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CARLOW COUNTY COUNCIL

District Heating Pre-Feasibility Study – Carlow County Council Position Paper

21st May 2026

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District Heating Introduction

Carlow County Council have been awarded funding for a District Heating Feasibility Study because of their partnership with SEAI in the SEAI Pathfinder Programme and their engagement with the SEAI Centre of Excellence for District Heating.

According to Carlow's Climate Action Plan, Carlow County Council believe there is "potential for the further integration of climate action and spatial planning across the policy areas of land use and transportation policy, energy efficiency, renewable energy sources and infrastructure (and) district heating...".

District heating is specifically mentioned as an action under Pillar 5 Sustainability & Resource Management, Action SRM1.10:

"Carry out a feasibility study to identify the logistical, financial, planning, environmental and market challenges of a proposed district heating project in Carlow, ensuring the study has appropriate regard to planning and environmental protection considerations."

There is also an action to complete a geothermal feasibility study in an specific area of Carlow designated the Carlow Decarbonisation Zone (DZ). This Action DZ1.3 states:

"Carry out a geothermal feasibility study in Carlow Town to determine the technical, financial, planning and environmental viability of a geothermal energy project, ensuring the study has appropriate regard to planning and environmental protection considerations."

According to the Climate Action Plan, the Carlow Decarbonising Zone (DZ) falls within the overarching criteria set out which required the Decarbonising Zone to be either:

- (i) Urban areas and agglomerations with a population not less than 5000 persons
- (ii) Rural areas with an area of not less than 4km²
- (iii) Other location/areas that can demonstrate decarbonisation at a replicable scale

The spatial area of the DZ selected for Carlow comprises of the District Electoral Division (DED's) of Carlow Rural, Carlow Urban and Graiguecullen Urban. The River Barrow is the second longest river in Ireland, at 192km and Special Area of Conservation (SAC). It is of significant historical and environmental importance to Carlow Town. Figure 1 outlines the boundary of the Carlow DZ.

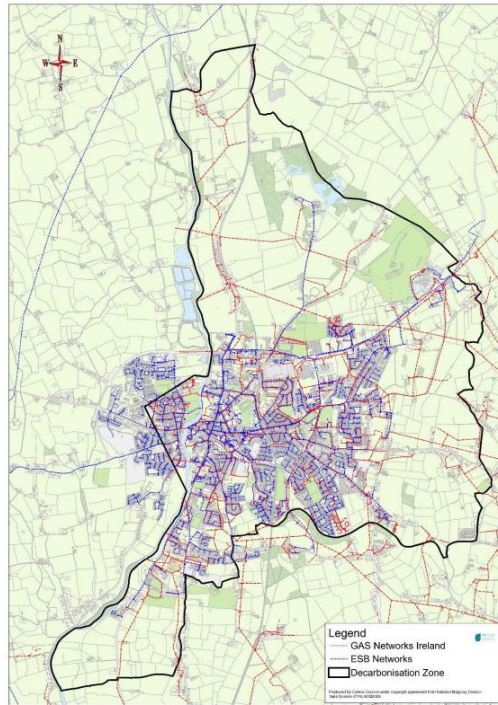


Figure 1: Geographic Boundary of Carlow Decarbonisation Zone

According to research carried out by Southeast Technological University, SETU:

“The Geological Survey of Ireland-Geothermal Group has identified Carlow as a key strategic area for potential geothermal use in Ireland.

Carlow is seen as having a number of positive attributes.

- *A Granite batholith lies to the east of the town, with significant potential in terms of radio-nuclide decay generating geothermal heat. The batholith extends for a significant distance west of Carlow beneath the overlying Limestone deposits.*
- *A significant thickness of Limestone which is classified as an important bedrock aquifer, has the potential for deep heat exchange together with significant fluid flow. It also insulates the underlying granite.*
- *A shallow gravel aquifer in hydraulic contact with the River Barrow, with a consistent groundwater temperature in excess of 12 °C*

A preliminary assessment undertaken by SETU as a postgraduate project, reviewed available geological data for Carlow, from mineral exploration boreholes, deep seismic, gravity and magneto telluric surveys.

The data was examined and compiled using proprietary software to create a working geological conceptual model, giving a preliminary estimated depth and basic geometry of the Granite’s western extent beneath Carlow Town, the River Barrow and the deep Limestone deposits.”

Since this original postgraduate research, SETU and GSI completed geothermal borehole drilling at a test location on the SETU grounds within the Carlow DZ on the 16th April 2026. They reached a depth of 370m into some very dense, hard granite. The researchers were then planning to lower temperature probes in the ground the following week to establish temperature profiles, but they expect temperatures at the lowest depth to be close to 18 degrees. They are willing to share all preliminary findings with Carlow County Council which will be provided to the appointed District Heating feasibility study consultant.



Figure 2: Image of Geothermal Borehole Test Drilling at SETU, Carlow – April 2026

Carlow County Council want to pursue a District Heating Feasibility Study that may, with the correct supports be realised in the future.

District Heating Pre-Screening of Different Areas in Carlow Decarbonisation Zone

In 2025, a new SEAI District Heating webpage was launched with pre-feasibility mapping tools and guidance documents for the various stages of District Heating project development. Using these tools and guides, a high-level analysis was completed of the Carlow Decarbonisation Zone with regards to District Heating.

At a high level, using SEAI's District Heating Candidate Map, the potential for district heating is concentrated in a small area of Carlow Town centre, within the DZ zone, south of the N80 ring road. This is illustrated in Figure 3. This Candidate Map calculates heat density and is for high-level illustrative purposes only and is a starting point for further evaluation.

In order to categorise the opportunities, the area within the SEAI District Heating Candidate Map (orange area) and the area in close proximity to this area is assessed for the presence of what are defined as Significant Energy Users (in terms of Heat Demand or Heat Sinks) and Potential Energy Sources (in terms of Heat Supply or Heat Sources). These Significant Energy Users, once identified, would ideally become future “anchor clients” of a viable District Heating development.

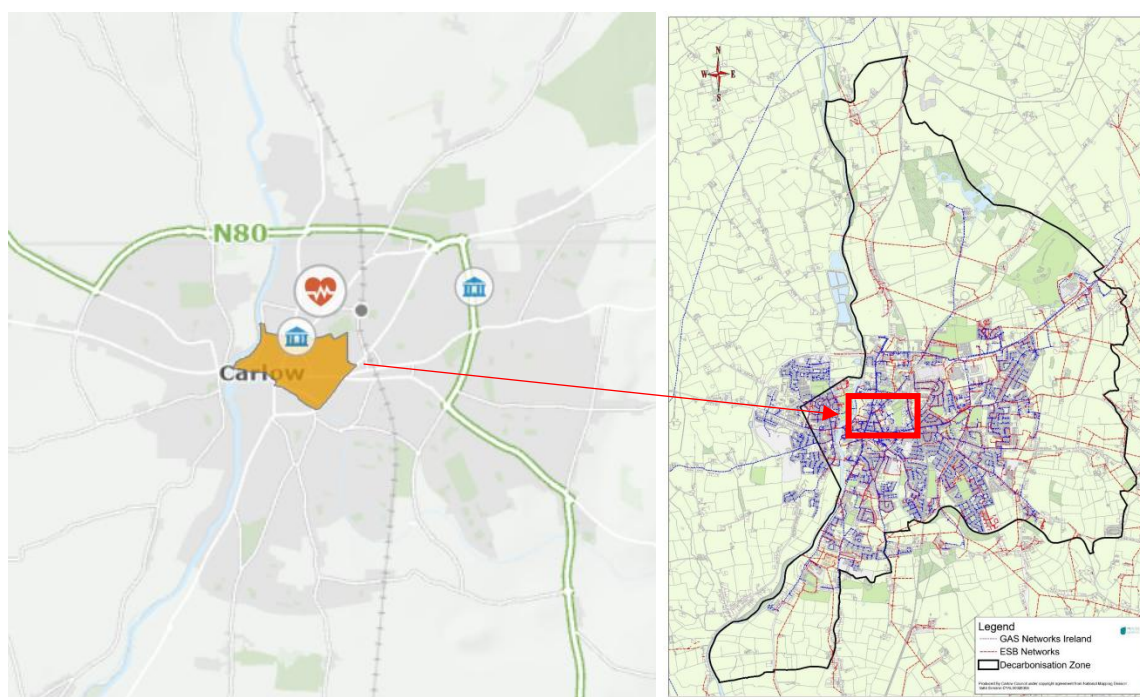


Figure 3: The SEAI Candidate Area is only a small subset of the larger Carlow DZ

In the proceeding section of this report, this SEAI Candidate Area (in orange in Figure 3) within the larger Carlow DZ is focused on.

Area 1: Heat Sinks / Sources located in SEAI Candidate Map Area within Carlow DZ

According to SEAI's District Heating Candidate Map, based on heat demand density, the area in orange has been highlighted as the most viable area for District Heating in Carlow. According to this map the area in “orange” aggregated could contribute 0.015 TWh / year towards the delivery of

2.7TWh / year of district heating, the 2030 Climate Action Plan target for District Heating. This same candidate area illustrated in Figure 3 is represented in Figure 4.

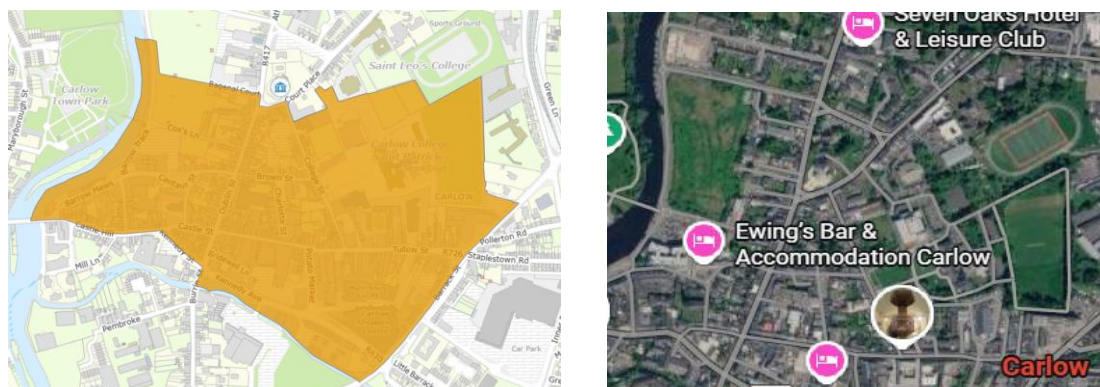


Figure 4: Area 1 - The SEAI Candidate Area within the Carlow DZ

This SEAI Candidate Map Area is made up of:

Candidate Area Name	Carlow
Suitable Residential Demand (MWh/yr)	1,417.77
Suitable Commercial Demand (MWh/yr)	7.551.39
Suitable Public Sector SEU Demand (MWh/yr)	0.00
Suitable Public Sector Non-SEU Demand (MWh/yr)	5,540.59
Total Suitable Demand (MWh/yr)	14,507.75
Total Suitable Demand (TWh/yr)	0.015
Estimated Residential Connections	180
Estimated Non-Residential Connections	127

Within Area 1, notable heat sinks include:

- The Visual Bernard Shaw Theatre
- The Cathedral
- Carlow College, St Patricks
- Carlow County Museum
- County Council Offices
- Carlow Shopping Centre
- Carlow South East Technology University
- Dinn Ri Hotel
- Seven Oaks Hotel and Leisure centre

These are all located within 0.25km² of each other.

Within Area 1, notable heat sources include:

- River Barrow (geothermal heat extraction)
- Alternative sources of heat – ground geothermal, air heat pumps, biomass, biomethane etc.

Area 1: Summary of Findings

If every building (domestic and non-domestic) was connected to a future District Heating network, i.e. 180 residential buildings and 127 non-residential buildings, the heat demand would be 14.5 GWh/year. This is a high volume of connections to aspire to in a very small geographic area. The

short-term reality would be to identify the future anchor clients, of which 9No. have been identified out of the list above and develop a District Heating business case around these through key stakeholder engagement with Carlow County Council, SETU, Carlow College, OPW and some key commercial sector businesses.

To increase the number of future anchor tenants, the District Heating feasibility study should look beyond the SEAI Candidate map. This wider area, for the purposes of this prefeasibility study is known as Area 2. Area 2 includes Area 1 and other surrounding areas and is described in the next section.

Area 2: Heat Sinks / Sources located in and close to the SEAI Candidate Map within Carlow DZ

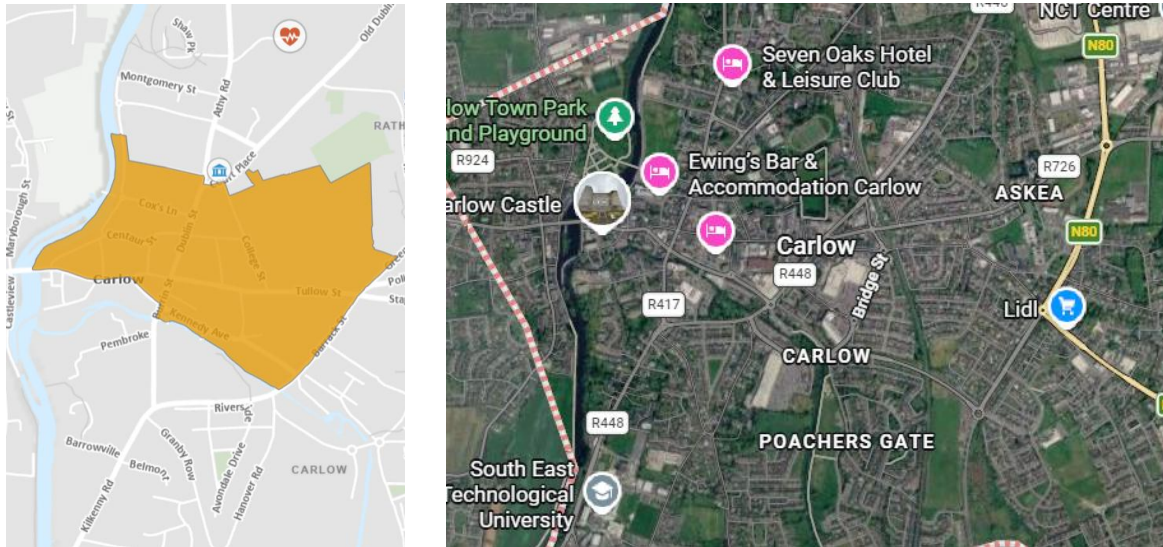


Figure 4: Area 2 - The SEAI Candidate Area 1 and Adjacent Areas within the Carlow DZ

Within Area 2, notable heat sinks include:

- The Visual Bernard Shaw Theatre
- The Cathedral
- Carlow College, St Patricks
- Carlow County Museum
- County Council Offices
- Carlow Shopping Centre
- Carlow South East Technology University
- Dinn Ri Hotel
- Seven Oaks Hotel and Leisure centre

And

- St Dymphnas Hospital
- Sacred Heart Hospital
- St Leo's College
- Bishop Foley National School
- St. Marys CBS
- St Josephs National School
- Scoil Mhuire National School

- Carlow Court House
- Central Engineering
- Other Industry / Commercial
- Southeast Technological University
- Askea National School
- Presentation Secondary School
- Gaelcholaiste Cheatharlach

This larger area, Area 2 is only 2.8km² (including Area 1) and hence, demonstrates how compact Carlow town is and potentially the high potential for District Heating.

Within Area 2, notable heat sources include:

- River Barrow (geothermal heat extraction)
- Waste heat from industry (potential, depending on the nature of industry activity)
- Alternative sources of heat – ground geothermal, air heat pumps, biomass, biomethane etc.

To add some context to the potential for District Heating in Area 2, thermal energy data has been collected for a number of these sites – Table 1-3.

Building Identifier	Floor Area (m ²)	2025 Gas (kWh)	Approx. Heat Load using 110W/m ² (kW)
Carlow Fire Station	1050	92,639	115
Carlow County Hall	2230	189,837	245
Carlow County Library	1234	171,692	136
Carlow Town Hall	789	68,709	87
Assembly Rooms	628	68,030	69
Carlow Arts (Visual)	3801	464,210	418
Machinery Yard	646	84,729	71
Total		1,139,846 (kWh)	
	Heat (x 90%)	1,025,861 (kWh)	1,141 kW

Table 1: Local Authority Buildings within Carlow DZ (Source: Energy Elephant, 2026)

Building Identifier	Floor Area (m ²)	20XX Gas (kWh)	Approx Heat Load using 110W/m ² (kW)
St Dymphnas (Campus DH)		4,783,850	
Carlow Court House		185,350	
Total		4,969,200 (kWh)	
	Heat (x 90%)	4,472,280 (kWh)	

Table 2: HSE and OPW Buildings within Carlow DZ (Source: SEAI Candidate Map, 2026)

Building Identifier	Floor Area (m ²)	2025 Gas (kWh)	Approx Heat Load using 110W/m ² (kW)
Main Campus (10 No. Bdgs)	32065	2,342,339	3,527
Apprentice	1955	98,451	215
South Sports campus	1564	100,200	172
Total		2,540,990 (kWh)	
	Heat (x 90%)	2,286,891 (kWh)	3,914 kW

Table 3: SETU Campus Buildings within Carlow DZ (Source: SETU, 2026)

Area 2: Summary of Findings

Compared to the SEAI Candidate Area, Area 1, which required over 1000 building connections to achieve a heat demand of 14.5 GWH/year – Area 2, will achieve a heat demand of 7.7 GWH/year through the engagement of 4No. stakeholders – Local Authority, HSE, OPW and SETU and connection of 21 public buildings. Notably, this selection of 21 buildings in Tables 1-3 does not include ETB buildings, Department of Education buildings, religious buildings, Commercial buildings, Multinational Companies, Residential developments (planned or in-situ) etc. located in the same area.

Recommendation:

As part of a District Heating Feasibility Study, the consultant will do a detailed study of Carlow DZ, not limited to the 2 areas listed above, which only serve as examples of potential District Heating anchor clients. The most important screening factor will be the viability of an actual District Heating project being built considering practical factors such as measured width and alignment of roads, areas of major growth and regeneration, areas of conservation, archaeological or environmental significance etc. which could provide opportunities but also barriers to implementation of District Heating in the town.

District Heating Feasibility Study Process and Priorities

The District Heating Project Development Process is outlined in Figure 5. As mentioned previously, the highest priority task is the pre-screening of areas and zones within Carlow DZ to compare and rank the area(s) to move forward with for the purpose of this study. Once these area(s) are selected, and agreed by the LA Stakeholder group, then the “Feasibility” tasks within the well-defined SEAI District Heating Project Development Phases can be initiated. The scope of this District Heating Feasibility includes the list of topics outlined under “Feasibility” in Figure 5 as well as priorities defined by Carlow County Council. These 6No. priorities are listed below:

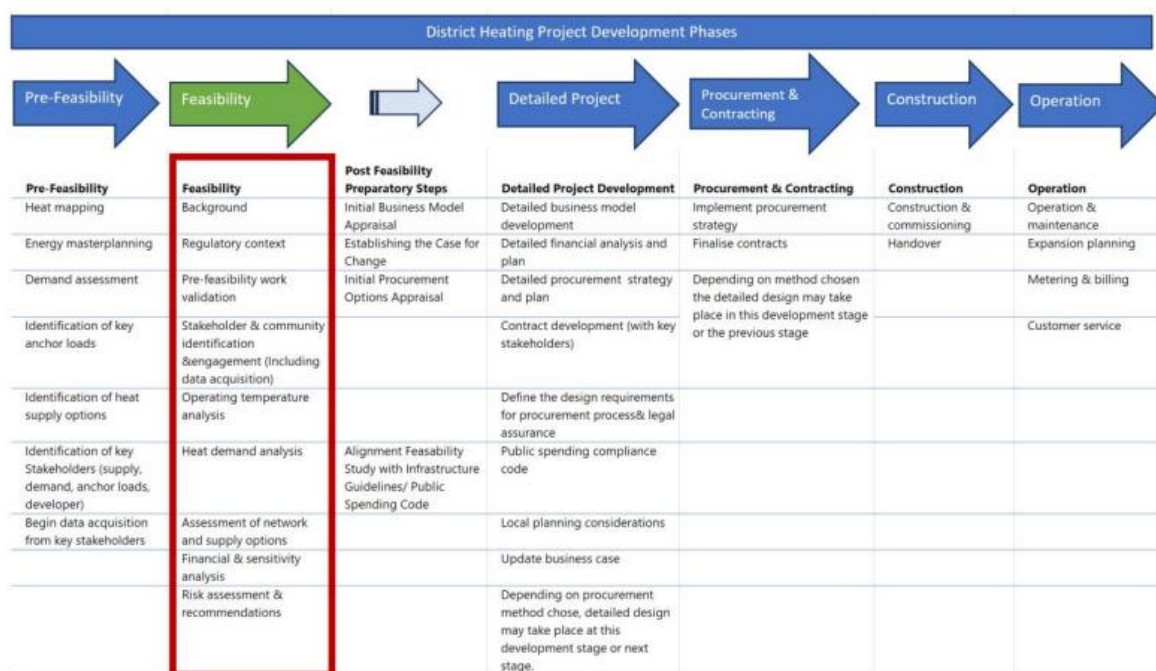


Figure 5: District Heating Project Development Process (SEAI, 2026)

1: Pre-screening of District Heating Areas

- 1.1 Propose areas within the Carlow DZ where new district heating networks would be best developed considering limitations such as measured width and alignment of roads, areas of major growth and regeneration, areas of conservation, archaeological or environmental significance etc.
- 1.2 Propose a set of criteria and scoring mechanism that will be used to rank different areas against each other including but not limited to heat density, measured width and alignment of roads, areas of major growth and regeneration, areas of conservation, archaeological or environmental significance etc.
- 1.3 Qualitatively and quantitatively evaluate and provide recommendation for either one or multiple areas of Carlow to focus the remaining scope of work associated with the District Heating Feasibility Study, i.e. this screening exercise may result in a recommendation to carry out feasibility studies on several small district heating systems in the town, rather than one larger district heating system.

2: Stakeholder Engagement and Data Acquisition

- 2.1 Once the proposed District Heating Area(s) have been adopted by the LA Stakeholder group, the next fundamental gap identified currently is the “stakeholder engagement process”. This will require meetings, workshops, “signed letters of intent” and “data acquisition” of heat data by month, week, day, hour (if available) at future anchor sites as well as physical site surveys of associated plant rooms.
- 2.2 Ideally, at least 30 anchor site buildings will be identified as part of the stakeholder engagement process and real data collected either via bills, GPRO, BMS data logging and/or heat metering (if available) for each anchor site (including data for multiple plant rooms within each large anchor site).
- 2.3 Consultants will create and follow a stakeholder engagement plan with number of meetings, workshops etc. anticipated to meet the data acquisition requirements of the feasibility study. The minimum target heat demand across the District Heating network is 4GWh/year. However, consultants should strive to exceed this target with a minimum of 30No. anchor site buildings signed up to participate in the feasibility study.

3: Heat Demand Profile

- 3.1 Once stakeholders are engaged, and data collected from anchor sites, the rest of the technical data required for analysis in a Detailed Feasibility Study will be easily collected such as operating temperature analysis, heat demand analysis, sizing of heat exchangers of anchor sites, and high-level assessment of network i.e. energy centre location, pipework sizing and distribution layout.
- 3.2 This will serve as the information required to create the Heat Demand Profile of a future District Heating System. This profile should provide an hourly, daily, weekly and monthly profile of heat demand over the year demonstrating seasonality.

4: Heat Source

- 4.1 In the context of the heat source options, a number of different heat source options such as biomass, CHP (anaerobic digestion), geothermal, air-water heat pumps will be explored, including the geothermal suitability of the River Barrow.
- 4.2 A detailed study of geothermal potential in Carlow has been carried out by South East Technological University. This study will be made available to the consultants at tendering stage.
- 4.3 As well as geothermal, other alternative fuel supplies (renewable) are to be considered and factored into a business case development.

5: Accurate Costing

- 5.1 Once the technical aspects of the DH concept are understood, a Quantity Survey or Cost Advisor will price up the infrastructure project in line with ICMS3 and ARM5 standards.
- 5.2 This will provide an initial starting point in terms of cost and will include, but will not be limited to the cost of design and installation of the infrastructure (Energy Centre, Pipework, Pumping, Heat Exchangers), the civil, mechanical, electrical, automation enabling works, the planning, regulatory, legal costs etc.
- 5.3 The Cost Advisor will also produce a risk assessment, including sensitivity analysis of anchor load characterisation and recommendations on the overall project and associated cost. For example, how is the business case affected if anchor sites X, Y and Z drop out at construction stage.

6: Non-Technical Elements

6.1 Once the technical analysis and initial costs/risks are understood, the non-technical elements need to be considered. Table 2 list several questions that will need to be considered in the context of the Irish District Heating market to gain further buy-in from stakeholders and progress this feasibility study to Post Feasibility Preparatory Stage and Detailed Project Development as per the Figure 5: District Heating Project Development Process illustrated previously.

Non-Technical Elements of District Heating in Carlow	
Governance and Ownership from a Management Perspective	Who is going to fund this project? Where will the money come from? Will there be incentives from the SEAI? Who owns this new utility? Who will operate and maintain new utility? Who will bill anchor clients?
Establishing the “why” or business case for Anchor Clients	How much will it cost for the anchor clients to connect – “sale price” not “cost”? How much will the ongoing operating cost for the anchor clients be €/kWh? How will clients be billed (heat metering data quality concerns)? What incentives exist for anchor clients to switch over?
Establishing the “why” or business case for Owner / Operator	Balanced approach to supply / demand connections? Required commitment / contract duration with anchor tenants? Required contract terms and conditions that anchor tenants must adhere to? Understanding of the size of margin applied to costs to get return on investment / payback?
Regulatory / Legal Aspects / Environmental – more detail – specific to Carlow Decarbonisation Zone	River Barrow Special Area Conservation restrictions Carlow Town Heritage restrictions River Barrow Discharge Licencing restrictions (could inhibit geothermal) Legal impacts on DH development regarding land ownership, planning permission, public/private roads and boundaries that network might interface with

Table 4: Non-Technical Questions to be Answered as part of this District Heating Feasibility Study

District Heating Governance in Carlow County Council

The internal governance and ownership of the project with Carlow County Council, is as follows:

Stakeholder Group Member	Title	Function/Area of Responsibility
Pádraig O'Gorman	DOS	DOS
Liam Carroll	Senior Executive Officer	Environment & Climate Action
Jannette O'Brien	Climate Action Co-ordinator	Environment & Climate Action
Mark Clancy	CAO	Environment & Climate Action
Mick O'Toole	Energy & Facility Manager	
Noel Dillon	A/SEE	Special Projects
Tadhg Madden	A/SEO	Housing Department
Barry Knowles	SEO	Planning
Fiona Byrne	SEO	Corporate Services & HR
Eoin Sullivan	Heritage Officer	

Conclusion

Carlow County Council believe that the “compactness” of the town, i.e. at least 30 Significant Energy Users within 3km² of each other lends itself to a potentially very viable District Heating opportunity in the town. The next step is to appoint a consultant to partner with Carlow County Council to complete the District Heating feasibility study.