Lincoln Green District Heating in Multi Storey Flats Summative Assessment

Project Reference 20R16P00784

Index

Introduction

The Lincoln Green District Heating Project was originally designed to improve 1,080 flats in 17 blocks in the Lincoln Green area of Leeds by providing low carbon district heating supplied with heat from Leeds' Recycling and Energy Recovery Facility (RERF) which would otherwise go to waste. This was later increased to include 1,350 flats in 23 blocks.

The project was originally planned to run between April 2016 and December 2019, however various factors, including procurement delays to project start, significant increases to the scope of the project and most notably the coronavirus pandemic in 2020, have led to the project duration being extended to June 2023.The project was managed by Leeds City Council (LCC).

Housing Leeds, who manage council houses in the city, led delivery, and the Sustainable Energy and Air Quality Team provided procurement, legal, 2financial, project management and ERDF support and ensured close alignment with the Leeds Pipes district heating project, under construction in parallel. The council undertook a competitive with negotiation procurement process to select the main contractor, Vital Energi Utilities Ltd. Vital were responsible for all design and installation work during the construction phase, including leading resident engagements, as well as the operation and maintenance of the system once completed.

To help run the project, LCC and Vital engaged the services of other organisations including

- Cenergist to provide EPC surveying expertise (subcontracted to Vital),
- Arup to provide NEC3 Project Management and Supervisor services,
- SWECO to provide Independent Certifier services and undertake the CEEQUAL assessment (joint appointment) and
- Equans to undertake additional energy efficiency work such as the installation of external wall insulation on some blocks.

The project primarily consists of physical interventions in the homes to improve the standard of heating, therefore we have taken a counter-factual approach to compare the likely costs of heating the homes using economy 7 storage heaters, as well as the likely carbon emissions using that type of heating, compared to the costs of heating and carbon emissions using district heating.

An effective way to do this probably would have been to compare residents energy usage before and after the installation of the works. There would have been some weaknesses to this method – for example the harshness of the winter and consequent use of the heating might have differed from one year to the next, leading to a skewed comparison, and it is unlikely that all residents would either want or be able to provide accurate information over the whole period. Nevertheless, the ability to directly compare households actual usage could have provided a useful comparison. Unfortunately we had to discount this method due to the difficulty in obtaining enough high quality energy usage data from residents for the pre-installation period.

In the end, it was decided to undertake a pre and post installation analysis of energy usage, energy costs and carbon emissions by modelling the heat demand, carbon emissions and RDSAP rating of each property based on their archetype before and after the installation. This is necessarily a more theoretical way of comparing the pre and post installation performance of the properties, however it is much easier to provide a full set of pre-installation data for the comparison. The main shortcoming of this method is that residents will not necessarily heat their homes to the modelled heat requirement, so overall energy usage may be different, however a resident that underheats their

home before the installation must be assumed to be likely to underheat their home after the installation.

We will also consider the additional benefits of the project in terms of the additional employment created and the strengthening of the supply chain, and the success of the scheme in creating a base load of demand from which to expand the wider Leeds Pipes system. In terms of additional employment we include KPI's in our contract requiring the generation of additional full time equivalents for the project which will enable us to produce a direct comparison from before the project.

With regard to creating a base load demand for future expansion of the district heating project, we know that without the Lincoln Green project bringing the pipeline to central Leeds, further expansion wouldn't have been possible, therefore we have assumed that all further investment in the Leeds Pipes programme wouldn't have been forthcoming without this project.

Flats in Lincoln Green

1. <u>Project Context</u>

The Lincoln Green flats are situated in an extremely deprived neighbourhood, both in a national and local context. Using the index of multiple deprivation as a measure, Lincoln Green is the 3rd most deprived area of Leeds (out of 482) and the 66th most deprived in England (out of 32,844). The area has a high turnover of residents, with the majority council tenants and some leaseholder properties. 74% of households have an income of less than £15,000 pa and 96% of households find it difficult to cope on their income.

The area suffers from high levels of unemployment and its residents face other challenges, for example 54% were born outside of the UK/EU and 51% don't speak English as a main language. The area suffers from high levels of overcrowding and is comparatively lacking in amenities compared to the high density of population.

The properties consist of high and medium rise blocks of system-built flats constructed in the 1960's which are expensive and difficult to insulate, requiring external wall insulation. In addition to this, they were heated with electric storage heaters that were expensive to use and difficult to control, often requiring residents to top up with on-peak electric heating. The presence of high-rise blocks meant that the properties were unsuitable for traditional gas central heating.

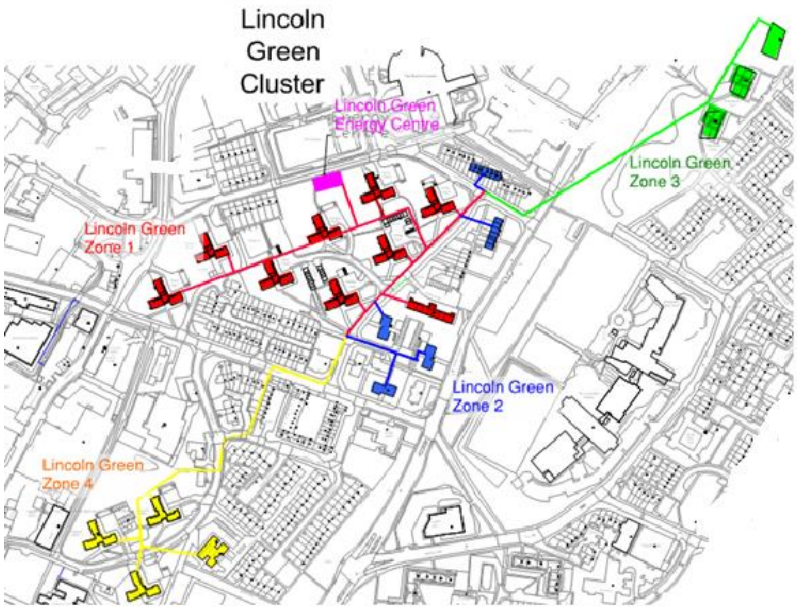
The fact that the flats were some of the most difficult to heat affordably and contained residents who were least able to afford to heat their homes, together with the age of the properties and the need to bring them up to a modern-day standard, provided a compelling justification to invest in improvements. The unsuitability of the flats for gas central heating, together with their high-density layout provided the impetus to look for an alternative source of central heating that could combine low carbon emissions with a modern, controllable wet central heating system that would be cheaper to run and would reduce fuel poverty.

While Housing Leeds needed to improve the living conditions of residents in Lincoln Green, the RERF was also under construction in the East of the city. The council had an ambition to use this source of heat to reduce carbon emissions from both new and existing buildings in the City Centre by developing a large strategic district heating network. However, district heating networks such as this require a guaranteed baseload of demand to create an investable business case. The ERDF investment to convert flats in Lincoln Green provided the ideal customer base and a means to address this market failure.

The project fitted well with the council's wider strategic ambitions, specifically:

- the Leeds Climate Change Strategy 2012-2015 contained commitments to develop a 21st century energy infrastructure.
- the Leeds Affordable Warmth Strategy 2017 – 30 sought to increase the energy efficiency of Leeds' housing stock as a whole and ensure that residents health and wellbeing wasn't put at risk by being unable to heat their home.

According to BEIS, 13.1% of Leeds households were in fuel poverty in 2019, as opposed to 11.1% across England. At the same time, Housing Leeds had a long-term strategy of improving its own housing stock through the Decent Homes Standard and moving



Map of Lincoln Green showing the blocks included as part of the project. Note that this map includes the proposed energy centre, which was omitted from the project when it was streamlined.

tenants away from expensive and difficult to use electric storage heating to more controllable, lower cost and lower carbon alternatives.

The project also aligned with national policy objectives to develop local heat networks through the Heat Network Development Unit, to decarbonise housing, through the Climate Change Act 2008 as well as reducing fuel poverty, as envisaged in the 2015 Fuel Poverty Strategy for England.

The project was designed to deliver a physical improvement to the properties and was implemented under a design and build contract which is a suitable way to deliver large scale capital improvements of this sort. It was closely managed by Housing Leeds who were able to monitor the progress and quality of the works and address any issues with the contractor, with appropriate escalation points.

Since the commencement of the project, the policy context has evolved to make the project more relevant and further justify investment in the scheme. Since commencement, Leeds has committed to become carbon neutral by 2030, significantly increasing its ambition to reduce overall greenhouse gas emissions across the city. Additionally, the war in Ukraine has led to a sharp rise in energy prices, leading to a requirement nationally to move away from imported fuel such as natural gas for domestic heating or to generate electricity, and a more urgent need to reduce the cost of domestic heating in homes. Additionally, since the original conception of the project, the Grenfell disaster has provided an added impetus to improve fire safety infrastructure in similar blocks of flats, therefore the opportunity was taken to install sprinkler systems alongside the new heating systems.

Another key contextual change was the arrival of the covid 19 pandemic in early 2020. This led to a considerable change in the way we could work, resulting in a substantial pause in installations whilst an approved protocol for working inside residents homes was developed by the Government. The rate and number of installations during the construction phase also reduced as some residents shielded and others refused entry. As a result of this, we have extended the timeframe of the project to mop-up installations in properties that were previously missed out, as well as allowing us to include leaseholder properties.

Given these changes, we still expect the project to perform well against its targets. This is reflected in various increases in the scope of the project since its commencement, including the increase in the number of properties improved and the addition of insulation improvements to the Roxby and Shakespeare flats.

The Leeds Recycling and Energy Recovery Facility (RERF)

2 Project Progress

When the application for the scheme was originally submitted, the project was expected to cost £13,101,188 and improve 1,080 flats by an average of 7.1 SAP points. It was also expected to reduce carbon emissions by 3,830 tonnes of CO2/pa and reduce the collective fuel bills by £295,000 pa.

Since initiation, the scheme has increased in scope and will now cost £19,619,341.96. This increased cost includes installing district heating in 1,350 homes, installing external wall insulation in 300 flats across three high rise blocks, as well as a new insulated roof and external wall insulation works in Roxby Close, a medium rise block containing 61 properties. In addition, we have found ways to bring in some of the leaseholder flats in the area. In total, we now expect carbon emissions to be reduced by 9,613 tonnes of CO2/pa.

The project scope was increased for the following reasons:

- Bringing the additional blocks into scope for district heating represented an economy of scale in that more homes could be improved without designing a new scheme or undertaking further procurement.
- Including private leaseholders meant that a larger number of residents could be offered assistance, again without designing a new scheme.

- The inclusion of insulation works would enable the new heating systems to operate more efficiently and provided the opportunity to repair and upgrade the walls and roof at the same time as the insulation works, helping to extend the life of these blocks.

As at the end of Quarter 1 2023, a total of £17,177,626 had been spent on the project with district heating installations completed in 1,177 properties and EWI completed on the 300 high rise blocks. Of the 1,177 properties improved so far, the average increase in SAP rating has been significantly higher than forecast at 35 SAP points, while the annual carbon saving for the completed properties is 8,400.45 t/CO2. These figures show that the scheme is on track to meet the targets in terms of number of properties improved and carbon emissions reduced. It is also evident that in the initial application, we underestimated the potential to improve the SAP rating of these properties. This is partly because our records showed that pre installation SAP ratings were between 64 and 79, whereas survey revealed that they averaged just 38 SAP points, meaning properties were bands E and F, just above the worst band of G.

Fig 1: Spend and Output Performance:

Indicators / Expenditure	Original Funding Agreement	Amount in most recent Funding Agreement Variation	Total achieved at time of evaluation	% of target	Projected to be achieved at Project Closure	% of target
Expenditure						
ERDF Capital Expenditure (£m)	£12,392,703.00	£19,986,228.50	£17,117,626.3	**86%**	£19,986,228.50	**100%**
ERDF Revenue Expenditure (£m)	£708,485.00	£290,198.68	£290,198.68	**100%**	£290,198.68	**100%**
Indicators (please select from dropdown)						
(C31) Number of households with improved energy consumption classification	1080	1350	1177	**87%**	1350	**100%**
(C34) Estimated GHG reductions	3834	9613.04	8400	**87%**	9613.04	**100%**

The main reason for the positive performance of the project at this stage is that such a large number of homes have been improved with low carbon heating. These properties had a low SAP rating to begin with and the existing storage heaters were high carbon, expensive to run and difficult to use, meaning that an easier to use, cost effective heating system proved to be a popular offer. Additionally, most residents are council tenants and Housing Leeds has worked hard to engage tenants and residents to ensure as many people as possible benefit.

When the project is completed, we forecast that it will have achieved what it had set out to achieve in terms of providing a large number of hard to treat, low-income homes containing residents likely to be suffering fuel poverty, with lower cost, easier to operate, low carbon heating. It is worth bearing in mind that in the final phase of the project we will be tackling those households such as leaseholders and previous refusals who are more difficult to engage.

As well as the direct improvement to properties described above, the scheme has succeeded in providing a base load for the wider district heating network, amounting to 16% of the total overall potential network capacity. As a result of this, Leeds has already managed to attract a further £30m of additional low carbon investment into the city, with further customers connecting regularly and more extensions planned.

The project has contributed to the ERDF cross-cutting theme of sustainable development by replacing home heating powered by electricity, a large proportion of which is generated using fossil fuels, with waste heat from the incineration process. It is also contributing to the cross-cutting

theme of providing equal opportunities by both providing affordable warmth in one of the most deprived areas in the country, but also by providing [XXXXX} *add employment figs*

3 Project Delivery and Management

As a local authority, Leeds has a strong Governance process that means that any project has to be planned, costed and approved by an officer or body with an appropriate level of authority. As a project worth several million pounds, the decision to go ahead with Leeds Pipes was classed as a key decision and had to be authorised by the Executive Board of the council.

Procurement was undertaken in accordance with the council's Contract Procedure Rules using the 'competitive with negotiation' procedure in accordance with the Public Contracts Regulations 2015. This route enabled the council to work with several potential contractors to develop and refine plans for this very complex scheme in an open and transparent manner.

Once the contractor Vital Energi Utilities was in place, Housing Leeds instigated a robust contract management regime based on NEC 3 option A contract management principles. As part of this process, Housing Leeds assigned a dedicated team including a project manager, senior technical officer and a technical officer to the project who was responsible for day-to-day management and liaison with the contractor through regular site visits, project meetings and resolution of issues. They also assigned a quantity surveyor to the project to manage invoicing and materials as well as officers to inspect the quality of works, resolve customer issues on the ground and ensure that the works take place as they should. A separate procurement process was used to select Arup to provide formal NEC3 Project Manager and Supervisor roles to ensure that the contract ran smoothly, and works were delivered to a very high quality.

Housing Leeds has specialist staff to manage asbestos and health and safety issues and their proactive management of risk included dealing with some Health and Safety incidents and near misses which were reported and ensuring that lessons were learned by the organisation and the contractor.

As well as the project team outlined above, Housing Leeds has staff dedicated to tenant liaison who have worked with tenants to persuade them to sign up and then helped to identify and rectify any snagging issues. Finally, for the main construction phase, Housing Leeds withheld 5% of the value of the works from the contractor as retention which was not released in full until all work had been completed satisfactorily, issues resolved and a 12-month defects liability period completed.

The project largely went to plan, principally due to the robust mechanisms mentioned above, and a tight working partnership between all participants, including Housing Leeds, the Sustainable Energy and Air Quality Team, Vital Energi Utilities, Sweco, Cenergist and Arup. The main issues to arise over the lifetime of the scheme have been operation during the covid pandemic, which extended the project timeframe, the timely resolution of snagging issues and some contractual issues that have held up the commencement of works on the additional properties once the construction phase of the project had finished. These issues have been worked through and resolved and have not impacted the overall quality of the project and a mopping up process has been put in place to enable flats which had been missed out, to be included at a later date. For future schemes we will need to reconsider contractual arrangement for undertaking any works delayed by tenant access issues, as the process was time-consuming.

The project underwent a CEEQUAL assessment and achieved a rating of 65.7% (very good) indicating that the project is highly rated in terms of sustainability and environmental performance.

The horizontal principles of sustainability and equal opportunities have been embedded into the project from the start as the project is focused on bringing in low carbon heating to residents in one of the most deprived areas of the country who would otherwise have difficulty heating their homes affordably.

We know that the project engaged with the right beneficiaries because the homes were all energy inefficient (mainly E-G) with a need for upgraded heating systems and are situated in an area within the lowest 2% for multiple deprivation nationally, therefore its residents were amongst the most at risk for fuel poverty. We are likely to undertake some further survey work in the near future to confirm that this has been the case. [XXXX] insert customer survey info.

4 Project Outcomes

In the logic model, we outlined our intended outcomes of:

- reducing energy bills,
- providing low carbon heating and
- alleviating fuel poverty for vulnerable residents

To date, 1,177 households have had their energy efficiency improved so far, making a direct contribution to output indicator C31.

In terms of fuel poverty, the project is likely to be having a greater effect than originally envisaged due to the recent sharp increase in energy costs and ongoing cost of living crisis. We took an average of economy 7 tariffs available in mid-June and compared them with Leeds City Council's standard district heating tariff and modelled that without any reduction in the average heating and hot water consumption, the district heating system would save pre-payment customers around £650 per annum while direct debit customers would save £600.

In addition to the tariff saving, we calculated that the new heating system has improved the average modelled energy requirement for the 1,177 properties by 4,084.17 kWh/pa. Below is a comparison between the cost of hot water and heating for individual properties using storage heaters based on the average economy 7 rate in June 2022 and the cost of hot water and heating using district heating and the council's district heating tariff. The consumption data is based on the RDSAP rating of the properties before and after the installation of the district heating system and compares economy 7 using both pre-payment and direct debit payment methods.

To take account of the fact that residents will be paying an additional standing charge, on account of still requiring electricity for lighting and appliances, we have reduced the savings by the average standing charge for electricity under the current price cap.

Fig 2: Comparison of heating costs with E7 and district heating

	E7 Storage Heating with Pre-Payment	**E7 Storage Heating with Direct Debit**	**District Heating**	***District Heating (Post April 2023)***
Heating and hot water consumption	12188.51	12188.51	8104.34	*8104.34*
Ave E& price per kWh (June 2020) Night Rate (£)	0.1859	0.1806		
Ave E7 Standing Charge (£)	0.535	0.428		
Price per kWh District Heating (£)			0.0773	*0.1*
Standing Charge District Heating (£)			0.4714	*0.5044*
Average standing charge for electricity (at £0.46 per day)			£167.90	*£167.90*
Annual price	£2,265.84	£2,201.24	£626.47	*£810.43*
Annual Standing Charge	£195.28	£156.22	£172.06	*£184.11*
Average Cost of Heating	**£2,461.12**	**£2,357.46**	**£798.53**	***£994.54***
Saving over E7 (minus additional electricity standing charge)	**£1,494.69**	**£1,391.04**		
Saving over E7 (as above, post April 2023)	*£1,298.68*	*£1,195.02*		

Although the above comparison is before the most recent increases to the energy price cap, it is apparent that households with district heating are paying considerably less for heating and hot water than they would have been using storage heaters, based both on a lower energy consumption due to more efficient heating, and a much lower tariff. This should significantly outweigh the slightly higher standing charge for the district heating tariff and the need to pay an additional standing charge due to the continuing need for electricity. It is worth noting that this is also the case when taking into account a planned increase in the district heating tariff from April 2023 which has also been included in the table.

Caution is required with these modelled figures as residents will not all use the same amount of heating and hot water. We know that many use less heat and hot water than modelled, given the deprivation in the area. Many people have a fixed budget for heating and lower per unit costs don't lead to cashable savings, instead they spend the same but live in a warmer and healthier home.

It is highly likely that the project will have provided benefits to the households in terms of health and wellbeing, and we intend to investigate these further in the near future.

Whilst some of the impacts in terms of fuel poverty alleviation have been amplified by outside factors, such as the sharp rise in domestic energy costs, the bulk of this impact has been achieved through the physical improvements to the properties themselves.

The project envisaged a large number of wider impacts, including an annual reduction of 3,800 tCO2 and a forty year reduction of 152,000 tCO2. For the 1,177 homes improved so far, the calculated annual saving in carbon emissions is 8,400.45 tCO2, amounting to 336,018 tCO2 over 40 years, representing a considerable contribution to output indicator C34. As mentioned before, the saving is greater than originally envisaged, partly due to our overestimating the initial energy efficiency of the flats. This has also resulted in the increase in the average SAP rating per property being much

greater at 35 points, than the 7.1 points originally predicted. It is worth bearing in mind though that RDSAP for electrically heated properties is based on the carbon intensity of electricity generation as it stands, therefore the differential may reduce as decarbonisation of the national grid progresses.

One of the key additional impacts intended from the project was to facilitate the expansion of the district heating network to serve a wide range of new and existing buildings in the city centre as a base load to justify the initial construction cost. Since the start of the project customers including schools, universities, hospitals, government and businesses have connected to the district heating scheme, amounting to £30m of additional investment in low carbon technology in the city centre. The Lincoln Green project plus other connected customers still only represents c16% of the heat capacity available from the RERF, so there is still plenty of scope for expansion. Since the construction of the spine to the city centre was reliant on the Lincoln Green project, it is fair to say that none of this additional investment would have been possible without the project.

The project envisaged wider beneficial impacts to the local area, and these have been realised, including a smarter external appearance of buildings, particularly where external wall insulation has been fitted, an increase in external and structural repairs to the blocks, and most notably, the installation of new sprinkler systems in the wake of the Grenfell tower disaster.

Insert employment figures plus value added table

5 Value for Money

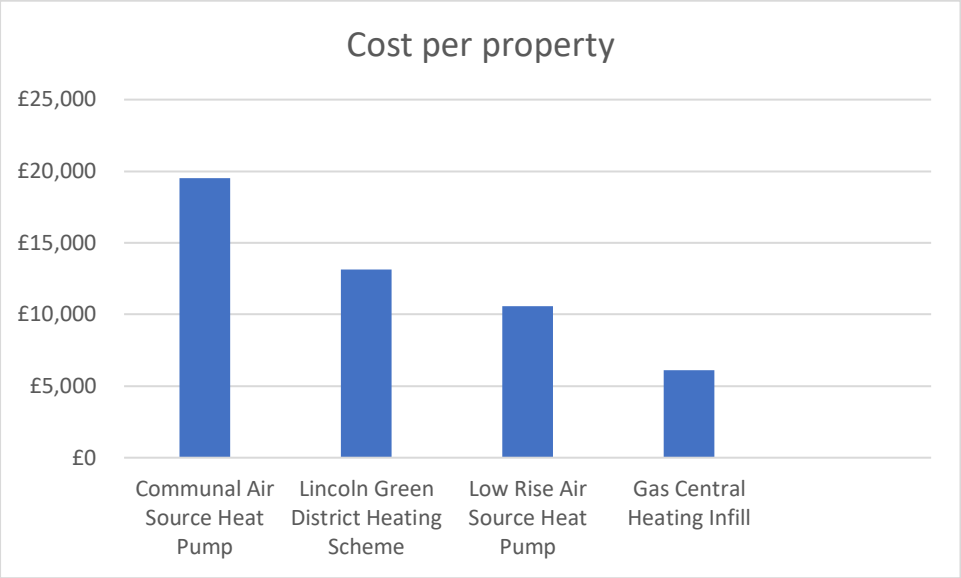
The full scheme is designed to improve 1,350 flats altogether at a cost of £19,619,341 of which £17,709,376 will fund heating works including the installation of district heating changeovers, radiators and other central heating equipment within the flats, communal pipeworks within the blocks and underground pipe connections leading to the main network. This comes to a cost of £13,118 per property, which is expensive compared to gas infill schemes in the past (one from three years ago in Swarcliffe cost £6,099.47 per property including connections to gas mains). However, it has to be borne in mind that gas central heating is an established technology, the distribution mains are already in the ground, the supply chain is more developed and it benefits from a more competitive market. Gas also has significant unaccounted externalities, such as contributing to poor air quality and carbon emissions, which DH largely avoids. Our network saves over 80% carbon compared to gas heating counterfactual.

Given that the majority of properties in Lincoln Green are medium and high-rise flats that are unsuitable for traditional gas heating, a better comparison would be with heat pump technology. Three years ago we undertook a scheme to install air source heat pumps in 13 low rise council owned houses. As with the Lincoln Green, this was a less established low carbon technology and installation cost in the region of £10,600 per property, which is more in line with the cost per property. These air source heat pumps didn't require any additional pipework or infrastructure outside of the property, therefore the £1,749 additional cost in Lincoln Green reflects good value when the costs of the additional communal infrastructure required to get low carbon heating into blocks of flats is taken into account.

Where we have been undertaking communal schemes for similar blocks of flats using heat pumps such as for Clustering for Warmth, the cost has been higher at approximately £19,500 per property. This reflects the need to include the cost of a heat generating source in these properties as they are too far from a pre-existing heat network such as Lincoln Green. This illustrates that connecting to an existing heat network where one exists, or better still using housing to create an anchor load to

establish a new one, is a cost-effective way to bring controllable low carbon heating to high rise blocks.

Fig 4: Comparison of the costs of different heating technologies



The cost of £1,367,904 for external wall insulation between the 300 Shakespeares flats comes to £4,559.68, which even for smaller properties is a competitive price for external wall insulation, bearing in mind costs for larger flats as part of more recent schemes have been in the region of £15,000, while the cost of installation for schemes in houses has been between £15,000 and 20,000 per property. The EWI and roof insulation for the 60 Roxby flats will cost £542,061, amounting to £9034.35 per property.

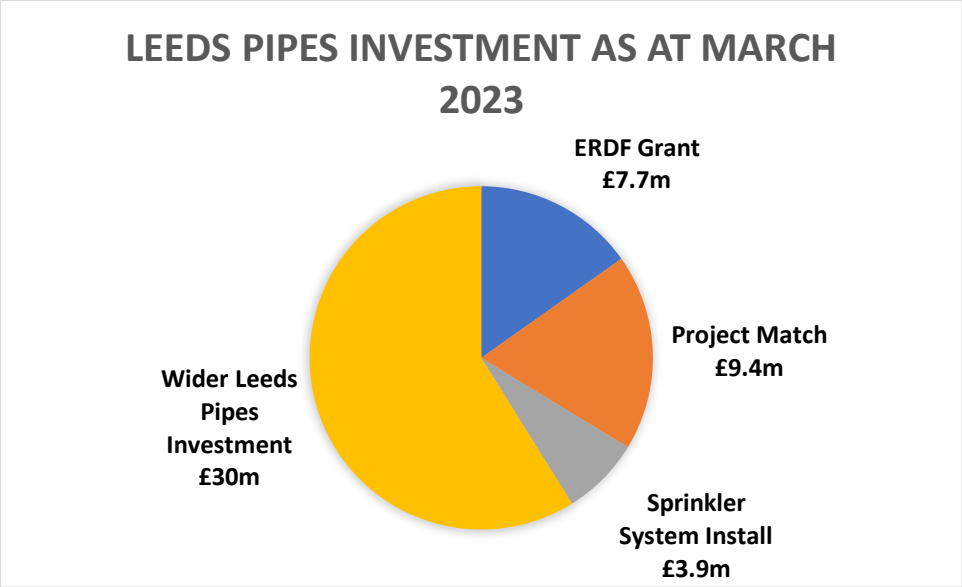
The below table outlines the cost per output of the scheme, as at March 2023 and as projected at the end of the scheme:

Fig 5: Cost per output

	As at March 2023	**Full scheme**
Cost per property improved	14,594.41	14,532.85
Cost per SAP point raised	416.98	409.37

As at March 2023 the claimed ERDF grant of £7,744,441 had generated a considerable amount of additional investment in Leeds, including the project match of £9,433,184, £3,784,661 of works on sprinkler systems and fire safety as well as £30,000,000 on the wider Leeds Pipes district heating network:

Fig 6: Project investment



As well as direct investment brought into the city through the scheme, it is important also to consider the additional savings to residents that could be brought into the local economy. If the 1,177 residents were to make the lower of the savings figure calculated of £1,195 per annum (assuming that they previously paid direct debit and taking into account the recent rise in the district heating tariff) that could amount to up to £1.4m extra spending power within the Leeds economy over the year.

The Shakespeare flats including EWI

6 Conclusion and lessons learned

Overall, the project contained many strengths, not least because it had a strong strategic fit serving many objectives. It brought controllable, affordable heating to residents in some of the most deprived areas of the country. It has also brought considerable investment in low carbon technology into the city by providing a baseload to the wider district heating spine and has bought regeneration benefits to the local area in the form of EWI and repairs to the blocks.

The project was well managed through NEC 3 principles and employed a wide range of techniques to ensure that work remained on track. It also brought in outside expertise to support in the management function and this has ensured that the project has progressed well. However issues did arise which required attention, including most notably the pandemic, which prevented works from taking place in many properties and extended the scheme timelines. We have addressed this by extending the project timeframe in conjunction with the Department for Levelling Up so that homes that were previously missed out could be included. There have also been some contractual problems around resolving snagging issues and undertaking further installs after the main construction phase, however these have been worked through and have not been allowed to affect the overall trajectory of the project.

The project has been a good example of close cooperation between organisations, including Leeds City Council, the Department for Levelling Up, Vital Energi Utilities, Cenergist and Arup, which has enabled any problems to be resolved and worked through and ensured the overall smooth running of the scheme, even during unprecedented world events. The ERDF audit process did highlight some weaknesses in our procurement record keeping, however we were able to improve these for the future.

One of the strengths of the project is that it wasn't static and took various opportunities to streamline its operation and add value for money. Early on a redesign of the project eliminated the need to construct an energy centre at Lincoln Green, whilst further improvements were added as funding allowed. These included the installation of insulation on the Roxby and Shakespeare's blocks, the inclusion of sprinkler systems as part of the works (albeit not funded through the scheme) and the extension of scope to Ebor Gardens and private leaseholders. However as the contractual difficulties in getting mop-up installs started have shown, it is better to include as many aspects of the project from the start where possible.

A key strength of the project has been the level of engagement between the council, contractors and local residents that has been built on Housing Leeds' considerable experience in writing to residents, holding information events and providing face to face advice and assistance. This has enabled the scheme to get off to a running start and is one of the reasons why such a high proportion of properties (1,177 out of 1,350 as at the end of March) has been reached. We are confident that a large proportion of the remainder will have been assisted by the scheme end in June.

Lessons Learned – Grant Recipient

- Grant recipients need to ensure that there are robust contractual mechanisms in place to ensure that changes to the scope of the project can be implemented quickly and effectively.

- Grant recipients need to ensure that procurement records are accurate and kept up to date.
- Grant recipients need to undertake robust contingency planning in case of major high impact/low probability disruptive events, such as pandemics.
- Grant recipients need to ensure timely and effective resolution of snagging issues.
- Grant recipients should include as wide a scope of works within the project design as possible, such as additional insulation measures to reduce the need for project changes later on in the scheme.
- Grant recipients should consider implementing time recording practices for key staff so that they are ready to record their activities for future projects.
- Grant recipients should attempt to take a cross tenure approach from the start, so that economies of scale can be reached effectively in terms of works, overheads and communications.
- Grant recipients should consider bringing in additional expertise to help manage and streamline their project.

<u>Lessons Learned – Scheme Designers</u>

- Project designers should include as much work as possible in the project scope, ideally taking a whole house approach from the start, to reduce the need for change requests in future.
- Project designers should attempt to take a cross tenure approach from the start, so that economies of scale can be reached effectively in terms of works, overheads and communications.
- Project designers should include robust contingency planning in case of major disruptive events such as the pandemic.
- Project designers should include robust mechanisms for the timely resolution of snagging issues.
- Project designers should consider bringing in additional expertise to help manage and streamline their project.

<u>Lessons Learned – Policy Makers</u>

- Policy makers should continue to ensure that a substantial proportion of development funding is made available to capital projects going forwards, particularly those aimed at improving domestic energy efficiency and bringing low carbon energy to cities. This should particularly be the case where the works will act as a base load for a potentially larger project as is the case for the Leeds Pipes district heating scheme.
- Policy makers should direct development funding to areas like Lincoln Green which combine high rates of multiple deprivation as well as a need for infrastructure and housing improvement.
- Policy makers should consider funding a higher proportion of works per property to enable whole house improvements to go ahead and to stretch housing providers budgets further.