



Dublin District Heating System

Environment SPC Update

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Abbreviations

| | | | |
|-------|--|------|---|
| AH&P | Aberdeen Heat and Power | DWtE | Dublin Waste to Energy |
| BER | Building Energy Ratings | EFSI | European Fund for Strategic Investments |
| CEO | Chief Executive Officer | EIB | European Investment Bank |
| CHP | Combined Heat and Power | EO | Economic Operator |
| DCCAE | Department of Communications, Climate Action and Environment | EU | European Union |
| DDHS | Dublin District Heating System | NTMA | National Treasury Management Agency |
| DEAL | District Heating Aberdeen Limited | SEAI | Sustainable Energy Authority of Ireland |
| DH | District Heating | SPC | Strategic Policy Committee |
| DHPLG | Department of Housing Planning and Local Government | | |

Section 1: In Brief

Progress to Date

1. Procurement of the Economic Operator (EO) was issued on the 22nd June 2017, and we are awaiting submission of tenders on the 6th of December 2017 for advice on options on a Business Delivery Model and to carry out an Engineering Review.
2. Codema were commissioned to carry out the following reports
 - Financial Appraisal
 - Market Research Report
 - Communications Plan
3. District Heating Workshop was held on the 7th July 2017, the key priorities of which are;
 - District Heating to the Poolbeg West SDZ needs to be prioritised
 - A national support structure / framework for District Heating should be developed
 - Guaranteed customers for heat are required
 - Sales rates for district heat needs to be established
 - A programme for delivery of District Heating to the Docklands SDZ should be developed
4. Consideration of options for an Energy Station on the Poolbeg Peninsula, which will have two energy storage tanks 35 metres high 10 metres in diameter, and a building to house boilers which is 8 metres in height.
5. Ongoing engagement with Developers and DCC's Planning Department to ensure compliance with DCC's policy to have development in the area District Heating ready.
6. A District Heating Working group has been established with the Department of Communications, Climate Action and Environment, and the Department of Housing, Planning, and Local Government. DCC and Codema officials are represented on this group.

Next Steps

- Source funding for the DDHS
- Prioritise the roll out of District Heating in Poolbeg West SDZ area
- Work with Government Departments on policy and to remove any potential barriers to District Heating development
- Appoint the Economic Operator to advise on options for the Business Delivery Model and Engineering Review
- Draft a 'Detailed Project Appraisal' in compliance with the Public Spending Code, following the completion of the Business Model Options Report
- Identify a suitable location for the energy station
- Update the document called 'Dublin District Heating – Technical Information Pack for Developers'
- Establish synergies with capital projects in the Docklands and Poolbeg area
- Ongoing engagement with developers

Section 2: Overview of District Heating in Dublin

District Heating (DH) is a technology which is long established in Europe in particular in the Scandinavian countries, where a 2012 EU Joint Research Centre report¹ describes 62% of homes in Denmark being supplied by DH, which is 50% of the total heat demand in the country. In Iceland in 2013 an impressive 92% of homes are served by DH. That same report describes case studies where DH has reduced CO² emissions by 13% in Barcelona, Spain, 12% in Cologne, Germany, and 19% in Liverpool in the United Kingdom.

DH has numerous benefits for Dublin, which are referenced in many National and International² documents, including the documents referenced in this report, they can be summarised and listed as follows;

- Reduced CO₂ emissions and other pollutants
- Less dependence on imported fuels
- Use of local energy resources and sources
- Fuel Flexibility
- Greater de-carbonisation of the heat sector
- Installation is labour intensive, requires local labour & local products
- Improved safety having no fuel in home
- Increased energy efficiency

Benefits specifically for Dublin and the Dublin District Heating System (DDHS)

- In Dublin, by connecting residents / customers to the DDHS in Poolbeg, Irishtown, Ringsend and the Docklands, the project could save Ireland over €807,000 worth of carbon fines, which are otherwise incurred if EU emission targets are not met.
- DDHS can replace fossil fuel based heating systems in residential and commercial buildings and therefore save approximately €3 million per year in equivalent gas imports for heating.
- With the Dublin Waste-to-Energy (DWtE) plant providing a suitable waste heat source, DH is a major yet untapped low carbon opportunity for Dublin City.
- Extending the network even further in Dublin City would provide even greater opportunities for carbon emissions savings.
- A recent Spatial Energy Demand Analysis (2015) by Codema also showed that 75% of Dublin City was considered suitable for DH due to high energy demand densities.

The benefits to customers can be listed as follows:

- Reduced energy costs
- Reduced local emissions — improved local air quality
- No carbon monoxide risks in the home as no gas connection is required
- No bulk buying of heating fuels required
- Reduced consumption of fossil fuels
- Increased level of comfort
- Uniform space heating / steady temperature in building
- On-demand, unlimited supply of hot running water
- Increased property value
- Increased space as no need for gas boiler or hot water tank (immersion tank) - no on-site back-up is required
- Decrease in maintenance cost as heat exchanger requires less servicing
- Heat exchangers have no moving parts, therefore they are quiet

While DH is established internationally, house holders in Dublin have little or no experience of DH in the scale proposed in the DDHS project, and it takes time for what is effectively a new

¹ European Commission – JRC Scientific and Policy Reports – Background Report on EU-27 District Heating and Cooling potential, Barriers, Best Practice and Measures of Promotion, 2012.

² United Nations Environment Programme – District Energy in Cities, Unlocking the Potential of Energy Efficiency and Renewable Energy – 2015.

utility to win the confidence of customers. In order to encourage residents to choose DH rather than Gas or Electricity, the project will require the provision of additional incentives, which will help address this unfamiliarity with DH.

The risks associated with acceptance of a new product or service and the innovative nature of the project in the Irish market will make it difficult to secure loans from purely commercial sources. However, institutions such as the European Fund for Strategic Investments (EFSI) have been established to compensate for market failure in activities of strategic importance to the EU and its member states. We believe the DDHS should be a strong candidate for support from EU institutions such as EFSI or European Investment Bank.

There are features of the DDHS project that support the case for this intervention that should establish this project on a robust commercial footing. The existence of an existing source of heat, in close proximity to planned development at a scale that would justify investment in DH infrastructure is an unusual set of circumstances. The DDHS project could act as a flagship project and is therefore an opportunity to demonstrate the benefits of DH on a reasonable scale in an Irish context that could be replicated by other DH schemes later.

The DDHS network assets have a long lifetime of over 50 years and DH is therefore a long-term investment that should be thought of in the same way as other strategic investments such as roads, bridges or electrical transmission lines.

Comparable DH projects in other countries have been driven by local authorities, in most cases requiring public funding and/or establish the first phases of the network. For example, in 2002 Aberdeen City Council established a not for profit company limited by guarantee, Aberdeen Heat and Power as the best means to achieve their local DH network. This network has continuously increased demand for DH connection and has reduced customer costs by an impressive 45%. In Sheffield the city council part-funded the DH network through a partnership with a private services company to establish Sheffield Heat and Power Limited. The Sheffield system is now 22 years running and has more than 44km of network installed, with expansion again due to increased customer demand for DH.

A United Nations Environment Programme³ document states that local authorities are uniquely positioned to advance district energy systems in their various capacities as planners and regulators, facilitators, providers and consumers, coordinators and advocates. District energy systems emerged as a best practice approach for providing local, affordable and low carbon energy supply, and represents a significant opportunity for cities to move towards climate-resilient, resource-efficient and low-carbon pathways.

Since 2011 Dublin City Council's (DCC) planning policy has been to encourage energy efficiency initiatives such as DH, policies which are stated in the previous and current city development plans, and the 'Docklands' & 'Poolbeg West' Strategic Development Zone's (SDZ). As a result the project team, in partnership with DCC's Planning Department are dealing with developers in the Docklands area so that new developments are designed to be integrated into a DH network, and that they are DH enabled.

The project team has engaged with representatives from a number of local and national organisations working in this field;

- CODEMA (City of Dublin Energy Management Agency)
- Commission for Regulation of Utilities (CRU, formally called the CER)
- Department of Communications, Climate Action and Environment (DCCA)
- Department of Housing Planning and Local Government (DHPLG)
- EU Commission's Directorate-General for Energy
- National Treasury Management Agency (NTMA)
- Sustainable Energy Authority of Ireland (SEAI)

In July 2017 a District Heating Workshop was arranged in our Wood Quay Venue with key national stakeholders working in this field and senior management of DCC, aiming to discuss

³ United Nations Environment Programme – District Energy in Cities, Unlocking the Potential of Energy Efficiency and Renewable Energy – 2015.

the barriers to moving the project forward and to de-risk the project by addressing and removing these barriers. A summary of the key priorities could be listed as follows;

- District Heating to the Poolbeg West SDZ needs to be prioritised
- A national support structure / framework for District Heating should be developed
- Guaranteed customers for heat are required
- Sales rates for district heat needs to be established
- A programme for delivery of District Heating to the Docklands SDZ should be developed

Taking all these items on board, one of the primary aims, or next steps, for the Project Team over the next few months is to source funding commitments for the DDHS, and to prioritise the development of DH to serve the new Poolbeg West SDZ area. The project team is concentrating on sourcing funding commitments specifically for the Poolbeg SDZ area, in order that the network will be commissioned and ready for connection prior to occupation of the developments.

Identifying a suitable location for the Energy Station in the Poolbeg area is also a priority, along with its preliminary design, planning permission, design and ultimately construction.

Another priority is to complete the current procurement of the Economic Operator (EO) / Consultant for the Business Delivery Model and the Engineering Review, so that decisions can be made on the most appropriate model for delivering DH in Dublin within Irish legislative framework.

On a National perspective, and following on from the publication of the Governments' energy white paper in December 2015, where it pledges to "*develop a policy framework to encourage the development of district heating.*" DCCAE convened a District Heating Working Group which will progress this commitment. Representatives from DCC and Codema were asked to be part of this working group which is chaired by representative from DCCAE, who had their first meeting in November 2017. The principal aim is to formulate potential solutions and recommendations on policy, regulation, planning and financing in order to progress DH.

Section 3: Summary of Previous Presentation

A presentation was given to the Environment Strategic Policy Committee (SPC) on the 28th of September 2016, describing the status of the DDHS. The presentation listed a number of international, national and local policies and documents which support DH.

The '*Dublin City Spatial Energy Demand Analysis 2015*' report was described which was drafted by Codema, and identified within Dublin City Council's jurisdiction where is the heat demand density, the potential waste heat sources, and the anchor loads for a potential DDHS.

The 2008 report called '*District Heating for Dublin Feasibility Study*' was also referenced, which describes rolling out DH to the Poolbeg West and Docklands areas of the city as a first phase. The phase, which is currently being progressed.

Following publication of that report some DH pipework was installed under the Liffey in the Liffey Services Tunnel, and under the LUAS line on Mayor Street Upper to the 3Arena (The Point Theatre). Drawings and photographs were presented for greater clarity.

A timeline was presented which described the procurement for an EO / Consultant who was to carry out work in the following three phases;

1. Engineering & Business Strategy
2. Tender Stage
3. Planning and Design Stage

The recommendation from the SPC was to report back within a year on the projects progress.

Section 4: Procurement Update

Our energy advisor Codema were requested to carry out work as listed below;

- Detailed Financial Appraisal of the DDHS Project
- Market Research Report
- Strategic Communications Plan
- Detailed Project Appraisal in compliance with the Public Spending Code

The 'Expression of Interest' was published on 22nd of June 2017, which is entitled 'Dublin District Heating System: Business Delivery Model and Engineering Review'. The purpose of this brief is to secure the services of a suitably qualified and multi-disciplinary EO to identify appropriate business/commercial delivery models together with a recommendation on the preferred model, including the role of DCC, if any, in the ownership, delivery, operation and maintenance for each of the business aspects;

- heat generation/source
- heat distribution network
- heat supply to customers

In addition the EO shall complete a high level review of engineering options for the delivery of DH, and shall be required to develop the options to a strategic/feasibility level of detail. In developing both the business/commercial and engineering options the EO shall be required to identify project risks and make recommendations of how they shall be addressed in future stages of the project through the completion of a Project Risk Management Plan.



Figure 1 – Project Brief Front Cover

The DH network shall focus on the Poolbeg and Docklands area as per the attached map TSD-DDHS2-001-REV 2 (Figure 2 on page 7) and will recover and distribute the waste heat from plants located primarily in the Poolbeg peninsula, focussing initially on the Dublin Waste to Energy (DWtE) Plant.

It was noted in the documents that previous studies of the Project have considered options for phased implementation, with the following areas being identified as possible phases:

- Poolbeg West SDZ
- Ringsend
- Grand Canal Dock SDZ
- and North Lotts SDZ.

These areas have distinct characteristics such as new development or need for conversion and public housing or private development. DCC's emerging preference is to give priority to Poolbeg West SDZ due to the opportunity to incorporate DH in new developments and the area's proximity to DWtE Plant.

The main deliverables from this procurement are listed as follow;

- Business Delivery Model Report
- Engineering and Infrastructure Review Report
- Project Risk Management Plan

Current dates for this procurement are as follows;

- 22nd June 2017 – Publication of documents on etenders
- 24th July 2017 – Closing date for Expressions of Interest
- 3rd Nov. 2017 – Tenders were sent to the successful 5 shortlisted Candidates
- 6th Dec. 2017 – Closing date for submission of tenders

The aim is to shortlist the tenders during December 2017 / January 2018, and sign a contract early 2018. The contract period is a six-month contract period, therefore the report should be completed by the middle of 2018.



Figure 2 - Project Work Area

Section 5: Dublin District Heating Workshop

On the 7th of July 2017 DCC organised a very successful DDHS Workshop which was held in our Wood Quay Venue. Representatives from the following organisations attended.

- Aberdeen Heat & Power
- CCMA Environment Committee
- CODEMA
- Commission for Energy Regulation (now the CRU)
- Department of Communications, Climate Action and Environment (DCCA)
- Dublin City Council
- Former Director General of EU Commission's Directorate-General for Energy
- National Treasury Management Agency (NTMA)
- Sustainable Energy Authority of Ireland (SEAI)

A summary of the key priorities from the Workshop could be listed as follows;

- District Heating to the Poolbeg West SDZ needs to be prioritised
- A national support structure / framework for District Heating should be developed
- Guaranteed customers for heat are required
- Sales rates for district heat needs to be established
- A programme for delivery of District Heating to the Docklands SDZ should be developed

Mr Dick Brady Assistant Chief Executive of Dublin City Council opened the proceedings, welcomed everyone to the venue, and introduced Mr. Jim Gannon CEO of SEAI who kindly agreed to chair the workshop. Mr. Gannon noted that the aim of the workshop was to discuss the barriers to moving the project forward with relevant stakeholders in order to de-risk elements of the project.

Three presentations were given, the first was presented by Mr Victor Coe who is the Project Manager of the DDHS project for DCC, he briefly described the history of the project. The second was given by Mr Ian Booth who is the CEO of Aberdeen Heat and Power (AH&P), who gave a detailed presentation on the development of DH in Aberdeen in Scotland since 1999. He noted that Aberdeen City Council appointed a CHP engineer in 2001, then established 'Aberdeen Heat & Power' in 2002 as a Not-for-Profit Company, and was tasked with developing DH / CHP for the benefit of the people of Aberdeen. The Board of the company has volunteer directors, employs 3 staff, and appoints external specialists. The company has a Service Level Agreement up to 31st March 2052 with the council for its housing stock. He noted that District Heating Aberdeen Limited (DEAL) was established in 2013 as a wholly owned subsidiary of AH&P, who are a retailer of heat to non-council and non-domestic customers. He noted that costs of heat to households have reduced by 20-50%. AH&P's future is to link multiple CHP plants together into one city wide network, and to review alternative heat source technologies, including geothermal, heat pumps, absorption heat pumps solar etc..

Ms Donna Gartland who is a Executive Energy Planner from Codema then presented a summary of the DDHS financial analysis, which was initiated to assess the commercial viability of the DDHS. She listed the following number of de-risking measures which were discussed later at the Workshop.

- The DDHS is ready to supply Poolbeg West SDZ when developers on site - no retrofit
- Connection guarantees can be obtained to secure sufficient heat demand
- The Renewable Energy supply from DH is accounted for in BERs
- Grants are available for customer side DH equipment
- Connect all public sector and local authority buildings in area
- Secure a low cost source of heat – HECHP/RHI

- Connect existing non-'DH enabled' buildings as soon as possible – older buildings, larger heat demands
- Effective communication and marketing required to secure customer connections
- National level low cost finance or grant funding – e.g. Heat Network Investment⁴ Project in UK £320 Million for DH

Following the presentations, guests were divided into four groups and discussed the following four topics, and a nominee was selected from each group to present the findings. The four topics are listed as follows;

1. What Legislation / Regulation / Policy is needed for the Dublin District Heating System?
2. What governance / ownership models are best suited for the Dublin District Heating System?
3. How do we ensure that Poolbeg West Strategic Development Zone is District Heating ready?
4. How do we get the District Heating network to the Docklands Strategic Development Zone?

The four groups looked into some of the barriers currently in place, and discussed potential solutions, barriers such as policy, legal, financial / funding, lack of customer guarantee, uncertainty around ownership models, current support for gas and electricity which is not available to DH.

The 'Market Research' and the 'Communications Plan' which are currently being drafted by Codema will help with guaranteeing customers, and will help to de-risk this element of the project, however there are many other effective actions which should be undertaken to reduce this risk further, such as, guaranteeing that there is a DH pipe to connect to prior to occupation of the buildings, and that the sale of heat is at a preferential rate to the sale of other energy sources. The cost of heat sales will be heavily influenced by the alternative costs of heat from gas, electricity, oil etc, and will depend on the heat source costs, the cost of infrastructure, cost of finance, and the cost of operating and maintenance of the network, all of which are to be established in more detail to give a clearer picture for the sale of heat.

It was noted from the workshop that the DDHS project was unlikely to be a fully private model, and that investment from Local or State funding is likely to be required to attract private funding and investment.

There was good consensus from all groups that there is a need for a 'Pilot Project Phase', or 'Flag Ship Project' for the Poolbeg West SDZ, and this could be achieved through fast tracking the network installation in the area; a preliminary estimate for which is €11.5 million. This finance is to be sourced as a matter of urgency to ensure that DH is available prior to the occupation of the new buildings / housing units in the SDZ. This could be financed on a pilot basis, and will give incentives for developing the network into the wider area, specifically the Docklands SDZ where there is a significant amount of existing and potential heat demand.

The DDHS is an important infrastructure project, not only for Dublin but Ireland in general in trying to achieve a reduction in its carbon emissions, and in other jurisdictions it is considered essential infrastructure, and it is hoped that this workshop is the first of many strategic discussions on the DDHS.

⁴ Information extracted from <https://www.gov.uk/government/publications/heat-networks-investment-project-hnjp>, on 3rd August 2017

Section 6: Dublin District Heating System Energy Station

A DDHS Energy Centre (or Station) is required to accommodate the back-up boiler and thermal storage requirements for the full development of the DDHS network into the Docklands, but the equipment itself will be rolled out on a phased basis according to the needs of each phase. There are two main functions of such an Energy Station;

- Thermal Storage / Energy Storage
- Back-up Boilers / Peak Load / Demand Boilers

Thermal Storage can be provided with the use of large insulated tanks, typically made from steel, used to store hot water. Some of the benefits of short term thermal storage are:

- To shift demands from peak hours to hours of lower demand
- Provide back-up in times of supply interruption or unexpectedly high demand
- Allow supply units to run longer periods at full load
- Allow increased use of heat from cheaper supply units, lowering costs

The thermal storage used in this analysis serves to cover scheduled outages for maintenance of the DWtE plant during summer period, and other hours outside of the 8000 hours guaranteed annual supply from the DWtE plant.

Back-up boilers are required in the event that there is an unexpected interruption in the supply of heat outside the scheduled hours of downtime from the DWtE plant. They are generally only required if heat is not available from either of the two 45MW condenser lines at the DWtE plant, as one condenser supply is sufficient for supply in majority of hours, and when there is not sufficient storage capacity. These back up boiler units are generally low-cost gas fed boilers as they are rarely utilised. The Operating and Maintenance (O&M) costs for these boilers will be mainly attributable to the fixed annual O&M rather than variable, as the plants will rarely be in operation. The units are sized to 120% of the peak load, in order to ensure security of supply even in peak hours of extreme winters.

6.1 Planning / site assessment and possible locations

The proposed energy centre (or Station) site can be located in an area zoned for industrial / mixed use development, and located close to the boundary of the DWtE plant. Consulting the proposed Poolbeg West SDZ the area most suited to the location of the energy station is the area to the east which is coloured in purple on Figure 3 on page 11, it is an area which is zoned for 'Mixed use – Commercial, Creative Industries, Industrial (Including Port Related) Activities'.

6.1.1 Dublin Port Company

Dublin Port Company are the significant landowners in the area. Meetings were arranged with the Company, and possible sites for the energy station were discussed, and following those meetings the Port Company confirmed that they are happy to engage with DCC and assist in any way possible to facilitate the project, by stating;

“As the design detail emerges over the timeframe of the project and having regard to our own land use objectives we will be happy to engage with Dublin City Council and assist in any way possible to facilitate the project.”

6.1.2 Transport Infrastructure Ireland

A constraint on the project is the South Port Access / Eastern Bypass Corridor, so the project team are in discussions with Transport Infrastructure Ireland to establish what is acceptable development within this corridor. The corridor is illustrated in Figure 4 on page 11.

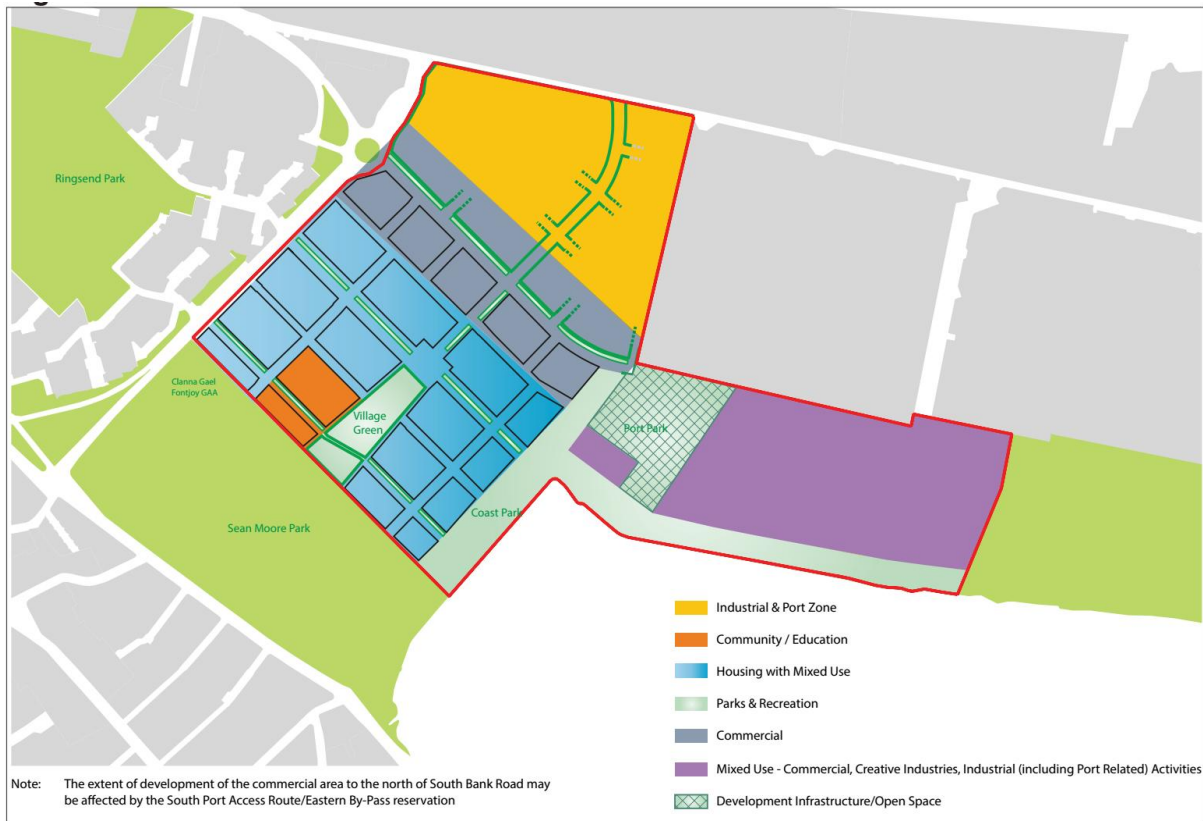


Figure 3 – Extract from Poolbeg West SDZ (Interim Document Figure 9.1)

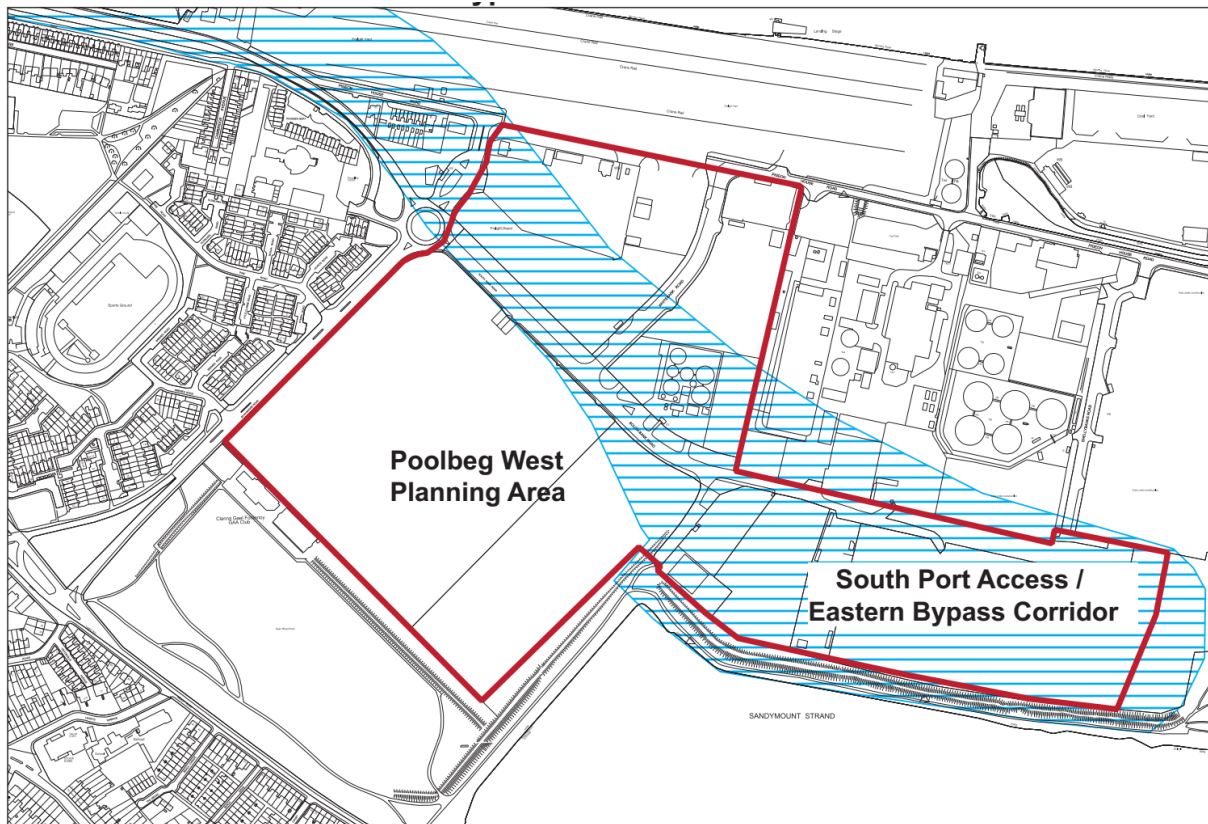


Figure 4 – Extract from Poolbeg West SDZ (Interim Document Figure 6.3)

6.1.3 Planning for the District Heating Energy Station

The following is an extract from the previous SPC presentation and it shows examples of different types and designs of energy stations in the UK and in Europe. When a suitable site for the Energy Station is sought and agreed, preliminary designs will be carried out, and planning permission will be sought through the normal processes.

Initial design advice is that there will be a requirement for the Energy Station to have two energy storage tanks which are 35 metres high, and have a diameter of 10 metres, and that the boiler building which would be 8 metres in height.



Figure 5 – Examples of Energy Stations

Section 7: Planning Compliance and Development

Developments in the Dockland's SDZ are to be DH enabled so that they can integrate with the proposed DH system for the Docklands Area, in order to comply with Objective SI14 of the North Lotts and Grand Canal SDZ and the vision for the Docklands outlined in Section 3.1 to achieve sustainable urban regeneration.

Objective SI14 of the Docklands SDZ states

“That all proposed developments be district heating enabled in order to provide an environmentally sustainable source of heating and cooling.”

There is ongoing engagement by project team with our Planning Department and the various developers in the area.

- 7.1.1 New Length of District Heating pipe under the new road alongside the 3Arena
There is a new road constructed beside the 3Arena, which runs north to south, located between the blocks 4 & 9 and blocks 5 & 10. The project team are currently going through the compliance and taking in charge process of the 300 metres long newly laid length of DH pipework installed under the road and the LUAS line.
- 7.1.2 Technical Information for Developers
The project team commissioned a document called ‘*Dublin District Heating System – Technical Information Pack for Developers*’. This report acts as a standardised technical guidance note available to prospective developers within the SDZ on www.ddhs.ie. It outlines the requirements of a development in order to be considered DH compatible and gives reference to relevant standards which outline technical details. The main design parameters of the planned DDHS for Dublin are outlined and some information relating to the relative cost of DH with respect to conventional heating for the benefit of prospective developers is provided. The current document is available on www.ddhs.ie, and the project team are currently updating this document.

Section 8: Other District Heating related items

There are a number of other DH related developments which the Project Team are dealing with;

- Department of Communications, Climate Action and Environment's District Heating Working Group
- GEO-URBAN: Identification and Assessment of Deep Geothermal Heat Reserves in Challenging Urban Environments
- Celsius Award Nomination

8.1 Department of Communications, Climate Action and Environment's DH Working Group

Following the publication of the Governments' energy white paper in December 2015, where it pledges to "develop a policy framework to encourage the development of district heating." The Department of Communications, Climate Action and Environment convened a Working Group which will progress this commitment. The group has had its first meeting in November of 2017.

The aim of the working group is to identify barriers impeding the development of DH nationally, and formulate potential solution and recommendations focussing on policy, regulation, planning, and financing.

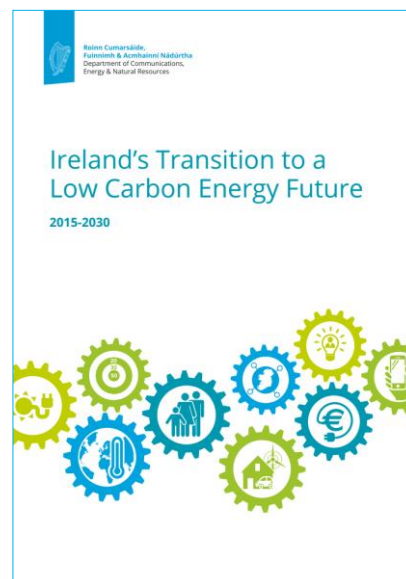


Figure 6 – DCCAE's White Paper

8.2 GEO-URBAN Project

DCC joined a consortium from Geothermal experts and universities from Dublin, Spain and Denmark for the Horizon 2020 GEOTHERMICA call. Stage 1 of our proposal, was entitled '**GEO-URBAN: Identification and Assessment of Deep Geothermal Heat Reserves in Challenging Urban Environments**' which was submitted on July 10th, our pre-proposal has been declared eligible, so now we are developing a proposal for stage 2 of the evaluation which is to be submitted on the 24th of November 2017.



The project will conduct a feasibility study for the identification and assessment of deep geothermal heat reserves in challenging urban environments. We will focus on two urban locations (Dublin, Ireland and Vallés, Spain), which comprise hard rock with fractures. The project will involve local stakeholders from each study location to assist in site selection and data collection. The project will investigate the deep geothermal feasibility for challenging carbonate environments as follows;

- Demonstrate and evaluate innovative geophysical prospecting techniques in challenging urban environments (passive and active seismic; passive and active electromagnetics).
- Identify and assess of the deep geothermal (>1000 m) heat reserves available to specific targets in Dublin, Ireland and Valles, Spain.
- State-of-the-art joint inversion modelling techniques for best models of the subsurface

- It will identify paths for commercial implementation of geothermal energy as part of 4th generation district heating/cooling in target areas, such as Dublin.

The main project output will be a guidelines document, providing a commercialisation strategy for deep geothermal reserves in challenging urban environments, including examples for the selected study locations. Significant outreach activities will also be undertaken as part of the project, such as stakeholder workshops. Furthermore, policy recommendations will be provided.

8.3 Celsius Award Nomination

We are delighted to announce that DCC has been nominated in the **CELSIUS Awards** in the category 'Getting Started' for their initiatives in DH. DCC and Dublin's Energy Agency, Codema, have been championing DH as a sustainable energy solution for the city for some time. This project will not only influence DH in the Dublin area, but across the country and Europe, to prove that DH is a viable solution for Ireland and other European countries as well.



The winner is to be announced on Monday, November 27th 2017 in the evening at the CELSIUS Summit conference in Gothenburg, Sweden.

Section 9: Next Steps

One of the primary aims of the Project Team over the next few months is to source funding commitments for the DDHS, and to prioritise the development of DH to serve the new Poolbeg West SDZ area. Developments within this SDZ could be occupied by 2021, so the project team are concentrating on sourcing funding specifically for the Poolbeg SDZ area, in order that the network will be commissioned and ready for connection prior to occupation of the developments.

DCC are currently investigating funding from a number of sources.

Identifying a suitable location for the Energy Station in the Poolbeg area is also a priority, along with its preliminary design, planning permission design and ultimately construction.

Complete the procurement of the EO for the 'Business Delivery Model and the Engineering Review', so that decisions can be made on the most appropriate model for delivering DH in Dublin within Irish legislative framework.

Further engagement with Government Departments to formulate solutions to barriers impeding the development of DH in Dublin and in Ireland.

Develop a programme for extending DH to the Docklands SDZ areas to ensure that as many of the developments within the SDZ that the DH Enabled are connected to the DH System.

Update the 'Dublin District Heating System – Technical Information Pack for Developers', to ensure greater clarity and compliance with planning policy and development conditions.

Greater engagement with potential customers, and carry out an in-depth and detailed study of customer needs, from a technical perspective.

Establish what are the synergies with other capital projects in the Docklands and Poolbeg areas, which can ultimately reduce disruption to the public and possible reduce capital costs. Projects such as;

- The new bridges proposed for the Dodder and the Liffey river
- Utility installations in the area
- Public domain projects, such as street renewals, cycle ways, and similar projects
- Flood Defence Projects
- Any other large capital projects in the area