Coventry City Council

Briefing note

To: The Business, Economy and Enterprise Scrutiny Board (3)

Date: 5th February 2025

Subject: Heatline District Heating Update

1 Purpose of the Note

1.1 The Business, Economy and Enterprise Scrutiny Board (3) has requested an update to be provided on the current state and efficiency of the Heatline District Heat Network system in Coventry, including its capacity usage, contribution to net zero, and commercial aspects.

1.2 This briefing note provides a summary of the following in relation the existing heat network:

- An Introduction to Heat Networks
- Organisational Arrangements of Heatline
- Commercial Arrangements of Heatline
- Associated Energy Statistics
- Heatline's Alignment with the UK's Net Zero Transition
- Current Growth Potential of Heatline
- Future Heat Network Activity

1.3 Throughout the report, as requested, comparison of Heatline with the wider context of Heat Networks in the UK will be presented where possible. However, due to the lack of published detail around heat networks, these comparisons will be largely qualitative and based on observations or inference from the limited information coming out from the ongoing government consultations on Heat Networks.

2 Recommendations

2.1 The Business, Economy and Enterprise Scrutiny Board (3) are recommended to:

1) Note the information provided about the current status of the Heatline District Heat Network.
2) Note the forthcoming changes to the context of heat networks in this UK.
3) Support the ongoing activity that aims to prepare Coventry City Council for meeting the requirements coming from the Energy Act 2023, evaluate future heat network opportunities and maximise the contribution that heat networks make towards the transition of Coventry towards Net Zero.

3 Background and Information

3.1 An Introduction to Heat Networks

Heat Networks are a type of heating or cooling system that involves a sharing of a hot or cold water to multiple end users or buildings. DESNZ estimates that there are over 14,000 heat networks in the UK supplying over 500,000 customers.

There are two categories of Heat Network: “Communal Heat Networks” and “District Heat Networks”.

District Heat Networks are systems that provide heating, cooling or hot water to multiple buildings. Heatline is an example of a District Heat Network. It is estimated that there are around 2,000 district heat networks in the UK ranging from very small systems that supply two neighbouring buildings (eg. Foxford School) to very large ones that serve entire communities (eg. Stratford in East London)

Communal Heat Networks are systems that provide heating, cooling or hot water to separate premises within a single building. Heatline also supplies heat to a number of Communal Heat Networks (eg. One Friargate). Communal Heat Networks are by far the most common type of heat network with an estimated 12,000 in the UK.

Heat Networks can use any type of fuel or technology to generate the heating, cooling or hot water. In the UK, gas boilers or gas fuelled combined heat and power (CHP) units are the most common form of heat source for heat networks however there is an increasing diversity of technologies being used. Coventry’s Heatline District Network uses the waste heat from the Energy from Waste (EfW) Plant in Whitley as its primary source of heat.

Whilst there are 329 active EfWs reported to be in the UK of which 53 currently process municipal waste, many of them focus purely on generating electricity with the residual heat generated not being recovered and used. Coventry’s EfW is one of the UK’s longest running heat recovery facilities with this year actually marking its 50th Anniversary of providing heat to the city. In 1975 it began supplying heat to the Peugeot manufacturing plant. Nowadays the heat is transported to the city centre via the Heatline Network and used to heat a range of buildings.

In summary, the Coventry EfW disposes of the domestic residual waste (Black Bin Rubbish) via a combustion process and the heat generated is used to generate steam that in turn is used to generate electricity before being condensed back to water by removing heat and returned to the combustion process. The Heatline heat network recovers heat by taking steam out of this cycle either before or after the electricity generation stage and transferring the heat into the heat network circuit. This reduces the amount of heat that is otherwise lost in the condensing part of the waste process. This is further discussed in section 3.3 of this paper.

The Coventry Heatline network currently supplies heat to 9 city centre buildings including 3 Offices, 2 sports facilities, a Museum, a Hotel, the Cathedral and a Student Accommodation Block via its 4km network of underground pipework.

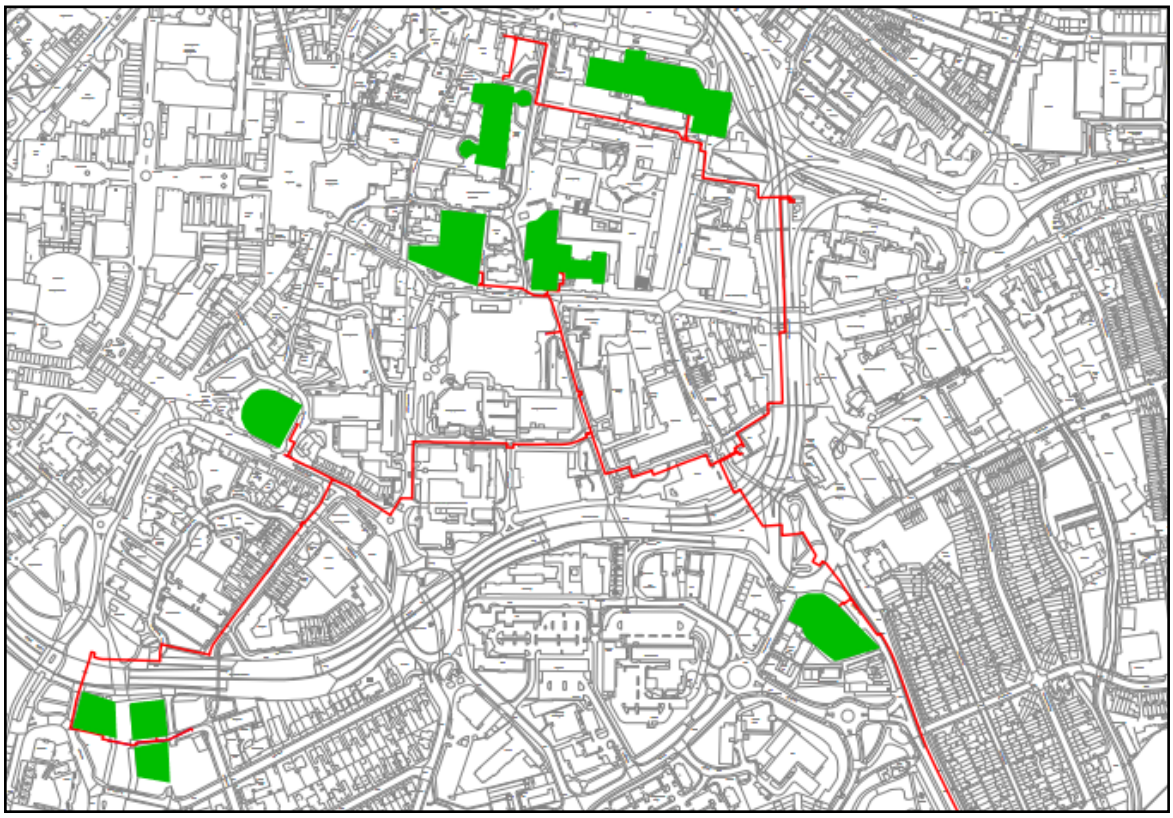

Figure 1 - Current Locations of the Heatline Heat Network and its Customers.

3.2 Organisational and Operational Arrangements of Heatline

The provision of heat via Heatline to customers involves 2 main organisations: Coventry and Solihull Waste Disposal Company (CSWDC) and Coventry District Energy Company (CDEC). Each company has a defined part to play in the heat supply chain as shown in the diagram below.

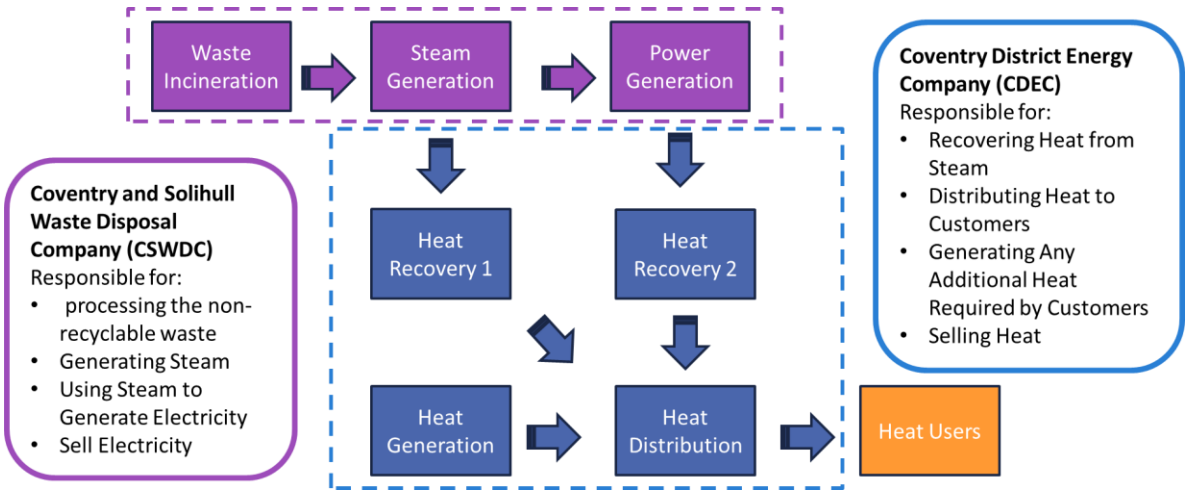

Figure 2 - Summary of the Organisational Responsibilities of CSWDC and CDEC.

Whilst Coventry City Council is the primary shareholder of CSWDC, it does not have shareholder interest in CDEC which was created in 2013 as a subsidiary company of district heating specialist Cofely District Energy for the specific purpose of operating and developing the Heatline heat network under a concession agreement. CDEC leases the network, heat transfer stations and thermal store from Coventry City Council under a concession agreement. Over the past decade there has been a number of changes to the name and ownership of the company ultimately responsible for CDEC. The latest of these changes took place in 2023/24 when Equans Urban

Energy was split out from the wider Bouygues Group and sold to a new investor consortium and rebranded as Bring Energy.

Figure 3 - Summary of the Branding and Organisational Changes behind CDEC.

Bring Energy currently operate heating and cooling networks in the UK serving over 450 business and 12,000 domestic households. The networks they operate are diverse including the East London Energy, which includes a biomass boiler and water-source heat pump, and the geothermal/CHP Southampton Network as well as traditional gas CHP schemes and Coventry's EfW scheme.

Whilst Bring Energy operate nationally, they utilise a regional approach to the management and operation of their networks. The Coventry based Heatline scheme is part of the Midlands Operating Region along with the 3 schemes that are operated under the Birmingham District Energy Company (BDEC) and the 4 schemes that are operated under the Leicester District Energy Company (LDEC). CDEC is the smallest of the 3 Midlands schemes operated by Bring Energy and is the only one that doesn't currently serve domestic customers either directly or indirectly.

There are a further 31 registered district heat networks currently within the WMCA region that are not within the Bring Energy group. These are believed to operate under a wide range of ownership and operating arrangements but publicly available information on this is limited.

3.3 Commercial Arrangements of Heatline

The commercial arrangements between Coventry City Council, CSWDC and CDEC in place to enable the supply of heat via Heatline are complex. There are 3 Heat Network related contracts in place:

- Heat Offtake Agreement – the contract between CSWDC and CDEC for the supply of heat from the EfW to the heat network. This sets out the volume of heat that is to be available to CDEC for onward supply and how much CDEC will pay CSWDC for the heat. As the use of steam for heating potentially reduces CSWDC's ability to generate and sell electricity, the heat price is based on a formula linked to the wholesale market price of power.
- Concession Agreement – the contract between CCC and Bring Energy for the operation of CDEC. This sets out the commercial mechanisms used to define the investment returns for Bring Energy as well as any rebates due to CCC as a result of either CCC investments or residual CDEC profits. The current concession agreement was for 25 years and expires in 2038.
- End User Agreement – the contract between CDEC and each customer for the supply of heat to their building. This sets out the heat tariff each customer

will pay CDEC for the supply of heat. These vary between customers depending on their usage requirements and how their connections were funded. The variety of tariff arrangements means the impact of wholesale market movement on customer bills is not consistent.

The below diagram attempts to summarise the commercial relationships that are in place.

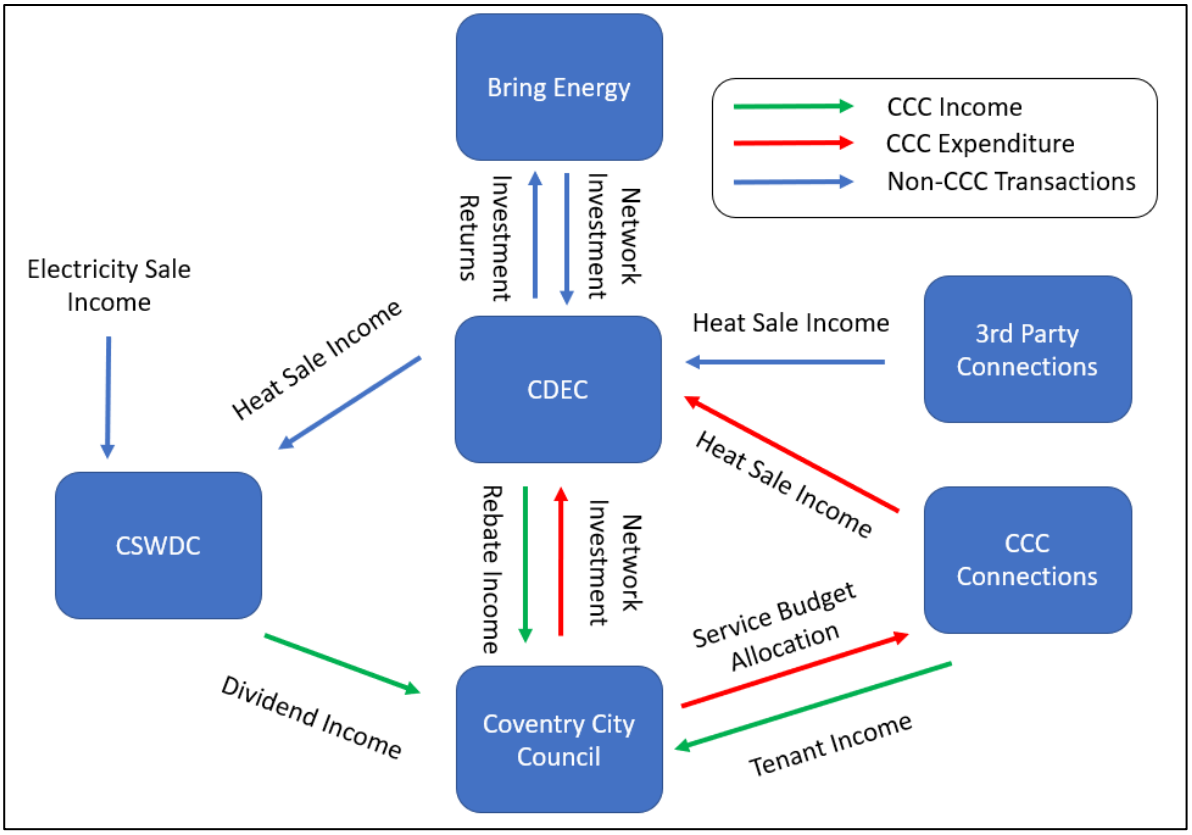

Figure 4 - Summary of the Financial Flows of the Heatline Energy System

It is unknown how the CDEC commercial structure compares with other Heat Network arrangements in the UK, however DESNZ has identified the lack of consistency in contractual approaches as one of the major barriers to Heat Network uptake that needs to be addressed through future regulation.

In the last available financial accounts CDEC reported an annual turnover of £1.4m and a pre-tax profit of £100k, however, the complex nature of the investments required to expand the network and connect new customers means there has been significant variation in reported annual profits over the first decade of the scheme. The latest asset value of the Heatline network was reported as £4.9m.

To date there has not been consistent enough profit within CDEC to generate rebate payments to CCC. However, CCC has received £98k to date as a result of a 50% share of the CDEC income generated from Renewable Energy Certificates (ROCs) sold by CSWDC. These ROCs are made possible by the recovery of heat by the network although the quantity and value each year is volatile. The ROC income provides a contribution to the operating costs of CCC's Energy Management team enabling it to be the point of contact within CCC for supporting the day-to-day activities of CDEC and other heat networks agendas.

A high-level comparison of the annual accounts published by the 3 midlands-based District Energy Companies operated by Bring Energy provides indication of the significant difference in scale of the more established BDEC and LDEC schemes.

Heat Network Scheme	2022 Turnover (£k)	2022 Pre-Tax Profit (£k)
Birmingham (BDEC)	13,918	292
Coventry (CDEC)	1,416	100
Leicester (LDEC)	12,241	202

Table 1 - Comparison of Turnover and Pre-tax Profit of the Bring Energy Heat Networks in the Midlands.

3.4 Associated Energy Statistics

In order to understand the energy related aspects of the Heatline heat network it is important to follow the energy flows all the way from the EfW through to the various end users. Unlike an energy centre that runs on electricity or gas, the highly variable composition of municipal non-recyclable waste makes it very difficult to predict the total amount of energy that is contained within it and therefore available for recovery. The energy quantities shown in this report are therefore only indicative based on typical energy content of such a feed stock and the typical annual throughput of around 290,000 tonnes of waste.

As the diagram below demonstrates the vast majority (83%) of energy recovered from the EfW is typically used for power generation. Approximately 14GWh (2%) of the recovered energy from the waste treatment process is currently used by CDEC to provide heat to customers. In a usual year, 99% of the heat delivered to CDEC customers is generated from the recovered heat at the EfW. A small amount of gas is currently used to cover routine or emergency maintenance activity at the EfW.

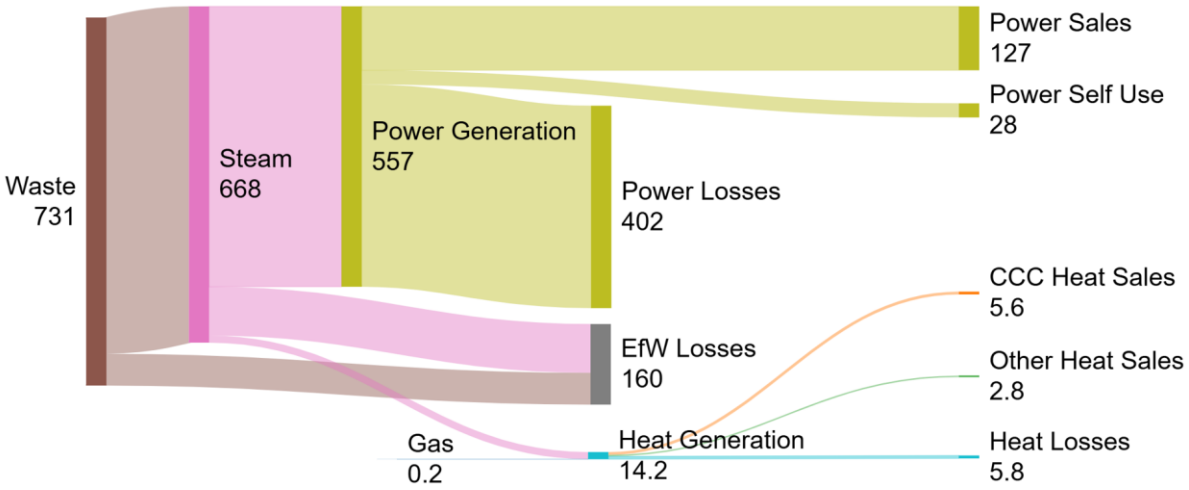

Figure 5 - Typical Energy Flows (in GWh/yr) of the Current Heatline Energy System

Coventry City Council is currently the largest customer for CDEC accounting for approximately 2/3 of the total heat sales. The council's heat consumption has varied in recent years following energy efficiency improvements in Council House, the transfer of operations from the Civic Centres and Coventry Sports Centre to One Friargate and the Wave and, most recently, the opening of Two Friargate.

There is not a straightforward way to compare the actual cost of the use of district heating with alternative heating technologies such as gas boilers or air source heat pumps (ASHP) as there are many differing variables and is dependent on the specific building being considered. However, the following high-level average comparisons can be made drawing from the Council's heat usage across its estate:

District Heating sites typically have a higher utility bill spend compared to gas heated sites but have lower emissions and lower maintenance costs associated with the heating equipment. Heat network installation costs are typically much higher than gas heating systems and are dependent on the distance from existing infrastructure.

District Heating sites typically have a lower utility bill spend compared to ASHP heated sites due to the current cost of electricity and also lower emissions and maintenance costs associated with the heating equipment. Heat network installation costs can be either higher or lower than ASHP installation depending on the distance from existing infrastructure and the availability of power connections at a site.

Currently the energy use of Heatline is limited by the annual demand of its connected customers. The existing infrastructure in place is estimated to enable up to 184 GWh of heat to be generated by the EfW. The 14.2 GWh/yr consumption currently used represents only a 7% utilisation rate of the existing heat network capacity. Expansion of the customer base to its maximum potential would enable more heat to be recovered from the EfW. The below diagram shows what the energy flows would look like if this was achievable. This would be result in approximately 27% of the total energy recovered by the EfW being used for heating.

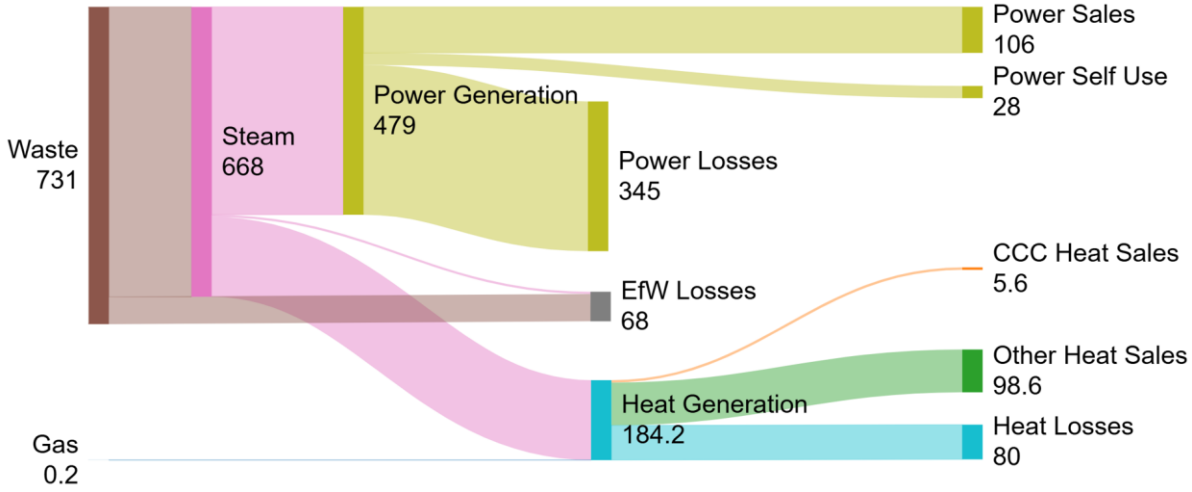

Figure 6 - Potential Energy Flows (in GWh/yr) for a Future Heatline Energy System Utilising Full EfW Capacity.

However, as the heat generated from the EfW is uniform across the year but the demand of most customers is skewed towards the winter, either significant thermal storage or additional peak heat generating plant would be required to make the most of the EfW plant heat recovery opportunity. Without additional peak heating plant the maximum utilisation would continue to be limited by the maximum winter demand of the customers connected. Currently gas boilers are the primary type of peaking plant used in the Heat Network Industry, therefore, a rapid expansion of the number of heat network customers would likely see increases in the amount of fossil fuels used in the short term. This therefore requires a balance to be struck in relation to the speed of new connections being brought forward and ambitions around the carbon intensity of the heat network. This is further explored in the following section.

3.5 Heatline's Alignment with the UK's Net Zero Transition

The decision to create Heatline was largely driven by its potential to provide low carbon heat to the city centre buildings. One of the primary benefits of heat networks is that there are no local emissions at the point at which the heat is being used. For dense urban environments it can therefore contribute to improved air quality. As a result of Heatline, 9 large buildings within the city centre are not reliant of gas boilers for normal operation. In 2023, this equated to an avoidance of 1,985 tCO2 being emitted in the city centre.

The other key benefit of heat networks is that they open up the opportunity for a more diverse range of heat sources to be used to generate the heat being supplied. The viability of different technologies can improve with the increased scale of collective heat demand. In particular it creates the opportunity to capture and use waste heat.

This increased diversity however also results in greater complexity in determining the appropriate level of emissions to report against the heat supplied via a heat network.

There are of course still emissions related to the use of Heatline. In the UK, there has been a constantly shifting opinion around how carbon emissions associated with heat networks should be calculated. Currently the accepted approach in the UK is based on the primary purpose of the activity that generates the heat. For example, in a gas CHP led scheme the emissions are clearly attributable to the energy generation as the gas is burnt for no other purpose but to generate energy. In the case of waste heat recovery, the emissions generated are for a different primary purpose that is not energy generation and therefore only additional emissions that are as a result of the heat recovery process are attributable the energy being supplied.

The use of municipal waste or biomass in the process adds even greater levels of complexity as the Green House Gas protocol states the emissions resulting from energy recovery from waste should not be attributed to the waste disposal process. As CDEC currently uses the EfW as its primary heat source for heatline, this is particularly relevant to Coventry.

The primary purpose for the EfW is the disposal of around 290,000 tonnes of non-recyclable waste annually. The only alternative would be to send this waste to landfill and it is estimated that in landfill it would generate emissions equivalent to 144 to 174 ktCO2. This would also need significant land availability as the waste currently processed by the EfW is enough to approximately fill the CBS Arena each year.

The combustion of the waste will also release emissions as the carbon content of the waste is turned into carbon dioxide. The actual emissions released will depend on what is in the waste and depending on the type of waste this can be either similar or higher than the emissions that would have resulted from landfill. Metals and plastics are the key example of waste types that will emit more emissions if put through combustion and is the basis for prioritising their separation from the residual waste.

There are, however, additional benefits of energy generation and reduced land use that would not be associated with landfill. Therefore, there are multiple outputs that these emissions can be allocated to and a decision is needed as to how much carbon is reported against each one.

Land use emissions are the most complex to determine and therefore it is usually excluded from the process. Historically, as UK power generation had a significant carbon intensity, emissions were allocated to the power generation output resulting in EfW being presented as both a low carbon waste and energy solution. With the rapid decline in the carbon intensity of the UK electricity generation, focus is now shifting from power generation to heat supply.

To allow for consistency in reporting CDEC uses UK carbon factors for steam generated by EfW as published in SAP10 and the published UK GHG conversion factors for grid supplied electricity and natural gas to calculate the operational carbon intensity of Heatline each year. The current carbon intensity for heat consumed via Heatline is therefore reported as 0.045 $kgCO_2/kWh$. This would equate to total carbon emissions from 2023 Heatline consumption to be 440 tCO2. This is 78% lower than the equivalent emissions from the use of gas boilers.

It is currently not possible to compare the carbon intensity of Heatline with other heat networks in the UK as the data is not published. This is something that DESNZ aims to address as part of the regulation of Heat Networks due to commence in 2025. The ability of heat networks to delivery lower cost transition to Net Zero has led to DESNZ adopting a target of growing heat network use from 3% of national heat demand to more than 20% as part of the UK strategy to reach Net Zero by 2050. Recent

consultations indicate an ambition for UK heat networks to have a maximum carbon intensity limit enforced by 2030. The most stringent limit being considered is 0.044 kgCO2/kWh, therefore the current Heatline network is in alignment with the ambitions of the UK Net Zero strategy. Depending on the final emissions limit adopted by DESNZ, there will be differing scope for utilising traditional peaking plant to support expansion of the number of customers in the short term.

In the UK the use of energy from waste facilities are considered a Recovery process in the waste hierarchy, and as shown below should be focused on Residual Waste only. However, in 2008 revision of the criteria required to achieve the R1 status needed for new facilities to be considered Recovery instead of Disposal. The calorific value of the waste plays a significant role in the R1 calculation. With the increased successful removal of recyclable waste such as paper and carboard from the residual waste, it has become increasingly difficult for EfWs from achieving R1 status on power generation alone. For Coventry's EfW, it would need approximately a 7-fold increase in the heat recovered via Heatline for it to achieve R1 status. Should there be a desire for CSWDC to obtain R1 status, this could therefore be a further driver for growing the Heatline network.

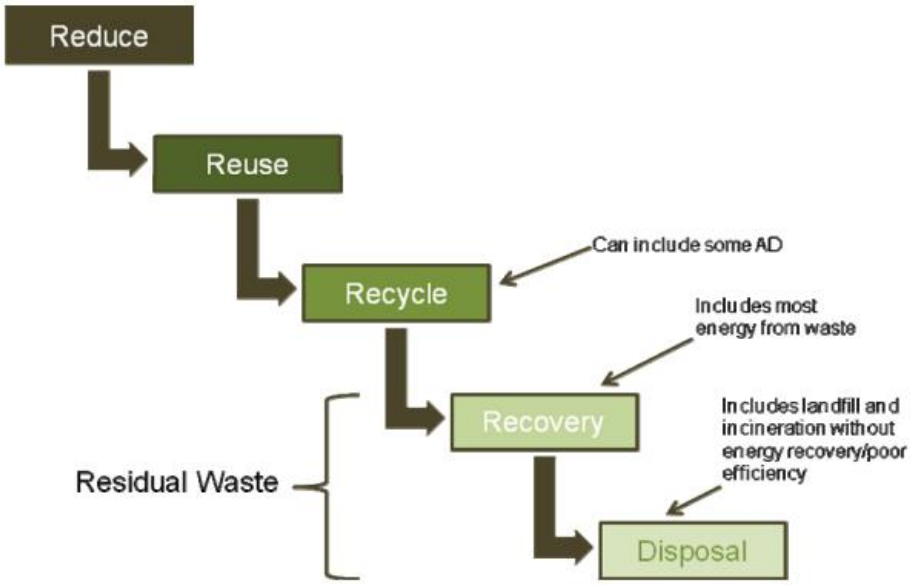

Figure 7 - Energy from Waste and the Waste Hierarchy.

A significant benefit of heat network adoption is that it could make the transition to net zero easier and more financially viable. Rather than every building owner having to directly decarbonise the heating systems of their properties, it transfers the responsibility to the heat network operator. This amalgamation of responsibility potentially improves the financial case for investment in more costly low carbon heat generation that would otherwise be too costly at an individual property level.

3.6 Current Growth Potential of Heatline

As mentioned in 3.4, Heatline is currently significantly underutilised. Whilst recent connections to the newly constructed Two Friargate and Hotel Indigo have helped to grow demand on the network, expansion of the network is likely to be driven through a resurgence of retrofit connections to existing buildings.

The launch of the Public Sector Decarbonisation Scheme has helped public sector organisations consider major capital replacement schemes that replace aging gas heating systems with low carbon alternatives. Coventry City Council supported Coventry University with their successful bid for PSDS grant funding that has enabled

them to retrofit 11 of their city centre buildings onto the Heatline Network. This will result in a major expansion of the network, more than doubling the number of connections and extending the network towards other potential future connections. Coventry City Council is currently assessing the viability of using PSDS for a second phase of public sector connections on the outskirts of Hillfields whilst the Courts and Tribunal Service has recently applied for PSDS funding to connect the two courts buildings in the city centre.

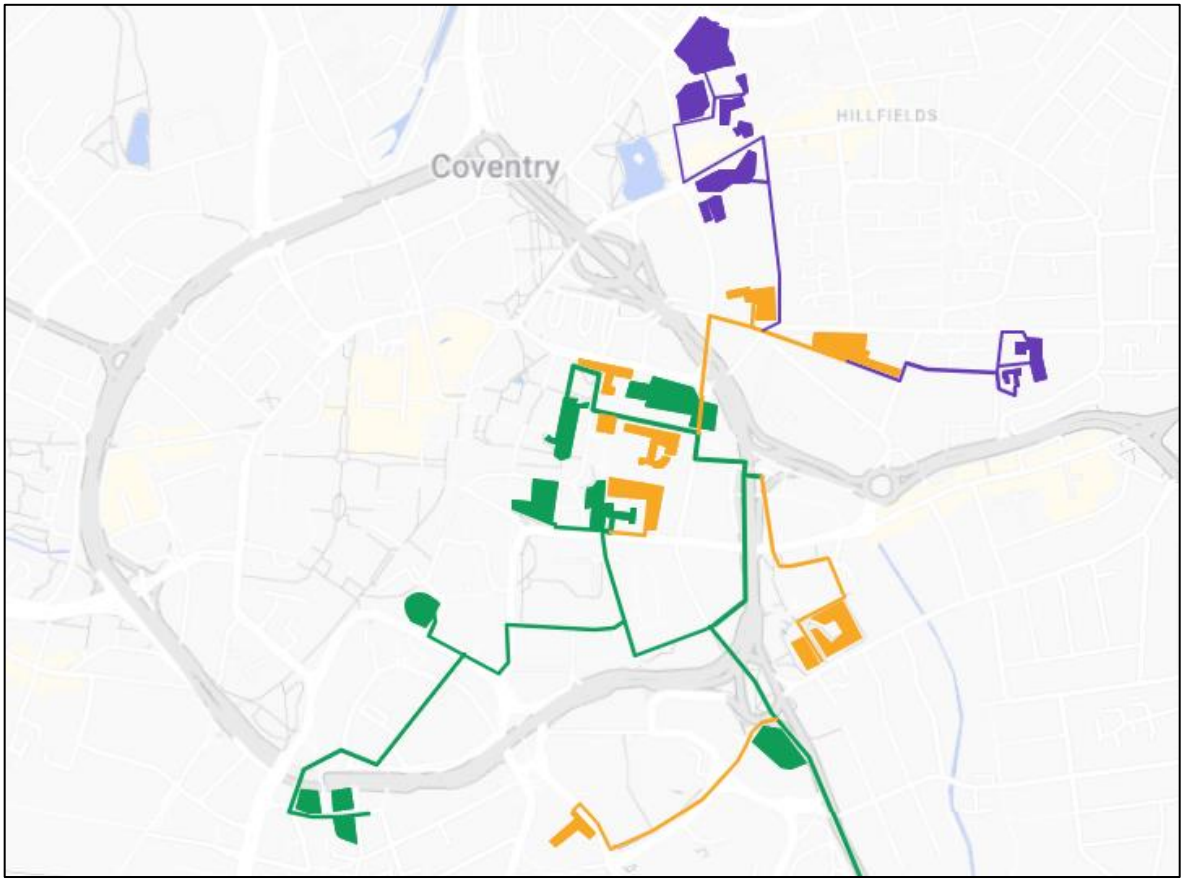

Figure 8 - Location Map of Existing (Green), Confirmed Phase 1 Expansion Sites (Orange), and Potential Phase 2 Expansion Sites (Purple).

Aside from the public sector led expansion, the recent adoption of Net Zero Targets of many city stakeholders has seen a renewed interest in the potential for Heatline to be a lower carbon alternative for heating provision. Bring Energy are actively engaging with a number of stakeholders located in the city centre. CCC has supported these discussions where possible including taking prospective customers around our existing connections to demonstrate what a retrofit heat network solution involves. As mentioned previously, the ability to connect new customers to the networks may also be impacted by the ability for Bring Energy to introduce additional low carbon peaking plant to the network.

The final driver for expansion is the forthcoming Heat Network Zoning that DESNZ is currently consulting on. The proposed legislation will see the creation of Zoning Coordinators with the new statutory function of designating geographic areas as Heat Network Zones and procuring Heat Zone Developers to build out and manage the heat networks in those zones. Within these zones, there will be mandatory requirements for certain buildings to connect to the heat network when requested.

Coventry was selected, along with Birmingham, by DESNZ to be part of the Heat Network Zoning Pilot and subsequent Advanced Zoning Programme. These programmes have been used by DESNZ to support the development of the new legislation and prepare a number of regions to be ready for early adoption after the

legislation comes into effect. This has given CCC early insight into the potential impact of the new legislation on the city. The below map shows the areas of the city that were identified by DEZNZ as potential Heat Network Zone opportunity areas that was published in September 2024.

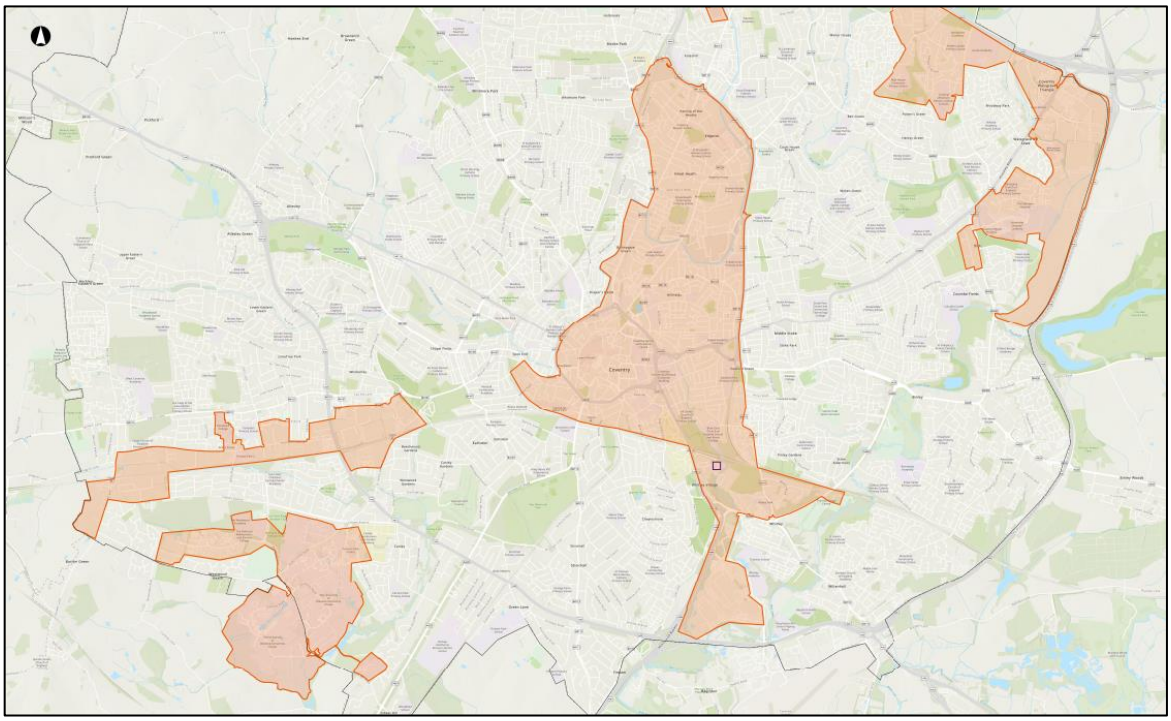

Figure 9 - DESNZ Map Showing Potential Opportunity Areas from Heat Network Zoning.

3.7 Future Heat Network Activity

As mentioned above, the forthcoming Heat Network Regulations are going to bring significant changes to the heat network sector. These regulations will introduce a raft of new requirements on existing heat network operators, any new entrants to the market and also many building owners not currently familiar with heat networks. The new legislation can broadly be split into 3 main areas of focus:

- Consumer Protection and Billing Standards
- Technical Standards
- Heat Network Zoning

Whilst all of these will be relevant to Heatline, the first two areas will be largely down to Bring Energy to address, while the area of most relevance to Coventry City Council is the Heat Network Zoning part of the regulations. DESNZ is set to create a new Central Authority to oversee the initial stages of zoning, however, it is anticipated that DESNZ will appoint Local Authorities as the Zoning Coordinators under the legislation. This will introduce new statutory duties from Zone Identification & Designation to Enforcement & Appeals (shown in Blue in figure below). Coventry City Council is therefore currently working on a number of different workstreams to help prepare for the new legislation.

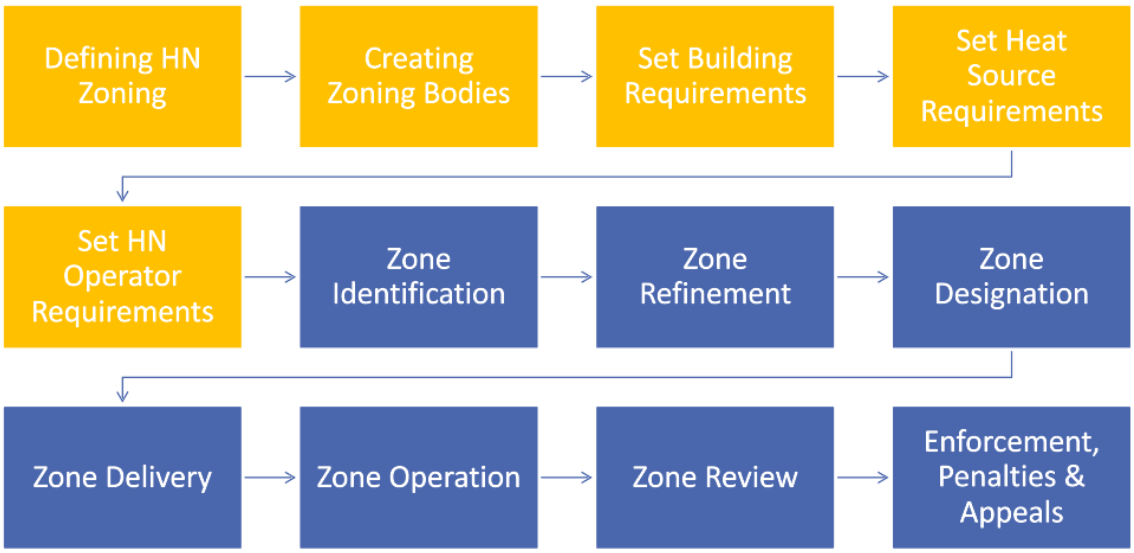

Figure 10 - Summary of Provisional Heat Network Zoning Tasks to be Undertaken by Central Authority (Yellow) and Zoning Coordinators (Blue).

As a participant of the Advanced Zoning Programme, CCC has been able to secure support from DESNZ appointed consultants to undertake the following works associated with the preparation for Heat Network Zoning:

- **Initial Stakeholder Engagement** – Consultant support to undertake initial engagement with the major stakeholders in the city that are likely to be impacted by within the 4 Strategic Heat Zoning Opportunity areas identified by DESNZ. The aim is to identify the level of their awareness of Heat Network Zoning and to gather insight on potential barriers or opportunities that can feed into the development of Coventry's draft Zoning Strategy. Due to time limitations this work will initially focus on key stakeholders with large estates in the city such as University of Warwick, Citizen Housing and UHCW. Further engagement with other organisations will be added if time allows.
- **Heat Network Vision Development** – Consultant support to begin drawing together the requirements of the legislation and the feedback from stakeholders to produce a draft Vision Document that can be used for wider engagement on the topic both internally and with external organisations develop Coventry's draft Zoning Strategy.
- **Heat Network Technical Feasibility Study** – Consultant support to evaluate a zonal approach on a part of Coventry in more detail to help provide an evidence base for defining the Zone Refinement and Designation part of the zoning process. This study will focus on Hillfields to enable it to support the wider Net Zero Neighbourhood agenda currently underway however the outputs may be able to inform plans for other areas of the city.
- **Low Carbon Energy Centre Feasibility Study** – Consultant support to evaluate the potential for creating a low carbon energy centre to support the wider heat network zoning agenda. This study will look to identify a potential plot within the city that could host a low carbon energy centre and evaluate the heat generation options available and potential investment requirements for development. This will help to inform the viability of developing heat network zones that don't have existing heat energy centres.

In addition to the DESNZ funded workstreams, CCC is also participating with WMCA's Heat Coordination Group that is focused on facilitating collaboration between the WMCA constituent authorities. This group helps to share experience and learning on heat networks between the west midlands based local authorities.

4 Health Inequalities Impact

4.1 The operation of Heatline has a positive impact on the air quality in the city centre as it avoids the combustion of fuels in a dense urban environment and provides a potential route to net zero for properties that are not suited or viable to have their own emission free heating system. Whilst at present the primary heat source does have associated emissions, the expansion of Heatline opens up the opportunity for a more diverse range of heat sources to be adopted. In the event that the energy from waste plant is no longer part of Coventry's waste management strategy other low carbon energy generation can be used to maintain supply to customers.

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