

Hub Guide 2 – Low Carbon Heat Projects

Introduction

The purpose of this Hub guide is to assist anyone wishing to develop a low carbon heat project. The guide outlines why decarbonising heat (as well as cooling) is important, how to manage heat demand through good building design and operation, the technologies available to establish low carbon heat and how to develop your low carbon heat, or cooling project. A separate Hub guide provides introductory information about heat networks, Hub Guide 1 - Heat Networks.

If you have any further enquiries, please see the Greater South East Energy Hub website www.energyhub.org.uk or contact info@energyhub.org.uk.

Background

Under the Climate Change Act 2008, the Government has committed to the reduction of annual greenhouse gas emissions to net zero by 2050, although recent research by the Intergovernmental Panel on Climate Change (IPCC) has led to some organisations to adopt net zero carbon targets ahead of this date. Decarbonisation of heat is a key part of delivering a low carbon economy.

For both the domestic and services sector, heat purposes include:

- Space heating
- Water heating
- Cooking/catering.

For the industrial sector heat purposes cover:

- Space heating
- High temperature processes
- Low temperature processes
- Drying and separation

In the domestic and services sector, around 75% of energy used for heat is for space heating, with the remaining used for cooking and hot water provision. Gas provides most of this heat. Unlike the domestic and services sector, where most of the energy use is for space heating, 60% of heat energy use in the industrial sector is for high and low temperature processes, with 13% for space heating¹.

¹ BEIS (2019) Energy Consumption in the UK, End uses data tables. All sectors; detailed consumption by fuel and end use by fuel 2018.

Types of Heat Projects

Given the variety of ways that heat is used, this guide outlines four project areas:

- Reducing heat demand
- Using recovered industrial heat
- Heat networks
- Low carbon heating and cooling technologies

Reducing heat demand

Adopting a fabric-first approach, for any building using energy efficiency measures to reduce energy consumption for heating, can be a cost-effective way of cutting cost and carbon emissions. This includes some of the following approaches and techniques:

- Thermal mass construction
- Optimising site orientation, layout and aspect
- Minimising air leakage
- Insulation – walls, roof and floor
- Draught proofing
- Passive heating and cooling
- Improved temperature controls
- High thermal efficiency glazing

Using recovered industrial heat

Industrial heat recovery is a process by which heat generated in or for an industrial process, that otherwise would be wasted, is recovered and used. This waste heat can be used within the same facility for heat or cooling, by another end user (e.g. via a new or existing heat network), or by converting the waste heat to power.

Industrial heat recovery has the potential to realise significant energy bill and carbon savings for industry, through a reduction in primary fuel use. This could help businesses lower their fuel costs, reduce waste heat and cut emissions, as well as provide a lower cost heat source to others.

Heat networks

Heat networks, also known as *district heating*, supply heat from a central source to consumers, via a network of underground pipes carrying hot water. The central heat source is often referred to as the *energy centre*. There are many technologies that can provide the energy centre, which are increasingly from renewable, low carbon fuel sources.

Heat is brought into each building through a Heat Interface Unit (HIU), which is similar in appearance to a conventional boiler. The HIU provides heating control and meters the heat supplied. This allows additional buildings and fuel sources to be added to the network over time.

Low carbon heating and cooling technologies

There are a range of technologies which can be applied, either for new buildings or as a retro-fit solution for space heating and cooling, which could address the impact of a changing climate whilst meeting occupant requirements. Depending on the specific needs and circumstances, one or more of the technologies in combination may be appropriate to your low carbon heat project:

- Biomass
- Heat pumps
- Electric heating using renewable/low carbon electricity
- Heat recovery and waste heat use
- Combined Heat and Power (CHP)
- Geothermal

Trials are also underway that inject biogas or hydrogen into the existing gas network to replace fossil fuel-based gas. These techniques may in the longer term become viable solutions using the existing gas infrastructure.

Available Support

Heat Networks Delivery Unit (HNDU)

The HNDU provides support and guidance to local authorities for heat network project development:

- Advice and guidance - Support is offered through a range of technical, commercial and legal guidance, delivered through the HNDU website, training sessions and other events across the UK. An online information-sharing site has been established which allows local authorities to exchange learning.
- Project development funding support - Since it was established, HNDU has run funding rounds totalling over £19 million.
- Scope of funding - HNDU provides funding, advice and guidance to local authorities through the early stages of heat network development.

- The services provided by HNDU include:
 - Heat mapping
 - Techno-economic feasibility
 - Early commercialisation
 - Energy master planning
 - Detailed project development
- Technical support - HNDU will fund up to 67% of eligible costs of external consultancy costs during these stages.
- Project management support – HNDU will fund 100% of eligible external project management costs.

The current funding Round 9 is open until the 3rd of January 2020. For more information please see the accompanying HNDU [guidance](#) and to request an application form contact hndu@beis.gov.uk.

Heat Networks Investment Project (HNIP)

The HNIP is a significant Government initiative which will invest up to £320 million of capital funding in heat network projects. Key dates for funding Round 3 are:

- Friday 20 September 2019 - Pre-application deadline for funding round 3
- Friday 18 October 2019 - Full application deadline for funding round 3
- November / December 2019 - Investment Committee will convene to award funding

BEIS and Triple Point Heat Networks Investment Management (TP Heat Networks) have jointly published [application guidance](#) and an [application form](#).

The two-stage application process involves a pre-application to ensure that projects applying for funding meet the HNIP eligibility criteria and is followed by a full application to the scheme. Only successful pre-application projects will be eligible to submit a full application – this is to ensure that only high-quality schemes are awarded HNIP funding (which is offered as gap funding through a combination of grants and loans). Given the complex nature of heat networks, it is advisable to seek specialist advice in support of your project.

Industrial Heat Recovery Support Programme

The Industrial Heat Recovery Support (IHRS) programme is designed to encourage and support investment in heat recovery technologies. This means helping businesses of any size to identify and invest in opportunities for recovering and reusing heat that would otherwise be wasted.

Developing Your Heat Project

NOTE: Specialist advice should always be sought from a suitably competent professional.

Each project will be different; however, there are some common features to developing a successful heat project:

1. Understanding the needs – consider heating, cooling and power demands together, since there will be potential suite of options. Each option will have specific design and operational requirements that will need to be factored into the project. Any potential constraints like the presence harmful materials or site restrictions should also be identified as early as possible.
2. Make use of local conditions – the location and situation in which the building(s) is located could help refine the choices available to you. For example, the site topography may favour a certain building aspect for managing solar gain, while the site conditions may allow the use of a water-source heat pump if there is a water body on or near the site. There may be opportunities to share services with, or utilise a source of waste heat from, other nearby sites
3. Establish the counterfactual – technology options should be compared against the current situation, or if a new site, a standard benchmark. This is usually the current Building Regulation standards, using either the current energy source where your project is a refurbishment, or the prevailing energy source available in the locality.
4. Consider the whole life rather than the capital cost only – using the counterfactual will allow you to compare different approaches to heating and may demonstrate that net savings could be achieved with a low carbon heating solution.
5. Think about what other costs and benefits that could accrue – will there be operational costs or savings from a specific technology, what is the long-term fuel supply availability, is the site owner/operator subject to carbon taxation or needing to upgrade to meet energy performance standards.
6. Talk to stakeholders to ascertain whether the needs of future occupants will be met.
7. Identify any need to improve operator/user awareness of the equipment operation to ensure savings are delivered, such as using Building Management System (MS) controls and setting them properly, rather than operating equipment manually. Sub-metering should be considered to improve the monitoring of performance, linking this to the BMS.
8. For projects which may be looking for public sector finance, follow the [HM Treasury Green Book guidance for business cases](#).

9. Use appropriate procurement – depending on the value and nature of the project, there may already be a mature supplier market. Frameworks such as the [Crown Commercial Services HELGA](#) or the [Feed-in Tariffs \(FIT\)](#) scheme or another Purchasing Organisation may be prove cost-effective, while energy technology listings from authoritative sources may prove useful for identifying appropriate equipment.
10. Seek advice from others – visit and speak to a range of people who have been involved in similar projects.
11. Allow time – heat projects can be complex, so factor this into your project programme.

What the Energy Hub Can Offer You

The Energy Hub can help you in the following ways:

- Online and telephone advice
- Access to case studies, briefings and guidance from authoritative sources
- Signposting to other supporting organisations
- Brokerage and stakeholder engagement, project structuring and critical review
- Funding where available, including funding for feasibility studies for communities, Rural Community Energy Fund (RCEF).

Where Else to Go for Help

General	UK Green Buildings Council Chartered Institution of Building Services Engineers Centre for Sustainable Energy Zero Carbon Hub (website only)
Commercial buildings	Carbon Trust
Community heat projects	Community Energy England
Heat networks	Heat Networks Delivery Unit
Waste industrial heat	Industrial Heat Recovery Support Programme
Energy Technology List	Product list



Legal Disclaimer

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