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Heat network evidence to support emerging Exeter Plan policy CC3

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Cover image: Heat network pipework at Monkerton

Management Summary

Emerging concerns about climate change and an appreciation of the potential role heat networks can play in providing low carbon heat have influenced decisions on energy infrastructure in Exeter for the past fifteen years or more.

Exeter's 2012 Core Strategy adopted policy on heat networks supported by evidence available in 2010. The emerging Exeter Plan requires up to date evidence to support its heat network policy.

National policy supports heat networks as a crucial part of how the UK will reach its net-zero targets. Government provides support to heat network delivery through the Green Heat Network Fund and Heat Networks Investment Project. The Energy Bill is introducing a heat network market framework and heat network zoning.

Core Strategy policies have been effective at delivering the City's Monkerton heat network and promoting the development of heat network plans in the city centre and to the south near the Marsh Barton Energy Recovery Facility.

The development of heat networks across Exeter are documented by a robust evidence base, which shows that:

- The policies developed in the 2012 Core Strategy are effective in supporting the development of low carbon heat networks in Exeter.
- Heat networks are practical and viable locally.

By their nature, heat networks require the support of local planning policy to facilitate creating sufficient heat demand and low carbon heat supply to achieve a critical mass for viable development. The intent of the emerging Exeter Local Plan is to follow up the demonstrable success of the 2012 Core Strategy policies with updated policy wording. The evidence supports this intent.

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1 Introduction

Emerging concerns about climate change and an appreciation of the potential role heat networks can play in providing low carbon heat have influenced decisions on energy infrastructure in Exeter for the past fifteen years or more.

Exeter's 2012 Core Strategy¹ adopted policy on heat networks supported by evidence available in 2010. The policy supported the development of the City's Monkerton heat network, which commenced in 2013. The privately funded Monkerton scheme is now in its eighth year of operation with 2,673 homes connected^a. Viable designs for heat networks have also been developed for the city centre and in the Marsh Barton / South West Exeter area although the reluctance of potential participants in these schemes have meant they have yet to be built.

Like its predecessor, the emerging Exeter Plan has a draft heat network policy (see Appendix A). The aim of this report is to document heat network activity in and around Exeter since 2010 and, in so doing, provide a consolidated evidence base for the emerging policy.

2 National policy context

The Government view heat networks as “a crucial part of how the UK will reach its net-zero targets as they are one of the most cost-effective ways of decarbonising heating in built-up areas at a fair price to consumers”. “They will therefore play a key role in achieving net zero. The Climate Change Committee estimated that around 18% of UK heat could come from heat networks by 2050 to support cost-effective delivery of our carbon targets (up from around 2% currently).”²

The Heat and Building Strategy³ supports the acceleration of the low-carbon heat network market through a series of complementary measures. These include the provision of funding through the Green Heat Network Fund and Heat Networks Investment Project to support current market growth and the development of the heat network zoning approach in England as part of a broader Heat Network Transformation Programme. The strategy also commits to investment of £338 million (over 2022/23 to 2024/25) and the development of regulations to drive decarbonisation and deliver better consumer protection, as part of a comprehensive transformation programme for heat networks.

Policy statements on a heat network market framework⁴ and heat network zoning⁵ were published pursuant to The Energy Security Bill. The former describes how The Bill will lay the foundations for the market framework, with delegated powers leading to:

- Regulation of the market, including consumer protections for consumers and carbon emissions limits and technical standards on networks.
- The appointment of a heat networks regulator to enforce regulatory requirements.
- The creation of rights and powers for licensed heat network developers to make constructing and maintaining heat networks easier.
- The introduction of step-in arrangements in the event of heat network insolvency, ensuring consumers continue to receive supply of heat.

Further details on heat network zoning are provided in the December 2023 consultation⁶ and the proposals are summarised in an overview published in January 2024⁷.

^a In September 2023 the Monkerton heat network has 2,673 homes connected of which some 2,100 are in Exeter with the remaining 600 in East Devon. 8 non-domestic properties (in East Devon) are also connected.

The documents propose a Heat Network Zoning Authority within central government which will identify heat network zones within which certain types of buildings and low carbon heat sources can be required to connect to a network within a prescribed timeframe. A national modelling process will identify potential zones in a consistent manner across the country. Local government will act as zoning coordinators and will play an important role in refining the zone boundaries and consider local factors to ensure the best outcome for each zone is identified.

The policies adopted in Exeter in 2012 and proposed in the emerging Exeter Plan (see Appendix A) are in line with the national policy intent.

3 Exeter Core Strategy policy

The 2012 Core Strategy included CP13, a policy on decentralised energy networks. Supporting evidence used to develop the policy included that prepared for the Regional Spatial Strategy, for example the REVision 2020⁸ report, and the local East of Exeter Energy Strategy⁹. The East of Exeter Energy Strategy was particularly influential as it established that site wide heat networks with combined heat and power (CHP) could cost effectively deliver low carbon energy solutions.

The resulting Core Strategy policy is as follows:

CP13: Decentralised Energy Networks will be developed and brought forward. New development (either new build or conversion) with a floorspace of at least 1,000 square metres, or comprising ten or more dwellings, will be required to connect to any existing, or proposed, Decentralised Energy Network in the locality to bring forward low and zero carbon energy supply and distribution. Otherwise, it will be necessary to demonstrate that it would not be viable or feasible to do so. Where this is the case, alternative solutions that would result in the same or better carbon reduction must be explored and implemented, unless it can be demonstrated that they would not be viable or feasible.

4 Evolution of heat networks in and around the Exeter

The concept of heat network development in Exeter emerged from proposals to develop an energy from waste facility at the site of an incinerator at Grace Road in the Marsh Barton area of the City. In 2006 the Exeter Area Energy from Waste Initiative brochure¹⁰ Devon County Council highlighted the opportunity for combined heat and power. EfW developer Cyclerval, published a heat network paper¹¹ showing a pipe route to County Hall and other buildings.

At a similar time, plans for a range of new build housing and non-domestic developments were being developed across the east of Exeter and the west of East Devon; the largest, a 2,900 home new community, was at Cranbrook 3 miles east of Exeter. In 2008 the Exeter and East Devon Growth Point, a collaboration between Exeter City Council and East Devon District Council, commissioned Element Energy to develop an Energy Strategy⁹ for the significant new development planned in the vicinity. The strategy highlighted the potential of site wide heat networks to deliver zero carbon energy solutions concluding that:

“district heating systems are (by a large margin) the least costly means of achieving significant carbon reductions (i.e. above CSH Code 4).”

The Energy Strategy had a number of other important insights including:

“For the great majority of dwellings, the highest code level (level 6 – carbon free homes) can only be achieved with site energy/heating systems.”

“The analysis shows that district heating is a key strategic technology for large developments in the Growth Point, enabling significant CO₂ reductions at lowest cost. A district heating system is not currently planned for the first phase of development at Cranbrook. Early investment in a district heating network will benefit the economics of future phases of Cranbrook.”

“Energy from waste, using advanced technologies could be a strategically important renewable resource. Gate fees from inbound waste make EfW systems economical. Locating an EfW plant adjacent to a significant heat demand will improve plant environmental performance”. “An energy from waste facility in the Growth Point is likely to be economically viable and an important source of low carbon energy”.

“Private wire systems can help improve the economics of CHP/district energy systems and in some sites this enhancement can make an important difference. However, the improvement is not so significant that it should be viewed as an enabling technology, or one with the strategic importance of district heating systems.”

The Energy Strategy led to the development of the Cranbrook heat network by E.ON. Heat provision to the first homes started in 2012 and the Cranbrook energy centre was completed in the same year. Gas combined heat and power now provides heat to over 2,000 homes and private wire electricity to adjacent commercial premises. Plans are in hand to decarbonise the network by connection to an EfW facility at Hill Barton.

Although Cranbrook is not in Exeter, it established the precedent for the delivery of heat networks in private low-density housing in the Exeter area.

In 2011, with the Cranbrook heat network scheme already underway, the Growth Point commissioned the Exeter and East Devon Multi Utility Sustainable Energy Strategy¹². The study supported heat network opportunities across Exeter and East Devon (see Figure 1).



Figure 1: A map of the Exeter and East Devon Growth Point Area from the MUSIS, 2011

4.1 Monkerton and east of Exeter

The success of the heat network at Cranbrook and its proximity to the 2,500 home Monkerton development on the east of Exeter, together with the prospect of further developed immediately adjacent to Monkerton in East Devon on the other side of the M5 (Tithebarn Green) led to the suggestion of a heat network serving both developments. Negotiations with landowners commenced in 2011 with heat network heads of terms signed with E.ON in 2013. Construction commenced in June 2015 with final documentation signed in November commensurate with the start of heat network installation. The first home was connected in April 2016 and the Monkerton heat network currently serves 2,763 homes. The Monkerton heat network was delivered without public sector funding; the Core Strategy policies highlighted in Section 3 were key factors enabling its delivery¹³.

4.2 City centre

Heat network provision to existing buildings across Exeter has been the subject of several studies at varying degrees of detail.

The first, a 2011 study by Cofely/ICE¹⁴, examined the potential for a scheme extending from Paris Street to the Heavitree Road (Heavitree Hospital site and St Luke's University campus). The study concluded that there was a basis for a viable scheme.

Northcroft/Parsons Brinkerhoff undertook a more extensive feasibility study¹⁵ in 2013, which covered the City Centre and South West Exeter as shown in Figure 2.

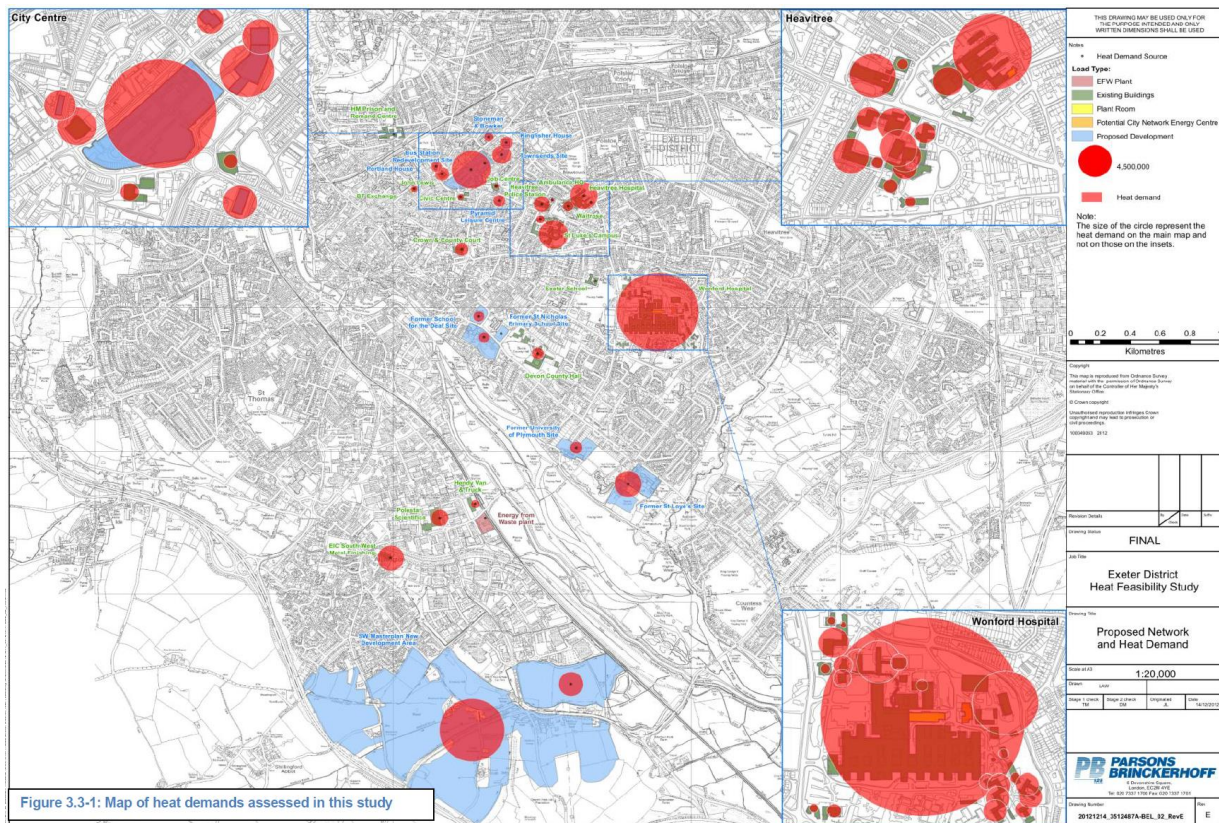


Figure 2: Heat demands considered in the Exeter Energy Network Detailed Feasibility Study, 2013

The 2013 study concluded that retrofit district heating schemes in Exeter could be viable and deliver 11,250 t CO₂e of annual emissions reduction (excluding the additional potential in SW Exeter - see below). The study identified the RD&E hospital site at Wonford as critical to the success of the scheme.

A subsequent study¹⁶ considered the energy centre design at the RD&E Wonford hospital and, in 2017, the 2013 feasibility study was updated¹⁷ to include this design, together with updated overall scheme energy and cost figures, for issue as part of the data room for the proposed procurement of a private sector ESCo Partner to deliver the scheme. The update provided routing information and capital costs for the preferred scheme (shown in Figure 3).

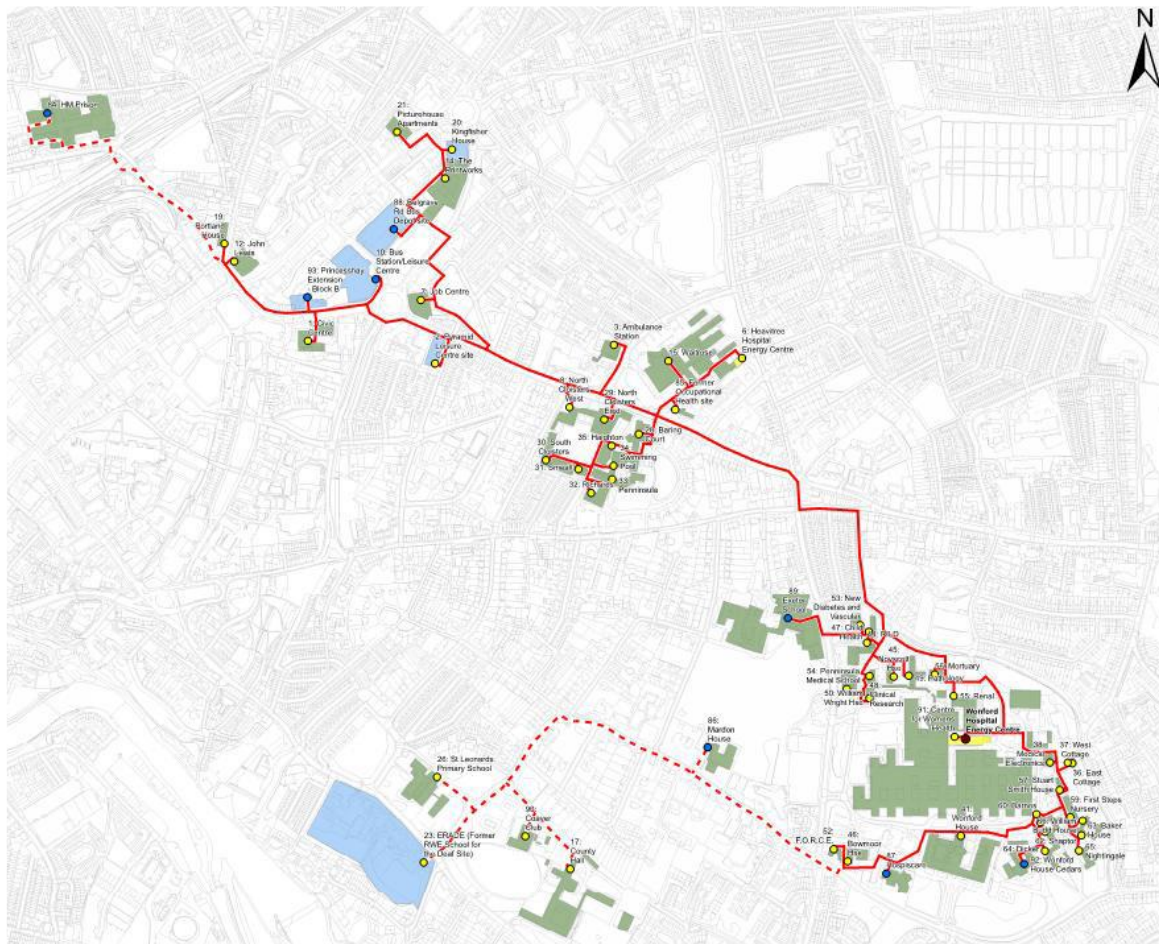


Figure 3: The proposed Wonford and City centre heat network, 2017

The public sector organisations involved with the scheme formed a joint venture company (Dextco Limited) to manage the procurement of a JV ESCO partner to deliver the network. A business case showed that the project was viable and the scheme moved into procurement. However, in 2019, procurement of an ESCO halted due to RD&E concerns over the redevelopment of the Wonford energy centre and its impact on the hospital's energy system. The RD&E subsequently decided to redevelop its energy centre without providing of heat to the city. Nevertheless, public sector organisations across the city, including the RD&E, are actively exploring ways to adopt low carbon heating systems and potential heat networks remain part of their strategies.

Planning policy in Exeter has led to many newer buildings in the city centre being built “district heating ready”, a low regrets requirement that significantly lowering potential cost barriers to heat network installation. Initiatives to develop heat networks in the City Centre continue.

Initiatives to provide heat networks across Exeter continue. In January 2024 it was announced that the Exeter Energy^b network has been awarded more than £42.5 million in Government funding for a heat network using air source heat pumps and the UK's largest high-temperature water source heat pump¹⁸. A project overview^c outlines the scheme and provide plans for an energy centre sited near the Water Lane Solar Park next to Marsh Barton railway station and across the railway line from the Marsh Barton Energy Recovery Facility.

^b <https://exeter.energy/>

^c <https://1energy.uk/wp-content/uploads/2024/08/Exeter-Energy-Network-A2-panels-pr4-HR-compressed.pdf>

4.3 Marsh Barton and South West Exeter

The energy from waste (EfW) plant at Marsh Barton, formally referred to as the Energy Recovery Facility (ERF), is designed as a CHP plant with a steam offtake to facilitate the use of heat use in the vicinity. In 2008 Exeter City Council inserted a clause in the Section 106 Agreement¹⁹ that required the developers make “best endeavours to use and market the energy from the incineration process”. To further support the installation of heat network infrastructure the City Council included conditions in the Section 106 agreement for the commercial development to the south of the ERF at Mafrord Park²⁰.

The 2013 Exeter Energy Network Detailed Feasibility Study concluded that it was unlikely to be financially attractive to transport heat from the ERF north across the railway, flood relief channel and the river Exe toward the city centre. However, the MUSIS identified that the South West Exeter development, which lies about 1 km south of the ERF and has 500 homes in Exeter and 2,000 in adjoining Teignbridge, was a potentially viable site for a heat network. The feasibility study also recommended that a further site-specific study to assess heat use in South West Exeter.

An Initial South West Exeter feasibility assessment²¹ suggested that a heat network with heat provided either the Marsh Barton ERF or a dedicated gas CHP energy centre to be a viable low carbon heating solution for the SW Exeter urban extension delivering significant CO₂ reduction.

A technical assessment in 2015, the South West Exeter DH network and energy centre design study²², established that a heat network serving the SW Exeter and Matford Park development areas with heat from the Marsh Barton EfW facility and top-up supply from a dedicated energy centre to be technically viable. The 2017 Exeter Energy Network Detailed Feasibility Study Refresh²³ incorporated an update examining an alternative energy centre site and a full feasibility update²⁴ followed in 2020. The 2020 update showed that a district heat network serving the developments planned at South West Exeter could achieve a positive internal rate of return (IRR) over 40 years making it eligible to apply for support through the Heat Networks Investment Project.

While Exeter’s Core Strategy had supportive policies for energy standards in new homes and heat networks the policy environment was less ambitious by the time Teignbridge’s local plan was adopted in 2014. Policy SWE1 considered the South West Exeter Development with section h) stating that the allocation include “incorporation of a site wide District Heating system to which all developments will connect, with preference given to using heat from the Marsh Barton Energy from Waste facility, subject to viability.” However, when planning permissions were granted this part of the policy was not enforced and subsequent efforts to encourage the developers to incorporate heat networks were unsuccessful²⁵.

The redevelopment of Marsh Barton as part of the Liveable Exeter project offers further opportunities to develop heat network infrastructure that utilises heat from the ERF. An initial assessment²⁶ of the Water Lane regeneration area in 2020 concluded that a heat network using heat from the Marsh Barton ERF provides a lower carbon solution than the heat pump alternatives and potentially provides the lowest cost solution for developers.

A more recent techno-economic feasibility study assesses low carbon district heating solutions to serve Water Lane (inc. Haven Banks) and Marsh Barton²⁷ in line with the draft allocations in the Exeter Plan and other existing sites in the vicinity.

5 Exeter Plan policy

National and local policy supports the deployment of heat network infrastructure as a method for delivering low carbon new development.

The evidence provided above shows that:

- The policies developed in the 2012 Core Strategy and the emerging Exeter Plan are effective in supporting the development of low carbon heat networks in Exeter.
- Heat networks are practical and viable locally

By their nature, heat networks require the support of local planning policy to facilitate creating sufficient heat demand and low carbon heat supply to achieve a critical mass for viable development.

The intent of the emerging Exeter Local Plan is to follow up the demonstrable success of the Core Strategy policies with updated policy wording. The evidence supports this intent and the proposed policy wording.

Appendix A. Exeter Plan – Consultation draft, climate change, Local energy networks

By considering existing and proposed development, and by working in partnership with developers and other organisations, more decentralised energy networks can be set up that will support the move to a net zero carbon city.

On average, standard centralised power generation (like that which provides power through the grid to most properties) is only 30% efficient, whereas decentralised generation is typically twice as efficient. The greatest efficiencies can be achieved through linking combined heat and power (CHP) plants including energy from waste (EfW) plants, to local energy networks. These provide heat and electricity via a local heat network of pipes and infrastructure which properties can connect to.

There are already heat networks in the city, including at Monkerton, to show how these projects can be provided. The City Council has now identified areas where the scale of development or the heat use opportunities are great enough to justify the planning, design and delivery of heat networks. Policy CC3 identifies the areas where evidence suggests local energy networks are feasible and viable. The policy also requires that new development outside these areas, but in reasonable proximity to a network, be constructed to allow connection (as and when a network is rolled out). Any local energy networks being established adjacent to the City Council's boundary will take account of development proposals outside of the city and be planned and delivered so that a single energy network is provided, where that is appropriate and viable.

CC3: Local energy networks

Local energy networks are proposed in the following locations:

- a. Monkerton and Hill Barton;
- b. The city centre, South Gate, Heavitree Road and Wonford;
- c. Matford, Marsh Barton, Matford, Water Lane and Exe Bridges Retail Park;
- d. Red Cow , New North Road and the University;
- e. South Gate and St Thomas; and,
- f. In other locations across the city where it is shown that it is feasible and viable to bring forward a local energy network.

Within these areas, and throughout the city within 500 metres of any local energy network subject to a contractual commitment, all new development (either new build or conversion) with a floorspace of at least 1,000 square metres, or comprising ten or more dwellings, must be constructed to have heating (water and space) systems compatible with the proposed or existing local energy network and include provision for the necessary pipework from those in-building systems up to the appropriate site boundary to allow for future connection to the network when available, unless it can be demonstrated by the applicant that, having regard to the type of development involved and its design, that this is not feasible or viable..

Elsewhere, any large-scale residential or non-residential development proposal must demonstrate that consideration has been given to whether it is feasible and viable for that development to be connected to any local energy network.

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