Phase 2 Public Sector Low Carbon Skills Fund: Guidance on the preparation of heat decarbonisation plans

1. Background

The following is intended to be a helpful guide to all eligible public sector organisations wishing to upgrade and improve their current heat decarbonisation plans or are setting about creating their first plan through Phase 2 of the Public Sector Low Carbon Skills Fund (Phase 2 LCSF).

Phase 2 LCSF has £15 million available to applicants to develop their heat decarbonisation plans and there is no cap to the amount of funding that an organisation can apply for.

We know that not all public sector organisations have an existing heat decarbonisation plan, so Salix has created this guide on heat decarbonisation plans, including to enable you to get started or to engage specialists to help prepare the plan.

Before starting out on creating a plan, it will be useful to set your situation in the policy context of what is happening in the United Kingdom today and how the world has responded to the threat that global warming brings. Many organisations up and down the country have declared a climate emergency as more understand how our reliance on fossil fuel is threatening our planet.

The UK has a legally binding target to reduce its emissions to Net Zero by 2050 under the Climate Change Act, which also introduced a series of carbon budgets up to 2050, which set interim targets for emissions reductions. As the public sector accounts for around 2% of all UK emissions, and the built environment accounts for around 40%, it is crucial for the public sector to show leadership and make a contribution to the delivery of Net Zero, by reducing its emissions, and in particular its direct emissions, which arise predominantly as a result of heating. A starting point in decarbonising is to have in place a heat decarbonisation plan, which demonstrates how an organisation will reduce its emissions.

2. Purpose of a heat decarbonisation plan

Reflecting the targets and rationale set out above the purpose of a heat decarbonisation plan is to describe how an organisation intends to replace fossil fuel reliant systems with low carbon alternatives (for example heat pumps, electric heating, or other low-carbon fuel sources) within its estate. To meet the challenge of net zero, organisations throughout the UK need to decarbonise their buildings. It is also recognised that this needs to be approached in a way that supports the type of estate an organisation operates. Estate and property portfolios can range from one building, to multiple buildings, to campus style activities, or a combination of the above.

With diversity of estates in mind a heat decarbonisation plan should be made to fit its purpose, but describe the current state of an organisation's energy use, where it is derived from, and the organisation's plans for reducing and/or decarbonising its energy use. The plan outlines what an organisation has already done, what it is currently doing, and what it plans to do in the future.

It is expected that a plan will lay out the current thinking and vision of how decarbonisation will be achieved. Within it should reflect the organisation's level of knowledge, an understanding of the technical solutions that are needed to decarbonise, the associated budget costs or estimates , as well as how and when over a timeline it might be delivered.

It is expected that an early plan will provide information at a very high level, and could incorporate feasibility studies as the next step, or be more mature, and detail the implementation of measures as the next step. A decarbonisation plan is a live document and should be updated to reflect the current status and to track progress.

3. Purpose of the Phase 2 Low Carbon Skills Fund

Phase 2 LCSF enables public sector organisations to access grant funding to help them produce a heat decarbonisation plan. If you do not have either the resources or the skilled personnel needed to complete a heat decarbonisation plan, you can apply for funding to either produce an entire plan, or develop an existing one.

For a list of the organisations eligible to apply, please see the 'who can apply?' section on the Salix Finance website.

4. Guidance on writing a heat decarbonisation plan

Purpose, sign off and summary of technical solution/or how to achieve the solution

It is useful to set out the purpose of your heat decarbonisation plan, and why are you proposing it. How is this plan going to contribute to the goals of your organisation and the UK? Why is it important for your organisation and how has this plan been agreed through your governance procedures? The purpose can outline the ambitions of the organisation and what would need to be completed to achieve net zero. It would therefore be reasonable to think that this plan will be endorsed and signed off by an accountable officer (e.g. the authorising official for the grant) in the organisation.

It is also useful to set out your overall vision of how net zero is going to be achieved. This should be described in a whole system context, taking into account the interactions between the different elements of a building.

It should reflect on the benefit of improving building fabric, requiring a lower cost heat solution, hence potentially reducing the need to upgrade the whole heating system.

It needs to recognise that changing your heat load to an electric source will increase the local network demands, and that there could be some local constraints that could be managed by the implementation of other measures.

It should recognise where you are on the journey – just beginning or getting ready for delivery and think about what the next steps are, and how you are going to achieve them with budget costs.

It may well be that you don't intend to complete all the elements through one project or with one contractor, so should also provide an explanation of how it is going to be delivered, so that the delivery of, individual projects as well as the whole programme can be understood.

Heat decarbonisation plan – The Introduction

Using the introduction section to provide a summary of your organisation's current situation and set your plan in context.

This includes what the organisation's estate looks like and setting out a summary of what is included within the scope of this decarbonisation plan (you may wish to link it to other documents/strategies, roadmaps or plans you have). You should describe the estate, its

use, age, location, characteristics, if it is close to other public sector buildings, also existing systems, with their age and performance.

You should include your energy consumption and costs, your emissions, what you have already done, its impact and where you currently are in the decarbonisation journey. This will enable you to set a baseline to measure future interventions against. You should also look at what that will look like into the future, what with any other plans (e.g. new buildings/disposals) will your energy consumption, emissions and energy costs look like? That way you will be able to track how you are doing against it.

Are you just starting out or has your organisation already undertaken a lot of work to decarbonise its buildings? A local authority will have schools in its area, do these schools or other individual organisations have heat decarbonisation plans? A local authority will have many non-domestic properties that would benefit from having a heat decarbonisation plan of their own. It is worth considering that the decarbonisation of heat is one of the later steps in the journey and any plan must include reducing demand to a minimum first as well as any enabling works (for example changes to the existing heating system to support lower operating temperatures). The introduction will describe what the priority areas are and what monitoring needs to be in place to help identify necessary works.

Buildings

A section in your heat decarbonisation plan needs to be about your buildings. The section aims to provide background information on your organisation's existing non-domestic buildings. This section aims to provide background on the condition and energy consumption of these buildings:

- Portfolio
    - How many buildings are included as part of this plan?
    - Do you hold a building inventory? This can be just for buildings that are owned or occupied under long term leases by the Public Sector Body.
- Building characteristics
    - What age are the buildings?
    - Where are they located (urban, rural) in groups/clusters or close to each other?
    - What is located in the surrounding area?
    - What is their use in terms of activity and occupants and hours of use?
    - What is the condition of the building fabric such as roofs, windows and walls?
    - What is the estimated heat loss of the building and could this be a barrier to low carbon heating?
    - Are there any proposed disposals, changes in use, major refurbishments or new builds planned?

Energy consumption and carbon emissions

You should provide a section on your current energy consumption which allows you to reflect on what your current energy consumption is, the level of the quality of the data, how you collect it and could do so in the future to track change. You should also think about what looks like in terms of carbon emissions and do a forward forecast with future emissions factors to enable you to understand your business as usual trajectory.

- Energy consumption
    - Do you have energy billing information?
    - Is existing metering/submetering installed in the buildings and are they monitored?
    - Who pays the energy bills for these buildings?
    - Do you have a breakdown of the current heat demand performance of these buildings (kWh/m^2), including floor area of the buildings?
    - Are there plans to implement additional meters?
    - Do you have historical energy consumption which will provide you with a baseline?
    - Do you have a monitoring and verification plan in place for any proposed measures?
- Carbon emissions
    - Do you know what your carbon emissions are against energy sources?
    - Have you calculated them in the past so you can start to see a pattern?
    - Do you know what the future emissions for the site will look like to 2050?

Heating Systems

A section in your heat decarbonisation plan needs to be about the current state of your buildings heating systems. This section aims to provide background on the condition and energy consumption of the heating systems. What is the age and condition of the heating systems? How are they controlled and how should they be controlled?

- What are the current heating technologies for the buildings? Or is it connected to a heat network?
- What fuel is being used by the heating system?
- If it is a heat network what is the source of the heat?
- Is it a wet system? If so:
    - What heat emitters are used in the building(s)? (e.g. radiators/under floor heating)
    - How is heat transferred throughout the building? (e.g. Low, Medium, High Temperature Hot Water/Steam)
- What is the condition of the heating system?
- If heat is provided through or combined with an air conditioning system:
    - What is the heat distribution to the air conditioning?
    - What type of air conditioning is it?
    - What is the cooling system? How is that fuelled?
- How is hot water provided e.g. heating system, separate gas fired water heaters, use electric heaters? What is it used for e.g. showers, washing hands, catering.
- What does the ongoing maintenance programme look like?
- Are there sites where heating equipment is at the end of its life and due for replacement?

Determining the whole solution

With the knowledge of the site and existing conditions (as well as understanding your heating systems) and the knowledge gained from exploring the following (click to jump to section), you should be in a position to explain in your plan what your solution will be:

- Previous energy efficiency projects and existing low carbon heating technology
- Heating networks and opportunities on site
- Electricity loading capacity to support a switch to electric heating solutions
- Plans for the sites

Dependent upon the stage you are at, your plan may be more or less mature. If you are at an initial stage you should record your conceptual ideas. You may have more than one and should capture them all, but with them note how easy and effective they may be to implement, and if they will achieve your goals. This will help to evaluate a shorter list of possible solutions. Questions to consider are:

- Is the solution going to work for this site?
- Will it be easy to install?
- How will it fit with other technologies on the site (will it complement them or overlap or be difficult to work together)?
- Are there other elements of a system that ought to be installed in advance or in parallel to get it to work better (i.e. building fabric improvements, controls upgrades, or ventilation)
- What energy reduction will it offer, will it move away from fossil fuels in part or fully? What will the replacement fuel supply is that readily available (i.e. biomass or electricity?)
- Are there permissions and other agreements one would need to seek before being able to go ahead (planning permission, access to land etc,)
- Who will install the technology?
- How easy will it be to operate? Who will operate it?

Estimating cost

You should explain what the budget costs are in an appropriate level of detail and accuracy for the stage that you are at (initial budgets to finalised quotes from contractors). You should think about if everything has been included in your budget cost and not just the purchase and installation of the equipment. As a check you should ask yourself these questions:

- Have you captured costs from all the different parts of the process?
- Within the installation are there other things that will need to be considered such as asbestos removal, temporary heat generation, preliminaries, ancillaries and making good.

You should provide an indication of what the solution would be how you would install it and if you have any other steps to complete to get to that point (i.e. involving an M&E engineer for design, tendering or gaining quotes). The next section on delivery covers this in more detail.

Delivery

You will need to think about how you are going to deliver the work the plan will recommend. You might wish to consider how you are going to get the plan through internal sign off and deliver it with consultants or contracts.

- How are the solutions going to be assessed?
- What metrics will you need to generate to gain internal sign off?
- Who is going to do that?
- How much is it going to cost? (see estimating cost)
- How are you going to commission the work/what procurement route?
- How long will it take?
- How are you going to manage the contract and oversee the outputs (linked to the section on Resource)

- What you think the overall longer-term delivery might look like (it is expected that this will be very approximate but show a rough plan for the overall delivery)

If this has already been established, then the plan should show what the overall implementation plan is detailing how it will be taken forward including:

- What the overall budget costs and benefits are expected to be?
- What the timeline for delivery will be?
- What the delivery model is likely to look like?
- How it is going to be managed (linked to resource)

Resources

This section of the heat decarbonisation plan aims to provide context on the existing resources available and outline the future resources required to develop and deliver the heat decarbonisation plan. Once you know what you are planning to deliver (see section delivery for more details) it is essential to make sure that there is enough resource to be able to coordinate it. Things you would need to know in advance of considering resource are:

- How many projects you plan to undertake across the portfolio?
- Over what time period?
- What the delivery route would be (who would undertake what roles and what would you outsource and what would remain within the organisation)
- What is the governance for the investment and delivery?

With those in mind then you are in a position to consider:

- How would this programme be driven within the organisation?
- Who would be responsible for coordinating it?
- Who is going to be senior sponsor and report on progress?
- Who is responsible for managing and monitoring the ongoing energy consumption across the estate and who will be overseeing the delivery of the plan? Would they be the same person? Would they have time to do everything?
- Are the individuals overseeing any project appropriately trained, or will additional training be required to deliver the heat decarbonisation plan?
- What is the existing resource for the identification, development, and delivery of the heat decarbonisation plan? Is it sufficient to deliver the scale that you need to?
- What are the anticipated resource requirements for the delivery of heat decarbonisation plan?
- Will this require additional human resource?
- Will it require additional financial resources?
- What is the resource plan which would support delivery?

Previous energy efficiency projects and existing low carbon heating technology

This section of the heat decarbonisation plan aims to outline all previously implemented energy efficiency works that have taken place and if any further energy efficiency works are planned and how these have been factored into the transition to low carbon heat.

- Have any energy efficiency works been completed in the buildings previously? If so what and did they deliver?
- Are there more projects that are planned?

- What type of project are they? Have you got a list of the projects knowing which are heat (direct/nontraded/scope 1 related) and other (primarily scope 2)?

Within the pipeline are there plans to improve the thermal efficiency and airtightness of the buildings? (Note that these might come from routine end of life replacement of windows, doors, roofing materials etc.). This stresses the importance of making the link between estate management and energy management in ensuring these aspects are captured.

- If applicable, has the proposed reduction in energy demand resulting from these energy efficiency measures been incorporated into the sizing of the low carbon heating system?

Heating networks and opportunities on site

This section aims to understand whether you have any local heat resources available that could facilitate the transition to low carbon heat. It is important to understand what the heat source is, to establish if it is low carbon. If this is the case, a short-term delay in order to wait for a heat network to be available to the organisation is an important consideration. Large public sector buildings or campuses with a high heat demand can provide a baseload for a district heating network which will have benefits for the wider community.

- Are there any existing or planned heat network developments located close to the sites that your buildings could connect to?
- Is there scope for the organisation to provide a potential baseload for a future heat network to benefit the wider community?
- Are there any other sources of secondary heat in proximity to the site(s) or on site?
- These may include:
    - Heat Sources such as: water, air, ground
    - Heat recovery opportunities
        - Sewer, industrial sites or anywhere where there is waste heat such as data centres or battery storage sites
        - Energy from waste e.g. Potential for anaerobic digestion
        - Significant cooling plant

Electricity loading capacity to support a switch to electric heating solutions

By adding additional electrical loading through the switching of your heat source, there is a chance that there won't be enough electrical capacity coming into your building(s) or in the wider area.

The cost of increasing the electrical supply to a site can vary substantially (and can be high). Therefore it should be investigated before any projects are commissioned.

This section aims to ask the questions which would help you understand what you might need to do.

- Do you know what the increased demand of a heat pump or other electrified heat load, plus any electric vehicle (EV) charging would be for your building (s).
- Do you know what the current capacity of the building(s) are?
- Do the sites have their own medium voltage network?
- Can you give some details on the rating and the loading capacity of the network?

- Is there sufficient capacity for the additional electrification of your estate (refer to the contract agreement with your Distribution Network Operator (DNO))?
- Have any energy efficiency or renewable generation measures been implemented previously to reduce electricity consumption of the buildings?
- Are there any further significant measures that can be considered to reduce electricity demand of the buildings (e.g. light emitting diode (LED) lighting and controls)?
- Are there plans to increase capacity?
- Have you contacted the DNO about increasing electrical loading?
- Is there potential on site to install/increase renewable generation to support the increase in electrical demand from low carbon heating solutions?
- Does the site have any existing EV charging stations and future plans (note that this will also affect the overall site capacity)?

Supporting information

This section brings together the energy data you have used to support the heat decarbonisation plan. It should include the following supporting information:

- Display Energy Certificates (DECs)
- Age of buildings and, where possible, U values of building elements
- Energy consumption data across the estate, to include where possible half hourly data and as granular as possible
- Energy costs across the estate
- Maintenance costs
- Current contractual agreements (e.g. facilities management) and their targets
- Target emission savings for the decarbonisation plan
- Site surveys
- Floor plans
- Images of the systems and building fabric.
- Heating system/building fabric condition reports.
- Heating and electrical schematics.
- Heat loss calculation for the buildings.

Plans for the sites

This section outlines plans for sites and the proposed expansion or rationalisation of sites that are in the public domain. This section could consider:

- Any planning restrictions or planning guidance in your area (including listed status of buildings)?
- Plans for demolition and rebuilding, major refurbishment or change of use, occupancy, or operational hours?
- Are there plans that are in the public domain for expansion or rationalisation of sites or change of usage?
- Plans for new builds and the planning standards for new builds in your area?
- Planning guidance for heating systems and energy efficiency in new builds in your area/buildings?
- Building standards and building regulations?

Key challenges

This section aims to explain the main challenges that the organisation faces in decarbonising heat and the support that the organisation needs to meet your decarbonisation targets. The challenges (i.e. barriers or key risks) can be summarised and are likely to include:

- What is the internal governance?
- Who would need to sign off on this work?
- Does the current business case process allow for carbon emissions?
- What are the challenges in decarbonising heat in your buildings?
- Are any of your buildings listed buildings?
- What options are available?
- What is the cost?
- What resources are required?
- Are partnership arrangements in place for different organisations to work together?
- Are procurement frameworks in place to enable timely delivery? Are they able to cover the technology and the scale?
- What commercial agreements for funding and finance are available beyond Salix?
- Are there public consultation exercises that are required to take place and has this been factored into the plan?
- Are there border issues that must be considered?
- Are there other environmental issues that impact on the plan?
- Are there any challenges within the supply chain for the recommended technologies?
- Installation/onsite risks?

5. Information about the Phase 2 LCSF

Dates for submission of the heat decarbonisation plan

Heat decarbonisation plans which have been funded by the Phase 2 Low Carbon Skills Fund must be completed by the 31st March 2022. Completed heat decarbonisation plans should be submitted to Phase2LCSFgrants@salixfinance.co.uk.

When the heat decarbonisation plan is submitted there should be clear information explaining how the heat decarbonisation plan was formally approved by the organisation.

Heat decarbonisation plan Support Tool

To support the development of a heat decarbonisation plan, a support tool can be downloaded here. This is a place where you can enter the specific details and figures in the following sections. The Support Tool will build up a database of the buildings on your estate, their current energy performance and opportunities to reduce the carbon footprint.

It is suggested that this is used to complement other material that you may have collected, and to offer an option to assessing the options. If you have had studies done by others into the replacements of specific heat sources, they are likely to provide a more accurate or bespoke solution for the situation.

Advice and support

Salix is available to answer questions regarding the application process in advance of the application deadline. Please email our team at Salix at

Phase2LCSFgrants@salixfinance.co.uk. Our team will endeavour to answer your query within three working days, for complex enquiries this may take a little longer.

We will also be running a series of webinars aimed at talking clients through the application process, these are published on our website here.

Glossary

Carbon baseline – A greenhouse gas or carbon emissions baseline is the estimate of the emissions over a set period that can be used to measure progress. Any year can be used, the more data that is available and the earlier the baseline, the better.

Distribution Network Operator (DNO) – Electricity grid operator, there are fourteen across the UK.

Electrical loading – Is the electrical power required by an appliance to operate.

Feasibility studies – A report that evaluates the practicality and deliverability of a proposed project. A feasibility study aims to: holistically appraise the strengths and weaknesses of an existing system; deduce opportunities and risks present in different solutions; consider the resources required to complete the project; and conclude the best course of action or likelihood of success.

Heat demand – The quantity of heat needed to maintain the desired internal temperature of a building during the external variable temperatures in a year.

Heat loss calculation - Heat transfer is the transfer of heat energy due to a difference in temperature across two points. A heat loss calculation allows for the assessment of the heat flow in a building and the overall heat demand needed to meet the desired room temperature. This assessment requires knowledge of the building size, fabric condition and internal/external temperatures.

HDP Support Tool - The Heat Decarbonisation Plan support tool is an excel file that can be downloaded from the Salix website by following the link at page 9 in this HDP Guidance.

This support tool provides a place to capture information that will form the basis of your heat decarbonisation plan. This will provide a database of buildings information to be included in the HDP. Building data is for pre and post decarbonisation design and focuses on the heating system, fabric insulation and electric system together with low carbon heating and energy efficiency measures.

The purpose of the tool is to create a data base of the buildings on an applicant's estate. The tool should be provided together with the HDP by March 2022.

Kilowatt hour (kWh) - a unit of energy equal to one kilowatt (kW) of power sustained for one hour. This is the standard unit for measuring energy usage.

Local network demands – is the increased pressure placed on a DNO by the added electrical loading of appliances, such as, heat pumps and Solar PV units.

M&E engineer – Mechanical and Electrical systems engineers can also be referred to as building services engineers. They are responsible for the heating, water, electrical and telecoms systems inside a building. These engineers are typically involved in the design and installation of building systems or oversee their maintenance and operation.

Net zero – A target to achieve a state in which the activities of an organisation result in no net impact on the climate from the release of greenhouse gas emissions. This is achieved by reducing greenhouse gas emissions, in line 1.5°C pathways or time-based

targets, and by balancing the impact of any remaining greenhouse gas emissions with an appropriate amount of carbon sequestration.

Scope of emissions (1, 2 & 3) - Greenhouse gas emissions are categorised into three groups or 'Scopes'. Scope 1 covers direct emissions from owned or controlled sources. Scope 2 covers the indirect emissions of an organisation from the generation of purchased electricity, steam or heating and cooling. Scope 3 includes all other indirect emissions that occur in a company's value chain, for example, purchased goods or services, travel and waste disposal.

Temporary heat generation – Is a heat source that is used when the primary heat supply is unavailable. The most common are electric heaters or electric radiators and are used during the replacement or maintenance of the primary heat source.

U Value - the rate of transfer of heat through a material (watts per square metre-kelvin), typically through the fabric of a building (e.g. roof, walls and windows). A lower U-value indicates the slower rate of heat transfer across a material.

Wet system – In this system, the heating medium used to reach the desired internal temperature of a building is a liquid and in most cases water. The heating medium is distributed via a pipe network and heat is emitted through radiators or under floor heating. The heating medium then flows back to the heat source.

Whole system context – Taking a system-based approach is to consider the demands and interactions between different elements of a building in the context of a site or campus.