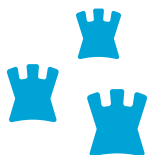




# DUBLIN DISTRICT HEATING SYSTEM

## EXECUTIVE SUMMARY

AUGUST 2020



Comhairle Cathrach  
Bhaile Átha Cliath  
Dublin City Council

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## PREFACE

Dublin City Council (DCC) is currently considering the next stages in the delivery of the Dublin District Heating System (DDHS) which involves the development of a proposed District Heating System to recover and distribute waste heat primarily from the Dublin Waste to Energy Facility at Poolbeg Peninsula.

Rambøll were awarded the project with Nicholas O'Dwyer Consulting Engineers and DEVCCO as sub consultants to advise DCC on suitable business delivery options and complete a review of engineering issues and risks for the project.

This report is an Executive Summary of the report.



# DELIVERING DISTRICT HEATING TO DUBLIN

## Geographical area

The geographical area of consideration for supply by the Dublin District Heating System (DDHS) initially focuses on the North Lotts and Grand Canal Dock Strategic Development Zone (SDZ), the Poolbeg West SDZ, and the Poolbeg Peninsula as per the figure below.

The Dublin District Heating System Business Delivery Model Report developed by Rambøll considers the following topics to advise DCC on the business delivery options for the DDHS:

- The legal and regulatory review with regard to District Heating in Ireland;
- Ownership options with regard to the DDHS and DCC's role;
- The business model options with regard to delivering the DDHS;
- The capital cost and economic viability of the DDHS project;
- The funding and investment options for the DDHS from a DCC and private investor perspective;
- A procurement strategy for progression.

## ABBREVIATIONS

DCC	Dublin City Council
DDHS	Dublin District Heating System
DHW	Domestic Hot Water
DH	District Heating
DWtE	Dublin Waste to Energy Facility
ESCo	Energy Supply Company
JV	Private Entity Joint Venture
MW	Mega Watts
NDFA	National Development Finance Agency
PPP	Public Private Partnership
PW SDZ	Poolbeg West Strategic Development Zone
SH	Space Heating
SPV	Special Purpose Vehicle

## DUBLIN DISTRICT HEATING SYSTEM AT A GLANCE

**The aim of the DDHS project** is to contribute to Ireland's Climate and Energy targets by delivering on Government policy at a European, National and Local level.

**The capture of waste heat** from industrial facilities located on the Poolbeg peninsula, in particular to use of the waste heat generated at the Dublin Waste to Energy Facility, and piping it into homes and businesses in the Poolbeg, Ringsend and Docklands areas of Dublin City.

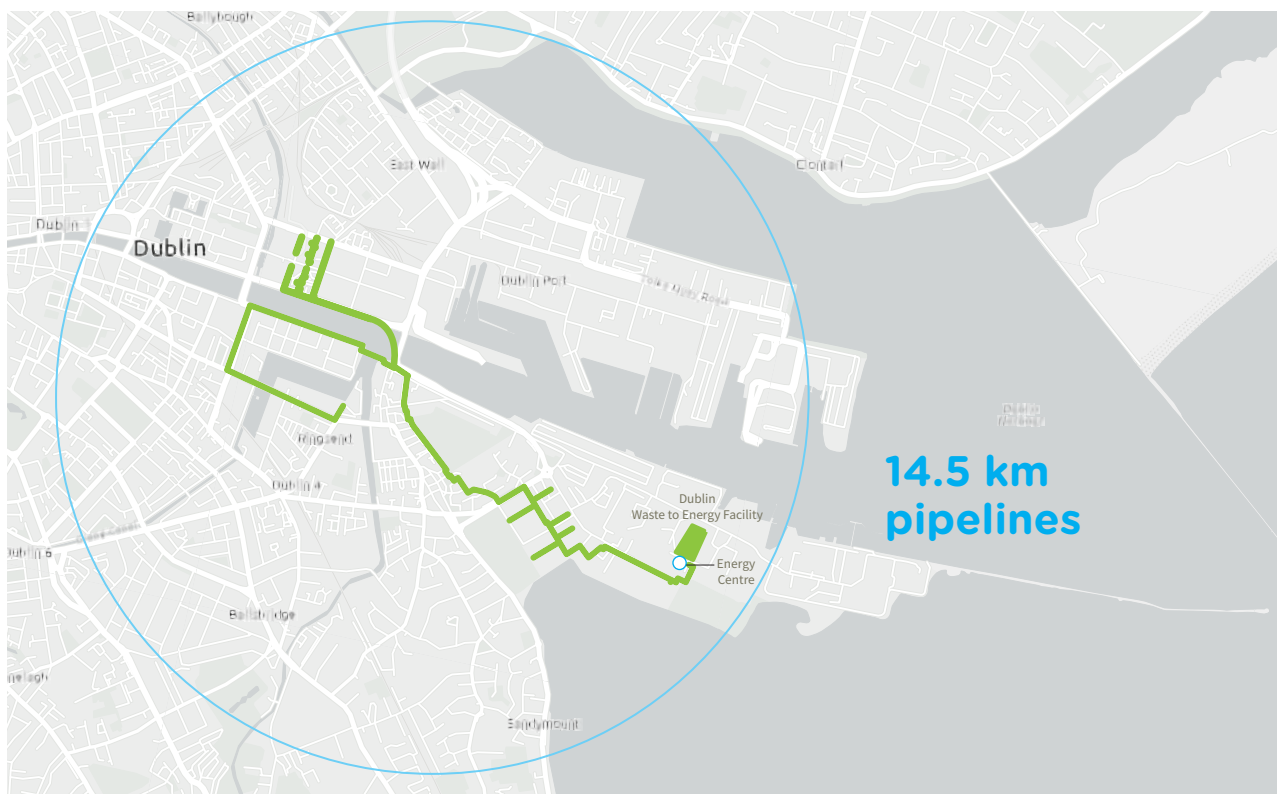
The waste heat produced from operations at the DWtE Facility (90MW of DH), has the **potential to heat 50,000 homes** in Dublin City, which would otherwise be released into the atmosphere or nearby water sources for cooling.

# 50,000

homes in Dublin City can be heated up with district heating from waste heat



The map shows the main structure of the heat network, from the Waste to Energy Facility to the development sites in the dock areas.



## THERMAL ENERGY INFRASTRUCTURE

The Dublin District Heating System will deliver thermal energy in the form of hot water through a network of highly insulated District Heating (DH) pipelines (flow and return) laid throughout the catchment area. In this way, heat rather than fuel is delivered to buildings.

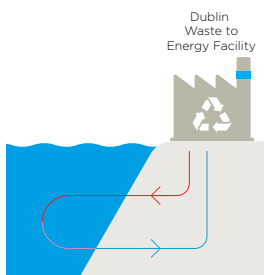
**This means there is no actual fuel delivered to buildings, requiring no gas, oil or coal deliveries or connections, and no open fires, gas or oil boilers and flues.**

As a result this will also positively impact the air quality in the region of the DDHS.

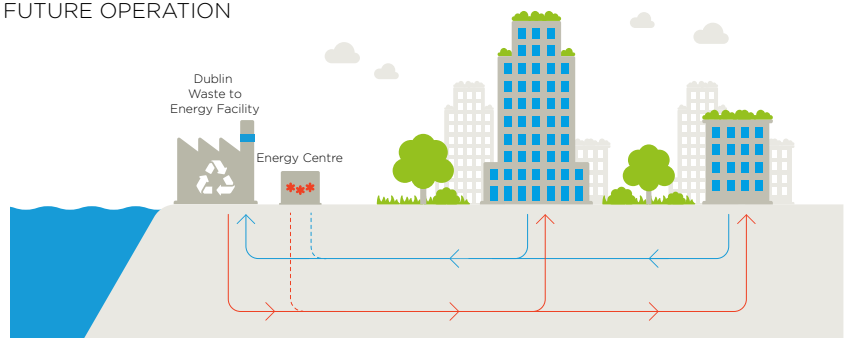
A Heat Interface Unit (HIU) at each building transfers the heat energy from the DH network to the building's own water based heating system, and heat is supplied for both space heating (SH) and domestic hot water (DHW).

**The Dublin District Heating System annual tCO2 savings are equal to 5% of Dublin City's total tCO2 from heat.** This is the very minimum savings expected over the lifetime of the infrastructure, and is based on a conservative connection schedule and limited only to direct savings from buildings most likely to connect.

TODAY'S OPERATION



FUTURE OPERATION



## INFRASTRUCTURE ELEMENTS

It is proposed that the Dublin District Heating System will consist of the following infrastructure elements within the catchment;



Installation of **14.5 km trench length** of 'flow' and 'return' DH pipes and associated infrastructure.



Construction of '**Energy Centre**' for back-up/ peak load boiler(s) & Thermal Storage.



Installation of **DH pipe** sizes ranging from Ø150mm to Ø670mm external diameter.



**Heat Extraction equipment** located within the Dublin Waste to Energy Facility.



Installation of **SCADA control system** to remotely operate and monitor the DH network.



**Heat Interface units (HIU)** located in each development/building.

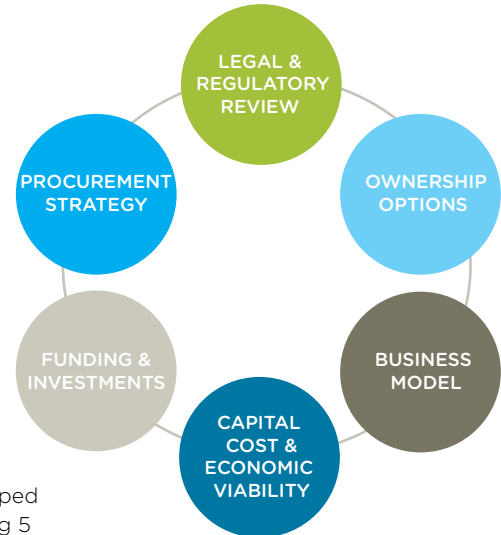


**Leak detection system** to locate any leakage from DH network in real time.



Temporary mobile **back up boiler** and heat source (to facilitate early customer connection strategies if required).

# SUMMARY OF THE BUSINESS DELIVERY MODEL



Elements in the Business Delivery Model.

## Legal and regulatory review

The legal and regulatory review focuses on what a municipality in an emerging market needs to know and what can be done to help develop district energy, incorporating international regulation experiences. Three areas are focused on and how those can be addressed through regulatory and legal actions and include:

- Consumer protection
- Pricing,
- Build out and development of a District Heating utility.

## Business models

The business model chapter assesses various applicable business model options for DCC to implement the DDHS project in the City of Dublin.

District Heating infrastructure ownership forms a key component of the basis for deciding a business model for District Heating utilities.

Different aspects of the DH system ownership were assessed to determine what objectives different structures would meet. This assessment was then used to evaluate the type of business model which will deliver this ownership structure and best deliver the required objectives of DCC.

Such models included public ownership, private concession ownership or a hybrid of both (such as a Special Purpose Vehicle (SPV) or Public Private Partnership (PPP) / Municipal and Private Entity Joint Venture (JV))

## Economic models

An economic model was developed for the proposed utility assuming 5 different implementation scenarios with associated sensitivity analysis of each.

This cash flow model includes all important revenue and expenditure streams covering the establishment of the district heating network and supplying the network with heat from the Dublin Waste to Energy facility in conjunction with necessary peaking and backup boilers for the system.

## Inputs and assumptions

A wide range of inputs and assumptions were used to develop the model. These include heat demand, technical assumptions, operational and capital expenditure, fixed operation costs, financial assumption with a risk analysis.

## Funding

Furthermore, various options to fund the DDHS are discussed and analysed including grant funding initiatives, public funding, and private funding with varying hybrid ownership structures incorporating both public and private debt and equity shares. This section also considers the responses received from the recent market soundings conducted by DCC.

Following the above analysis, a procurement strategy was assessed, and a recommendation made with associated rationale.

# CONCLUSIONS AND NEXT STEPS

## DDHS Regulation

In the absence of regulation of district heating in Ireland, DCC will need to initially fulfil this role and maintain a level of control as to how the utility is developed for the city.

It is recommended as a result to establish as transparent a structure as possible for the DDHS with the following characteristics:

## Pricing and consumer protection

- Prices are regulated based on cost of service due to the natural monopoly character of the business.
- An independent board of appeal should be established to handle customer complaints.
- The district energy utility should be separated from other policy areas and focus on running an efficient energy utility business.
- Standard contracts with transparent billing and clear conditions should be prepared.

## Enabling District heating build out

- Clear rules should be established for access to laying pipes in public ground for the district heating utility as well as permitting.
- Work towards a level playing field and recognition in building regulation and energy rating of the benefits provided by district energy.
- Establish clear responsibilities for planning and project preparation and evaluation.
- Ensure that project baselines, forecasts and other assumptions are transparent and independently assessed.

## Ownership

Both the public owned and hybrid owned options provide the best fit for development of the Dublin District Heating System based on the regulatory recommendations made. Complete private ownership does

not provide the transparency and consumer protection required for the Dublin District Heating System in the absence of DH regulation and so is not recommended.

## Business Model Options

The hybrid SPV (PPP/JV) models achieve the highest score, wholly public and cooperative models are ranked next. Significant DCC involvement and oversight is a key component to these models while allowing for contract flexibility and inclusion of third-party district heating development and operation experience.

To summarise the key benefits of the hybrid SPV model for DCC:

- It brings experience in implementing DH projects to the DDHS development.
- Such a partnership arrangement allows for contract flexibility for changes to be agreed as the DDHS utility is developed.
- A partner will bring experience and resources to oversee implementation and set up of the DDHS utility.
- The model allows day to day management of the DDHS utility by a 3rd party.
- Due to the incentivised third-party involvement, the model has a greater chance of meeting the DCC driver of realising the DDHS project.
- Provided share majority control is maintained, the model provides DCC with DDHS utility management control (board/shareholder level).
- Decisions on network expansion, can be made with a clear understanding of the operational impact alongside the environmental and policy objectives of DCC.

The wholly public model incorporates some of the above benefits

for DCC. The main drawback of the wholly owned public model is that DCC would be delivering the project without the necessary operational experience and expertise for a start-up utility and this could expose DCC to significant commercial risk. Some of the additional key benefits of the wholly public model include:

- This model provides decision/ investment control to DCC on network expansion.
- This model provides greater transparency to DCC on procurement decisions of the DDHS utility management.
- This model provides DCC control on consumer heat price.

The private models score the lowest and would have the least input or oversight from DCC. This would significantly curtail DCC's ability to achieve its environmental policy objectives and customer service.

## Project Capital Cost

Rambøll has analysed the project capital costs based on Rambøll's international experience of energy planning for district heating projects in countries with and without a district heating supply chain.

The economic modelling results indicate that the project is viable, based on a number of financial estimates and assumptions on connection rates, capital costs, heat purchase and heat sales prices.

Two key points which affect the projects viability are the price which heat can be sold at and the connection rate of new consumers.

The demonstrated viability is based on a heat price which is 10% lower than the forecasted gas price.



**DDHS Funding**

The Market Soundings conducted by DCC in coordination with the NDFA indicative interest from private experienced operators to provide equity financing for the project. In addition to this the project can offer ROI's (return on investment) which would be interesting to such operators. However, the project does not offer ROI's which would facilitate full private development and so will require public investment from DCC to drive the project.

In this regard DCC has already invested significantly in the project to date with infrastructure already in the ground. Additionally, the allocation of up to €20 million from the Climate Action Fund, which is currently going through a validation stage with the Department of Communications, Climate Action and Environment, provides an excellent opportunity for the project to access grant funding for the project.

The level of private finance sought should equate to the level of financing that is additionally required to fund the total cost of the project.

DH system development tasks and utility operation responsibility should be allocated based on which party (private operator or DCC) is best placed to control such aspects of the project, and who is best placed to manage the associated risks.

Based on this report's findings, DCC should access the market to attract an experienced district heating partner. Rambøll has recommended a procurement approach with associated phasing.

Each procurement strategy places risk on different parties. Prior to procurement, DCC will need to decide on the specifics of what control, risk and investment they are willing to take on.

**Procurement Phasing Recommendations**

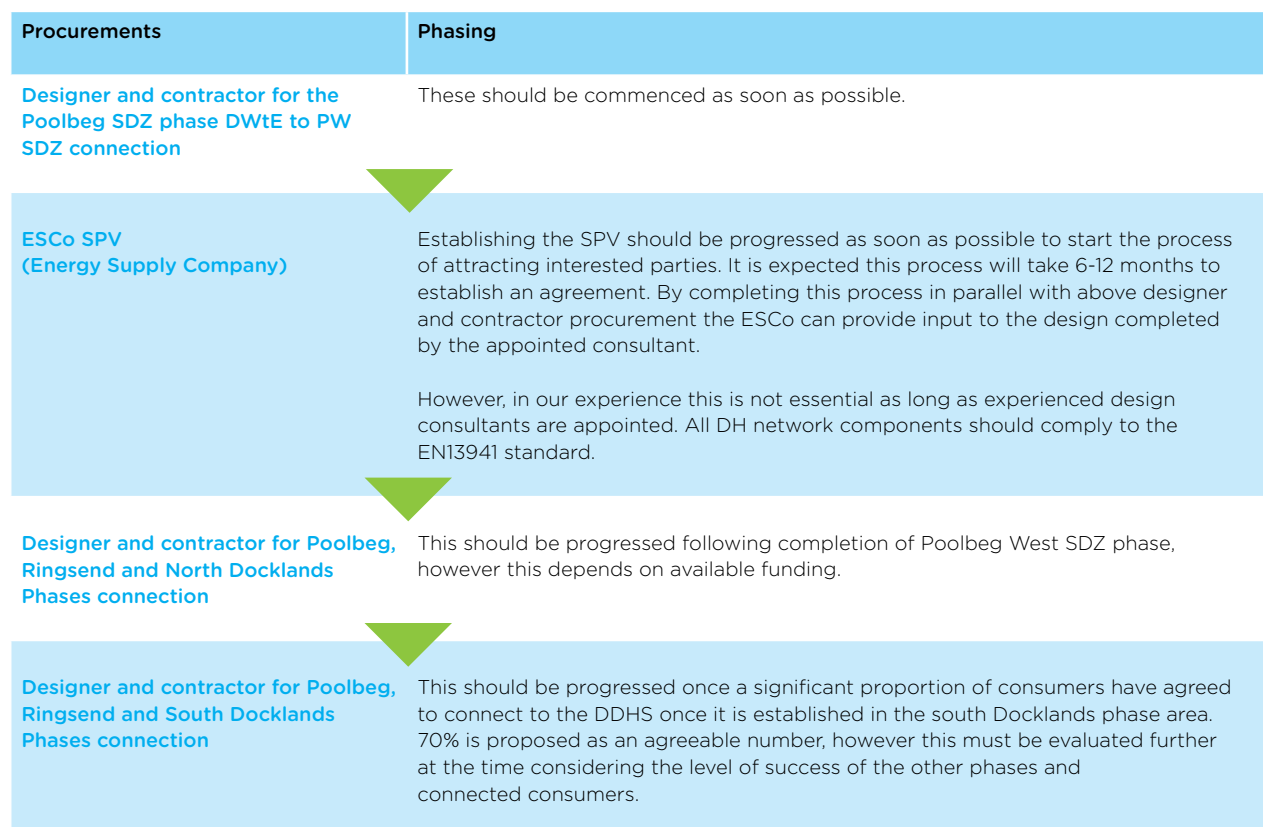
Securing supply of PW SDZ phase 1 from the DDHS will provide an initial pilot study of how the DDHS project can and will work in Dublin.

Consumers who are considering connecting can be shown a physical example of how the DDHS operates in

Dublin. In addition, from an investment risk perspective (whether public or private), such a connection will establish a consumer base to consume heat and demonstrate a demand for the DDHS in Dublin.

**The opportunity of connecting the DDHS to the PW SDZ should be prioritised.**

A specific timeline for the procurement is difficult to estimate at this point of the project until decisions are made on how to progress. However, if the approach outlined in the report is agreed upon, we propose that the following sequence is followed:



Procurement Phasing proposed.

# RECOMMENDATIONS FOR PROGRESSION

**58 actions** to be addressed for the implementation of the DDHS are outlined in the report. It is not expected that this list is exhaustive, but it outlines many issues to progress to get started and what to plan for. Highlighted below are some key recommendations for further consideration.

- **Confirm the ability of the City to sell heat** and if there are any caveats within this, for instance if the heat must be produced in conjunction with electricity. For instance, in the UK, Section 11 of the Local Government (Miscellaneous Provisions) Act 1976 (as amended by the Electricity Act 1989) provides that a local authority may generate and sell heat and electricity, and may also purchase and supply heat<sup>1</sup>.
- Should it be decided to deliver the DDHS via the ESCo SPV or NetworkCo arrangement proposed, there are other legal powers to consider and matters ancillary to that, such as directors' duties, indemnification/insurance of directors, conflicts of interest generally, plus company audit and secretarial functions.
- Consideration should be given to the NetworkCo and whether it would be treated as a Public Body and therefore subject to following related procurement rules.
- Consideration should be given as to what duration of operation the ESCo SPV arrangement should be for.

- The specific tax treatment of undertaking this project will depend on the legal and contractual arrangements, including:
  - The ownership of the assets;
  - The contractual relationship between the parties, such as supply contracts; and
  - Accounting treatments applied to each party to the arrangements.

At a high level, Corporation Tax; Stamp Duty; and Value Added Tax will need to be considered and their relevance.

- **Insurance is one of the key considerations** that lies at the heart of any heat network project's risk management strategy. It is essential that DCC, the ESCO SPV and the NetworkCo's minimum insurance requirements and associated contractual provisions are clearly stated in relevant project documents. Transparency of insurance costs during the construction or operational periods will also be required to ensure value for money in the treatment of insurance associated with the project.

DCC should undertake an insurance due diligence process that sets out:

- The risk allocation between the various parties taking into account both legal and commercial considerations.
- A rationale for insuring project risks and an understanding of the

insurance policies to be put in place for the project and/or a rationale for self-indemnifying insurable project risks.

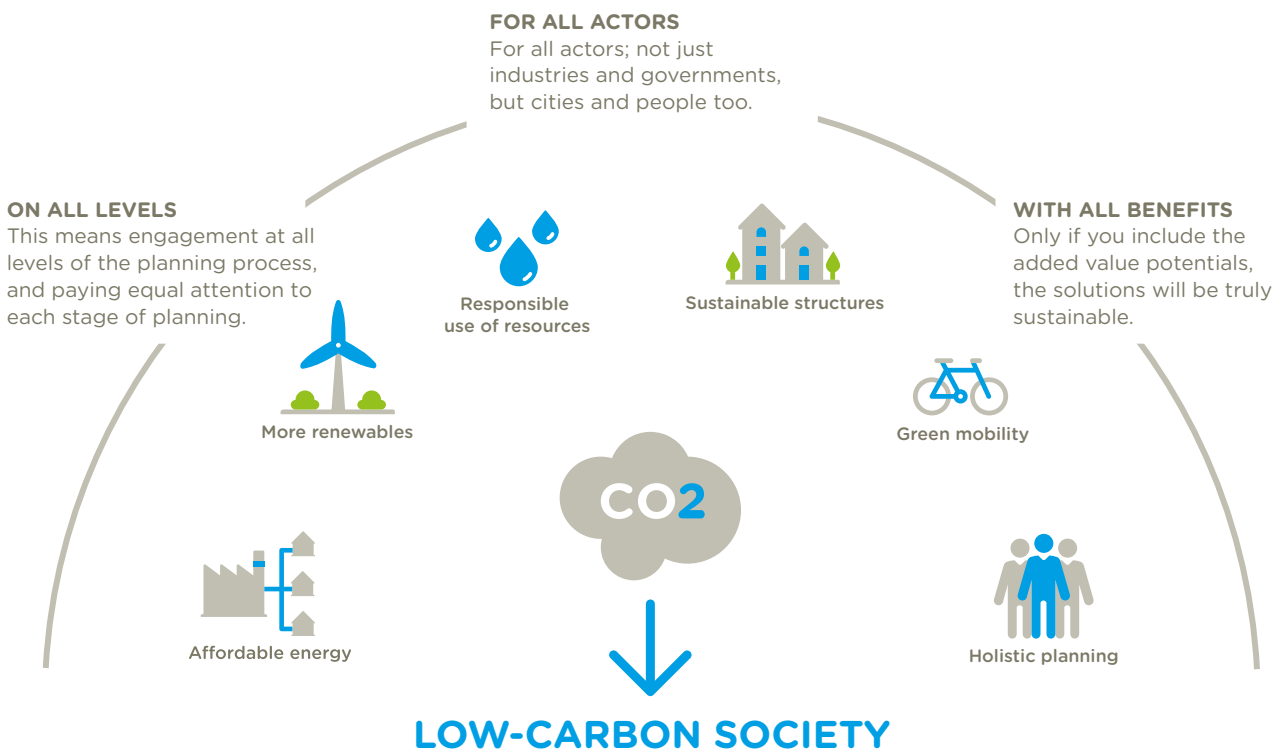
Due to the varying size, scope and complexity of this project, consideration should be given to seeking professional insurance advice as and when deemed appropriate.

- Once a decision has been made to progress the project, it should be finally agreed what parties will fulfil what roles. The process of allocating parties to roles is inherently iterative; needing to be aligned with the workable contract structures and procurement routes and also tested with the parties themselves.
- It is very important that proposed parties are engaged and their appetite for given roles tested before completion of the business plan and commitment made to a particular delivery model.

## Workshops

A workshop or series of workshops can be an effective means to reach a consensus on the allocation of roles and the resulting delivery model. Those present at the workshops need to be able to undertake significant financial and commercial decisions on behalf of the organisations they represent (even if those decisions will need subsequent formal approval).

<sup>1</sup> <https://www.brownejacobson.com/-/media/Files/PDF-Documents/Public%20sector/Department%20for%20Business%20Energy%20and%20Industrial%20Strategy%20district%20heating%20guidance%20%2023916.ashx>



**The DDHS annual tCO<sub>2</sub> savings are equal to 5% of Dublin City's total tCO<sub>2</sub> from heat**  
 This is the very minimum savings expected over the lifetime of the infrastructure, and is based on a conservative connection schedule and limited only to direct savings from buildings most likely to connect.