
CARDIFF DISTRICT HEAT NETWORK

Reason for the Report

1. A report titled 'Cardiff Heat Network' is due to be received by Cabinet at its meeting on the 19 April 2018. The reasons for taking the report to Cabinet are described as:
 - To report the outcome of a Detailed Feasibility Study on District Heat Networks in Cardiff.
 - To present the Outline Business Case (OBC) for the proposed Cardiff Heat Network (CHN) recommended in this study.
 - To seek authority to commence with the next steps of the project including grant applications and the development of a Final Business Case (FBC) for further consideration by the Cabinet.
 - To signal a future Council Capital Bid for £4m of Public Works Loan Board (PWLB) Invest to Save borrowing for the CHN, subject to other funding confirmation and approval of a Full Business Case.

Background

2. A heat network – sometimes called district heating – is a distribution system of underground, insulated pipes that takes heat from a central source and delivers it to connected buildings, therefore, reducing their reliance on fossil fuels for heat. The heat source is often a facility that provides a dedicated heat supply to the network, such as a combined heat and power plant. Other potential heat sources include waste heat recovered from industry and urban infrastructure, heat generated at

energy from waste plants, and heat harvested from natural resources such as canals, rivers and underground water sources.

3. Heat Networks can reduce reliance on fossil fuels for the heating of buildings and so form an important part of Government plans to reduce carbon and cut heating bills for customers. The Department of Business, Energy and Industrial Strategy (BEIS) established the Heat Network Delivery Unit (HNDU) to support action nationally on this agenda. More recently this has been supplemented through the addition of their Heat Network Investment Project (HNIP) which is providing grants and loans to kick start schemes in many cities in the UK. In turn, Welsh Government (WG) is also very supportive of heat networks in Wales and has provided support for Cardiff's project through its Green Growth Programme.
4. The Council's Capital Ambitions document commits the Council to develop Sustainable Heat network proposals for the City. This ambition relates to our climate change and carbon reduction commitments, especially the more recent WG target for all public sector organisations in Wales to be carbon neutral by 2030.
5. The development of a successful heat network would also provide an opportunity to create a major new localised economic activity in the city as well as helping to develop Cardiff's position as a forward thinking, low carbon business destination.
6. The Council's long term strategic objectives can be summarised as:
 - To use Cardiff's multiple heat sources to provide low cost heat supplies;
 - To establish infrastructure allowing the long term decarbonisation of heat supplies;
 - To provide long term, secure and locally sourced heat supplies;
 - To provide low cost heat as an economic development benefit for new and existing businesses;
 - To provide benefits to the overall economy in Cardiff and Wales more broadly.

Feasibility Study

7. In 2014, the Council applied to the Department of Business, Energy and Industrial Strategy's (BEIS) Heat Network Delivery Unit (HNDU) for grant funding to investigate

the potential for heat networks in the city. The Council was subsequently awarded a grant of £245,000 from HNDU. A small part of this funding was initially used to evaluate a private sector offer that was made to the Council and other public sector partners to deliver a heat network with the local public sector as anchor customer. However, that offer was never formalised by the private sector provider and so the Council was unable to assess its viability.

8. Following this outcome the Council reshaped the use of the grant funding in consultation with HNDU and commissioned external consultants to conduct a series of technical feasibility and business case development studies. This aimed to identify and test specific opportunities and options for the city, as well as identifying a recommended network to pursue.
9. Welsh Government (WG) provided additional support for this phase of the project as part of their Green Growth Wales Agenda. It should be noted that WG has been included as a key stakeholder throughout the project and has helped to shape it through regular attendance at the project's steering board and other stakeholder meetings. An issue of particular importance to WG has been to ensure that the benefits of any heat network that is supported by public funds are retained for the local economy as far as is possible.
10. The commissioned work programme arising from this has delivered:
 - A Heat Mapping Report (May 2017) cataloguing existing and potential heat sources and identifying large user customer clusters that might be served by these;
 - An Energy Masterplan (November 2017) outlining a number of potential areas across the city where heat networks might be feasible;
 - A Detailed City Centre Feasibility Study (November 2017) focussing on the immediate and specific opportunity presented by the Trident Park EfW heat source; and,
 - An Outline Business Case for the Cardiff Heat Network based on the EfW scheme.

11. The Heat Mapping and Energy Masterplanning exercise identified a number of areas in the city where heat networks could be viable. Amongst these, the analysis identified that a network serving parts of the Bay and south City Centre was the most feasible and deliverable of these options. Detailed feasibility work then focussed on this preferred option.
12. These studies have culminated in the production of an Outline Business Case (OBC) for this recommended network for the Council to consider and take forward. A summary of this is presented in **Appendix A**. The heat network proposed in the OBC will require a specific mix of grant, equity and direct Council loan funding to make it viable and the OBC has developed options around this. It should be made clear, however, that the network is only feasible if its initial start-up phase is supported by successful applications for direct Government funding.
13. This report draws from the OBC and gives details of the proposed network, the recommended delivery model, and the next steps the Council will need to take to secure the relevant funding and take decisions on a final scheme.

The Cardiff Heat Network

14. The proposed Cardiff Heat Network is envisaged to begin at the EfW plant in Cardiff Bay and run through large parts of the Bay area before crossing the main Cardiff to London railway line. It will then skirt the southern edge of the city centre and finally end in the western parts of Newport Road.
15. The proposed primary heat source for the network is envisaged to be the Trident Park Energy from Waste (EfW) plant. Low pressure steam from the EfW plant will be used to heat water which will then circulate in the distribution network at a temperature of around 90°C. A heat exchange process will ensure physical separation of the fluid at the EfW plant from those in the distribution network. Similarly, heat exchangers will be installed in customer buildings to ensure physical separation of building heat fluids and those in the network.
16. A separate “energy centre” containing top-up/back-up gas boilers will also be required to ensure resilience for the network. This facility will step in to guarantee

heat supplies in the event that the EfW cannot deliver sufficient heat as a result of routine maintenance requirements or other operational issues.

17. Over time it is expected that other heat sources will provide heat into the network, in a similar manner to the multi-source heat networks found in Scandinavia. These may include waste industrial heat and other water source and ground source heat supplies, subject to detailed technical and financial analysis.
18. The feasibility study work to date has focussed exclusively on public sector customers. This is because these organisations are more able to commit to the long term heat supply contracts required to instigate a network. They are also bound by the same carbon reduction targets outlined above and so have other non-financial motivations to participate. This committed and stable customer base is a particular feature that potential funders will be looking for to give confidence that any scheme is financially stable and sustainable in the longer term.
19. The envisaged route of the network is shown in **Figure 1**. The plan identifies the potential public sector customers along this route. There is, also a considerable private sector customer pool in the vicinity of the proposed network. The potential upside of this additional customer base is discussed below, but is not included in the Outline Business Case for the project.
20. The public sector connections shown on the figure have a combined annual heat demand of 34 GWh. Adjacent to the full network but not shown are private sector buildings with a combined annual demand of around 22 GWh (see **Appendix B** for details). From a technical perspective the existing EfW plant could supply over 85% of the total combined public and private heat demand of buildings in close proximity to the distribution pipes. The network will, therefore, be sized to allow the potential connection of these private sector loads from the outset.
21. The delivery model envisages that the network will be developed in two key phases. Phase 1 will reach to the area immediately south of the railway line, and Phase 2 will complete the network to points north and east of this as well as providing further reach into the southern Bay area. Phase 1 will be the focus of the initial grant and equity funding route described below. This is the most expensive phase as it

contains all of the costs of initial connections to the EfW plant, the development of the backup energy centre and the costs of “future proofed” heat distribution pipes to accommodate future growth.

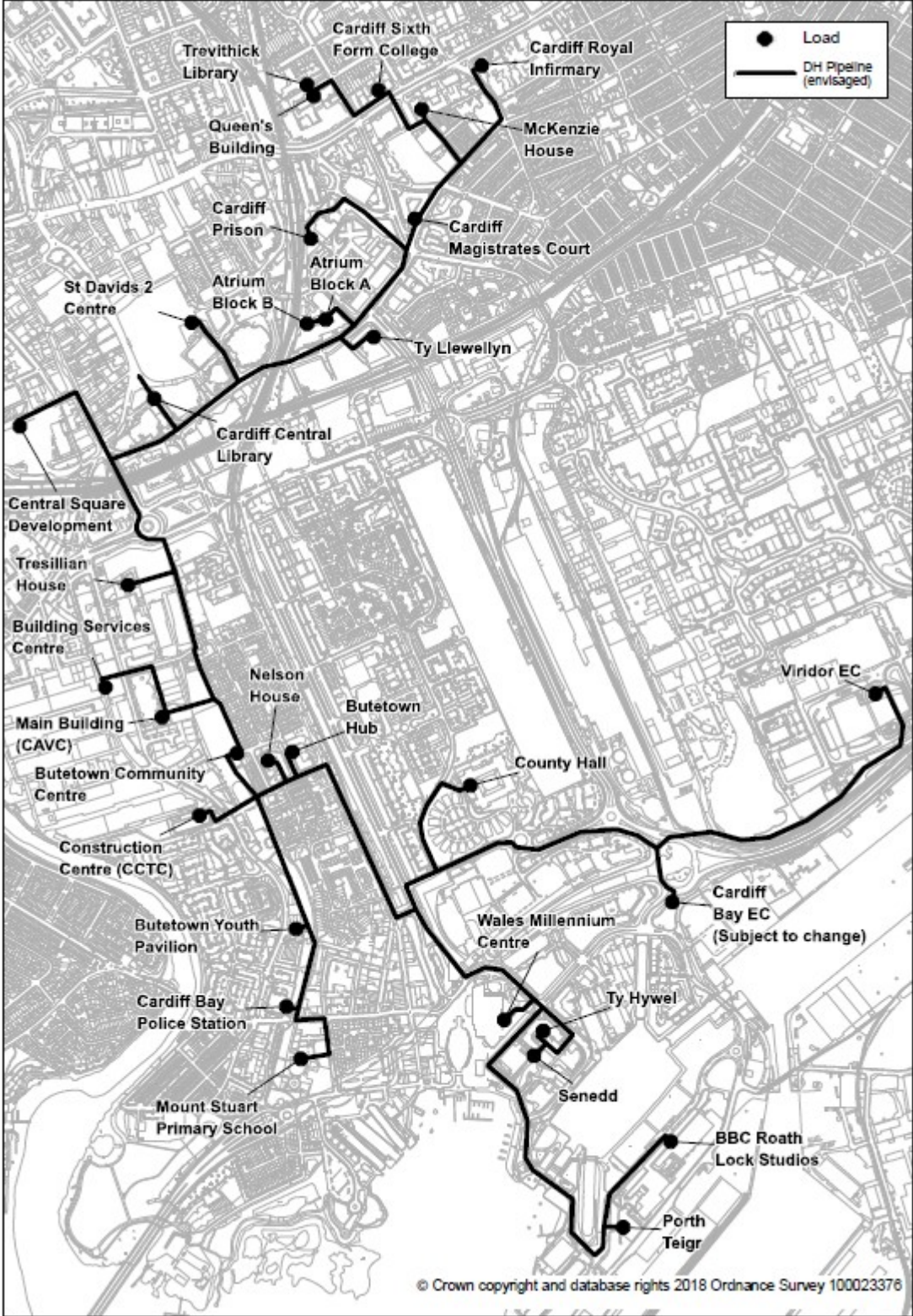


Figure 1: The Cardiff Heat Network (Full Heat Network)

Outline Business Case

22. An Outline Business Case (OBC) has been developed which considers the case for investment in a heat network in Cardiff city centre. It follows the Five Case Model in accordance with HMT's Green Book and considers the viability of investment from five perspectives: strategic, economic, commercial, financial and management. **Appendix A** to this report contains a detailed summary of the OBC. The findings of this OBC give confidence that the Cardiff Heat Network is a viable prospect subject to securing the correct funding structure to support its inception. The paragraphs below highlight the key findings and recommendations from the OBC.
23. **Appendix C** contains the full detail of the Outline Business Case for the Cardiff District Heat Network. The document is deemed exempt from publication as it contains information pursuant to paragraphs 14 and 21 of schedule 12A Local Government Act 1972. This document has been provided to Member on a confidential basis on yellow papers. Should any Members of the Committee wish to discuss the content of **Appendix C** then the public meeting will need to be closed and any relevant discussion will need to take place in a private session.

Costs

24. The total capital cost for the full network has been estimated at £26.2m, with the first phase estimated to have a capital cost of £14.4m This includes the connection to the EfW plant, the back-up energy centre, oversized/future-proofed distribution pipes and the heat exchangers required in each connected building. It also includes the various costs associated to setting up and procuring a body to manage, maintain and operate the network.
25. A 40 year life span has been assumed for the network for modelling purposes, although, with good maintenance and the eventual integration of additional heat sources and customers this could be significantly extended.

Funding

26. The development of the OBC included an options appraisal on potential funding routes and delivery structures for the project. This fixed on three potential funding sources for Phase 1 that could meet the various aspirations for the project including

the delivery of low cost sustainable energy whilst retaining as much of the benefit of the system within the local economy. These are:

- Grant funds available from Central Government's Heat Network Investment Programme (HNIP) - a £320m capital funding pot for investing in district heating networks;
- An offer of direct financial investment from WG, either in the form of an Equity stake or loan on bespoke and favourable terms; and,
- Borrowing through an invest to save loan from the Council.

27. The precise distribution of this would be subject to future grant applications and other negotiations, however, it is envisaged that funding would be distributed roughly as follows, i.e. a £5.4m grant from HNIP, a £5m stake from WG and a £4m stake from the Council.

28. Funding options for Phase 2 have also been investigated. With Phase 1 established, operational and de-risked using the structure above, it is envisaged that Phase 2 will be a bankable proposition for a range of other private sector investors such as pension funds and equity investors. Soft market testing with these sorts of organisations was undertaken as part of the feasibility study which confirmed this interest.

Operational Costs & Cash Flows

29. Forecast cash inflows and outflows for Phase 1 have been prepared by the financial advisors for the project. Key points of their detailed funding and financing model and recommendations for the project as summarised in the OBC have been presented to the Council's Investment Review Board (IRB).

30. The work identified that the Phase 1 project would be cash positive over its lifespan but with only a very marginal overall rate of return due to the high set up costs. It also identified that this scenario was only achievable with the specific mix of grant, equity and Council funding outlined above. This outcome is not unusual for a start-up heat network and similar results on schemes elsewhere in the United Kingdom have been a key motivation for the government in establishing its HNDU and HNIP organisations and associated support funds.

31. It should be remembered that the OBC has delivered a “worst case scenario” which has taken into consideration only those public sector customers who can provide the security of long term sign-up to the scheme. Additional analysis shows that the inclusion of private sector customers immediately adjacent to the first phase alone could more than double the heat demand of Phase 1, for less than a 10% increase in capital expenditure. However, the OBC has not relied on this additional customer potential since it cannot satisfy target funders by guaranteeing income for a sufficient portion of the 40-year lifespan of the project.
32. Regular stakeholder engagement has taken place with potential public sector customers identified for Phase 1, including introductory letters, email exchanges and site visits undertaken as part of the feasibility study. One to one meetings have been routinely held between the Council and potential public sector customers. Additionally, the Council is in the process of agreeing a draft Memorandum of Understanding (MoU) with each of the initial public sector customers in the first phase. This follows informal confirmation already in place from each of the Phase 1 partners that they are interested, in principle, in participating as customers to the project. The final MoU will be the subject of further discussion and approval as the project progresses.
33. Alongside this, meetings have been held with the EfW operators to discuss the technical parameters for the heat off-take arrangements. The approach to the technical and commercial arrangements has been captured in a draft Heads of Terms (HoT) document which is currently with the EfW operators for comment. This will build on an “in principle” commitment to investigate opportunities to make use of heat in this way that are included in the various contractual arrangements under Prosiect Gwyrdd (PG) which delivered the EfW scheme. The PG partnership will need to sign off the contractual arrangements.

Project Delivery

34. A Public Sector Partnership delivery model with the Council working in conjunction with Welsh Government has been identified as the preferred delivery option for the project. This conclusion followed an analysis of the relative benefits and advantages of different options. In particular, WG’s funding interests were constrained by a

requirement to ensure that the benefit of substantial public sector investment in the project was retained locally to support local socio-economic objectives.

35. A separate “arm’s length” delivery body, in the form of a special purpose vehicle (SPV), was recommended to take specific control of project delivery. This recommendation took into account funding, project risk, management and governance considerations.
36. The SPV would be an independent body, separate from the Council and, therefore, able to make the best decisions to meet the overall objectives of the energy business without having to manage competing Council constraints. However, it is envisaged that the Council will be represented in the governance arrangements and step in rights would be established so that the Council or Welsh Government, as the proposed initial owners of the company, could take over the project should that be required at any stage. The precise definition of the establishment mechanisms for the SPV, along with its constitution and governance will be the subject of a detailed piece of work in the next stages of the project development.
37. It was also recommended that the heat network will be implemented through a “Design, Build, Operate and Maintain” (DBOM) contract, thereby ensuring that the appropriate skills and delivery capacity are in place, and achieving an acceptable level of risk transfer to private sector contractors.
38. The OBC’s development, including the commissioning of all technical, financial and commercial advice, has been overseen by the Cardiff Heat Network Study Board. This was established in the spring of 2017 and has met on a monthly basis since. Welsh Government representatives sit on this board as key stakeholders. The governance structure for the commercialisation phase of the network will mirror those adopted for the development of the OBC. The implementation of the network will continue to be overseen by a Project Board led by the Director for Planning, Transport and Environment.

Other Background Issues for Phase 1

39. The Council is currently considering options around the future of its County Hall building that is one of the key customers of Phase 1. The assumption has been

made in the modelling exercise that, if a decision to relocate is taken at a future point, any replacement site for County Hall would be likely to be within one of the designated redevelopment areas that are in reach of the network established in Phase 1, i.e. within the redevelopment areas south of the railway line. In such a circumstance, it will be necessary to ensure that any replacement County Hall building is district heating enabled and that the Council, as key anchor tenant, is completely committed to its connection. Ensuring by way of a covenant that the current site of the existing County Hall would be sold/let on the basis that the building occupying the site will be heated via the network (cost neutrally) could also provide a significant additional upside, as could a similar arrangement in relation to the proposed new Indoor Arena. These will be key areas for discussion as the Council moves forward with both projects.

40. The Heat Network project will involve disruption to traffic during the installation of the pipe network. This issue was considered during a risk workshop involving the Council's Highways service which was facilitated by the project's technical consultants. It was also explicitly addressed in the feasibility study sections covering network routing. There will be a need to ensure good governance and communications between the contractor responsible for development of the network and those responsible for other planned highway maintenance and upgrade proposals. The aim will be to identify potential synergies to reduce cost and disruption.
41. The network will need to cross private land in order for the full envisaged route to be developed. Discussions have been held with land owners where this is the case and in relation to the highest risk elements of the route, draft HoT have been issued for discussion.
42. Once a clear project plan and funding structure for the delivery of the heat network is approved, it will be possible to develop Planning Policy and Supplementary Planning Guidance to ensure that future development proposals are District Heat enabled, ensuring that they are able to connect to the network in the longer term.

Way Forward & Next Steps

43. The work done to date has produced an 'Outline Business Case' that identifies a viable heat network for Cardiff. This Cabinet report is intended to formalise the Council's support for the scheme in principle.
44. Further Council decisions will be required to approve of a Full Business Case for the project and this will be subject to securing the correct mix of grant, equity and invest to save loan funding needed to underpin the assumptions made in the OBC.
45. The next steps for the project, therefore, will be to develop the scheme proposal to a 'Full Business Case' position. This will trigger a series of work streams to:
 - Secure the funding position by:
 - i. submitting the relevant grant funding application to HNIP by Autumn 2018;
 - ii. formalising a position with WG on the detailed structure of their investment element; and,
 - iii. making a formal application for a Council Invest to Save or other capital allocation as part of the 2019-20 budget setting process.
 - Formalise / agree a position with the EfW plant and PG on the terms of the heat supply contract, and reach an 'in principle' contractual position with heat customers.
 - Develop in detail the process required to constitute and establish a Special Purpose Vehicle for the delivery of the scheme, and initiate a procurement of associated DBOM contractor as well as longer term procurements for external advisers (as detailed in the table below).
 - Develop and populate the various detail of the Outline Business Case to achieve a final and approved 'Full Business Case'.
46. It is the intention to extend the project management arrangements currently funded by HNDU and WG to steer and deliver this phase of work over the next 18 to 24 months. An application has already been made to HNDU for a further grant of £150k

to fund this stage and, if successful, this will be match funded using £150k from the Council's energy reserve budget.

47. Once complete, this work will form the basis of another Cabinet report that will seek final authority to proceed with the project.
48. A Local Member briefing session on the Cardiff Heat Network took place on the 20 March.

Cabinet Paper Financial Implications

49. The Cabinet report on the Cardiff Heat Network contained a financial implications section, the details of which are set out below in this report.
50. In producing an OBC the project is at an early stage of development and as covered in the report points to areas where a significant amount of additional work is required to move towards a Full business Case (FBC). In a financial context this includes, but is not limited to, further work to confirm :
 - Funding - to include confirmation of the terms of WG funding and the outcome of the HNIP grant application;
 - Construction & Operation – commencing procurement to allow dialogue to inform estimates for the costs of installing and operating the network and associated infrastructure;
 - The terms on which Viridor will supply heat to the network from its Trident Park ERF facility.
 - The terms, including the length of contracts, on which customers agree to buy heat.
51. The proposed delivery model for the Heat Network is by the creation of a Special Purpose Vehicle (SPV). This is expected to be in the form of a trading company but again further work is required to bring together more detailed proposals into the FBC. One of the areas that will need to be considered is the ownership and governance of the SPV that will need to consider the composition of the Board of Directors and Reserve Matters where decisions will need to be referred back to the Council.

52. The potential financial benefits to the Council arise from the Cardiff Heat Network are:

- Savings on the price of Heat from the Network compared to the gas equivalent.
- To avoid State Aid implications any funding the SPV receives from the council will need to be at “market rates” appropriate to a newly formed SPV with no trading history. These are likely to be higher than the rates the council pays to acquire this funding. The allocation of this margin will be influenced by the FBC funding discussions with the WG and in particular the mix of equity and loan in the WG funding package.

53. A grant application to HNDU for £150,000 has been made to fund the additional work required to take this project forward to the FBC stage. The council will be required to match fund this grant and it is proposed that this expenditure is funded by a draw down from the Energy Reserve. The current balance of the Energy Reserve is £450,000 but as with the use of any reserve this will have implications for the financial resilience of the Council.

Cabinet Paper Legal Implications

54. The project has had the benefit of external advisers (including legal) who have provided advice in respect of the project generally and the Outline Business Case (OBC).

Procurement Strategy

55. The general procurement strategy is set out in the report and includes:

- **Procurement for DBOM Contractor** – It is understood that this is to be competitively procured using a Competitive Dialogue process. The competitive dialogue process has advantages in that it enables the authorities to enter into dialogue with bidders as to the solutions available to meet their requirements, and disadvantages in that it is a resource intensive process that is costly to both the authorities and bidders. The amount of transfer of risk will be subject to the conclusion of the procurement process.

- **Budgetary Framework** – It is understood the cost/funding of any proposed solution will be subject to further approvals. Accordingly it is advised, as is standard in procurements, that if the procurement has commenced before this process has been completed that the Council reserves the right to withdraw or abandon the procurement and not to award the contract and that the Council will have no liability should they exercise such rights. It should be noted that there will be an expectation from bidders that the Council will proceed with any procurement unless there are reasonable and justifiable reasons not to.
- It is understood there will be procurement of further advisers, which will be the subject of officer decisions report. With respect of the other proposed contracts referred to in the OBC, it is understood further decisions will be sought at the appropriate time (in accordance with the Council's constitution).
- **State Aid** – Legal Services has instructed there are potential state aid implications in relation to the project that need to be addressed and the proposals for the project have been designed to address those implications. However, further detailed assessment is required.
- **Special Purpose Vehicle (SPV)** – It is understood the OBC makes reference to a creation of a separate trading company and the costs and resources required for that company. In order to set up a trading company a business case will be required. It is understood that a formal decision to set up a trading company will be sought at the same as the Final Business Case. Further legal implications on the trading company will be detailed in that future report.
- **Procurement of bulk heat supply onto the network** – In addition to considering any implications of this procurement, Cardiff, as a partner authority under the Project Gwyrdd (PG) Contract, would need to consider the implications on the PG contract separately. Whilst it is appreciated that Cardiff is one legal entity, Cardiff will need to make decisions regarding the heat network proposals from the perspective of the Council and from the perspective of being a partner authority in the PG contract.

- **Grant Conditions** – if the council is in receipt of any grant money then the council will need to comply with the terms of those Grants.

General

56. In considering this matter the decision maker must have regard to the Council's duties under the Equality Act 2010. Pursuant to these legal duties Councils must, in making decisions, have due regard to the need to (1) eliminate unlawful discrimination, (2) advance equality of opportunity and (3) foster good relations on the basis of protected characteristics. Protected characteristics are: (a). Age,(b) Gender reassignment(c) Sex (d) Race – including ethnic or national origin, colour or nationality, (e) Disability, (f) Pregnancy and maternity, (g) Marriage and civil partnership, (h)Sexual orientation (i)Religion or belief – including lack of belief.
57. The decision maker should also have regard when making its decision to the Council's wider obligations under the Wellbeing of Future Generations (Wales) Act 2015.
58. **Appendix D** contains a number of exempt legal implications that relate to the Cardiff District Heat Network. The document is deemed exempt from publication as it contains information pursuant to paragraph 16 of schedule 12A Local Government Act 1972. This has been provided to Member on a confidential basis on yellow papers. Should any Members of the Committee wish to discuss the content of **Appendix D** then the public meeting will need to be closed and any relevant discussion will need to take place in a private session.

Way Forward

59. The Cabinet Member for Clean Streets, Recycling & Environment and officers from the Planning, Transport & Environment Directorate have been invited to provide a presentation on the item and answer any questions that Members may have.

Legal Implications

60. The Scrutiny Committee is empowered to enquire, consider, review and recommend but not to make policy decisions. As the recommendations in this report are to consider and review matters there are no direct legal implications. However, legal

implications may arise if and when the matters under review are implemented with or without any modifications. Any report with recommendations for decision that goes to Cabinet/Council will set out any legal implications arising from those recommendations. All decisions taken by or on behalf of the Council must (a) be within the legal powers of the Council; (b) comply with any procedural requirement imposed by law; (c) be within the powers of the body or person exercising powers on behalf of the Council; (d) be undertaken in accordance with the procedural requirements imposed by the Council e.g. Scrutiny Procedure Rules; (e) be fully and properly informed; (f) be properly motivated; (g) be taken having regard to the Council's fiduciary duty to its taxpayers; and (h) be reasonable and proper in all the circumstances.

Financial Implications

61. The Scrutiny Committee is empowered to enquire, consider, review and recommend but not to make policy decisions. As the recommendations in this report are to consider and review matters there are no direct financial implications at this stage in relation to any of the work programme. However, financial implications may arise if and when the matters under review are implemented with or without any modifications. Any report with recommendations for decision that goes to Cabinet/Council will set out any financial implications arising from those recommendations.

RECOMMENDATION

The Committee is recommended to:

- i. Note the contents of the report and pass on to the Cabinet any comments, observations or recommendations that they might have.

DAVINA FIORE
Director of Governance & Legal Services
11 APRIL 2018