

Overall, while there is support for improving air quality, many respondents are concerned about the potential socioeconomic impacts of the proposal and believe that other sources of pollution should be addressed first.

Q6: Do you agree with including permanently moored vessels (houseboats) using the River Cam within the Cambridge City Council district boundary? (772/772)



Q7: Why do you agree? (38/772)

There is a lower response rate of 70% for this question, but of those that responded approx 40% cited fairness for all residents who are polluting, 15% about concerns on health when using the river for amenity or 4% proximity of the boats to their residential premises and subsequent impact on health. Approx 9.5% expressed view that impact of houseboats was greater on the natural environment. Of the 2.5% respondents who gave additional answers whilst there is support for fairness, and the lower chimney height impacts greater on health of those using the river for amenity, there is a clear concern still about suitable viable alternatives and support for the boating community if this were progressed

Q8: Why do you disagree? (281/772)

Response rate of 64% to this question. Of those that responded only 2% live on a boat and expressed concerns about costs and practicalities. This was overwhelmingly supported by the wider responses around practicalities and costs (34%) and being proportionate given the small number of boats owners and scale of problem from them (12%). Of the remaining 3% who provided wider answers this focussed primarily again on proportionality, costs and practicality and curtailing peoples freedoms and the way they choose to live their lives

Q9: Do you have anything to add about including permanently moored vessels (houseboats) using the River Cam within the Cambridge City Council district boundary? (optional) (324/772)

Respondents expressed a mix of opinions regarding the inclusion of permanently moored houseboats in the smoke control area expansion. A significant number of

responses highlighted concerns about air pollution caused by houseboats burning wood and coal, which affects the health of nearby residents and those using the river paths for exercise

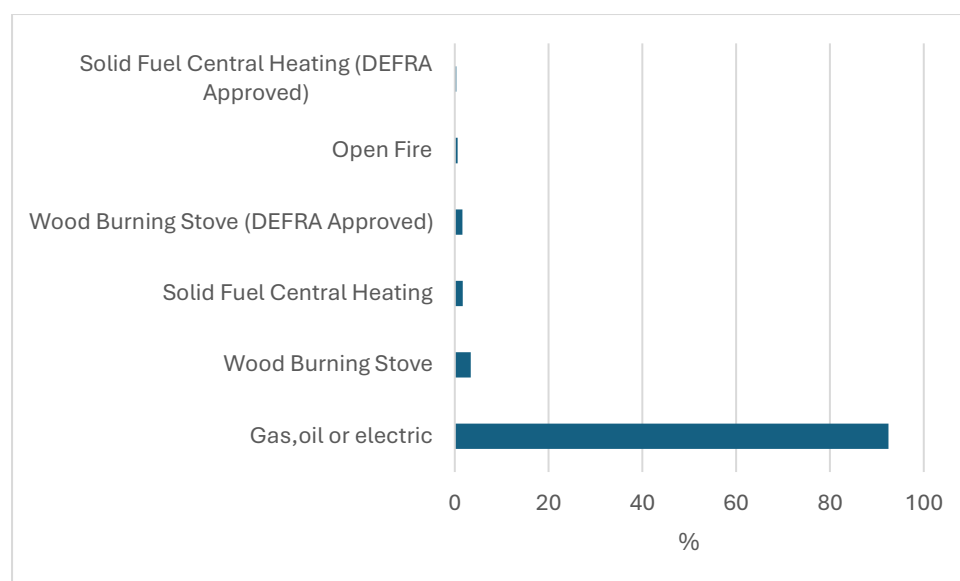
Many respondents suggested that houseboat residents should be supported financially to transition to cleaner heating alternatives, such as providing electrical hookups or grants for new stoves

Conversely, some respondents argued that houseboats are an integral part of Cambridge's character and provide affordable housing options in an expensive city. They emphasised that many houseboat residents are low-income and have limited heating options, suggesting that imposing restrictions could disproportionately affect them

Some respondents felt that the pollution from houseboats is minimal compared to other sources and that the focus should be on more significant contributors to air pollution

Overall, there is a call for a balanced approach that considers both the environmental impact and the socio-economic challenges faced by houseboat residents.

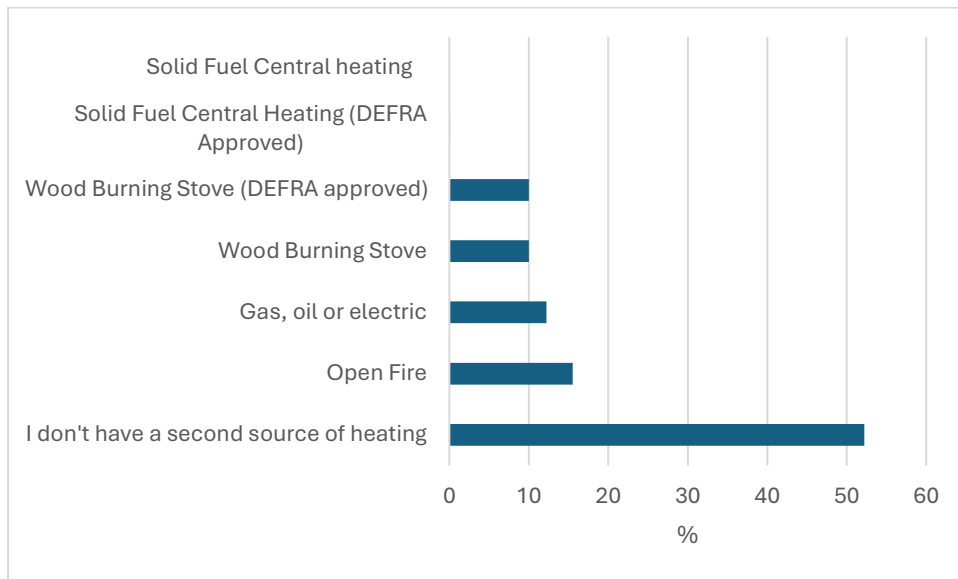
Q10: What is your main heating system? (772/772)



Note: About 5.7% of respondents (44 residents) responded that a solid fuel system that may not comply with the new SCA rules if the expansion goes ahead was their primary source of heating. Some of them likely live on boats and wouldn't be affected by the changes. However, most of them probably prefer using solid fuel for heating, even though other answers suggest they also have access to gas or electric heating.

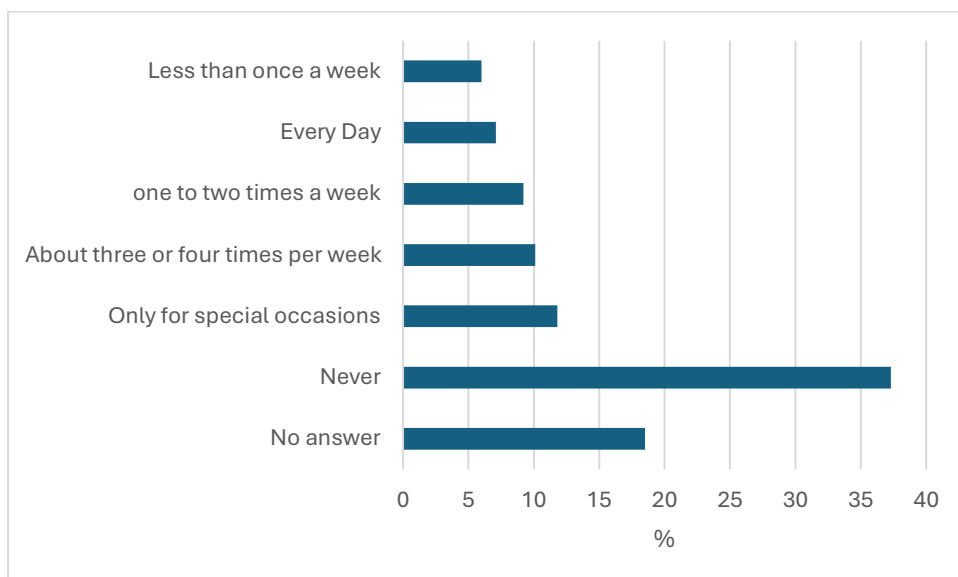
That said, there is a small risk that a few residents rely only on solid fuel for heating. These individuals could be negatively affected by the policy change.

Q11: Do you have a second source of heating? (772/772)



Note: 12.2% (94) stated gas, oil or electric suggesting it is a choice to use solid fuel as a main source, however it is unclear if this is financially driven or preference

Q12: If you burn solid fuel or wood in your household how often do you use it (during the colder months)? (optional) (629/772)



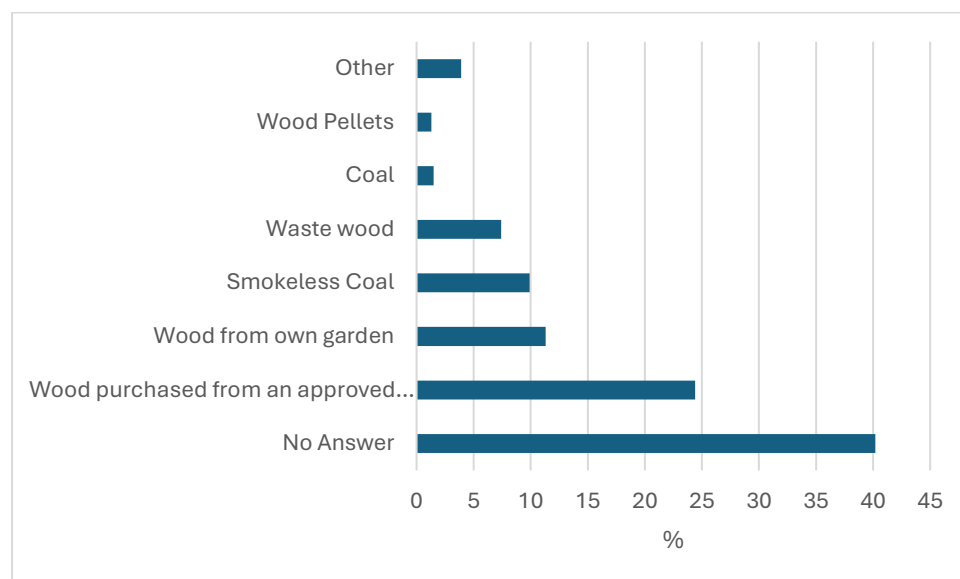
Q13: If you use a woodstove or open fire as a second source of heating, why do you use it? (optional) (345/772)

41% of respondents chose not to answer this question. Of those that did 19% cited heating only part of the house, 11% cheaper than central heating and comfort 19%. Of the 10% that provided further responses this is mixed with many respondents citing either not having a wood burning stove (we had intended for these residents not to answer this question) or having concerns about air pollution. Among those who do

use them, a significant number mention using them as a backup during power cuts or when central heating fails. Cost-effectiveness is a common theme, with many believing it is cheaper than central heating, especially during cold spells. Some respondents prefer heating only one room rather than the whole house, which they find more economical and efficient. The comforting atmosphere provided by a woodstove or open fire is also frequently mentioned. Additionally, several respondents highlight the use of sustainable or locally sourced wood as a carbon-neutral option.

Note: A few responses indicate that woodstoves are used for special occasions or cultural reasons but do not elaborate more widely on specific examples.

Q14: If you burn solid fuel or wood, what do you burn? (optional) (374/772)



3.9% or 39 respondents cited 'other' with many of the answers falling within the categories above but the respondent wanting to highlight personal situation. This included sourcing wood from garden, from local businesses, emphasis that they season it appropriately. Throughout all answers there are concerns raised about environmental impacts of using process 'smokeless fuel' versus natural wood. Again there was those that emphasised the health impacts and their choice not to use it for these reasons.

Overall, the responses reflect a diverse range of practices and sources for burning materials, with a strong emphasis on using seasoned and sustainably sourced wood.

Q15: If we were to expand the SCA, what changes would you have to make and/or problems might you encounter? (optional) (325/772)

Many respondents indicated that they would not need to make any changes if the Smoke Control Area (SCA) were expanded, as they already comply with existing regulations or do not use wood-burning stoves

However, a significant number expressed concerns about the financial burden of upgrading to DEFRA-approved stoves or purchasing approved fuels, which could increase their cost of living. Several respondents highlighted the potential impact on their ability to heat their homes affordably, with some fearing they would be left cold during winter

There were also concerns about the environmental implications of switching to smokeless coal and the potential increase in greenhouse gas emissions

Some respondents mentioned the cultural and personal value of wood-burning stoves and open fires, noting that they contribute to the atmosphere and enjoyment of their homes

Others expressed frustration with perceived inconsistencies in environmental policies, such as the continued use of vehicles and industrial pollution

There were calls for exemptions for certain uses, such as museums and heritage sites, and for better enforcement and education regarding approved fuels and stoves

Some respondents suggested that the expansion could lead to civil disobedience or resistance due to economic pressures

Overall, while there is support for cleaner air and compliance with regulations, many respondents are concerned about the financial and practical implications of expanding the SCA.

Q16: Do you have any other comments for us? (optional) (224/772)

Respondents expressed a mix of support and opposition to the expansion of the Smoke Control Area (SCA). A significant number of respondents highlighted health concerns, particularly respiratory issues exacerbated by smoke from wood-burning stoves and open fires. Many supported the initiative as a means to improve air quality and public health

Conversely, several respondents opposed the expansion, arguing that it infringes on personal freedoms and disproportionately affects lower-income individuals who rely on wood-burning for heating

Some questioned the evidence supporting the need for expansion, suggesting that vehicle emissions are a more significant source of pollution

There were calls for better enforcement of existing regulations and for providing support or exemptions for those who cannot afford to upgrade their heating systems

Concerns were also raised about the impact on boat-dwellers and the need for alternative heating solutions for them

Overall, while there is recognition of the potential health benefits of expanding the SCA, there is also significant concern about its implementation and impact on certain communities.

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Appendix D – Engagement with boat owners

1. Introduction

Additional engagement was conducted with residents living in permanent residential moored vessels (hereafter referred to as "boats") to assess potential issues related to their inclusion in proposed changes to the Smoke Control Area (SCA). The aim was to understand the potential impact these changes would have on boat residents. A survey was distributed via digital newsletter. The aim was to gain a general understanding of boaters' circumstances, including fuel use, financial status, and vulnerabilities. Survey results were indicative but inconclusive, necessitating follow-up interviews. A focus group was also planned but cancelled due to insufficient participation.

The interviews provided deeper insights into the challenges boaters face and their capacity to adapt to SCA regulations. Many participants expressed concern about smoke and its health impacts, with one stating: "If I was sitting next to a woman whose little child had asthma and had been hospitalised because of air pollution, no brainer isn't it." Several also described personal efforts to reduce emissions. Nonetheless, most felt the proposed rules would disproportionately affect their lives and wellbeing relative to the public health benefits. Based on the interviews and further research, we recommend against including boaters in the SCA.

There are 70 permanent mooring licenses within the Cambridge City Council. There were 31 responses to the survey sent out to the boaters, giving a response rate of 44%. Eight interviews were conducted. While the interview sample is not representative of all Cambridge boaters—due to reliance on email communication and voluntary participation—it offers valuable insights into potential issues and overlooked considerations.

2. Costs

Many boaters choose this lifestyle for financial reasons. With high rents and property prices in Cambridge, living on a boat offers an alternative to shared housing or social housing, especially for those with families or partners. One participant noted that boating allowed her family to afford activities like swimming, which would have been unaffordable with a mortgage or rent.

Boaters lack access to the gas and electric grids, relying solely on stoves for heating. While alternatives like gas or diesel were mentioned, they are often impractical and

more expensive, making solid fuels the most viable option. This could be smokeless fuel over wood, but there are financial reasons why boaters may prefer using (some) wood.

Survey responses and interviews indicate that many already use smokeless fuel as their primary heat source. For these individuals, inclusion in the SCA would not significantly raise costs. However, those using wood or a mix of fuels would face increased expenses. Prior estimates suggested a cost difference of under £80 annually between wood and smokeless coal, though interviews revealed that wood costs may be much lower than expected due to informal sourcing, like being given free dried wood from a friend's land.

Boaters with Defra-exempt stoves would not need to change fuels, but the prevalence of such stoves is unclear. While the Morsø Squirrel is a popular Defra-exempt stove for boats, it is unclear how many boaters have one. Replacing stoves could be partially subsidised—up to 70%—through potential Defra funding, but this is not certain, and the remaining cost may still pose a burden for low-income boaters.¹

3. Practical considerations

Fortunately, smokeless coal is already widely used among boaters, partly due to misconceptions that wood burning is already prohibited. Boaters also prefer coal for its long, consistent burn and ability to maintain warmth overnight and during short absences (e.g. going to work during the day). In contrast, wood burns quickly, requires frequent tending, and is less suitable for maintaining as much heat as coal in poorly insulated boats.

Boaters often leave the stove on all day and night in winter, due to the boat losing too much heat too quickly with no fire, and the effort and time it takes to restart it and heat the boat up again. Wood is less suitable for maintaining a fire like this for (over) 24 hours.

Additionally, wood requires more space to store and keep dry than coal. Still, boaters value the option to burn wood, especially because it provides heat faster than coal. Wood also helps reduce dampness, a common issue on boats. Moreover, through autumn and spring the heat coal produces becomes excessive, in temperature and length of time. This can also be problematic for those with health conditions like asthma, who need

¹ Defra 2024 *Smoke Control Areas Waterways Air Quality Grant Scheme: Guidance for Local Authorities* (LA letter)

a cooler environment. Coal ash may also exacerbate asthma symptoms due to its toxic heavy metal content.² Overall, only having access to smokeless coal inhibits the ability to regulate temperature to individual preferences and current circumstances.

Concerns were raised about Defra-exempt stoves, particularly regarding flue height and single-door designs. While guidelines recommend a 4.5-meter flue, to prevent back draught, this is impractical on boats, where 3 meters is generally considered sufficient.³ Single-door stoves increase the risk of smoke and ash entering the cabin during ash removal, especially with shorter flues. Finding a suitable stove that meets all requirements and fits on a narrowboat may be challenging.

Alternative heating methods—diesel, LPG, solar—were generally deemed impractical or insufficient. Storing enough gas on a boat for heating is unsafe, diesel heats the boat insufficiently while also still creating air pollution, and solar panels do not produce enough power for heating. None of these options address dampness of the boat well enough either. The only widely supported alternative was connection to the electric grid, which, while not solving dampness, was seen as a desirable long-term solution.

4. Enforcement

Boaters expressed concern about enforcement, even when using smokeless coal. To maintain heat for longer, fires are often set to slumber, which increases smoke and moisture. This practice is not recommended, but boaters argue that avoiding it can lead to discomfort by being too warm, fire risks, or stove damage.

Even properly used smokeless coal produces smoke during ignition. Boaters noted that this phase can last from 10 minutes to an hour, depending on conditions. Given the low height of boat chimneys and their proximity to footpaths, smoke is more noticeable and more likely to be reported than from houses.

5. Targeting

Some boaters feel marginalized and distrusted by both the council and residents. One participant remarked: “I think the boats are seen as kind of an unnecessary evil.” There is concern that SCA rules could be used to unfairly target boaters due to prejudice.

This perception is compounded by a sense of injustice. Boaters often strive to

² Physicians for Social Responsibility (2010) *Coals Ash Toxics: Damaging to Human Health*. [Coal Ash Toxics: Damaging to Human Health | Physicians for Social Responsibility](#)

³ BFCMA. *Chimney & Flue Design*. [Chimney & Flue Design - Wood & Solid Fuel - BFCMA \(British Flue and Chimney Manufacturer's Association\)](#) (last accessed on 02-06-2025)

minimise emissions and live sustainably of their own initiative. Being scrutinised for the one thing they cannot easily change feels disproportionate and unjust. Being asked to change their burning practices, while they believe there are other boaters causing more pollution through burning inappropriate materials who are not currently enforced against, also creates a sense of unfairness.

6. Conclusion

Life on a boat presents unique challenges. Heating is difficult due to poor insulation, and other aspects—access to water, waste disposal, lack of postal addresses, maintenance, and raising families in small spaces—add complexity. One participant noted: “People on boats don’t shower every day; that’s a house thing”, showing the loss of certain luxuries that come with living on a boat.

Boaters also face systemic issues, such as inaccessible moorings and facilities (one person called access to the Jesus Green tap “purely dangerous”), broken infrastructure like the pump-out, and uncertainty around the permanency of their moorings. These unresolved problems contribute to a sense of being unfairly targeted by the SCA.

While some boaters manage well, others are more vulnerable—financially, physically, or due to caregiving responsibilities. The proposed rules could have negative effects on people’s health and wellbeing, either by directly influencing their physical condition, or by making it more difficult to keep warm. It could also worsen boaters’ financial situation through increased fuel costs, unaffordable stove replacements, or fines.

Given the financial, practical, and social implications, we recommend against including permanent residential moored vessels in the SCA. The risks of exacerbating hardship and damaging community relations outweigh the potential benefits.

Cambridge City Council Equality Impact Assessment (EqIA)

This tool helps the Council ensure that we fulfil legal obligations of the [Public Sector Equality Duty](#) to have due regard to the need to –

- (a) eliminate discrimination, harassment, victimisation and any other conduct that is prohibited by or under the Equality Act 2010;
- (b) advance equality of opportunity between persons who share a relevant protected characteristic and persons who do not share it;
- (c) foster good relations between persons who share a relevant protected characteristic and persons who do not share it.

Guidance on how to complete this tool can be found on the Cambridge City Council intranet. For specific questions on the tool email Helen Crowther Equality and Anti-Poverty Officer at equalities@cambridge.gov.uk or phone 01223 457046.

Once you have drafted the EqIA please send this to equalities@cambridge.gov.uk for checking.

1. Title of strategy, policy, plan, project, contract or major change to your service
Expansion of the Smoke Control Area to cover the whole city (excluding permanent residential moored vessels)

2. Webpage link to full details of the strategy, policy, plan, project, contract or major change to your service (if available)
: Agenda for Cabinet on Tuesday, 24th June, 2025, 5.00 pm - Cambridge Council

3. What is the objective or purpose of your strategy, policy, plan, project, contract or major change to your service?
Cambridge City Council has a responsibility under LAQM to monitor air quality in its district and identify actions to deliver continued air quality improvements, including how we can help meet national targets for PM _{2.5} . Solid Fuel Burning is the largest single source of PM _{2.5} accounting for 40% of all PM _{2.5} emissions in Cambridge. Domestic Burning is the largest source in the city and continues to increase due to the growing trend for wood burning stoves. Review of existing SCA's as a mechanism for reducing PM _{2.5} emissions is an action for Local authorities within the National Air Quality Strategy.

Legislation to control emissions from solid fuel burning is the Clean Air Act 1993 and the use of Smoke Control areas (SCA); a designated area where the emission of smoke is not permitted. You can burn inside a SCA, but either smokeless fuel or a DEFRA approved appliance must be used. In Cambridge we currently have three SCA's which were introduced in the 1960's and 1970's. The existing SCA's provide limited control on emissions from solid fuel burning due to the limited geographical area.

The expansion of the SCA will enable emissions from solid fuel burning to be managed under a single piece of legislation. All new stoves installed will be DEFRA exempt, and sale of fuels within the city will need to meet SCA requirements helping drive a reduction in emissions. The same rules will apply to all residents and businesses and with tailored education and awareness raising about 'better burning' will help embed attitudes to burning and lead to further reductions in emissions. Where smoke complaints are received they can be managed under a single piece of legislation providing clarity to all residents and businesses. Any response to complaints be reasonable and proportionate focussing again on education as opposed to enforcement. will A reduction in PM_{2.5} emissions will lead to improvements in health for all residents and visitors to the city.

4. Responsible Team and Group

Environmental Health, Communities Group

5. Who will be affected by this strategy, policy, plan, project, contract or major change to your service?
(Please tick all that apply)

- ☒ Residents
- ☒ Visitors
- ☒ Staff

The expansion of the SCA would predominantly affect Cambridge City residents and businesses who may be required to adapt how they burn solid fuel within their home or business. However, any improvements in air quality following changes will offer health benefits to residents, visitors and staff.

6. What type of strategy, policy, plan, project, contract or major change to your service is this?

- ☐ New
- ☒ Major change
- ☐ Minor change

7. Are other departments or partners involved in delivering this strategy, policy, plan, project, contract or major change to your service? (Please tick)

☐ Yes
☒ No

Environmental Health will be responsible for implementing the changes, however we will continue to work closely with the comms team to disseminate information about these changes and raise awareness.

8. Has the report on your strategy, policy, plan, project, contract or major change to your service gone to Committee? If so, which one?

Permission to proceed with a public consultation on proposals to expand the SCA with scope to include permanent residential moored vessels was agreed at the Environment & Community Scrutiny Committee on 26th September 2024. The consultation ran for 12 weeks between 26th January and 20th April 2025. Following analysis of responses, wider engagement with the boating community alongside wider research, the request to expand the SCA to cover the whole city, but exclude permanent residential moored vessels will be put forward at the June Cabinet.

9. What research methods/ evidence have you used in order to identify equality impacts of your strategy, policy, plan, project, contract or major change to your service?

Public Consultation

772 responses were received online via the Citizen Lab portal with an additional 4 submitted in hard copy totalling 776 responses. The consultation was widely promoted across various platforms to maximise visibility, which is represented in the good response rate received. The consultation focussed not only on views about the proposal to expand the SCA (with the option to include permanent residential moored vessels) but also wider questions on what heating is used, access to alternatives and motivations for burning solid fuel. The findings of the consultation support the findings in the Smoke Control Impact Study that with the exception of boat owners most residents and businesses are not solely dependent on solid fuel burning, but that it is a choice. Approximately 55% of respondents support the expansions, 40% of respondents disagree and 5% neither agree or disagree.

Boat Owners Engagement

In parallel to the wider consultation, boat owners were also encouraged to respond to a separate questionnaire and follow up interviews were carried out to try and gain a better understanding on the impact any changes in the SCA would have on this community. There are 70 licenses issued for permanent residential moored vessels. Just under a 50% response rate was received (32/70), although following subsequent work it is believed some of the boats are vacant so this response rate could be higher. The findings from the survey

supported the Smoke Control Impact Study confirming that this group has above average protected characteristics, most notably older age groups, disability and low income.

Smoke Control Impact Study 2024

Cambridge City Council commissioned an independent report 'Smoke Control Area Impact Study 2024' produced by Logika Group and dated 28th August 2024 to assess the effects of amending the SCA in Cambridge to cover the whole of the city. It considered both the inclusion and exclusion of permanent moored vessels in terms of changes in pollution emissions, health & socio economic impacts.

Residential emissions are the largest single source of PM_{2.5} emissions in Cambridge with the majority of properties currently outside the SCA. Moored vessels represent a much smaller contribution to overall emissions, and current assumptions are that most are already burning MSF which is compliant under SCA rules, meaning they would not need to change their behaviour.

The report concluded that any changes to widen the scope of the SCA would provide a net benefit to society from health improvements due to reduced air pollution and greenhouse gas emissions, with these benefits outweighing the combined costs. Costs include: cost to home and vessel owners of switching fuel or upgrading stove and cost to council for implementation vessels owners given the increased potential vulnerability of this group. Should changes to the SCA be implemented it should be accompanied by a robust awareness raising campaign and enforcement.

The impact on individuals was considered as part of the socio economic study. Very few residents are solely dependent on solid fuel for heating and hot water, with changes impacting those that use wood burning stoves for pleasure or to subsidise other forms of central heating. However, this is not the case for moored vessel owners who are more dependent on solid fuel. Evidence suggests that this group may have lower incomes and be more vulnerable. Where moored vessel owners are not compliant with SCA rules further support may be required.

The report recommends the expansion of the SCA to cover the whole city including moored vessels however, recommends further engagement with.

Other Evidence

- [Public Health Outcomes Framework - Data - OHID \(phe.org.uk\)](https://phe.org.uk)
- [Committee on the Medical Effects of Air Pollutants \(COMEAP\): 2022 Annual Report \(publishing.service.gov.uk\)](https://publishing.service.gov.uk)
- 'State of the city Report' (www.cambridge.gov.uk/state-of-the-city)
- Census 2021 and Joint Strategic Needs Assessment data - [Cambridgeshire & Peterborough Insight – Welcome to Cambridgeshire & Peterborough Insight \(cambridgeshireinsight.org.uk\)](https://cambridgeshireinsight.org.uk).
- [The Health Of People From Ethnic Minority Groups In England | The King's Fund \(kingsfund.org.uk\)](https://kingsfund.org.uk)

- UK Poverty 2024: The essential guide to understanding poverty in the UK | Joseph Rowntree Foundation (jrf.org.uk)

10. Potential impacts

For each category below, please explain if the strategy, policy, plan, project, contract or major change to your service could have a positive/ negative impact or no impact. Where an impact has been identified, please explain what it is. Consider impacts on service users, visitors and staff members separately.

(a) Age - Please also consider any safeguarding issues for children and adults at risk

13.5% of Cambridge City population is under 15 years old with 11.4% of the population over 65 years old (Census 2021).

There is clear evidence that PM_{2.5} (particulate matter smaller 2.5 micrometres) has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases, with even low concentrations of pollutants likely to be associated with adverse effects on health. All ages are impacted by poor air quality, but the young and the old are the most vulnerable. Older adults are also more sensitive to air pollution leading to the need for increased care, including hospitalisation.

These proposals will help drive improved air quality, most notably a reduction in PM_{2.5} emissions having a positive impact on children aged under 15 years old and adults aged 50 or over which represents approximately 38.7% of Cambridges population.

The impact study report confirmed that limited residents are dependent on solid fuel as a primary source of heating and hot water, with changes unlikely to impact young and old disproportionately. These findings were supported by the wider consultation. Responses to the wider consultation included a wide cross section of ages with those over 65 being the most well represented group and under 24 least represented of those that chose to confirm age. (approximately 50% of respondents).

The wider engagement work with the boating community further supported the findings of the Smoke Control Impact Study and wider consultation confirming that permanent moored vessel residents are more likely to be dependent on solid fuel and likely to be more vulnerable (more likely to be older, have a disability or long term health condition) with the main age group of those living on boats to be between 50 and 69. No one younger than the 30-49 age group responded to the survey although one parent of young children took part in one of the follow up interviews.

Based on the supporting evidence we have opted to exclude permanent residential moored vessels from the recommendation to expand the smoke control area. Continued engagement is recommended to identify practical ways to help move residents away from solid fuel burning as it is also recognised that there is a disproportionate negative impact on health due to poor air quality, from solid fuel burning in confined spaces.

Should the expansion proceed there will be an education and promotional campaign about the changes and implications for residents. The follow up to complaints will be reasonable and proportionate and centre around education and awareness raising. A potential barrier exists in the older population for accessing information and services through online platforms and social media. Research shows that older adult can be digitally excluded ([Internet users, UK - Office for National Statistics \(ons.gov.uk\)](https://ons.gov.uk/peopleandpopulation/demographicsanddiversity/olderpeople/articles/internetusersuk)). We will need to ensure that older adults are targeted as part of the promotion campaign. Regular articles in Cambridge Matters, and targeted visits and communications including older peoples networks and community groups will help reach this core group..

Positive Impact: Health benefits because of the resultant improvements in air quality and reduction in exposure to pollution

Potential Negative Impact: Research suggests that older adults are more likely to be digitally excluded. When promoting the changes we will need to consider this group and ensure they are targeted so they understand the implications of the proposed changes.

(b) Disability

In the 2021 census a total of 6.2% of Cambridge City residents are living with a disability that limits day to day activities a lot and 10.5% are living with a disability that limit their day to day activities a little.

All members of this group would benefit from the health benefits offered from improved air quality. Although it is the case that improved air quality can prevent exacerbation of certain existing conditions for example those who have existing heart and lung conditions are more sensitive to air pollution leading to the need for additional medical care including hospitalisation. This group would disproportionately benefit from the amendments to the SCA were it to go ahead.

On the other hand, the Canal and River Trust 2022 Census¹² found that 33.7% of boaters report that their day-to-day activities are limited because of a long-term health problem or disability, which is significantly higher than the national average (17.8%). Moreover, disabled people are more likely to experience poverty ([UK Poverty 2024: The essential guide to understanding poverty in the UK | Joseph Rowntree Foundation \(jrf.org.uk\)](https://jrf.org.uk/uk-poverty-2024/)) and have higher living costs relating to their disability ([Disability Price Tag 2023: the extra cost of disability | Disability charity Scope UK](https://disabilitycharity.org.uk/disability-price-tag-2023/)). Wider engagement with the boating community found that 43.33% of respondents stated that they had a condition that impacts their ability to carry out day-to-day activities at least a little. There is the potential that changing the SCA requirements to include the boating community may have a disproportionately negative impact. Insufficient respondents chose to complete this question on the wider consultation to draw any conclusions.

Should the expansion proceed there will be an education and promotional campaign about the changes and implications for residents. A potential barrier exists for those with a disability accessing information and services through online platforms and social media. Research shows that people with a disability can be digitally excluded ([Exploring the UK's digital divide - Office for National Statistics \(ons.gov.uk\)](https://ons.gov.uk/peopleandpopulation/demographicsanddiversity/peoplewithdisabilities/articles/exploringtheuksdigitaldivide)). We need to ensure that members of the community with a disability are targeted as part of this campaign. Regular articles in Cambridge Matters, and targeted visits and communications to community groups and

centres will help reach this core group. Information in alternative formats can be provided on request.

Positive Impact: Health benefits because of the resultant improvements in air quality and reduction in exposure to pollution

Potential Negative Impact: Research suggests that people with a disability are more likely to be digitally excluded. When promoting the changes we will need to consider this group and ensure they are targeted so they understand the implications of the proposed changes.

(c) Gender reassignment

No negative impact has been identified specific to people with this protected characteristic should the expansion go ahead although all members of this group would benefit from the health benefits offered from improved air quality.

No Impact predicted

(d) Marriage and civil partnership

No negative impact has been identified specific to people with this protected characteristic should the expansion go ahead although all members of this group would benefit from the health benefits offered from improved air quality.

No Impact predicted

(e) Pregnancy and maternity

There were 1,293 live births to people in Cambridge City in 2021 (JSNA 2023). Exposure to air pollution is linked to premature birth, still birth and organ damage during development. The proposal will improve air quality across the city with positive impacts in terms of pregnancy and maternity.

No negative impact was identified. All people with this protected characteristic would benefit from the health benefits offered from improved air quality

Positive Impact: Health benefits because of the resultant improvements in air quality and reduction in exposure to pollution

(f) Race – Note that the protected characteristic ‘race’ refers to a group of people defined by their race, colour, and nationality (including citizenship) ethnic or national origins.

Approximately half (53%) of the respondents to the 2021 census in Cambridge City described themselves as White British. The remainder is made up of black and ethnic groups with the largest group Other white (21.5%) followed by Asian, Asian British or Asian Welsh (14.8%).

City wide improvements to air quality will benefit all people living in the city, including a high proportion of the population from ethnic minority backgrounds. This could be important as UK-wide research shows that there are health inequalities between ethnic minority and white groups, and between different ethnic minority groups – and air pollution can exacerbate some existing health conditions.

It is worth noting that of the 67% of respondents who opted to answer the question on ethnic group, 80% classed themselves as white British therefore other groups remain under represented despite wide promotion across a wide range of platforms.

We need to ensure that members of the community for whom English is not their first language can access the information and understand what the changes may mean for them. This will be achieved through targeted communications with key networks and community centres. Information in alternative languages can be provided on request.

Positive Impact: If the expansion to the SCA were to go ahead health benefits because of the resultant improvements in air quality and reduction in exposure to pollution

Potential Negative Impact: Challenge of reaching and effectively communicating the proposed changes to all members of the community whatever their ethnic origins.

(g) Religion or belief

No negative impact has been identified specific to people with this protected characteristic although all members of this group would benefit from the health benefits offered from improved air quality.

No Impact Predicted

(h) Sex

No negative impact has been identified specific to people with this protected characteristic although all members of this group would benefit from the health benefits offered from improved air quality.

No Impact Predicted

(i) Sexual orientation

No negative impact has been identified specific to people with this protected characteristic although all members of this group would benefit from the health benefits offered from improved air quality.

No Impact Predicted

(j) Other factors that may lead to inequality – in particular, please consider the impact of any changes on:

- **Low-income groups or those experiencing the impacts of poverty.**
- **People of any age with care experience – this refers to individuals who spent part of their childhood in the care system due to situations beyond their control, primarily arising from abuse and neglect within their families. The term “Care experience” is a description of a definition in law, it includes anyone that had the state as its corporate parent by virtue of a care order in accordance with the Children Act 1989 and amendments.**
- **Groups who have more than one protected characteristic that taken together create overlapping and interdependent systems of discrimination or disadvantage. (Here you are being asked to consider intersectionality, and for more information see: https://media.ed.ac.uk/media/1_159kt25q).**

Low Income Groups – One of the key aims of the SCA Impact Study was to identify whether residents in Cambridge are solely dependent on solid fuel for the provision of heating and hotwater and whether any changes to the SCA would have a disproportionate impact on those with lower income. The report found that this is not the case with solid fuel stoves used predominantly for pleasure or as a secondary source of heating, with the exception of permanently moored vessel residents. These findings were further supported by the wider consultation and engagement with the boating community. Based on these findings we have decided not to recommend the inclusion of moored vessels into the remit of the SCA.

People of any age with care experience - No impact identified for people with Care Experience

Groups who have more than one protected characteristic - Where one of the protected characteristics is age or disability then positive and negative impacts as identified above will apply however, it is not envisaged that there will be a cumulative impact for those with more

than one protected characteristic. If people have some long-term health conditions as well as well as being children, older age, or pregnant then impacts of poor air quality can be exacerbated as increased vulnerabilities.

11. Action plan – New equality impacts will be identified in different stages throughout the planning and implementation stages of changes to your strategy, policy, plan, project, contract or major change to your service. How will you monitor these going forward? Also, how will you ensure that any potential negative impacts of the changes will be mitigated? (Please include dates where possible for when you will update this EqlA accordingly.)

Should cabinet choose to proceed with the recommendation to expand the SCA the procedure of revoking the existing SCA's and then declaring a new city wide SCA is likely to take up to 12 months. For the 12 months leading up to the declaration of the new SCA we will do a targeted promotional campaign to raise awareness about the changes in policy, implications to residents who burn solid fuel but also the benefits of 'better burning' for both health and the environment. Alongside the normal mechanisms for dissemination Promotion and awareness raising will be targeted at key groups across the community including those with protected characteristics as identified above.

12. Do you have any additional comments?

[Click here to enter text.](#)

13. Sign off

Name and job title of lead officer for this equality impact assessment: Elizabeth Bruce, Principal Technical Officer

Names and job titles of other assessment team members and people consulted: Helen Crowther, Equality & Anti Poverty Officer; Yvonne O'Donnell, Environmental Health Manager; Jo Dicks, EQG Team Manager, Sam Scharf, Communities Director

Date of EqlA sign off: 11th June 2025

Date of next review of the equalities impact assessment: June 2026

Date to be published on Cambridge City Council website: 16th June 2025

All EqlAs need to be sent to the Equality and Anti-Poverty Officer at equalities@cambridge.gov.uk



REPORT TITLE: Procurement of Contractor(s) to deliver energy efficiency and associated works to Council homes

To:

Cabinet

Date 24/06/25

Report by:

Lynne Miles, Director of Economy and Place

Tel: 01223 457358

Email: lynne.miles@cambridge.gov.uk

Wards affected:

AL

Director Approval: Director Lynne Miles confirms that the report author has sought the advice of all appropriate colleagues and given due regard to that advice; that the equalities impacts and other implications of the recommended decisions have been assessed and accurately presented in the report; and that they are content for the report to be put to Cabinet for decision.

1. Recommendations

1.1 It is recommended that Cabinet:

Approve the issue of tenders and, following the evaluation of tenders, authorise the Director of Economy and Place to award a contract(s) to a contractor(s) to deliver energy efficiency (retrofit) and associated maintenance works to Council Housing for three years from 2026-29, with an option to extend for one or more periods up to a maximum of two years.

2. Purpose and reason for the report

2.1 This report seeks approval for the procurement and the award of a new contract(s) to support the continued delivery of the Council's housing energy efficiency (retrofit) programme, which contributes to achieving the objectives set out in the Council's *Climate Change Strategy 2021–*

2026. The strategy outlines a vision for Cambridge to become a net zero carbon city by 2030, subject to the necessary enabling actions from central government, regulators, and industry.

The Council's Housing Asset Management Strategy includes a commitment to improve the energy efficiency of its existing housing stock, in turn reducing carbon emissions. A key target is to upgrade all Council homes currently rated EPC 'D' or below to a minimum of EPC 'C'. To support this, a capital budget allocation of £3.8 million per annum has been made within the Housing Capital Plan through to 2035. This has been supplemented by government grant funding secured since 2023 onwards. The programme is also aligned with the national target for all social housing to achieve at least EPC 'C' by 2035.

Under the current External Wall Insulation (EWI) contract, which commenced in December 2023, approx. 225 council homes have been retrofitted from EPC 'D' and below to EPC 'C'. Measures delivered include external wall insulation, enhanced ventilation, replacement of external doors and windows where required, top-up loft insulation and associated maintenance and repairs. This phase was supported by £2.26 million from the Social Housing Decarbonisation Fund (Wave 2.1).

Following a successful bid to the Wave 3 round of the Government's Warm Homes: Social Housing Fund, the Council has been awarded £3.8 million to upgrade a further 370 Council homes between 2025/26 and 2027/28. This will include a similar suite of energy efficiency measures, together with replacement of gas boilers with air source heat pumps in 37 homes. The current EWI contract is due to expire in March 2026, however the above demonstrates that there is an ongoing demand for the works and services. This report proposes the procurement and award of a new contract(s) to ensure continuity in the delivery of the energy efficiency programme once the current contract expires.

3. Alternative options considered

- 3.1 **1 - Open tendering on a project-by-project basis** – This approach would involve undertaking a separate open tender exercise each time a new grant funding award is received. This was discounted due to the procurement challenges associated with high levels of market demand, as each time central government releases a new wave of grant funding for social

housing retrofit, there is a surge in activity across the sector. This creates a highly competitive environment and limits contractor availability, leading to delivery risks that could undermine the Council's retrofit delivery strategy. While we are still proposing an open tender, it would not be each time there is a grant funding award.

2 - The use of framework suppliers – The retrofit frameworks currently available often operate with a restricted pool of pre-approved contractors, which reduces market competition and limits opportunities for local and small and medium-sized enterprises (SMEs) to participate. In addition, frameworks are generally designed to serve a broad range of client needs, resulting in less flexibility to accommodate the Council's bespoke project requirements. The frameworks are not configured to support works to leasehold properties, which is a necessary component of the Council's retrofit programme.

3 - The use of the Council's own retrofit framework – The Council used its own Retrofit Framework to procure the current External Wall Insulation (EWI) contract. However, the framework has been set up in such a way that it targets support to the private domestic retrofit market and has limitations for Council housing delivery - particularly in relation to leasehold properties and the types of building contracts required for the delivery of larger-scale works. As such, it is not considered viable for this next major phase of energy efficiency works. A joint scoping exercise will be undertaken to explore how a future iteration of the Council's retrofit framework can better support cross tenure delivery.

4. Background and key issues

- 4.1 Cambridge City Council is making significant progress in improving the energy performance of its housing and non-domestic building stock through a well-established and expanding retrofit programme. This work contributes directly to the city's climate and public health goals. Alongside the long-term programme to retrofit Council homes, the Council has helped to establish and lead the Cambridgeshire Energy Retrofit Partnership (CERP), which has attracted over £25 million in funding for energy efficiency upgrades to private homes. A £5 million net zero retrofit pilot to 50 homes is currently underway to inform future best practice in achieving net zero homes.

The Council has also launched new research and guidance for industry and residents and formed a new “Energy and Retrofit” team to coordinate delivery across tenures and building types. The Retrofit Framework is in place to streamline procurement and delivery in particular to private homes. The Council has also delivered decarbonisation upgrades to key community facilities, with wider plans under development. In parallel, it is investing in building the local retrofit supply chain and skills base. This should help provide long-term value to residents, the local economy, and the city’s climate and public health objectives.

Following a tendering exercise using the Council’s Retrofit Framework, in December 2023 Aran Insulation Limited were awarded and are delivering the latest contract for energy efficiency works to Council homes. By the end of the contract in March 2026 it is anticipated that approximately 435 Council homes will have been retrofitted to an EPC ‘C’. There is still an on-going demand, together with government funding, for the services covered by this contract, so it is proposed that a new procurement exercise is carried out to establish a replacement contract(s).

It is expected that one replacement contract will be awarded, but the procurement will be carried out in a way that will allow flexibility to award more than one contract if this is advantageous to the Council.

A formal leaseholder consultation process will take place to ensure the Council complies with all legal requirements and will be able to recover the cost of works from leaseholders where applicable.

The estimated value of the future contract is around £5.0m per annum – making a total estimated contract value of £15m between 2026 and 2029 or up to £25m, if the full two-year extension period was used.

The planned package of energy efficiency and associated maintenance measures that are to be carried out may include:

- External and internal insulation works, including to walls, floors, lofts and roofs and below damp-proof course (DPC)
- Cavity wall insulation, including removal and replacement of failed insulation

- Installation of renewable energy installations
- Installation of low carbon heating systems
- Replacement doors, windows, canopies and window trickle vents
- Installation of new or replacement mechanical ventilation and door undercuts
- Rainwater goods fascias, soffits and chimney works
- Internal and external finishes related to insulation works
- Alterations and adaptations to servicing infrastructure, including meter boxes, cabling, pipework, flues and airbricks
- Temporary removal, relocation and reinstatement of satellite dishes and other external wall fixtures
- Roof repairs, roofline alterations, or re-roofing, including bay window roof insulation
- Structural works, internally or externally as required
- Alterations to soft and hard landscaping, including resurfacing as necessary
- Alterations to fencing as necessary
- Asbestos removal
- Any other associated repairs, adaptations and enabling works required to install the above measures

It is proposed that the contract(s) is set up so that services will be available for all Council-owned built assets. If other services are added in the future then the value of the contract may increase.

5. Corporate plan

- 5.1 The decision links to the reduction of energy consumption and carbon emissions from homes in Cambridge as set out in the Council's Corporate Plan.

6. Consultation, engagement and communication

- 6.1 A number of internal Council teams have been notified and consulted on this proposal, contributing to this report. This includes the Procurement team, Legal team, Climate Change team, Equality and Anti-Poverty officer, Asset Management team and Home Ownership team.

Tenants will be informed about the procurement and new contract via the “Open Door” tenants newsletter.

A formal leaseholder consultation process will take place to ensure the Council complies with all legal requirements and will be able to recover cost of works from leaseholders where necessary.

All residents affected by this proposed project will be informed about the proposed work, the potential energy, carbon, and financial savings, together with the health and wellbeing benefits of the work. Detailed consultation will be carried out before work starts including:

- An on-site resident consultation event to give information about the proposed work and collect feedback and comments
- Personal visits to each resident to explain the work and identify any special requirements
- Information and support in the use of energy efficiency measures following installation.

7. Anticipated outcomes, benefits or impact

7.1 The new contract will:

- Ensure the continuation of the Council’s long-term energy efficiency programme, which targets achieving EPC C ratings across its housing stock, following the expiry of the current contract in March 2026.
- Support the Council in meeting the delivery targets associated with external grant funding.
- Facilitate compliance with the Section 20 consultation process, thereby enabling retrofit and associated maintenance works to be undertaken on Council-owned blocks that include leasehold properties, which have not been possible on previous energy efficiency contracts.
- Enhance the delivery model by adopting a more appropriate form of contract that better aligns with the scope and requirements of the retrofit programme.

- Streamline procurement processes by reducing the need for multiple procurements and contract awards, thereby conserving resources across various internal teams.
- Maximise social value impacts, in line with the Council S1750 policy, by offering longer term opportunities for potential suppliers to support wider community wealth building outcomes.

8. Implications

8.1 Relevant risks

None known

Financial Implications

8.2 The budget for most of the work that will be carried out under this contract is included in the HRA Capital Investment plan, together with additional government grant funding.

Works to non-HRA (Housing Revenue Account) property types will be covered by existing budgets or will be subject to bids for resources.

It is possible that new tender prices will be different to existing prices and effect the delivery plan.

The evaluation of tenders will be based on a combination of quality and price with the emphasis on quality of service and work. Social value will play a significant part of the quality evaluation.

An external cost consultant will be appointed to assist with the financial evaluation of tenders to help ensure value for money for the Council.

Legal Implications

8.3 Any procurement for the award of a new contract should follow the requirements of the Procurement Act and Regulations and the Council's Contract Procedure Rules.

Equalities and socio-economic Implications

- 8.4 An Equality Impact Assessment has been completed alongside this report. The EqlA identifies the groups at most risk of fuel poverty and the adverse affects of cold and damp homes, which include babies, children and the elderly, disabled persons and those with chronic illnesses, those in pregnancy and maternity, ethnic groups, and single parent households.

The proposed contract is expected to have a positive impact across these groups, by improving thermal comfort and indoor air quality, reducing bills from what they otherwise would have been, and reducing exposure to cold, damp, and mould-prone environments.

Climate Change and Environmental implications

- 8.5 The project has a “medium positive” climate change rating.

‘Net Zero’ and ‘Climate Change’ implications:

- Reduction in greenhouse gas (GHG) emissions through decreased energy consumption in council homes as a result of improved energy efficiency measures.
- Further reduction in GHG emissions from the installation of low-carbon heating systems replacing gas boilers in up to 40 properties.
- Enhanced community resilience through improved energy security and reduced reliance on fossil fuels.
- Improved thermal comfort and climate resilience of homes, with insulation upgrades mitigating overheating in summer and cold ingress in winter.

‘Environmental implications’

- Biodiversity enhancement through the inclusion of swift boxes as part of the contract specifications.
- Minimising or eliminating the use of fossil fuel based insulation products.
- Waste reduction measures, including recycling targets for window replacements and insulation offcuts to minimise construction waste.
- Mitigation of environmental disturbance via the implementation of a noise, disturbance,

and traffic management plan for both construction sites and associated compound facilities.

Procurement Implications

- 8.6 The work will be procured via the Council's procurement portal. Routes to market are being considered and there will be a period of market engagement as part of the tender process. Routes to market could be informed by market forces and will be agreed with the procurement team and compliant with the current regulations. Initial Market engagement is programmed for July 2025 (subject to approval).

It is currently intended that there will be one contract, however flexibility will be built into the procurement process to allow more than one contract to be awarded.

The Strategic Procurement team will be involved in the project and legal requirements will be provided by the best available option.

Community Safety Implications

- 8.7 There are no procurement-specific community safety implications. This is a contract to ensure existing buildings and services are upgraded and maintained in good condition.

9. Background documents

Used to prepare this report, in accordance with the Local Government (Access to Information) Act 1985

- 9.1 n/a

10. Appendices

- 10.1 n/a

To inspect the background papers or if you have a query on the report please contact Negin Ghorbani, Retroft Manager, tel: 01223 457294, email: negin.ghorbani@cambridge.gov.uk

Cambridge City Council Equality Impact Assessment (EqIA)

This tool helps the Council ensure that we fulfil legal obligations of the [Public Sector Equality Duty](#) to have due regard to the need to –

- (a) eliminate discrimination, harassment, victimisation and any other conduct that is prohibited by or under the Equality Act 2010;
- (b) advance equality of opportunity between persons who share a relevant protected characteristic and persons who do not share it;
- (c) foster good relations between persons who share a relevant protected characteristic and persons who do not share it.

Guidance on how to complete this tool can be found on the Cambridge City Council intranet. For specific questions on the tool email Helen Crowther Equality and Anti-Poverty Officer at equalities@cambridge.gov.uk or phone 01223 457046.

Once you have drafted the EqIA please send this to equalities@cambridge.gov.uk for checking.

1. Title of strategy, policy, plan, project, contract or major change to your service
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Procurement and award of a contract for energy efficiency works to Council homes

2. Webpage link to full details of the strategy, policy, plan, project, contract or major change to your service (if available)
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n/a

3. What is the objective or purpose of your strategy, policy, plan, project, contract or major change to your service?

The Council is procuring a contract to deliver a rolling programme of energy efficiency upgrades to its housing stock, with the objective of improving all council homes rated (Energy Performance Certificate) EPC Band D or below to at least Band C. This will be achieved through measures including:

- | |
|---|
| <ul style="list-style-type: none">• Insulation of walls and lofts• Replacement windows and doors (where required)• A small proportion of low carbon heating installations• Improved mechanical ventilation |
|---|

The programme is funded through a dedicated annual Housing Revenue Account (HRA) allocation of £3.8 million, with additional grant support from the Government's *Warm Homes: Social Housing Fund (Wave 3)*.

The anticipated outcomes are to:

- Improve residents' thermal comfort
- Reduce energy costs and alleviate fuel poverty
- Lower carbon emissions from the housing stock
- Improve building condition and mitigate risks of damp and mould
- Support better health and wellbeing outcomes

4. Responsible Team and Group

Energy and Retrofit Team, in Economy and Place Group

5. Who will be affected by this strategy, policy, plan, project, contract or major change to your service?

(Please tick all that apply)

- ☒ Residents
☐ Visitors
☐ Staff

Please state any specific client group or groups (e.g. City Council tenants, tourists, people who work in the city but do not live here):

Cambridge City Council tenants will be affected by this work. Leaseholders living in blocks owned by Cambridge City Council may also be affected by this work.

6. What type of strategy, policy, plan, project, contract or major change to your service is this?

- ☐ New
☐ Major change
☒ Minor change

7. Are other departments or partners involved in delivering this strategy, policy, plan, project, contract or major change to your service? (Please tick)

- ☐ Yes
☒ No

If 'Yes' please provide details below:

N/a

8. Has the report on your strategy, policy, plan, project, contract or major change to your service gone to Committee? If so, which one?

It is due to go to Cabinet on June 24th 2025.

It is noted that similar energy efficiency works have previously been delivered through earlier phases and existing contracts. A contract is currently in place and is due to conclude in March 2026. However, this Equality Impact Assessment is the first produced specifically for this programme.

9. What research methods/ evidence have you used in order to identify equality impacts of your strategy, policy, plan, project, contract or major change to your service?

[“Annual Fuel Poverty Statistics in England”, 2025 \(2024 data\) by the Department for Energy Security and Net Zero \(DESNZ\)](#)

[“Fuel Poverty, Cold Homes and Health Inequalities in the UK” Institute of Health Equity](#). This paper has helped to identify the particular groups at most risk of fuel poverty and the adverse affects of cold and damp homes, used to provide information for question 10.

10. Potential impacts

For each category below, please explain if the strategy, policy, plan, project, contract or major change to your service could have a positive/ negative impact or no impact. Where an impact has been identified, please explain what it is. Consider impacts on service users, visitors and staff members separately.

(a) Age - Please also consider any safeguarding issues for children and adults at risk

The proposed programme is expected to deliver a positive impact for residents across age groups by improving the thermal efficiency and condition of council homes. This will support better health outcomes and reduce the burden of fuel poverty.

- Older people are one of the groups most at risk of experiencing adverse health impacts of cold homes, and homes with damp and mould. They are also most sensitive to disruption during building works. Pre-works surveys will assess individual support needs and, where necessary, adaptations can be made to the delivery process (e.g. offering optimal programming of works to suit individual needs).
- Households with dependent children are statistically more likely to be in fuel poverty. Children’s developing organs make them more susceptible to the effects of cold homes, including asthma and other respiratory conditions. Damp, mould and fluctuating temperatures can also affect children’s ability to concentrate and thrive.

- Babies living in colder environments require higher caloric intake and are more susceptible to illness. Improvements in insulation and heating will directly benefit infant health and wellbeing.

(b) Disability

The programme is expected to have a positive impact on disabled residents and those living with long-term health conditions by reducing exposure to cold, damp and poorly ventilated housing, which are known to exacerbate many physical and mental health conditions. Issues relating to damp and mould can have a disproportionately negative impact on people with some disabilities, especially where this relates to respiratory conditions. The programme will have a particularly positive impact for in these cases

- Households home to people living with chronic illness and disability are statistically more likely to be in fuel poverty, as they are more likely to experience low income, and their condition or impairment might mean they have increased energy demand and that they might need to spend longer periods spent at home.
- Some disabled residents rely on electrically powered medical equipment. Ensuring that homes are more energy efficient will help reduce the operational cost of these essential supports and improve resilience in periods of energy price volatility.
- Retrofit and energy efficiency works may pose short-term challenges for disabled people—particularly those with noise sensitivities, mobility impairments or mental health conditions. Pre-works surveys will assess individual support needs and, where necessary, adaptations can be made to the delivery process (e.g. offering optimal programming of works to suit individual needs).
- It is essential that energy efficiency works do not interfere with existing adaptations (e.g. grab rails, ramps, stairlifts) or create new barriers.

(c) Gender reassignment

No impact has been identified specific to this protected characteristic group.

(d) Marriage and civil partnership

No impact has been identified specific to this protected characteristic group.

(e) Pregnancy and maternity

The programme is anticipated to have a positive impact on pregnant individuals and those with newborns or young infants, by improving internal thermal comfort and reducing exposure to cold, damp, and mould-prone environments.

- Pregnant people, their unborn babies and those who have recently given birth, who may have weakened immune systems, are at greater risk of the adverse impacts of cold and damp homes.
- Babies and young children are particularly sensitive to low temperatures, requiring more calories to maintain body heat, and are more susceptible to conditions such as bronchiolitis, asthma and low weight gain. Warmer, well-ventilated homes will help mitigate these risks.
- Pregnant individuals and households with infants may experience higher levels of stress or discomfort during construction activities involving noise, dust, or temporary loss of heating or hot water which will be taken into consideration following pre-works surveys and when planning works.

(f) Race – Note that the protected characteristic ‘race’ refers to a group of people defined by their race, colour, and nationality (including citizenship) ethnic or national origins.

The proposed programme is expected to have a broadly positive impact across ethnic groups, with a particularly beneficial effect for those disproportionately affected by fuel poverty and substandard housing conditions, leading to damp and mould.

- Whilst the council does not currently hold data on ethnic groups most likely to experience fuel poverty in Cambridge, national data indicates that households with a ‘Black household reference person’ (HRP) continue to experience the highest levels of fuel poverty, while White British households tend to have the lowest. (Note that the council will be undertaking a large-scale survey of its tenants to find out more about them so will have greater information on who is most likely to experience fuel poverty and issues with damp and mould in its own housing stock.)
- According to national data, refugees, asylum seekers and Traveller populations are also identified as one of the groups at particular risk of cold homes.
- Language barriers may also limit engagement or understanding of works, and therefore the resident liaison officers should hold specific training on inclusive engagement. The Council has an interpretation and translation contract if the provider of this particular contract is unable to offer this support

(g) Religion or belief

No impact has been identified specific to this protected characteristic group.

(h) Sex

No impact has been identified specific to this protected characteristic group.

(i) Sexual orientation

No impact has been identified specific to this protected characteristic group.

(j) Other factors that may lead to inequality – in particular, please consider the impact of any changes on:

- **Low-income groups or those experiencing the impacts of poverty.**
- **People of any age with care experience – this refers to individuals who spent part of their childhood in the care system due to situations beyond their control, primarily arising from abuse and neglect within their families. The term “Care experience” is a description of a definition in law, it includes anyone that had the state as its corporate parent by virtue of a care order in accordance with the Children Act 1989 and amendments.**
- **Groups who have more than one protected characteristic that taken together create overlapping and interdependent systems of discrimination or disadvantage. (Here you are being asked to consider intersectionality, and for more information see: https://media.ed.ac.uk/media/1_159kt25q).**

While social housing is typically more energy efficient than the private rented sector, Government data shows that 54.5% of social rented homes rated EPC Band D–G are fuel poor. By definition, homes rated EPC A–C are not fuel poor, regardless of income.

This programme directly targets homes rated EPC D or below, upgrading them to at least Band C, and is therefore expected to deliver significant benefits for low-income and fuel-poor households.

Many residents may face overlapping disadvantage due to multiple protected characteristics—such as race, disability, and low income. Single parent households, particularly lone mothers, consistently face the highest rates of fuel poverty.

In mixed-tenure blocks, where leaseholders or private owners do not participate, council tenants may be unable to benefit from the full scope of works. However, some measures may be classified as improvements rather than repairs and are therefore not automatically chargeable to leaseholders.

11. Action plan – New equality impacts will be identified in different stages throughout the planning and implementation stages of changes to your strategy, policy, plan, project, contract or major change to your service. How will you monitor these going forward? Also, how will you ensure that any potential negative impacts of the changes will be mitigated? (Please include dates where possible for when you will update this EqlA accordingly.)

To realise the full benefit of the upgrades, residents will need clear guidance on how to use new features—such as maintaining ventilation systems in order to avoid future condensation issues, managing insulation, and operating low-carbon heating differently from traditional gas boilers to avoid increased running costs.

The Council will need to ensure there is a communication plan in place to ensure that residents are fully informed about new installations and equipment in their homes, and that the information is accessible and easy to understand by all end users.

12. Do you have any additional comments?

N/a

13. Sign off

Name and job title of lead officer for this equality impact assessment: Negin Ghorbani, Retrofit Manager, Economy and Place Group

Names and job titles of other assessment team members and people consulted: Helen Crowther, Equity and Community Power Manager

Date of EqlA sign off: 11th June 2025

Date of next review of the equalities impact assessment: Following project pre-surveys, estimated April 2026

Date to be published on Cambridge City Council website: Monday 16th June 2025

All EqlAs need to be sent to the Equality and Anti-Poverty Officer at equalities@cambridge.gov.uk