

## 1. Overview

The purpose of this document is to outline the requirements for a comprehensive, actionable and costed Heat Decarbonisation Plan for a single public sector building or an estate. The following outlines what this should constitute. Ultimately, the completed Plan should leave the Public Sector Organisation with all the required information to apply for PSDS funding.

## 2. Requirements

Task	Purpose	Scope
Strategy	Setting out broader ambitions, objectives and aims and providing a clear scope for the heat decarbonisation plan	<ul style="list-style-type: none"> <li>Establish an estate-wide target for decarbonising heat.</li> <li>Create clear objectives - Decide what you want to achieve and why.</li> <li>Define the scope of the heat decarbonisation plan.</li> <li>High-level prioritisation of building/s to focus on, based on understandings of estate e.g. age, current/future function of buildings.</li> <li>Outline existing initiatives both internally and externally that support and/or impact this strategy.</li> <li>Demonstrate organisational commitment to targets and governance.</li> <li>Outline your strategy for how you aim to meet your objectives, and the associated challenges and risks.</li> </ul>
Baselining current emissions	Baselining current emissions from heat	<ul style="list-style-type: none"> <li>Determine a baseline year for emissions reporting</li> <li>Gather data to determine annual demand and greenhouse gas emissions from fossil fuel heat and electricity <ul style="list-style-type: none"> <li>Use HH meter data where possible, otherwise meter readings and energy bills</li> <li>Follow Green Book guidance regarding the carbon intensity of fuels and the electricity grid</li> </ul> </li> <li>Present total emissions for the baseline year</li> <li>Consider known changes in the future (e.g. estate changes and/or operational changes) and present a forecast of emissions.</li> <li>Clarify sources of emissions and identify opportunities to reduce emissions. <ul style="list-style-type: none"> <li>Prioritise these based on your own targets/criteria.</li> </ul> </li> </ul>
Review of current systems	To create a baseline for the HDP, based on the building's current energy systems, demands and emissions	<ul style="list-style-type: none"> <li>Gather general building data <ul style="list-style-type: none"> <li>DEC certificate, building age, internal area</li> <li>Electricity/gas meter numbers, current fuel supply agreements and tariffs</li> </ul> </li> <li>Review current electrical connection(s) <ul style="list-style-type: none"> <li>Determine type of supply (i.e., 1/3ph), maximum import capacity, typical loading (% of max)</li> </ul> </li> <li>Review current building fabric <ul style="list-style-type: none"> <li>Conduct survey to record details of existing building fabric (including material, age, condition, known/estimated u-values and air-infiltration, ventilation strategy)</li> <li>Use this information to determine the peak (kW) heat loss of the building</li> </ul> </li> <li>Review current space heating, hot water and process heating system(s) <ul style="list-style-type: none"> <li>Determine system type, components (make/model), capacity (kW), seasonal efficiency, age</li> <li>Estimate the remaining useful lifetime</li> <li>Record/estimate annual operating hours, space heating flow temperature, hot water temperature</li> <li>For multiple heat-source systems, record/estimate the proportion of building demand met by each system</li> <li>Record any additional buildings/loads fed by heating system(s)</li> <li>Provide/ create schematic of heating system</li> <li>Determine costs for like-for-like replacements (including removal of existing equipment, new equipment and controls, ancillaries e.g., plinths/insulation, installation, and commissioning)</li> </ul> </li> <li>Review current heat distribution system <ul style="list-style-type: none"> <li>Determine system type, components, age, condition</li> <li>Estimate the remaining useful lifetime</li> <li>Determine cost of like-for-like replacements</li> </ul> </li> <li>Review current cooling system</li> </ul>

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		<ul style="list-style-type: none"> <li>○ If applicable, quantify total existing cooling load (kW)</li> <li>○ Record system's efficiency</li> <li>• Review existing (if any) renewable energy measures               <ul style="list-style-type: none"> <li>○ Type, capacity, components, SLDs</li> <li>○ Estimate the remaining useful lifetime</li> <li>○ Determine cost of like-for-like replacements</li> </ul> </li> <li>• Review existing electrical loads               <ul style="list-style-type: none"> <li>○ Determine age and type of all non-LED light fittings</li> <li>○ Identify any large and/or non-standard electrical loads</li> </ul> </li> </ul>
Options Appraisal	To review all feasible options for decarbonising the buildings heat demand, as well as other renewable energy and transport opportunities	<ul style="list-style-type: none"> <li>• Undertake techno-economic feasibility of a long list of potential options for the individual buildings identified against the counterfactuals and including sensitivity testing. Technologies and measures should include:               <ul style="list-style-type: none"> <li>○ Energy efficiency measures – building fabric upgrades (e.g. insulation, draft-proofing, double glazing), LEDs, and building controls (e.g. BEMS, metering).</li> <li>○ Low carbon heat technologies - Heat pumps, district heating, CHP, biomass, thermal stores, waste heat recovery (inc. MVHR)</li> <li>○ EVs/EVCPs</li> <li>○ Onsite generation / storage – Solar PV, Solar Thermal, Wind, energy storage</li> </ul> </li> <li>• Screen long list of options against constraints to focus on practical solutions. Scope out unsuitable technologies and clearly demonstrate the reasoning for the decisions.</li> <li>• Provide initial sizing and potential yields of potential solutions.</li> <li>• Outline carbon savings and financial (NPV, IRR, payback) against the counterfactual.</li> <li>• Recommend solutions for each building in the near, medium and long term.</li> </ul>
Project identification	Based on the findings of the options appraisal, detail the proposed new energy system measures and the physical changes and supplementary activities required to facilitate this	<ul style="list-style-type: none"> <li>• Fabric improvements proposed               <ul style="list-style-type: none"> <li>○ Specify and cost measures recommended from OA</li> <li>○ Quantify impacts on peak heat demand</li> </ul> </li> <li>• Heating technologies proposed               <ul style="list-style-type: none"> <li>○ Conduct feasibility studies where necessary (e.g. WSHP/GSHP)</li> <li>○ Specify make/model; sCOP/efficiency; output; min operating temperature (if applicable); flow/return/DHW temperatures;</li> <li>○ Specify thermal store, if applicable</li> <li>○ Procure costs for design, equipment, ancillaries, installation and commissioning</li> <li>○ Demonstrate that there is a suitable location for the new equipment</li> <li>○ Produce schematics for the new system</li> <li>○ Demonstrate that new heating system meets new peak heat demand and quantify estimated annual heat demand</li> </ul> </li> <li>• Heat distribution system modifications required               <ul style="list-style-type: none"> <li>○ Specify and cost any new pipework/heat emitters/controls required</li> <li>○ Demonstrate that these are suitable/compatible for the new heating system</li> <li>○ Outline if any upgrades to electrical infrastructure are required to satisfy new heat technology demand</li> </ul> </li> <li>• Other technologies proposed               <ul style="list-style-type: none"> <li>○ Specify and cost any additional measures recommended from OA</li> </ul> </li> <li>• Planning requirements               <ul style="list-style-type: none"> <li>○ Determine if planning permission/ listed building consent/ building warrant is required</li> <li>○ Where applicable, determine cost of permission(s) and submit pre-application(s) to facilitate discussions with planners</li> </ul> </li> <li>• Grid connection requirements               <ul style="list-style-type: none"> <li>○ Determine if a new grid connection and/or an increase in substation capacity is required</li> <li>○ If necessary, seek budget cost estimate and discuss connection options with DNO</li> </ul> </li> </ul>

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Action Plan	To outline the steps and resource required to implement the chosen project/s	<ul style="list-style-type: none"> <li>• Funding review <ul style="list-style-type: none"> <li>○ Identify possible sources of grant funding, loans and other financing options</li> <li>○ Determine eligibility of each new/upgraded building energy system element in PDS</li> </ul> </li> <li>• Procurement plan <ul style="list-style-type: none"> <li>○ Detail necessary steps and resource required for funding applications, planning permissions, grid connections and tendering from design through to commissioning of new equipment, as necessary</li> </ul> </li> <li>• Governance plan <ul style="list-style-type: none"> <li>○ Detail necessary steps and resource required to ensure that the new/upgraded building energy systems operate as intended (e.g. arranging maintenance, import/export contracts, etc)</li> </ul> </li> <li>• Monitoring plan <ul style="list-style-type: none"> <li>○ Detail necessary steps and resource required for measuring and reporting energy generation, consumption and emissions over the lifetime of the new/upgraded building energy systems</li> <li>○ Detail necessary steps and resource required for identifying, measuring and reporting other qualitative impacts of the project e.g. jobs supported, regional development, etc.</li> </ul> </li> <li>• Dissemination plan <ul style="list-style-type: none"> <li>○ Detail necessary steps and resource required to ensure that the operational performance of the new/upgraded building energy systems and learnings from the implementation process can be captured and shared with relevant stakeholders</li> </ul> </li> <li>• Project Programme <ul style="list-style-type: none"> <li>○ Identify project milestones</li> <li>○ Produce a Gantt Chart detailing the timing of each activity associated with implementing the new/upgraded building energy systems through to commissioning</li> </ul> </li> <li>• Risk register <ul style="list-style-type: none"> <li>○ Determine the risks associated with delivering the project and implementing it over its lifetime (financial, technical, resource etc)</li> <li>○ Produce a risk matrix that details the nature, likelihood and severity of each risk, as well as mitigation measures and their impact on each risk's likelihood and severity</li> </ul> </li> <li>• Review Plan <ul style="list-style-type: none"> <li>○ Create and implement a plan to investigate mid-long term future projects at a defined later stage.</li> <li>○ Review progress of current project to inform future plans.</li> </ul> </li> </ul>
Business Case	To present the financial business case for the project/s, to demonstrate the costs, and long term financial and emissions impacts.	<ul style="list-style-type: none"> <li>• Project costs <ul style="list-style-type: none"> <li>○ Determine the development, capital, operational, and any other delivery costs associated with implementing the new/upgraded building energy systems</li> <li>○ Determine the financial burden associated with each governance task (e.g. maintenance).</li> </ul> </li> <li>• Financial modelling <ul style="list-style-type: none"> <li>○ Produce an unlocked spreadsheet quantifying the financial impact of each element of the new/upgraded building energy systems, for each year of its lifetime</li> <li>○ The above should consider energy and other operational costs/savings vs a Business-as-Usual scenario, payback periods, NPV and IRR for project lifetime</li> <li>○ Calculate the marginal cost of each measure per tonne of carbon dioxide avoided over its lifetime</li> <li>○ Follow Green Book guidance regarding financial assumptions</li> </ul> </li> <li>• Emissions projections <ul style="list-style-type: none"> <li>○ Produce an unlocked spreadsheet quantifying the emissions produced and avoided, compared to a Business-as-Usual scenario, impact of each element of the new/upgraded building energy systems, for each year of its lifetime</li> <li>○ Follow Green Book guidance regarding the carbon intensity of the electricity grid</li> </ul> </li> <li>• Non-financial projections <ul style="list-style-type: none"> <li>○ Produce an unlocked spreadsheet quantifying the non-financial impacts and benefits of each element of the new/ upgraded building energy systems, for each year of its lifetime e.g., jobs supported/created.</li> </ul> </li> </ul>