Codema
Dublin's Energy Agency

# Drogheda District Heating Feasibility Study

## Waste to Energy Plant Heat Recovery

External summary document

comhairle chontae na mí
meath county council

Comhairle Contae Lú
Louth County Council

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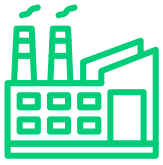
Dublin's Energy Agency

# Drogheda District Heating Feasibility Study: Scenario One

## Executive summary

A town-wide district heating network could reuse heat from a local **Waste to Energy (WtE) Plant** to heat buildings across Drogheda. In theory, the scheme is **technically and financially viable** over the long term and has the highest decarbonisation potential of all scenarios assessed.

In practice, however, the project's **scale and complexity** mean it cannot be delivered in a single phase and faces **significant infrastructure and delivery challenges**. The network would need to be built in phases, starting small and expanding over time.



**Industrial waste heat (Waste to Energy Plant) is the most suitable option, using heat from the Waste to Energy plant.**

**Switching to district heating would reduce emissions equivalent to removing 2,800 diesel cars from the road each year.**

## Viability

The success of any initial phase depends on securing a **sufficient concentration of large heat users** in close proximity to the Waste to Energy plant.

While sufficient heat demand is not currently present, it could emerge through future strategic development. At present, this is the main challenge for this scenario.

# Introduction to district heating

District heating is an innovative and efficient way to supply heat to buildings from a centralised source. Instead of each building using its own boiler or heat pump, a network of insulated underground pipes distributes hot water or steam from a central plant to multiple buildings.

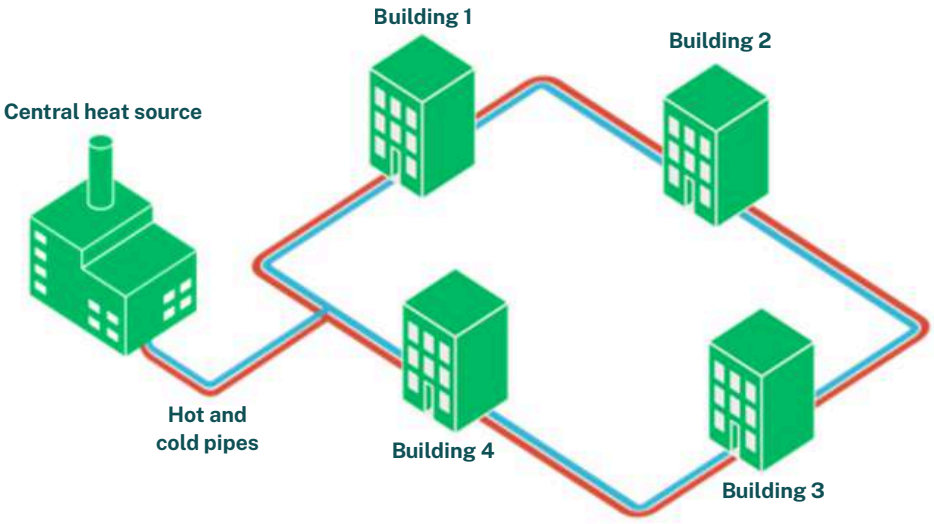



**Figure 1: District heating diagram**

## Key advantages of district heating

**Flexibility**: District heating can use heat from many different sources. It can combine various renewable and low-carbon heat sources, including biomass, geothermal and waste heat from industrial processes or data centres.

**Environment and climate**: District heating is a vital tool in reducing greenhouse gas emissions and enhancing local air quality.

**Legislation**: District heating also aligns with local, national and EU-level climate goals; the European Union recognises district heating and cooling as critical components of its Energy Efficiency and Renewable Energy directives, while the Heat (Networks and Miscellaneous Provisions) Bill 2024 is in development to provide a legislative and regulatory plan for the district heating sector in Ireland.

## Other benefits of district heating


## What makes district heating feasible?

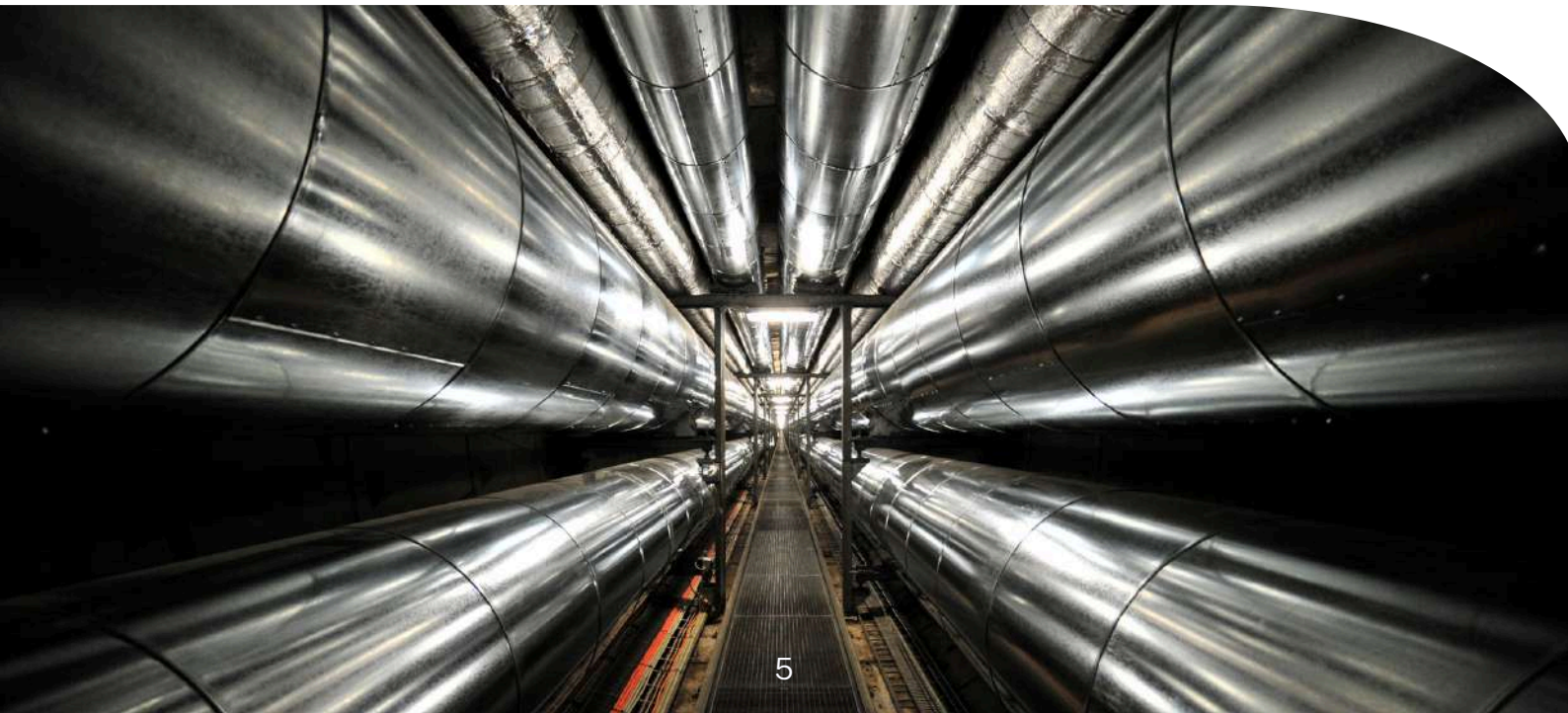
District heating is most effective in areas with **high building density**, where many heat users can be connected within a local network. In low-density or dispersed communities, the cost of laying extensive pipework relative to the heat demand makes the system less economically-viable. These areas are often better suited to individual, low-carbon solutions, such as heat pumps, which require less infrastructure and can be tailored to single-building needs.

### High-density areas

District heating is effective in areas of high building density where mutliple users can connect to a local network.

### Low-density areas

Low-density and dispersed communities are better suited to individual, low-carbon solutions such as heat pumps.



## Rolling out district heating in Ireland

While district heating offers many environmental and efficiency advantages, it is a relatively new concept in Ireland and its use has been limited for a number of reasons. It requires **strategic, long-term planning and coordination** across local authorities, developers and utility providers. The initial infrastructure investments (such as underground insulated pipe networks and centralised energy hubs) are substantial but they lay the foundation for a clean, scalable heating solution.

Success also relies on connecting a sufficient number of users to achieve **optimal performance and cost-effectiveness**. In areas where heat demand is spread out or where shared heating systems weren't planned before, rollout may take longer. However, as policy, public awareness and technical experience grows, **district heating is well-positioned to become a central part of Ireland's low-carbon energy transition**.

## Examples of district heating in Ireland

Although district heating is still in its early stages in Ireland, progress has been made. The **Tallaght District Heating Scheme**[1], developed by South Dublin County Council in close partnership with Codema, Dublin's Energy Agency, became operational in 2023 and is Ireland's first large-scale district heating network. It captures waste heat from an Amazon Web Services data centre and supplies South Dublin County Council buildings, a number of Technological University Dublin's Tallaght campus buildings and local, cost-rental apartments. The network is set to expand even further in future phases.

The **Dublin District Heating System**[2] is also being developed to use waste heat from the Dublin Waste-to-Energy Plant in Poolbeg to supply homes, businesses and public buildings in the surrounding area. Several other heat network developers and local authorities are actively developing schemes and feasibility studies for district heating networks, with the goal of rolling out sustainable heating solutions in their regions.

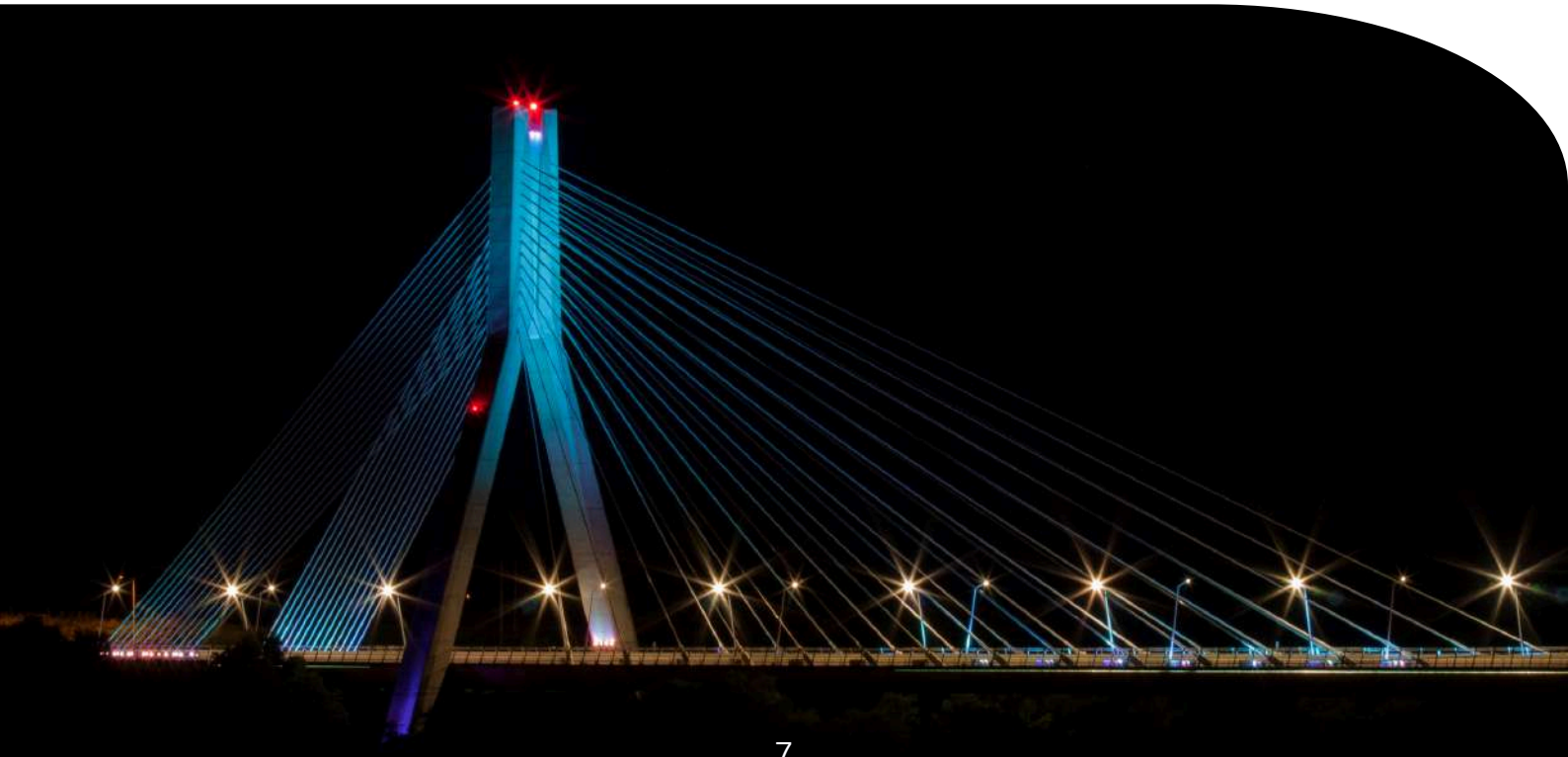
There are also district heating projects being spearheaded outside of Dublin. One example is the **Galway District Heating Project**[3], being developed by HeatGrid Ireland. Currently progressing through planning applications with Galway City Council, the project plans to deliver heat to a mix of public sector, commercial, industrial and residential buildings across the city. The network will primarily use renewable electricity to generate low-carbon heat, displacing fossil fuel use in individual buildings and supporting decarbonisation goals.

Image: Tallaght District Heating Scheme

# The potential for district heating in Drogheda

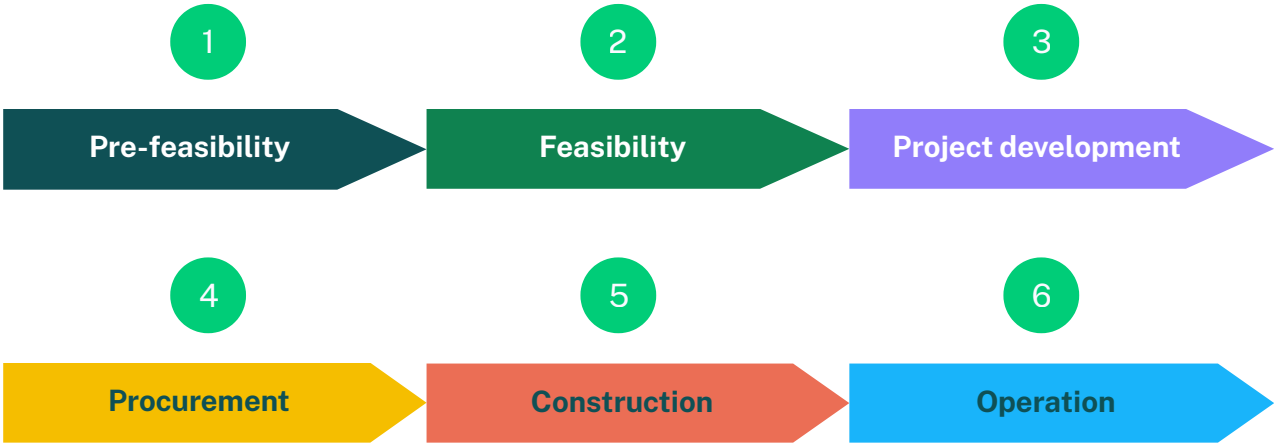
Drogheda is suitable for district heating because it has a large and concentrated demand for heat within a compact, urban area. The town includes major public buildings such as a hospital, schools and civic buildings, alongside commercial premises, industry and housing. This mix creates steady, year-round heat demand and allows future growth to be planned using shared, low-carbon heat infrastructure rather than relying on individual fossil fuel boilers or heat pumps.

Drogheda is also well placed from a local policy perspective. Louth County Council identifies district heating as a relevant solution within its Climate Action Plan[4], including actions to raise awareness of district heating opportunities. While not explicitly named in the Louth County Development Plan[5], district heating directly supports objectives requiring the integration of climate change mitigation measures into future development. Both Meath and Louth County Councils have committed to a 51% reduction in energy-related greenhouse gas emissions and district heating aligns with their priorities on energy efficiency, emissions reduction and climate resilience. The Drogheda Joint Local Area Plan[6] also highlights the need to support a low-carbon transition and improve quality of life, both of which can be supported by reusing heat from the nearby Waste to Energy Plant (WtE) through a phased district heating scheme.



## District heating development process

The development of a district heating system typically follows a structured process, beginning with a **conceptual exploration and pre-feasibility stage**, progressing through detailed **feasibility assessment** and ultimately leading to **design, financing, procurement and implementation**.




## Current study

The current study for Drogheda represents the **feasibility stage** of this process and follows on from an initial pre-feasibility assessment carried out by Codema in June 2024. The pre-feasibility study involved high-level mapping and stakeholder identification.

The feasibility study aims to assess whether a district heating scheme is technically, financially and environmentally viable within the town. This includes:

- A **heat demand analysis** to identify suitable heat sources and map potential demand
- A **route analysis** to evaluate network routes
- A **financial assessment** to estimate capital and operational costs.

This study follows the SEAI's district heating feasibility study how-to guide as a standardised approach.[7]

While several scenarios and heat sources were explored, two scenarios were developed further for detailed analysis. The first relates to the use of waste heat from the Waste to Energy Plant and the second relates to a Thermal Source Network (TSN) that would connect a data centre in central Drogheda directly to Our Lady of Lourdes Hospital only. A separate summary brochure has been developed for the TSN scenario.

The study provides a solid evidence base to inform decision-makers, helping them determine whether to proceed to the next stages - namely detailed design, stakeholder engagement, business planning and ultimately, infrastructure development.

## Heat demand analysis

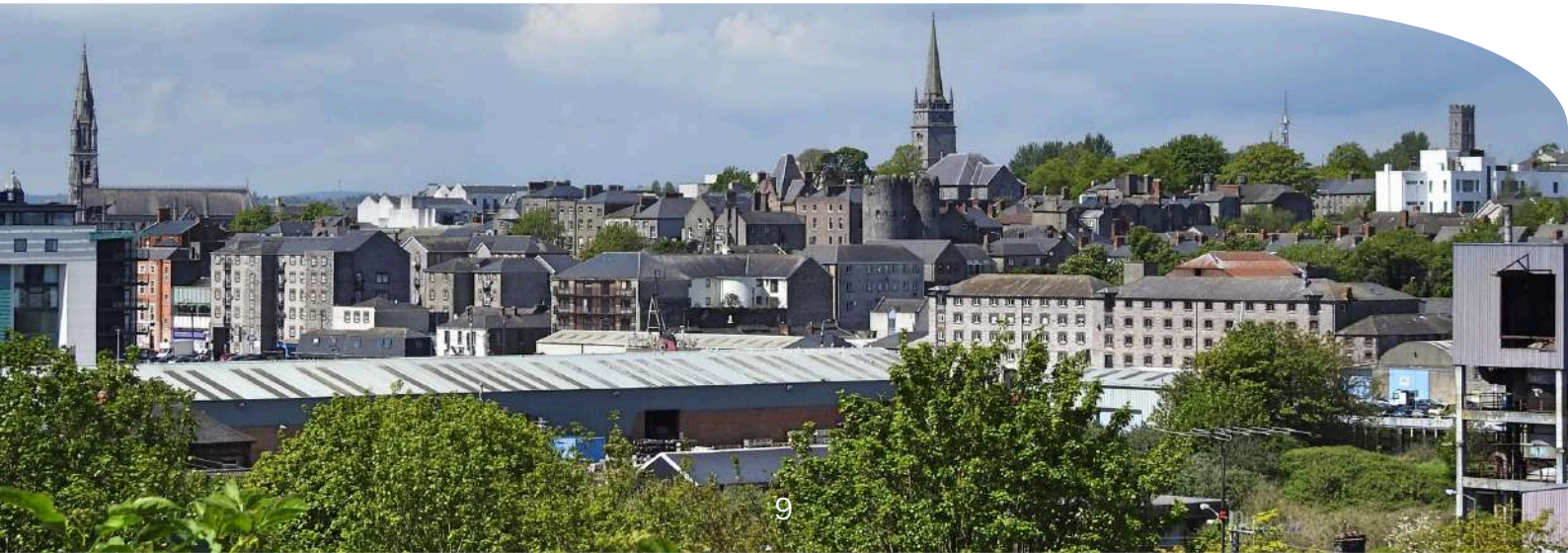
The heat demand analysis examined how much heat is used across Drogheda, where this demand is located and which buildings could realistically connect to a district heating network. Drogheda includes a wide range of heat users such as hospitals, public buildings, commercial premises, industry and housing. However, demand is unevenly distributed across the town. Some areas have clusters of large heat users, while others are more spread out. This affects how viable different parts of the network are, particularly in the early stages, as district heating works best where high heat demand is concentrated.

Buildings with large demands could offer a strong, steady “base load”, which improves the operation of the network. These buildings are also known as “anchor loads”, due to how central they are to the running of the network. In the Drogheda scenario, the main identified anchor load is Our Lady of Lourdes Hospital, which is located in the north of the town. By contrast, heat demand in the south is less dense, making the initial phase more challenging. For this reason, the study concludes that a phased rollout is essential, with early engagement focused on securing large public and private sector heat users to support a viable starting phase and enable future expansion.

### Anchor load

Buildings with large heat demands that can offer a strong, steady demand on the network. These buildings are considered crucial to the running of the network.

The feasibility study also highlights that this scenario carries higher delivery risk because of its size and its reliance on a small number of very large heat users. While a phased approach is recommended to reduce risk, this is difficult in practice because the only clearly identified anchor load is Our Lady of Lourdes Hospital in the north of the town. A southern starter phase scenario was modelled but it does not have enough nearby heat demand to stand up as a viable first phase on its own. The study shows that this could change if additional large heat users along the southern route, such as major industrial, leisure or commercial sites, were secured. Bringing these users together would significantly strengthen the business case for a phased rollout and would make a southern Phase 1 more realistic, underlining the importance of early and targeted engagement with potential large heat customers.



## Route analysis

The route analysis examined how a district heating network could physically pass through Drogheda and connect the heat source to key buildings. Because the Waste to Energy Plant (WtE) is located in the south of the town and the largest anchor load is in the north, the proposed routes are long and complex. They would need to pass through built-up urban areas, cross the River Boyne and move through the historic town centre. These factors increase construction cost, disruption and delivery risk compared to smaller or more compact schemes.

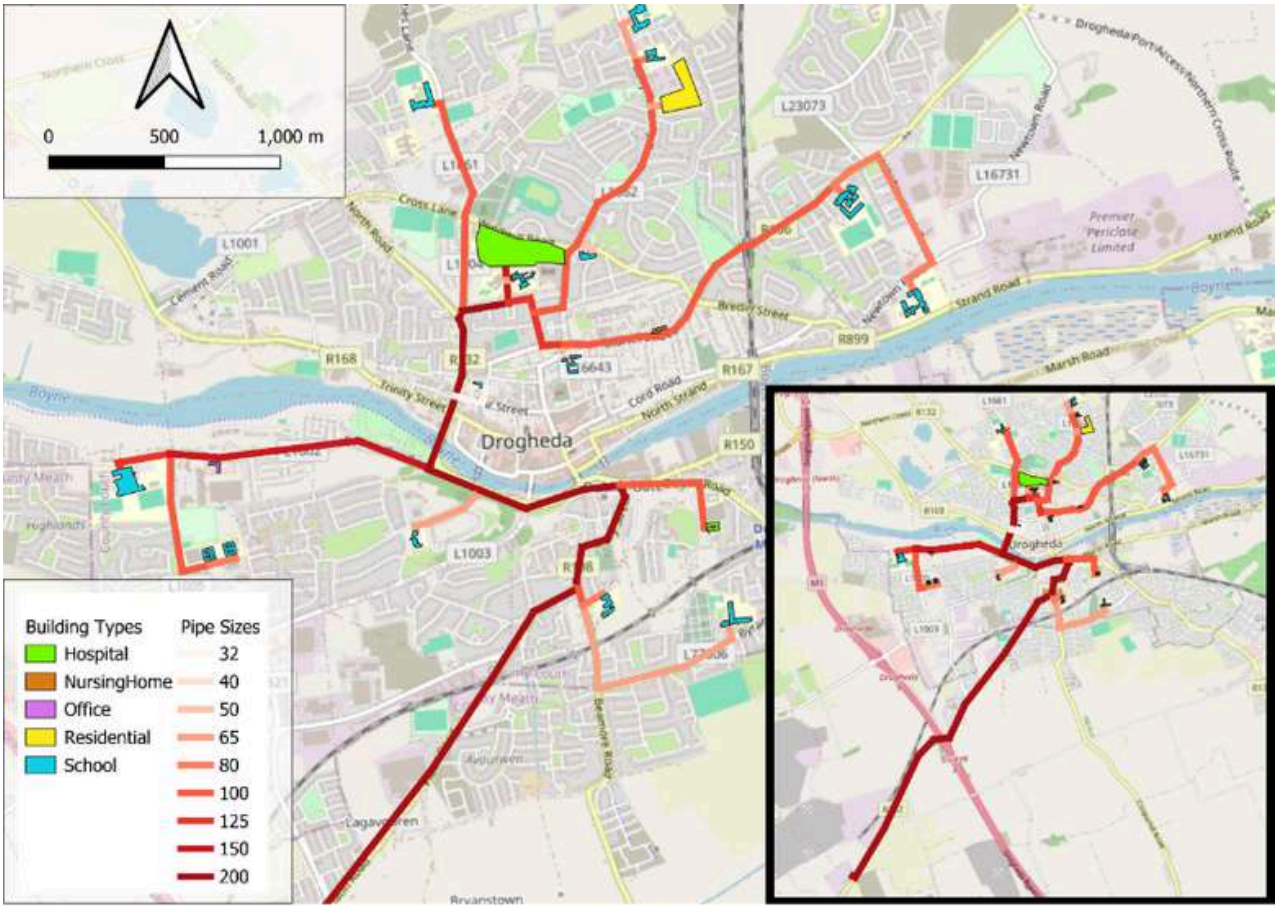



**Figure 2: Route mapping**

A major constraint identified is the archaeological sensitivity of central Drogheda. Much of the town centre lies within areas of high archaeological potential, which means additional surveys, monitoring and possible delays during construction. This makes routing through the centre particularly challenging, especially for an early phase of the network. For this reason, the study concludes that routes closer to the WtE plant in the south are lower risk for initial development, while routes extending northwards would be more suitable for later phases once the network is established and confidence in delivery has increased.

## Heat source analysis

Codema assessed several potential heat sources that could supply a district heating network in Drogheda. These options were shortlisted based on technical suitability, availability, scale and alignment with long term decarbonisation goals. The assessment focused on heat sources that could provide reliable, low-carbon heat at a scale large enough to support a town-wide network, either from day one or as part of a phased rollout.

### Heat sources assessed

**Data centre waste heat**

Using waste heat generated by cooling processes in data centres to provide heat

**Wastewater heat recovery**

Using heat generated by operations at wastewater treatment plants

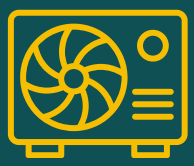
**Industrial waste heat**

Using heat generated by industrial activities that would otherwise be lost

**Shallow geothermal**

Using heat from up to 400m below the earth's surface

**Air-source heat pump**



Taking heat from the air outside and using electricity to raise the temperature

**Biomass**

Using animal or plant matter to create energy for heating

## Preferred heat source

Among all options, the industrial waste heat (Waste to Energy Plant) option stood out as a very suitable heat source for Drogheda because it can provide a large, reliable and continuous supply of heat at a scale that matches the ambition of a town-wide district heating network. The heat is already being produced as a byproduct of normal operations and is available throughout the year, which makes it well-suited to meeting both everyday heat demand and peak winter demand without relying on multiple smaller or uncertain sources.

# Financial analysis

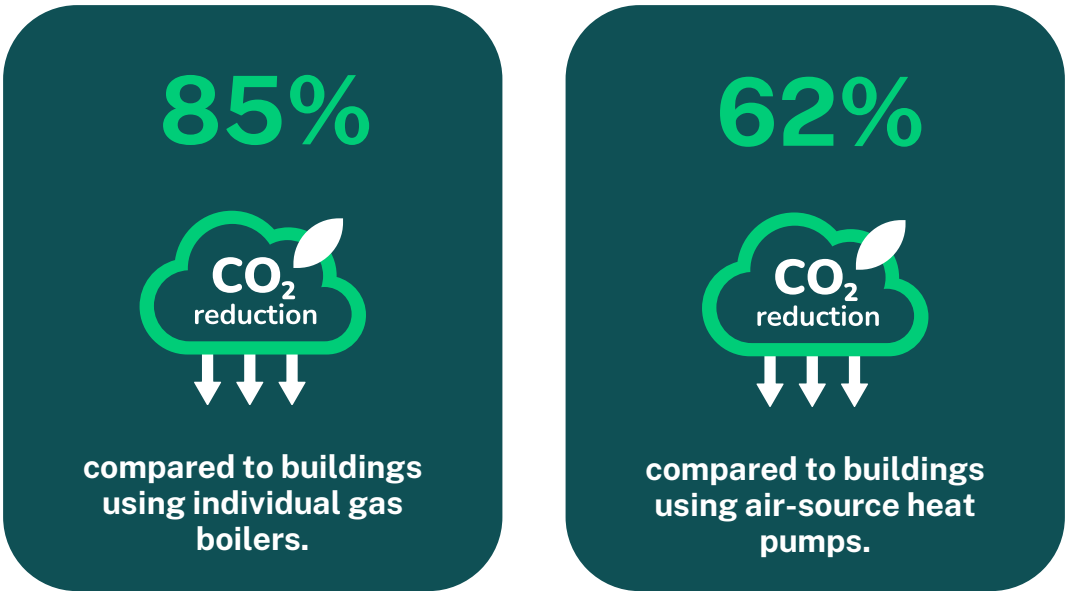
The project requires a total capital investment (CAPEX) of €33.7 million. This investment includes all infrastructure, construction and integration of customer connections.

- **Total CAPEX**: Approximately €33.7 million, (+/- 20%, including contingency costs)
- **Payback period:** 25 years

These figures show that with targeted support, grant funding from the Infrastructure, Climate and Nature Fund and strong stakeholder engagement, the project can be financially-viable over its lifetime. However, an Internal Rate of Return (IRR) of 4.5% means it is unlikely to be attractive to purely private investors. In addition, the scale of the scheme and the absence of a clearly-viable standalone first phase increase delivery risk if the network were to be pursued unphased. The project is therefore better suited to delivery as a public or publicly-supported infrastructure scheme, with a strong focus on reducing risk through phasing and on securing additional large heat users to make an initial Phase 1 feasible and to enable longer-term network expansion.

# Energy and emissions savings

By replacing traditional, fossil-fuel based heating systems with an energy-efficient and low-carbon district heating network, the scheme achieves substantial reductions in greenhouse gas emissions. Carbon emissions are reduced by approximately 85% compared to buildings using individual gas boilers and by 62% compared to those using air-source heat pumps.




District heating brings together multiple heat demands within a single, shared system, enabling far higher overall efficiency. Much like a single high-capacity train engine is more energy-efficient than many individual car engines travelling the same route, a centralised heat network delivers efficiency gains even after accounting for distribution losses. This proposed district heating network would reduce energy consumption by **6 GWh a year** and could reduce emissions by **up to 2,300 tonnes of $CO_2$ every year**.

This is the equivalent of **taking 2,800 diesel cars off of the road each year**. As more renewable energy is integrated into the national electricity grid, the carbon intensity of district heating will continue to decrease, making it an increasingly low-carbon heat solution over time. This positions the project as a cornerstone of local climate mitigation efforts, delivering measurable and lasting environmental impact.

The proposed network would save 2,300 tonnes of $CO_2$, the equivalent of taking **2,800 diesel cars** off of the road.

# Key considerations

Within this study, Codema identified several important factors that could influence the project's success:

## Phasing is essential

- The scale and complexity of the scheme mean it **cannot realistically be delivered in a single phase**. A **phased approach is required** to reduce cost, risk and disruption.

## A viable Phase 1 is critical

- The **absence of a self-sustaining first phase** is a major challenge. **Additional, large heat users are needed**, particularly in the south of the town, to make an initial phase feasible.

## Anchor loads drive success

- **Large buildings with steady heat demand** are central to the business case. **Securing these early** is key to improving financial performance and operational stability.

## Route and heritage constraints increase risk

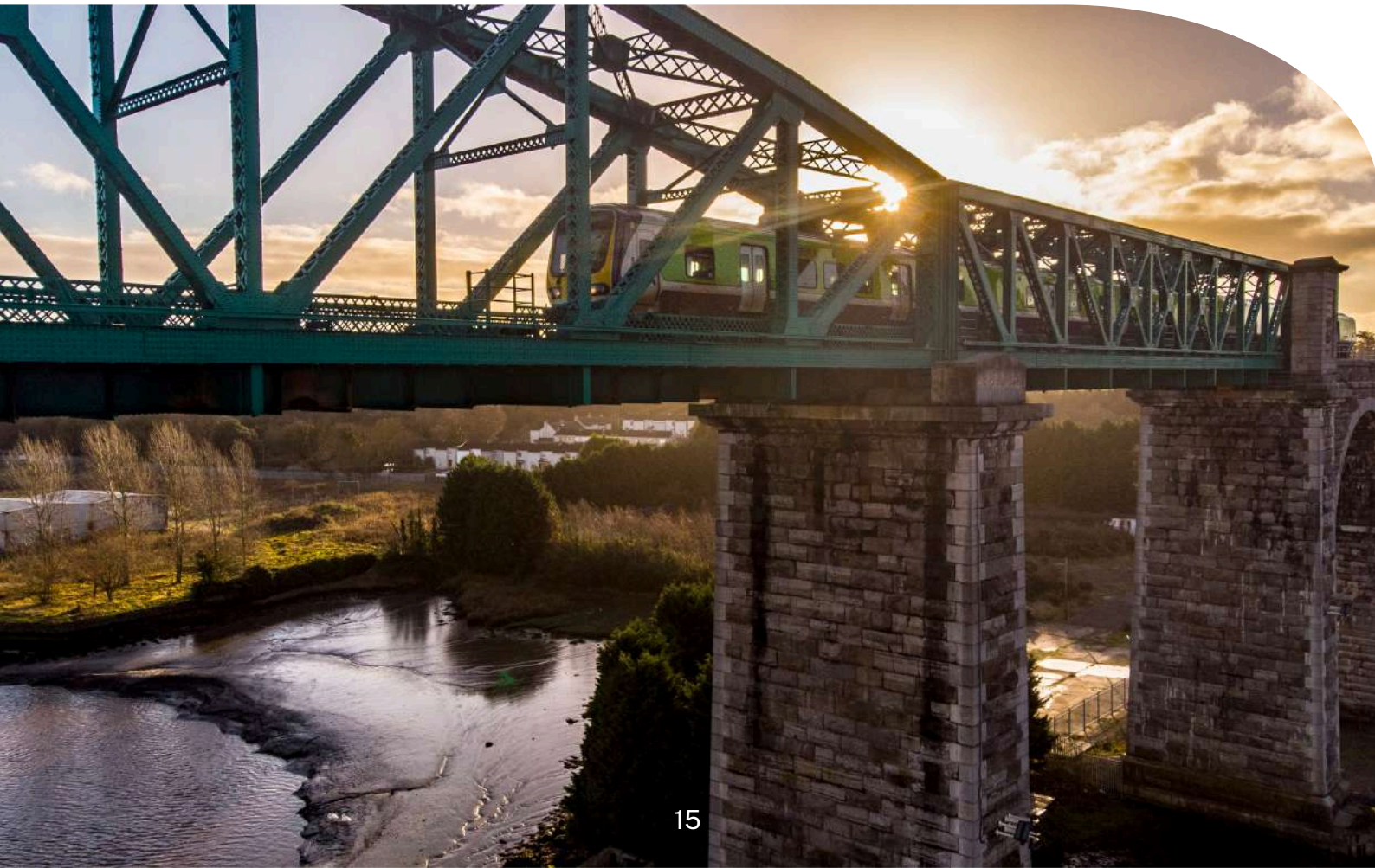
- **Long network routes**, the need to cross the **River Boyne**, and **archaeological sensitivity** in the town centre add **complexity, time and delivery risk**, particularly in early phases.

## Public sector leadership is required

- Given the **long payback period** and moderate financial returns, the scheme is **better suited to public or publicly-supported delivery**, aligned with long-term climate and energy objectives.

# Why district heating for Drogheda?

This option was selected because the **Waste to Energy Plant**, as a key source of industrial waste heat, can provide a **large, reliable and continuous supply of low-carbon heat** that matches the scale and long-term ambition of a district heating network in Drogheda. The heat is already being produced and does not depend on future development, which reduces supply risk. While the scheme carries delivery challenges due to its size and the need for effective phasing, securing additional anchor loads would allow a viable first phase to be developed and support future expansion. This approach also aligns with **local climate action objectives** set by Louth County Council and Meath County Council, which promote low-carbon heat solutions and the integration of climate mitigation measures into urban development, making this **a strong strategic fit for Drogheda's long-term energy transition**.



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