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Energy Service

Local Authority Low Carbon Heat Grant Learnings

March 2025

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Introduction to Low Carbon Heat Grant

This report presents the key learnings from the Welsh Government Energy Service's Low Carbon Heat Capital Grant (LCHG) scheme. This scheme provides funding for Local Authorities across Wales to accelerate their transition away from burning fossil fuels for space heating and hot water.

The learnings in this report are an update on those set out in a previous report *Public Sector Low Carbon Heat – Technology Introduction & Project Learnings* and have been taken from the experiences of heat pump installations in Round 1 (April 2023) and Round 2 (April 2024). Round 3 applications were granted funding in February 2025.

The funding is available to all local authorities with projects that are ready for implementation. It is intended for capital works associated with retrofitting low carbon heat solutions in non-domestic, local authority-owned buildings.

The objectives of the Low Carbon Heat Capital Grant are to:

- reduce carbon emissions as part of the drive towards achieving net zero
- accelerate the transition away from burning fossil fuels for space heating and hot water
- provide funding for low carbon heat projects, enabling schemes with challenging financial situations
- encourage a whole building approach for low carbon heat
- build capacity and capture learning within the public sector enabling low carbon heat to become business as usual

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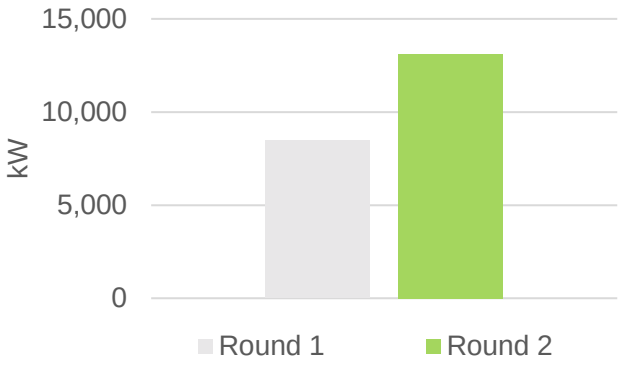
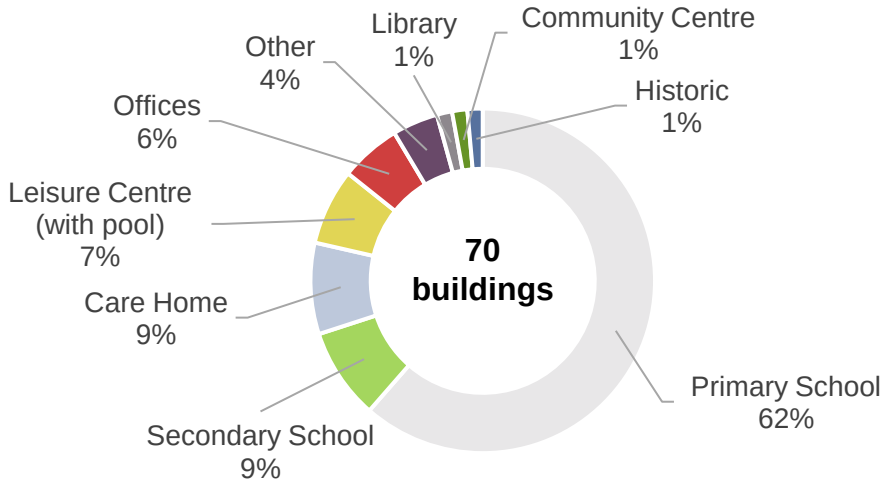
Introduction to Low Carbon Heat Grant

Funding through the Local Authority LCHG has been distributed among 14 Local Authorities, with funding allocated on a financial year basis across three separate rounds. This gives local authorities the support to implement low carbon heat projects as part of their journey towards achieving Net Zero.
This has resulted in 21.6 Megawatts of heat pump capacity being installed in 70 public sector buildings, including primary and secondary schools, leisure centres, care homes, offices, community centres and historic buildings.





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Heat pumps vs gas boilers

Heat pumps are different to traditional heating methods such as natural gas fired boilers. For example:

- Different types of heat pumps are available such as air-source, ground-source, or water-source and the optimal solution will depend on the site and heating needs.
- Heat pumps are more energy efficient but use electricity, which tends to be more expensive per kWh than gas or other fossil fuels, so optimising the heat pump system efficiency is key.
- Heat pumps will increase the electricity consumption of a site but are compatible with renewable technologies such as solar photovoltaic panels which can offset this increase. Additionally, with the continued decarbonisation of the UK electricity grid, any increase in electricity consumption will still greatly reduce heating emissions.
- Heat pumps can make use of existing heat emitters but replacement heat emitters with a larger surface area tend to be a more efficient solution.
- Heat pumps will require wider behavioural change as they operate differently to natural gas boilers, they are not a like-for-like replacement.

“Having a heat pump specialist on the project from the very beginning would be useful to provide valuable expertise, helping the process go smoothly. Our original designs for the low carbon heat solution at each site were reviewed by the heat pump expert, who was able to suggest improvements. For example, he recommended delivering heat throughout the building using air rather than water. This would mean the heat pump can be used to cool the building in the summer, as well as provide heating in the winter”

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Project Lifecycle stages

A typical low carbon heat project can be split into the following lifecycle stages. Each stage is sequential, although some iteration is often required. The general delivery and project approach stage encompasses the full length of the project.

Project delivery (timelines and approach)

Business case & feasibility	Design stage	Fabric upgrades & enabling works	Permissions & procurement	Installation	Commissioning	Ongoing control & monitoring
Scoping the project	RIBA stage design	Plumbing upgrades	Planning permission	Onsite works	Handover to on site team	End user training and support
Size and timescale of project	Heating capacity required	Energy efficiency and fabric upgrade works	Engaging with internal procurement	Considering operational impacts	Set up and commissioning	Connection to BMS & control systems
Developing business case	Technical specifications	DNO upgrades	Contractors and suppliers		Performance testing	Ongoing performance testing
Funding options						

Project timeline

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2. Learnings

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Project Delivery – timelines

Slippage on the project timeline and unforeseen delays can cause knock-on issues on low carbon heating projects. Key learnings on how to overcome these challenges are:

- Incorporate contingency into project timelines, especially for planning applications and procurement processes, as both can be time-consuming.
- If time and budget permit, it's advisable to conduct site surveys in advance to identify potential issues, especially in older buildings.
- Carefully managing contractors and on-site activities can minimise potential operational disruptions.
- Consider any requirements to avoid peak operational times, such as term times, and try to avoid installing in the winter heating season.

"Procurement can take months."

"Our buildings are in a worse condition than previously thought, only revealed by deep surveys…"

"Additional design considerations and surveys required due to river proximity, time for these should be built into the project programme."

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Project Delivery – approach

The key learnings on the project approach are:

- Ensure a holistic method such as Whole Building Approach is adopted in the construction and design process to consider all aspects of a building's lifecycle and functionality.
- Combine low carbon heating projects with other building refurbishment works to minimise overall disruption to users and create economies of scale.
- Engage stakeholders and maintain transparency throughout the project to manage expectations, such as potential disruptions and increases in running costs.
- To maximise the benefits of the technology post-installation, it is essential to train and educate end users on the operation of the systems.

"Roll-out of heat pumps needs to be done as part of a whole building approach…"

"Possible to maintain site comfort levels during the heating season and still deliver a project on scope and on time."

"Having a heat pump specialist on the project from the very beginning would be useful to provide valuable expertise"

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Business case & feasibility – scoping, size and timescales

Preparation is key to ensuring smooth project delivery:

- Understand the existing infrastructure before starting the project. Confirm all essential maintenance requirements before installing the low carbon heat solution.
- Training in-house teams on the efficient use of LCH systems should be included in the project specification.
- Not all buildings are currently suitable for heat pumps, particularly older properties. The required ancillary works, such as grid upgrades, electrical modifications, and additional insulation, can often be the most complex aspects but will improve the comfort and condition of the building regardless of heating upgrades.
- Start with a smaller pilot project to gather insights before scaling up.

“Even a design from a specialist M&E design consultant may be inadequate. We had to involve our maintenance servicing contractor to get the correct information”

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Business case & feasibility – funding

Key learnings on developing a business case and obtaining funding are:

- It is often necessary to fund the design works before knowing the project will go ahead. Engage with budget holders on this and investigate funding options.
- Wider team buy-in, e.g. procurement and senior decision-making staff, is vital to securing both internal and external funding.
- Check what the funding providers cover e.g. design and development, or capital works only.
- Remember to consider enabling, project design and management costs.
- Be sure to look at the lifetime costs of the system, especially if you won't be the end user. This will be critical when building buy-in with the end users, e.g. if it will save money over time, or if bills will increase.
- Look to combine funding from other sources, such as the Wales Funding Programme, Digarbon, Transforming Towns and thematic funds.

"Funding the design element is proving difficult as there are no immediate savings, and the project isn't guaranteed to go ahead until the feasibility is assessed'

"Utility bills may increase due to the additional electricity usage, sometimes costing us more than previous gas usage."

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Design stage

Key design stage learnings are:

- Ensure realistic assessments of the outdoor air temperature are carefully considered during the design stage to avoid over- or under-sizing the system. Minimise design temperatures as much as possible, consider conducting a winter trial beforehand to reduce flow temperatures.
- Designs may need to include the provision of concrete plinths for the air source heat pump and a security enclosure, as some manufacturers recommend specific fencing as a protective zone around the heat pump.
- Ensure the buffer vessel's capacity is enough for it to act as a significant heat store. Fitting a larger buffer vessel could allow it to charge off-peak and/or maximise Coefficient of Performance (CoP).
- When sizing the thermal store, consider both its size and CoP. Ensure it can fit through doorways to reach its final destination.
- Include noise and acoustic modelling, ensure a control approach is considered if relevant, e.g. only one or two compressors working at night.
- It is recommended to develop a mature design such as RIBA stage 3 or 4 before applying for funding.

"There are risks that can be mitigated at the design stage focusing on the location of the units."

"the ancillary works (grid, electrics, additional insulation etc.) are the most complex part… it means that a simple low carbon heating project on any older property requires a lot of modelling, control and effort."

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Fabric upgrades

Fabric upgrades improve the building's energy efficiency, reducing the heat demand, reducing drafts and improving thermal comfort for occupants. Fabric upgrades should be included within the scope of work of low carbon heat projects to reduce the heat demand of the building and, consequentially, the amount of low carbon heat required.

Key learnings on fabric upgrades are:

- Ensure external pipework, valves and brackets are thermally insulated using high-quality materials, such as aluminium-clad 'Stucco' cased rockwool pipe insulation. Additionally, be cautious with pipework clips, as they can create cold bridges between the pipe and the wall.
- Consider if fabric improvements such as dealing with drafty gaps in doors/openings are required and should be included in the contractor’s specification and quote.
- Incorporating fabric works into the project can reduce heating demand, reducing the required system size and operational energy consumption of the heating system.
- Before making any roof insulation upgrades, you may need to conduct a bat survey. If bats are present in the roof, the upgrades may not be feasible.
- All windows should be double glazed as a minimum – replace single glazed windows as part of upgrades for the heating system.

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Enabling works

Enabling works ensure that the onsite infrastructure can support the new heating system and technology. Works may be required to the electrical supply to site, wiring and fuses on site, the pipework and heat emitters and other areas not directly linked to the heat pump.

Key learnings on enabling work are:

- Seek early engagement with the electricity Distribution Network Operator (DNO). Some LCH projects do not need upgrade works as there is enough electrical capacity onsite already. Larger LCH projects may require additional capacity before a LCH system can be installed, so the distribution network will need to be upgraded.
- Consider any other electrical works planned for the whole site, such as solar PV arrays, electric vehicle (EV) charging, kitchen refurbishments / switches to electric cooking when sizing the upgrades needed.
- Additional plant rooms may need to be build or extended, secure enclosures and concrete plinths may be required to ensure safe, flat ground to install the external equipment on.
- Installing or extending solar PV arrays to provide onsite electricity generation may be central to making the low carbon heating project financially viable. Ensure timescales are considered for both elements of the project.

“Plan sufficient time for this step. Network providers are slow and can lead to project delays”

“Bad weather delayed the pouring and setting of concrete, meaning the heat pumps couldn’t be lifted into place”

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Procurement

Key procurement learnings are:

- Engage with your procurement team early to understand the policies and processes you need to follow.
- Consider using existing contractual relationships, such as Re:fit Energy Performance Contracts to design and/or install the low carbon heating systems.
- However, while expertise in designing efficient LCH systems is improving, you may need to look outside current M&E contractors when procuring LCH support.
- The design of heat pump systems can involve multiple preliminary site and building surveys, not all undertaken by heat pump installers, and the actual heating system installation requires contractors working on different disciplines. Consider whether you want to split the procurement of system design from the system installation, and how you will purchase the equipment. A turnkey solution may be appropriate for smaller or more simple sites.

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Planning and permissions

Key learnings related to planning and permissions are:

- Allow suitable time to ensure you have the correct planning permission for the scheme. Many LCH projects will fall under permitted development rules, and do not require planning permission, however, this will require checking with the local planning department.
- Adaptations to the design may be requested by the planning department, such as acoustic enclosures or re-siting external equipment. Factor in time to undertake these before installation begins. Ensure air flow is not impacted by fencing or enclosures.
- Consider the environmental impact of the site and other planning issues such as flood risk and conservation areas.

“Get the planning application in as early as possible - request drawings that are to scale from the designer/ contractor.”

“Current timeframes for planning are typically longer than anticipated. Ideally installs could be made permitted development.”

“The two key things picked up by planning were visual impact and noise.”

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Installation

The key learnings on installation are:

- It is important to think about installation timelines. If installing low carbon heat into a school or college, doing it over summer instead of winter is a good start. Major works can also take place over half terms if needed.
- If the low carbon heat project is part of a wider programme, it can be challenging to factor in timing, e.g if the project is delayed for reasons other than the LCH system, that can still slow the LCH element as well.
- Site security is always important, especially in schools where there is extra risk to young children who may be curious around the site. Take extra care in shutting gates.
- Consider and mitigate for the impact of dust in occupied spaces, sealing off rooms and ventilation where possible. Dust can trigger fire alarms, so care needs to be taken when isolating alarm systems.
- Make sure there is space to clean the pipework, radiators, and behind the heat pumps themselves.

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Commissioning

The key learnings on commissioning are:

- Conduct performance testing and ensure the whole system is working whilst contractors are still on site.
- Use the commissioning stage as an opportunity to promote energy saving measures within the site and engage occupiers.
- Utilise the handover period to equip the occupiers with the information required to manage the technology once you've left the site. Provide guides in an accessible format as well as a detailed, high-tech version. Include clear pictures and explanations which show exactly where in the plant room onsite staff will need to look to troubleshoot minor issues.

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Ongoing control and monitoring

The key learnings on ongoing control and monitoring are:

- Develop a back up plan should heat pumps fail to restart after a power cut to avoid operations having to shut for the day.
- Pay careful attention to heat pump defrost control settings. Manufacturer operating sheets include design outdoor temperatures, however, if the building is closed and the heat pump starts from a cold start, especially in low temperatures and high humidity, there can be persistent icing of the heat pump and cycling of defrost mode, which significantly reduces the heating ability until the system warms up.
- Organise staff members into a maintenance support group to develop internal maintenance expertise, solve minor issues, and ideally mitigate the risk of call-out fees.

“Understand the maintenance responsibilities after you take ownership of the heat pump, and what support is available for you in the handover period and beyond.”

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Unforeseen challenges

The following things were not initially identified but were later identified as needed on LCH projects:

- Asbestos surveys, structural surveys, bat surveys.
- Requiring additional fabric upgrades and enabling works.
- Security enclosure and concrete plinths for air source heat pumps are sometimes suggested by the manufacturer. These can also be a requirement for the planning application to reduce noise and satisfy health and safety requirements.
- Delivery timescales for certain heat pump units may be very long. Consider options from several manufacturers and different unit sizes to improve availability.
- Keeping the site secure may conflict with easy access for contractors, especially if they need to work out of hours. A key holding service may be required.
- Existing heating systems, pipework and radiators may need flushing before connecting to the new heat pump.
- When making any opening through the wall for crossing the pipework from ASHPs to the plant room, it is recommended to install flashing on the edges of the opening to prevent rainwater penetration.

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3. Summary

Summary

The public sector is making good progress, with low carbon heat now being considered at an early stage during regional and local area energy planning, and low carbon heat projects being implemented to replace existing fossil fuel systems.

The key considerations when planning for low carbon heat projects are:

- Whole building approach
- Electrical loading and capacity
- Appropriate sizing of the low carbon heat technology and thermal storage
- Design and planning considerations
- Funding and ongoing running costs
- Procurement routes
- Installation, commissioning and handover programme
- Ongoing measurement and verification

Delivering low carbon heating can be complex. However, despite the challenges, the market is engaged and all stakeholders are gaining learnings and experience as low carbon heat starts to become ‘business as usual’ in Wales.

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Find out more online:

www.llyw.cymru/y-gwasanaeth-ynni-ar-gyfer-grwpiaur-sector-cyhoeddus-grwpiau-cymunedol

www.gov.wales/energy-service-public-sector-and-community-groups

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The Welsh Government Energy Service ("**WGES**") is funded by the Welsh Government with the aim of developing energy efficiency and renewable energy projects that contribute to public sector decarbonisation and national energy targets. The WGES is delivered by the Carbon Trust, Energy Saving Trust and Local Partnerships (the "**Delivery Partners**"). This report (the "**Report**") has been produced by the Delivery Partners and, whilst the views expressed in it are given in good faith based on information available at the date of this Report:- (i) these views do not necessarily reflect the views of the Welsh Government, which accepts no liability for any statement or opinion expressed in the Report; (ii) the Report is intended to provide general guidance only, rather than financial, legal or technical advice for the purposes of any particular project or other matter, and no-one in receipt of the Report should place any reliance on it in substitution for obtaining their own advice from an appropriate third party advisor; and (iii) any person in receipt of this Report should therefore obtain their own financial, legal, technical and/or other relevant professional advice insofar as they require specific guidance on what action (if any) to take, or refrain from taking, in respect of any project, initiative, proposal, involvement with any partnership or other matter to which information contained in the Report may be relevant; and (iv) the Delivery Partners accept no liability in respect of the Report, or for any statement in the Report and/or any error or omission relating to the Report.

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