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Optimisation of Heat Networks:

Issues for Project Sponsors to consider

Contents

Introduction

This publication sets out a summary of issues for heat network sponsors and/or owner-operators to consider when optimising a heat network. It is written in the context of themes that have emerged from support provided to projects through the Heat Networks Delivery Unit (HNDU) and the Heat Networks Investment Project Pilot (HNIP).

- HNDU provides grant funding and guidance to local authorities in England and Wales for heat network project development;
- HNIP is a £320m capital funding programme offering grants and loans as 'gap funding' to grow the UK heat networks market. The HNIP Pilot accounted for £24m of this providing funding to nine public sector-led projects in England.

The information provided is high level. It touches on some of the decisions likely to be required during the optimisation process. It does not seek to address every decision in detail but aims rather to provide an indication of the type of issues likely to be relevant when making those decisions. Links to documents providing further detail are noted at the end.

This document starts by providing an overview of the context of optimisation. That is: the project's objectives and constraints. Then it provides an introduction to some useful decision-making tools and focusses on issues to consider when optimising a project's technical and commercial design.

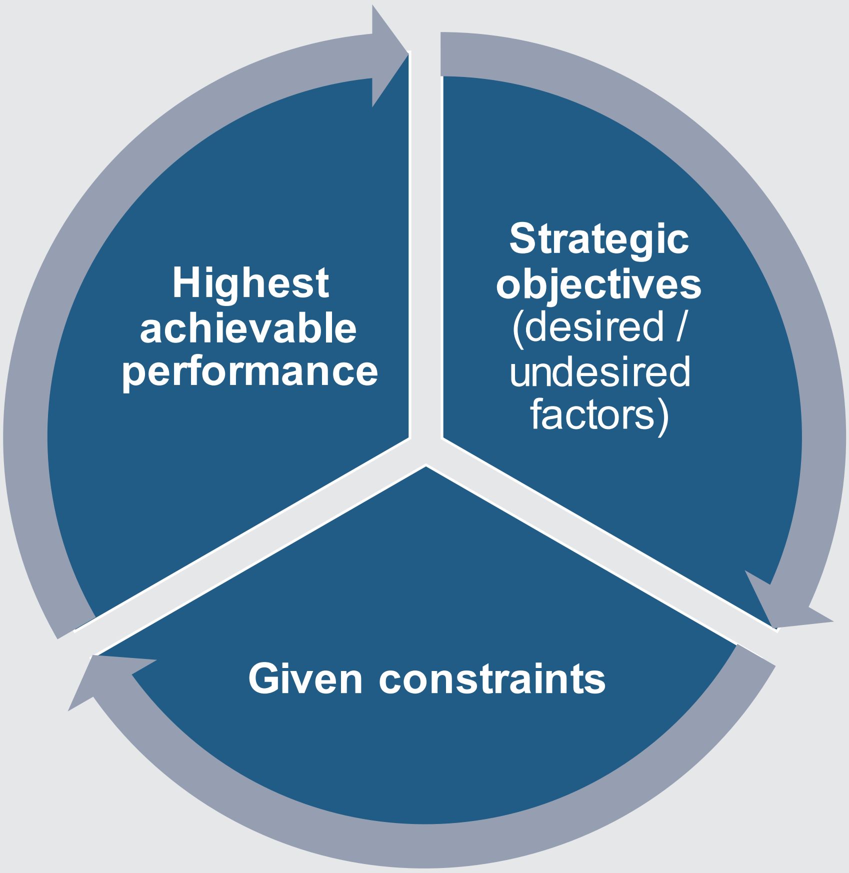
It is advisable to read this document if you are a project sponsor or owner-operator developing a scheme and thinking about taking this project to market or applying for HNIP funding. It considers some of the appropriate evidence that is required to give your project the best chance of success.

For more information see the links on page 22.

What is meant by optimisation?

The concept of optimisation is, in principle, straightforward. A business dictionary definition describes it as:

> *Finding an alternative with the most cost effective or highest achievable performance under the given constraints, by maximizing desired factors and minimizing undesired ones.*



The practice of optimisation is however more challenging. Working out what is most 'cost effective' and the 'highest achievable performance' and understanding project constraints are not necessarily simple tasks; and once these are grasped, it is then necessary to work out what action to take to achieve the best outcomes.

In the context of heat networks, this short paper seeks to break the challenge down, by first considering the objectives against which a project is to be optimised, and then looking in more detail at the two primary – and related – aspects of technical and financial performance.

An important point to note at the outset is that optimisation is a design process where solutions will be revisited and evolved and is likely to require trade-offs. It often has to be undertaken in the context of incomplete information and uncertainty. Understanding the limits of the information held at any one time and the sensitivity of project performance to alternative scenarios – in other words, risk analysis – is a key part of the optimisation process.

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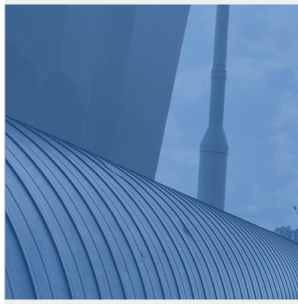
Chapter 1: Objectives and constraints – making good decisions



In the context of delivering heat networks, the aim of optimisation is to bring maximum value to sponsors, investors and other stakeholders. This means understanding what their objectives are and hence what 'value' looks like. It also means understanding any constraints that might limit the achievement of those objectives.

In the context of these objectives and constraints, many decisions will have to be made to optimise the project. Although the logic behind some of these decisions may be implicit, for the purposes of an evidence base for an investment decision it is better to be explicit. The project decisions need to be clear which means the objectives and constraints need to be clear and the right tools applied to assess the project choices against them.

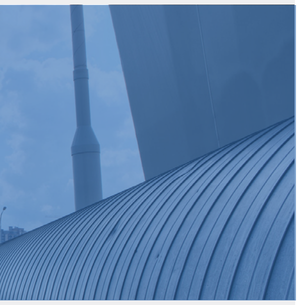
This section outlines some things to consider when approaching the task.

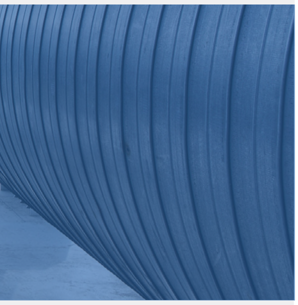
What might the objectives include?

Project objectives must be set out clearly and may involve the following aspects, amongst others:

- Economic – generate a return on investment.
- Social – provide consumer protection, maximise economic and employment/training opportunities.
- Environmental – reduce carbon emissions and improve air quality.
- Technological – be future proofed against technology change and changes in heat sources.
- Legal - comply with all planning requirements and constraints.

The project sponsor's strategic objectives will vary. For a Local Authority, they may include reducing the risk of fuel poverty, as well as reducing emissions. While for a private sector energy company, they may be about expanding existing operations into a new area at least cost; and for a private property developer, they may be about meeting planning obligations or enhancing brand value by deploying low carbon technologies. In all cases, it is likely that a network will change over time and that a trade-off is required between performance now (technical, economic etc) versus benefits in the future. The relative importance of long and short term objectives will have to be understood.





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What might the constraints include?

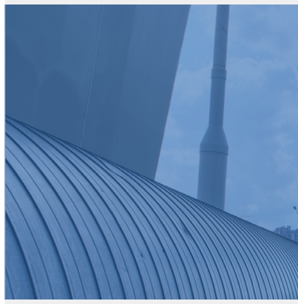
The project will also need to demonstrate how it deals with any constraints, such as:

Wider strategic fit	Ensure alignment with existing work programmes (time) or link to core business (scope)
Budget	Demonstrate return on investment and affordability
Quality	Provide consumer protection to an appropriate standard Include flexibility to deliver long-term improvements in air quality / carbon emissions Comply with planning / legal requirements
Benefits	Demonstrate minimum threshold / optimal economic return to society
Risk	Have a deliverable procurement strategy / supply side capacity / capability Be technically feasible with an acceptable level of risk (commercial / legal) for investors (internal resource)

What tools might be used?

To make decisions about the project the relative merits of the project choices need to be assessed against the project objectives and constraints. Various tools exist which can help you to carry out this assessment process, such as:

- Well known and regularly applied analysis tools such as SWOT (strength, weaknesses, opportunities, threats) and PESTLE (political, economic, social, technical, legal, environmental).
- Group discussion and thinking tools such as Edward de Bono’s Six Thinking Hats; neutral, emotional, analytical, optimistic, pessimistic or organised.
- Risk quantification and risk management.
- Mathematical techniques.



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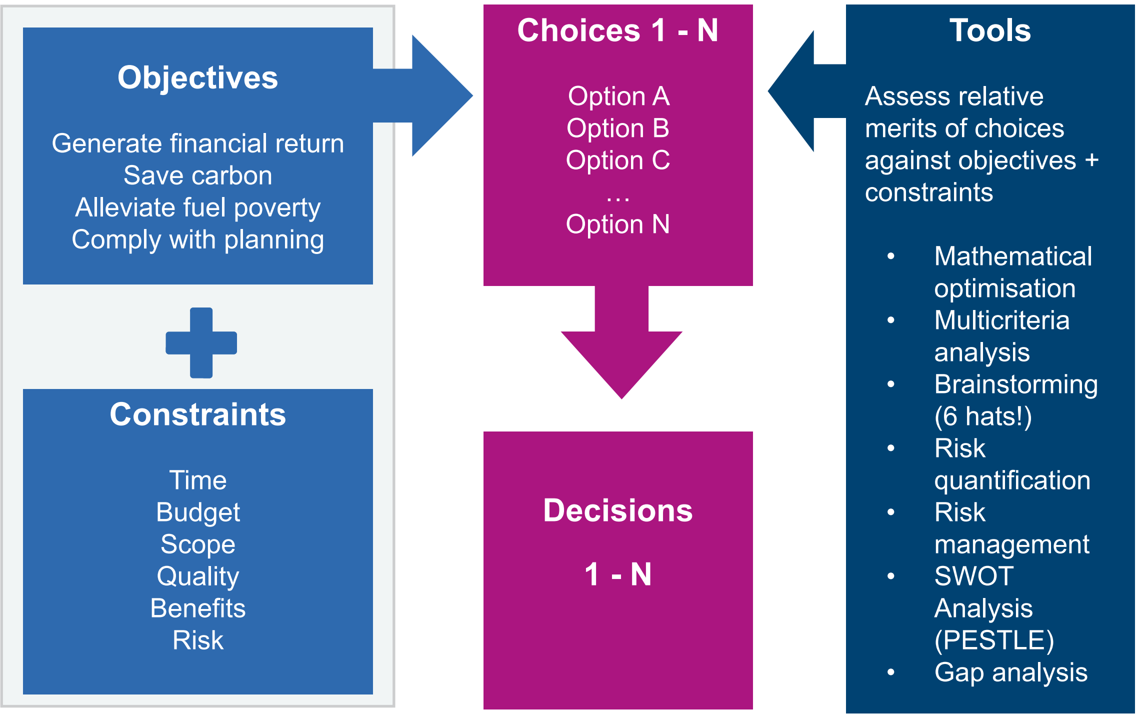
It is likely that some of these tools will be used as part of the project decision making process.

Figure 1: Optimisation = making good decisions



Other things to consider for objectives and constraints

The relative importance of objectives will differ, and it may be necessary to prioritise them. Using available tools and techniques may help with this, such as the ‘MoSCoW method’ for prioritisation (‘Must have, Should have, Could have and Won’t have’).

Objectives and constraints may cross over, and it might not always be clear what is an objective, what is a constraint and what is both. For example, providing a fair heat price may be both an objective and a constraint. It is also important to realise that objectives may change, conflict or be misaligned. It may not be possible to avoid this, so it is helpful to be aware of any misalignment and mitigate this to the extent possible.

Project choices and decisions can have both positive and negative impacts and there may be a need for trade-offs. Some choices may introduce new constraints such that you will need to revisit earlier decisions, as mentioned previously, optimisation occurs during the design process. Some objectives may be such as to eliminate the need to make a choice at all.

Objectives and constraints are always project specific and belong to the project sponsors BUT when seeking external support, to improve your chances of success you may need to:

- Adjust the objectives (e.g. to meet a project partner’s investment criteria).
- Accept additional constraints (e.g. an investor may require additional insurance or a minimum Debt Service Cover Level).

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CHAPTER 2

Chapter 2: The What and How of technical optimisation

Having explored the project objectives and constraints, Chapter 2 looks at some techniques to achieve technical optimisation.

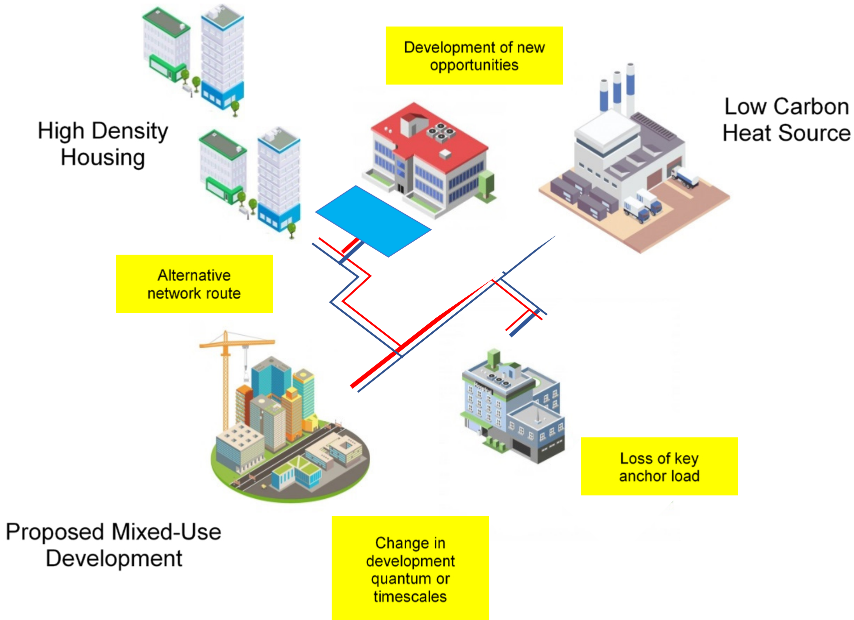
What is technical optimisation?

Technical optimisation examines the options for a technical solution. Things you will need to consider for your heat network include:

- The heat network scope (i.e. which customers will be served).
- The heat network route (for example, expensive low risk vs. a more risky but lower cost shortcut).
- Scheme phasing considering the impact of loss or delay of key customers.
- Timing, location, size and type of heat generation plant.
- The approach to back-up (for example, this could include use of existing plant in existing buildings, distributed around the network).
- Future proofing such as including spare capacity should the scheme expand or ensuring adequate plant room space and accessibility for a change of heat source.

Technical optimisation needs to assess the project's resilience to change, consider sensitivities to assumptions and quantify and manage any risks.

Figure 2: Technical optimisation – things to consider



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How can technical optimisation be achieved?

Getting technical optimisation right involves ensuring the modelling reflects reality – as far as available information allows. For example, a model should consider:

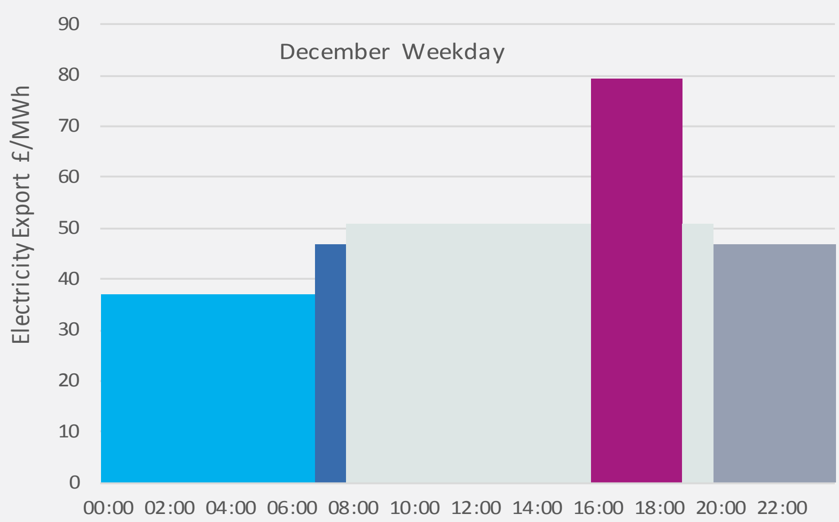
- Accurate heat demand, fuel costs and operation and maintenance costs (O&M)
- Costs that reflect the actual cost base (e.g. £/hour operation for O&M, electricity costs to reflect time of use)
- Include maximum number of plant starts /day
- The impact of operating generation plant at part load i.e. lower efficiency and higher operation and maintenance cost
- Assessment of thermal store
- The impact and accuracy of daily and seasonal demand profiles.

The importance of ensuring modelling reflects reality

In this chart the average tariff over 24 hours is c.£50/MWh. In the case of a CHP plant, if this value were used as an input assumption, modelling might suggest that it would be economic to operate the plant continuously over 24 hours.

However, the chart shows that in reality, night time tariffs are below £40/MWh and as such income from operating the plant at night would be lower. If this more detailed assumption were used, modelling might suggest that income would be insufficient to justify 24 hour operation and that a maximum of 17 hours runtime per day would be economically preferable.

The assumed tariff will therefore have a significant impact on modelled plant operation and hence on plant sizing – a tariff reflecting time of use would tend to result in choosing a larger CHP unit and larger thermal store as these would maximise IRR. Overall, a system optimised on a time of use tariff tends to have a higher IRR than one optimised on a tariff averaged over 24 hours.



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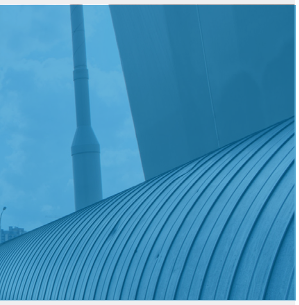

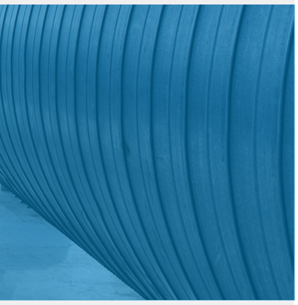

Some approaches to technical optimisation

There are different approaches to optimising a project. Two that are considered here are 1) a strictly mathematical approach, which is good for exploring the interplay between two variables and finding an optimal balance between them; and 2) a more qualitative approach, good for understanding the interplay between multiple factors.

1. A mathematical approach to optimisation

Techno-economic modelling is commonly used in heat network projects. It is used to determine how one technical or economic aspect of a project varies as another is changed. A good use of this technique might be to look at how a project's internal rate of return (IRR) varies with different capacities of low carbon plant as this would allow the size of low carbon plant which delivers the "highest achievable IRR performance" to be identified.

The advantages of this approach are that it is

- Quantitative; and
- Objective.

The limitations are that it

- Includes certain assumptions which therefore creates risk; and
- Only optimises a single criterion (in this case, IRR).

Any modelling is only as good as the assumptions which sit behind it. While this is a limitation, it can also be a helpful tool because a sensitivity analysis on an assumption can be used to quantify the risks inherent within it which should help sponsors make more informed decisions.

Consider Figure 3, which includes two curves of how IRR for a particular project varies with plant size – each curve represents a different set of assumptions for the heat load leading to scenarios as follows:

- Scenario 1 (the blue curve) shows how the scheme will perform if the heat load does not expand beyond the initial phase; whereas
- Scenario 2 (the purple curve) shows how the scheme could be expected to perform with a larger heat load assuming all phases were to be fully built out.

Scenario 1 has a more conservative assumption for the project's heat load and results in a curve of IRR vs. plant size where the optimum plant size is relatively small (shown by the yellow dot, Y1).

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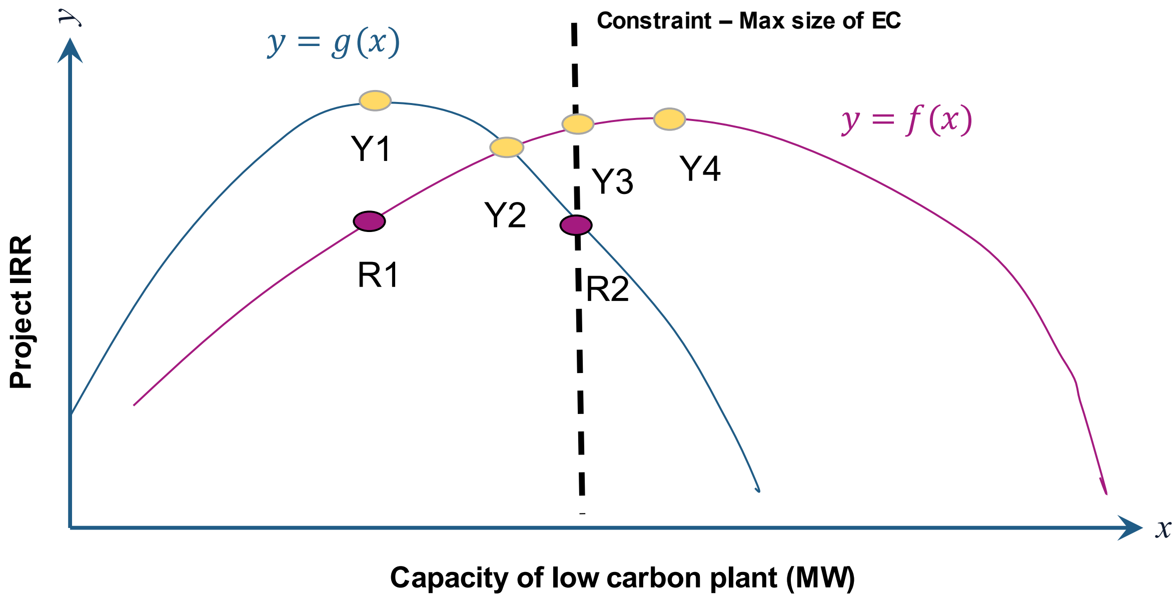
Scenario 2 includes a more bullish assumption around scheme build out which may not materialise and is therefore risky. In this case, the optimum plant size is shown by Y4. However, let us assume there is a known constraint which limits the energy centre to a maximum capacity shown by the dashed vertical line. Taking this constraint into account, the optimum plant size is reduced as shown by the yellow dot labelled Y3.

Figure 3: Example mathematical model to review project IRR



Now let us consider how the scenarios allow the impact (but not probability) of a risk to be quantified.

The risk is that either

- The plant capacity is optimised for Scenario 1 in the anticipation that the scheme may not grow. If the scheme does grow to achieve the performance shown by the red line, the IRR will drop from Y1 to R1; OR
- If the larger plant capacity is selected on the assumption the scheme will be built out (bearing in mind energy centre constraints) BUT only the smaller load anticipated in Scenario 1 arises, the IRR will drop from Y3 to R2.

Depending on the sponsor's risk appetite and assessment of the probability of the two scenarios arising, it may be preferable to select an interim plant capacity as indicated by Y2 to future proof the scheme. This choice represents a trade-off of risk vs. IRR. It is a more resilient plant size which is insensitive to heat load (giving the same IRR in either scenario). Although this compromise gives an IRR that is worse than either Y1 or Y3 it will be better than R1 or R2.

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Another similar scenario analysis could be used to explore the merits of oversizing the heat network from day one to serve the largest anticipated heat load vs. designing the network to meet only the confirmed load. This analysis might be expected to show the cost implications of installing larger pipes now vs. the impact of installing additional pipes at a later date. A sponsor might assess the potential long-term gain to be sufficiently significant and probable to accept the definite short-term pain.

Finally, let us consider an example of how sensitivity analysis around assumptions can be used to develop an approach to managing risk through contractual means.

As well as the assumptions about heat load explained above, both scenarios in Figure 3 also include assumptions around plant availability. These assumptions could be varied to understand how critical availability is. If the sensitivity analysis shows that poor availability could reduce the project IRR below a minimum acceptable level, an approach would need to be developed to managing the risk. One way of addressing this would be to include appropriate minimum performance guarantees around availability in the operation and maintenance contract for the plant to ensure the investor's hurdle rate is safeguarded. The sensitivity analysis should also inform what level of penalties should be included in the contract for failing to achieve this.

2. A multi-criteria analysis approach to optimisation

A limitation of the type of mathematical optimisation above is that it only allows a single criterion to be optimised.

Most projects will be trying to achieve a balanced approach that delivers against a more complicated blend of objectives and so a multi-criteria analysis may be more appropriate. For example, this would allow a project to balance IRR, carbon emission savings and risk.

The advantages of a multi-criteria approach are that

- It remains largely quantitative, while
- Allowing different benefits to be weighed up against one another.

The limitations are that

- The relative weighting given to different criteria are qualitative, and
- Some of the criteria under consideration may be purely subjective.

In the multi-criteria example in Figure 4, for combined heat and power (CHP) (options A, B and C), we can see that carbon savings and IRR are aligned (as the IRR increases, so do the carbon savings and vice versa). Option B is clearly the preferred choice for CHP. However, for a water source heat pump (WSHP), carbon savings and IRR are not quite aligned; if you increase the size of the WSHP from Option E to Option F, the carbon savings increase but the IRR decreases. Choosing a preferred WSHP option is more difficult but let us assume option E is preferred.

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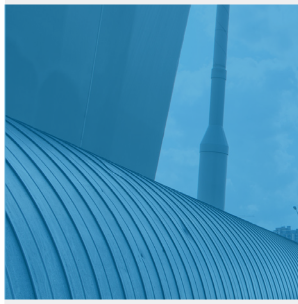

Choosing between CHP and WSHP (option B vs. option E) is a more complicated assessment which will depend on the relative priorities of carbon savings versus IRR and the risk appetite of the project sponsor.

Figure 4: Multi-criteria analysis example

METRIC	OPTION A	OPTION B	OPTION C	OPTION D	OPTION E	OPTION F
Heat source	1MWe CHP	1.3MWe CHP	1.6MWe CHP	2MW WSHP	2.5MW WSHP	3MW WSHP
IRR	5.2%	7.3%	4.1%	4.0%	5.1%	4.9%
Lifetime Carbon saving (ktCO2)	1400	1700	1250	2700	3400	3450
Risk	L	L	M	M	H	H

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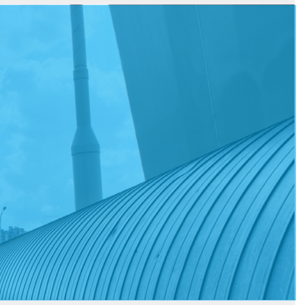
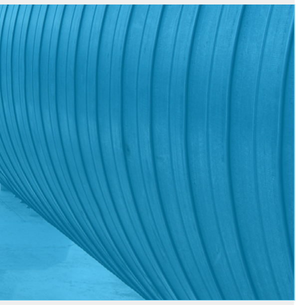


Chapter 3: Optimisation of commercial and financial structures

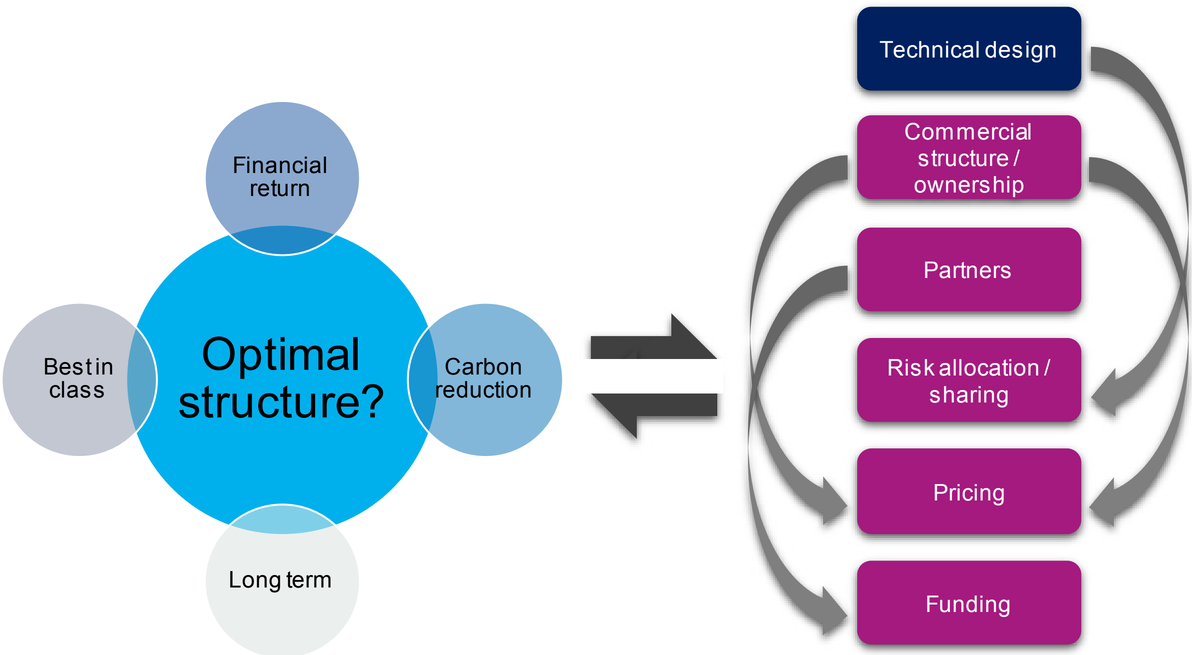


This final chapter addresses commercial and financial optimisation. As we saw in Chapter 1, the starting point needs to be the strategic objectives of the project, which will vary depending on project sponsor. For example, a Local Authority's objectives may relate to reducing fuel poverty and emissions whereas a private developer may be seeking to maximise value whilst deploying low carbon technologies.

Once the objectives are set, it is helpful to consider what 'levers' can be pulled to achieve them. Figure 5 indicates some of the key ones such as the commercial structure or delivery vehicle, project partners (including operational partners) and how risk is shared with them, as well as pricing, tariffs and funding.

As with technical optimisation, financial and commercial optimisation is a design process which will see solutions revisited and evolved and is likely to require trade-offs. Technical design is usually dealt with first but as outlined in Chapter 2 technical optimisation also needs to consider financial and economic matters. It is important to note that all these elements interact.

Figure 5: Optimisation of commercial and financial structures



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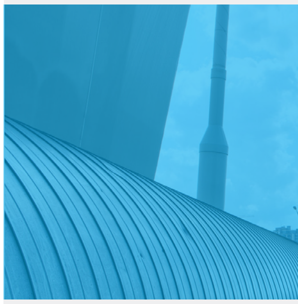


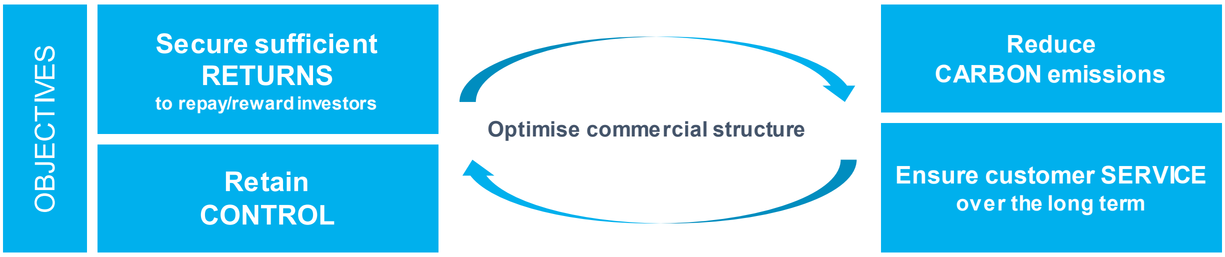
Many aspects of commercial optimisation will seem to be ‘common sense’ and as such to be implicit in decision making. However, for the purposes of a due diligence exercise, gaining support for the project or making an investment decision, it is better to be as explicit as possible to demonstrate that sponsors have a clear rationale and fully understand risk.

The following sections look at three areas of optimisation. In practice, these will be linked.

Optimisation of commercial structures

Figure 6 lists some of the variables that will need to be considered to optimise your commercial structure, in the context of objectives such as retaining control and rewarding investors while at the same time reducing carbon emissions.

Figure 6: Considerations for optimisation of commercial structures



COMMERCIAL STRATEGY

Variables	Some considerations
Delivery Vehicle e.g. in house or special purpose vehicle (SPV)	When to set up SPV? As a key party to contracts, it needs to be done up front
Joint venture partner(s)	Who is best to partner with? Will they be providing technical or other inputs?
DBOM / D&B + O&M etc	DBOM or separate D&B and O&M – pros and cons of each
Contracts / risk allocation	
Customer engagement / billing & metering	Billing & metering – can be lower cost but may lose key interface with customers?
Exit strategy / refinancing strategy	Planning for exit or refinancing – useful to have suitable contracts in place up front
Network expansion	

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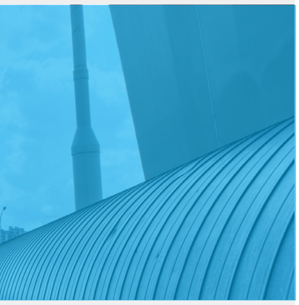

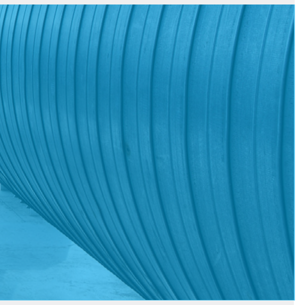

Commercial considerations might include:

- **What does your delivery vehicle look like?**

  This will differ depending on project sponsor; a property developer might have a different approach from that of an energy company. Do you want to set up a Special Purpose Vehicle (SPV) to own and operate the heat network assets or do you prefer to keep the project in-house as part of an existing corporate structure? A SPV can have advantages such as helping to insulate the sponsor from (some) project risk and facilitating third party investment, however it is likely to take longer to set up, timing being important. Some project developers will only consider setting up a SPV for a project over a certain size threshold.

- **Joint venture / level of control – who is it best to partner with?**

  This requires considerations in relation to quality and value for money as well as risk. Partners may bring expertise as well as, or instead of, finance.

- **What is your procurement approach?**

  Decisions need to be made around how to package up the project (as a single turn-key contract or as separate discrete packages of works) as well as around the type of contract (e.g. Design, Build, Operate & Maintain (DBOM) versus separate D&B and O&M). There will be pros and cons for each. For example, a single turn-key contract may be more straightforward and include less client involvement, but separate packages may enable better value for money to be realised; a DBOM model will mean that whoever is designing and constructing the project (or distinct package) will have a long-term interest in ensuring operations are efficient and effective but separate D&B / O&M contracts can be effective for aspects of the project where performance is less critical or not co-dependent on both design and operation.

- **Contracts and risk allocation**

  As seen in Figure 7, there are a wide range of relationships between the various different parties, each of which will need to be considered, negotiated, and clearly defined. Setting up a robust contractual framework reduces risk and hence can lower the cost of finance.

- **What relationship do you want with your customers?**

  Some providers may want to retain close customer engagement, particularly where they have a long term relationship with tenants (e.g. a property developer that retains ownership of the development, or a housing association supporting vulnerable households), others may be happier with something more distant. For the former, contracting with a specialist metering and billing provider might be preferable or even bringing the service in-house, while for the latter handing full responsibility to a third party energy services company (ESCo) may be preferable.

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- **What is the long-term strategy and exit agreement?**

  Networks are likely to change over time and there could be a trade-off between performance now (technical, economic etc) vs benefits in the future. Long-term considerations can impact on drafting of contracts at the start. They may also affect decisions around commercial vehicle (e.g. exiting from a SPV is likely to be more straightforward than from a project that is established in-house).

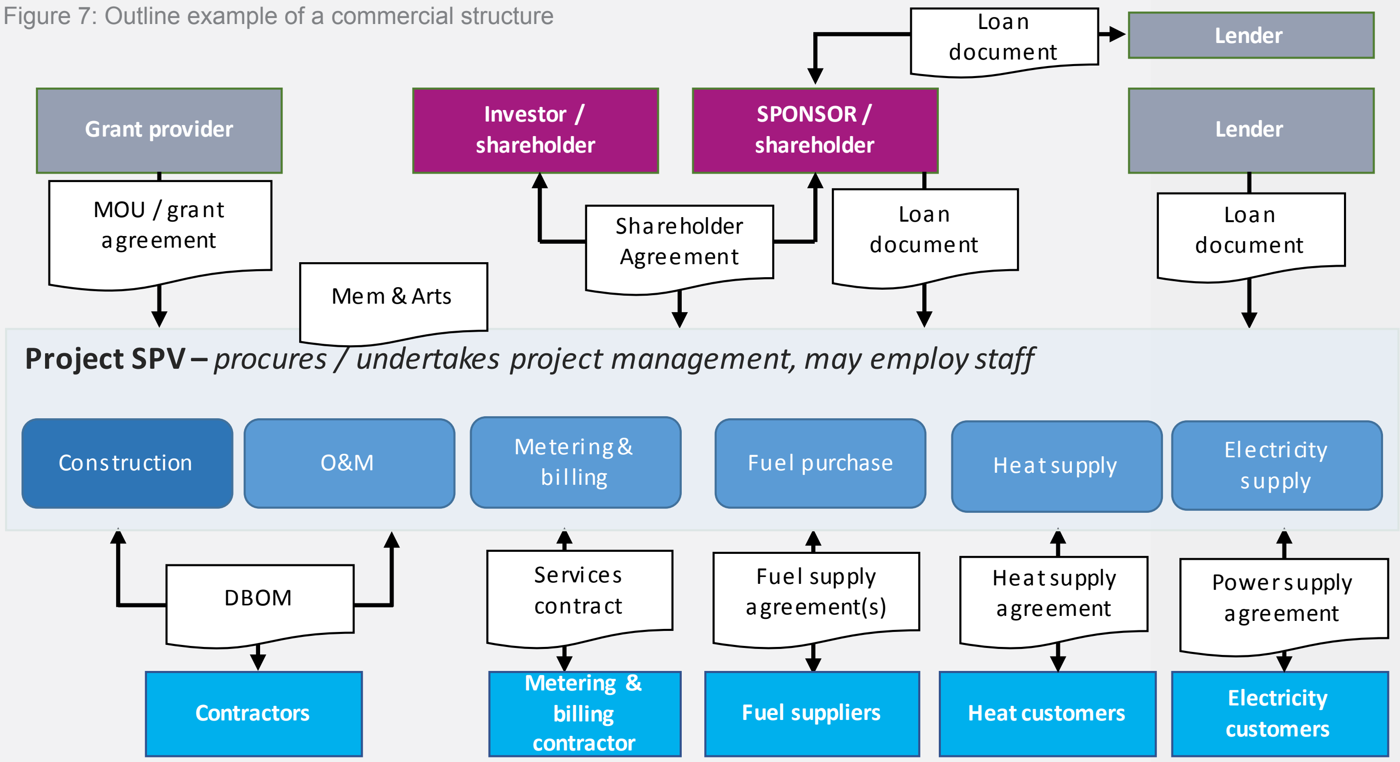
- **What opportunities are there for future network expansion?**

  Also taking the longer term view, it is important to take into account future opportunities for expansion when making both technical and contractual decisions at the earlier stages of project development (e.g. around the specification of a 'red line boundary' for a project let out under a Concession Agreement).

Example of a commercial structure

Figure 7 is an example of a commercial structure involving the creation of a Special Purpose Vehicle (SPV) for the project. The schematic shows some of the legal documents that would need to be put in place, each one setting out an appropriate allocation of risk and reward between the parties to the contract or agreement. This is an important aspect of commercial optimisation. If this is done well, risk is allocated to the party best able to manage it and therefore at least cost to the project.

Figure 7: Outline example of a commercial structure



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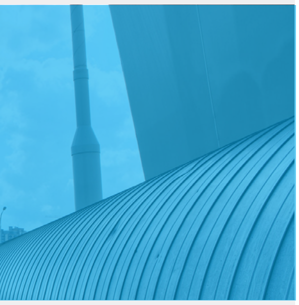
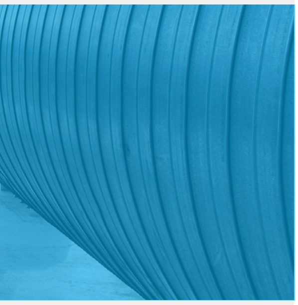




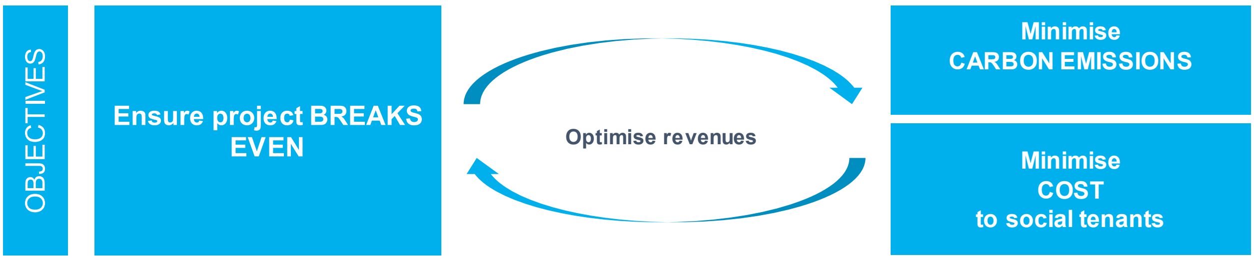
Revenue Optimisation

Optimising revenue has two aspects to it, quantity and price. Quantity – how much energy is supplied – is largely a technical matter which will be considered as part of the technical optimisation discussed above (although in some cases, there may be a desire to require minimum volume guarantees in order to secure sufficient income). Price – tariff setting – is considered here.

As indicated in Figure 9 there are two factors to balance when optimising tariffs: the costs of providing the energy as incurred by the heat network operator; and the costs the market will bear (typically based on the costs of the most likely alternative or 'counterfactual'). The challenge is to find the 'sweet spot' somewhere between the two where applying the tariff to the minimum anticipated volume of heat to be sold generates an income sufficient to cover the costs of the project and is at the same time acceptable to the consumer.

There are a number of variables to consider when optimising tariffs (Figure 8).

Figure 8: Considerations for revenue optimisation



TARIFF STRATEGIES

Variables
Customer specific tariffs
Variable / fixed split
Connection charges
Indexation
Basis of charges £/kW? £/m2?
Discount against market rates
Electricity – private wire
Bulk supply

Some considerations
Can lower tariffs for social tenants (discount against market rates); but still need to manage all tariffs within context of market equivalent
Need to be careful not to load too much into fixed element – seen as non-transparent. Also need to consider what is reasonable to pass on to end consumer and what should be covered by landlord
Indexation is critical to future values – link to existing commodity price eg. gas? Or to actual running costs? Be careful of long term lock in
Complexities & costs of private wire – few larger customers more likely to be achievable than lots of smaller ones

Some of the variables that need to be considered are expanded below:

Variable / fixed split – the inclusion of a fixed or standing charge has the potential to improve the overall financial viability of a project by establishing a secure revenue stream that covers all or a proportion of the fixed operating costs. However, this needs to be considered in the light of consumer perception and market factors. A consumer survey suggests that this is a contentious area and consumers often do not fully understand what the fixed element is for.

Bulk supply / end customer supply – projects may be supplying domestic customers indirectly via a bulk supply to a single building owner / manager. Consideration should be given as to how this bulk supply is passed on to end consumers. The pros of bulk supply include fewer relationships to manage and less credit risk, while cons include possible operational risk (bulk supply typically means the building manager manages the secondary (and any tertiary) systems rather than the network operator, however these systems have a critical impact on heat network performance which could cause problems if they are not under the network operator's control).

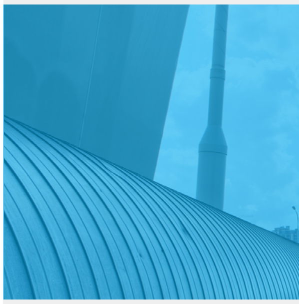
Price discounts – the use of discounts (against a counterfactual) may be appropriate for certain end user groups (e.g. to address fuel poverty) or may be necessary when negotiating with a key customer. However, they need to be considered in the context of the network operating costs and whether the resulting reduction in revenue is affordable by the project.

Operational incentives – tariffs can be structured to influence consumer behaviour in a way that improves scheme performance, for example, offering a discount for lower return temperatures, or related to time of day. These alternatives are relatively new to the UK market but are increasingly being considered.

Electricity – setting electricity tariffs differs from setting heat tariffs as electricity is a regulated commodity and as such there are more issues to take into account. Some areas to consider include:

- Potential for private wire opportunities in the heat network area whereby electricity can be sold at retail value. Although selling electricity through a private wire arrangement can help optimise revenues there are additional costs and complexities that must not be forgotten.
- Potential for maximising electricity revenue through technological innovation e.g. battery storage and/or demand side response either directly or indirectly through a third-party provider.

Indexation – it is of critical importance to understand the underlying elements of cost and revenue for the project and apply appropriate indices. As with other aspects of commercial optimisation, selecting an index requires an understanding and appropriate allocation of risk. Examples include: linking domestic tariffs to a basket of standard gas tariffs or linking commercial tariffs to a wholesale gas price.



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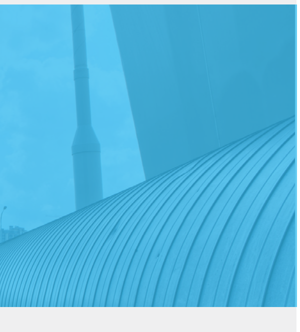
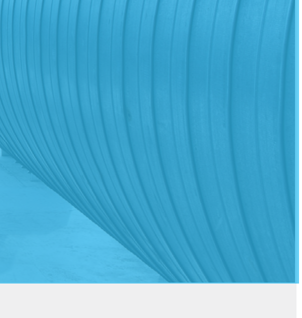
A note on heat tariff constraints

The heat tariff is key to commercial optimisation. There are many factors that impact upon it and many ways in which it can be structured. This needs to be considered in relation to the objectives and constraints outlined in Chapter 2.

Figure 9 - Heat tariff constraints





Optimisation of funding sources

Figure 10 provides examples of potential funding sources and some considerations to take into account when opting for one rather than another. As for all optimisation, different funding sources need to be considered in the context of the constraints and objectives as outlined in Chapter 1.

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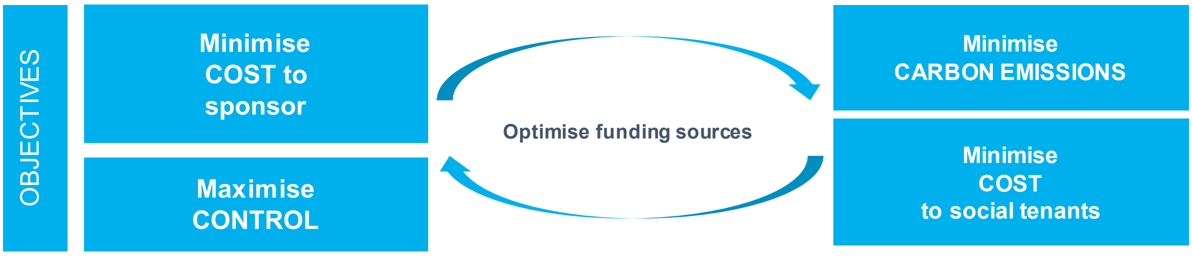
Figure 10: Considerations for optimisation of funding sources



FUNDING STRATEGIES

	Options	Some considerations
Capital offset	Connection charges	Start with seeking to reduce capex through value engineering but be sure this does not jeopardise quality of service or ability to reduce emissions
	Developer contribution	
	Grant	Grants low cost but conditions attached; developer contributions may come with timing issues
Debt	Public sector – PWLB	Loans – cost less if risk can be minimised, eg. through good contract negotiation and suitable contract terms (eg. on DBOM, fuel supply agreements, heat off take agreements etc)
	Bank loan	
	Corporate bond	
	Lease finance	Equity investors – tend to be more expensive, may also involve some dilution of control. May want to retain control to ensure quality of service.
Equity	From shareholders	

Funding sources have been grouped under headings of: 'capital offset' – i.e. funding with zero finance cost (but note such funds may have other 'costs' attached such as administration, or a trade-off in the form of higher operating costs); debt; and equity. Each have different expectations of risk and reward and hence different costs.

As with all financing decisions, issues to consider include:

Timing – How long does it take to secure the finance? What is the timing of market engagement? How does this fit with the rest of the project programme?

Risk – Is there a good understanding of risk? Where does it sit, how can it best be managed / mitigated and by which party?

Legal support – Is there access to good legal / commercial support for contract drafting / negotiation and / or availability of standard contracts (e.g. heat supply agreements, Power Purchase Agreements)?
The better the contractual drafting, the lower the risk and the lower the cost of finance.

Scale – Do some funding sources 'fit' better based on project scale (e.g. project finance loans)?

Funder requirements – Does the project meet funder requirements such as those set out by BEIS/HNIP? What are the conditions attached to funding? Is it recourse or non-recourse?

Capital constraints – on balance sheet finance might be cheaper but exposes the sponsor to project risk; the project will need to compete with other potential capital projects.

Further information

Further details and guidance on the HNIP scheme can be found at the following links. Alternatively, please contact: heatnetworks@beis.gov.uk

Heat networks: guidance for developers and the supply chain
https://www.gov.uk/government/collections/heat-networks-guidance-for-developers-and-the-supply-chain

Heat Networks Investment Project (HNIP) – home page
https://www.gov.uk/government/publications/heat-networks-investment-project-hnip

HNIP Scheme Overview document - a summary of the main features of the HNIP scheme
https://www.gov.uk/government/publications/heat-networks-investment-project-hnip-scheme-overview

What is a heat network?
https://www.gov.uk/guidance/heat-networks-overview#what-are-heat-networks

Learning from the HNIP Pilot
https://www.gov.uk/government/publications/evaluation-of-the-heat-networks-investment-project-hnip-pilot-scheme

Heat Networks case studies
https://www.gov.uk/government/publications/heat-network-case-studies

Evaluation of the Heat Networks Investment Project: Pilot Process Report
https://www.gov.uk/government/publications/evaluation-of-the-heat-networks-investment-project-hnip-pilot-scheme

Evaluation of the Heat Networks Delivery Unit
https://www.gov.uk/government/publications/evaluation-of-the-heat-networks-delivery-unit

Estimating the cost reduction impact of the HNIP on future heat networks (Carbon Trust)
https://www.gov.uk/government/publications/estimating-the-cost-reduction-impact-of-the-heat-networks-investment-project-on-future-heat-networks

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If you would like to find out more about the Heat Networks Investment Project, please visit:
https://www.gov.uk/government/publications/heat-networks-investment-project-hnip

Or contact: heatnetworks@beis.gov.uk

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