Department for
Business, Energy
& Industrial Strategy

# Evaluation of Phase 1 of the Public Sector Decarbonisation Scheme and Phase 1 of the Low Carbon Skills Fund

## Impact evaluation report

September 2022

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Any enquiries regarding this publication should be sent to us at:
PSDScorrespondence@energysecurity.gov.uk

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# Executive summary

Phase 1 of the Public Sector Decarbonisation Scheme (PSDS) provided £1 billion in grants over the 2020/21 and 2021/22 financial years, supporting public sector organisations in England[1] to undertake energy efficiency and heat decarbonisation projects within public sector buildings. The principal objectives of this first phase of the scheme were to reduce carbon emissions and deliver an immediate stimulus to the supply chain working on decarbonisation and energy efficiency. The scheme is managed by Salix Finance Ltd, a BEIS non-departmental public body.

The PSDS was complemented by the Public Sector Low Carbon Skills Fund (LCSF). This fund is available to all bodies eligible for PSDS and is intended to ensure that potential PSDS grant recipients are not prevented from participating due to resource and skills gaps. The LCSF provided three strands of capacity and capability funding: for development of a robust application for the PSDS, to project manage the delivery of a PSDS funded project, and to put in place a heat decarbonisation plan.

Building on the earlier process-focused report, this report provides an updated assessment of Phase 1 of the PSDS and of the LCSF. It focuses primarily upon impacts arising from the PSDS and LCSF-funded projects to grant recipient organisations and the participating supply chain. The key findings from this interim evaluation stage are that:

- **Phase 1 of the PSDS and LCSF has supported jobs in the low carbon and energy efficiency sectors. Scheme participation has also delivered wider financial, reputational and skills development benefits to the supply chain.**
- **Although for many grant recipients it is too soon after project completion to provide robust measurement of project outcomes, there is already preliminary self-report evidence of measures delivering intended outcomes.**
- **Attribution of expected outcomes to PSDS is strong: three quarters (75%) of grant recipients surveyed said they would not have implemented *any* of the funded actions in the same timescale without the PSDS and four-fifths (79%) would not have expected to take such action within at least the next three years. The evidence gathered has highlighted a number of opportunities to further support the energy efficiency and low carbon supply chain and decarbonisation objectives.**

### Supporting jobs in the low carbon and energy efficiency sectors

The extent to which Phase 1 of the PSDS and the LCSF have supported jobs in the supply chain was explored through analysis of a survey of 132 supply chain firms involved in the PSDS and/or LCSF. A key caveat to this analysis is that amongst survey respondents, there is

[1] For central government departments where their roles are reserved (i.e. not devolved to Scottish or Welsh Governments or the Northern Ireland Executive), funding could be used for estates located anywhere within the UK.

likely to be underrepresentation of installer subcontractors; the reasons for this are explored in section 1 of the report. These firms tended to have more employees working on PSDS-funded projects than the (likely overrepresented) consultancies / project management firms[2]. It is therefore important to note that the figures discussed below are not necessarily representative of the supply chain population that participated in PSDS and LCSF[3]

130 survey respondents were able to estimate how many employees had worked on the PSDS/LCSF projects their firms were involved in; the average (mean) was 6 employees. More than a fifth (22%) of respondents said that their participation in PSDS / LCSF funded work had led to new employees being recruited. Over one third (35%) agreed that the work supported by PSDS / LCSF funding had enabled them to sustain jobs that may otherwise have been lost.

To further explore the additionality of the scheme on supporting jobs, Quasi-Experimental Analysis (QEA) was used to compare employment levels between participant and non-participant firms, over the delivery period of Phase 1 of the PSDS/LCSF. The 'control group' of non-participant firms was constructed to be as comparable[4] as possible to the treatment group, within the limitations around knowledge of the participant supply chain population.

The change in employment in participant firms included in the analysis was an average of 1.7 employees higher than that of non-participant firms, suggesting that PSDS/LCSF not only led to job preservation but went beyond that to generate additional roles**.**

In addition, the evaluation has found participation in PSDS/LCSF has helped many firms with both short-term performance and longer-term enhancement of reputation and capacity:

- Over three quarters (77%) of supply chain survey respondents – 93% of installation firms and 73% of non-installation firms - felt that participation in the PSDS / LCSF funded projects had enhanced their organisation's reputation. Over two-fifths (42%) of supply chain survey respondents reported having been able to 'sell on' services additional to the PSDS / LCSF-funded work they had initially been asked to deliver.
- Two-thirds (66%) of supply chain survey respondents felt participation in PSDS-funded projects had built skills and experience amongst employees in their organisation. Following their involvement in the PSDS-funded project(s), 63% of supply chain survey respondents said they were now more likely to try to work on decarbonisation / energy efficiency projects in the future.

[2] The expectation is that monitoring and evaluation activity conducted across 2022 and 2023 will identify more supply chain participants, increasing the size and representativeness of the composition of the sample used in analysis.
[3] In addition, the number and profile of all supply chain participants in the PSDS and LCSF is not known, so figures could not be reliably extrapolated.
[4] As the PSDS Phase 1 supply chain participant population is not known, a control group was constructed from a 3-digit sectors unlikely to be affected by PSDS and with similar employment furlough take-up rates as the sectors affected by PSDS. Finally, to reduce the potential spillover effects, the firms in the control group which belonged to the same enterprise group as those in the treatment group were excluded from the sample.

### Impacts for grant recipients arising from the funded projects

A telephone survey of grant recipients was conducted in late 2021. Of those that had completed at least some of their funded project(s) (141 respondents to the evaluation's grant recipient survey), every respondent had already observed at least one benefit; the most common were improved knowledge, improved comfort and improved energy management behaviour. Despite the relatively short time that had elapsed between project completion and survey, over a third of respondents reported reductions in energy consumption and bills, and reduced maintenance costs.

Overall, the results indicate that as early as winter 2021/22, benefits of PSDS-funded projects were already being seen. Responses to date from the pilot of the post-completion project monitoring survey and depth interviews with grant recipients provide further evidence of this.

### Strong attribution of outcomes to PSDS

Accelerating the decarbonisation of the public sector is key to BEIS' aim of reducing emissions from public sector buildings by 75% by 2037. In the quantitative survey of grant recipients, attribution of outcomes to PSDS was strong; three quarters (75%) of grant recipients surveyed said they would not have implemented *any* of the funded actions in the same timescale without the PSDS. More than half (52%) said action would have taken more than five years, whilst almost four-fifths (79%) would not have expected to take action within three years. A quarter (26%) could not envisage when they may have otherwise taken action.

As well as enabling the implementation of funded measures, participation in PSDS was felt by many participants to have increased organisational knowledge and motivation to pursue net zero activity.

### Opportunities to further support the energy efficiency and low carbon supply chain and decarbonisation objectives

Key suggestions from interviews and analysis across the evaluation are summarised here:

- Continuation of central government funding to support public sector organisations to decarbonise was felt to be valuable in ensuring supply chain engagement and growth, and keeping decarbonisation high on the agendas of public sector organisations, particularly for encouraging investment in internal capacity, knowledge and skills.
- Acknowledging the cost of PSDS, some suggested this could become a hybrid grant and loan scheme, with grants prioritised for measures with longer paybacks, and / or tailored to organisational circumstances. Other recommendations for enhancing PSDS included discrete budgets based on sector or region, and reworking the application process to focus more on social value and supply chain development.
- Applicants highlighted the time it takes to develop project plans and thus stressed the importance of LCSF opening well in advance of PSDS to maximise its value in helping to create a level playing field for PSDS applications. Some recipients also felt that building

skills and capacity within public organisations should be prioritised over temporary plugging of capacity and capability gaps through external support.

- There were suggestions for wider policy to support the overarching objectives of PSDS, including recommendations to build the capacity of UK low carbon product manufacturing, creating employment / economic benefits, whilst simultaneously mitigating challenges observed in Phase 1 around global supply chain issues.

# 1: Introduction

## 1.1: Background to the PSDS and LCSF

Phase 1 of the Public Sector Decarbonisation Scheme (PSDS) awarded £1 billion in grants to public sector organisations in England[5] to undertake capital investments in energy efficiency and heat decarbonisation projects within public sector buildings. The principal objectives of Phase 1 of the scheme were to deliver stimulus to the energy efficiency and low carbon heat sectors, supporting jobs in the low carbon and energy efficiency sectors, and to reduce carbon emissions from the public sector. The scheme has been delivered by Salix Finance[6].

**For Phase 1 of the PSDS**, the applications window was open from 30 September 2020 to 11 January 2021. To better ensure delivery against the objective of supporting economic recovery from COVID-19, funded projects were required to be complete by the end of September 2021. Due to the various implementation challenges encountered on some projects (described further in this report), in April 2021 this deadline was extended to the end of March 2022[7].

In April 2021, **Phase 2 of the PSDS** provided a further £75m of grant funding for projects to be delivered by March 2022, with a stronger focus on heat decarbonisation than Phase 1. Reflecting the importance of the public sector's role in meeting the government's commitment to reach net zero by 2050, **Phase 3** of the PSDS opened for applications on 6 October 2021, ultimately aiming to deliver £1.425 billion of funding through three Phase 3 application windows over the period 2022/2023 to 2024/2025.

**This report forms part of an evaluation focused on Phase 1 of the PSDS.**

In Phase 1, organisations could apply for grants of up to 100% of the costs of the projects, dependent upon meeting a combination of criteria – paying the bills for the buildings to be improved, the £ per tonne of $CO_2$ saved (£/t$CO_2$) value of the project[8], and funding covering mainly capital costs. There was no minimum or maximum grant value.

The measures eligible for PSDS funding were assigned to categories reflecting prioritisation of heat decarbonisation. Category 1 comprised low carbon heating technologies such as heat pumps and connection to low carbon heat networks. Categories 2 and 3 comprised technologies that support future heat decarbonisation, either by reducing overall energy demand (e.g. insulation) or enabling future heat decarbonisation projects to take place (e.g. metering or battery storage). Category 4 – gas-fuelled - technologies were only permitted if (a) they replaced coal- or oil-fuelled heating systems; and (b) Salix was satisfied that it was not

[5] For central government departments where their roles are reserved (i.e. not devolved to Scottish or Welsh Governments or the Northern Ireland Executive), funding may be used for estates located anywhere within the UK.
[6] More information about PSDS Phases 1-3 can be found here.
[7] With Treasury permission, certain projects funded through Section 31 of the Local Government Act 2003 were approved for a further extension up to 30 June 2022.
[8] The cost to save a tonne of carbon ($CO_2e$) over the lifetime of the measures installed was required to be no more than £500, as calculated by the Support Tool in the Grant Application Form.

viable for a low carbon heating system to be installed within the building. Measures outside Category 1 could only be supported through the scheme (a) if combined with measures in Category 1; (b) for buildings that already use low-carbon heating for all their heating requirements; or (c) if specific commitments to future heat decarbonisation were made for the buildings in which measures were installed.

## 1.2: The Public Sector Low Carbon Skills Fund (LCSF)

The PSDS is complemented by the Public Sector Low Carbon Skills Fund (LCSF). This scheme is available to all bodies eligible for PSDS and is intended to ensure that potential participants are not prevented from participating by a lack of capacity and capability. The scheme is delivered by Salix Finance[9].

**Phase 1 of the LCSF** launched alongside Phase 1 of the PSDS and made available £32 million of grant funding (£20m of which was awarded) across three funding 'strands' for which eligible organisations could apply:

- Strand 1 (open from 30 September to 4 December 2020) - funding for expertise to help potential applicants to formulate an eligible project and / or put together a PSDS funding application.
- Strand 2 (open from 30 September to 11 January 2021) - funding to support the further development and / or delivery of a project that was awarded PSDS funding.
- Strand 3 (open from 30 September to 11 January 2021) - to support the development of a heat decarbonisation plan.

There have been two further Phases of the LCSF to date. However, **this impact report focuses solely on Phase 1.**

## 1.3: Phase 1 of the PSDS and LCSF: funding applications and awards

The following section provides a summary of the profile of funded organisations and projects awarded PSDS and LCSF funding in Phase 1. More statistics summarising Phase 1 applications and awards can be found here. The full list of Phase 1 funded projects – grant recipient organisations, regions, and project values – can be found here.

### 1.3.1: PSDS award summary

By the time the Phase 1 application window closed, the scheme had received a total of 1,642 applications, with an overall value of £2.38 billion. 343 public sector organisations were awarded PSDS grants for 461 energy efficiency and heat decarbonisation projects.

[9] More information about the LCSF can be found here.

The majority[10] (59%) of PSDS grant recipients in Phase 1 were local authorities[11]. Educational establishments comprised around a quarter of recipients (schools 22% and FE/HE 6%), NHS 7%, Central Government 4%, and emergency services and Non Departmental Public Bodies 1%. Grant values awarded across organisation types tended to be proportionate to this breakdown. The exceptions were NHS recipients (accounting for 26% of awarded funding), who were generally undertaking larger scale projects, and school / academy recipients (6% of awarded funding).

- Applications ranged in value from £1,000 to £80.7 million. The median value of all applications was £339,349 and the average (mean) application value was £1,421,900.
- Over half of all grants were for less than £1 million, representing nine per cent of the funding awarded. At the other end of the scale, 21 of the 461 grants were for over £10 million and represented nearly 43% of all funding.
- Reflecting this, the median value of all grants was £615,000, whilst the average (mean) was £2,169,194.

Around a fifth (19%) of applicant organisations were awarded funding across multiple applications / projects. This often reflected how the organisation elected to organise applications, rather than the scale of the proposed works, or scale of PSDS funding received[12].

Reflecting the decarbonisation focus of PSDS, many of the most commonly funded measures were low carbon heating measures (in particular air source heat pumps). LED lighting and insulation were also included in a large number of projects.

### 1.3.2: Post-award changes

Post-award, there have been changes to the majority of projects:

- In most cases, this comprised a request from the grant recipient to extend the project delivery deadline beyond September 2021, usually to March 2022[13]. This was the deadline for most projects[14] for costs funded by PSDS to be incurred; many on site installation works and commissioning were only finally completed later in 2022 and some beyond, with alternative sources of funding. Even on projects completed after the agreed deadline, in most cases the full grant (or vast majority[15]) was paid, as organisations were able to

[10] Source: Public Sector Decarbonisation Scheme: Phase 1 Summary Report (Jan 2022) (Base=343)
[11] It is important to note that local authorities were able to apply for funding across a wide range of buildings, including schools managed by the local authority. Therefore, schools were represented not only through applications received directly from schools, but also through many applications submitted by local authorities.
[12] For example, one combined authority grouped projects from across its constituent local authorities into one very high value application, whilst one multi-academy trust submitted many applications (one per individual school), each of much lower value.
[13] As highlighted in section 1.1, certain projects funded through Section 31 (S31) of the Local Government Act 2003 were approved for a further extension up to 30 June 2022.
[14] 30 June was the equivalent date for projects funded through S31.
[15] A number of grant recipient organisations have picked up the (relatively) small costs of completing onsite installation and commissioning.

evidence that the cost had been incurred prior to the deadline e.g. through vesting certificates.

- There has been rescoping of some funded projects, including adjustments to the type of measures (e.g. swapping a Ground Source Heat Pump for an Air Source Heat Pump), the number of measures (e.g. installing multiple smaller heat pumps rather than one large one), and / or the models used (e.g. switching to a different heat pump manufacturer). While all are still expected to deliver the required level of benefits to qualify for the grant, in some cases there has been substantial de-scoping, as it was no longer viable to deliver the original mix of measures. For example, the evaluation has identified cases of whole sites and / or measure types being removed from project plans. This will affect the impacts that can be achieved compared to those expected under the original grant application.
- Twelve projects were abandoned completely, with the decision being taken by the grant recipient organisation that it was no longer feasible to deliver the planned works.

Changes to projects have largely been the result of delays in the supply chain and / or price inflation across contractors and measures, though internal procurement and decision-making timescales in some organisations has also hampered progress. Supply chain and price inflation issues have been at least partially ascribed to PSDS, in terms of both the increased investment and scheme timescales. These challenges are explored in greater detail in the earlier process-focused evaluation report.

### 1.3.3: LCSF Award Summary

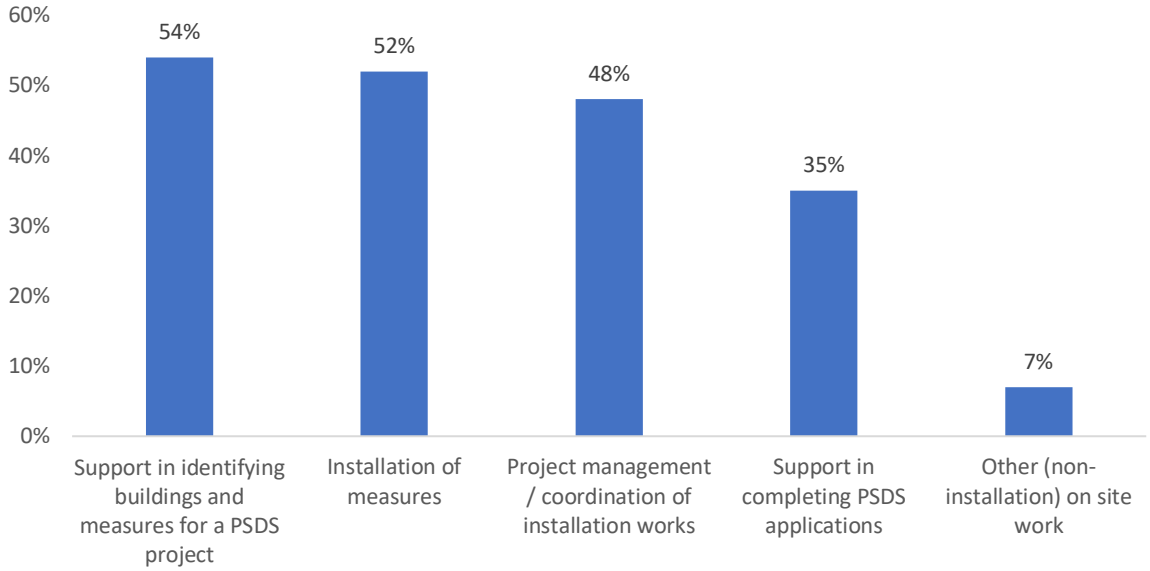
Under Phase 1 of the LCSF, approximately £20 million of LCSF grants were awarded by Salix Finance to 489 organisations[16]. The majority (80%) of awards were for Strand 1 (application support), eight per cent were for Strand 2 (delivery support), and twelve per cent for Strand 3 (heat decarbonisation plan support). Salix data on LCSF awards shows the majority (64%) of recipient organisations were educational establishments (schools, colleges or universities), with local authorities comprising 22%, NHS 11%, and other groups less than 5%.

### 1.3.4: Participant supply chain

A range of business types / sectors were involved in PSDS / LCSF funded projects: as well as installers, these included consultancies, engineers, designers, manufacturers[17] and builders. They were involved in a range of different activities[18], including identification of project measures and buildings, support in completing the PSDS application forms, project management, on-site work (outside of actual installation), and actual installation of measures. The extent to which surveyed firms delivered these different roles was explored in the survey of participant supply chain firms (described further in Section 1.4.2).

[16] Some had multiple awards within, or across, the three strands.
[17] Equipment manufacturers were not included in the sample; they were often not directly involved in, and so would find it challenging to discuss, particular projects. Depth interviews with a small sample of manufacturers were conducted instead.
[18] Firms were often involved in multiple activities e.g. both design and overall project management.

**Figure 1: Roles being carried out by supply chain survey respondents**




*Source: Quantitative survey of the supply chain for the main PSDS evaluation [n=132]*

In the first stage of depth interviews with stakeholders providing an overarching view of the supply chain (conducted in 2021 as part of this evaluation), a view was expressed within some respondent groups that PSDS was most likely to benefit larger, established organisations and / or those on public sector frameworks, rather than market entrants. It is true that many grant recipient organisations opted to use established frameworks to appoint a large lead contractor to deliver projects for efficiency and reliability reasons. Organisations on these frameworks tended to be larger, well-established firms. However, these lead contractors often utilised a number of smaller / specialist subcontractors on projects. Almost half of both project management firms and installers (45% and 51% respectively) responding to the supply chain survey reported that they had sub-contracted work on the PSDS project(s)[19].

## 1.4: Evaluation of Phase 1 of the PSDS and LCSF

Following an initial report focused on process evaluation objectives, this follow-up report focuses principally upon impact findings to date. Future stages of the evaluation will draw upon granular project and buildings data to generate estimates of reductions in both energy consumption and carbon emissions arising from PSDS-funded projects (depending upon the measures installed).

[19] Furthermore, the evidence presented across Chapter 3, from the quantitative and depth interviews, is that smaller sub-contractors: (a) are often realising multiple business benefits from delivery of a specific role on PSDS-funded projects; (b) would not have the capacity, or would be looking, to lead wide-ranging and large-scale decarbonisation projects anyway.

### 1.4.1: Objectives

The impact evaluation aims to understand whether, and to what extent, funded projects resulted in a range of intended outcomes (in particular, around jobs and carbon).

### 1.4.2: Summary method

The findings in this report are synthesised from a combination of qualitative interviews, surveys, desk-based analysis of scheme data, QEA, and a workshop with LCSF contractors. This section provides a summary of key elements undertaken to date.

**Quantitative survey of grant recipients: November-December 2021**

The key purposes of the survey were:

1. To provide quantitative evidence to support the process evaluation e.g. around applicant experiences, or challenges to project delivery.
2. To provide quantitative evidence to support future impact and economic analysis.

In total, 300 PSDS and LCSF grant recipient organisations were surveyed[20]. Sampling was managed to ensure close alignment to the breakdown of recipient population figures, in terms of organisation type, and the type and value of funding received. While differences in proportions were therefore small, the survey data were still weighted to ensure the findings from the survey analysis were fully representative of the population by organisation and type of funding accessed[21].

**Quantitative survey of the participating supply chain: January-February 2022**

One of the principal objectives of Phase 1 of the PSDS was to act as a stimulus to firms working in and around decarbonisation and energy efficiency. The evaluation therefore included a quantitative survey of the supply chain that worked on Phase 1 applications and funded projects, to collect quantified data on business benefits arising from participation in the scheme, as well as providing statistical data on supply chain experiences of delivering support.

The survey sample was partly derived from collated responses to a form circulated by Salix in 2021, which collected contact details and consent to be contacted for evaluation purposes. Additional supply chain contacts were provided by grant recipients and other supply chain firms in interviews (snowball sampling).

Overall, 132 supply chain firms were surveyed. For this survey, data were not weighted. Whilst the avenues used to source contact details were sufficient for conducting the survey, there remains no overall population data to which responses could be reliably weighted.

[20] 74 were recipients of LCSF only; 125 were recipients of PSDS only; 101 received both.
[21] The only group receiving a substantial weight were the 'LCSF-only' recipients. This was for two reasons: 1) the sampling had prioritised PSDS recipients, as the group of primary interest to the evaluation questions and objectives; 2) the LCSF-only recipient group included a large number of organisations that had opted out of being contacted for evaluation purposes.

### Post-completion monitoring survey data: May 2022

Salix will be approaching all grant recipients to collect post-completion data through an online survey, focusing on impacts arising from the projects.

In May 2022, a version of the survey was circulated to a limited pool of grant recipients (for projects that completed by March 2021) as a pilot of the approach. Salix issued the survey to 61 Phase 1 grant recipients on 30 May 2022 and received 32 responses (a 53% response rate).

Grant recipients for the remaining projects will be asked to complete the survey in late 2022 or early 2023, and all projects will be asked again in spring 2024. The pilot phase informed refinements for the later survey, but has itself generated useful findings (albeit from a limited and atypical sample[22]) that have been included in this report.

### Qualitative and semi-structured interviews: May-June 2022

Across four groups, 71 interviews were undertaken as summarised in the table below. Where available and consent was provided, contact details for all groups were shared by BEIS.

| Respondent group | Interview numbers |
|---|---|
| Public sector organisations – Phase 1 of the PSDS and / or LCSF recipients across a range of organisational and project profiles | 30 PSDS recipients, 15 LCSF recipients |
| Contractors – delivering project development and / or delivery work funded through Phase 1 of the PSDS or LCSF | 10 installers, 9 LCSF contractors |
| Manufacturers of the decarbonisation technologies / measures being installed (this covered large businesses and SMEs, and in terms of measures included heat pumps, lighting and Building Management Systems (BMS)) | 6 |
| Third Party Technical Assessor supporting the review of project applications | 1 |

The purpose of the interviews was to enable in-depth exploration of project delivery to date, supply chain impacts, and, where feasible, initial insights into the impacts arising from the measures installed. Interviews also explored public sector capacity and capability gaps, potential solutions to addressing these, and delivering decarbonisation more generally.

[22] Projects completed by 31 March 2021 tended to be smaller scale, in terms of both numbers and types of measures, and value of funding. Linked to this, the grant recipient organisations on these projects were disproportionately smaller educational establishments.

**LCSF Contractor workshop: June 2022**

The aim of the workshop was to explore issues of interest from the LCSF contractor interviews, with the discussions being centred around the effectiveness of the LCSF, supply chain issues affecting delivery, and the implications of this for public sector decarbonisation. The workshop also enabled participants to discuss issues with one another to generate additional insight. The workshop was attended by six attendees, each representing a different business involved in the provision of LCSF Strand 1 and 2 support to PSDS applicants.

**Analysis of scheme impact on jobs: April-July 2022**

Described further in Chapter 2 of this report, this analysis aimed to estimate the number of supply chain jobs supported by Phase 1 of the PSDS and LCSF. Approaches included extrapolation of numbers of individuals working on projects as stated in supply chain survey responses, and QEA exploring change in employment compared to a control group.

### 1.4.3: Limitations

The main challenges, and associated limitations, encountered during the research process are summarised below for readers' context when interpreting the report findings:

- **Project progress -** less than a third of Phase 1 funded projects were complete by the end of September 2021. As stated in previous sections, project delivery has often been hindered by a range of factors, particularly inflated costs and issues obtaining supplies. This has been driven in part by external factors (COVID impacts on global manufacturing output, global availability of key components, and Brexit impacts on import[23]). There was also a strong consensus amongst scheme participants that PSDS itself had created a largely unanticipated spike in demand for certain equipment (especially heat pumps) and qualified contractors (both generalist builders and specialist installers e.g. drilling companies for Ground Source Heat Pump bore holes).
- Despite a commensurate delay to certain evaluation activity (intended to maximise useful responses), at the time of the quantitative surveys many Phase 1 projects had yet to complete works, and in some cases were yet to commence work on site. This meant certain question areas (e.g. post-implementation impacts, especially over a heating season) could not be meaningfully explored and were only answered by portions of the respondent sample. Linked to this, for some research questions concerning longer term outcomes (e.g. 'long term growth in the energy supply chain'), data collected by the time of this report was expected to provide indicative evidence only. Priority questions on impacts are being included in (a) the final round of interviews with grant recipients and supply chain, scheduled for later in 2022; and (b) the further waves of the online post-completion monitoring survey (described in the previous section) in autumn 2022 and autumn 2023.
- **Awareness -** some supply chain respondents – particularly installer subcontractors – were not aware of the PSDS. Interviews sought to ensure they were discussing experiences of

[23] For projects continuing to be implemented into 2022, the conflict in Ukraine has also impacted upon the delivery lead times and cost of equipment and materials.

the PSDS-funded projects by couching questions in terms of the known public sector client (the grant recipient organisation). In a small number of cases, the firm conducted multiple concurrent projects for the public sector client, so isolating the effects of the PSDS project on their business became more challenging.

- **Contractor representation -** Salix did not collate supply chain data. The initial PSDS / LCSF contractor database was shared by BEIS, compiled from supply chain responses to an invitation from BEIS to share basic information on the firm and scheme participation. This database does not contain details of all contractors involved in PSDS funded projects. This opt-in approach may mean responses over-represent atypically enthusiastic firms. Further contacts were generated from grant recipient and supply chain survey interviews. However, from analysis of the survey respondent profile, it seems likely that smaller installers (often subcontracted to by larger firms) are under-represented in the surveyed sample, albeit the 'true' population is unknown. Smaller installers were less likely to be in the project lead roles that were (a) visible to grant recipient organisations asked to list firms they worked with; (b) less likely to have been sent, and responded to, Salix and BEIS information gathering exercises.
- **Data availability -** for the QEA, there were challenges in using the Inter-Departmental Business Register (IDBR). Several firms were excluded from the QEA because they could not be matched with the IDBR, which provided the source for employment data in the period of interest for the analysis. Furthermore, employment and turnover are not updated regularly for SMEs in the IDBR. As the data is not time-stamped, we do not know what time period data refers to for firms that do not show year-on-year changes. However, detailed scoping work was undertaken to check that this issue did not undermine the robustness of the findings.

# 2: Supporting jobs

## 2.1: Context – targets and analysis limitations

Supporting jobs in the energy efficiency and low carbon supply chain was a key objective of Phase 1 of the PSDS, as part of the Chancellor's 'Plan for Jobs 2020'[24] commitment to support the UK's economic recovery from COVID-19.

The evaluation has explored realisation of this outcome in several ways. This has included analysis of survey data from a sample of supply chain firms involved in PSDS; the data covers numbers of employees involved with delivering PSDS projects and impacts on recruitment and safeguarding of jobs. In addition, the evaluation has included QEA into the additionality of the scheme on supporting jobs.

For this report, analysis focused upon **direct jobs** (people employed directly to deliver funded works/install funded measures) and did not consider indirect jobs (people employed by businesses which supply the goods and services used in the process of installing measures)[25].

A key caveat of the analysis to date is that the degree to which figures are representative of the full population of firms participating in the PSDS is unknown as the size and composition of this population is unknown. However, there is almost certainly overrepresentation of the consultancy and project management firms in the datasets used in the analyses to date compared to the full population:

- In the survey sample, 54% of respondent firms were involved in the design and scoping of projects, 48% in project management / coordination, and 35% in producing PSDS applications. The original database used for the supply chain survey was mainly derived from responses to a form circulated by Salix in 2021, which collected contact details and consent to be contacted for evaluation purposes. This was likely to have yielded a better response rate from those involved in consultancy / management of the projects; smaller / specialist installers are unlikely to have received this, or responded directly, and some may even not have been involved in projects at the time the form was circulated. Due to the range of specialist measures involved, most projects are likely to have had multiple installation firms working on them at some point, yet for some projects no installer firm details are known and the known sample of installers is substantially less than the number of funded projects.
- To identify further firms involved in PSDS / LCSF that could be included in the QEA, snowball sampling was used whereby grant recipient and supply chain survey respondents were asked to provide details of firms that had worked on their projects. However, there tended to be greater awareness of the larger consultancy and project management firms; many grant recipients had no direct contact with the smaller

[24] https://www.gov.uk/government/publications/a-plan-for-jobs-documents/a-plan-for-jobs-2020
[25] Indeed, manufacturers interviewed as part of the evaluation said that they would find it very difficult to estimate a number of FTEs that had worked on manufacture of measures for PSDS.

installation / construction firms. These firms tended to have smaller numbers of employees directly involved in projects, compared to installation / construction firms.

Therefore, as the full population of firms is not known, the data on the number of employees working on projects from the supply chain survey could not be used to extrapolate to a population-level jobs supported figure at this interim stage. In addition, the aforementioned considerations around likely actual vs. installer numbers and likelihood of these being captured suggests that the data available was disproportionately from firms that tended to employ fewer individuals on projects.

Steps are being taken to address these issues and further analysis will be conducted following the gathering of additional data on the supply chain population through project closure and post-completion monitoring activities.

## 2.2: Jobs 'supported': using self-reported data from survey sample

Respondents to the survey of supply chain participants were asked how many employees (whether full or part time) had worked on the PSDS/LCSF funded projects in which the firm had been involved. Descriptive analysis of the responses (*n=130)* generated a mean average of 6 jobs (not FTEs) supported per organisation.

Sub-sector analysis was limited to those survey respondents that could be matched in the Inter-Departmental Business Register (IDBR), the source of employment data used in the analysis. However, the analysis provides indicative evidence that average jobs supported are higher for installation firms, as among those in the 130-firm supply chain survey sample, the average number of jobs supported (8) was more than twice those of 'non-installation' firms (3).

At a more granular (3 digit SIC code) level, among the 73 firms represented in supply chain survey responses who could be matched with the IDBR, the highest mean average number of jobs supported – more than double the second-highest average – was for 'electrical, plumbing and other construction installation activities' (9 jobs), compared to the second highest of 4 for 'architectural and engineering activities and related technical consultancy'. This is also supported by the relative recognition of jobs benefits by installer and non-installer respondents to the supply chain survey; these are summarised in sections 2.4 and 2.5 below. As such, the average taken from our current sample may well be an underestimate of the average number of jobs supported in firms involved with PSDS/LCSF.

## 2.3: Jobs 'supported': measuring additionality of the scheme through QEA

To further explore the impact of PSDS/LCSF on jobs supported, analysis into additionality of the scheme was conducted to estimate the number of jobs that would not otherwise have been

preserved or roles that would not have otherwise been created in the low carbon and energy efficiency supply chain in the absence of PSDS/LCSF. The analysis used a QEA approach to explore the difference in change in employment between the firms involved with PSDS/LCSF and control group firms. A detailed explanation of the 'difference in difference' (DiD) method is provided in the appendices of this report.

A key limitation of the QEA was lack of robust data on the population of the participant supply chain for PSDS Phase 1 i.e. there was no complete list of participant firms. This meant a control group **could not include firms in the same sectors as firms involved with PSDS/LCSF**, as they may have been affected by the PSDS/LCSF or other similar interventions. Including such firms in the control group could undermine the estimated treatment effects. This approach to control group selection can be seen as a significant limitation of the QEA, but the results can still be considered as an approximation of the potential impact of the scheme. Therefore, the evaluation seeks to estimate the causal effects in the best possible way given the limitations of the available data.

As far as possible, firms in the control group were therefore selected on the basis that they shared similar characteristics to those in the treated group i.e. within the same broad industry, and those with similar furlough rates to the sectors of the PSDS/LCSF firms. The furlough rates were used to source comparable control units because one of the main purposes of PSDS 1 was the green recovery from the COVID-19 pandemic, therefore control units were sourced from sectors that were similarly affected by the pandemic in economic terms. This process resulted in most of the firms in the control group (80%) being engaged in the maintenance and repair of motor vehicles. While enterprises in the motor vehicle maintenance and repair sector may be quite different from the treatment group enterprises in terms of various characteristics, they are similar in terms of how they were affected by the pandemic. This makes companies in this sector reasonable comparators given the policy objectives. In addition, the regression model used in the QEA controlled for differences in employment between sectors.

**The analysis shows that over the period of Phase 1 project delivery, firms involved with the PSDS/LCSF showed a change in employment of 1.7 employees higher on average than 'control' firms; a statistically significant difference[26].**

**Given the average number of employees in treated firms increased**, **while the number of employees in 'control' firms remained relatively stable, this suggests that the PSDS/LCSF not only contributed to job preservation but went beyond that to support generation of additional roles.**

The QEA will be repeated following further collection of supply chain data. This will enable testing of the assumption that installer firms not only had more staff working on PSDS/LCSF projects than other participating firms, but also whether they experienced greater scheme impacts in terms of job preservation and generation of additional roles.

[26] This result, however, should be interpreted with caution given the limitations of the control group available for the analysis (e.g. using a broad industry group for selecting control units).

## 2.4: Recruitment

All respondents to the supply chain survey were asked if their participation in PSDS / LCSF-funded work had led to new employees being recruited. More than a fifth (22%) of respondents said that it had; this was more likely in firms involved to some extent in installation (32%; n=69) than those not (11%; n=62). This provides further support for the hypothesis that the change in employment observed in the QEA includes instances of additional roles being created, not simply jobs being preserved.

Whilst firms (especially installers) working on PSDS-funded projects were more likely to recruit resource to deliver works, LCSF contractors / consultancies seemed generally more likely[27] to try to deliver high volumes of work using existing staff and asking them to work longer hours. This was linked to the perception that Phase 1 of the PSDS application work was a one-off spike, rather than a sustained revenue stream that could justify recruitment. These consultancies seemed to be overrepresented in the supply chain survey sample.

Only a small sample of firms [n=26] cited and were able to quantify recruitment benefits. Amongst this group, numbers recruited tended to be 1 or 2 jobs (reported by nine and ten respondents respectively). However, several installation firms brought in larger teams[28] to deliver the work; three reported having recruited around 10 employees, whilst two larger firms reported having recruited more than 25 employees. All installer depth interviewees that reported taking on new staff (and in some cases creating new roles) said those staff were still with them.

On recruitment, a common view was that whilst Phase 1 projects had created a spike in work that could have justified greater recruitment, the perceived short-term nature of the scheme meant a reticence in recruiting large numbers of staff that the post-PSDS workload may not support. This was linked by depth interviewees to the need for a more secure and sustainable funding regime:

> *“Keep supporting and funding the initiative. We are just an SME and…it's helping us grow and it's bringing on new experience for employees. I'd hope to see it continue." [Installer; depth interview]*

## 2.5: Jobs safeguarded

All respondents to the supply chain survey were asked if the work supported by PSDS / LCSF funding had enabled them to sustain jobs that may otherwise have been lost. Over one third (35%) agreed that it had; again this was more likely for firms involved in installation (44%) than others (25%).

[27] One should however note that there were numerous examples of LCSF contractors bringing in additional (usually 1-2) staff to help manage workloads.
[28] Albeit possibly on a temporary basis.

Compared to recruitment, those acknowledging a job safeguarding benefit found it harder to quantify the extent of it. Where they did, most estimates were between 1 and 10 employees.

Linked to safeguarding of jobs, 20% of supply chain survey respondents acknowledged that the PSDS/LCSF projects had enabled them to bring employees off furlough. Almost all those acknowledging this benefit [n=23] cited between 1 and 10 employees being brought off furlough.

**Overall, including both recruitment and / or safeguarding of jobs, 50% of the 132 supply chain survey respondents reported these benefits arising from the funded projects.**

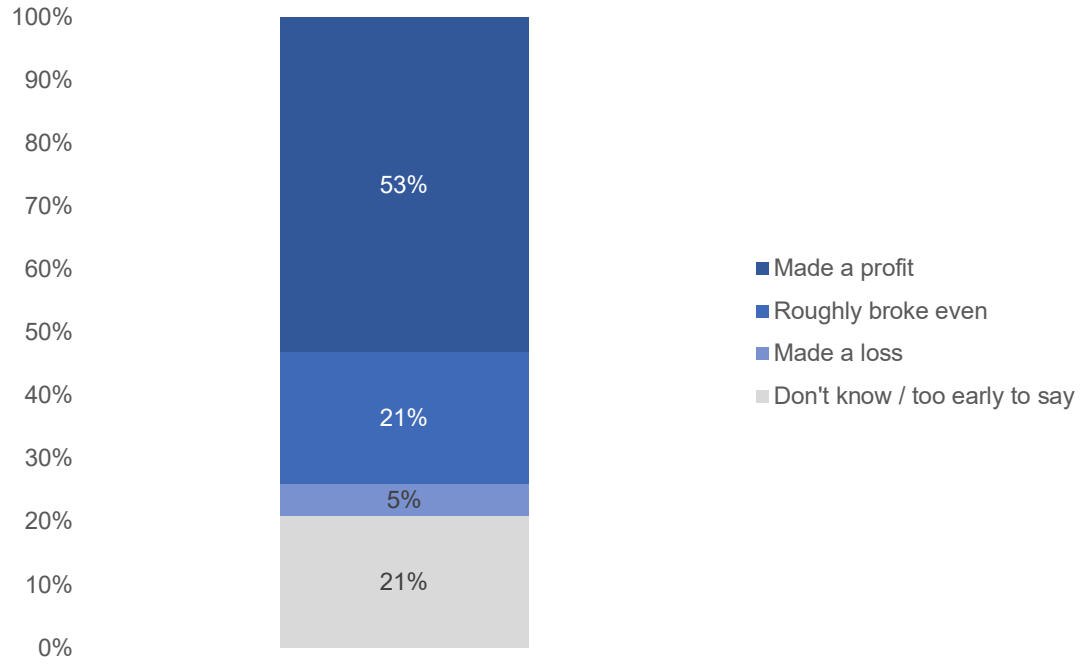
# 3: Wider business performance

In addition to employment, respondents to the supply chain survey and qualitative interviewees were prompted to a range of wider business benefits they may have seen from involvement in Phase 1 of the PSDS, LCSF, or both. Although roughly a fifth of respondents were either unsure or said it was too soon to say, the remainder (79%) acknowledged wider benefits.

## 3.1: Revenue and growth from Phase 1 of the PSDS / LCSF project work

All respondents to the supply chain survey were asked, specifically for the PSDS-funded project(s) they worked on, whether overall they had made a profit, roughly broken even, or made a loss. The breakdown of responses was as follows:

**Figure 2: Self-reported supply chain performance on the PSDS-funded contracts**




*Source: Quantitative survey of the supply chain for the main PSDS evaluation [n=132]*

Amongst the group reporting a loss, it should be noted that some made this assessment based upon the hours they had to devote to project work beyond the time they were officially being paid for, rather than an assessment of the project's effect on company accounts. The remaining fifth (21%) did not know / felt it was too soon to say.

Amongst those firms both recognising a profit on the PSDS/LCSF work and able to quantify it (27% of all respondents), the mean average profit margin was 17%. Of those reporting a profit on their PSDS/LCSF work, 29% said the profit had offset reductions in revenue / losses

elsewhere in the business, often as a result of COVID-19. Albeit a limited sample size [n=70], this was much more common amongst installation firms (40%) than others (13%).

Many depth interview respondents emphasised that their order books had not particularly suffered during COVID restrictions, but PSDS work had enabled them to grow their business:

> *"It's not kept us going, but if the PSDS funding wasn't available and we hadn't secured the works then we wouldn't have expanded as a company." [Installer; depth interview]*

> *"We didn't furlough anyone but… we wouldn't have taken on any more people. We would have ticked along and our turnover would have been lower than it was prior to COVID." [Installer; depth interview]*

> *"Our revenue from public sector buildings has grown faster than forecast originally via the availability of the PSDS fund. And that in turn has allowed us to recruit engineers specifically for those projects." [Installer; depth interview]*

Examples were also given by respondents to the supply chain survey of PSDS-funded work having sustained their business:

> *"We got guys back off furlough; it helped us get back to normal and get the year on track." [Installer; supply chain survey]*

> *"We wouldn't have survived without this project; it was 80% of our revenue and allowed us to stay afloat." [Installer; supply chain survey]*

Even where respondents felt there would have been sufficient demand for their services in the absence of the PSDS, several acknowledged that focusing on a single, large-scale project was more efficient than numerous smaller ones, and eliminated the need for their business to spend significant (likely non-chargeable) time in marketing to / seeking customers:

> *"It means that we can focus just on delivering the project; we're not going out doing so many sales calls, and marketing and advertising," [Installer; depth interview]*

For some larger organisations, the revenue from PSDS / LCSF work had been relatively small, whilst for SMEs[29], it had often been significant and occasionally integral to the survival of the business.

Several manufacturer interviewees had anticipated that business would contract during the height of the pandemic, but instead found that PSDS-related work had either compensated for expected losses or led to business growth.

> *"It enabled us to maintain our turnover during the period when we expected the market to drop off by 20%." [Manufacturer; depth interview]*

[29] Small and Medium-sized Enterprises,

Whilst all six manufacturer interviewees had contributed to projects on funding schemes prior to Phase 1 of the PSDS, and several already had established relationships with public sector organisations[30], others described the public sector providing an alternative, or expanded, market for their product.

> *"It's given us business which we certainly wouldn't have got. I mean the schools would not have been investing in heat pumps if they hadn't had the grant to do so. The hospital wouldn't have been investing without the grant." [Manufacturer; depth interview]*

One interviewee noted that their business has doubled in size over the past two years and attributed approximately half of this to the PSDS.

The principal revenue stream had of course been product sales, but several manufacturers interviewed for the evaluation had also been involved throughout the project, from inputting to design at the application stage, to installation of their product, to training of other contractors and building managers on the use and maintenance of their products. Some also provided post-installation monitoring and a maintenance / repair service.

## 3.2: Further revenue

Overall, the supply chain felt their PSDS / LCSF work had strengthened existing client relationships and helped to build new ones, which respondents hoped would generate future opportunities. More generally, the PSDS was felt by some firms to have pushed decarbonisation up the agenda amongst potential public sector clients (this is explored further in Chapter 4).

Over three quarters (77%) of respondents to the supply chain survey – 93% of installation firms and 73% of non-installation firms - felt that participation in Phase 1 projects had enhanced their organisation's reputation.

The general supposition was that it was a 'good thing' to have been involved in the project(s), in order to enhance their profile with public sector clients and on net zero more widely. Rather than concrete examples of further work being generated, respondents expressed optimism about the *potential* future effects of their participation, saying that they had done 'a good job', that the work should raise their profile, that they were able to cite the PSDS / LCSF work in relevant tenders, and / or that they had produced a case study of the work. The hope was that this would lead to increased sales and new revenue streams.

> *"It's given us a new avenue to build a business plan on, with the amount of work that is required within the nation." [Installer; depth interview]*

[30] Some reported that the public sector client on some PSDS projects had specified their (the manufacturer's) involvement to the lead contractor / project management firm.

> *“Only time will tell, but we've now got a portfolio behind us that not many have. It can only be of benefit." [Installer; depth interview]*

However, several respondents were able to cite specific examples of subsequent contracts with new clients that they felt had been won as a direct result of their involvement in Phase 1 of the PSDS / LCSF:

> *“[The PSDS / LCSF work] directly led to us being recommended to another fire service and we won a tender, which allowed us to build a reputation. We have now worked with three fire and rescue services, and it has opened up a new market for us.” [Consultancy; supply chain survey]*

Several respondents to the depth interviews highlighted that participation in sometimes complex PSDS project(s) had given them a competitive advantage in tendering for – and delivering - future work, as they had encountered, and been able to develop solutions for, challenges arising on this type of project:

> *"We've worked on a number of these schemes and all those issues that I've mentioned around supply chain, electricity infrastructure issues, we're fully abreast of them now; so we've got, for the next schemes, a tried and tested mechanism, and we appreciate the factors to consider, so hopefully it will put us in good stead against some of our competitors." [Installer; depth interview]*

In terms of strengthening existing client relationships, almost half (42%) of supply chain survey respondents reported having been able to ‘sell on’ services additional to the PSDS / LCSF-funded work they had initially been asked to deliver. These services included further surveying and project design work, support in developing future funding applications, and post-installation monitoring and remedial work. One respondent reported that they were installing the insulation and ventilation measures recommended by their own LCSF survey (the installation was paid for from client budgets rather than PSDS).

> *“There is a need for on-going maintenance activities. It probably won't happen for another eight months because all the systems will be within warranty, but then I think [the client] will be looking for someone to provide maintenance services to keep the systems running efficiently. I know they're quite keen for us to investigate that with them.” [Installer; depth interview]*

Linked to future revenue generation and gaining competitive advantage, one interviewee noted that growing interest in their heat pump offer had stimulated research and development to improve the performance of their existing product range:

> *“It’s really pushed our R&D departments to look at what’s next. Our product needs to be something maybe even better than it is now, and that’s really pushing what refrigerants we should use, what temperatures we should get to, what efficiencies we need to get to, to really stay ahead of the game.” [Manufacturer; depth interview]*

Following their involvement in Phase 1 project(s), 63% of supply chain survey respondents said they were now more likely to try to work on decarbonisation / energy efficiency projects in the future. These respondents often not only recognised that decarbonisation was both a positive direction in itself, but also that it was likely to be a growing area of work. The PSDS project had built their skills and reputation and had (generally) been a positive experience for them. Almost all the remaining 37% of respondents said their participation in the PSDS had not made a difference to their likelihood of working on decarbonisation / energy efficiency projects, but for most this was because they were already heavily involved in such work.

Subsequent to participation in Phase 1 of the PSDS, 57% of supply chain survey respondents said they were now more likely to engage with government programmes like the PSDS in future. Their involvement with PSDS had been positive overall and had built their experience. Again, most of the remaining respondents said the PSDS had not increased the likelihood as they would be continuing to engage with future schemes regardless of their experience with PSDS. A handful of respondents said they would have reservations about participating in a future scheme with a similar application process.

## 3.3: Enhancing supply chain capacity and capability

Enhancement of supply chain capacity and capability was a potential additional benefit of Phase 1 of the PSDS and LCSF. Two-thirds (66%) of supply chain survey respondents felt participation in Phase 1 funded projects had built skills and experience amongst employees in their organisation. Descriptions of this covered:

- Organisational knowledge and understanding of, and ability to work with, new technologies; air source heat pumps was the most commonly cited, but LEDs and smart controls were also mentioned.
- Organisational skills in more general, rather than measure-specific activities, including electronic design, scanning of buildings, heat loss in buildings, working with local authority planning departments / planning policy, site health and safety (especially related to COVID), quality assurance, and building understanding of the data required to produce a heat decarbonisation plan. This also, for some firms, included increased understanding of how to undertake and manage large projects.
- Organisational knowledge and understanding of working with certain building types e.g. hospitals, schools, listed buildings.

Also related to staff development, roughly one-fifth (21%) of supply chain survey respondents involved in installing measures on Phase 1 projects said staff had undertaken related training. This was often training on installing / integrating specific equipment from manufacturers, but one respondent also mentioned PAS 2030 and 2035 (retrofit specifications).

# 4: Beneficial outcomes from projects

This section summarises the key benefits being observed by grant recipients on funded projects at this interim stage. As outlined in section 4.1.3. below, due to limitations around the timing of project completion and monitoring, this does not include consideration of how well the assumptions, schedules and targets in project applications and appraisals are being matched by outcomes.

## 4.1: Context

### 4.1.1: The importance of PSDS funding to the projects

A key question explored in the grant recipient survey and depth interviews was attribution of the projects (and therefore their impacts) to PSDS funding, i.e. what would have been achieved in the absence of PSDS.

In the quantitative survey, all grant recipients were asked about the importance of the PSDS funding to the projects being implemented. Three quarters of PSDS grant recipients surveyed said none of the project measures would have been undertaken in the same timescales in the absence of PSDS[31].

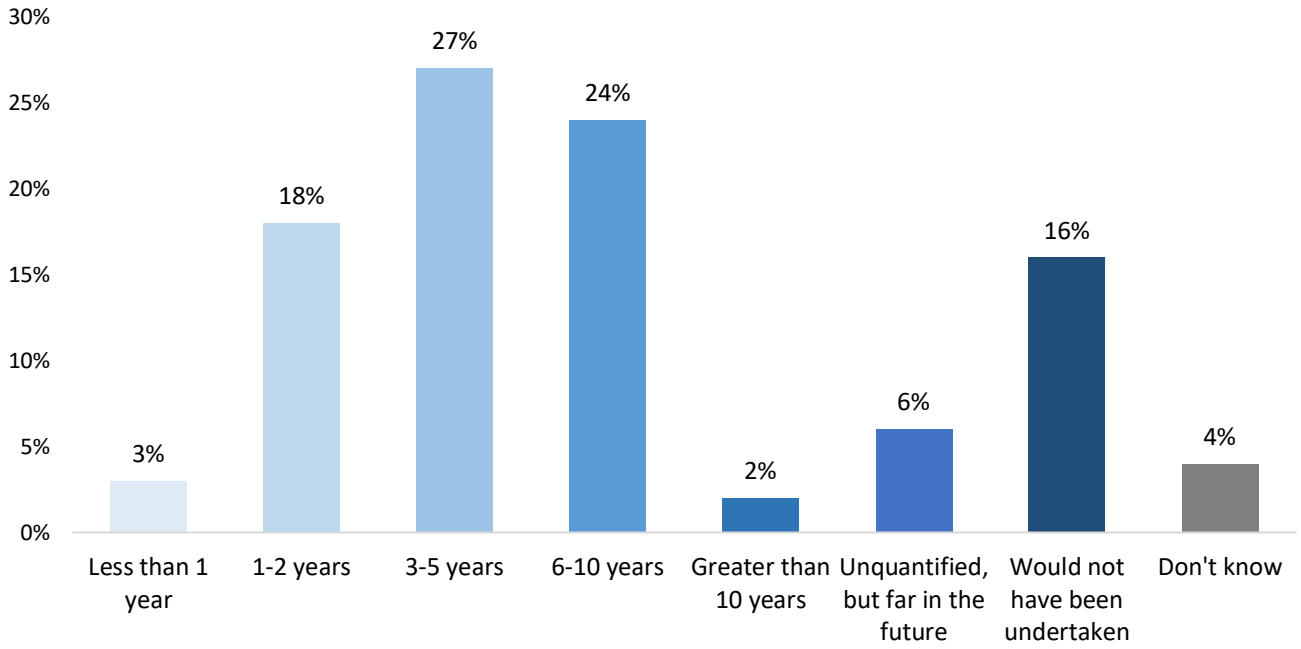
Only two respondents said their projects would have been financed anyway (one cited another external fund, the other internal budgets). PSDS was seen by many recipients surveyed as a catalyst to investigate, identify and propose works; or more often to progress projects that had already been conceived, but for which funding was lacking.

> *"We have a strategy [but] PSDS has enabled a more focused look at what can be decarbonised, how it can be decarbonised, and how quickly it can be done."*
> *[PSDS recipient Local Authority; depth interview]*

Accelerating action to decarbonise is key to delivering on the overarching PSDS aim to support the target to reduce emissions from public sector buildings by 75% by 2037, compared to a 2017 baseline. PSDS grant recipients surveyed were therefore asked about the likely timescales in which they expected that they would have taken any action in the absence of Phase 1 of the PSDS funding; the breakdown of responses is shown in Figure 3.

[31] The qualifier on timescales was included in each statement (a) because part of the intended benefit of PSDS was to give a short-term boost to the economy and decarbonisation supply chain, and therefore the question sought to establish what they would have achieved in 2021/22; (b) to avoid respondents making vague assertions that actions might have been enabled by an as yet unknown fund becoming available in future.

**Figure 3: Extent of grant recipient attribution to Phase 1 of the PSDS: timescales in which project activity would be expected to have occurred in the absence of funding**




*Base size: Phase 1 grant recipients (n=224[32])*

Respondents sometimes explained that different timings would apply to different measures, and that action would therefore be staggered. Yet overall, more than half (52%) said action would have taken more than five years, whilst almost four-fifths (79%) would not have expected to take action within three years. A quarter (26%) could not envisage when they may have otherwise taken action.

When respondents were also asked how they may have funded action in the absence of PSDS, most were unsure. Ideas included accumulated internal annual budget savings, other existing funding schemes, or through seeking private investment.

> *"There is a chance that the work would never have happened at all without grant funding. It would have been at least three years and we would have had to look at council funds." [PSDS recipient Local Authority; grant recipient survey]*

> *"LEDs would have been installed over time in a gradual manner, linked to other capital programmes. None of the other measures would likely have been done at all." [PSDS recipient School / Academy; grant recipient survey]*

> *"I don't think it would ever have been done. We have limited funding for capital projects, so projects which have to be prioritised for us are health care or patient care ones." [PSDS recipient NHS Trust; grant recipient survey]*

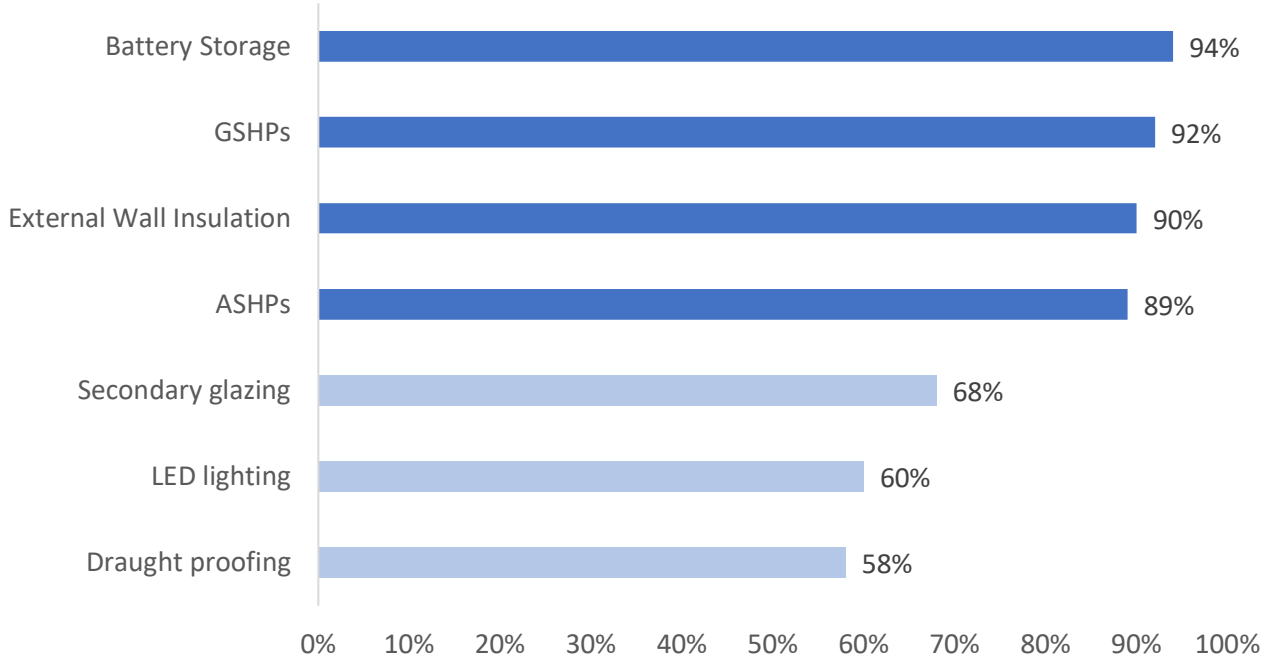
[32] The two respondents who said they would have undertaken exactly the same action in the same timescales anyway were not asked this question.

Linked to this, one NHS Trust representative noted that Phase 1 of the PSDS funding had freed internal capital funding that could then be reallocated to other activities (i.e. backlogs / patient care services); an indication of indirect benefits delivered by the PSDS investment.

Qualitative interviews with Phase 1 grant recipients indicated that attribution was stronger for more complex and expensive measures such as heat pumps, whilst measures within maintenance cycles[33] – e.g. lighting, boiler upgrades, and some fabric measures – were felt to have likely happened anyway, albeit sometimes in a different timescale[34]. Many respondents also argued that measures such as LEDs would be easy to make a business / investment case for, regardless of PSDS.

This is supported by responses to a question in the grant recipient survey asking whether, for each measure they implemented, they would not have done it all in the same timescales ('highest' attribution), done less (e.g. installing fewer / less impactful measures) in the same timescales, or taken exactly the same action in the same timescales ('lowest' attribution) in the absence of Phase 1 of the PSDS. The chart below shows the four measures with the largest proportions of respondents selecting the highest attribution rating, along with the three measures with the smallest proportions (it should be noted that the sample size for some measures is low):

**Figure 6: Measures with the four largest and three smallest proportions of the 'highest' attribution rating i.e. 'Would not have implemented the measure in the same timescales in the absence of PSDS'.**




[33] In almost all cases, depth respondents said they were replacing end-of-life heating systems.
[34] For example, several depth interview respondents said limited budgets may well have necessitated persisting with old heating systems, even where these were scheduled for replacement / upgrades in maintenance cycles.

*Base size: Phase 1 grant recipient telephone survey [Numbers of respondents per measure [battery storage n=34; GSHPs n=15; EWI n=8; ASHPs n=122; secondary glazing n=8; LED lighting n=147; draught proofing n=21]*

Figure 6 illustrates that the measures that respondents most commonly said they would not have implemented in the absence of PSDS were larger, more complex measures. This attribution rating was least common for the more straightforward energy efficiency measures.

As an indication of the counterfactual, interviews with non-funded applicants[35] identified examples of projects being implemented, though it was not clear if these comprised the same measures as in their unsuccessful Phase 1 application. Most of those taking action reported that their organisations had installed LED lighting and solar photovoltaics (PV). Internal funding was the main source, while others included the NHS Energy Efficiency Fund and PFI partners (as joint funders).

In some cases, work undertaken by non-funded applicants had been confined to planning and commissioning of feasibility work; examples included baselining studies, studies of heating ventilation, introduction of heat and cooling systems (based on heat pumps) and low carbon heat networks. However, most unsuccessful applicants indicated that their organisations were not in a position to fund such projects internally.

> *"Well, [we have done] nothing, because we haven't got any money to do it. We haven't replaced any of our LED lighting because our capital programme is overcommitted on backlog maintenance and keeping the hospital safe." [Non-funded applicant NHS Trust; depth interview]*

Linked to improving measures in line with maintenance cycles in the absence of Phase 1 of the PSDS, many grant recipient survey respondents also noted that they would have adopted a much more staggered approach in terms of their portfolio, with only certain sites / buildings receiving certain measures. Some noted that the prioritisation of building improvements may have focused on the most inefficient buildings first.

### 4.1.2: Project quality

Central to the achievement of intended project benefits is the quality of installations. Measurement of impacts in future stages of the evaluation may provide indication of quality (i.e. if measures are under-performing compared to expectations). However, at this stage, respondents were asked for their perceptions of project quality, and issues encountered. In contrast to the challenges encountered throughout the implementation of most Phase 1 projects[36], respondents were overwhelmingly positive about the final quality of the installation works.

[35] Conducted in June 2021 as part of an initial stage of depth interviews.
[36] Principally price inflation and delays, though technical issues were encountered on some projects e.g. asbestos being found, or bore holes being hard to place due to unexpected pipework / concrete.

Many respondents to the June 2022 depth interviews were reassured by their lead contractor performing a Quality Assurance role[37] on works (especially where there was an energy performance contract[38] in place). Some were also reassured by what they had seen from monitoring data[39] to date (for example, energy consumption data, or data on generation from renewable measures) where this was available and had been analysed.

At the time of the quantitative surveys, for most projects, it was too early to fully assess installed technologies. Another limitation was respondent understanding of measures in terms of whether they are able to detect whether certain measures are working optimally, especially before the completion of a heating season.

Where at least some of the works were complete, respondents to the grant recipient survey were asked if issues had subsequently arisen. Amongst these respondents, 16% cited issues with measures not working optimally. When explored, these were usually less substantive energy efficiency measures (usually lighting), only some of a particular measure, and not always an issue with the quality of installation. Most were addressed as part of the service provided by the installer, or fell under warranty:

> *"The new lights were staying on all night, so we've had to get the contractors out a few times to try and resolve the issue." [PSDS recipient School / Academy; grant recipient survey]*

> *"We have had pigeons peck the wires on the solar PV so it needs repairing." [PSDS Recipient School / Academy; grant recipient survey]*

No respondents to the June 2022 monitoring survey had encountered post-installation issues with measures not working at all. Five of the 32 respondents cited issues with measures not working *optimally*; as in the grant recipient survey, these tended to be minor (e.g. lighting not switching off or one of the solar installations not reporting impacts) and quickly resolved.

The largely positive response on installation quality was echoed in responses to the supply chain survey. Quality was reported to be good, based on things such as visual inspections post-installation, user feedback, extended warranties and service backups. Only one respondent reported having had to go back onto site to fix faulty measures. Where they had any further involvement at all, this was almost always either ongoing monitoring for their client, or provision of training so staff in the client organisation could operate the measures properly. One contractor raised an issue with clients bundling different specialisms into a single tender, which was simpler in terms of management of the contract, but increased the risk that the successful contractor wouldn't have all the necessary skills. However, this respondent did not cite any issues arising from the client's approach.

[37] Most manufacturing interviewees were involved in the installation of their equipment and reported that they undertook a commissioning exercise to ensure it had been correctly installed and was operating as expected.
[38] These commit the lead contractor to measures achieving certain levels of savings, otherwise payments are made to the grant recipient to match the shortfall.
[39] For example, energy consumption data, or where relevant, data on generation from renewable measures.

In the depth interviews (conducted around six months later than the grant recipient survey), still only a minority of grant recipient respondents mentioned post-installation “snagging” issues, and most seemed relaxed about these issues; some level of this had been expected anyway, they were often related to relatively minor measures, and issues had usually been quickly resolved (at no / low expense).

> *"The only issue that remained was a noise issue on the air source heat pumps; we need to do some mitigation… acoustic fencing.” [PSDS recipient Local Authority; depth interview]*

> *“When we had the installation audit a few weeks back… one of the radiators was leaking on the floor. But we called the contractor and he came in later that day to fix it." [PSDS recipient University; depth interview]*

This view was echoed in the depth interviews with contractors and manufacturers. None reported any significant post-installation technical issues. Most noted that they had been involved in dealing with minor issues that they would expect on any installation.

On a minority of projects across the quantitative and depth surveys, installers / manufacturers were required to re-visit sites to address certain equipment and / or systems not working properly; respondents tended to view these as tolerable / expected issues that have now been resolved, but they did lead to delays in measures generating impacts. On a small number of projects, the heating equipment specified / delivered had not been the optimal size.

Beyond measures not working properly, a serious issue was reported at one site, where a light fitting fell and hit one of the occupants. This had been addressed by the time of the evaluation survey.

### 4.1.3: Impact monitoring to date

Chapter 1 highlighted that many funded projects are yet to be fully completed, and outcomes are not yet being measured. As it is often the larger, more complex measures that are still in progress, any measurement of outcomes would not, at this point, reflect the full impact of the project anyway.

Furthermore, even for most projects completed pre-April 2022, there has not been sufficient time elapsed for the grant recipient organisations, or their contractors, to have robustly measured outcomes. In particular, for projects completed in 2022, it has not been possible to measure impacts over a full heating season.

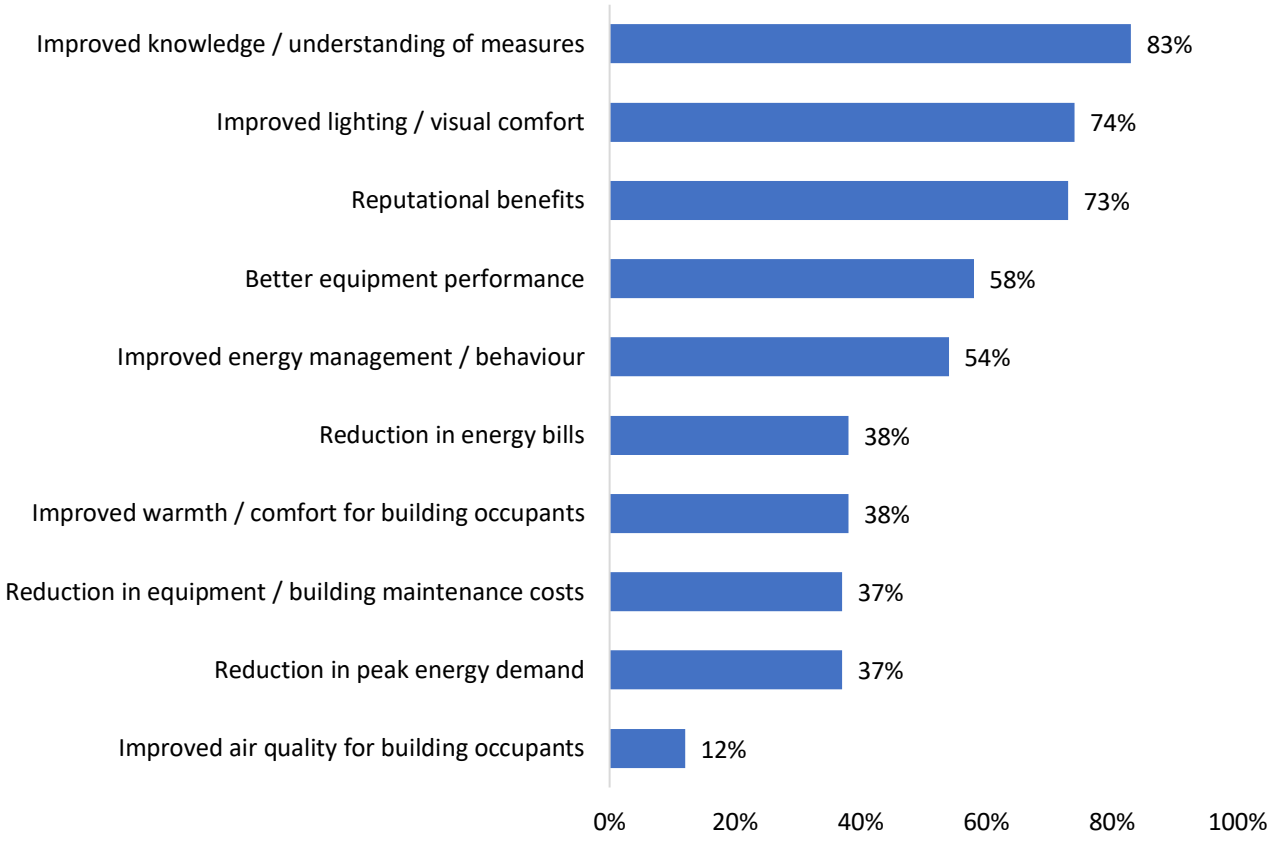
However, all grant recipients interviewed have either started monitoring impacts or have plans in place to do so. In some cases, measuring outcomes is part of the lead contractor’s agreed service, and some have energy performance contracts.

# 4.2: Realisation of intended project outcomes

## 4.2.1: Overall

In the survey of grant recipients, those that had completed at least part of their funded project(s) were prompted with a list of benefits, and asked if, to date, any had arisen:

**Figure 7: Benefits seen by those completing projects (as of winter 2021)**




*Base size: Phase 1 grant recipients (n=141)*

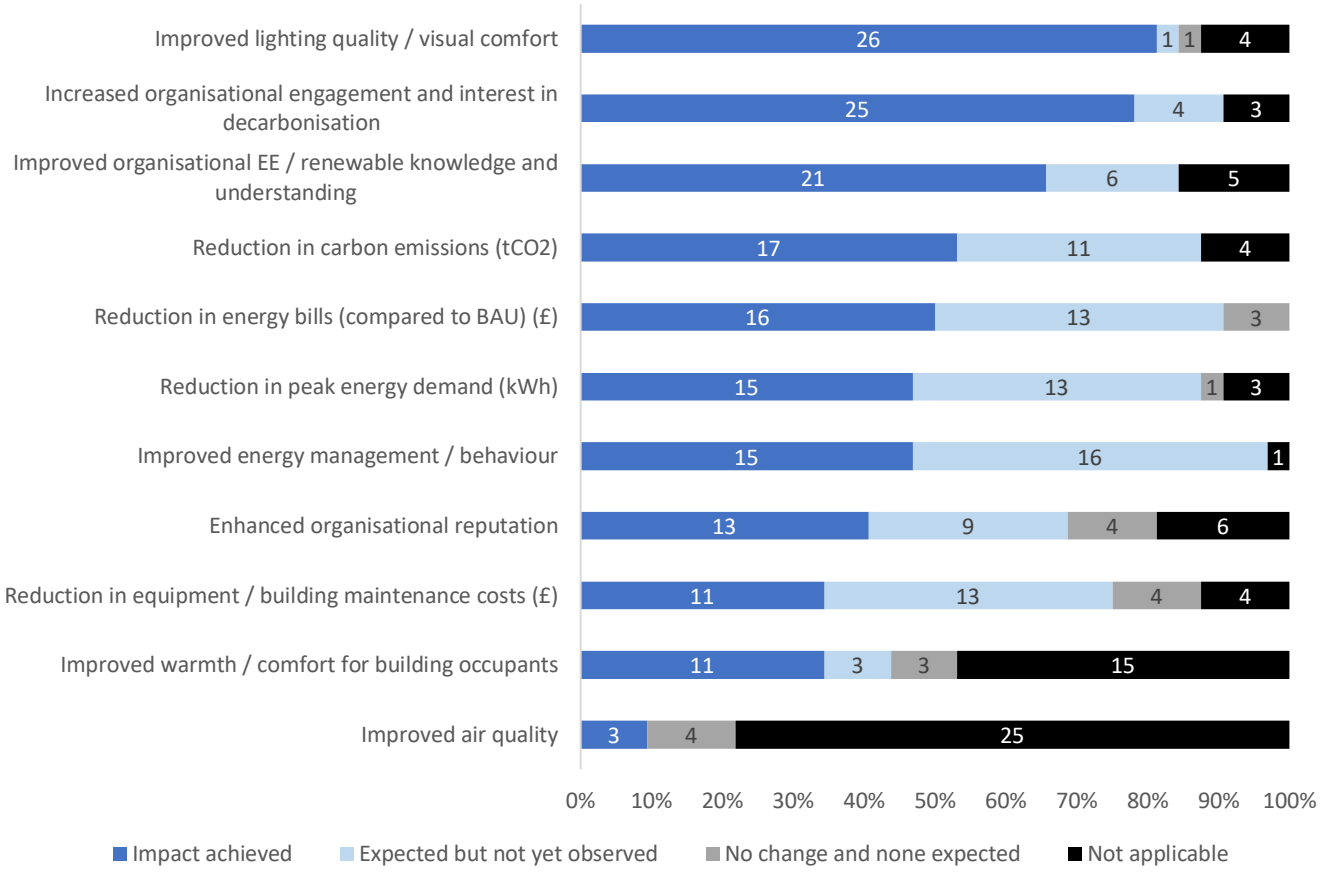
Overall, the results indicate that as early as winter 2021, the anticipated benefits of Phase 1 projects were already being seen by many.

Every respondent prompted with the list recognised at least one benefit. The most commonly selected benefits were those that are harder to quantify, such as around knowledge improvement and reputational benefit. This may reflect the timing of the surveying – many said it was too early to assess quantified outcomes.

Prompted quantifiable benefits – environmental and financial - were more commonly recognised on smaller (<£5m) projects that had completed early, often in schools. Calculation of impacts across large, partly completed, multi-site, multi-measure projects was more challenging. In addition, several depth interview respondents claimed that they are collecting the requisite data but have not yet had the time to properly analyse it to assess project impacts.

The pilot of the post-completion survey, conducted in June 2022 and sent to projects completed by April 2021, provided early indications of the achievement of impacts from a very limited sample of 32 grant recipients.

**Figure 8: Project benefits acknowledged by respondents in the pilot of the post-completion survey [n=32]**




*Base size: Phase 1 grant recipients (n=32)*

All respondents recognised at least one benefit, and for the more easily quantifiable impacts (around energy use and costs), 7 of the 32 respondents consistently responded that they were expecting, but had not yet observed, these[40].

[40] It was not clear from responses whether this was because the benefit was yet to be achieved, or because the organisation had not received / analysed the data yet.

For the 16 organisations that had responded to both the Autumn 2021 telephone survey and June 2022 post-completion monitoring survey, it was possible to compare responses on achievement of key intended impacts. Taking energy demand and cost reduction as examples, this provides an indication of the rate at which 'expected' impacts are being realised:

| | |
|---|---|
| Reduction in peak energy demand | • 4 re-confirmed that this had been achieved<br>• 7 were still expecting impacts, but these had not been observed<br>• **5 had previously expected impacts and these had now been confirmed** |
| Reduction in energy costs (compared to BAU) | • 6 re-confirmed that this had been achieved<br>• 7 were still expecting impacts, but these had not been observed<br>• **3 had previously expected impacts and these had now been confirmed** |

Almost half (7/16) Phase 1 grant recipients were still unable to state whether key environmental and financial benefits had been achieved.

Whilst in most cases it seems an external contractor is collecting and providing key quantified data to the grant recipient organisation, it may be that where this data needs further analysis to identify certain benefits, the organisation lacks the knowledge / expertise to do that.

In addition, respondents have cited complications in trying to calculate impacts. This was often the case for energy bill reductions, as the substantial rise in gas prices has introduced challenges for some in ascertaining what the BAU / counterfactual energy costs would have been without the measures.

> *"We would have expected to see a reduction in energy bills; however, due to the rise in fuel prices we anticipate the prices to increase, though the consumption should be reduced." [PSDS recipient School; post-completion monitoring survey]*

In addition, reduced or altered occupancy levels during COVID have complicated the picture for many organisations; for example, many schools / colleges had minimal occupation during lockdowns, but are now back to full capacity, whilst certain buildings still have lower occupancy compared to pre-pandemic levels, and are not expected to reach those levels again.

Several respondents also mentioned challenges (sometimes related to the metering set up on their sites) in disaggregating the effects of the Phase 1-funded installed measures from other changes that have been made in the last year or so.

> *"Reduction in energy was expected, but the project has come hand in hand with site expansion and increased ventilation. Due to the lack of submetering, it is very difficult to*

*separate the energy reduction from the BMS[41]." [PSDS recipient NHS Trust; post-completion monitoring survey]*

The following sections of this Chapter provide more detail on the individual beneficial impacts arising from the projects.

### 4.2.2: Reduction in energy demand

At the time of writing, over half of the 32 monitoring survey respondents reported that a reduction in peak energy demand had been achieved. However, respondents' supporting explanations of impacts indicated a degree of supposition that these benefits were being / would be achieved (i.e. 'we've installed what was intended, so impacts will be achieved').

*"The [predicted impacts] were provided by the manufacturer and installer. We have no reason to doubt the figures for their product that they gave, so we haven't independently verified it." [PSDS recipient Emergency Services; post-completion monitoring survey]*

However, from depth interviews with respondents that have established processes to collect (and are checking) monitoring data, the installed measures do seem to be performing as intended, and energy / gas consumption has reduced.

*"There's been a huge reduction in emissions at the leisure centre in particular. Watching the graph of gas usage go to zero was a highlight of my year in many ways." [PSDS recipient Local Authority; depth interview]*

### 4.2.3: Reduction in energy costs

Reductions were reported by over a third (38%) of respondents to the grant recipient telephone survey[42]. They were acknowledged by half of those completing the post-completion monitoring survey [n=16], with most of the rest reporting that they still expected to achieve this benefit.

For most projects, it is too soon to properly gauge the effects of measures installed on their energy costs. In addition, as described above, this metric has been somewhat complicated by utility price rises in 2022, meaning some organisations are not apparently seeing any reduction in energy bills at all, even though compared to the counterfactual scenario of not having acted, the increase in energy prices means they will be saving more money in absolute terms than expected.

*"There was originally an estimation that we'd save £25,000/year on utility costs, but that will be higher now because of the gas prices." [PSDS recipient College; depth interview]*

[41] A Building Management System monitors and controls building equipment such as that providing heating, cooling, and lighting.
[42] Only those that had completed the installation of at least some measures were asked about benefits in the telephone survey, and it was expected that they would be answering only for these completed measures. However, it is possible that respondents were also including expectations for any outstanding measures in their response.

> *"We reckoned it would save us around £400,000/year which, given the way costs are going, will be closer to £1million next year. Whilst our energy bills are still going to go up next year, they'd have gone up a lot more otherwise." [PSDS recipient University; depth interview]*

Aside from direct cost reductions, many of those installing solar PV highlighted that any electricity sold back to the grid could offset other costs.

### 4.2.4: Reduction in maintenance costs

Reductions in maintenance costs were acknowledged by around a third (37%) of respondents to the grant recipient telephone survey, and a similar proportion (34%) of the 32 respondents to the post-completion monitoring survey; a majority of the remainder (13 out of 21 respondents) expected to achieve this benefit.

In almost all depth interviews, the projects were felt by respondents to have reduced, or be likely to reduce, maintenance costs. This is in part through newer equipment and measures being less likely to break / need replacing anyway, but also because these newer measures are now under warranty for a certain number of years, sometimes replacing systems / equipment that were so old, the warranty had expired:

> *"The new windows are UPVC so they'll need a lot less maintenance." [PSDS recipient School / Academy; depth interview]*

> *"We were replacing bulbs regularly beforehand, whereas the LEDs are lasting longer." [PSDS recipient School / Academy; depth interview]*

A couple of respondents to the depth interviews reported that the project had temporarily increased maintenance costs, as it had highlighted some further essential works (e.g. fixing leaks), but that these would ultimately have needed addressing anyway, and may have caused more (and more costly) issues down the line if they had not been spotted:

> *"If anything the BMS has actually increased maintenance…Because the software is newer and more sensitive, it's picking up where sensors have failed, controllers have failed, so they've had to go and replace them, but that's a good thing!" [PSDS recipient University; depth interview]*

### 4.2.5: Improvements to the indoor environment

Where relevant (i.e. projects included heating, insulation and / or lighting measures), respondents to the grant recipient telephone survey were asked about improvements to occupant experiences in the building. Although in some cases respondents were taking 'no complaints' as evidence of occupant satisfaction, many also provided evidence of positive improvements.

Amongst respondents to the grant recipient telephone and monitoring surveys, 74% and 81% respectively reported improved quality of lighting, with educational establishments in particular reporting improved focus amongst learners.

> *"We've got improved learning environments, better lighting levels; we're getting lots of positive comments from children, parents and staff." [PSDS recipient School / Academy; depth interview]*

One respondent said they received feedback that the light from new LEDs was too bright; in response they have installed a dimmer switch.

Around a third of grant recipient survey and monitoring survey respondents (38% and 34% respectively) said there had been improved warmth / comfort in improved buildings. This tended to be a result of energy efficiency rather than heat decarbonisation measures. Although they had not always measured it, most depth interview respondents installing fabric measures (windows, insulation etc.) reported occupants feeling more comfortable.

> *"The windows of the building were old... the cold draught that came through was truly incredible at times… I've got an infra-red thermometer that measures the temperature difference. The old windows, in the winter we'd got a frame temperature of 14 degrees, with the new windows we'd got a frame temperature of 19 degrees." [PSDS recipient Local Authority; depth interview]*

> *"Complaints about the cold have gone; we've actually collected in all of the portable radiators because people don't need them anymore." [PSDS recipient School / Academy; depth interview]*

> *"We were sending students and staff home because it was just too hot; 40 degrees. Whereas now the windows have that solar-tinted glass, so it's a much more pleasant environment for everyone to work in." [PSDS recipient College; depth interview]*

In addition, respondents highlighted that their new BMS would better enable them to identify any remaining / new areas of heat loss in the building(s). In a few cases, respondents were able to cite 'before and after' thermal imaging that demonstrated the improved heat retention / reduced leakage of the improved buildings.

It should be noted that several depth interview respondents reported post-installation complaints from occupants regarding comfort – generally because the new heating system was not felt to be as powerful / fast as the old conventional gas boiler system. Respondents tended to seem unconcerned by these complaints, assuming that occupants would adapt behaviours to accommodate the way the new system operates; further waves of the post-completion monitoring survey will provide insight into experiences over a heating season.

Finally, one respondent mentioned that the PSDS-funded fabric measures had reduced the level of traffic noise from outside the building.

### 4.2.6: More energy efficient behaviour

Improvements to occupant energy use behaviour were acknowledged by around half of respondents to both the grant recipient telephone survey and monitoring survey (54% and 47% respectively).

Several monitoring survey respondents reported more efficient use of heating and lighting, saying that occupants had been more conscientious about energy use behaviour subsequent to project completion:

> *"We have seen positive impacts in all areas with auto-switch off on lights reducing use, and new BMS controlling how and when heating is used." [PSDS recipient School / Academy; post-completion monitoring survey]*

> *"Our heating times and temperatures have reduced, as we are now able to control this." [PSDS recipient NHS Trust; post-completion monitoring survey]*

There was limited acknowledgement of occupant behaviour change amongst the depth interview respondents. One respondent observed that the changes had prompted conversation about the benefits of implementing decarbonisation measures. Another organisation is planning a wider behaviour change campaign.

The post-completion monitoring survey sought to explore possible rebound effects. Only two respondents reported that the lights were being left on longer subsequent to measure installation, and only one respondent (of those not installing heat pumps[43]) reported the heating being left on longer. None felt the heating was being turned up higher.

### 4.2.7: Improved aspirations

An added benefit of the LCSF funding was to help public sector organisations identify and prepare specific decarbonisation projects, those that might be funded in Phase 1 and beyond.

Commitment to sustainability was already high amongst many public sector organisations, with the climate emergency and net zero carbon targets having been declared prior to Phase 1 of the PSDS. Grant recipients surveyed were asked to what extent they felt PSDS participation, and the project(s) it funded, led to an increase in the level of engagement and interest in decarbonisation within their organisation. Almost two-fifths (39%), felt it had done so to a great extent, with only two per cent reporting no effect.

Of those surveyed, 86% said that they were taking and / or planning further decarbonisation action. A fifth (20%) of this group said they would not have undertaken or planned this further action at all without PSDS/LCSF, and a further three-fifths (57%) said action taken or planned would have been slower and / or less ambitious.

[43] Heat pumps may need to be left on longer than conventional heating systems to deliver required temperatures.

PSDS grant recipients felt projects had increased organisational focus on, and accelerated plans[44] regarding, decarbonisation and net zero, including encouraging the development of project ideas that could be taken forward in future funding rounds. It was hoped that PSDS-funded projects would serve as exemplars and 'proof of concept' on the benefits of certain measures. Similar projects may then be more readily supported internally in future.

> *"The impact of the PV[45] has now been demonstrated and the Trust will look to continue the investment across its other schools." [PSDS recipient School / Academy; post-completion monitoring survey]*

> *"PSDS1 has shaken the tree, and people are starting to see it can be done, it just needs resourcing…we're starting to see investment grade audits to identify future projects or answer funding requirements. Political and strategic ambitions are becoming reality." [PSDS recipient Local Authority; depth interview]*

### 4.2.8: Improved knowledge

Improved organisational knowledge and understanding contributes to realisation of decarbonisation ambitions. Over four-fifths (83%) of grant recipient survey respondents, and two thirds (66%) of monitoring survey respondents, agreed that the Phase 1-funded project had enhanced knowledge of measures and decarbonisation projects[46].

Respondents to the surveys and depth interviews highlighted a range of areas in which knowledge had been enhanced; these included:

- Greater understanding of 'decarbonisation' and 'net zero' – how they can be achieved, the key challenges / barriers, and likely overall costs and resources required.

  > *"I think the interest was always there, but there's now an awareness of what decarbonisation actually looks like and, more importantly, what a correct approach looks like..." [PSDS recipient Local Authority; depth interview]*

  > *"We've made a climate emergency declaration; I think there's more awareness now that it's not as simple as just putting a new different boiler in. We are talking about major works, and sites with new pipelines and so forth. I think acknowledgement has begun to be made that it's not as simple as it looks." [PSDS recipient University; depth interview]*

- Greater understanding of specific measures – what they are, how they can be installed / integrated (and additional costs that may arise), and how they operate.

  > *"[The PSDS project] has educated us on so many different elements - that air source heat pumps need to go with solar panels, that you've got to improve your windows and doors at the same time... I know our energy team would do it in a completely different way from the start next time. We now understand what's involved, how long these things*

[44] The impact of LCSF Strand 3 – funding production of heat decarbonisation plans – is described in Chapter 5.
[45] Solar Photovoltaic panels
[46] LCSF-funded work was also felt to have benefits to organisational knowledge; this is explored in Chapter 5.

*take, what the challenges are; we understand our own portfolio in more detail. We've just got a bit more nous about it now." [PSDS recipient Local Authority; depth interview]*

Supply chain firms were asked about their confidence in the ability of the building occupants to properly operate the installed measures. Contractors were largely confident that, where necessary, their clients understood how to use the installed technologies. Many measures were covered by warranty, and any issues would be addressed by the installers or manufacturers.

- Greater understanding around project management e.g. what needs to be coordinated / considered, and stakeholders to involve.

  *"For me personally it's really been just learning how to risk manage a very complex project, and phasing of delivery." [PSDS recipient University; depth interview]*

## 4.3: Value for money

In future, it will be feasible to analyse objective energy consumption and cost data to enable a more robust assessment of the value for money of the PSDS. For the interim stage, respondents to the depth interviews were asked about this in terms of (a) the project cost and time investment compared to its achieved / expected outcomes; (b) the public money invested through PSDS versus the overarching scheme outcomes / expected outcomes.

Most respondents to the depth interviews found value for money hard to assess, with many still unsure of the quantifiable impacts, and final costs, of their project. Many had no previous similar project to compare to, and / or found it hard to envisage what an alternative course (and therefore costs) would have been. All respondents felt that a robust judgement on whether the scheme represented value for money for government/society was beyond their contextual knowledge.

Amongst those depth interview respondents that felt able to give a view, there was, overall, a mixed response regarding the value for money of the scheme. As explored in Section 4.1, there was consensus that Phase 1 of the PSDS had funded many measures that would not have been installed otherwise. However, a number of respondents highlighted ways in which the individual projects, and therefore the scheme overall, had not necessarily maximised value for money:

- Several respondents re-emphasised their views on the ‘unfair’ application stage, arguing the process did not necessarily reward the best designed / most impactful projects[47].
- Linked to this, some grant recipients reported that, due to the application and project delivery timescales, they had designed / applied to Phase 1 of the PSDS with projects that were easier to deliver, but not necessarily as impactful as they could have been.

[47] Discussed in more detail in the process evaluation report.

- Also, many funded projects included measures (e.g. LED lighting and draught proofing) that some organisations might have undertaken as part of 'business as usual' replacements / upgrades; as highlighted in section 4.1, grant recipient survey responses show lower levels of attribution to PSDS in enabling these measures.
- The emphasis on decarbonisation rather than fabric measures was felt by many to have likely led to larger installations (e.g. ASHPs) than might have been necessary had a genuine ‘whole building’ approach been supported.
- Many respondents reiterated the effect of PSDS on project costs (and so value for money), with the sudden influx of funds to the market leading to price inflation. This was felt to be contributing to projects either (a) delivering their originally intended impacts, but at a higher cost to the taxpayer[48]; (b) following de-scoping change requests, delivering a smaller and less impactful project.

[48] Whether the funding was from central government (PSDS) or the public sector grant recipient’s own budgets.

# 5: The impact of Phase 1 of the LCSF

Phase 1 of the Low Carbon Skills Fund (LCSF) was available to all bodies eligible for PSDS and was intended to ensure that potential applicants to the PSDS were not prevented from participating by a lack of capacity and capability.

This Chapter of the report provides assessment of whether and how LCSF-funded support addressed the decarbonisation capacity and capability gaps in public sector organisations participating in PSDS.

## 5.1: Supporting project design

In Phase 1, Strand 1 of the LCSF funded expertise to help potential applicants to the PSDS to formulate an eligible project and / or put together a PSDS funding application. In the depth interviews, the scheme was seen by many public sector organisations and contractors as 'levelling the playing field' for PSDS applications, providing expertise that would not normally sit within the smaller, less experienced organisations. Strand 1 was not necessarily designed to support in-house skills development or capacity building, though one applicant suggested this should be considered - increasing the ability of public sector organisations to develop and implement projects without, or with a reduced need for, external support.

There was no ringfencing of funding to the three different Phase 1 strands and Salix determined how best to allocate the funding. Salix received a higher value of applications for Strand 1 than the entire budget for all three strands but wanted to keep some money for the other two LCSF strands, particularly since they were aware that not everyone applying for LCSF Strand 1 funding would receive the PSDS funding.

LCSF-funded support, and therefore the skills gaps that were being filled, generally comprised one or a combination of the following:

- Options appraisals to assess suitable buildings and technologies;
- More detailed work to assess the technical and financial feasibility of a particular project;
- Calculation of project impacts (e.g. $CO_2e$ savings) and other information needed for a PSDS application;
- Support with procurement of equipment and labour, in particular sourcing quotes to evidence project costs.

The level of assistance varied, with some LCSF contractors compiling and organising data to support an application, whilst others drafted the actual submission.

> *"You might, within a county council, have a couple of energy managers who have enough knowledge to do the surveys… But it's not realistic that a multi-academy trust…*

> *would have someone who could go in and do decent energy calculations. We were able to provide that for our clients." [Strand 1 LCSF Contractor; depth interview]*

> *"The skills that they [district councils] are missing is understanding their estate in terms of energy and carbon. Prioritising where they need to work, doing the feasibility and surveys, going around the building and understanding it, and then putting it in an application form." [Strand 1 LCSF Contractor; depth interview]*

For many organisations, the LCSF support was addressing a technical skills / capability gap:

> *"[The contractor conducted] technical feasibility for a solar PV system, support with the planning application for a solar farm, glint and glare studies, arboricultural surveys to see if they'd provide screening... we haven't got that kind of expertise in house." [Strand 1 LCSF recipient; depth interview]*

Contractors with prior experience of submitting applications to Salix were found to be especially helpful as they understood what information was being requested and how to present it.

A common view expressed in depth interviews and in the workshop with LCSF contractors, was of a big capacity and skills gap in the public sector in general, but particularly in the education sector. Primary schools were felt to need the greatest amount of support in terms of both capacity and skills.

For some LCSF recipients, the value was simply that the contractor had the time to do the work; it was noted that the NHS is extremely stretched. However, even in cases where the support was more for capacity than expertise, there was often a benefit of expert endorsement of the applicant organisation's plans, helping to engage and persuade organisational decision makers to authorise projects:

> *"It was not that they were significantly more knowledgeable than in-house staff, but they had the time to do the work… and senior decision makers value having external validation of internal staff's work." [Strand 1 LCSF recipient Local Authority; depth interview]*

Based upon figures provided in the grant recipient survey, the mean average days spent on PSDS applications by LCSF Strand 1 recipients *[n=143]* was 11.1 days; for non-recipients *[n=157]* this was 16.7 days. This suggests that LCSF-funded support reduced the time public sector applicants needed to spend on the process.

Regardless of the specifics of the work, a number of LCSF recipients also commented on the importance of being able to conduct it at no financial risk:

> *"To have risk-free grants to complete speculative - but not wildly speculative - projects was a godsend in terms of being able to explore options." [Strand 1 LCSF recipient Local Authority; depth interview]*

For recipients, LCSF Strand 1 was very important to PSDS participation. In the grant recipient survey, over two-thirds (68%) of LCSF Strand 1 recipients [n=143] said that they would not have applied for PSDS at all without the LCSF-funded support. Over half (54%) said that they would not have been able to source any external support with their application without LCSF.

LCSF Strand 1 recipients were prompted as to ways in which the funded support influenced their PSDS application, compared to a scenario in which there was no such funding:

- Three quarters (74%) said the LCSF-funded support better ensured the application deadline was met;
- 70% said it identified a more appropriate and / or impactful mixture of energy efficiency and decarbonisation measures;
- 51% felt it better ensured the success of their PSDS application.

Ten per cent of LCSF recipients did not acknowledge any benefit from LCSF to their PSDS application. However, this was not because the LCSF output wasn't deemed useful; in most of these cases the organisation had ultimately not submitted a PSDS application, usually because they understood funding to have run out[49], but also in at least one case because of concern around delivery timescales. For the remainder, LCSF had funded work not directly related to the project they applied to PSDS with; in these cases, it was anticipated that this work would inform future projects.

Cases were reported where the LCSF grant did not cover all the associated costs of developing a PSDS application, for a variety of reasons. In some cases, it was never intended that LCSF would cover all the costs (for example, where LCSF was used simply to pay for the initial designs). In others, after initial scoping, it had transpired that more work was needed than had been included in the LCSF funding application.

Some Strand 1 recipients also hadn't fully thought through the costs associated with project management, and, it would seem, could have benefitted from Strand 2 funding.

> *"When we were awarded the money I asked, 'Who is going to implement the project?' They said, 'You are.' I said, 'I'm not going to do that in a part-time job.' So they put me on a full-time role for that year [which the council paid for]." [Strand 1 LCSF Contractor; depth interview]*

There were also cases where the applicant had been conservative with their funding request because of fear their application would be unsuccessful if they asked for more.

[49] Once PSDS became fully subscribed, the Salix team wrote to applicants yet to be approved for LCSF funding to let them know that PSDS was fully subscribed (and that the applicants were therefore very unlikely to get PSDS funding). In the end, all but six of the LCSF applicants carried on with their application, saying they would like to have the funding to develop a project even though they wouldn't be able to access PSDS funding.

> *"No [it didn't cover all the costs] but it helped…. I think we probably should've asked for double… I was hedging my bets really, because if you go in too heavy, I was feeling that it might been rejected." [Strand 1 LCSF recipient Local Authority; depth interview]*

Frustration was expressed by one non-funded PSDS applicant, that public sector organisations couldn't claim for time spent by their own staff on the PSDS application.

> *"The PSDS and the development of all this probably took up 90% of my time. I suffered because of it and I couldn't claim any money back for my time that I put in. Some of my admin officers put a lot of time into this and we couldn't claim anything for them either." [Strand 1 LCSF recipient Local Authority; depth interview]*

## 5.2: Supporting project implementation

Strand 2 of LCSF supported the further development and / or delivery of a project that was awarded PSDS funding. Amongst LCSF recipients surveyed, Strand 2-funded support generally comprised project management of the works, with further uses including quality assurance, impact monitoring, and installing and monitoring of meters.

For recipients, LCSF Strand 2 was seen as very important to project delivery. LCSF Strand 2 recipients surveyed [n=29] were prompted as to ways in which the LCSF-funded support influenced their project, compared to a scenario in which there was no such funding:

- 80% felt the LCSF-funded support ensured a higher quality of project than would otherwise have been achieved;
- 72% felt it ensured the project met deadlines;
- 59% felt it ensured the project achieved greater impact / value than it would have otherwise.

Especially in the context of tight timescales, Strand 2 funding recipients commented that it was very helpful to have resource to support delivery of projects; several felt this is something that is often insufficiently resourced.

> *"We would have struggled [without the LCSF-funded support]. I genuinely do believe that, with the skill set we've got in-house, and the amount of work we've got on, things would have been delayed or stopped. So it was important that we got those guys on board." [Strand 2 LCSF recipient Local Authority; depth interview]*

As well as carrying out the onsite project management, some LCSF Strand 2 contractors also managed the procurement process, including liaising with contractors and doing site-visits. In the depth interviews and workshop with contractors, several participants emphasised the importance of this work to project quality and realisation of intended outcomes through ensuring (a) appropriate and high-quality tenders for work that would deliver what was needed; (b) proper checking of buildings and good quality installation on site.

> *"We were looking after clients' interests, because they've no experience of the installation... They just don't have a clear understanding if corners are cut. And it's after the event that they'll then find out that they bought something that is going to give them years of trouble, or indeed not work at all. I find that a lot in the public sector." [Strand 2 LCSF Contractor; depth interview]*

LCSF Strand 2 funding was provided for project delivery support, but several grant recipients and contractors said they would have valued being able to spend it beyond March 2021. Ongoing project management costs were covered by the grant recipient, at considerable expense, where these had not been incorporated into PSDS costings.

> *"Spending the money by 31st March last year is ludicrous, because the projects had hardly even got going by that stage." [Strand 2 LCSF recipient Local Authority; depth interview]*

Where the project management cost was funded through PSDS rather than through LCSF Strand 2, there seemed to be more scope to extend support in line with the timetable for installation of measures. LCSF Strand 2 funding filled a gap where some enabling costs were not covered by the PSDS. This has been subsequently changed for future phases of the PSDS, as all enabling costs are now eligible through the capital scheme, whilst no enabling costs are available through the LCSF.

## 5.3: Creating heat decarbonisation plans

Strand 3 of LCSF was intended to support the production of heat decarbonisation plans, which would provide a roadmap for future action. Amongst LCSF Strand 3 funding recipients surveyed [n=45]:

- 83% said the funding enabled them to produce the plan sooner
- 73% said it ensured a higher quality plan
- Only 14% said they would have been able to source such support without the funding.

> *"Given several years, and having everything taken off me, I probably could have done the work myself, but it just wasn't going to be practical at all." [LCSF Strand 3 recipient Local Authority; depth interview]*

Qualitative interview respondents said the funded plan would be instrumental in informing their future work and giving their organisation a pipeline of projects. One respondent also described how the plan had helped to overcome resistance to decarbonisation projects in their organisation:

> *"Any resistance I had from old gas engineers that didn't really want to engage with the new low-carbon technology, this heat decarbonisation plan addresses that. It helps me to push through… the low-carbon technology agenda and push back on any installation*

*of gas boilers in any of our stock." [LCSF Strand 3 recipient Local Authority; depth interview]*

## 5.4: Impacts of Phase 1 of the LCSF on future aspirations

On LCSF more broadly, where LCSF recipients were unable to pursue or were unsuccessful with PSDS applications under Phase 1, evidence from interviews and the grant recipient survey indicates that the LCSF has (a) built skills and understanding within organisations that can be deployed on future plans and projects; (b) left a legacy of reports and projects which can be used to inform applications, either in later phases of the PSDS or other sources of finance. One LCSF recipient interviewee provided an example of a client who had been able to use their LCSF funded report to successfully secure internal capital funding.

Two-fifths (39%) of LCSF recipients in the grant recipient survey said that LCSF had influenced them to apply to Phase 3 of the PSDS[50], whilst almost half (48%) said it had influenced further works outside of PSDS.

In some cases, LCSF funding has helped organisations to progress the work for which they had hoped to get Phase 1 PSDS funding, unlocking internal funding and/or putting organisations in a strong position to bid for any future funding. It has also helped to develop and update estate strategies and raised awareness of potential opportunities, as well as ensuring organisations have a robust / realistic understanding of the likely financial and resource costs of future projects.

*"I think [heat decarbonisation plans] are really, really useful in actually coming up with a cost. It's all well and good, a council going 'we're going to reach net zero.' But they have no idea how much it's going to cost and what resources are going to be used." [LCSF Strand 3 recipient Local Authority; depth interview]*

*"It's given a clear investment schedule for decarbonisation to certain levels. We know pretty much exactly how much we need to spend in order to reduce our carbon by [the target %]. It's also given the platform to make it easier to tender for work going forward, whether it's funded or not." [LCSF Strand 3 recipient NHS Trust; depth interview]*

[50] And had provided useful information for Phase 3 PSDS applications.

# 6: Future support of PSDS and LCSF goals

Lessons learned from Phase 1 delivery have already fed into the design of Phases 2 and 3 of PSDS. At the time of writing, these have included:

- In Phase 3, a proportion of projects can be completed across multiple financial years, allowing for larger, more ambitious (and so potentially more impactful) projects and measures
- Phase 2 and Phase 3 place a greater emphasis upon decarbonisation, recognising the concerns around PSDS additionality when funding straightforward energy efficiency measures.

Across the quantitative surveys and depth interviews, respondents were invited to suggest changes to the policy landscape to further support public sector decarbonisation impacts, and the supply chain that would help to deliver the projects.

Building on the learnings detailed in the separate process evaluation report, this final chapter summarises new findings from our second stage of qualitative fieldwork regarding (a) future phases of PSDS and LCSF; (b) wider policy.

## 6.1: Future Phases of PSDS

### 6.1.1: Ongoing funding

By far the most common recommendation for future PSDS phases from public sector and supply chain respondents was that there *needs to be* future phases. For most, ongoing funding was seen as a necessity if net zero targets were to be achieved. Phase 1 of the PSDS has helped many organisations to take some action, and for most has highlighted action that could be taken in future, but more support is felt to be needed for these ambitions to be realised. All interviewees welcomed the PSDS, but many highlighted that the value of the scheme was a relative drop in the ocean in the investment required to achieve net zero.

> *"A lot of councils have said they want to be net zero by 2030 and we've scoped out for them what would be required; for any one organisation it's costing millions and millions." [LCSF Contractor; depth interview]*

### 6.1.2: Application processing and assessment

A number of PSDS applicants felt that the quality – and so the impact – of future projects could be enhanced if more feedback were provided on (particularly unsuccessful) applications:

> *"We have no idea of why [certain applications were successful and others unsuccessful]. Was information missing? Was it that they didn't make a compelling case? Was it that they weren't in the favoured areas? We've no idea." [PSDS grant recipient local authority; depth interview]*

In encouraging impactful measures, one contractor felt that Ground Source Heat Pumps (GSHP) in particular are disadvantaged by a carbon accounting approach that assumes a twenty-five-year lifespan for GSHP groundworks when in fact they might have a lifespan of around one hundred years. This interviewee suggested that GSHP boreholes or ground loop installations should be regarded as long-term infrastructure investments and be treated more favourably by the scheme criteria.

### 6.1.3: Communications

A number of respondents suggested that BEIS / Salix could establish a forum whereby grant recipient organisations (especially those of similar sizes / sectors or implementing similar measures) can share experiences and learnings on the design and implementation of projects. This, it was felt, could lead to both more efficient projects (avoiding pitfalls) and more impactful / ambitious projects (as organisations appreciate what is possible and has been achieved elsewhere). Similar to this, several respondents requested that more case studies of Phase 1 projects be published to provide learnings and solutions to other organisations in similar situations.

## 6.2: Future Phases of LCSF

Respondents from several LCSF recipient organisations thought there would be value from building in-house capability and doubts were raised regarding the degree to which LCSF currently had such long-term positive impacts. Although some colleagues may have picked up specific experience and knowledge from LCSF and PSDS funded works, respondents argued that to a large extent the LCSF had provided a temporary fix for a lack of organisational capacity and capability, with the scheme mostly increasing skills and experience on the supply side.

> *"When you have the external project manager, we don't gain those skills, we become reliant on the external project manager; we haven't learnt enough from it to then be able to do it ourselves next time." [LCSF Strand 2 recipient Local Authority; depth interview]*

Linked to this, one recipient felt that due to hourly / daily rates, a more focused effort to increase internal capacity and capability in public sector organisations would be more cost effective than funding for outsourcing to consultancies. The respondent argued that having internal resource to call upon would avoid the costs and time required to go through a tendering process.

Several LCSF contractors felt that within the public sector clients they worked with, there had been some increased understanding of performance specifications, approaches to quality

assurance, and identifying and commissioning consultants, However, others did not feel the LCSF work had made much impact on their clients' in-house skills. It was noted that transferring skills and knowledge to clients was hampered by the tight project timescales, though some also pointed out that long term liaison between supply chain and public sector clients (e.g. through maintenance contracts) could lead to some knowledge transfer.

## 6.3: Wider policy

A number of recommendations were made regarding changes that would benefit both future phases of PSDS and LSCF and the wider policy landscape. These included:

a) Identifying opportunities for linking up different funding streams and initiatives across government departments, to ensure complementarity and to remove the risk of double funding (e.g. PSDS and Heat Networks funding being used for the same works).

b) Addressing the delays to installation and commissioning resulting from necessary interactions with the regional district network operator.

c) Revising planning policy, to make this more supportive of substantial measures such as ground source heat pumps and District Heating.

d) Ensuring clarity for both public sector organisations and the supply chain on the prioritisation of heat pumps and PV versus hydrogen solutions:

   *"Government needs to come out very strongly that Hydrogen isn't an option for heating, because there's a lot of distraction in the conversation that says let's put off doing a decarbonisation project, because a magic fuel is going to come down the pipes that we already have, at some point soon."*

e) Building the capacity of UK low carbon product manufacturing, creating employment / economic benefits, whilst simultaneously mitigating the challenges observed in Phase 1 around global shortages / supply chain issues.

f) Having a greater focus on fabric measures, reducing overall consumption and ensuring greater value for money on decarbonisation projects, as units could be smaller:

   *"There's no point having a posh air source heat pump with all the hot air going out the door or the windows."*

To facilitate transformation of the sector and deliver net zero, requests for wider policy to complement schemes like PSDS were also common. Most recommendations were in terms of either incentives, taking the form of subsidies for 'green' products / measures, or regulation, for increased taxes on fossil fuels and higher costs of gas relative to electricity[51]. It was suggested by one respondent that revenue from this could be used to discount electricity and so incentivise, for example, a switch from conventional gas boilers to heat pumps.

[51] Again, it should be noted that this suggestion was made prior to the recent increases in utility prices.

> *“A carbon tax could be done tomorrow, like the tax on cigarettes and alcohol. That would mean that between now and 2030 the supply chain could tool up to deliver properly to the market - they would have the certainty that the market would be there.” [Consultancy]*

The development of the electric vehicle sector was cited by some as providing an example of how a consistent policy framework could help to trigger the development of a now self-sustaining market.

# Appendix: further detail on the evaluation

### Evaluation objectives

The specific impact-focused evaluation questions (EQs) are listed below:

| Area | Key questions[52] |
|---|---|
| Jobs and skills | How effectively has the scheme supported energy efficiency and low carbon jobs?<br><br>To what extent were job impacts additional to those which would have occurred in the absence of the scheme?<br><br>How effectively has the scheme driven the development of skills needed to meet Net Zero?<br><br>Did the scheme contribute to the creation and support of long-term growth in the energy efficiency supply chain? |
| Decarbonisation impacts and ambitions | How effectively has the scheme delivered carbon savings?<br><br>To what extent were carbon impacts additional to those which would have occurred in the absence of the scheme?<br><br>To what extent has the scheme influenced public sector attitudes / ambitions on decarbonisation? |
| Installation | To what extent did the scheme deliver energy efficiency and low carbon heat installations which were high quality and represented good value for money? |
| LCSF | How effective was LCSF in aiding the delivery of projects funded by PSDS?<br><br>How effectively has LCSF supported the development of heat decarbonisation plans?<br><br>How long term were the LCSF benefits in relation to the capacity and capability of the public sector to develop and deliver successful energy efficiency and decarbonisation projects? |

[52] Unless stated, these apply principally to PSDS rather than LCSF.[53] Abadie, A. (2005). Semiparametric difference-in-differences estimators. *The review of economic studies*, *72*(1), 1-19.

### Explanation of the DiD jobs analysis method

This section provides further technical details on the semi-parametric DID (SDID) method used to analyse the impact of the PSDS on jobs.

The SDID method allows to estimate the causal effect of a treatment on a variable of interest $y$ at a given time $t$. Assume that each subject has two potential outcomes $(y_{1t}, y_{ot})$, $y_{1t}$ is the value of $y$ if the subject receives the treatment at time $t$ and $y_{ot}$ is the value of $y$ had the subject not received the treatment at time $t$. $d_t$ is a binary variable that takes the value of 1 if the subject is treated and 0 otherwise. In this case, the average treatment effect on the treated (ATT) is defined as follows:

$$ATT = \mathbb{E}(\mathrm{y_{1t}} - \mathrm{y_{ot}} |\, \mathrm{d_t} = 1)$$

ATT cannot be estimated in practice as $y_{ot}$ is never observed for a treated subject. Abadie (2005)[53] shows that the sample analogue of

$$\mathbb{E}\{\frac{\Delta \mathrm{y_t}}{P(d=1)} \times \frac{\mathrm{d} - \pi(\mathrm{x_b})}{1 - \pi(\mathrm{x_b})}\}$$

Can be considered as an unbiased estimate of ATT. Here $x_b$ is a set of pre-treatment characteristics, $\Delta \mathrm{y_t} = y_t - y_b$ is the change of $y$ between time $t$ and the baseline $b$, $\pi(\mathrm{x_b}) = P(d = 1|x_b)$ is the conditional probability to be in the treatment group. It is worth noting that this estimate is unbiased if the following assumptions hold: $\mathbb{E}[\mathrm{y_{ot}} - \mathrm{y_{ob}}|\mathrm{d} = 1, \mathrm{x_b}] = \mathbb{E}[\mathrm{y_{0t}} - \mathrm{y_{0b}}|\mathrm{d} = 0, \mathrm{x_b}], \mathrm{P(d} = 1) > 0 \text{ and } \pi(\mathrm{x_b}) < 1.$

One of the ways to construct the weights $\pi(\mathrm{x_b})$ described by Abadie (2005) is to use propensity score matching approach (PS). The PS weighting achieves covariate balance by conditioning on the probability of receiving the treatment and assumes that the correct model is known to the researcher. The PS approach to estimating weights has some important limitations. In practise, the correct model is less likely to be known. The PS thus fails to balance all the covariates in such cases. One must go back and forth between the two models to find suitable weights that balance all the characteristics.

The more reliable alternative to PS, which we use in this analysis, is Entropy Balancing (EB) (Hainmueller, 2012)[54]. The EB is a generalisation of the PS and has the advantage of avoiding the cyclical process of finding suitable weights that balance all the characteristics while at the same time ensuring that the characteristics are balanced.

[53] Abadie, A. (2005). Semiparametric difference-in-differences estimators. *The review of economic studies*, *72*(1), 1-19.
[54] Hainmueller, J. (2012). Entropy balancing for causal effects: A multivariate reweighting method to produce balanced samples in observational studies. *Political analysis*, *20*(1), 25-46.

According to the EB balancing scheme, the weights $\omega_i$ are chosen by the following reweighting procedure:

$$\min H(\omega) = \sum_{\{i|d=0\}} h(\omega_i)$$

Subject to balance and normalising constraints:

$\sum_{\{i|d=0\}} \omega_i \, c_{ri}(x_i) = m_r, r \, \epsilon \, 1, \ldots, R, \sum_{\{i|d=0\}} \omega_i = 1, \, \omega_i \geq 0$ for all $i$ such that $d = 0$.

Once the weights $\omega_i$ are calculated, the DID regression can be estimated by weighted least squares as follows:

$$\left(\hat{\mu}, \hat{\alpha}, \hat{\beta}, \hat{\tau}^{spdid}\right) = \arg\min_{\mu,\beta,\alpha,\tau} \sum_{i=1}^{N} \sum_{t=1}^{T} (Y_{it} - \mu - \alpha_i - \beta_t - W_{it}\tau)^2 \hat{\omega}_i^{\text{spdid}}$$

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