Retrofit guide addendum

September 2023

Cambridge City Council

Contents

Introduction

We published the Cambridge Retrofit Guide in November 2022 to provide residents in Cambridge with advice on retrofitting their homes. Following feedback on the guide, we have produced this addendum to provide additional information and clarification on the cost estimates for some of the retrofit measures included in the guide.

It is noted that the cost figures presented in the report might exceed those outlined in other reference guides or widely accepted benchmarks. In response, this addendum aims to clarify the methodology that outlines and explains the retrofit measures and their associated costs.

The initial section elaborates on the best practice approach to retrofitting, outlining the inclusions and the underlying rationales. the following section details how the methodology has been applied to three widespread retrofit measures: loft insulation, external wall insulation, and heat pump installation.

The primary objective of the original guide and this addendum is to equip homeowners embarking on retrofit projects with a robust and accurate cost assessment, in alignment with the overarching goal of achieving net-zero carbon status. While it may have been possible to remove some ancillary costs and present an exclusively optimistic scenario, the aim of the guide is to provide residents with a realistic indication of the potential full costs of retrofitting their homes. The aspiration is to encourage retrofitting initiatives while safeguarding homeowners from unforeseen expenses that could compromise their budgets midway through a retrofit process, thereby supporting our commitment to responsible guidance.

1. Methodology for comprehensive and robust best practice retrofitting

The preparation of the guide was rooted in primary research conducted for an internal report commissioned by Cambridge City Council. The central objective of this report was to formulate a technical framework for retrofitting the entirety of the city's private housing stock, while estimating the associated costs required to achieve a zero-carbon performance standard. Presented on the following pages is a concise overview of the applied methodology.

1.1 Incorporation of retrofitting best practices

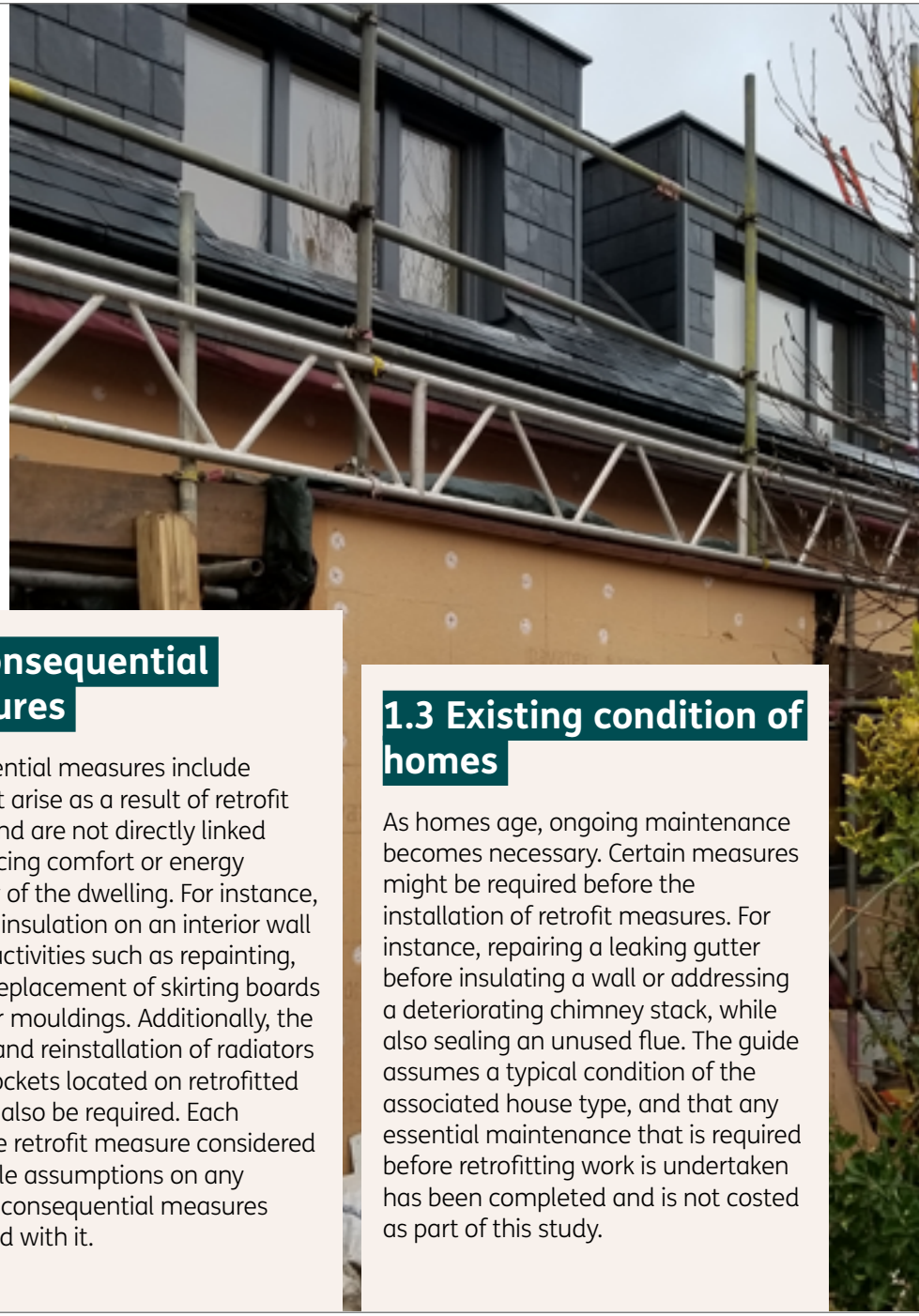
The guide draws upon a multitude of best practice principles, integrating guidelines from authoritative bodies such as the British Standards Institution (BSI) and esteemed professional associations including the Royal Institute of British Architects (RIBA), The Chartered Institute of Building Services Engineers (CIBSE), and The Royal Institution of Chartered Surveyors (RICS).

Of real importance is the national standard PAS 2035, introduced in 2019, which provides comprehensive guidance for retrofitting residential properties. This standard was established in response to the significant need to retrofit the UK's housing stock and the recognition of inadequately designed and performing retrofit projects. PAS2035 ensures retrofit installations are robust and address any possible risks associated with the measure. This avoids the cheaper, but often risky shortcuts that are sometimes present in retrofit projects. For example, the poor installation of internal wall insulation that ignores moisture risks that can lead to mould growth.

Although adhering to best practices such as PAS 2035 might initially contribute to increased project costs, it will ultimately deliver value and cost-savings in the long-term.

1.2 Consequential measures

Consequential measures include tasks that arise as a result of retrofit actions and are not directly linked to enhancing comfort or energy efficiency of the dwelling. For instance, installing insulation on an interior wall requires activities such as repainting, and the replacement of skirting boards and other mouldings. Additionally, the removal and reinstallation of radiators or plug sockets located on retrofitted walls will also be required. Each respective retrofit measure considered reasonable assumptions on any potential consequential measures associated with it.



1.3 Existing condition of homes

As homes age, ongoing maintenance becomes necessary. Certain measures might be required before the installation of retrofit measures. For instance, repairing a leaking gutter before insulating a wall or addressing a deteriorating chimney stack, while also sealing an unused flue. The guide assumes a typical condition of the associated house type, and that any essential maintenance that is required before retrofitting work is undertaken has been completed and is not costed as part of this study.

1.4 Risk mitigation

Engaging with older buildings or subpar new builds invariably presents unforeseen challenges that often entail additional costs. For instance, when installing underfloor insulation, the discovery of floor structure rot may require new joists and the reinstatement of subfloor ventilation. Alternatively, the identification of asbestos may lead to mandatory removal. While precise risks cannot be predicted, their existence is certain. Consequently, a nominal percentage of 10% is incorporated into the cost estimation for each measure to accommodate such uncertainties and ensure a robust overall estimate.

1.5 Procurement strategies

Procurement involves the purchase of materials, services, and labour required for completing a construction project. Many approaches are available, each carrying their own distinct advantages and costs. The most suitable procurement method depends on the complexity of the retrofit measures. Simpler tasks, such as adding draught seals to a door, can be handled by a tradesperson or even undertaken as a DIY project. Correspondingly, the costs in the guide reflect this streamlined approach.

For higher-risk and more extensive retrofit packages, the employment of a single main contractor aligns with RIBA's best practices and is strongly recommended. This approach provides a singular point of contact responsible for overseeing the project to completion, assuming accountability for the entirety of the work and managing subcontractor risks. These benefits, however, entail associated costs such as fees for project management, contractor profit, potential tool rentals, temporary infrastructure, and welfare facilities.

It is now more common for retrofit coordinators to manage low- to medium-risk retrofit projects. These coordinators can oversee multiple independent installers, ensuring project quality. This "contract management" procurement approach typically involves a fee charged by the retrofit coordinator.

1.6 Professional Fees

Engaging a PAS 2035-accredited retrofit assessor, coordinator, designer, or architect is essential. Larger retrofit projects might also require input from building services engineers, structural engineers, and party wall surveyors. These fees may range from modest amounts for a basic whole-house plan with a limited number of measures, to higher charges for intricate measures or projects involving higher-risk structures. The guide bases its estimations on reasonable assumptions regarding these fees.

1.7 Statutory obligations and associated fees

Certain retrofit measures will require statutory fees for permissions and legal obligations. This encompasses planning permission and building regulations approval , with potential additional fees for Listed Building Consent when working on listed properties. Even actions such as placing skips and erecting scaffolding on public land or highways may also require permissions.

1.8 Retrofit market

The study was conducted in 2021, and the guide was completed in 2022. This timeframe witnessed considerable fluctuations in inflation, material and labour availability and costs, and energy prices. As with any cost estimate, it serves as a snapshot in time.

Finally, both the Cambridge and the wider UK retrofit market are relatively underdeveloped, with a limited ecosystem of retrofit designers and installers. Certain niche products might prove challenging to source locally, such as timber/wood fibre insulation boards and high-performance loft hatches. Whilst we are optimistic that costs may come down with an improved supply chain, government support, and regulation, this expectation has not been assumed within the study and resulting guide.

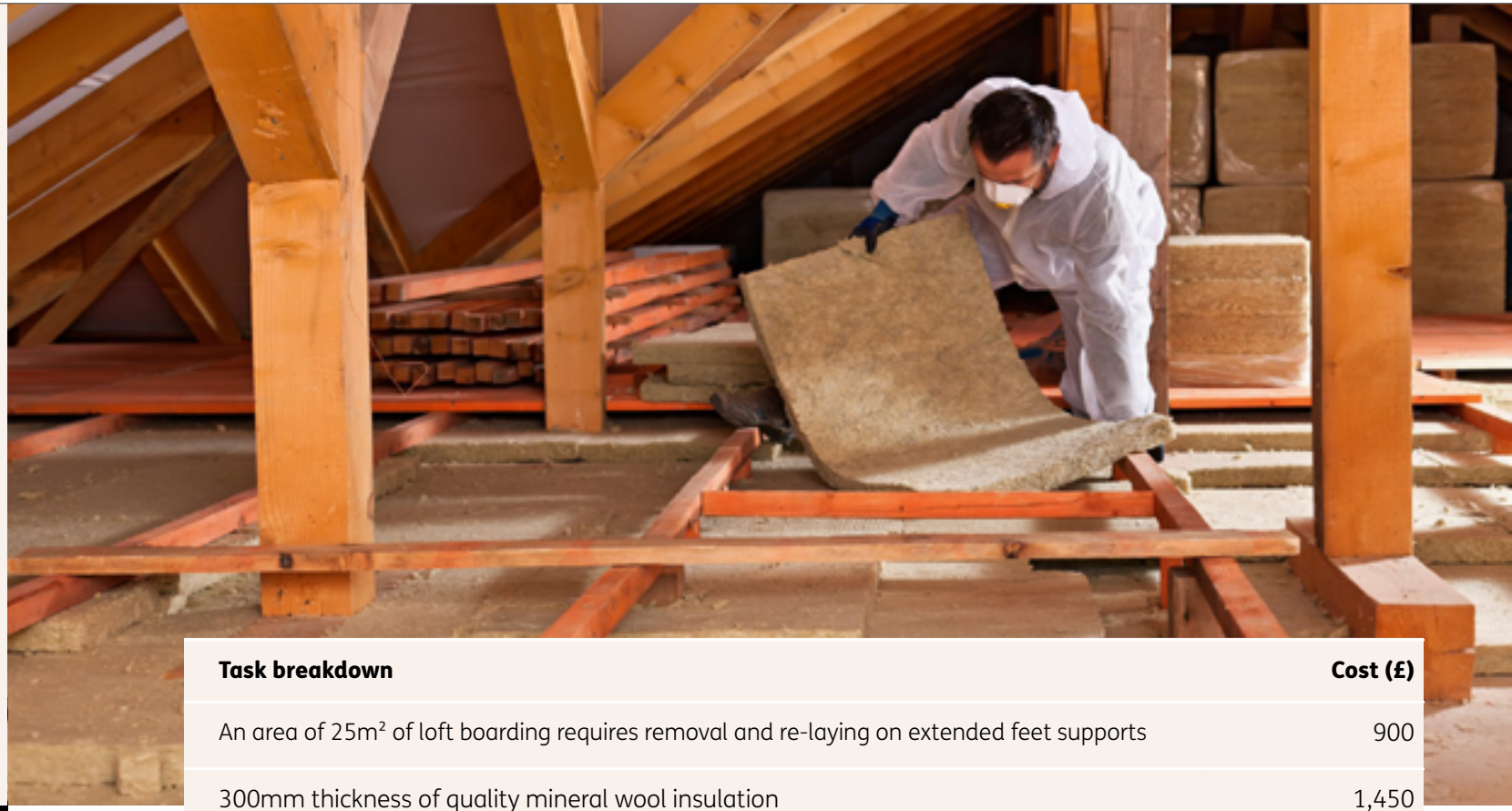
2. Three retrofit examples

Including the precise specifications, scope of work, and associated costs for each retrofit measure within the guide would have resulted in an impractical document. Presented on the following pages are three illustrative examples of key measures.

2.1 Loft insulation

The simplest and cheapest way to insulate a loft is for a homeowner to purchase the insulation and install it themselves. The price of the insulation will vary depending on specification and thickness. As the measures in the report build towards a target of net zero, it is assumed the insulation will be a good quality mineral wool product. It is also assumed there will be consequential work required (e.g., adjustments to loft boarding and electrical services) and costs incurred by having a builder carry out the work rather than the homeowner. A breakdown of the costs and assumptions made for the Type C house (1930s semi-detached house) is given opposite.

Note: Total area of loft to be insulated – 48m²

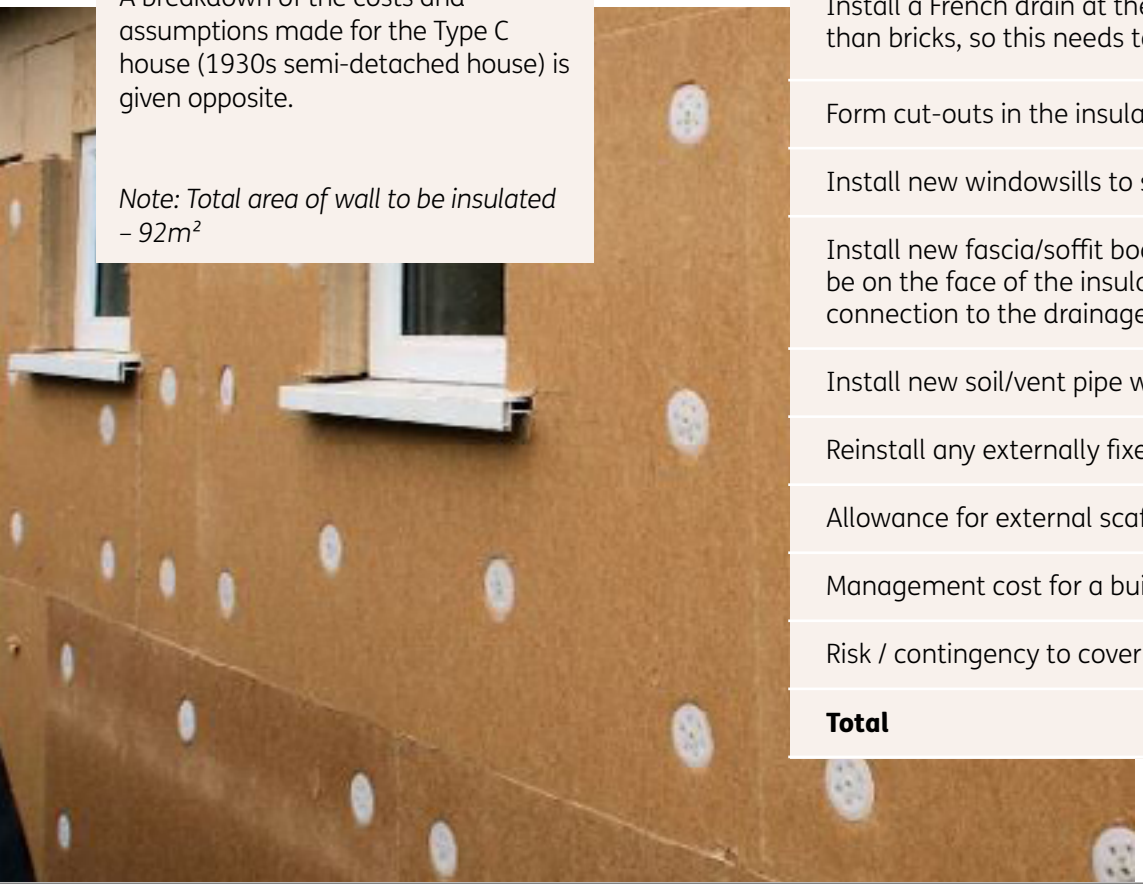


Task breakdown	Cost (£)
An area of 25m² of loft boarding requires removal and re-laying on extended feet supports	900
300mm thickness of quality mineral wool insulation	1,450
Eaves ventilation is installed to maintain cross-ventilation in the loft space and prevent damp build-up	750
Any existing power sockets or light switches installed at low level to be relocated above the new insulation	250
Management cost for a builder to carry out the work	300
Risk /contingency to cover unforeseen costs during the works (c.10%)	350
Total	**4,000**

2.2 External wall insulation

The addition of external wall insulation to a property may incur a reasonably significant amount of consequential cost which is essential if the installation is to be successful and not risk potential issues that can affect the property later (primarily damp problems). The costs are therefore based on this work being carried out by an experienced builder. A breakdown of the costs and assumptions made for the Type C house (1930s semi-detached house) is given opposite.

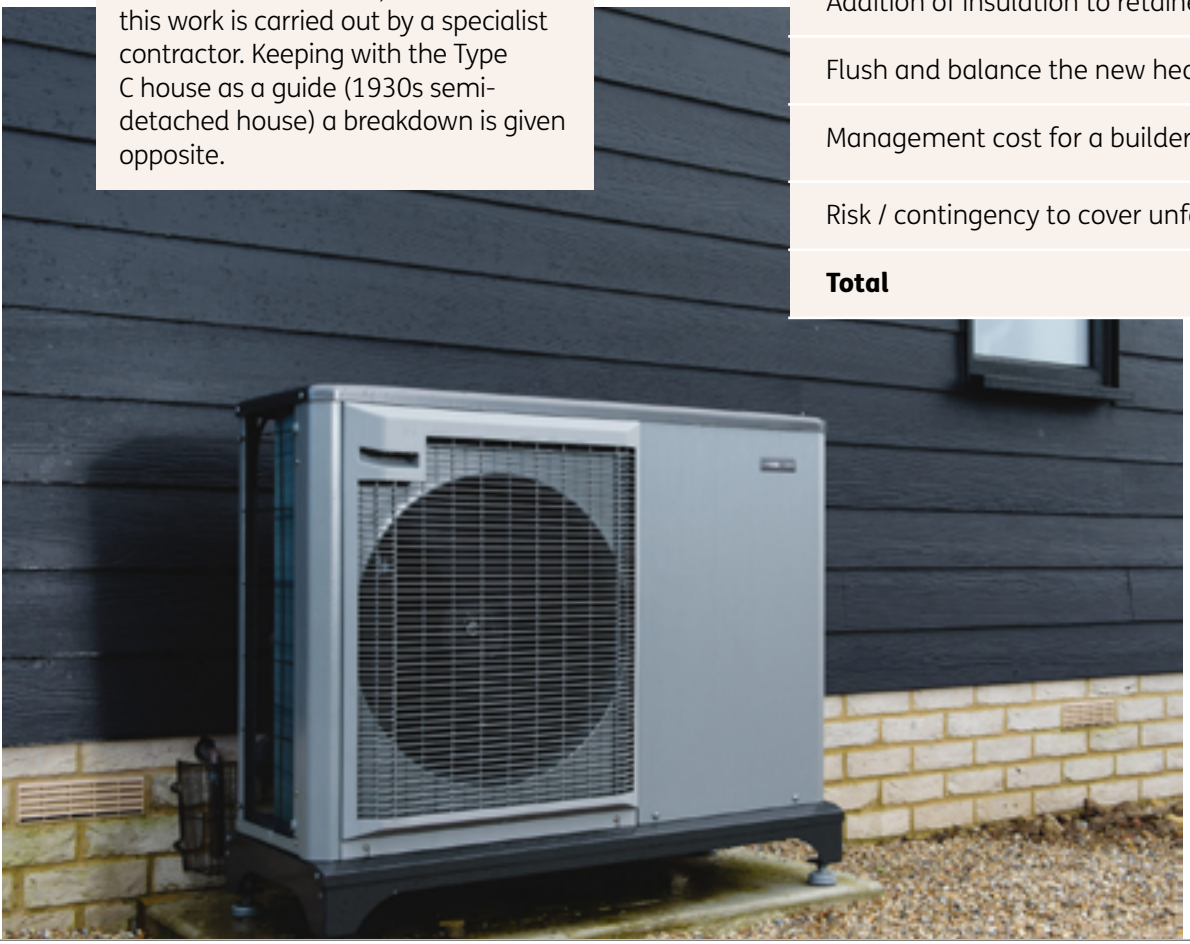
Note: Total area of wall to be insulated – 92m²



Task breakdown	Cost (£)
Remove existing fixtures, rainwater downpipes and any soil/vent pipes	270
Remove the existing roof gutter and fascia/soffit boarding as this will need to be extended over the insulation	530
Remove existing windowsills, which will also need to be replaced with wider ones over the insulation	900
Install external insulation with lime render including detailing around window and door openings	19,700
Install a French drain at the bottom of the render as water will run off the render quicker than bricks, so this needs to be managed to prevent ponding	1,600
Form cut-outs in the insulation and render for air bricks	350
Install new windowsills to suit wider wall construction	1,800
Install new fascia/soffit boarding with new gutter and downpipe. As the pipe will now be on the face of the insulation and render, an allowance is included for forming a new connection to the drainage below ground	3,900
Install new soil/vent pipe with a new below-ground drainage connection	500
Reinstall any externally fixed items	150
Allowance for external scaffolding	4,000
Management cost for a builder to carry out the work	3,000
Risk / contingency to cover unforeseen costs during the works (c.10%)	3,700
Total	**40,400**

2.3 Air source heat pump

The change from a gas or oil boiler to an air source heat pump (ASHP) is one of the biggest steps to take on the journey to net zero, but one that is recommended carrying out ***after*** the fabric of any property is upgraded to reduce the overall heating requirement. As with the other measures above, it is assumed this work is carried out by a specialist contractor. Keeping with the Type C house as a guide (1930s semi-detached house) a breakdown is given opposite.



Task breakdown	Cost (£)
Removal of existing boiler	400
Installation of a new air source heat pump	14,400
Installation of smart heating controls	700
Replacement of existing radiators to larger size to suit the lower water temperature	2,000
Addition of thermostatic radiator valves	200
Addition of insulation to retained heating pipework	1,500
Flush and balance the new heating system	300
Management cost for a builder to carry out the work	1,700
Risk / contingency to cover unforeseen costs during the works (c.10%)	2,200
Total	**23,400**

2.4 Caveats

When calculating the costs included in the report, several assumptions have been made on the size of the 'archetype' property and the extent of any consequential work.

When a homeowner is considering a budget for any retrofit work, it is recommended they carefully consider the overall financial cost of the proposed retrofit measures, including all consequential works, specialists' fees, and surveys etc, that may also be required.

The items included above are not intended to be definitive or exhaustive, as the scope and requirements of each retrofit project will vary according to the requirements of the property.

Acknowledgements

This guide and associated study was commissioned by Cambridge City Council and delivered by Bioregional, 3G Construction Consultants and Transition by Design.

Please get in touch via our websites for further information.

Thanks to A1 Air Tightness Testing, Cambridge Carbon Footprint/Open Ecohomes, and Transition Cambridge for linking us with residents for the home visits. Thanks also to the obliging residents in Cambridge for their time and access to their homes.

Original document template designed by Steers McGillan Eves. Addendum document by Bioregional.