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Energy Saving Trust

Evaluation of the District Heating Loan Fund (DHLF)

Final report

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Executive Summary

The Scottish Government has made a commitment to support the development of district heating networks in Scotland, with generation and householder connection targets to reach by 2020. Since 2011, on behalf of the Government, the Energy Saving Trust has managed a programme to support scheme take up and implementation – the District Heating Loan Fund (DHLF).

The Warm Homes Fund (WHF) also offers loans and development grants to RSLs and local authorities to implement renewables based projects providing affordable warmth to householders. Where this funded DH projects, these were included in the evaluation. Therefore where DHLF is used in the evaluation, this also refers to WHF-funded district heating schemes.

The Energy Saving Trust (EST) commissioned Databuild to undertake an evaluation – comprising interviews with scheme managers and customers - to help to answer the following strategic questions:

- To what extent the funded District Heating (DH) projects are delivering/projected to deliver the carbon and other impacts anticipated at the outset?
- Attribution – how important was the DHLF to the projects and what would have happened without it?
- Applicant experience of, and satisfaction with, the DHLF programme.
- What issues schemes have encountered and what support – if any – could be provided to overcome these.
- How Scottish Government/the DHLF could encourage more and/or larger DH schemes and so greater impact towards 2020 targets.

Impact and attribution

The total *predicted* CO_2 saving impact across the funded projects included in the evaluation was calculated through predicted boiler efficiency. *Actual* boiler efficiencies were obtained from 14 of the 22 evaluated projects i.e. those that are operational and could provide these figures.

Amongst these 14 projects, predicted CO_2 saving impact was 2,368tCO_2 per annum/59,200tCO_2 lifetime but actual impact was 97% of this - **2,300tCO_2 per annum/57,500tCO_2 lifetime.**

Assuming this will be true of all 26 funded schemes (including those not yet operational and those not evaluated), the total impact across the funded schemes would be 4,271tCO_2 per annum/106,775tCO_2 lifetime.

It is clear that in all cases, the DHLF had an influence upon the impacts delivered by the funded DH schemes. Initially, all but one respondent to the evaluation claimed that their scheme would not have happened without the DHLF. However, exploring this in greater depth, half of respondents stated that if DHLF had not been available, they *would* still have taken some action, for example by accessing the required finance elsewhere. Yet where this was the case, they did state that the process would likely have been more challenging, costly and slower thus placing risk on project delivery. This means that:

- For 11 of the 22 schemes explored, these would likely not have happened at all without DHLF funding; this equates to extrapolated savings of 2,385tCO_2 per annum/59,625tCO_2 lifetime (56% of the total achieved).
- For the other 11 of the 22 projects, though these would still likely have happened (through sourcing other finance), the DHLF made these happen quicker, better and/or with fewer costs i.e. the remaining 44% of achieved impacts would still have been influenced by the DHLF.

In total, 835 households have been - or will be - connected to district heating from all the projects funded to date (excluding the 200 households already connected to the Wick scheme, which will benefit from additional funding provided).

Satisfaction

Overall, satisfaction with all aspects of the DHLF process was high; most found the application process clear and straightforward and found the payment terms to be flexible and manageable. There was also no strong appetite from successful projects for adjustments to either the loan cap or conditions (e.g. interest rate).

Scheme issues and solutions

The key barriers and issues cited by respondents were analysed to generate a set of likely success factors for DH schemes. These included:

- Conducting in depth research into existing DH schemes in advance of project design and implementation; benefits of this included identifying existing schemes to learn from, signposting of contacts and building knowledge of technical elements (enabling better contingency planning and realistic project planning).
- Collecting baseline data on the properties involved in the scheme; this ensures the viability and impact of the technology is more accurately assessed.
- Having excellent contractors; most scheme managers either were themselves – or brought in - experienced contractors to deliver key elements of the work.
- Early and frequent customer liaison; this has helped scheme managers to build customer understanding of – and trust in – the technology, ensuring buy-in and addressing concerns.
- Restricting installation work to times of the year when good weather can be expected.

Enhancing DH scheme impacts

There would seem to be potential for encouraging more and larger DH schemes through:

- Wider marketing of opportunities like DHLF to organisations with potential to take up DH schemes e.g. housing associations or facilities management companies in shopping centres. The effect may not be immediate but these organisations may then consider DH when trigger points arise. Further research could be conducted to understand the potential for uptake amongst these large public sector bodies and what the barriers are.
- The DHLF application assessment panel driving consideration of larger schemes through – where appropriate – offering both the original amount bid for and an 'enhanced'/'premium' loan offer (i.e. more money) to deliver a larger scheme where this is possible.
- Developing a DHLF/EST best practice guide, which as well as being an excellent idea in encouraging schemes and helping organisations to design schemes in the most efficient and effective way, might also help organisations to be more relaxed and reassured about pushing for an expansive and ambitious scheme.

Finally, managers on several smaller schemes were concerned about smaller schemes being "drowned out" in the battle for funding through an emphasis upon large, ambitious schemes. This perhaps indicates the value of supporting both large and small scale projects.

1 Introduction

1.1 The DHLF

The Scottish Government has made a commitment to support the development of district heating networks in Scotland, with generation and household connection targets to reach by 2020[1].

Since 2011, on behalf of the Government, the Energy Saving Trust has managed one of the key policy interventions put in place to support take up - loans for district heating projects. This District Heating Loan Fund (DHLF):

- Comprises an unsecured loan of up to £400,000, which can cover 100% of the costs of DH schemes; it carries 3.5% interest and is repayable over 10 years[2].
- Covers both renewable and low carbon technologies.
- Cannot fund individuals, only organisations[3]. A wide variety of organisations can be funded (public, private, third sector), though for the private sector, DHLF only funds SMEs, not large (+250FTE) businesses.
- Places no limitations on those that apply from accessing and utilising other funding pots.
- Includes an element of technical support where appropriate.

After initial filtering and assessment of applications, a proposed DH project goes to a cross-organisation DHLF Panel who then make recommendations to the Scottish Government on whether to make a funding award. The panel looks for benefits to the local areas, carbon reduction and the prospect of heat price reduction, and overall deliverability of the project.[4] The application form and panel review also has a focus upon assessing additionality i.e. could the bidding organisation implement this project anyway without the loan.

The Warm Homes Fund (WHF) offers loans and development grants to RSLs and local authorities to implement renewables based projects providing affordable warmth to householders; up to £5m loans and up to £20K development grants can be offered. The scheme has funded four capital projects and 30 development studies to date.

In relation to district heating loans, over 40 applications have been progressed to the DHLF Panel. Thirty were approved for funding and 26 took this up; most of these are now operational. There were a wider number of projects whereby interest in the DHLF was expressed and the application process started but then stopped. The Energy Saving Trust have logged a number of reasons for this, therefore this group will not be followed up in the detailed evaluation at this point in time.

[1] http://www.scotland.gov.uk/Topics/Business-Industry/Energy/Energy-sources/19185/Heat
[2] There is scope for flexibility on these conditions but so far little call for it.
[3] Though a sole trader business would be eligible.
[4] To be funded, a project must demonstrate that domestic energy prices would be reduced by at least 20% based on current pricing for alternative fuels. .

1.2 Evaluation objectives

The Energy Saving Trust commissioned Databuild to undertake an evaluation to quantify the impact of the projects funded by DHLF and WHF[5] and the satisfaction/experiences of the DH project teams that went through the DHFL process. More widely, both EST and the Scottish Government had a number of strategic questions that the evaluation was intended to feed into:

- **Impact - to what extent the DH projects are delivering – and are projected to deliver - the carbon and other impacts anticipated at the outset**? This provides Scottish Government with an understanding of what their investment has delivered, as well as progress towards 2020 carbon and generation targets. It also tests how far expectations of the volume of DH projects required to deliver on targets aligns with project performance 'on the ground'[6]. It therefore provides a clearer picture of what further level of DH will be required to ensure targets are met, as well as information to assess whether the programme has demonstrated value for money.

  Linked to ascertaining impact, secondary objectives were to understand (a) why achieved impacts are different to anticipated impacts (where this has been the case) (b) identify what types of information DH project teams are struggling to collect and/or calculate, and therefore what support might be required to help them to do this.

- **Experience of and satisfaction with the process - applicant assessment of the DHLF application process**. To assess what works well currently and inform any changes going forward e.g. around loan amounts, eligibility and application requirements.

- **Attribution and the counterfactual – how important was the DHLF to the success of the funded projects and what would have happened without it.** Understanding both the extent to which DHLF supported impact - and how - is important for the Scottish Government and EST in designing further interventions. In addition, the research needed to explore whether more could be achieved – in terms of supporting more 'transformational' projects – by increasing the current £400K loan cap.

- **Overcoming barriers – what issues projects have encountered and what support – if any – could be provided to overcome them.** This provides an understanding of what support needs DH projects have and so can inform the development of future support. In addition, EST hoped the research would generate examples of project issues and solutions that new DH projects can learn from.

[5] For the latter, district heating projects only. Throughout the report, the whole sample is referred to in terms of DHLF but includes some WHF-funded district heating projects.
[6] Anecdotally, boiler efficiencies on projects have not been as high as claimed in the applications, so any shortfall needs to be ascertained, with achieved and projected impact figures revised.

1.3 Summary of the methodology

The approach to the evaluation was as follows:

- Circulation of a note to all funded projects that the evaluation was taking place. This provided both an introduction to the research and attached was a 'key project data' template[7] for contacts to complete in advance of being interviewed.

- Semi-structured telephone interviews with 17 lead contacts across 22 DH projects funded through the DHLF/WHF; this sample included 5 projects that received funding in recent months, on the basis that although the DH project itself may not have progressed substantially, recall of the application process would be fresh in the respondent's memory.

- Shorter telephone interviews with 4 lead contacts – covering 5 projects – whereby the project progressed to the DHLF Panel but funding was not taken up, principally to understand what has happened to this project subsequently and why, if funding was offered, it was not taken up.

- A paper survey of residents in areas where a DHLF-funded project has been implemented. This is yet to be distributed but will explore the benefits – financial or otherwise – of district heating to the household, as well as any issues and challenges arising. This survey was designed by Databuild but will be administered and analysed by the Energy Saving Trust.

- Interviews with a group of householders on a DHLF-funded project to obtain further insight into resident experiences of large DH projects.

- A focus group with DH project leads to discuss application and project delivery experiences, in particular as it was thought that a more discursive approach could encourage more openness and honesty around challenges and factors underpinning these.

- Analysis of the interview data and project impact data held by the Energy Saving Trust to calculate DHLF impacts – and satisfaction of those interacting with the Fund – to date, as well as projected future impacts.

The interview topic guides and focus group discussion guides can be found in the appendix to this report.

[7] See Appendices for the full template.

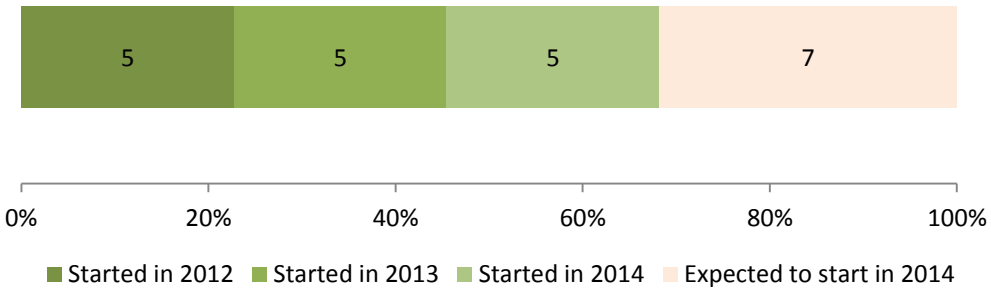
2 DH project profile

Although the application process meant that the DHLF team captured substantial amounts of data on each project, the survey provided an opportunity to supplement this. This section focuses upon some of the key findings.

2.1 DH scheme progress

All project leads were asked if and when the scheme had become operational; the responses are summarised in Figure 1:

Figure 1: Timeline of surveyed DH schemes becoming operational [n=22 schemes]

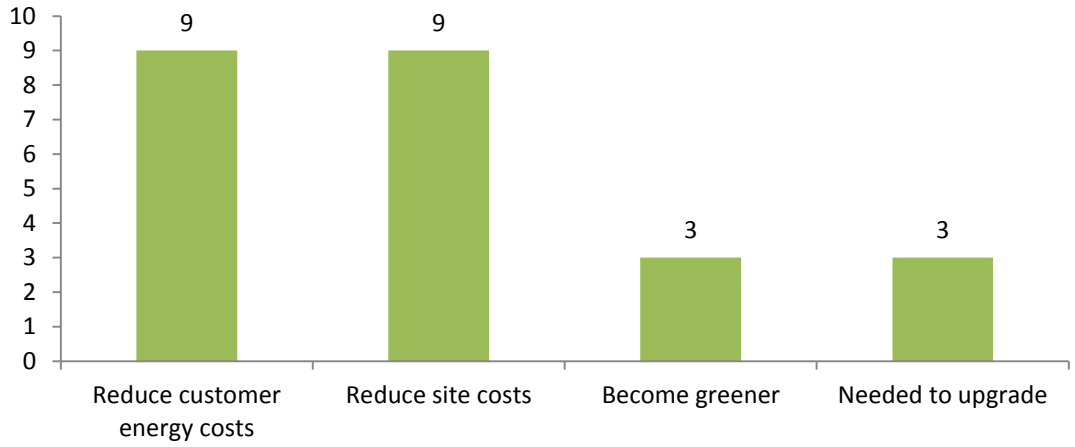


The majority of the funded schemes are now operational. The seven not yet operational mainly comprise those that only received funding in 2014, which is not unexpected. All these schemes are expected to become operational before the end of this year. Only one lead contact on these schemes felt that the scheme was behind schedule – they attributed this to a more protracted tendering process than anticipated for the construction work.

2.2 Drivers of DH schemes

All project leads were asked – unprompted - about what had originally motivated their organisation to undertake a DH scheme. Their responses are summarised in Figure 2:

Figure 2: Motivations for implementing a DH scheme [n=17 respondents; multiple responses possible]



Expectation of reducing costs – for the lead organisation, residents, or both – was the most commonly cited motivation, though three organisations also cited a commitment to sustainability. Reducing resident living costs was in particular a concern for housing associations.

"We have three sheltered housing complexes which have oil boilers and the cost for tenants has been going up year on year. We had seen a similar district heating project at another housing project and it seemed like a good option." [housing association]

"We wanted to upgrade the heating system. We were looking for a sustainable source of energy for the future and to keep costs down." [private business]

"We wanted to implement a green energy system; we are idealists and feel that green energy is the future." [private business]

"It's important for us to provide our customers with an affordable supply of heat as a number of them are low income." [housing association]

Whilst more a trigger than a motivation, three organisations needed to replace their existing systems anyway, which provided the opportunity to look for and consider a new solution.

Responses also highlighted several common enabling factors. Several respondents had seen other schemes in operation prior to even considering their scheme and these experiences seemed to highlight to them the benefits and feasibility of DH networks. Several also mentioned that access to their own wood fuel supply made DH seem more viable.

2.3 Scheme size and ownership

Scheme size varied greatly – from 543 separate properties to just 3. All but four schemes are providing heat for less than 50 properties. Nine were purely providing heat to domestic properties, four purely non-domestic and the rest a mixture. The scale of the scheme was almost always dictated by the geographical proximity and grouping of buildings to the location of the generation plant.

All the projects evaluated are delivered by one lead organisation with no delivery partners.

2.4 Technology selection

On almost all funded schemes (except one solar thermal with a back-up water to water heat pump system), the technology chosen was a biomass boiler. The principal reasons given by respondents for selection of this technology were the availability of supply and the relatively low level of system adaption needed from the previous conventional heating system. Another potential factor – stated by respondents – was familiarity with biomass DH schemes.

"We wanted a sustainable source of energy and to reduce costs; biomass seemed like the ideal option as we already produce our own woodchip." [private business]

"It was the most logical for the size of the project; carbon savings from wood chip are quite significant as well. We didn't do any studies as we have already put in a couple of smaller biomass boilers in the village, so we already knew how the technology worked." [third sector organisation]

"It's one of the easiest ways to heat the properties. The RHI at the moment makes it an attractive project. I was already well aware of the technology and had been to see other similar projects nearby." [private business]

On the one project using solar rather than biomass, the reasons given by the lead contact were as follows: *"We didn't want to use biomass boilers. I don't think there is enough woodchip supply locally and I think the cost will go up in the future. Also our site ground conditions weren't right."* [private business]

Of the 21 funded projects using biomass boiler technology, 17 are using woodchip and only 4 are using wood pellets. The reason given for selection of the former was that woodchip was less expensive (especially where the site owners had access to their own supply). Where pellets had been selected, the reasons given by respondents were that they had been advised pellets were a more efficient form of the fuel and easier to load.

11 biomass schemes are using external local suppliers, on 9 schemes the lead organisation owns its own supply and one scheme has access to both. No respondent had encountered, or envisaged – any issues with the reliability of supply.

The programme NPV spreadsheet influenced technology selection on four schemes, though it was used more widely to confirm the cost effectiveness of and endorse a decision already made on the DH technology.

None of the DH schemes were operating in conjunction with other fuels/technologies[8] though 12 of the 22 have back-up systems in place – 8 have oil fired heaters and 4 have gas heaters.

2.5 Funding received

The loans provided to the schemes covered in the evaluation averaged around £210,000 per scheme and ranged from £110,000 to the maximum of £400,000[9]. Only three organisations applied for and received the DHLF maximum amount. Figure 3 shows how the funding award aligned with the amount originally applied for:

Figure 3: How the loan received equated to the amount originally applied for [n=22 schemes]

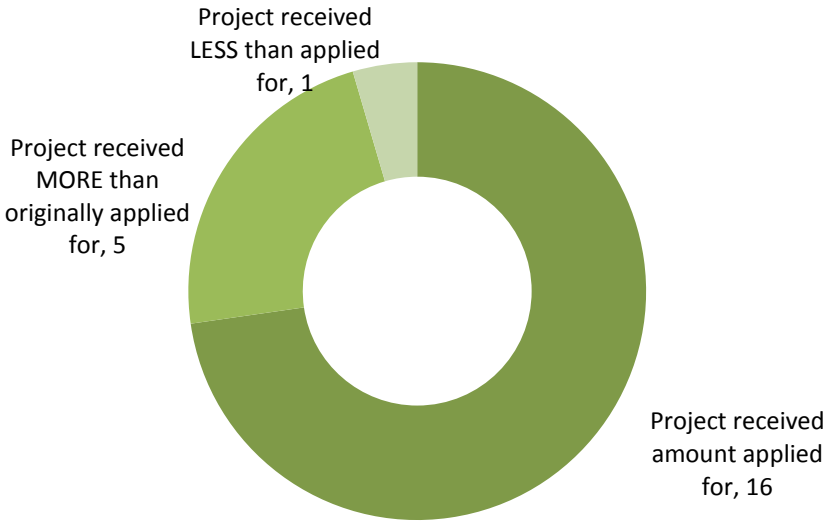


Figure 3 shows that most applications yielded exactly the amount applied for. Where they did not, it was more common for the project to be awarded *more* than originally bid for rather than less. This is because project progress concurrent to the application highlighted new additional costs that the applicants were allowed to account and seek funding for[10].

"This was what we initially applied for but the build was more complicated than we anticipated. We had to do a bit of extra building work and pipework, mainly due to the old buildings."[private business]

"It was just a few extra costs which were realised after the initial application. We originally applied for £195,000."[third sector]

"We originally applied for less as we initially thought we could get the rest of the funding from a bank loan. However, this proved difficult so we went back to DHLF and applied for more." [private business]

[8] Apart from West Whitlawburn – hybrid gas and biomass.
[9] One organisation bid for two rounds of funding on the same project and ultimately have received over £620,000. In addition, a WHF DH scheme received the maximum of £1.5m, but this was not a scheme covered in this evaluation.
[10] Organisations still had to re-apply for the increased amount. Scottish Government considered minor claims, but large increases were referred to the Advisory Panel.

For the one scheme receiving less than originally applied for, this was because they had much reduced the size of their project during the application process, meaning that whilst the full amount was offered, they did not need to use/take up the whole offer.

In terms of use of the loan, most respondents could not point to one specific project element for which the requested loan was required. Instead, the money was being distributed across multiple elements (design, implementation, procurement etc), though in all cases at least some of the money was being used for the installation capital costs.

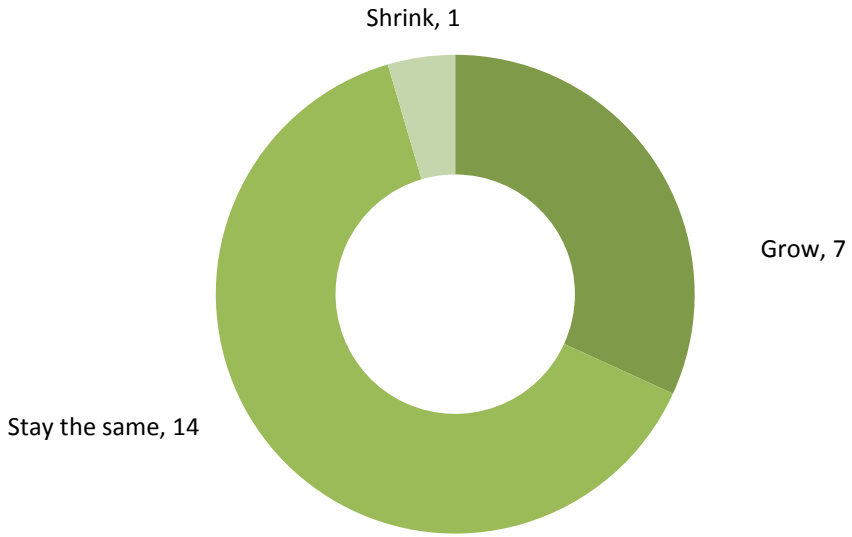
2.6 Scheme costs

Respondents were able to provide a fixed costs estimate for 20 of the 22 projects explored. As a result of multiple factors (including scheme size and lead organisation requirement for contractors), stated costs ranged from £90,000[11] to an outlier of £6.8m[12]; all other scheme costs quoted were less than £1m. The average scheme cost - ignoring the outlier - is £240,000.

Respondents were generally not able to provide detailed disaggregation of the costs. As might be expected, average scheme costs were higher than the average award, but there were two instances where costs were overestimated leading to the award being higher than the actual loan draw down.

On running costs of the DH schemes, respondents were asked whether they expected these to grow, stay the same, or shrink over the coming years:

Figure 4: Expectation of the level of scheme running costs in future years [n=22 schemes]



Most respondents expected their running costs to stay broadly the same as they are currently, though around one third expected them to grow. These respondents envisaged increases in the cost of the fuel and other aspects of the scheme in line with inflation. Two also expected maintenance costs to grow as time progresses (along with insurance).

[11] For a network of seven domestic properties.
[12] For a network of 543 domestic properties.

"The cost of wood pellets will increase year on year with inflation." [housing association]

"Raw materials and maintenance will go up a bit." [private business]

"Everything will increase with inflation." [private business]

2.7 Wider support

All respondents were asked about support accessed from third parties aside from the DHLF team.

In terms of financial support, most schemes were using DHLF and the lead organisation's own resources, though a small number have also accessed finance from banks or private companies with an interest in the scheme (N-Power was cited on two schemes).

On 18 of the 22 schemes the project leads had accessed wider design support and expertise. This was most commonly from the specialists / energy companies they were working in partnership with, though several sourced consultants outside of the project group. Selection was usually upon the basis of reputation and experience of having assisted on previous DH schemes.

Where respondents mentioned it, the type of support that was provided included advice on the layout of the scheme, how to make the system as efficient as possible, and feasibility testing (in particular in terms of the likely heat that would be generated).

2.8 Scheme customers

2.8.1 Number

As outlined above, scheme size (measured in numbers of customers) varies greatly from 543 domestic properties to 3 non-domestic. All but four respondents said they got the customer numbers originally anticipated; where they did not, this was only a variation of one or two customers, though did create viability issues for at least one scheme.

"We wanted one more residential property, but they opted out." [third sector]

"The one remaining house is currently still being built." [private business]

"We originally intended just three but there was a cottage nearby which made sense to include in the project; they were keen to be involved." [private business]

2.8.2 Selection

Decisions on selection of customers and therefore the scale of the project were almost always made on a geographical basis. The networks are usually of properties in close proximity, keeping the pipework and scheme feasible and the costs manageable. For landowners and housing associations, all properties within their ownership were included by default.

This meant that customer autonomy varied between schemes (generally only those where the properties were occupier-owned had an opt-out approach), though no respondent on a scheme where tenants had no choice in participation felt there was any significant dissatisfaction. In all cases there seemed to have been some form of pre-consultation and attempt to 'sell' the benefits of the scheme to the potential customers.

"We live in a rural, isolated area so it makes sense to connect the buildings together." [private business]

"We basically didn't have much choice; they were the buildings near us." [third sector]

"Three of the properties are our own but rented out so we made the decision; the tenants were consulted." [third sector]

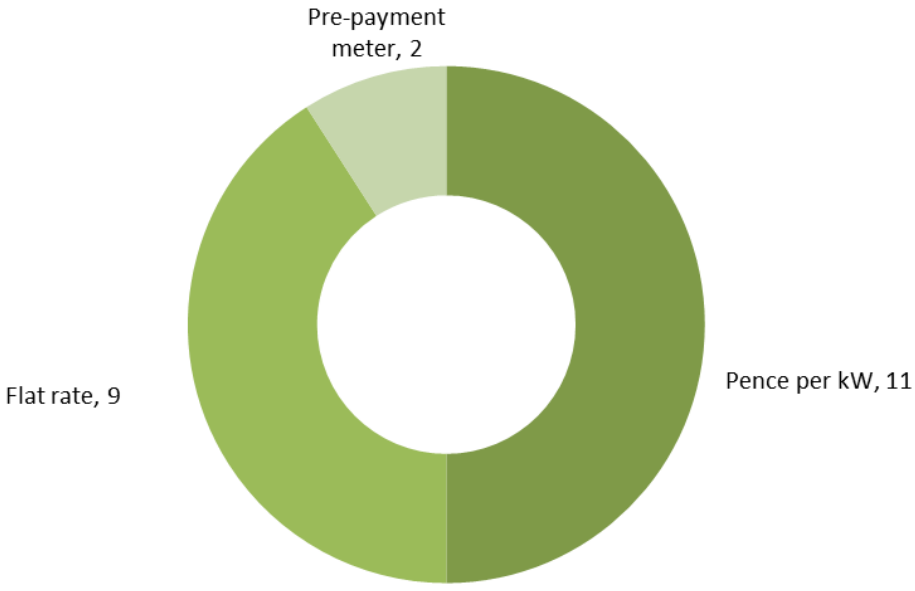
"They were existing tenants, it wasn't opt in. There was a generally positive response, though a couple of criticisms from people who were unsure how to use the new heating systems." [housing association]

In the project lead focus group, one participant emphasised the benefit of having both commercial and non-commercial customers in a network to balance risk in terms of demand.

2.8.3 Charging and contracts

All respondents were asked how they were charging – or expected to charge – the scheme customers for heat used:

Figure 5: Current/expected charging approaches on DH schemes [n=22 schemes]



As Figure 5 shows, most project leads are planning to charge on a pence per kW basis; rates ranged between 3p and 5p.

Although few operate such a system, participants at the project lead focus group advocated the reduced administrative costs of chasing bad debts as a result of pre-payment meters:

"*Our strong preference is… any customer that come along now goes onto pre-paid with a meter. And then, in one stroke, you deal with your revenue collection, your bad debt issue and, interestingly enough, the majority of customers we have on a meter actually prefer it*." [private business]

Those participants not operating pre-payment systems also worried that there is no incentive for domestic customers to use less energy if they pay a flat rate. However, some organisations have a goal of sustaining heat use. One participant - a social housing provider - said that a low flat rate fee benefits vulnerable/fuel poor households that would otherwise turn their heating off in order to save money.

On 16 projects a contract has been established with customers, though in cases where the customers are tenants of the lead organisation, obligations relating to the scheme are being included in the tenancy/leasing agreements rather than as a separate contract. On two projects there is not yet a formal contract in place but there is expected to be, whilst on four there is no expectation of a formal contract. The information covered in the contracts includes:

- A guarantee of supply
- The charging approach being used and – where applicable – when and how this will be reviewed[13]/increased.
- How long the contract will run for; in some cases, this is up to twenty years.

2.8.4 Independent Heat Customer Protection Scheme

All respondents were asked about this scheme. Only two were aware of it[14], though both viewed it positively:

"It should provide more confidence and promote confidence in the sector." [private business]

"It's good because things were unregulated before. It is voluntary and we will look to sign up to it." [third sector]

[13] One organisation are guaranteeing that the pence cost per unit will always be less than current LPG costs by a set margin and plan to review this annually.
[14] Both relatively large projects covering in total 225 domestic properties and 4 commercial properties.

3 Experience of delivering the DH schemes

As well as being asked about the design and set up of their scheme and associated charging and contractual approaches, respondents were asked about the experience of implementing and managing their schemes. The aim of this was to identify potential areas of support for future DHLF rounds as well as highlighting instances of good practice in addressing or avoiding challenges.

3.1 Installation

On all but one project (operated by a company specialising in the technology), the lead organisation brought in contractors to install the DH system. Some procured multiple contractors (e.g. one for the ground work/digging and then specialist technology suppliers, though some found this complicated the process) and some allowed their main contractors to further sub-contract without too much oversight.

Most respondents said that they found it easy to source the required contractors and skills – some had contacts from previous projects and several found enough potential suppliers to set up a competitive tender.

Similarly, most respondents felt that the installation process had gone as smoothly as could be expected and praised the contractors. Respondents noted that the work was particularly easy where there was already infrastructure set up for a network (so they simply had to link up the new system) and where the ground to lay pipes was soft.

"This was a new build and we used guys on the framework which we had used before, so they were easy to find; they sub contracted some of the specialist work." [housing association]

"We had a very good local civil engineer who dug up the required areas. His team were very good so there were no issues." [private business]

"Because a plant room and distribution system were already there, we just connected the new system up." [housing association]

Issues cited by respondents regarding installation ranged in severity, though most seemed to have been completely resolved at the time of interview; these issues included:

- A scheme where the contractor initially left the connecting pipe spurs outside, creating a heat loss, and valves not closing properly and also causing a heat loss. The first issue has been resolved and the second is currently being resolved.
- Several schemes where installation took place during cold and wet months, which made it difficult to manage heavy equipment and machinery and in one case caused pipes to burst during installation.
- One scheme where the ground proved very rocky in parts and delayed installation.
- Several schemes had challenges around retrofit, especially one dealing with old buildings (where the structure had to be reinforced prior to pipework being laid).
- Build up of dirt in a pipe on one scheme, which had to be cleaned out once it had been put in. This caused delay.

- Complications and costs in connecting new pipework into existing older systems not necessarily designed with expansion in mind.
- One scheme where the installers came across some large gas mains under the main building. This had to be moved and delayed the development by an estimated two months, as well as costing about £25,000.

3.2 Metering

All respondents were asked about the metering on their DH schemes. Most (19 out of 22) schemes have a meter per property; one scheme is working towards this and two just have a meter at the central building.

Where schemes have meters per property, no issues were reported with installing these except that it can take time and creates costs.

3.3 Customer management and satisfaction

3.3.1 Organisation perspective

All respondents were confident that the customers connected to the DH scheme were satisfied with the process and scheme going forward, though for schemes yet to become – or only just becoming – operational, the respondent acknowledged that it was difficult to yet tell. The potential cost/bill savings were the main reasons given by respondents for this customer satisfaction; increased reliability, efficiency/performance and impressive technology were also cited but each only by one respondent.

"They have been very satisfied. For a typical property it saves them approximately £200 per year." [private business]

"They have been very happy with the scheme so far. Once the system is in place they will have more heating, currently their heating is very unreliable." [private business]

"They have been pleased with the idea of lower energy costs." [private business]

"Satisfied I think, but we will have to wait until the first bill!" [private business]

Although not common and usually fairly minor, customer issues/dissatisfaction included:

- Some initial concerns about the level of construction work required and the resultant disruption.
- Protracted negotiations as to where in the domestic properties meters are installed
- Problems with the system i.e. occasional leaks and the system unexpectedly shutting down for a couple of hours.

When asked about the extent of engagement with their customers, most participants in the project lead focus group admitted that it had been limited or irregular (though at least one said their communication had been substantial and included a field trip to another scheme). Participants tended to feel that customers are not interested in engaging unless there is a problem to resolve; participants tended to agree that they should invest more time communicating and engaging with

customers but that this often seems to be less critical than operational issues associated with managing a DH scheme day-to-day.

"*The reality is you are viewed as a service and a service that [our customers] would prefer not to think too deeply about because, let's be honest, there are more important things in peoples' lives than heating. So what they really want is a service where they know what it's going to cost them, they are confident it's going to give them value for money and it works. If you do all of those things, it is a quiet life for everybody."* [private business]

Participants were asked whether they had sought or received any advice from the DHLF on how to communicate with their customers; none had done so.

3.3.2 Customer perspective

EST are distributing and will be analysing a quantitative survey for all DH project customers to explore their experience of scheme installation and subsequent benefits or issues. To complement this, seven face-to-face interviews were conducted with customers of the Wick project across a range of demographics, exploring in more depth their experience of the whole process.

Whilst the Wick scheme was unusual (in the sense that the current managing organisation took over a pre-existing DH scheme from the council and built upon it) it provided a good example of a fairly large-scale scheme and of biomass technology.

Overall, customer satisfaction with the scheme – i.e. the costs, beneficial impacts and support provided - appears to be high.

"*It has been brilliant. That's the only thing I can say. It's been the best heating we've ever had*".

"*They [Ignis] always notify you. And they won't charge you if they are doing maintenance. They are good like that*."

"I haven't had many dealings with them [Ignis] because everything has run fine".

"*It is good value for money; that is all I can say."*

Conversations with both the customers and Ignis – which operates the DH scheme – identified several activities and approaches that may have helped to ensure this high satisfaction:

- **A considerable amount of consultation by Ignis with the existing customers at the time of scheme takeover and subsequently** Ignis initially distributed a postal survey to existing domestic customers to assess their willingness to remain in the scheme. When the postal survey yielded a poor response rate, the directors of Ignis conducted a door-to-door survey, as well as providing a Q&A session (though this was not well attended).
- **Deployment of incentives in addition to 'selling the benefits' of scheme participation** When Ignis took over the scheme, householders were given a choice to remain in the scheme or to have gas installed by the council. They were advised that the cost of their heating would be

cheaper if they remained in the scheme and were also offered £50 in cash or £100 of credit as an incentive for doing so[15].

- **Ad hoc availability** Ignis representatives frequently check in with the customers to make sure there are no issues (the general manager lives in the area) and as one customer stated Ignis are "*always at the end of the phone if we need them.*" In certain cases Ignis will collect payment from the household if the occupants have mobility issues.
- **Flexibility on payments** Whilst Ignis made it obligatory for customers with poor credit history to move onto a 'pay-as-you-use' meter, they allowed those with good credit history to remain on the original fixed monthly payment contract and also allow a small 'emergency credit' for any household if they trip over the limit. All types of payment can be made at local shops.
- **Good management of repairs/maintenance** Whilst Ignis do require the system to be switched off several times a year for maintenance works, customers said that they were always notified well in advance.
- **Swift resolution of issues** Where customers had encountered issues (e.g. a leaking hot water pipe) they said that this had been fixed *"very promptly"* by Ignis.
- **Realisation of benefits** The cost saving and heating benefits promised to customers by Ignis are being realised, as well as wider benefits not originally expected. These latter are discussed further in section 4.3.

The one concern customers still had was the viability and so longevity of the scheme. This may be limiting appetite for joining such schemes across the country, though the same customers noted that many of their friends and relatives wanted to join.

[15] Ignis retained 164 of the original 250 customers. Customers report that there a number of their friends and relatives want to access the scheme, though Ignis have stated that they could not expand to more domestic premises without further funding.

3.4 Key barriers and learnings

In order to capture all potential learnings from those that went through the experience of delivering a DH scheme, project leads were asked:

a. What – if anything – had been a key barrier to the progress of the scheme. Respondents were split equally as to whether they felt there had been any barriers. Where they did not think that there had been any barriers, they were asked to articulate what design decisions, factors, characteristics and/or elements of their scheme had ensured no barriers arose.
b. What – if anything – they might have done differently if they were to start the process again from scratch. Again some respondents did not think they would have done anything differently.

The responses provided are summarised in the table below to highlight what seem to be important 'success factors' and what appear to be 'risk factors':

Table 1: Key scheme success and risk factors [drawn from responses on barriers and learnings]

Success factors	Risk factors
Conducting in depth research into DH schemes in advance of project design and implementation; benefits of this included identifying existing schemes to learn from, signposting of contacts and building knowledge of technical elements of how the system is installed and operates (enabling better contingency planning and realistic project planning). *"We did a lot of research and found somebody who had done something similar; we were fortunate that these people were able to share with us what they had done and what we should expect. They put us in touch with a company (Energy Works) which we would never have heard of, they were brilliant."* [private business]	**Potentially insufficient pre-planning and research;** although not cited by respondents, one respondent felt scheme issues were due to poor contractors being appointed and another seemingly only began to appreciate the full costs and likely payback of the required retrofit once work had started. *"The houses being old which meant they needed extra work. This delayed the project by about 2 months."* [private business]
Collecting baseline data on the properties involved in the scheme; this ensures that data such as peak demand can be ascertained and so the viability and impact of the technology more accurately assessed. *"We researched the technology and buildings being connected so we knew whether the technology could cope. There were no surprises."* [private business]	**Not having/providing sufficient information on the scheme**; as well as this affecting DHLF applications (see sections below), it affected a number of key stakeholder interactions for some schemes. *"Getting the system approved by the local environmental health department, getting all the technical data and air quality monitoring done. The problem was the time it took, it delayed things by four weeks."* [private business] *"Unexpectedly encountering the gas main, which we had to move, costing us £25,000 and delaying the project by two months."*

Excellent contractors; as stated above, most scheme managers brought in experienced contractors to deliver key elements of the work (where they did not, this was usually because the lead organisation themselves had the expertise in-house).	**Selecting the wrong contractors;** several respondents felt that their selection of contractors could have been better; this was attributed to deciding to work with the first company they found or lack of knowledge of others. *"I think in hindsight it's very important to use a local contractor; you often have about five emergencies to deal with in the first year, so you need your contractors to be local."* [private business] *"We are a small organisation without much expertise/knowledge in this area. We relied on other people's expertise and were let down. We also encountered problems with the installers who did a poor job and the system is not very efficient, with a number of heat losses."*[third sector]
Early and frequent customer liaison; this has helped scheme managers to build customer understanding of – and trust in – the technology, as well as ensuring early buy-in and managing expectations and concerns. *"Keeping the tenants as informed as possible and explaining the technology clearly has helped to prevent any surprises."* [private business]	**Not winning and securing customer support;** several scheme managers reported that this had been challenging and that they were regretting not creating a more formal contract to better manage the relationship. *"Winning the support of residents. One main concern is that most residents have said yes, but we have no contract with them, so they could turn around and say no, which adds risk and uncertainty."* [third sector]
Efficient project management; several respondents felt that not involving too many organisations at a management and coordination level in schemes prevented delays.	**Managing the scheme alongside other commitments;** this was particularly a challenge where the lead organisation and its representatives were not a specialist company but were a housing association or community trust with other priorities (either personal or organisational). *"We were doing these projects at the same time as our normal jobs, so it was time consuming and perhaps delayed things a bit."* [housing association]
Restricting installation work to times of the year where good weather can be expected. *"Everything has ran smoothly; a key learning would be to fit the system in the summer when the weather and ground conditions are better."* [private business]	**Poor weather;** several schemes suffered from delays and on site issues relating to poor weather during installation stages. *"We wouldn't install the system in November if starting anew; we had some difficult ground conditions. It should be installed in the summer."* [private business]

All participants in the project lead focus group endorsed the idea that it is vital for new projects to "do their homework" by commissioning a good feasibility study, ensuring the assumptions underpinning their business plan are sound.

Regarding barriers encountered, no respondent said that they had sought DHLF support to address these and most did not see how the DHLF could have supported them on the issue. Indeed, only three respondents thought they would have benefitted from any sort of external support at all in relation to the barriers cited.

"How do you see the unforeseeable? I'm not sure there is any support that could be offered with regards to solving issues that arise with residents such as where the meters are positioned." [third sector]

Specific to the potential for further DHLF support, several respondents said that this could be valuable in providing more money should they seek to extend the scheme. One respondent felt that they would have benefitted from a step by step guide covering each stage of the project. They said that they would also have valued more technical and legal expertise, or at least signposting as to where they could obtain this.

4 Impact and attribution

4.1 Comparing anticipated and actual scheme impacts

In terms of their expected technology and customer size, almost all projects have been delivered as anticipated.

The impact of each scheme is ascertained by entering the boiler efficiency percentage into EST impact calculation formulas. This was done at the outset based upon anticipated efficiency percentages. Based upon the responses provided to the evaluation survey, the table below shows the anticipated and actual scheme impacts where schemes have become operational and therefore boiler efficiency has been ascertained.

Table 2: Anticipated and realised scheme impacts [n=14 operational projects]

Scheme	ANTICIPATED		ACTUAL	
	Boiler efficiency	Scheme impact (tCO_2 per annum)	Boiler efficiency	Scheme impact (tCO_2 per annum)
Angus College	90%	200	92%	204
Balgray Estate	90%	75	90%	75
Blackhill	90%	189	93%	195
Brae	90%	202	93%	208
Camaghael Community	90%	58	94.5%	61
Colstoun Estates	92%	96	94%	98
Combie Court	90%	92	91%	93
Comrie Development Trust	90%	133	65%	96
Dunbeg Corridor	90%	206	85%	195
Mull	90%	200	85%	189
Queen Elizabeth Court Fettercairn	95%	121	92.3%	117
Stevenson	92%	50	94%	51
Wick	90%	600	85%	567
Yell	90%	146	93%	151
OVERALL		2,368		2,300

The table shows that across all schemes where the comparison is possible, actual impact is 97% of the predicted impact. If this percentage is applied across all funded projects (both those that were not included and those not yet operational[16]), the impact that will be delivered is 4,271tCO_2 per annum.

Various factors causing inefficiencies were cited (e.g. seasonal demand for heat and the use of variable heat pumps or accumulators), though there was also a general sense in the focus groups

[16] Each of which is assumed here to generate the average (from the table) of 164tCO_2 per annum.

that the manufacturer quotes may be absolute maximum and so unrealistic. Participants tended to agree that it is extremely difficult to optimise scheme efficiencies.

"L*osses in DH systems are a fact of life; it's just going into it with your eyes open."* [private business]

The impact of lower than predicted efficiencies on schemes has been slower returns on investment for the lead organisations and, in at least one case (Comrie Development Trust), the inability to pass savings onto customers in the short-medium term as originally intended.

4.2 Attribution of scheme impacts

To ascertain the importance of the DHLF to their scheme, respondents were asked whether or not the scheme would have gone ahead without the DHLF funding. All but one respondent said that their scheme would not have gone ahead without the DHLF funding. The remaining one stated that it saved them both time and money*: "my payments will be less as a result of the loan, this has enabled me to charge less to my customers for fuel."* [private business]

The reason given by all respondents who said that the project would not have happened without the DHLF was that they would not have been able to obtain the required level of funding from another source to make the scheme deliverable.

"We wouldn't have been able to get the funding from elsewhere, the bank were not going to give me that level of loan." [private business]

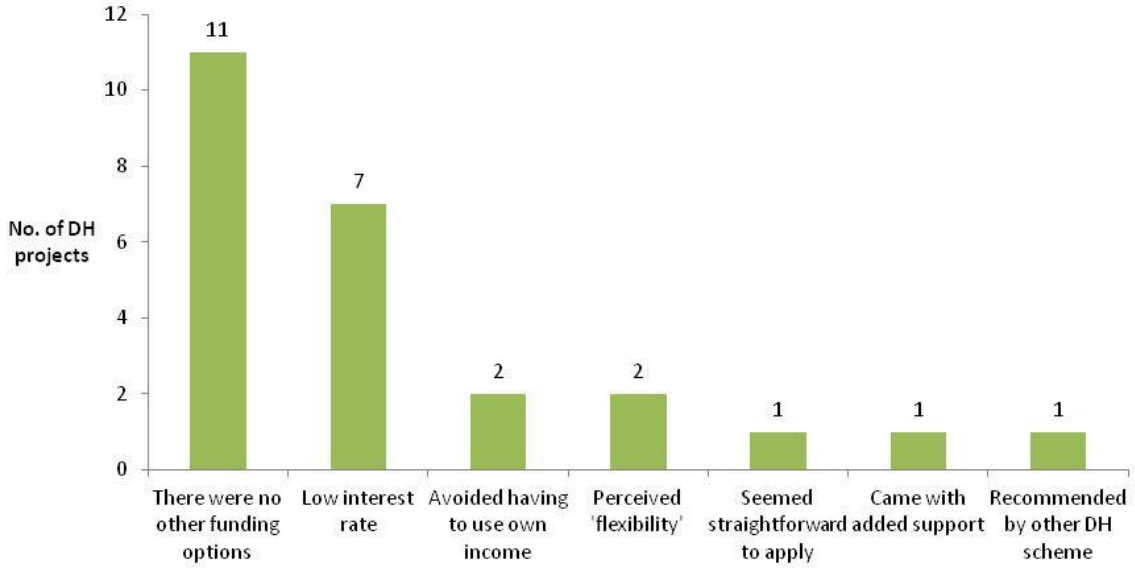
"We wouldn't have been able to get the finance from elsewhere." [housing association]

"We couldn't have funded it ourselves and funding from elsewhere wasn't an option as interest rates would have been too high." [housing association]

The attribution responses above would mean that impacts from all but one funded project should be attributed in full to the DHLF. However, whilst some had been rejected by commercial lenders as 'too risky', some explanations of attribution were less clear cut and imply that respondents may have been slightly overstating how crucial the DHLF was. Several stated in their explanation that they had not actually investigated any alternative sources of finance but simply speculated that it would have been too difficult or expensive (in terms of interest on repayments) to take finance from another source.

All respondents were asked separately about their motivation for applying for the DHLF and their responses further indicate that assuming projects would simply not have happened without the DHLF may have been too generous. Figure 6 summarises the extent to which different reasons for applying were cited by respondents in their answers:

Figure 6: Extent to which different factors motivated organisations to apply for DHLF support [n=22 projects]



As the chart shows, whilst it was the most commonly cited reason for applying, half of respondents felt that they would not have been able to get funding from elsewhere. Several clearly stated that they *could* have used alternative sources but wanted to use the DHLF due to it being a much better deal and/to avoid having to dip into their organisation's reserves.

"It was a low interest rate. I guess I could have taken out a finance deal, or there may have been ways for me to finance it myself, but the loan obviously made it a lot easier." [private business]

"I probably could have funded it myself but it would have meant using the income generated from the farm and would have put me in a more difficult situation." [private business]

"We needed some capital and the low interest rate really attracted us. We do have a source of income, but we wanted to do this project as much as possible without dipping into those reserves." [third sector]

"The interest rates were very desirable and I felt it was more flexible than a bank loan." [private business]

The project lead focus group explored attribution in more depth, establishing that several participants had investigated commercial lenders/finance and discussed offers but found the levels of interest or personal guarantees required to be unpalatable. The general insistence in the group was that none would have progressed without the finance.

Overall, the survey responses indicate that in many cases the organisations could have accessed – and in some cases were in the process of accessing - finance elsewhere, albeit this would have made the process more challenging. Therefore for 11 of the 22 projects, the DHLF influenced the scheme rather than being essential to it.

The following table and commentary explains what this means for understanding attributed impact:

Total annual impact across all funded projects	4,271tCO_2
Total annual impact *influenced* by the programme	4,271tCO_2
Total annual impact *to which the programme was deemed crucial*	2,385tCO_2

- As the DHLF was deemed crucial to 11 of the 22 schemes evaluated, we would assume that it would have been crucial to 13 schemes in total *if all 26 schemes had been evaluated*.
- Of the 14 projects for which impact calculation was possible, 9 would not have happened without the DHLF, equating to 1,729tCO_2 (75% of impact achieved across the 14 projects)[17].
- In extrapolating to the total number of projects to which the programme was crucial (i.e. rather than just those for which impact calculation was possible), we have assumed a cautious per project impact of 164tCO_2.
- Applied to four projects, this requires adding 656tCO_2[18] to the 1,729tCO_2, meaning the DHLF has been/will be crucial to extrapolated annual impacts of 2,385tCO_2 in total. This equates to 56% of achieved impact across the whole funded population.
- The remaining 44% of achieved impacts would still have been influenced by the DHLF even though it wasn't essential to those, meaning all 4,271tCO_2 per annum was influenced by the programme.

4.3 Impacts and benefits observed by customers

"I am one of the few people who doesn't have to eat or heat".

Customers of the Wick scheme were asked about the extent to which the scheme had delivered the anticipated benefits to them.

4.3.1 Cost savings

A few customers had been sceptical about the promised cost savings. In fact, almost all reported that they had achieved savings, albeit none specifically compared their achieved savings to the amounts promised or the percentage expected by the DHLF team. Some did not have a clear idea of the level of their savings but knew they must be achieving some due to the prices being cited by non-participants they know. Examples of responses around achieved heating cost savings were as follows:

- Respondent A felt that their heating is significantly cheaper than other forms of energy; their view has been informed by discussions with their neighbours who complain of (ever increasing) gas bills.
- Respondent B reported that their heating costs have declined since they joined the scheme and that the cost was considerably less than gas or electric.

[17] The DHLF tended to be most important for larger schemes i.e. the average impact per project to which the DHLF was crucial is 192tCO_2 whilst the average amongst those to which it was not crucial is 114tCO_2.
[18] Due to the average of 164tCO_2 per project being applied to 4 more projects, covering 2 not yet operational that attributed in full and 2 non-evaluated projects that it is assumed would have attributed in full if interviewed.

- Respondent C reported considerable cost savings in the region of £150 per year, though they mainly attributed this to the absence of standing charges associated with this scheme.
- Based upon conversations with friends and family, respondent D was sure that the scheme is cheaper than gas or coal.
- Since they have been part of the scheme, respondent E has seen the price of a bag of coal (which they previously used) increase from £13.50 to £20.00, compared to a fixed weekly cost of about £10.
- Respondent F worked out that their heating costs are about £8-10 per week, but noted that some of her friends are paying as much as £30-40 per week; "*they [my friends] think I have lots of money, but they don't realise how much money I am saving with this heating*".

Some project lead focus group participants (particularly those representing community groups) stated that the communities they serve are now more resilient because (a) they are not exposed to volatility in fuel prices and (b) they have a more powerful voice when negotiating price increases with their supplier.

Only one respondent was not certain about having made a saving. They said that in fact their monthly charge has increased slightly, though they acknowledged that this may have been to a far lesser degree than cost increases for other fuel types.

Aside from this, one respondent was worried that the large savings she was making on heating would mean she would no longer qualify for the winter heating fuel allowance.

4.3.2 Wider benefits

Customers were also asked about any other benefits aside from reductions in heating costs.

Linked to cost savings, two respondents said that the provision of meters as part of the scheme had helped them to monitor usage carefully. In addition, several respondents felt that heating cost reductions had been enabled because the new DH system was much more efficient than the previous one; this is exemplified by a household that had used storage heaters to heat a couple of rooms, whereas they now find the new system can heat the whole house in less time and with less cost. One respondent uses less energy now because their house is now warm enough to dry clothes in, negating the need to use the tumble dryer.

"*It's a lot warmer. I don't know how but the heating seems to come on more quickly and last for longer once it goes off*"

Several respondents noted that the water provided through the DH system is always very hot and doesn't run out, though one commented that it was too hot.

For most respondents this is a comfort benefit, though in one case there were potential health benefits - the occupants relied on the heating because one household member is immobile and feels the cold much more keenly. Regarding health benefits more generally, Ignis believe that the scheme has reduced condensation and damp issues in domestic properties, providing significant benefits to residents' health and wellbeing. However, it should be noted that previous issues with damp etc were not recognised by any of the interviewees.

In the project lead focus group, some participants reported that wider benefits recognised by commercial customers included a reduction in CO_2 emissions and using a renewable source of energy. They felt these provided CRC (carbon reduction commitment) benefits for some clients and/or marketing opportunities, though did not cite examples to show that they had received specific feedback about this.

Wick domestic customers were asked about their perceptions of the environmental benefits of the scheme i.e. using sustainable fuel sources. Some customers were not aware that the DH scheme was more environmentally friendly and most said that they were not particularly concerned about this, though one respondent not previously aware of this was pleased to find this was the case. Overall, customers saw the environmental aspect as good but for none was it a motivation for joining the scheme.

One respondent said that they were pleased that the scheme supported local businesses rather than large energy companies. This was a benefit echoed by the project lead focus group participants; one explained that investment in their DH scheme goes into the local economy (including engineers, forestry companies, contractors, designers, etc.)[19].

[19] There were calls for research to be commissioned on this issue to strengthen the case for supporting the DH sector.

5 The DHLF process

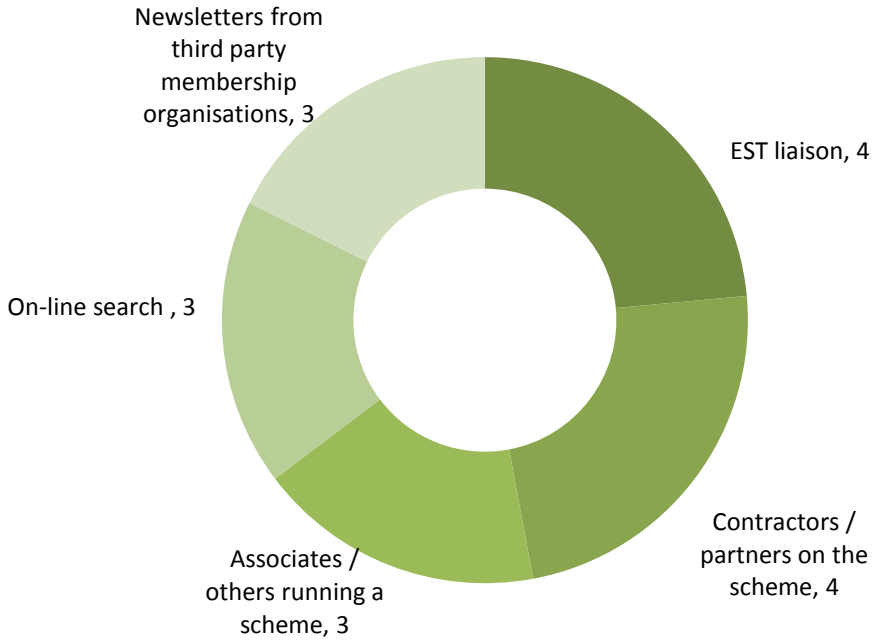
"It has been very valuable, it's been an easy process. The interest rates are good, the help from Ken has been good. It's made us relaxed loaning the money from them rather than a bank." [third sector]

All respondents were asked about their experience of and satisfaction with various aspects of the DHLF; responses are summarised in the sections below. Overall, satisfaction with the programme is high, though the evaluation has highlighted some potential opportunities for improvement.

5.1 Discovering the DHLF

All respondents came upon the DHLF as they were searching for finance for the scheme, rather than the existence of the DHLF precipitating interest in this type of project. Figure 7 summarises the different ways in which they became aware of the programme:

Figure 7: How applicants became aware of the DHLF [n=17 respondents]



The chart shows that there is no one channel through which organisations have usually accessed the DHLF. EST liaison includes a seminar, a follow-up to discussions with EST about domestic boiler loans and discussions at a Scottish Government meeting.

5.2 The application process

Respondents were asked about their level of satisfaction with three aspects of the application process. Their responses are summarised in the table below:

Aspect of the application process	Overall	Any issues encountered?	Sample responses
Clarifying eligibility for the loan.	Deemed to very straightforward and EST were helpful when required.	One applicant wasn't clear from the outset exactly what types of cost were eligible, which led them to hire an independent assessor only to find the loan would not cover that. Although not an issue of clarity, some focus group participants were not supportive of the emphasis upon having domestic customers.	*"It was easy, I was e-mailed the information and within a day I had sent an application form off. A couple of days after that they replied letting me know that it seemed like an eligible scheme."* [private business] *"Ken was always available if I had any questions but there was nothing specific that I struggled with."* [housing association] *"EST couldn't have been more helpful, they were easy to contact and the information was clear."* [private business]
Sourcing the information requested to be included in the application	Mostly deemed to be straightforward, though applicants were more reliant on partner organisations here and several struggled with specific aspects.	One organisation struggled with the required technical information so had to seek an outside consultant to support them. Another organisation found their installers unwilling to spend much time supporting them on the application so struggled to complete it.	*"I had most of the information already as I was developing the project myself and was aware of the technical specifications."* [private business] *"I would have struggled to fill it out on my own; [the consultant] did all of this for me."* [private business] *"No problems; we have our own technical team who are good with that sort of information. If we had a problem we would just contact Ken. There was nothing specific, just general queries/checking things."* [housing association]
Level of support provided by EST during the application process	Some did not seek much if any of this support but where they did all but one found it helpful and met their needs.	One organisation found the NPV form difficult to read, didn't fully understand it and would have liked more help on that. The same organisation also felt that they had run into difficulties on the project through EST not detecting an erroneous 'predicted efficiency' figure in the application (provided by the applicant's consultants).	*"EST were always available to speak if we had any questions."* [private business] *"It was very good; if I had any queries I could call them up."* [private business] *"It has been first class; I think we have built a good relationship with them. They are always available if we have any small queries."* [housing association]

Some organisations said that they found the application process overall very straightforward, yet did caveat this by saying that they had involved consultants in some or most of the application work (which may have been a reason why they did not require EST support).

"I had help from an outside agent. I would have found it all very difficult without that help. My knowledge of the more technical elements of a district heating scheme is quite limited." [private business]

"It was easy in that we used an agent; some of the technical information regarding the boiler and heat network would have been too difficult for us to handle ourselves as this is not our expertise." [private business]

Feedback from the project lead focus group was that:

- The timeframe for submitting applications was too short and might not allow for sufficient due diligence[20], though conversely others felt it got schemes off the ground quickly where other programmes have been too slow/bureaucratic.
- It would be helpful for EST to recommend good consultants/suppliers to advise schemes during the planning and development phases; this is not possible due to the public status of EST and the programme.

5.3 Loan administration

All but one respondent felt that the timing from application to decision was reasonable; the one respondent had to wait for three months and this delayed their project: *"I think an ideal amount of time would be six weeks."* In the focus group, it was generally agreed that it would be useful for organisations to have more time to spend the loan once awarded.

In terms of the repayment process, some schemes are yet to commence this but where they had, most respondents felt that this was working fine.

"It has been seamless so far; I have not heard from the finance department about any problems." [housing association]

"It has been very straightforward; to date the payments have gone out in line with the figures suggested." [private business]

"It's been fine, no problems; we just have a direct debit set up." [private business]

A small number of respondents cited initial issues with the process but these seem to have been resolved and usually served to impress the respondents as to the flexible and supportive nature of the programme. In the focus group, one participant felt that repayment schedules should be sympathetic to schemes with variable cash-flow across seasons, though this is something EST are already happy to negotiate on.

[20] Linked to this, several participants felt it would be useful for the programme to require seasonal rather than annual revenues as these vary greatly depending upon temperature.

"Generally with loans you carry out the capital work and begin repayment once income is generated. We won't be generating income until November, but the repayments begin in October." [private business]

"We have struggled to meet repayments at times due to the problems encountered with the installation. But they have been very flexible with us and gave us a six month loan repayment break." [third sector]

"There was a small bit of confusion with the way that the interest was calculated - which was more like a car loan rather than a mortgage - but that was easily resolved." [housing association]

"The only issue is that it gets paid after you've generated an invoice, so for large projects and smaller companies there is a potential cash flow issue. This wasn't an issue for us though." [private business]

"It might have been a good idea for the repayments to be lower in summer time when we aren't making as much money (due to lower energy demands)." [private business]

5.4 The loan conditions

To understand the potential for the DHLF to support larger schemes, all respondents were asked whether or not they would have bid for >£400,000 if the available loan per scheme had been higher. The actual bids made (just three asked for the maximum of £400,000) indicate that they would not have, and this was borne out in responses to this question, with only two respondents stating that they would have applied for more:

"I needed an extra £100,000 which I got from the bank. I would have preferred to get it from EST due to the better interest rates. I also think the EST are more trustworthy." [private business]

"We would have applied for £800,000. It would have meant we could have considered doing more things and could have increased the size of the network." [private business]

However, in the project lead focus group, one participant suggested that EST or Scottish Government should enable greater access for private companies to access the WHF (at higher levels of funding).

Respondents were then asked how they thought larger DH schemes could be encouraged (either by the DHLF or more widely). Many did not feel able to suggest a policy or approach to achieve this, on the basis that their own was as large a scheme as they would be interested in undertaking. A small number of respondents made the following suggestions:

- That that the effective cost of schemes could be reduced if the timeframe for repayment was extended.
- Greater marketing and promotion of schemes like the DHLF.
- Greater promotion of the range of potential schemes and technologies to broaden the horizons of those considering undertaking schemes.

6 Projects not taking up the loan

Interviews were conducted with four lead contacts – covering 5 projects – whereby the project progressed to the DHLF Panel but funding was not taken up, principally to understand what has happened to this project subsequently and why, if funding was offered, it was not taken up.

The table below provides a summary of these findings for the schemes followed up; generally lack of take up was nothing to do with the DHLF (respondents were satisfied with the programme) but more to do with wider considerations of costs and return on investment. However, there was one instance where a change in DHLF conditions might have enabled the scheme to go ahead.

Table 3: Reasons for non-take up of the loan and subsequent scheme progress [n=4 respondents]

Scheme	Reason for not taking up the loan	Subsequent scheme progress	Views on the DHLF
1	Unexpected arising of new costs significantly extended the likely payback period of the scheme from six to ten years and "basically scared" the scheme manager. New unexpected costs were principally the need for new buildings to house the boiler (not in the original plan)	Discontinued; no further progress and no revival of the scheme is expected	Positive; they found it easy to source the requested information for the application and eligibility was made very clear to them.
2	Further investigation of scheme costs made the scheme manager realise that the scheme would not be cost efficient.	A subset of the properties that were going to be connected ended up putting in a new boiler (not biomass) of their own. There are no plans to re-start the project.	Positive; the application process ran smoothly.
3	The scheme initially had twelve months to spend the loan money and this was revised down to just nine months soon after. The respondent felt that eighteen months would have been needed based upon their organisations plans for housing re-development. On that basis the loan was not used.	Instead of a DH network, all properties in the redevelopment are individually heated by gas boilers. The organisation needed to get tenants into the houses and didn't have time to go through the application process again or try and set up a DH network.	Mixed; found it easy to find out about eligibility and the additional information required was clear and straightforward. The organisation struggled with the projected running costs and savings - "it was hard to make those kind of predictions" – and would have benefitted from a longer period in which to claim the loan.
4 & 5	Scheme 4 was large and got to the point when it was about to start. The organisation had anticipated ECO funding but that was greatly reduced. There was also an issue with one of the	On scheme 4, nothing further has been done on the site and the respondent did not envisage anything as they would not know where to get sufficient funding from and	Positive; the organisation have their own technical team to provide complex information and if they had a problem they would contact EST.

	main buildings on the site (which would have comprised a lot of heat sales) being demolished. On scheme 5, again the funding was approved to the amount asked for, but there was a problem with a large hospital (which was going to be attached to the network and was the major heat customer) deciding not to get involved as they were unsure about the feasibility of the network: *"I think they got cold feet and thought it was a bit of a risk."*	there are issues regarding the number of potential customers. The respondent is "quite confident" that scheme 5 will start again in the future as there have been further discussions with the hospital. The timetable for this is not clear though.	

7 Key conclusions and recommendations

7.1 Delivering anticipated impacts

Extrapolating the impacts being achieved by operational schemes covered in the evaluation to all funded schemes, total impact would be 4,271tCO_2 per annum/106,775tCO_2 lifetime[21].

For 11 of the 22 schemes explored, these would likely not have happened at all without DHLF funding; this equates to extrapolated savings of 2,385tCO_2 per annum/59,625tCO_2 lifetime (56% of the total achieved).

For the remaining projects, though these would still likely have happened (through sourcing other finance), the DHLF made these happen quicker, better and/or with fewer costs i.e. the remaining 44% of achieved impacts would still have been influenced by the DHLF. This would mean the programme influenced the total impact of 4,271tCO_2 per annum/106,775tCO_2 lifetime.

7.2 Encouraging greater numbers of DH schemes and enhancing existing ones

Whilst word-of-mouth proved to be effective in raising awareness of the DHLF, in many cases applicants were reliant upon these DH-related relationships or existing work with EST in order to become aware of the programme. Blanket marketing to organisations with potential to take up DH schemes – e.g. housing associations or facilities management companies in shopping centres – may open up more and potentially larger applications[22]. The effect may not be immediate but these organisations may then consider DH – and the DHLF – when trigger points arise e.g. heating systems need replacing or utility costs need to be reduced. Further research could also be conducted to understand the potential for uptake – of DH schemes and the DHLF - amongst these large public sector bodies and what the barriers are.

Responses to the evaluation indicated a lack of organisational appetite for more money to deliver more ambitious schemes. Some organisations were very geographically focused (e.g. a specific community development trust or housing association) and therefore there may be no scope for a larger scheme. Some schemes were in very remote areas and there may be no realistic expansion potential.

However, responses also indicated that organisations sometimes do not see the opportunity for a large scheme or dismiss the idea as too difficult. It may therefore be that there is a role for the DHLF in driving consideration of this type of scheme. Specifically, the application assessment panel could assess the scheme area and customer potential and – where appropriate – offer both:

- The requested loan for the original project
- An 'enhanced'/'premium' loan offer (i.e. more money) to deliver a larger scheme that the panel could outline for the applicant. This would include recommendations as to what support might be needed to deliver it, as well as any potential further considerations/risks).

[21] Anticipated lifetime is 25 years.
[22] It was recommended by participants in the project lead focus group that public sector organisations needed to move from an 'intent' to implement DH schemes and create some demand by doing so.

In the project lead focus group, several participants called for a more holistic evaluation of the DHLF in order to highlight the range of scheme benefits (beyond just the heating bill savings) and so create more appetite for uptake:

"The existing financial drivers, I don't think are enough [for large DH projects to be viable] at the moment –the case needs to be made for there being wider economic multiplier benefits, in order to get more financial funding or support in place for these big district heating schemes."

As well as helping organisations to design schemes in the most efficient and effective way, a DHLF/EST best practice guide might help organisations to be more relaxed and reassured about pushing for an expansive and ambitious scheme, rather than – as at present – some treating it almost as a mini-pilot/feasibility study. The best practice guide could also cover some 'show stopper' factors which would address what factors enable success/guarantee failure so that potential applicants don't waste time and money going far down the route to implementation before realising the scheme is not going to be viable.

It is important to highlight that for several respondents, encouraging large schemes is not valuable and these respondents felt that the DHLF should continue to focus on small projects, arguing that these are more efficient and suffer less from heat loss. They were also concerned about smaller schemes being "drowned out" in the battle for funding by large, ambitious schemes. This perhaps indicates the value of funding both smaller and larger schemes.

In terms of the availability of infrastructure and professional support, there did not appear to be an issue or dearth of this for interviewed programme participants i.e. all found the contractors they needed fairly easily. However, schemes could benefit from DHLF providing exhaustive lists of contractors/signposting in order to maximise open competitive tenders. Based upon some experiences, there may also be benefits in DHLF hosting or signposting forums for rating contractors, which would not affect duty to remain neutral.

Regarding encouragement of more DH schemes (regardless of size) several project lead focus group participants felt that the "*dynamic policy environment*" was making it more difficult to develop and run viable DH schemes e.g. uncertainty surrounding RHI and changes to ECO were mentioned on numerous occasions during the discussion. Several also argued that if the aim is to increase scheme impact, 'off-network' communities should be targeted, as these yield the greatest potential impacts.

7.3 Improving the DHLF process

Overall, satisfaction with all aspects of the DHLF process was high; most found the application process clear and straightforward and found the payment terms to be flexible and manageable. There was also no strong appetite for adjustments to either the loan cap or conditions (e.g. interest rate) as it is already seen as very competitive.

The following suggestions for potential enhancements to the service are based upon responses from one or two respondents (so not widespread issues), though changes to this effect could benefit a larger proportion of applicants:

- Greater explanation and promotion of how the DHLF can help an organisation; many had encountered technical or contractor-related barriers at one stage or another of their scheme but

none saw the DHLF as being a programme that could help them. Consultation and advice-seeking from DHLF seemed to be limited to application clarifications.

- Ensure detailed checking of claims and figures (especially efficiency predictions) or expectation management if that that is not what DHLF can realistically deliver.
- There is a need for some applicants to receive more handholding on using the NPV spreadsheet.

8 Appendices

8.1 Appendix A: Evaluation topic guides

8.1.1 Participants

Introduction[23]

Good morning/afternoon; my name is [x] and I am calling from Databuild on behalf of the Energy Saving Trust. I am calling regarding the evaluation of the District Heating Loan Fund (DHLF). You may have received an email from Ken Brady at EST about this?

I am calling to arrange an appropriate date and time to speak to you about the project that was awarded DHLF funding. We are speaking to lead contacts at projects about the DHLF application experience and subsequent progress and experiences of delivering the DH project.

The conversation is expected to last around 40 minutes, so if you are happy to do this now, that would be great, but it would also be fine if you can specify a date and time that would be more convenient.

If asked: Contact details were provided by the Energy Saving Trust.

Confidentiality

We would like to be able to make all your responses attributable to you/this project. Responses could be viewed by EST and Scottish Government but would not be published. Can I check that you are happy to proceed with the interview on this basis? We will check again at the end so you have the opportunity to change your mind.

- *If respondents are broadly comfortable with this but wish for particular comments to be kept 'off the record', we would allow this, perhaps covering them in an anonymised way in reporting.*
- *If respondents are uncomfortable with any of their feedback being attributable, we would try to understand the source of the respondent's concern, reassuring them that all feedback is useful to EST and would not prejudice any future support provision.*
- *Although unusual, if they were still unwilling to make their responses attributable, we may not be able to progress with the interview as we are looking to obtain a very high response rate and as (hopefully) few projects will require anonymity, EST may be able to identify them. We would ask the respondent if they would like to contact EST directly to discuss the issue.*

Respondent profile and project status[24]

- Confirm the respondent's role on the project [OE]
- Confirm the organisations involved in the DH scheme and which one they represent (if multiple). [OE]
- Is the DH system in operation yet? [options of Y/N and then open end probes for each code as per below]
    - If so, for how long has this been so?
    - If not, when is it expected to start operating?[25]
- Is this: [just coded options as per below]
    - Single generation site and single ownership
    - Single generation site and multi ownership
    - Multi generation site and single ownership
    - Multi generation site and multi ownership

[23] This covers all lead contacts who have not responded to the email with a suitable date / time for interview. Where they have, we are assuming that no formal introduction is necessary. The introduction will need to be adapted slightly if the respondent is a WHF recipient.
[24] Some of this content may have been provided in the templates but questions assume not in order to make sure all details are covered.
[25] If not yet operational, all subsequent questions need to be phrased to acknowledge that some aspects of the DH project are being planned / anticipated rather than actually in existence.

Pre-application and application experience

- How did they first hear about the DHLF/WHF? [OE]
- Why did they decide to apply for it? *In particular try to explore why they needed funding in the first place – what for specifically? Also, why those funds could not be obtained within the project team/from another external source. Or even if they COULD have got those funds through other sources, what was attractive about the DHLF offer?* [OE]
- How easy or difficult was it to find out about eligibility and how to apply for funding? *If difficult in some way, explore how.* [OE]
- How easy or difficult was it to obtain the information the DHLF team requested as part of the application process? *If difficult, which specific bits?* [OE]
- Was the level of support provided throughout the process sufficient for their needs? I*f not, why not? What did they need?* [options of Y/N and then open end for no]
- Can they think of any way in which the application process as a whole could have been improved? [options of Y/N and then open end probe for yes]

Loan offer

- Do they feel the time from application to decision was reasonable? If not, why not and what problems did the timing cause? [options of Y/N and then open end probes for no]
- Confirm the amount offered. [OE]
- Was this the amount they had applied for? If not, did they get more or less, and was the reason for this explained to them? Also if more or less, how – if at all - did this affect their project design/implementation? [options of 'More / Same / Less' and then open end probes for 'More' or 'Less']
- How do they feel the loan repayment process has been managed by the programme so far? [OE]

Project design – structure/governance

- Why did you decide to implement a DH project? How was the opportunity identified? *Want to understand their organisation's interest in this. There is a possibility that they were not originally involved but were brought in by another org, so in that case move onto next question.* [OE]
- Did they access any external support/guidance to help them design the project and if so what? *If received guidance on this from DHLF.* What support did they receive from the DHLF and how useful was this? *If it was signposting, how useful was the signposted source?* [Multiple choice of DHLF support / other support / none; should be able to choose both DHLF and other support options and have OE for both]

Project design – technology

- What technology is the project utilising to generate heat? *Should know already so a confirmation question.* [OE]
- How did they decide upon that technology/mix of technologies? *In particular explore whether they did any options appraisals etc – how evidence based was their choice of tech and what were the key decision criteria i.e. set up cost, likely RoI, technical feasibility in that area...?* [OE]
- Did they use the NPV spreadsheet provided through the DHLF to influence their decision? If so, did this influence them at all /was it useful to them in any way? [options of Y/N and then open end probe for yes]
- *Specific to biomass* – upon what basis did they decide between wood chips vs pellets? [single choice options of wood chip and pellets and OE for both]
- What – if any - other heat generation systems are being used in conjunction? [OE]

Project implementation

- What approach was taken to:
    - Installing the pipework
    - Work on ground conditions
    - Metering

  Want to understand <u>who</u> did it, and, whether there were any issues. If there were issues, what these were and whether/how these were overcome. [Option and OE for each sub-bullet above; have to provide answer in all]

- *If they needed to bring in contractors to do installation.* How easy was it to find appropriate contractors to install the system? [Yes / no on whether they had to bring in contractors or not and open end probe on yes]
- *If applicable.* Where do they get their wood chip/pellets from and was it easy to find suppliers? How reliable has the supply been to date? [OE; just enter N/A if the tech wasn't either of these]

Project – costs

- Overall, what have been the total costs[26] from setting up and running the DH project to date? Can get total and then this could be broken down (perhaps rough %s) by type of cost? *Could explore:*
    - *Studies and appraisals*
    - *Planning dept approval process*
    - *Construction / installation*
    - *Equipment*
    - *Fuel supply*
    - *Administration* [space for total and then spaces below for each sub-bullet, but not compulsory to enter into anything but the 'total' space]
- Are running costs expected to grow/shrink/stay roughly the same? [coded options and OE "why?" for 'grow' or 'shrink']
- How much energy is being used to fuel the heat network?
- Aside from DHLF, what finance[27] did they access in order to set up the project? *Establish internal contribution but also get information on each external source, amount contributed.* [OE]
- Thinking in particular about ensuring the expected level of boiler efficiency, but also about technical elements more generally, what are the key learnings for them from this project? What – if anything – would they do differently if starting out again? [OE]

Project – customer management

- What is the number of domestic and non-domestic properties connected? [Space for 'total' and then 'dom' and 'non-dom', but all compulsory to have something in them.
- Is this the same as originally planned? *If not, explore original intended and why this hasn't been reached.* [Ask for dom and non-dom separate; options are Yes / No and open end probe on no]
- How did they decide upon customers? Was this opt in – what recruitment activities took place and what sorts of responses did they get? *Particularly interested in customer concerns – what these were and how – if at all – they were reassured.* [OE]
- How is the heat charged to properties i.e. per unit, standing charge, flat rate, pre-payment? [OE]
- Do customers have a contract for the heat supply and what are the key points? *Costs per unit of heat, rates of increase, standing charges, length of contract, supply guarantees, compensation, etc.?* [OE]
- What proportion of customers have had a meter installed as part of the project? [OE]
- Overall, how satisfied do they think the customers have been with the scheme so far? [OE]

Project barriers

- What barriers have they encountered so far throughout the process of designing and implementing the DH project? *If there <u>haven't</u> been any*, why do they think this is i.e. what about their project has kept it free of hurdles? *If there <u>have</u> been any*, were these overcome? If so, how? If not, what problem(s) has this caused for them /is this still causing? [options on 'can cite barriers' and 'no barriers', with probes as above relevant to response]
- To what extent did the DHLF technical guidance help them to overcome any barriers? [OE]
- Would they have benefitted from any further support in overcoming barriers? If so, what? [options of Y/N and then open end probe for yes]
- Would they still benefit from any support now? If so, what? [options of Y/N and then open end probe for yes]

Project impact[28]

[26] May have been completed on the template so can either not ask or use the information to further tailor the questions.
[27] May have been completed on the template so can either not ask or use the information to further tailor the questions.

- I'd like to explore some of the achieved and forecast impacts of the project. *May be most straightforward to open the template and take them through this row by row. But need from them.* Need boiler efficiencies as priority. [Spaces for each part of Excel template]

Importance of DHLF

- How has the DHLF assisted in the implementation of the project? What was the money specifically used for? [OE]
- Would the DH project have happened without the DHLF funding? If so, did the DHLF mean that it happened quicker than it otherwise would have (*why and how much quicker)* or were they able to make it bigger/better due to DHLF (*how and with what effect – larger capacity/more customers etc?).* [options of Y/N and then open end probes for yes] *If they think they could have achieved exactly the same outcomes without the DHLF, explore several things:*
    - *How else they would have funded the elements that DHLF funded (i.e. was there another source as quickly accessible?) or were those elements not that important?*
    - *Why they bothered applying for DHLF at all i.e. if they had another ready source/what the DHLF funded wasn't important, why did they bother?*
    - *Remind them of their response on the original application form and enquire as to why they said here (as they would have needed to do to get the funding) that the project would have struggled without the DHLF?*
- Overall, how valuable was the DHLF to the project? [OE]
- Aside from DHLF, what funding sources have been contributed to this project? *Would be useful to capture both sources and amounts (including organisations within the project team).* [options of 'other sources' and 'none' and open end probes for 'other sources']
- *For DHLF only; not WHF.* The loan cap is currently £400k; would you have bid for more money if the cap had been higher? If so, how much would you have ideally wanted from the DHLF? *If they would have liked the DHLF to offer more and would have bid for this, explore whether this would simply have meant obtaining less finance from elsewhere to do the same as they have done, or whether it would have meant they did something bigger. If the latter, what would they have done?* [options of Y/N and then open end probes for yes]
- In what way do they think the DHLF could encourage and support even larger projects? [OE]

General / closing

- Are they aware of the Independent Heat Customers Protection Scheme? If so, do they think this would provide more confidence to householders in connecting to a system/help to promote confidence in the sector? *Ask them to explain their answer.* [options of Y/N and then open end probes for yes]
- Get permission to call back.
- Re-check attributable response permission.

[28] Ideally, much of this section would have been completed in the template.

8.1.2 Non-participants

Introduction[29]

Good morning/afternoon; my name is [x] and I am calling from Databuild on behalf of the Energy Saving Trust. I am calling regarding the evaluation of the District Heating Loan Fund (DHLF).

We are speaking to lead contacts of projects that reached the Panel stage of the DHLF application process but did not receive funding. I was hoping to have around 10-15 minutes of your time to understand what has happened to the project since the DHLF process.

Are you happy to talk about this now?

If asked: Contact details were provided by the Energy Saving Trust.

Confidentiality

We would like to be able to make all your responses attributable to you / this project. Responses could be viewed by EST and Scottish Government but would not be published. Can I check that you are happy to proceed with the interview on this basis?

- *If respondents are broadly comfortable with this but wish for particular comments to be kept 'off the record', we would allow this, perhaps covering them in an anonymised way in reporting.*
- *If respondents are uncomfortable with any of their feedback being attributable, we would try to understand the source of the respondent's concern, reassuring them that all feedback is useful to EST and would not prejudice any future support provision.*

Initial check questions[30]

- Confirm the respondent's role on the project

- Is the project:
    - Discontinued – why? *Explore lack of finance, changes in Government funding streams, lack of appropriate technical information, unable to secure heat supply contracts/planning/match funding etc.? Any plans to resurrect the project?*
    - Still at the planning stage – *when is implementation anticipated?*
    - Implemented

- Confirm summary reason for not being funded:
    - Application unsuccessful - was the reason for this clear? Do they agree with it?
    - Successful but not enough offered – what had they wanted and what were they offered? Was the reason for this clear? Do they agree with it?
    - Successful but not taken up for another reason – what reason?

Pre-application and application experience

- How did they first hear about the DHLF/WHF?
- Why did they decide to apply for it? *In particular try to explore why they needed funding in the first place – what for specifically? Also, why those funds could not be obtained within the project team / from another external source. Or even if they COULD have got those funds through other sources, what was attractive about the DHLF offer?*

[29] This covers all lead contacts who have not responded to the email with a suitable date / time for interview. Where they have, we are assuming that no formal introduction is necessary. The introduction will need to be adapted slightly if the respondent is a WHF recipient.
[30] Some of this content may have been provided in the templates but questions assume not in order to make sure all details are covered.

- How easy or difficult was it to find out about eligibility and how to apply for funding? *If difficult in some way, explore how.*
- How easy or difficult was it to obtain the information requested by the DHLF team as part of the application process? *If difficult, which specific bits?*
- Was any additional information required throughout the process? If so, what? And how clear was it what extra information had to be provided?
- Was the level of support provided throughout the application process sufficient for their needs? *Again, if not, why not? What did they need?*
- Can they think of any way in which the application process could have been improved?
- Do they feel the time from application to decision was reasonable? If not, why not and what problems did the timing cause?
- Confirm the amount offered.
- Was this the amount they had applied for? If not, more or less, and was the reason for this explained to them? Also if more or less, how – if at all - did this affect their project design/implementation?

Effect of not accessing DHLF funding

- What were they planning to use the DHLF funding for?
- What difference did not accessing DHLF funding make to your project? *Obviously can partly infer this from the check questions at the start, but explore further:*
    - *If project has stalled – is that because of the DHLF or other reasons?*
    - *If project has still gone ahead – did lack of DHLF mean this was slower/smaller than it would otherwise have been? If so, by how much?*
- *If their project is still being planned /is now operational.* Can they summarise the key aspects of this?
    - Motivation for running a DH project?
    - Multi or single generation site?
    - Multi or single project team members?
    - Financial / legal structure?
    - What technology? How did they choose?
    - (Anticipated) Size in terms of generation capacity/customers?
    - What external support – if any – they have accessed to help with the project – funding, advice, technical / construction skills?
    - Overall costs to date (set up, ongoing)...?
    - Issues and barriers encountered throughout the process? How these were overcome (if they have been)?

General/closing

- Get permission to call back.
- Re-check attributable response permission

8.1.3 Resident face-to-face interview topic guide

Introduction

- Useful to lead with a few questions about them and their circumstances – how long living in the area, other occupants, level of need for heating.
- Confirm the purpose of the interview and wider evaluation.
- Offer anonymity (though if accompanied by Ignis rep then obviously this cannot be guaranteed at that level).

Engagement and expectations

- How did they first hear about the DH scheme?
- Why did they want to be involved in it? Did they feel they had a choice?
- What expectations and understanding were they given about:
    - What a DH scheme is and how it works?
    - What the potential benefits to them might be?
    - What the potential issues might be during installation?
    - What the potential issues might be after installation?
- *How* did they get information on the scheme before, during and after installation work?
- Was the level of information and communication sufficient for them? Or would they have liked more / less? If so, ask them to describe.

Impacts

- What did they think of the DH scheme installation[31] process? *Want to keep this fairly neutral i.e. not invite negative responses by asking them how "disruptive" the installation process was!*
- How well or otherwise has the metering and billing process worked?
- In terms of their energy costs, has there been (a) a reduction in costs? (b) the level of reduction promised? If no to either, do they know why (i.e. are they comfort taking?) and whether this can be remedied?
- Have there been any other (i.e. non-financial) benefits to them from being part of the scheme?
    - Increased comfort (through more efficient boiler / cheaper energy so longer heating)?
    - Attitudinal change – being part of a sustainable energy project has encouraged them to consider other living costs or environmental issues?
    - Any others?

Summary

- Is there anything else that they can think of about the Wick DH scheme that has either gone:
    - Well/better than expected
    - Poorly/worse than expected
- Would they recommend being part of a DH scheme to another household? If so, why? If not, why not?

[31] The work was to some extent an update / expansion rather than installation from scratch so will be interesting to see if they are aware of that / recall the council scheme.

8.1.4 Project lead focus group discussion guide

Experience of delivering DH

- Core question: "Have there been any differences between the scheme and impact *as anticipated* and the reality? If so, why?
- Core question: "What have been the principal successes and principal challenges in delivering your DH scheme?"
    - Original idea and design
    - Sourcing required support and contractors
    - Actual installation/implementation
    - Enable RHI discussion at this point to get it out the way?
    - Emphasise that customer management will be addressed separately (unless there is something very pertinent to achieving impacts).
- Challenge question: For the future, what effect might the compulsory metering per property have on the scheme in terms of costs/technical issues? *Might need to outline what the requirement will be.*

Customer experience

- Core question: "how do you think customers connected to your DH scheme have felt about the whole process?"
    - What customer engagement was there from start to post-completion i.e. format and at what points?
    - What information on the DH scheme was provided to customers i.e. content and format?
    - What feedback mechanisms have there been for customers?
    - Overall, what has worked particularly well and what not so well in terms of customer engagement and encouragement?
- Challenge question – "does customer buy-in matter?" *Interesting to explore as some interview indicated that customers might be relatively oblivious to the change in system and in some other cases they are tenants on land owned by the project team, so cannot formally oppose the scheme.*

The value of the DHLF

- Core question: "What difference has the existence of the DHLF made to your scheme?"
    - Lots of interview statements to the effect that the banks would never have loaned the required money. Why is it so hard to make the case for financing DH to other, commercial loan providers?
    - Aside from the finance and terms, how valuable was the advice element? Any examples of this influencing scheme decisions/design would be very interesting.
- Challenge question – there were lots of responses in the interviews [*and might be true of the focus group as well]* to the effect that the scheme would not have happened without DHLF funding. Would they really have folded the scheme without DHLF? Unless they only started planning the scheme after becoming aware of DHLF, they must have had some plan in place as to obtaining finance...?

Wider policy questions

- Core question: "What policies or levers would drive or enable (a) greater numbers of schemes/participation in DHLF (b) larger DH networks or schemes in Scotland?"
    - Amount of money available; would they have done something more ambitious – different tech, more properties, etc – if more money had been available, or did they already have clear plan in mind? Presumably their plans must – to some extent – have been developed with at least a vague sense of budget parameters, so what ideas were dropped (even at very early stages) as unfeasible?
    - Is money the only barrier to more/bigger projects or are there others – technical installation issues, availability of required expertise, availability of require equip and materials...?

Closing questions

- If you were to give one piece of advice to new project team starting out on a DH scheme, what would it be?
- If you were to give one recommendation to Scottish Government on how to encourage greater levels of DH schemes, what would it be?

8.2 Appendix B: Data template for recipients to populate

Scheme information	
Scheme name	
Management organisation	
Network owners	
Length of time the scheme has been operating (years and months)	
Generation technology. *[If multiple, please provide broad breakdown of heat provision (acknowledging that there may be variations depending upon the time of day etc)]*	
Fuel	
Capacity	
Length of pipework	
Energy supply	
Flow temperature	
Return temperature	
Per customer charge for the heat	
Scheme participants	
The number of households originally intended to be on the network	
The number of households currently connected to the network	
[if any difference between the two rows above] Why do you think this is?	
The number of non-domestic customers originally intended to benefit from / be involved in the scheme	
The number of non-domestic customers currently connected to the scheme	
[if any difference between the two rows above] Why do you think this is?	
Total household domestic demand (including - if known - breakdown by season)	
Per household domestic demand	
Total non-domestic demand	
Per customer non-domestic demand	
What costs were incurred in developing the district heating scheme? Please provide as detailed a breakdown as possible - e.g. planning dept approval process, construction, equipment, administration etc - but a total as a minimum, perhaps with approximate % breakdown across specific costs?	
Cost type 1...	£
...	£
...	£
...	£
TOTAL	£
What *ongoing* costs are there? Again, please provide as detailed a breakdown as possible - e.g. maintenance, fuel supply etc - but a total as a minimum.	
Cost type 1...	£
...	£
...	£
...	£
TOTAL	£

Please list the source and quantity of any external funding from sources **other than** the District Heating or Warm Homes Loan Fund *[please provide as detailed a breakdown as possible but a total is fine if not feasible]*	
External source 1...	£
...	£
...	£
...	£
TOTAL	£
Impacts	
The efficiency of the boilers installed	
Extent of electricity generated?	
Income through selling electricity to the grid	

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