

salix



Department for
Energy Security
& Net Zero

PHASE 4

Public Sector Decarbonisation Scheme

Guidance Notes

September 2024



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1 Executive summary

1.1 Introduction

The Public Sector Decarbonisation Scheme (PSDS) provides grant funding to public sector organisations in England, as well as those with reserved functions operating in the Devolved Administrations, to install heat decarbonisation and energy efficiency measures in their buildings. Through Phase 4 of the PSDS, the Department for Energy Security and Net Zero (DESNZ) will make capital funding available from 2025/26 to 2027/28. The value of available funding and the profile split across the three financial years will be confirmed in due course. This funding will be allocated following an application window in autumn 2024. The application portal will open by mid-October and close on 25 November 2024. Phase 4 follows Phases 1, 2 and 3 of the PSDS which collectively made more than £2.8bn of funding available to the public sector to decarbonise their buildings.

The UK needs to reduce its greenhouse gas emissions significantly to reach net zero by 2050. The scheme supports the aim of reducing emissions from public sector buildings by 75% by 2037, compared to a 2017 baseline. The public sector is also well positioned to provide leadership to other sectors and to demonstrate the UK's commitment to carbon reduction. This is expected to catalyse further innovation in green technologies and generate new business and job opportunities.

The electricity grid is decarbonising: in 2022, 56% of UK electricity came from low carbon sources¹. However, most public sector buildings still rely on burning fossil fuels for heating, and these 'direct' carbon emissions account for approximately 2% of total UK territorial emissions², and 9% of emissions from UK buildings.

It is challenging for public sector organisations to reduce these heating emissions as the costs of installing and running fossil fuel systems, such as gas boilers, are often lower than their low carbon alternatives. The PSDS helps overcome this challenge by providing financial assistance to public sector organisations to install low carbon heating, along with energy efficiency measures needed to support the low carbon heating system. Targeting emissions from heating eliminates fossil fuel reliant technology and improves the warmth and efficiency of public buildings.

A typical PSDS project will include building fabric improvement measures, such as insulation, which keeps warmth inside the building, improving heating efficiency. This supports the new low carbon heating system, which could, for instance, be a connection to a heat network or a heat pump. Additionally, a project may also include electrical energy efficiency measures such as LED lighting which reduces the building's electricity use. Finally, some applicants might include renewable electricity generation such as solar PV. This reduces bills by providing electricity on site.

1.2 Key features and changes for Phase 4

The strategic objective of the PSDS is to reduce direct carbon emissions from public sector buildings. For Phase 4 of the scheme, policy changes will be implemented to ensure the scheme delivers the highest amount of direct carbon emissions savings possible across the public sector. This is in addition to implementing an updated definition of what constitutes a public sector organisation.

The section below highlights key features of the scheme and elements that have changed since previous phases. These features are expanded upon in detail throughout the document, with relevant sections linked.

¹ Digest of UK Energy Statistics 2023: Chapter 5 Electricity <https://www.gov.uk/government/statistics/electricity-chapter-5-digest-of-united-kingdom-energy-statistics-dukes>

² <https://www.gov.uk/government/collections/uk-territorial-greenhouse-gas-emissions-national-statistics>

Key features of the Public Sector Decarbonisation Scheme

Building eligibility	<p>Applicants must be public sector organisations in England or those with reserved functions operating in the Devolved Administrations. Applicants must either own the building that the funding is being used to upgrade or have a lease arrangement where the tenancy agreement places the responsibility for operation and maintenance of the building services on the applicant.</p> <p>Buildings with a Private Finance Initiative (PFI) arrangement where operation and maintenance is funded from PFI unitary charges paid by the applicant are also eligible. See section 4.1 for building eligibility and subsidy rules.</p>
Existing heating system requirements	<p>Each building within the application must be served by a fossil fuel heating plant at the end of its useful life. This is generally 10 years or older. See section 4.2.1.</p>
Minimum recipient contribution	<p>Applicants must contribute the cost for a like-for-like replacement of the existing fossil fuel heating plant at a minimum of 12% of total project costs. See section 4.3.1.</p>
Additionality	<p>The project must be additional, meaning that the project would not take place without the PSDS grant, must not have already started, and measures must not be required to be installed by law. See section 4.1.2.</p>
Whole building approach	<p>Applicants must consider the inclusion of building fabric improvements and energy efficiency measures as appropriate, where they reduce the heat or electrical demand of the building being heated by the proposed low carbon heating system. See section 4.2.2 for further guidance on taking a whole building approach.</p> <p>Applications should only include eligible technologies listed in Appendix 1. Applicants should seek prior authorisation from Salix to include technologies in their application which are not listed.</p>
Proposed heating system requirements	<p>Applications must propose low carbon heating for all buildings. Design requirements and technology-specific guidance can be found in section 4. No technologies reliant on the use of fossil fuels are eligible.</p>

Key changes	
Allocation process	
Targeted allocation	Phase 4 sees a move away from allocating funding on a first-come first-served basis, as has been applied in previous phases, and instead will use a targeted allocation approach. The order in which grants are awarded will primarily be driven by the application's grant carbon cost. Applications are prioritised by carbon cost initially though will also be impacted by the sector ('education', 'health' and 'other') and annual funding profile. See section 2.1.
Carbon cost calculation	
Calculating the application's grant carbon cost	<p>An application's grant carbon cost will now be a key factor in determining which applications will be funded. The grant carbon cost of the application will be calculated by dividing the requested grant value by the direct carbon savings delivered by the measures that are funded by the grant only. Measures proposed to be funded by the recipient contribution will not impact the grant carbon cost.</p> <p>Applications must have a grant carbon cost of no more than £510 per tonne of direct carbon saved over the lifetime of the measures (£510/tCO₂e LT). For further detail on how the grant carbon cost will be calculated see section 2.2.</p>
Applications with a lower grant carbon cost are more likely to receive funding	The grant carbon cost for an application will be a key factor in deciding which applications will be funded. Applicants can influence the grant carbon cost of their application by adjusting the measures proposed as part of their application or the amount of grant funding requested.
Eligible organisation definition	
The definition of 'public sector organisation' has changed to align with up-to-date legislation	<p>Organisations must meet the definition of a 'public authority' as defined by the Procurement Act 2023.</p> <p>This may impact the eligibility of higher education institutions. See section 4.1 for further detail on evidence required. Additional evidence will also be required for leased buildings and PFI arrangements. Where the lease length is below the useful lifetime, or 'persistence factor', of the measures, it will be capped to the remaining lease length unless lease renewal evidence can be provided. See section 4.1.3.</p>

1.3 Application window dates

The Phase 4 application window will open by mid-October and closes at 2pm on 25 November 2024. The broader PSDS timeline can be seen in Figure 1.

Applications will be assessed once the application portal closes, and all successful applications will be awarded funding by approximately the end of May 2025.

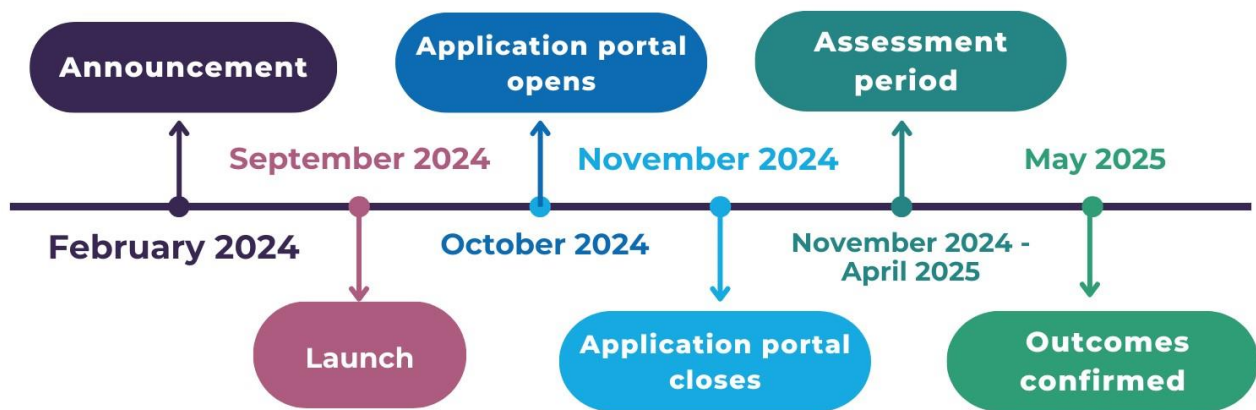


Figure 1: The timeline for Phase 4

1.4 Funding available for Phase 4

The scheme will run from 2025/26 to 2027/28. The value of available funding and the profile split across the three financial years will be determined in the Spending Review and confirmed in due course.

Applicants will need to decide the profile of grant spend required across each financial year to deliver the project. Following the application submission, applicants will not be able to amend their requested profiles. During the assessment process, it will be at Salix's discretion to approve any changes to this profile. If successful, grant funding will be allocated for each financial year. Once agreed via the Grant Offer Letter, funding cannot increase and cannot be moved between financial years.

Where projects may take up to three financial years to complete, applicants can only apply for sequential annual grant funding. Applications with only 2025/26 and 2027/28 funding will not be approved.

Applications seeking funding for the 2025/26 financial year should be mindful of the timeline to allocate funding shown in Figure 1. Due to the timing of the launch of Phase 4 there is no guarantee all Grant Offer Letters will be issued by the start of the 2025/26 financial year. Efforts will be made to allocate funding as soon as possible however, the time required to complete assessments may result in Grant Offer Letters being issued as late as May 2025. Applicants should reflect a potential start date of as late as May in their project plans and timelines.

Projects must be designed to complete no later than 31 March 2028.

Applying for a 'planning year' before commencing spend

Applications are welcome for projects that are anticipated to take up to three years to complete but may not need the grant in the first and/or second financial year. This 'Planning Year' option allows applicants to apply for funding for projects with spend in 2026/27 and 2027/28, using 2025/26 as a planning year to design and develop their projects with no grant spending. Similarly, applicants can apply for funding in 2026/27 only, or 2027/28 only, using previous year(s) as planning years. This is designed to help applicants plan ahead.

Applicants will still need to include details of planned project spend in each financial year.

2 How will funding be allocated?

2.1 Allocating funding: the introduction of targeted allocation

Phase 4 will not use the first-come first-served allocation approach as used in previous phases of the scheme. Instead, it will be replaced with a targeted approach to allocating funding. The targeted allocation model will prioritise PSDS funding towards the most cost-effective carbon saving applications first, whilst also taking into account the sector that the application is from.

Figure 2 provides a description of how the targeted allocation process will work, which can be read alongside the 'targeted allocation' video available on the [Salix website](#).

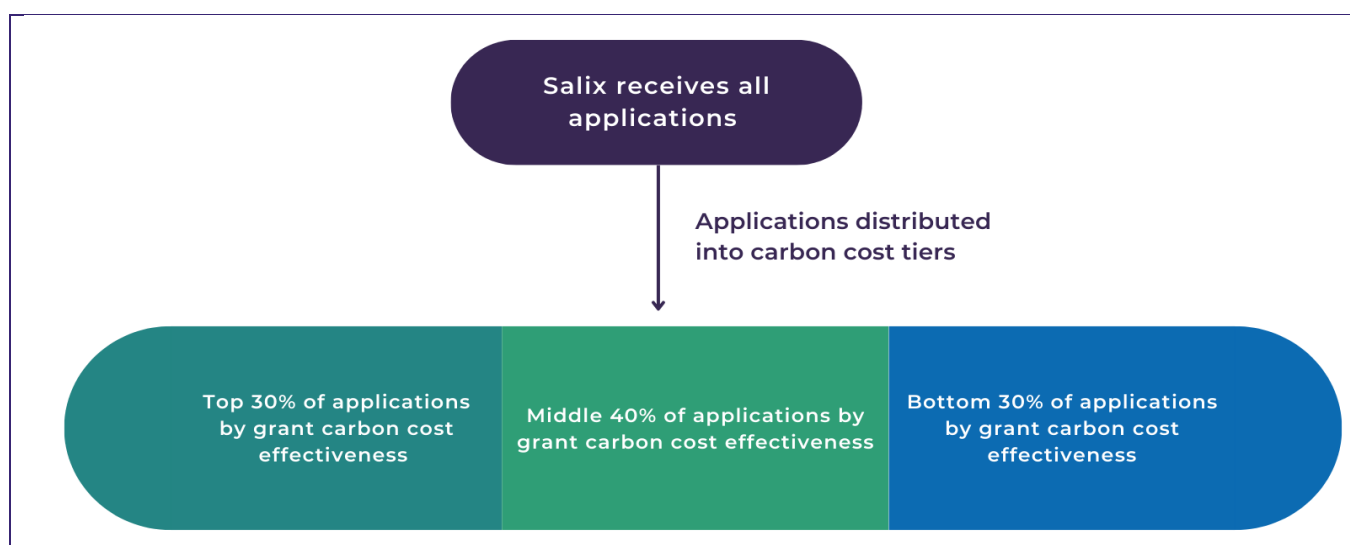


Figure 2: An overview of the targeted allocation process

1. Salix receives all applications.
2. Applications will be sorted into three carbon cost tiers, where the top 30% of applications by grant carbon cost effectiveness are prioritised over the middle 40%, which in turn are prioritised over the bottom 30%.
3. Applications are randomised within their tiers and then fully assessed and awarded funding in this order until the sector soft caps have been met (see section 2.1.4).

2.1.1 Carbon cost tiers

When the application window closes, Salix will sort all applications into three 'tiers' based on their grant carbon cost. The top 30% of applications by grant carbon cost effectiveness are placed in the top tier, the next 40% are placed in the middle tier and the final 30% are placed in the bottom tier.

The maximum acceptable grant carbon cost for Phase 4 is £510/tCO₂e over the lifetime of the project for grant funded measures. Funding will be prioritised towards the most grant carbon cost-effective tiers first, noting the interaction with the sector soft cap policy in section 2.1.4.

2.1.2 Randomisation

After applications are sorted into carbon cost tiers, they are randomised within each tier. This means that applications will be awarded funding in a random order within the three carbon cost tiers. Consequently, any two applications in the same carbon cost tier will have an equal chance of being assessed and awarded a grant first.

2.1.3 Sector soft caps

As with previous phases of the scheme, applications will continue to be assigned to one of three sector categories – ‘education’, ‘health’ or ‘other’:

- Education - includes state primary schools, state secondary schools, further education colleges, universities and local authorities applying on behalf of schools only. Education-owned leisure centre facilities would also be included in this sector.
- Health - includes hospitals and health centres.
- Other - includes emergency services and ambulance services, local authorities, leisure centres, law courts and prisons, Central Government Departments and their arm’s length bodies, community centres, clubs, museums, and theatres. Applications which are mixed (e.g., a local authority application which covers a school and a leisure centre) will fall in this ‘other’ sector.

Between 30 to 35% of available funding will be assigned to each sector. The result of this is that ‘education’ applications will only be in competition with other ‘education’ applications, and so on.

These sector caps are ‘soft’, meaning that if insufficient eligible and complete applications within a particular sector result in that sector soft cap not being filled, any unallocated funding from within that sector soft cap can be allocated to other sectors – even if by doing so, those other sectors then exceed their sector soft caps.

2.1.4 Funding profile

The allocation of funding will also depend on the financial profile of applications prioritised by the targeted allocation model. If the funding in one of the three financial years is fully allocated, and funding still remains in one or both of the remaining financial years, any funding remaining will be allocated to applications that only have spend in the financial years with funding remaining. This will be based on their spending profile in the application form. For example, if funding is exhausted in 2027/28 but the ‘health’ soft sector cap has not been met, funding will be allocated to the next ‘health’ applications that have spend in only 2025/26 and/or 2026/27.

2.2 How to develop a competitive application

2.2.1 Calculating an application’s grant carbon cost

An application’s grant carbon cost will be a key factor in deciding which applications will be funded. The grant carbon cost of an application will be determined by the direct carbon saved by the PSDS grant alone.

All applications are part funded by an applicant’s own contributions. The carbon cost calculator within the application form will automatically determine which measures are deemed to be funded by the PSDS grant and which measures are funded by the applicant’s own contribution. To do this, the calculator will rank the low carbon heating and energy efficiency measures based on how much they cost per tonne of direct carbon saved, with the most carbon cost-effective measures deemed to be funded by the PSDS grant.

Once the calculator has determined which measures are funded by the grant, the application's grant carbon cost is arrived at using the formula below.

Applicants can therefore influence the grant carbon cost of their application by adjusting the measures proposed as part of the application or the amount of grant funding being requested. This means that an applicant may improve their grant carbon cost by either removing, or self-funding, less carbon cost-effective measures or those that do not save direct carbon.

Calculating an application's grant carbon cost is explained in further detail in the 'calculating carbon cost' video, which can be found [here](#).

The grant carbon cost calculation for Phase 4 (£/tCO₂e over measure lifetime (LT)) is as follows. The lifetime of measures used to calculate the grant carbon cost are provided in Appendix 1 and definitions are provided in the Glossary.

$$\text{Grant carbon cost (}\text{£/tCO}_2\text{e LT)} = \frac{\text{Grant value requested (}\text{£)}}{\text{Direct carbon saved by grant funded measures over the lifetime (tCO}_2\text{e LT)}}$$

Figure 3: Grant carbon cost calculation

Applicants can use the carbon cost calculator in the application form to identify the most carbon cost-effective measures and buildings to determine how they might improve their grant carbon cost and make their application more competitive. Grant funding may be requested for measures that do not deliver direct carbon savings, such as LED lighting and solar PV, but an applicant should note that this will increase the grant carbon cost of their application, as it would increase the grant cost without increasing direct carbon savings.

Stage 1 – Inputting measures into the application form

Applicants need to input all measures they plan to install as part of their PSDS project into step 4.1 of the application form. This will include a breakdown of measure costs and associated energy savings. A measure's energy savings will be used to determine the lifetime direct carbon savings it delivers.

The application form will automatically rank measures based on their measure carbon cost and generate a carbon cost curve, specific to the measures inputted. This graph shows the grant value against the grant carbon cost. The applicant can use this to identify a grant value that will likely achieve a competitive grant carbon cost.

Stage 2 – Deciding how much grant funding to request

Applicants should select their grant value in the application form, which will return a grant carbon cost for the application. This will be selected in step 4.2 and will automatically notify the applicant if the grant carbon cost exceeds £510/tCO₂e over the lifetime of installed measures and/or the minimum recipient contribution has not been met.

The applicant must ensure that the proposed applicant contribution balances competitiveness and affordability. Should an applicant reduce the value of the grant to make the application more competitive, they must ensure that they are able to cover any additional costs above the grant value and the minimum recipient contribution of 12% (this is calculated as either 12% of the total project costs or the like-for-like costs percentage, whichever is highest).

Applicants should note that the grant value cannot be increased following the submission of an application. Therefore, any cost increases must be covered by the applicant. If the applicant requires support with meeting their contribution, information on alternative sources of funding can be found in section 3.1.

Stage 3 – Final grant value selected

Once the applicant is satisfied with their grant carbon cost, they will submit their application form through the online application portal. The application is then sorted into a carbon cost tier based on the methodology outlined in section 2.1.1.

3 Developing the project

This section sets out what applicants need to consider when developing their project. Applicants must conduct detailed technical and commercial analysis to confirm their project meets the scheme eligibility criteria, is technically feasible and deliverable within the grant funding period and provides the most cost-effective route to decarbonising the buildings proposed. These steps are captured in Figure 4 and demonstrate that applicants need to engage with internal and external stakeholders to develop their project.

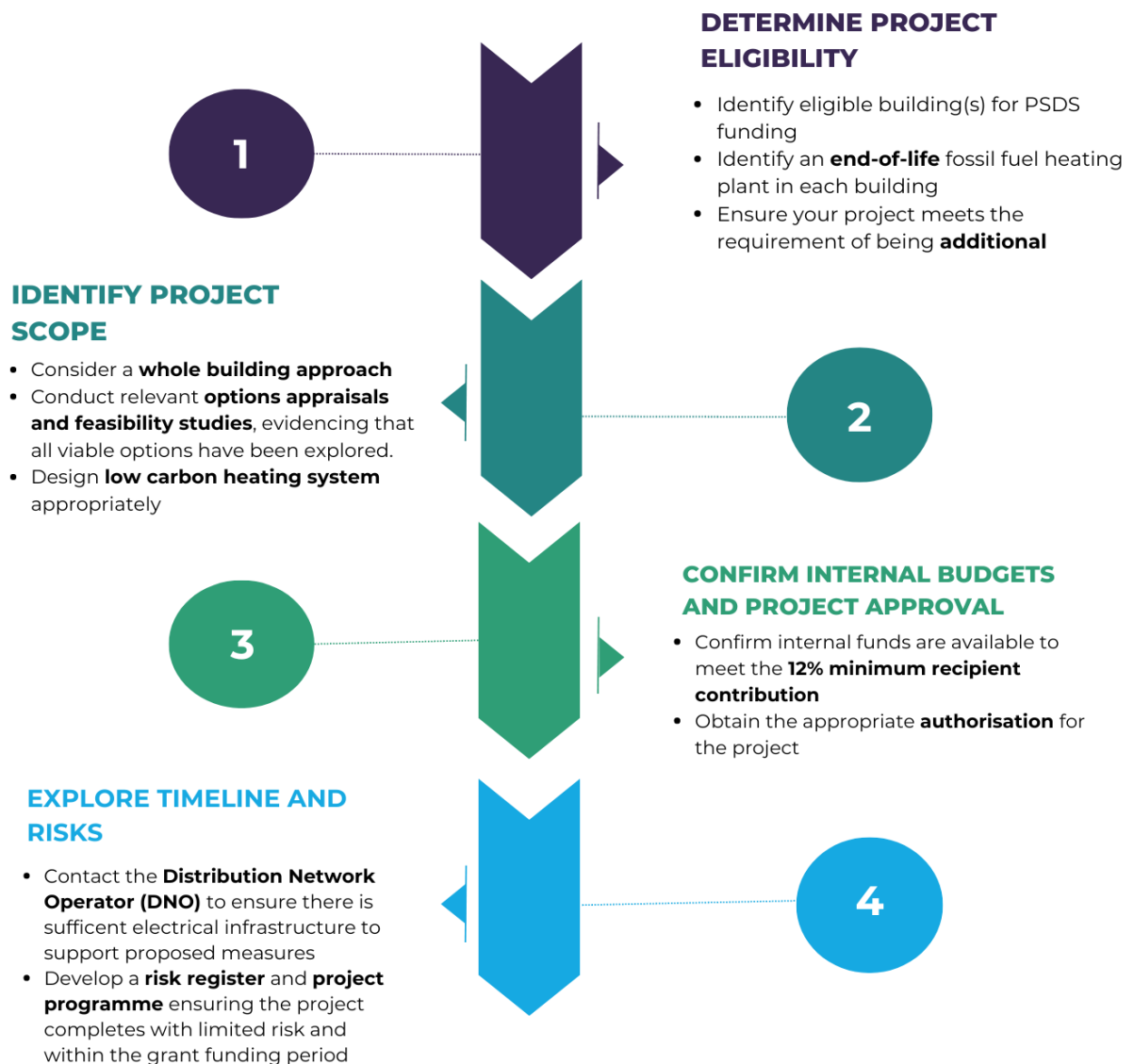


Figure 4: The steps for developing an application

3.1 Key areas to consider as an application is prepared

The information below draws out the key areas applicants need to consider when preparing their application. These topics are highlighted specifically for their relevance to new scheme policy and from Salix's experience in delivering the previous three phases of the PSDS. The topics cover common project risks seen throughout delivery to encourage applicants to instruct the relevant investigations and engage with stakeholders to ensure these areas are covered as part of their application design.

This guidance can be read alongside the general public sector decarbonisation guidance published by Energy Systems Catapult (ESC)³.

Is there an opportunity to connect to a local district heat network?

What is a heat network?

Heat networks supply heat from a central source via a network of pipes carrying hot water to an end user. In high density urban areas, heat networks are a particularly cost-effective low carbon heating solution. Heat networks are proven, scalable solutions supplying a single building, a campus or even city wide. They can use sources of heat such as geothermal energy or waste heat from industry, in addition to being able to use heat pumps to access other local heat sources such as rivers, sewers or data centres. While many are currently powered by gas, they can be converted to low carbon heat sources.

Although there are at least 2,600 district heat networks in the UK⁴, they meet less than 2% of heat demand⁵, meaning that they risk being omitted from low carbon options appraisals. Heat networks are expected to play a substantial role in any net zero scenario. Significant growth of heat networks is therefore anticipated across the country over the next two decades, with heat networks eventually supplying up to about 20% of the UK's total heat by 2050.

What is the role of public sector buildings within heat networks?

Heat networks remove the need for an individual building-level heating solution. By connecting to a heat network – especially a district heating system across a town or city – applicants will become part of a bigger community solution and benefit from economies of scale and diversification. Large public sector buildings can also be valuable anchor loads for heat networks due to their significant energy use and because they use heat at different times to domestic users. The important role of large public sector buildings in facilitating access to low carbon heat for their communities should be carefully considered when deciding what heating system to install.

What are the benefits of heat networks?

Heat networks can provide the following benefits to local energy systems, the wider economy, and consumers, such as PSDS applicants:

- **Cost:** As district heat networks can use a variety of local heat sources and achieve economies of scale, they can reduce heating bills and the costs associated with maintaining individual heating appliances.
- **Efficiency:** As district heat networks connect users who need heat at different times of the day, the total capacity requirement of the system is lower than that of individual heating systems. This results in lower upfront costs and reduces demand from the local grid.
- **Resilience:** Through accessing different local heat sources and using thermal storage, district heat networks can increase a building's resilience and reduce the need to install and maintain back up equipment.

³ <https://es.catapult.org.uk/tools-and-labs/public-sector-decarbonisation-guidance/>

⁴ <https://www.gov.uk/government/statistics/heat-networks-registered-under-the-heat-network-metering-and-billing-regulations-statistics-december-2022>

⁵ BEIS (2021), 'Opportunity areas for district heating networks in the UK: second National Comprehensive Assessment (<https://www.gov.uk/government/publications/opportunity-areas-for-district-heating-networks-in-the-uk-second-national-comprehensive-assessment>).

- **Building upgrades:** By accessing higher temperature heat sources that aren't available through individual building solutions, heat networks can provide heat at higher temperatures, enabling buildings to implement building fabric improvements over a longer period of time.

What are the key considerations for a PSDS application?

It is important that applicants consider whether they can connect to a heat network, either now or in the future, as part of their application to the PSDS, considering both the capital and ongoing operating costs of their heating system. As heat networks are scalable, they can be appropriate for public sector buildings in many different settings.

Applicants should consider the following factors when applying for PSDS funding for a heat network project:

- **Availability:** Whether an existing or planned heat network is or will be available for connection.
- **Operation of the heat network:** Heat networks are overseen locally by heat network operators. They can advise on expansion plans, operating temperatures and the potential of a heat network connection.
- **Timing of connection:** Applicants should agree with the heat network operator when a heat network connection is possible, in order to determine the application's funding profile.
- **Heat network compatibility:** Where a heat network connection is not currently possible, but a heat network exists or is likely to be developed, applicants should consider ensuring that their project is heat network compatible to facilitate an easy connection to a heat network in the future.

Additional support

Additional 'Heat network compatibility guidance for Public Sector Decarbonisation Scheme Phase 4 applicants', is available on the [Salix website](#).

Further information about heat networks is available on the Government's heat network collection on GOV.UK⁶. Maps that identify some of the areas where heat networks are expected to provide the lowest cost low carbon heat will be published on GOV.UK⁷.

Has a 'whole building' approach to decarbonisation been considered?

What is a 'whole building' approach?

A 'whole building' approach considers all factors that contribute to a building's energy consumption. Building fabric improvements and energy efficiency measures can be implemented to reduce the building's energy consumption and peak heat demand, and applicants must consider different options for the building to identify the most cost-effective solution (see Figure 5).

Improved thermal performance and a reduction in heat demand facilitates the installation of a smaller low carbon heating plant, which can reduce costs and the likelihood of requiring electrical infrastructure upgrades. Reducing the building heat demand can also enhance system efficiency and operating costs, as heat pumps and other low temperature heating systems are most efficient when performing at lower flow temperatures.

Electrical energy efficiency measures help to mitigate against the increase of the building's electrical usage, reducing energy bills and demand on the electricity grid.

⁶ <https://www.gov.uk/government/collections/heat-networks>

⁷ <https://www.gov.uk/government/publications/heat-networks-zoning-pilot>

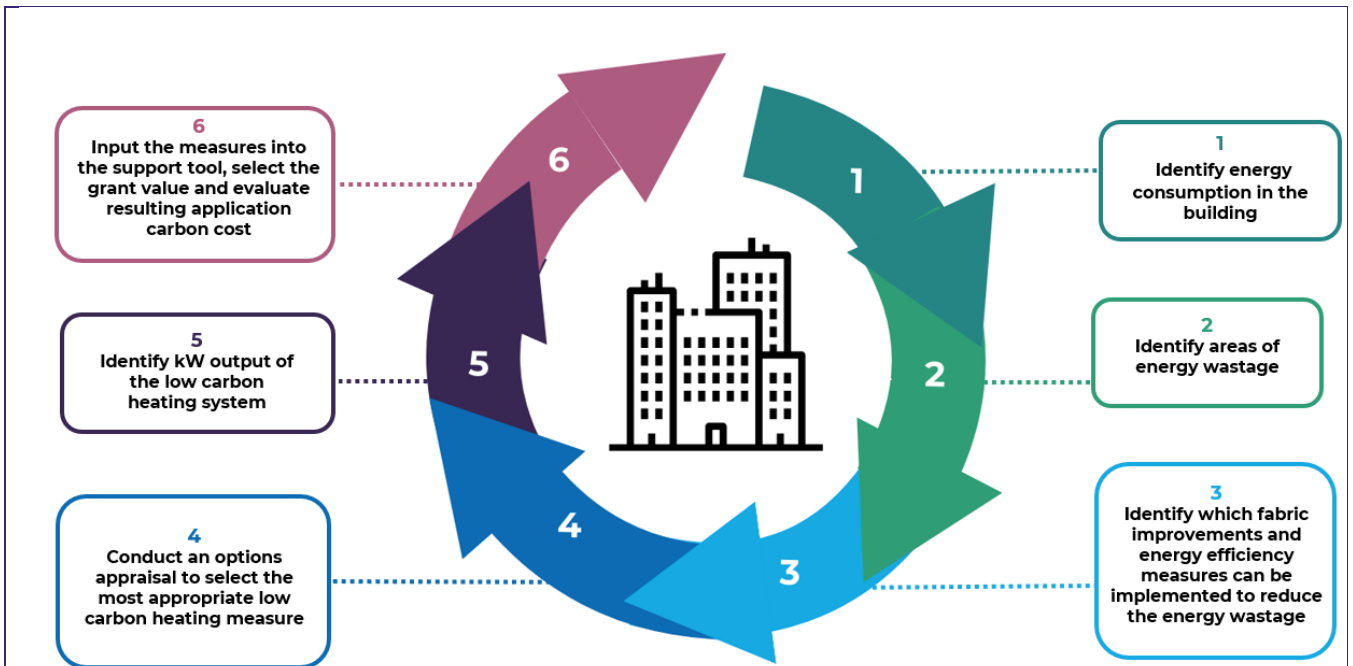


Figure 5: A step by step approach to taking a whole building approach

PSDS applications are assessed on whether a whole building approach has been taken. See [section 4.2.2](#) for how the approach can be evidenced.

Does this project align with the organisation's long term decarbonisation plans?

Applicants should also consider how applying a whole building approach as part of their decarbonisation project might benefit the building's operational use in the long-term. For example, the design (including unit size or flow temperatures) of the selected low carbon heating system can influence the project's life-cycle costs, potentially making the best value option upfront more costly in the long-term.

Climate change adaptation measures should also be considered by the applicant to both minimise building work disruption and ensure the building is adaptable to changes. These factors will not be assessed but can help to develop projects that provide long-term value to the applicant's organisation.

Will planning permission be needed?

Applicants must consider whether any planning permission may be needed for their project, and early engagement with the relevant planning authorities is encouraged. For example, alterations to the architecture or aesthetics of a listed building may require an application for planning consents. Gaining these consents can impact the final design of the project and the required capital expenditure and may also cause potential delays to the programme of works.

Will the electrical infrastructure on site require upgrading?

What is a Distribution Network Operator?

The Distribution Network Operator (DNO) owns and operates the network of pylons, transformers and cables that carry electricity from the transmission network to businesses and homes across Great Britain. Each DNO

manages the network in its region and must be consulted if a significant change to the demand for electricity is expected, and if export to their network is proposed. There are seven main DNOs across Great Britain, and there are also a number of independent DNOs who manage smaller parts of the electricity network.

What are the key considerations for a PSDS application?

Applicants must ensure there is sufficient electrical infrastructure on site to support the measures they wish to install. If additional electrical capacity is required to accommodate the new low carbon heating system, applicants must contact the DNO regarding connection of their proposed system to the grid prior to application submission. The specific steps applicants should take include:

- **Finding the local DNO:** Applicants can find their local DNO online by entering their postcode⁸.
- **Identifying the site's current electrical capacity:** Applicants can request their current capacity from the DNO or energy provider by sharing the MPAN number of their connection. Current capacity can also be found on an electricity bill under 'assigned capacity'.
- **Identifying the capacity needed post-installation:** Applicants should calculate the maximum demand needed to accommodate the proposed measures, based on the load specifications of the equipment.
- **Contacting the local DNO:** Applicants can book an appointment with their DNO through their DNO's website if they do not have all the information needed to get a quotation or if they have any questions. Alternatively, if all information is available then an application for a new connection should be submitted on the DNO's website.

Applicants should contact their DNO as soon as possible for a quotation to minimise delays. When design stage information is insufficient to complete a request for quotation, applicants can request for a 'surgery' appointment, enabling the DNO to provide a high-level review of the requirements. Previous phases have shown that costs and timelines on DNO upgrades are often a risk to project delivery and, as such, should be considered in the applicant's risk register. It is beneficial to have a good understanding of connection costs when applying, as DNO costs can be included in an application.

Should no DNO works be needed, it is the applicant's responsibility to ensure the equipment is run safely and is in line with standard practice. Applicants should inform their DNO about the connection of new assets to ensure that the DNO can assess any potential system impacts of connecting new low carbon heating equipment onto their local networks.

Have alternative sources of finance been considered?

Applicants may wish to consider other finance schemes to fund part of the cost of their project, including the minimum recipient contribution. This could include other government grant and loan schemes or private loan agreements.

If other funding is being utilised, this must be declared in the application form and must show that it will not be funding the same measures being applied for in Phase 4, as per the terms and conditions.

An example of alternative funding for eligible organisations (local authorities and universities) is a UK Infrastructure Bank (UKIB) loan. UKIB is a government-owned policy bank, launched in 2021, focused on increasing infrastructure investment across the United Kingdom to help tackle climate change and support regional and local economic growth.

Eligible organisations may wish to consider UKIB loan financing to support their PSDS projects, or projects with requirements that extend beyond PSDS timescales, or projects that fall outside the PSDS criteria.

Phase 4 grants and UKIB loans are separate, meaning that eligibility for grant funding is unchanged by

⁸ <https://www.energynetworks.org/customers/find-my-network-operator>

eligibility for UKIB loan finance. The success of an application to the PSDS will not affect the success of an application to UKIB and vice versa. Salix will not have any involvement in the UKIB loans process and cannot advise applicants on whether to apply for UKIB funding or not.

In accordance with GDPR and the Phase 4 Privacy Notice, contact details of applicants eligible for UKIB finance with an application value of more than £3.5 million may be shared by DESNZ with UKIB, and UKIB may contact these applicants about financing opportunities.

The minimum UKIB loan size is £5 million and is at the entity rather than project level so can therefore be used to support a programme of decarbonisation activities. Accordingly, for projects with a cost below £5 million, an enquiry to UKIB may still be appropriate, for example where the aggregation of multiple applications within a local authority or combined authority area exceeds £5 million. For any questions about UKIB loan finance, please contact UKIB directly by emailing LAlending@ukib.org.uk.

When lending to universities, UKIB will undertake a credit assessment to establish an appropriate rate on commercial terms. The indicative minimum loan size is £25 million. For any universities interested, please contact UKIB directly via their website.

4 Project requirements and evidencing the application

This section sets out the requirements of a PSDS application and how eligibility and project design should be evidenced. Applications will be assessed by Salix and an external technical assessor and will be subject to due diligence checks in line with the size and scope of the project. Assessments will include the review of:

- **Eligibility evidence** which will cover organisation status, building ownership and leasing arrangements, compliance with subsidy control and fossil fuel heating plant eligibility.
- **Technical case** which will cover areas including technical feasibility and optimisation, feasibility studies and options appraisal content, energy saving calculations and energy monitoring plan.
- **Financial case** which will cover areas including breakdown of like-for-like costs, capital costs, and operational and maintenance costs.
- **Project governance** which will cover areas including project risks and mitigations, project implementation, previous experience, governance processes, procurement, and deliverability within the grant funding period.

Salix expects a high level of detail to support the project requirements set out in the sections below. Failure to do so could lead to the application being withdrawn by Salix.

Where an applicant presents an exemption for not meeting any of the requirements listed below, their case will be assessed at the discretion of Salix. If this evidence is insufficient, applications will be withdrawn.

4.1 Determining eligibility and evidence needed

4.1.1 Public authority definition and exceptions

Public sector organisations in England are eligible for PSDS funding. Organisations with sites in Northern Ireland, Scotland and Wales with reserved functions are also eligible. Eligible public sector organisations are those that are defined as ‘public authorities’ by the Procurement Act 2023⁹ on the date the application is submitted.

⁹ The Procurement Act (<https://www.legislation.gov.uk/ukpga/2023/54/part/1/enacted>) is not yet in force. The PSDS uses the definition of public authority in the Act.

In the Procurement Act 2023, a “public authority” means an organisation that is

- a) wholly or mainly funded by public funds; or
 - b) subject to public authority oversight;
- and*
- c) does not operate on a commercial basis.

Generally, eligible organisations include:

- Central Government Departments and their arm’s length bodies (set out in Public Bodies as published by the Cabinet Office¹⁰)
- Emergency services
- Local authorities, including town and parish councils
- Schools within the state education system, including maintained schools, academies, multi-academy trusts and free schools
- Further education providers
- Nursery schools maintained by a local authority
- NHS trusts and foundation trusts (including NHS student accommodation).

Higher education institutions are independently governed, and therefore will not meet the public authority oversight test in the Procurement Act. To be defined as a ‘public authority’ according to the Procurement Act, and therefore eligible for PSDS, higher education institutions must meet the first test, that they are wholly or mainly funded out of public funds.

Exclusions:

- In some areas of England, Government has made commitments via devolution agreements to deliver funding for decarbonising public sector buildings differently and in a more devolved way. In these areas schemes will be run by devolved authorities and eligible applicants in those areas will have to work with those institutions and will not be eligible to apply to the Phase 4 of the Public Sector Decarbonisation Scheme. We will set out in more detail what this means on our ‘devolved authorities’ website page [here](#).
- Social housing as defined by the Housing and Regeneration Act 2008 (sections 68-70)¹¹.
- Public Corporations and private sector organisations are not eligible. Registered charities are also not eligible, unless they are also non-departmental public bodies as defined by the Cabinet Office. GPs are not eligible unless they are contracting authorities of an eligible body (including NHS trusts) that either own or have a long-term lease agreement with responsibility for maintenance of the buildings not including NHS property services as these are semi-private. Social housing is not eligible to apply to Phase 4.

Evidence required

All applicants will be required to declare in the application portal that they meet the Procurement Act definition. For higher education institutions, evidence of meeting the first eligibility test will be required in the form of either of the following:

- An assessment against the Procurement Act
- A procurement statement
- A financial statement
- A signed letter from a chief financial or procurement officer.

If a higher education institution can prove that they are subject to public authority oversight, this would also be considered proof of eligibility.

¹⁰ <https://www.gov.uk/government/publications/classification-of-public-bodies-information-and-guidance>.

¹¹ <https://www.legislation.gov.uk/ukpga/2008/17/contents>

4.1.2 Additionality definition and requirements

PSDS funding can only be awarded where projects would not otherwise take place without the grant. This means that:

- The measures concerned are not required to be installed by law (including building or health and safety legislation). For measures that go beyond what is required by law, grant funding can be sought for the increased cost.
- The installation of the measures concerned has not begun.
- Other funding options have been exhausted or are not suitable for the project.

Evidence required

Applicants must sign and return the counter fraud declaration, available on Salix's website, confirming compliance with the additionality criteria. This should be signed by the applicant's Authorising Official or Chief Financial Officer, or equivalent. Additionality criteria will also be checked throughout the assessment of the technical design, cost evidence and project programme.

4.1.3 Subsidy control rules

Phase 4 of the PSDS will not grant any subsidies that are considered to be of particular interest, as defined in Section 3 of the Subsidy Control Regulations 2022.

Direct Subsidy

In some instances, public sector organisations can operate as enterprises as defined in Section 7(1) of the Subsidy Control Act 2022. If, in connection with the delivery of a Phase 4 grant, an applicant is undertaking any economic activity, meaning that works funded by the grant directly impact any economic activity they are undertaking, the applicant must cooperate with Salix to ensure compliance with the Subsidy Control Act 2022.

A public sector organisation will be an enterprise if it is engaged in any economic activity by offering goods or services on a market. Applicants will be expected to consider this as part of their application and complete step 5, section 8 in the application form.

The Department and Salix are unable to advise on the position of public sector organisations applying to the scheme; please refer to the UK Government subsidy control guidance¹² or engage with legal advisers when completing an application.

Further information on the subsidy control regime is available on the gov.uk website, including information on enterprises in the context of public powers in Annex 1, Limb B1 of the above referenced Statutory Guidance for the UK Subsidy Control Scheme.¹³

Indirect Subsidy – energy bill savings

An indirect subsidy may occur in buildings owned by a public sector applicant but leased to an enterprise (as defined in Section 7(1) of the Subsidy Control Act 2022). This indirect subsidy may occur if the enterprise is paying any portion of the building's energy bills and therefore benefits from any savings to the energy bill because of PSDS funded measures. An enterprise is any organisation engaged in an economic activity that entails offering goods or services on a market, to the extent that they are engaged in such an activity.

An enterprise must not receive energy bill savings as a result of the installation of PSDS funded measures that cause the enterprise to exceed their minimal financial assistance (MFA) threshold of £315,000. Any energy bill savings that do occur and exceed the MFA threshold must be recovered from the enterprise by the grant

¹² <https://www.gov.uk/government/publications/uk-subsidy-control-statutory-guidance>

¹³ <https://www.gov.uk/government/collections/subsidy-control-regime>

recipient. Any MFA subsidies will need to comply with the transparency requirements set out in Chapter 3 of Part 2 of the Subsidy Control Act, unless the amount of the subsidy is no more than £100,000. MFA subsidies are also subject to cumulation rules, meaning that a new MFA subsidy given through the PSDS would cumulate with any previous MFA subsidies given to the same beneficiary within the current and two previous financial years. This may cause the total amount to go over the MFA threshold of £315,000.

While it is required that an enterprise does not exceed the MFA threshold of £315,000 from energy bill savings, it is strongly encouraged that all energy bill savings are recovered by the grant recipient from the enterprise. Full recovery of energy bill savings would mean no indirect subsidy will occur and no subsidy control rules will need to be followed.

If the application does feature building(s) with an enterprise paying all or part of the energy bills, both the applicant and the enterprise(s) will be required to declare that they will adhere to these indirect subsidy rules. Salix will be in touch with relevant applicants following application submission to request this declaration or to gather further information.

Indirect Subsidy – buildings owned by an enterprise leased to the public sector

Buildings that are rented by the public sector but owned by a private landlord may benefit from PSDS funding, providing they have an eligible public sector tenant as the applicant. If the landlord is classed as an enterprise under the Subsidy Control Act, then this enterprise may be in receipt of an indirect subsidy due to benefitting from the value of the new measures installed in their building using PSDS grant funding. This indirect subsidy may be granted providing it is being used for the subsidy's intended purpose of decarbonising the public sector over the full lifetime of the carbon savings being funded.

To ensure PSDS grant is only funding carbon savings over the period it is used by the public sector, the persistence factor that is given to measures in the building will be capped at the remaining applicant lease period. This means that, for the purposes of calculating the application's grant carbon cost (see section 2.2.1), any measures saving direct carbon emissions are assumed to only be doing so for the remaining period of the lease. For example, in a building where an applicant has 10 years remaining on their lease, the maximum persistence factor for measures installed in that building would be capped at 10 years. Buildings owned by the public sector are assumed to be used by the public sector, and so will not have the persistence factor capped in this way.

If, for any reason, including early termination of the lease, the building stops being occupied by a public sector organisation before the full lifetime of the direct carbon savings has elapsed, then the purpose of the indirect subsidy would not be fulfilled, resulting in a misuse of the subsidy. Any amount of subsidy misused by the enterprise in this way will be liable to financial recovery. The financial recovery value will be equal to the proportion of the subsidy that has been misused. For example, where PSDS has provided grant funding for 10 years of public sector carbon savings, should the public sector stop occupying the building after seven years this would mean three years of carbon savings would not be used for the subsidies intended purpose, meaning that the proportion of misused subsidy would be 30%. See the Subsidy Control Act for further details.

In order to mitigate the risk of a subsidy being misused, any public sector authority occupying a building owned by a private sector landlord and wishing to benefit from PSDS will have to provide further information to Salix to ensure that the grant being given is compliant with subsidy control law. See details in the Evidence required section below.

If a building's persistence factor has been capped, but the applicant is 'highly certain' that the lease will be renewed or the building will continue to be used by the public sector, the applicant should include the renewal length in the lease period within the application form, step 2.2, to request an exemption to the rules on capping carbon savings described above. If the applicant includes the lease renewal length but the lease does not get renewed, then it could result in a misuse of the subsidy as described earlier in this section.

Evidence required

In cases where the landlord is an enterprise and is in receipt of an indirect subsidy, further information will be required to ensure that the grant being given is compliant with subsidy control law. For this reason, the grant cannot be confirmed until satisfactory evidence has been returned. Salix will be in touch with relevant applicants following application submission to request and gather further information. This will include ensuring private sector landlords understand that PSDS funding could be recovered from them if their lease with the public sector organisation terminates early, before the lifetime of the installed technologies. This is because this may be considered a misuse of subsidy under the Subsidy Control Act 2022. Please check the Subsidy Control page on the Salix website for the latest guidance on this matter.

A copy of the leasehold agreement to evidence the remaining lease length must be provided in the application portal under additional supporting evidence and referred to in the application form. On step 2.2 of the application form, the applicant must provide the outstanding lease period (including renewals if the applicant can evidence high confidence in a renewal) and the current expiry date of the lease (not including any prospective renewals).

If applicants wish to also use the exemption detailed above, where the lease will be renewed and intend to utilise the extended lease period, strong evidence should be provided to Salix to support this claim. This evidence must be provided via the application portal and Salix will need to be satisfied that the building is 'highly certain' to remain in public use beyond the end date of the current lease. The evidence will differ between buildings, but examples include:

- A legal agreement with the landlord that the lease will be renewed or extended;
- Strong evidence that the building or site in question is designated solely for use by a public sector authority;
- Strong evidence that the leaseholder is entitled to a new lease on the same terms as the old lease subject to reasonable modernisation and at a new market rent, such as those covered by the Landlord and Tenant Act 1954.

Any requests to use this exemption will be assessed on a case-by-case basis.

Indirect Subsidy – Private Finance Initiative (PFI) buildings

PFI buildings are eligible for PSDS. As with all buildings, PFI buildings need to follow the indirect subsidy control rules outlined above. The majority of PFI buildings will be owned by an enterprise but occupied by the public sector. They are therefore subject to the misuse of subsidy rules outlined in this section. Where the ownership of the PFI building freehold transfers to the applicant, at no additional cost, at the expiry of the PFI contract, these buildings will not have any cap on the persistence factor given to measures in that building. For these PFI buildings, the applicant should select the building ownership as 'PFI – Transfer Clause' in step 2.2 of the application form. For PFI buildings that do not transfer to the public sector, the persistence factor that is given to measures in the building will be capped at the remaining PFI contract length, as per the rules outlined above regarding buildings owned by an enterprise.

Evidence required

A copy of the PFI contract is required to show either the transfer clause in the contract or the remaining PFI length and must be provided in the application portal under additional supporting evidence.

4.2 Technical requirements and evidence needed

Applicants need to demonstrate that the proposed project meets the technical requirements of the PSDS. To

satisfy these technical requirements, applications should be at RIBA Stage 2¹⁴ (as a minimum).

4.2.1 Fossil fuel heating plant at the end of its useful life

The fossil fuel heating plant being replaced must be at the end of its useful life. For the PSDS, this is a heating plant aged 10 years or older, from the date of commission to the point of removal.

Evidence required

Evidence that the existing fossil fuel heating plant will be at the end of its useful life at the point of removal includes:

- Clear, high-resolution photographs of each boiler nameplate, which must clearly display the year of installation.
- Clear, high-resolution photographs of each boiler serial number. This should be accompanied by an explanation of how the installation year can be deduced.
- A dated commissioning certificate which includes the boiler make, model and serial number.
- A third-party plant service report, which must clearly display the year of installation or a servicing date of more than 10 years ago. This should also include the boiler make, model and serial number.
- An email from the manufacturer confirming the age based on the serial number.
- A comprehensive asset register could be used, however it must be supported by further evidence as listed above.

In addition, clear, high-resolution photographs should be provided of the heating plant in situ (of the standard presented in Figure 6).



Credit: ©Mantis Energy

Figure 6: A good example of boiler plant in situ (top), also showing examples of the name plates of these boilers, clearly illustrating the year of manufacture, in this example 2004 (bottom).

¹⁴ <https://www.architecture.com/knowledge-and-resources/resources-landing-page/riba-plan-of-work#available-resources>

The fossil fuel heating plant must be decommissioned before the project completion date. If the plant reaches the end of its useful life during the delivery of the project (for example, the plant will reach 10 years of age in September 2025), the applicant must demonstrate that the plant will only be decommissioned after this date in their project programme, see section 4.4.3.

In the case where the plant has reached the end of its useful life sooner than is typically expected (for example, through high operation or poor design), the applicant must set out the rationale and provide a third-party service report to show that this is the case.

Temporary heating systems

Where an existing fossil fuel heating plant has already been replaced by a temporary fossil fuel heating plant, applicants still need to evidence that the existing fossil fuel heating plant meets the end-of-life criteria and confirm that all units (including temporary) will be removed once the low carbon heating system is installed and operational. Eligibility will be assessed on a case-by-case basis.

Replacement of heat interfaces

Where a building is disconnecting from a campus heat network to install low carbon heating, the local interfaces that connect to the heat network (such as plate heat exchangers and calorifiers) can be counted as the building's heating plant for the purpose of meeting the scheme criteria. These must be evidenced in the same way as end-of-life heating plant and must also be 10 years of age or older. In this scenario, the options appraisal must evidence that this is the optimal long-term solution to decarbonising the overall site.

Replacement of cremators

Where an electric cremator is proposed as the low carbon heating measure, applicants must evidence that an end-of-life gas-fired cremator is being decommissioned. End of life criteria for cremators is generally 10 years or older. Like-for-like costs must be based on the cremator for these applications.

4.2.2 Whole building approach

Applications will be assessed against how effectively the total energy use and peak heat demand of a building has been considered when selecting the measures to be installed. These can be split into building fabric improvement and energy efficiency measures which can impact the direct and indirect carbon savings expected to be delivered by the project.

Building fabric improvement measures

Investment in reducing the heat demand of a building, such as through the installation of insulation or double glazing, can reduce the size of the low carbon heating plant and the likelihood that the distribution system will need to be replaced to accommodate the flow temperatures of the new system. Heat pump solutions and other low temperature heating systems will achieve better performance at lower flow temperatures. These lower flow temperatures will generally be between 35-55 °C rather than the 70-80 °C typical of fossil fuel boilers. Having a more efficient low carbon heating system will have a positive influence on ongoing operational costs and reduce the electrical demand of the building.

Energy efficiency measures

Investment in reducing a building's electrical demand, such as through the installation of energy efficient lighting

or a Building Energy Management System, can reduce the need to upgrade a building's electrical infrastructure to accommodate the installation of a heat pump. These measures can also help to mitigate the impact of any increase in operating costs resulting from electrification of heat.

Funding from Phase 4 can support enabling measures, such as energy storage and smart meters. These measures can be included in an application as energy efficiency measures or included within a low carbon heating system. A list of eligible technologies can be found in Appendix 1, below.

Evidence required

An options appraisal should be provided for each building proposed, setting out that all viable options to reduce the building's energy demand have been explored. If building fabric improvement measures are proposed, applicants must provide pre- and post-improvement peak heat loss calculations (see section 4.2.4 for further guidance). Applications without or with few fabric improvement or energy efficiency measures will be required to provide evidence to explain why a whole building approach is not being taken. Suitable evidence may include that works would be too disruptive, cost prohibitive, or unlikely to receive planning consents. Where the PSDS project is part of a wider decarbonisation refurbishment project, applicants are required to describe the suite of works to be undertaken, the timescales of that work, and the impacts on the design of the proposed low carbon heating system.

4.2.3 Feasibility study, including a detailed options appraisal

Applicants should have conducted a site survey to feed into an options appraisal, which shows that all viable options have been explored for building fabric improvements, energy efficiency measures and low carbon heating measures.

Applicants must provide a feasibility study for each site, which may include the options appraisal. The feasibility study must demonstrate in detail what solutions have been identified as viable and how they can be implemented.

Evidence required from an options appraisal

Commentary should be provided on what measures are most suitable and why other measures were discounted. The options appraisal must be quantified and is recommended to be carried out using a scoring matrix. The options appraisal for low carbon heating is expected to consider:

- Heating system configuration (for example, justification for why a cascading heat pump system is preferable to a standalone heat pump system).
- Impact on local grid and need for electrical infrastructure upgrades.
- Capital and life-cycle costs so a reasonable comparison can be made for the organisation's net financial impact. This life-cycle cost analysis should include costs for design, equipment, installation and any ongoing operation and maintenance so that the most cost-effective option in the long term can be determined.

Applicants are encouraged to connect to an existing heat network where possible or make their project heat network compatible if it is in an area where a future heat network is likely. Reasons as to why projects have/have not connected to a heat network or are/are not designed to be heat network compatible are required in the application form.

Evidence required from a feasibility study

A feasibility study should provide a comprehensive overview of the building, allowing applicants to decide whether to proceed, modify the project, or abandon it altogether. In doing a feasibility study, the organisation can gain a firmer understanding of any challenges to the capital works that would be required. A feasibility study should consider the following factors that may affect the deliverability of a proposed project:

- Financial feasibility
- Technical feasibility
- Legal feasibility

- Project delivery/scheduling feasibility.

If designs have progressed since the feasibility study was conducted, applicants must provide further detail on why they are applying for the chosen design if it differs from the feasibility study.

Indicative schematics of the existing and proposed system must be provided which detail how the system will operate in the building. Piping and instrumentation diagrams are preferred, high level illustrations are acceptable. Clear site layout drawings would be advantageous, demonstrating the layout of the proposed measures.

4.2.4 Low carbon heating - system sizing

As part of the options appraisal and feasibility studies required to deduce an appropriate low carbon heating solution, the study should include an evaluation of the building's peak heat load and demand profile. These are used to determine the sizing of the low carbon heating solution. The proposed low carbon heating system must be sized to ensure that the space heating and (if included) domestic hot water (DHW) demand for the building is satisfied.

The proposed low carbon heating plant should not have a total output load larger than the fossil fuel plant being replaced or the post-improvement peak heat loss of the building. Applications for a low carbon heating plant with a higher total output load than the plant being replaced, or than the peak heat loss of the building, will be refused unless a clear, technically sound justification is provided.

The size of the low carbon heating solution might include other heating-related loads such as swimming pools, or process heat. Applicants must consider not only the peak heat demand, but also operational requirements such as re-charging of swimming pools, temperature recovery times for DHW systems and hygiene safety standards. An explanation of how these factors are accounted for in the sizing of the low carbon heating solution must be provided.

To ensure accurate and reliable heat loss calculations, crude methods that convert daily or monthly consumption (in kWh) to a thermal output (in kW) by dividing by a building's operational hours will not be accepted.

Evidence required

The evidence submitted to support the sizing selection of the low carbon heating solution must be site specific with a clear description of the methodology taken and any assumptions made. Applicants should consider the most appropriate method for calculating their building's heat demand:

- For buildings with sub-metering systems and half-hourly data, applicants should use multiple years' worth of data to calculate the peak heat demand, including detailed commentary on the calculations used. All applicants should submit metered data, in the form of utility bills, to support their application.
- If sub-metering is not available, the peak heat loss should be calculated by:
 - Recording the area and U-values (thermal transmittance) of the walls, floors, roof, windows, and doors.
 - Measuring fabric and ventilation/infiltration heat losses for the coldest day of the year based on geographic location.
 - Using realistic air change rates to estimate ventilation losses.
- The Salix peak heat loss tool¹⁵ is another option to estimate system sizing. Please ensure that all commentary boxes are completed in this tool, with justification for the figures provided.
- Industry approved heat loss dynamic simulation software models will also be considered, as long as the software used is credible and data inputs are clearly evidenced. Commentary on the full calculation methodology and outputs should also be provided.
- Calculations and details should be provided on how an applicant proposes to meet the peak DHW demand and what strategies are in place in the design of the DHW system to combat legionella, including

¹⁵ <https://www.salixfinance.co.uk/news/tools-and-resources>

how storing heated water will impact on this.

- For applications including an Air Handling Unit (AHU) system, the total supply air volume, the percentage of fresh air, and the additional AHU heating loads must be provided. The additional AHU loads should be included in the total low carbon heating systems heating loads.

4.2.5 Low carbon heating - emitters and pipework

Low carbon heating systems generally have lower flow and return temperatures than fossil fuel systems. This can influence the system's ability to heat a room if the existing emitters and/or pipework are not correctly sized to accommodate lower flow temperatures. For this reason, applicants must consider any upgrades to the heating distribution system as part of their options appraisal and feasibility study. The flow temperature of the proposed system will impact on the evidence required during assessment, as set out for each scenario below.

High flow temperatures

High temperature heat pumps can circumvent this design consideration, as they run at similar temperatures to fossil fuel heating systems. However, this generally comes at the expense of efficiency, with high temperature heat pumps having higher life-cycle costs. This should be considered when an applicant is selecting their proposed low carbon heating system.

Evidence required

- Options appraisal demonstrating that it is not feasible to implement building fabric improvements or energy efficiency measures that support lowering flow temperatures, due to the nature of operation of the building.
- Life-cycle cost analysis which demonstrates that implementing building fabric improvements or energy efficiency measures to lower flow temperatures is prohibitive.

Low flow temperatures

Applicants should consider the flow temperatures of the low carbon heating system. Where these differ from their existing flow temperatures, analysis of the heating performance of their current emitters should be undertaken.

Evidence required

- Analysis of the heating performance of current emitters.
- Where it is calculated that larger emitters are required, applicants should demonstrate that there is suitable space and costings have been included for this upgrade.
- In the long-term upgrading emitters could prove to be better value for money than designing a system to operate at higher flow temperatures. Where high temperature heat pumps are proposed, applicants should demonstrate that is in infeasible or cost prohibitive to upgrade the emitters.

Delta T

Applicants should consider the delta T of the proposed low carbon heating system. The delta T is the difference between the flow temperature and return temperature of a heating system. For example, a heating system with a flow temperature of 45°C and a return temperature of 35°C would have a delta T of 10°C.

Applications with a high delta T, or significantly differing from that of the existing system, must evidence that the design has considered the specific requirements of the heating system.

Evidence required

- Proposed heating system schematics and/or piping and instrumentation diagrams are required to provide an overview of the system design.

- Description of operation.

The evidence must demonstrate that the supporting infrastructure will be able to maintain efficient performance of the low carbon heating system in the long term, especially if existing emitters are being retained and the proposed delta T has increased.

4.2.6 Low carbon heating - technology-specific requirements

The low carbon heating measure is the central component of the PSDS application for each building. Eligible low carbon heating technologies and their specific evidential requirements are listed below. Please also refer to the list of eligible technologies in Appendix 1. [Appendix 1](#).

Low carbon heating technology	Evidence required for assessment
Heat network connection (district and/or campus)	<p>For individual buildings connecting to a heat network, there is no requirement for changes to be made to the energy centre that supplies the network with heat. Energy efficiency measures are encouraged to be installed in the newly connected building to meet the whole building approach, where appropriate.</p> <p>Applicants must provide the following documents to support their application:</p> <ul style="list-style-type: none"> • Bespoke carbon factor models, showing the predicted path to decarbonisation over the lifetime of the connection. • Calculations evidencing the heat loss figures for the primary pipework connecting the building to the energy centre. • Network design drawings clearly demonstrating the pipelines to be funded by the PSDS. These drawings should also show what is being funded by other schemes, for example the Green Heat Network Fund. • Design considerations for how thermal losses across the network will be minimised. • Evidence that the new connection will be operational by the grant end date. • Water flow and return temperatures for the existing and proposed system, including whether any upgrades are needed to the heating distribution system. <p>Improvements to an existing network's distribution system will be eligible if accompanied by the installation of a low carbon heating system in the energy centre, replacing an end-of-life fossil fuel heating source.</p> <p>When an application includes a connection to a heat network and the decarbonisation of the network, Salix will consider sleeving arrangements that are used to determine the carbon factor of the network connection.</p>

<p>Air-to-water heat pumps</p>	<p>Applications should consider how the air source heat pump will work, ensuring that any concept design is based on real life conditions, not just data from the manufacturer, improving the technical viability.</p> <p>Different refrigerants can have differing global warming potentials and risks. Applicants will need to justify their choice of refrigerant, explain how the risks will be mitigated and detail the leak detection plans they will have in place.</p>
<p>Air-to-air heat pumps</p>	<p>If the proposal is to change the distribution system and emitters from a wet to an air-based system, applicants will need to justify this change. This is because changing the system is unlikely to be the most cost-effective and viable solution for the building. If the applicant is in an area where a heat network is available or likely, changing the distribution system could mean that the building may not be heat network compatible, as outlined in the 'Heat network compatibility guidance for Public Sector Decarbonisation Scheme Phase 4 applicants' document, is available on the Salix website.</p> <p>If replacing both heating and cooling systems, and a cooling load in excess of the capacity of the current system is proposed, only the proportion of the system replacing current cooling load will be eligible. The remaining value of the project covering the new cooling load will need to be funded by the applicant.</p>
<p>Water source heat pumps</p>	<p>Applications proposing an open loop water source heat pump system must provide evidence of relevant planning permissions, such as abstraction or discharge, from the Environment Agency for the proposed water source. A map of the proposed water source, showing the location of the boreholes/pipework, should also be supplied for open and closed loop systems.</p>
<p>Cascading heat pumps</p>	<p>Applications proposing a cascading heat pump system should provide a bespoke calculation for the seasonal coefficient of performance. If the second stage is being used to boost the flow temperature, it should be shown within an options appraisal and feasibility study section 4.2.3, that the cascading system is the most cost-effective solution compared against a standalone heat pump solution.</p>
<p>Ground source heat pumps</p>	<p>Applications must include a geological conditions or ground survey report as part of the feasibility study to indicate the suitability of this solution. The applicant should describe whether boreholes or horizontal collectors are proposed and the reasons for this selection. The location and quantity/area of the array should be evidenced. If the borehole locations are underneath operating areas of the site, applicants should also set out how disruption to the site would be managed.</p>

<p style="text-align: center;">Biomass</p>	<p>Applications proposing the installation of a biomass system will need to show:</p> <ul style="list-style-type: none"> • Why biomass is more suitable than other low carbon alternatives, for example, where there is not appropriate infrastructure in place to support a heat pump. • How they intend to mitigate any potential impacts on air quality particularly on people in the local area. Applications are discouraged from proposing biomass boilers in heavily built-up areas. • That they will obtain their biomass fuel from sustainable sources. The Biomass Suppliers List¹⁶ lists suppliers who have demonstrated that their wood fuel meets the sustainability criteria of the Renewable Heat Incentive scheme¹⁷. • How they intend to maintain their boilers to ensure the performance over the lifetime of the plant. Note the Microgeneration Certification Scheme has published a standard¹⁸ for the maintenance of biomass boilers. • How the fuel will be stored and whether there is sufficient space on site for this store.
<p style="text-align: center;">Hybrid low carbon heating systems</p>	<p>A hybrid low carbon heating system, for some applications, might operate more efficiently than a standalone system, as the primary low carbon plant is sized to meet the majority of the heat demand. The peaks are then provided by an additional form of low carbon technology (for example, an electric boiler). Both plants are therefore sized more optimally to represent the heat loads they cover, providing life-cycle cost savings.</p> <p>Applications that propose a hybrid low carbon heating system should provide evidence for:</p> <ul style="list-style-type: none"> • How the operation of the low carbon heating solution will be set out by providing plant operation strategy details. • How the operating flow temperatures of the different plant will operate together. • How the operating costs of the hybrid system would differ from a standalone system. This should be addressed in an options appraisal. • How the electrical infrastructure will be affected by having these different technologies.

¹⁶ <https://www.biomass-suppliers-list.service.gov.uk/>

¹⁷ <https://www.legislation.gov.uk/uksi/2022/1217/contents/made>

¹⁸ <https://mcscertified.com/mcs-launches-new-biomass-maintenance-standard/>

Electric cremators

Fossil fuel powered cremators can be a significant proportion of an organisation's direct carbon emissions. This measure is eligible as a low carbon heating solution. It is not eligible as an energy efficiency measure. The fossil fuel cremators must meet the end-of-life guidance, outlined in section 4.2.1.

Applications that propose the installation of electric cremators are eligible where the electric cremator is replacing an end-of-life fossil fuel powered cremator and evidence must be provided for the like-for-like costs of the fossil fuel powered cremator.

Also, the applicant can and is encouraged to install heat recovery from the proposed electric cremator to be used for space heating, providing the heat recovery is replacing eligible an end-of-life fossil fuel heating plant. If the fossil fuel heating plant is not end-of-life, the heat recovery would be considered outside the scope of PSDS and should not be included in the PSDS application.

The size or output of the new electric cremator cannot be larger than the current fossil fuel powered cremator. To support an application, Salix requires the following evidence:

- Details on the number of cremations per year, including gas and electricity consumptions to deliver these numbers, (broken down by cremator, if more than one is being replaced).
- Proposed electricity consumption for the new electric cremator, including how this will affect the grid supply.
- Plant layout sketches.
- Assessment of site constraints including planning and air quality requirements.
- If applicants are proposing heat recovery, then the fossil fuel boilers being replaced by the electric cremator must meet all eligibility requirements. Also, all the requested documentation outlined elsewhere in these guidance notes must be submitted.

<p>Other eligible low carbon heating technologies</p>	<p>In some circumstances, depending on the demand profile or building use, installing one or more of the below low carbon measures can be more efficient than utilising a more common low carbon system, such as a standalone heat pump. An assessment of life-cycle costs should be included in the options appraisal.</p> <p>Electric point of use heaters: Applicants should provide a breakdown of the sizing of each unit and why the domestic hot water cannot be connected to the low carbon space heating system.</p> <p>Electric boiler: Applicants should demonstrate how electric boilers are the most viable and cost-effective solution, due to the differences in efficiency and the effect on the operating costs and electricity grid compared to other low carbon options.</p> <p>Electric heater: Applicants should provide commentary around why electric heaters are the most viable and cost-effective solution, due to efficiency considerations and the effect on the operating costs and electricity grid. Where relevant, applicants should take into account considerations outlined in 'Heat network compatibility guidance for Public Sector Decarbonisation Scheme Phase 4 applicants' document, is available on the Salix website.</p> <p>Electric radiant panel heater: Applicants should provide a room-by-room breakdown of the panel heaters and how the proposed sizing is suitable for that space. The cost effectiveness, impact on the electricity grid and considerations outlined in the PSDS heat network compatibility guidance should also be taken into account by applicants where relevant.</p> <p>Solar thermal: Applicants should provide evidence of the orientation of the solar array and that utilisation has been taken into account in energy saving calculations.</p>
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4.2.7 Bivalent systems

Applicants can retain existing end-of-life and non-end-of-life fossil fuel heating plants that are intended to operate in a bivalent configuration with a new low carbon heating solution. Applicants must demonstrate how the retained units are exempt from the end-of-life eligibility criteria as part of their supporting documentation, especially if the removed and retained boilers are of the same make, model and age.

Applicants are expected to demonstrate:

- How the operation of the low carbon heating solution will be prioritised by providing plant operation strategy details; and,
- How the flow temperatures of the different plant will operate together; and,
- How the carbon savings are calculated and are proportionate to the capacity of the new low carbon heating solution and the fossil fuel plant retained, based on the operation strategy chosen for the whole heating solution; and,
- How long the retained fossil fuel plant will operate for in this configuration; and,
- How the retained end-of-life boilers will be monitored and what would happen to the bivalent system should the end-of-life boiler fail.

Applicants should ensure that the total output load of the low carbon heating plant remains lower than that of

the removed fossil fuel heating plant, as well as the full bivalent system being sized to match the calculated heat demand of the building, as per section 4.2.4. Salix technical assessors will assess the proposed bivalent heating systems' end-of-life criteria and total sizing on a case-by-case basis.

4.2.8 Heating system backup and resilience

Salix appreciates the requirement for some sites to have a level of alternative fuel backup in line with their operating safety procedures and/or technical standards. For example, if fossil fuel backup to a new electrical heating system is mandated, then such systems can be retained for backup purposes only. It is important for applicants to note that such alternative fuel backup provision is an exception only for the NHS, prisons and other sites that are legally and contractually required to have backup and primary and secondary fuel resilience. The scheme criteria still apply, and applicants would be required to decommission their primary end-of-life fossil fuel heating plant. Applicants who retain a dual fuel boiler (for example, gas and oil) for alternative fuel backup must evidence that one of the fuel supplies has been decommissioned, leaving a single fuel for alternative fuel back up.

Retention of end-of-life fossil fuel heating plant for alternative fuel backup, where there is not currently mandatory alternative fuel backup, will not be approved.

PSDS funding cannot be used to install new backup heat capacity, even when this is low carbon, as any backup measures are considered an energy security measure. Any backup heating plant must be funded by the applicant and will be considered outside the scope of the PSDS project. If an applicant is replacing their fossil fuel backup plant, the alternative fuel backup plant should not contribute any fossil fuel use to the yearly consumption data provided, as the low carbon heating system should be sufficient for all planned heating usage. This is because the backup plant should be designed only to be used if there was a failure in the low carbon heating system.

Grant funding cannot be used to fund heating system resilience or new N+1 requirements that are not already part of the primary heating system being removed. Any heating capacity that exceeds the total output of the removed fossil fuel heating system or the peak heat loss of the building would be considered outside the scope of a PSDS application.

Definitions for each term used above can be found in the Glossary at the end of this document.

4.3.8 Energy saving calculations

Applicants must provide unlocked energy saving calculations showing methodology of the savings declared for each measure proposed. Commentary on the calculations and assumptions made must be included in a summary sheet, with key input or output value cells used in the application form highlighted. If modelling is used, this must also be explained. This must also be aligned with the assumptions and figures referenced in feasibility study provided.

Once the calculations are complete, energy savings must be sequenced in step 4.1 of the application form, to ensure no double counting of savings. For more information, please refer to the [sequencing video](#) on the Salix website in the Tools and Resources area.

Evidence required

- Energy savings should be presented in an unlocked Excel spreadsheet.
- Energy savings must be based on baseline fossil fuel consumption, acceptable formats of which are metered data (including a metering strategy which provides data on end-uses), the previous year's energy bills, or the latest Display Energy Certificate. Metered data is the preferred option.
- Figures in the supporting information should exactly match those in the application form.

4.3 Financial requirements and evidence needed

4.3.1 Minimum recipient contribution: like-for-like replacement costs

The costs for the like-for-like replacement of the existing fossil fuel heating and/or DHW plant must be evidenced. These costs should include the cost of auxiliary works within the plant room only, including but not limited to:

- Removal of the end-of-life heating plant
- Installation of the same thermal output fossil fuel heating plant
- New controls
- Pumps
- Flue systems
- Expansion vessels
- Pipework and insulation
- Commissioning work.

Evidence required

Like-for-like costs can be based on actual quotes for the replacement work, or costs obtained from other similar projects. Note that once submitted, like-for-like costs are not subject to revision. The like-for-like costs are used to help determine the minimum recipient contribution. The minimum recipient contribution is calculated as either 12% of the total project costs or the percentage of the total like-for-like costs, whichever is highest. The minimum recipient contribution will be deducted from the total project costs to calculate the maximum grant value that can be requested.

The applicant must confirm that they have the funds to meet the minimum recipient contribution within the application form and counter fraud declaration. If an applicant chooses to increase their contribution above the minimum to make their application more competitive, they may be requested for further evidence during assessment to ensure they can afford the contribution, see section 6.2.

4.3.2 Evidence of project capital costs

All project costs must be evidenced, and an itemised cost breakdown must be provided in an Excel document to include details of equipment and installation costs for each measure and any associated enabling works. This should demonstrate that the costs are reasonable and include an acceptable level of contingency to cover unforeseen cost increases. A standardised and accepted cost breakdown can be found on the [Salix website](#). The cost breakdown must cover the following elements:

- Design and engineering
- Main equipment
- Installation and commissioning
- Project delivery (including consultancy and external management)
- Contingency (this should be reasonable based on the size and scope of the project, but typically ranges between 10 – 20%)
- Enabling measures
- VAT (if non-reclaimable).

Evidence required

Applicants must provide evidence in the form of one or more of the following: quotations, previous project costs, quantity surveyor cost plan or contractor estimate to support from where the cost breakdown was derived. A description of where costs were derived from, and any assumptions made, must be provided in the application form. Submitted evidence should be provided on headed paper from the organisation from which they were obtained.

If the applicant has used inflation rates to reach final costings, evidence must be provided on how the chosen percentage rate increase was reached. All supporting information must match the figures in the application form.

4.3.3 Operational and maintenance costs

Applicants are encouraged to conduct life-cycle cost analyses to demonstrate they have considered the operational and maintenance costs of the proposed measures in addition to capital costs.

Evidence required

The options appraisal is expected to include forecasted costs for design, equipment and installation and any ongoing maintenance for the viable options considered so that applicants can determine the most cost-effective option in the long term. A key consideration should be the impact of the price of fuel on the organisation, given that most applicants propose to move from gas to electricity, and evidence of fuel costs should be provided as part of the application. Applicants must provide justification for any proposed measure(s) with a negative annual financial impact, as per step 4.1 of the application form, and why the installation of this measure is preferable for the overall site.

4.4 Project governance requirements and evidence needed

4.4.1 Skills and experience of the project team

Applicants must provide a detailed overview of who will be involved in implementing and managing the project, including a project organogram, to demonstrate that the governance structure in place is suitable for the size and scope of the project. This should also include the appointment of an authorising official (AO). The AO must approve and sign official and legal documentation associated with the project. This may be a chief executive, a financial officer or another senior official. The application should also identify a main contact to manage engagement with Salix during the application process. This does not have to be the same individual.

The AO and main contact are accountable for the application, project delivery and governance of the PSDS project. This responsibility cannot be transferred to contractors. The AO is responsible for ensuring that contractors are delivering projects in line with the Phase 4 terms and conditions, see section 7. Their names and contact details will be requested in the application portal, see section 5.

Evidence required

A project execution plan must be provided which sets out the strategy for managing the project. This should include documentation of the roles, responsibilities and relevant skills and experience of both internal staff members and contractors involved in the execution of the project. Applicants should detail plans for how they intend to manage contractors, including quality assurance and due diligence that projects are being delivered in line with the scheme criteria and terms and conditions.

4.4.2 Detailing the procurement process

To ensure the project is able to deliver within the required timescales, applicants should have considered the procurement of their works and services.

Evidence required

Applicants must provide a detailed procurement process that explains plans for procuring the services needed for their project. Please find further guidance on the Energy Systems Catapult website¹⁹. These timelines should be considered as part of the application's project programme, see below.

¹⁹ <https://es.catapult.org.uk/tools-and-labs/public-sector-decarbonisation-guidance/procurement/>

Applicants will also need to state how they will mitigate against fraud in relation to their procurement policy within the application form.

4.4.3 Project programme

Applicants must provide a detailed project programme, showing key actions and milestone completion dates which ultimately demonstrate project completion by the grant end date specified. For example, this could include dates for: project approvals, designs complete, tenders complete, orders placed, completed on site and final commissioning. These dates should align with the milestone dates in the application form.

Evidence required

A project programme is typically presented in a Gantt chart, either in an Excel spreadsheet or dedicated project management software. Milestones should be realistic and incorporate lead times for suppliers of equipment and times of unavailability due to site constraints (for example, disruptive works might only take place at an educational facility during term breaks). The project programme should include sufficient contingency and be updated if there are any variances to the programme of works. The optional Salix project programme template can be downloaded [here](#) to support applicants.

4.4.4 Project risks and mitigations

A detailed risk register must be provided which identifies the risks associated with the feasibility and deliverability of the project. Common risks can include:

- Supply chain delays
- Approval or permission delays
- Cost increases
- Delays for necessary electrical infrastructure upgrades
- Working in a live environment.

Evidence required

Applicants must provide a completed risk register using the Salix template found [here](#). The risk register should outline the context for each identified risk, mitigation actions, risk owners, and residual impacts of the risk once actioned. This must demonstrate that risks will be appropriately managed to ensure the timely and responsible completion of the project within the grant funding period. Any further supporting information can be provided on the application portal.

4.4.5 Mitigating fraud and provision of a counter-fraud agreement

Applicants must complete a fraud risk assessment to demonstrate mitigating checks are in place, including false representation and failure to disclose information. Applicants must share details of this in the application form. Applicants are also required to provide a signed copy of the counter-fraud agreement by the authorising official. The template for this can be found on the Salix website [here](#). Please ensure that the highlighted sections on the template are completed with the information and figures specific to the application.

4.4.6 Provision of an Energy and Carbon Monitoring Plan

To measure the effectiveness of the project, applicants must provide an energy and carbon monitoring plan to show how each technology will be monitored and how the energy savings will be measured. This could include monthly metered readings, who will be responsible for this, where it will be recorded and whether the data will be analysed. The International Performance Measurement and Verification Protocol²⁰ provides guidance on how to provide accurate monitoring and verification of energy savings.

²⁰ <https://www.nrel.gov/docs/fy02osti/31505.pdf>

Applicants are encouraged to consider the installation of smart meters as an eligible enabling measure to facilitate accurate energy monitoring and system performance. Updating how buildings measure and use energy can help to reduce running costs and in some cases can lead to revenue generation.

Smart meters can provide up to half-hourly data on energy usage. Installing a smart meter offers the ability to accurately monitor and manage an organisation's energy usage and spend, improve its energy efficiency and environmental performance, and access innovative and flexible energy solutions. To progress with smart meter upgrades, organisations should speak with their energy provider who can discuss metering options. Public sector decarbonisation guidance published by ESC (Theme 7 – Monitoring and Evaluation)²¹ offers further information on smart metering. The Smart Meter Public Sector Guide also provides broader information on smart meters including benefits and some frequently asked questions.

Applicants may also wish to consider potential cost savings and revenue streams that might be available from schemes that incentivize flexibility with regard to energy consumption (referred to as 'demand side response'). More information can be found by searching 'Power Responsive' or visiting the National Grid website²².

5 Submitting an application

Applications will be assessed in the order determined by the targeted allocation process regardless of the time of submission. Nevertheless, Salix recommends that applicants submit their applications well ahead of the portal closing date to ensure all documentation is fully submitted within the application window.

Private organisations can support the preparation of the application form; however, the online application must be submitted by a member of the eligible organisation. Any applications submitted by external consultants or contractors will be withdrawn by Salix. Failure to provide all mandatory information, or providing false information, will also result in the application being withdrawn.

5.1 Application portal registration

Prior to submitting an application, all applicants must register within the Salix Finance website. The registration can be made by the person who will be filling out the portal information, who must be a member of the eligible organisation. It is strongly recommended that applicants register in advance of the portal opening to ensure that all registration details are working and up to date²³.

5.2 Submitting the application to the application portal

The application portal will open by mid-October 2024. A link to the application portal will be available from this date via the Salix website. Sign up for news updates through the Salix website [here](#). The application portal will remain open until 2pm on 25 November 2024.

Applicants must only submit one application per project. Any duplicate applications will not pass the initial quality checks and will be withdrawn by Salix. Applications must also be bespoke to the organisation applying and the site(s) that are the subject of the application.

All applications must be accompanied by the following list of mandatory documents. Applications excluding any listed documentation will be unable to submit their application through the portal.

²¹ <https://es.catapult.org.uk/tools-and-labs/public-sector-decarbonisation-guidance/monitoring-and-evaluation/>

²² <https://www.nationalgrideso.com/industry-information/balancing-services/power-responsive>

²³ <https://application.salixfinance.co.uk/user/register>

Mandatory documents:

- Application form
- End-of-life evidence of the current fossil fuel heating plant
- Building energy consumption data
- Peak heat loss calculations
- Energy saving calculations
- Feasibility study, including a detailed options appraisal
- Schematics of existing and proposed heating system
- Manufacturer data sheets
- Itemised cost breakdown
- Detailed risk register
- Project programme
- Counter fraud declaration signed by the Authorising Official
- Project execution plan
- Procurement status evidence (if applying on behalf of a higher education institution)
- Leasehold renewal evidence (if applicable).

See section 4 for detailed guidance on the type and quality of evidence needed to satisfy the requirements for each document.

The application portal also provides a section for applicants to upload any supporting documentation that has not been previously listed.

5.3 Support and advice

Any questions on developing an application can be sent to Phase4PSDSgrants@salixfinance.co.uk.

Salix will host a series of webinars following the launch of these Phase 4 Guidance Notes and application form. These will provide support in explaining the Phase 4 criteria and how to develop a robust application. This is also an opportunity to ask questions directly to Salix and hear from other potential applicants. Please find further resources on the Salix website under [Phase 4 PSDS](#) and [Tools and Resources](#). This includes guidance on technologies, applicant journey, frequently asked questions, grant terms and conditions, and the application portal questions.

During the application assessment period, contact will be limited to ensure a fair assessment process is maintained for all applicants. Important announcements will be shared on the Salix website under Phase 4 PSDS. For further information on the Salix assessment policy, see section 6.2.

5.4 Consortium applications

Applicants from two or more organisations may undertake projects jointly. These are known as 'consortium' applications, in which case the application must identify the amount to be granted to each individual applicant.

These applications must meet the following requirements:

- All members of the consortium provide evidence that they comply with the eligibility criteria outlined here in section 5.4 and section 4.1.
- A lead applicant of the consortium must be identified.
- The Consortium Documentation tab in the application form is completed and the terms of the consortium are disclosed.

6 Assessment policy and allocation of funding

6.1 Assessment process overview

Once an application is submitted, Salix will follow the process set out in Figure 7 for applications which fall within the budget profile available for Phase 4, in the order determined by the targeted allocation process. Full technical assessments of applications will begin when the portal closes on 25 November and will continue until all funding is allocated, by approximately the end of May 2025.

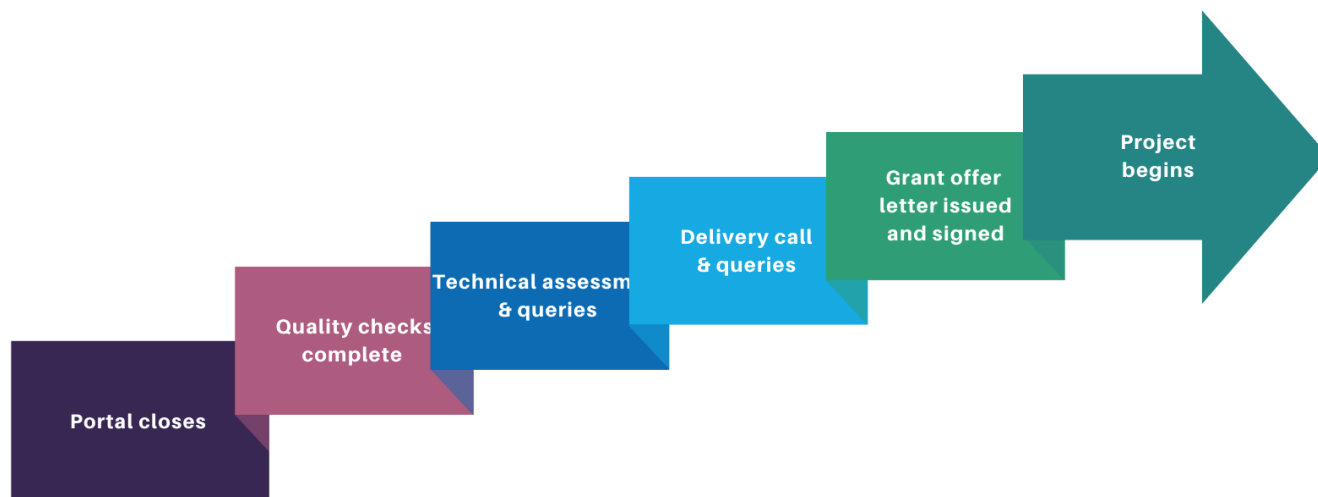


Figure 7: Stages of the assessment process

6.2 Salix assessment policy

Applications must be original and bespoke to the organisation applying and the site(s) that are the subject of the application. Where Salix finds evidence that applications are not original and bespoke to the organisation applying, these applications will be withdrawn. This includes cases where near identical answers and data inputs are used across multiple independent applications as these are therefore not bespoke to the application. Salix will not accept multiple versions of the same application with different grant values requested. In such cases, all versions will be withdrawn.

If applications do not adhere to the minimum requirements set out in section 4 and are considered poor in terms of quality or supporting evidence at any point in the assessment process, Salix exercises the right to withdraw the application without completing full due diligence. This may include the assessor having no contact with the applicant prior to making this decision. Applicants are expected to complete all sections of the application form (relevant to the measures proposed). Written responses that only refer to a separate document will be considered incomplete, which could result in the application being withdrawn as part of the quality checks review.

During technical assessment, if there are any questions, or further information is required, the applicant will be contacted to request this. Salix (and their external technical assessors) reserves the right to conduct a site visit during the assessment process in order to verify information provided by the applicant. It will not be possible to progress the application further until all requested information is provided and agreed by Salix.

Applicants are expected to return information and evidence to Salix to meet the assessment queries within four working days. At this stage the applicant will be expected to have sufficient resources in place to adequately answer any queries.

Any named contacts in the application form must be contactable during the assessment period. If any contact changes, the applicant must share the new contact details at the earliest opportunity.

Failure to respond in the timescales, or with sufficient detail, could result in an escalation process being followed which could ultimately result in the application being withdrawn by Salix. Query rounds will not be exhaustive, and applicants should respond to all queries within the four working day period. Continued failure to respond adequately to queries will put the application at risk of being withdrawn by Salix.

Salix may arrange a call to discuss the deliverability of the proposed project. The main contact and any relevant support (such as necessary members of the finance team) will be required to attend from the applicant organisation to discuss project risks and timelines.

6.2.1 Application adjustments during assessment

During assessment, requests for further information by Salix (or their external technical assessors) may result in adjustments to the application. Applicants can request adjustments but should note that these are only permissible within certain parameters:

- After submission, the grant value requested is fixed and cannot be increased.
- During assessment, applicants cannot change the low carbon heating technology or add any new buildings or measures.
- If there are changes to the grant carbon cost throughout assessment, this may impact the application's position under targeted allocation. Applicants should therefore ensure that all information that may impact the grant carbon cost of the application is accurate and realistic.

6.3 Issuing a Grant Offer Letter

Successful applicants will receive confirmation of grant funding from Salix in a Grant Offer Letter (GOL) via DocuSign. A copy of this letter must be signed by the applicant's authorising official within ten working days of receipt. Salix will withdraw applications should the GOL not be returned within ten working days.

The GOL will outline the terms and conditions for grant recipients to deliver their Phase 4 projects. This includes the grant start and end dates, the project funding profile, monitoring and reporting information, and specific project conditions. Further information on requirements during project delivery can be found in section 7. For projects with grant funding across financial years, the GOL will detail the grant for each financial year.

Organisations can prepare for work to commence before the GOL is signed, but they cannot claim any grant funding for these preparations where they are carried out before the GOL is signed and would do so at their own risk.

7 Delivery of the project

7.1 Managing delivery: progress updates to Salix

Experience from previous phases of the PSDS has shown that grant recipients that start early and have a clear project plan from the beginning have a higher chance of successfully delivering projects. Applicants should be aware, for their own resourcing availabilities, that Salix will expect regular updates on the following:

- Planning consents required, and the timeline to receive these
- Key milestones, and risks to successful delivery
- Supply chain management and lead times for key equipment and materials
- Internal governance and approval processes
- Payment forecast (when the grant recipient expects to request payments from Salix)
- Any evidence required to meet additional grant conditions listed in the GOL
- DNO engagement plan and potential works required.

7.1.1 Monthly reporting

The GOL sets out how regular contact with Salix will be maintained and what is required from the grant recipient. This will include scheduled meetings and completing monthly monitoring reports (MMRs), which requires updates on details as listed above and in Figure 8. A template will be provided by Salix. All grant recipients will be allocated a dedicated Salix relationship manager to assist with queries and help support the project.



Figure 8: Monthly progress updates required by grant recipients

7.1.2 Change request policy

Throughout project delivery, it might become necessary to make amendments to the original design. Salix will offer the opportunity for these proposed amendments to be assessed as part of the change request procedure. This procedure will be shared with grant recipients at the start of project delivery. This process may be different to previous phases due to the new methodology by which grants will be awarded for Phase 4. Grant recipients should contact their relationship manager for any queries around this procedure.

7.2 Payment of the grant

Grant recipients will be able to claim payments during delivery and following completion of their project(s). The full schedule of payments will be outlined in the project's MMR. The grant can be requested until the grant end date as per the GOL. The grant will be paid through instalments which will require forecasting within the MMR or at least six weeks in advance of all claim submissions. Please note, the final payment will be a minimum of 10% of the funding awarded for the final year of the grant unless otherwise agreed in writing with Salix.

Before any claim for payment can be processed, Salix must receive a completed payment request accompanied by supporting documentation that evidences the amount being claimed. This will include a payment request document that must be signed by the AO.

Grant funding can only be paid to the grant recipient, it cannot be paid to any third parties or a subsidiary. Grant funding may not be used by the grant recipient for financial instruments, i.e. engaging in a contract, agreement or any obligation giving rise to an asset and liability relationship between entities including (not an exhaustive list) surety bonds and hedges and any relevant instrument as defined in Article 3 of the Financial Services and Markets Act 2000 (Regulated Activities) Order 2001 and any other applicable law or guidance. General use of grant funding for Special Purpose Vehicles (SPVs) is not permitted, with the exception that a public sector organisation may decide to set up an SPV with the primary objective to aid in the delivery of projects. If use of a SPV is intended for limited purpose this must be disclosed in step 5 of the application form and, if the application is successful, the grant recipient will be required to provide specific evidence to evidence appropriate use of a SPV to support payment claims at the outset of the grant and at any point during the agreement. Evidence sought at the outset includes:

- 1) the SPV's:
 - a) Memorandum of Association

- b) Articles of Association
 - c) Certification of Incorporation
- 2) Signed letter from Authorising Official setting out the nature of the relationship between the organisation and the SPV.

Where a lead grant recipient has secured a grant as a consortium application, payments can be made to individual eligible organisations following the same payment request process. Specific project conditions are required to be issued throughout the delivery of the project to release payments.

Full payment requirements are set out in the terms and conditions accompanying the GOL.

7.3 Post completion monitoring and reporting

Once the project has completed, and all associated information required has been approved by Salix, i.e. the project is 'closed', Salix will require annual monitoring of savings for the following three years. Templates for these reports will be available on the Salix website. A post-completion monitoring survey will be sent to grant recipients with 'closed' projects for the purposes of evaluation.

7.4 Engagement with Salix

During, and on, completion of the project, Salix will engage with grant recipients through surveys, which will help Salix to continually improve its services. It is a requirement of the scheme that these surveys, sent via email, are completed by the grant recipient by the required date.

7.5 Evaluation

DESNZ will conduct an evaluation of Phase 4 of the PSDS. To facilitate this, Salix will share applicant, grant recipient, contractor, and installer information with DESNZ and those engaged in carrying out this evaluation, to ensure that applicants, grant recipients and the supply chain can be contacted and invited to participate, in accordance with the 'public task' legal basis under GDPR.

If grant recipients have a smart meter, they will be asked whether they consent for DESNZ and its third party intermediaries (those engaged with carrying out the evaluation) to access their annual smart meter energy consumption data on request via their energy supplier. If the grant recipient has indicated that they are content for the data to be accessed, those grant recipients will receive additional information on how to provide access to their smart meter data after their application is submitted. Having access to this data will assist in evaluating the impact of energy efficiency changes made as part of the project.

Please see the Department for Energy Security and Net Zero [Phase 4 Privacy Notice](#).

7.6 Grant audit

Salix is responsible for taking reasonable steps to monitor government funding and grant recipients' use of this awarded funding. This includes auditing a sample of projects during delivery and following completion. If a project is selected for an audit, checks will include a financial audit and an onsite technical review of project delivery.

Grant recipients will be required to:

- Comply within the stated timescales to ensure that the audit can be completed on time.
- Provide requested evidence to demonstrate that the public funds granted were utilised as stated per the GOL and terms and conditions. This extends to any other public sector organisations which are beneficiaries under the grant.

- Provide evidence of the grant income and expenditure being fully accounted for in the grant recipient's accounting system as per the payment requirements and the grant terms and conditions.

All grant recipients must maintain all income and expenditure records related to the grant and the project for a period of at least six years following the grant end date. Salix has the right to review the grant recipient's accounts and records that relate to the project and the grant.

Appendix 1 – Examples of eligible technologies

Applicants planning to include technologies that do not appear on the eligible technology list in their application should discuss this with Salix prior to submission. Technologies not on this list will be considered on the following basis:

- Technologies that are listed in Simplified Building Energy Model (SBEM) are likely to be supported and evidence of inclusion in SBEM should be shared.
- Evidence is required to show the technology is in operational use, with case studies and a track record of rigorous testing and commissioning to support the design performance described in the manufacturer's data sheet.
- Technologies which need to undertake research and development (as part of the works) are not suitable due to the uncertainty on cost, quality and programme and will not be funded through the scheme. A minimum technology readiness level of 9 is required for consideration²⁴.

Provided that the technology adheres to the above minimum requirements, on assessment of a new/novel technology Salix will need evidence to show:

- A thorough options appraisal has been undertaken to validate the selection of the technology including a matrix assessment on capital, operational and repair expenditure against other similar technologies.
- At the proposed site in comparison against other similar technologies, this technology is preferable in terms of the deliverability, feasibility, and cost effectiveness.
- The technology's operational lifetime.

The following list includes examples of eligible technologies for Phase 4 of the PSDS. This list can also be found in the application form. The definition of lifetime and persistence factor can be found in the glossary.

Project Type	Work Type	Saves direct carbon	Saves indirect carbon	Lifetime of Measure
Low carbon heating	Air source heat pump (air to water)	✓		20.00
	Air source heat pump (air to air)	✓		20.00
	Water source heat pump	✓		25.00
	Ground source heat pump	✓		25.00
	Connect to existing district heating	✓		30.00
	Connect to onsite district heating	✓		30.00
	Hot water – electric point of use heaters	✓		12.00
	Solar thermal	✓		25.00
	Biomass	✓		20.00
	Electric boiler	✓		20.00
	Electric heater	✓		10.00
	Electric radiant panel heater	✓		20.00
Electric Cremator	✓		15.00	
Project Type	Work Type	Saves direct carbon	Saves indirect carbon	Persistence Factor
Building management systems	BEMS – not remotely managed	✓	✓	8.42
	BEMS – remotely managed	✓	✓	8.42
Cooling	Cooling – control system		✓	6.84
	Cooling – plant		✓	8.21

²⁴ <https://www.ukri.org/publications/activities-associated-with-different-technology-readiness-levels/>

	replacement/upgrade			
	Energy efficient chillers		✓	14.44
	Free cooling		✓	13.68
	Replacement of air conditioning with evaporative cooling		✓	13.68
Energy from waste	Anaerobic digestion	✓	✓	15.20
	Incineration	✓	✓	15.20
Heating	Heat recovery	✓		10.83
	Heating – discrete controls	✓		6.84
	Heating – distribution pipework improvements	✓		25.00
	Heating – zone control valves	✓		15.00
	Plate heat exchanger	✓		28.50
	Steam trap replacements	✓		7.30
	Thermal stores	✓		20.00
Hot water	Flow restrictors	✓		14.00
	Hot water – distribution improvements	✓		25.00
	Hot water – efficient showers	✓		8.00
	Hot water – efficient taps	✓		12.00
Industrial Equipment	Energy efficient convection-oven	✓	✓	10.30
	Energy efficient dishwasher	✓	✓	20.00
	Energy efficient washing machine	✓	✓	20.00
	Energy Efficient Steriliser	✓	✓	20.00
Insulation – building fabric	Cavity wall insulation	✓		60.00
	Double glazing with metal or plastic frames	✓		28.00
	Dry wall lining	✓		35.00
	External wall insulation	✓		60.00
	Floor insulation – suspended timber floor	✓		30.00
	Floor insulation – solid floor or other type	✓		30.00
	Loft insulation	✓		27.00
	Roof insulation	✓		30.00
	Secondary glazing	✓		7.92
Insulation – draught proofing	Insulation – draught proofing	✓		29.25
Insulation – other	Automatic speed doors	✓		15.00
	Automatic/revolving doors	✓		10.00
	Draught lobby (external)	✓		29.25
	Draught lobby (internal)	✓		29.25
	Radiator reflective foil (external walls)	✓		8.00
Insulation – pipework	Heating pipework insulation (external)	✓		9.00
	Heating pipework insulation (internal)	✓		22.50
Project Type	Work Type	Saves direct carbon	Saves indirect carbon	Persistence Factor

LED lighting	LED – new fitting		✓	25.00
	LED – same fitting		✓	13.00
Lighting controls	Lighting – discrete controls		✓	10.00
	Lighting control system centralised		✓	10.26
Motor controls	Fixed speed motor controls	✓	✓	11.40
	Motors – flat belt drives	✓	✓	11.40
	Variable speed drives	✓	✓	10.26
Motor replacement	Motors – high efficiency		✓	15.00
Renewable energy	Small hydropower		✓	22.80
	Solar PV		✓	22.50
	Wind turbine		✓	20.00
Swimming Pool Covers	Pool covers manual	✓		7.92
	Pool covers motorised	✓		8.73
Time switches	Time switches	✓	✓	9.70
Transformers	Low loss		✓	30.00
	Transformer tapping change		✓	30.00
Ventilation	Fans – air handling unit		✓	23.75
	Fans – high efficiency		✓	14.25
	Phase change material		✓	23.75
	Ultrasonic humidifiers		✓	7.22
	Ventilation – distribution		✓	30.00
	Ventilation – presence controls		✓	7.92
Project Type	Work Type	Saves direct carbon	Saves indirect carbon	Persistence Factor
Enabling Measure	Battery - in combination with renewable			
	Battery - standalone			
	Capacity improvements			
	Electrical distribution			
	Incoming electricity upgrade			
	Meters - flow			
	Meters - heat			
	Meters - other			
	Smart meters			
Upgrade electrically powered uninterruptible power supply				

Glossary

Additionality

PSDS additionality criteria prohibit spending grant funding on any measures that are required to be installed by law. This ensures that all grants create additional value, thereby maximising the impact of the PSDS.

Air-to-air heat pump

An air-to-air source heat pump extracts the heat energy contained within the air and transfers it to the air inside a room through a series of fan coil units. It cannot provide domestic hot water (DHW) so an alternative system would be required to cover DHW demand.

Air-to-water heat pump

An air-to-water source heat pump extracts the heat energy contained within the air, it draws in air through a heat exchanger containing a refrigerant, which absorbs the heat and turns into a gas. The refrigerant gas is then compressed, heating it up, which then passes through another heat exchanger and heats up water to a desired flow temperature. The refrigerant turns back into a liquid and is expanded, and the process will recommence.

Alternative or dual fuel resilience

A form of backup where two different fuel types are required to ensure continuation of supply, in case of a failure in the primary fuel system, at sites with critical needs, such as hospitals.

Authorising official

The individual from the public sector organisation in a position of authority to approve and sign official and legal documentation associated with the application. This may be a chief executive or financial officer, or another senior official. This individual should be identified and agreed upon before submitting an application and should be part of the project governance structure.

Backup heating plant

Any form of heating plant that only operates when the primary heating system is not working, either due to a failure, maintenance, or downtime. The backup does not operate in conjunction with the primary system and ensures that the site still has a heating supply, when the primary system is not running. It can be the same or different fuel type as the primary system, and is generally sized to match the primary system, unlike N+1 resilience. It is considered an energy security measure, so is not eligible for funding under PSDS, see section 4.2.8.

Bivalent systems

Typically use a primary and a secondary heating/cooling generator. The primary system provides part of the peak load, with the secondary system supplying either the remainder of the peak load (a parallel bivalent system- this strategy minimises contribution by the secondary plant) or the entire load under peak conditions (an alternative bivalent system).

Campus heat network

A series of buildings connected to a district heat network where the building owner and heating plant owner are either the same or are related parties, for example a university, prison or hospital site.

Carbon cost

A metric calculated by dividing a measure's, or overall project's cost, by the lifetime direct carbon savings it delivers, which is used to determine which measures and projects offer the best value for grant funding.

Carbon cost tiers

Applications that are within the maximum allowable grant carbon cost (as defined below) will be split into three tiers based on each application's grant carbon cost.

The top 30% of all applications by grant value, based on their grant carbon cost, will be placed in the top 'tier', with the next 40% of applications in the second 'tier', followed by the worst-performing 30% of applications.

Cascading heat pump system

More than one heat pump works together to meet the heating and hot water requirements. The most common is a water source heat pump being fed from an air or ground source heat pump to provide higher flow temperatures.

Commercial gain

A private sector organisation benefits financially from the scheme, which could provide an unfair advantage to them and/or result in scheme benefits being transferred outside the public sector. Examples of commercial gain that the scheme is targeting with Phase 4 rules include:

(a) where a building owned by a private sector organisation is retrofitted with new measures (such as new windows) by PSDS funding which then makes the building more valuable to the private sector organisation.

(b) where a private sector organisation is leasing a building from the public sector and the building is retrofitted with measures that reduces the energy bills the private sector organisation then needs to pay.

Consortium

An association of two or more eligible organisations applying for PSDS funding under one application.

Delta T

The difference between the flow temperature leaving the heating plant, and the return temperature of the heating system. For example, a heating system with a flow temperature of 45°C and a return temperature of 35°C would have a delta T of 10°C.

Direct carbon

Carbon emissions resulting from combustion of fossil fuels either within an organisation's site boundary or, where heating is provided by district heating, from an off-site energy centre.

District heating

Heating for several buildings in a local area is provided from an external energy centre. The heating is typically transmitted to each building via a network of highly insulated underground hot water or steam pipes. It is also known as a heat network or teleheating. The heat is often obtained from a cogeneration plant burning fossil fuels or biomass, but heat-only boiler stations, geothermal heating, heat pumps and central solar heating are also used, as well as heat waste from nuclear power electricity generation. District heating is differentiated from onsite heat networks in the PSDS application form. Please see below for onsite heat network definition.

End-of-life fossil fuel heating plant

A heating plant or local heat interface that is ten years of age or older when it is decommissioned. For PSDS, this is a key basis of eligibility and can be evidenced in several ways as set out in section 4.2.1. An end-of-life status can also be given to plants that are less than ten years old, however evidence must be provided to show that it has reached its end-of-life prematurely.

Feasibility study

A site-specific comprehensive overview that considers the financial, technical, legal and delivery feasibility of the project. More detail on feasibility studies can be found in section 4.2.3.

Grant carbon cost

The carbon cost effectiveness of a grant application, which is calculated by dividing the grant funding by the lifetime direct carbon savings from measures funded by the grant alone.

This marks a change from previous phases where the carbon cost was calculated by dividing the grant funding by lifetime direct carbon savings from the whole project (including self-funded measures).

The maximum allowable grant carbon cost for Phase 4 is £510 per tonne of direct carbon saved by the grant-funded measures over the lifetime of a project.

Ground source heat pump

A ground source heat pump extracts the heat energy contained within the ground. It circulates a water-antifreeze mixture known as a 'thermal transfer fluid' through pipework underground. This is then pumped through a heat exchanger containing a refrigerant, which absorbs the heat and turns it into a gas. The refrigerant gas is then compressed, heating it up, which then passes through another heat exchanger and heats up water to a desired flow temperature. The refrigerant turns back into a liquid and is expanded, and the process recommences.

Heat networks

Heat networks supply heat from a central source via a network of pipes carrying hot water. In high density urban areas, they are often the lowest cost, low carbon heating option. They can use any source of heat such as renewables, large rivers, geothermal or waste heat from industry.

Organisations that cannot connect to a heat network yet but are likely to be near heat networks in future are encouraged to make their projects heat network compatible.

Heating plant

The unit that generates thermal energy for use in space heating and/or hot water requirements for buildings. Examples include boilers and combined heat and power units.

Hybrid low carbon systems

A low carbon heating system that uses one low carbon heating technology, such as an air source heat pump, to meet the average/standardised heating needs of the building. This is then paired with another heating technology as a 'top-up', such as an electric boiler, to meet the peak loads of the building, when the main low carbon heating technology cannot alone. The advantage of a hybrid system is that it optimises the heat pump performance as it can run all or most of the time.

Indirect carbon

Carbon emissions resulting from power generation off-site by another organisation. For the vast majority of public sector organisations, this will primarily be carbon emissions arising from grid electricity use.

Leasehold

The leasing agreement or contract that a public sector organisation holds over the responsibility of operation and maintenance of a specific building.

Life-cycle costs

An approach that considers all costs that an organisation will face throughout the lifetime of an asset/project up until its disposal. This includes, but is not limited to, the initial investment, operating costs, maintenance costs and service costs etc.

Lifetime of low carbon heating measures

The anticipated lifetime of a low carbon heating technology. The lifetime is used alongside the lifetime of energy efficiency measures to calculate a measure's carbon cost.

Like-for-like costs

All the costs incurred should the existing heating plant be replaced with a typical fossil fuel heating plant of the same type and size. In most cases, this will be equivalent to the costs of replacing the existing system with a conventional boiler.

Low carbon heating

A heating system that emits little or no direct carbon. Electric heat pumps are the most common low carbon heating solution. They are often multiple times more efficient than a fossil fuel boiler, and the indirect emissions associated with electricity use will reduce over time to zero as the power grid decarbonises.

Main contact

The individual responsible for overseeing delivery of the project and fulfilling certain duties such as completing monthly monitoring reports, sharing payment evidence, and ensuring Salix is kept up to date during project delivery. Their name and contact details will be inputted into the application portal upon submission.

Marginal costs

Costs in addition to the business-as-usual costs for replacing the existing fossil fuel heating plant on a like-for-like basis.

Measure carbon cost

The carbon cost effectiveness of a proposed measure, which is calculated by dividing the measure cost by the lifetime direct carbon savings it delivers.

Measures that do not deliver direct carbon savings do not have a measure carbon cost.

Minimum recipient contribution

All grant recipients must contribute a minimum of 12% of total final project value. If the like-for-like cost is greater than the 12% of the total project value, then the recipient will need to provide further funding to match the equivalent of the like-for-like costs.

Monthly monitoring report

The monthly monitoring report (MMR) is a document which Salix uses on a monthly basis to report changes and project forecasts.

N+1

'N' is the number of components needed to achieve the design conditions. For example, this could be 4 boiler heating modules designed to achieve 100% of the heating load at design conditions. '+1' redundancy provides a minimal level of resilience by adding a single backup component. In the above example N=4 boilers and +1= 1 similar sized back up boiler to the N boilers. N+1 may be achieved on a single fuel system, so can provide a different form of resilience to alternative or dual fuel.

Options appraisal

A site-specific report identifying viable design options for the building's fabric improvements, energy efficiency measures and low carbon heating measures. Details of what should be considered within an options appraisal can be found in section 4.2.3.

Persistence factor

The persistence factor is the lifetime of the energy efficiency technology averaged to factor in degradation. The persistence factors for individual technologies employed by Salix are based on those derived by the Carbon Trust.

The persistence factor is used in the calculation of cost to save a tonne of CO₂e over the lifetime of an energy efficiency measure (£/tCO₂eLT).

Private Finance Initiative (PFI)

A private finance initiative (PFI) is a specific example of a project where capital for public sector projects is financed from the private sector. PFIs involve a long-term contract between a private party and a public sector entity where the private sector designs, builds, finances and operates a public asset and related services. The costs are repaid by the public sector over a long-term finance agreement.

Procurement Act

The legislation that replaces the Public Contracts Regulations 2015 as the source of the definition of an eligible public sector body, called "public authorities" in the Act, that can apply for the scheme. The Procurement Act 2023 was ratified in 2023 and will come into force in late 2024 and defines the procurement processes that public sector bodies are required to follow.

In the Procurement Act 2023, a “public authority” means an organisation that is:

- a) wholly or mainly funded by public funds; or
- b) subject to public authority oversight;

and

- c) does not operate on a commercial basis.

More detail on the Procurement Act can be found [here](#).

Sector soft caps

A further approach to targeted allocation which is intended to align the distribution of funding across the public sector to the emissions produced by that portion of the public sector. The caps ensure that each of the three sectors – health, education and other – are awarded no less than 30% and no more than 35% of the total budget.

The caps are ‘soft’ in that they can be relaxed if it becomes infeasible to maintain them, for instance if there are insufficient quality applications within any given sector to fit the available budget profile, or applicants withdraw during the allocations process.

Special Purpose Vehicles (SPVs)

SPVs are separate legal entities created to fulfil narrow, specific or temporary objectives. They are fenced organisations having limited pre-defined purposes and legal personality. SPVs may also be referred to as subsidiaries, and for the purpose of the PSDS terms and conditions are one and the same.

Subsidy ‘enterprise’

Defined in section 7 of the Subsidy Control Act 2022.

Targeted allocation

The process that will be used to prioritise applications for funding in Phase 4. The stages will include:

- Prioritising applications into carbon cost tiers (see description of ‘carbon cost tiers’)
- Allocating with regards to sector soft caps (see description of ‘sector soft caps’).

Water source heat pump

A water source heat pump extracts the heat energy contained within water. It pumps water from an available water source to a heat exchanger containing a refrigerant, which absorbs the heat and turns into a gas. The refrigerant gas is then compressed, heating it up, which then passes through another heat exchanger and heats up water to a desired flow temperature. The refrigerant turns back into a liquid and is expanded, and the process recommences.

Whole building approach

An approach to retrofit for decarbonisation that considers all the factors that contribute to a building’s energy consumption together to identify the most cost-effective solution. For example, investment in improving the insulation levels of the building fabric will reduce the size of low carbon heating plant required, improve thermal comfort and save on fuel bills. Investment in reducing the peak electricity consumption can reduce the need to upgrade a building’s electrical infrastructure to accommodate the installation of a heat pump.