

# Hampshire County Council Winchester District Energy Scheme

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*Part 1 - Financial Analysis*

*Part 2 – ESCo Structure and Procurement Approach*

Final Issue

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## PART I – FINANCIAL ANALYSIS

### 1 INTRODUCTION

- 1.1.1 The approach to the development of the financial model can be summarised as five distinct stages:
- a Extract suitable data from the Parsons Brinckerhoff “Detailed viability assessment of a Winchester District Energy Scheme” to form the basis of the energy loads, capital expenditure and annual operating cost assumptions within the model for the following:
    - i Base case
      - a. Option 1 – West scheme future proofed for connection to the East, operational from 2019
      - b. Option 2a – West scheme connected to Elizabeth Court II North & West and Elizabeth Court II South, connected 2019
    - ii Upside to option 2a
      - c. Option 2b1 – 2a + additional load north of Elizabeth Court II, connected 2019
      - d. Option 2b2 – 2b1 + HM Prison, connected 2022
      - e. Option 2b3 – 2b2 + Police HQ, connected 2025
      - f. Option 2b4 – 2b3 + Law Courts, connected 2026
      - g. Option 2b5 – 2b4 + River Park Leisure Centre, connected 2028
    - iii BAU comparator for the University of Winchester, the Royal Hampshire County Hospital and Elizabeth Court II North & West and Elizabeth Court II South.
  - b Using industry data develop assumptions for tariff growth rates, funding and general inflation assumptions;
  - c Undertake financial modelling to establish the viability of each of the two base case options identified based on delivery models identified by the Council.
  - d Validate the chosen assumptions with the Council project team, and
  - e Based on an assessment of the risks identify and model a range of sensitivities on the two base cases.
- 1.1.2 A detailed financial model for the Project has been developed for the two base case options based on a public sector funding model. In addition a Business as Usual comparator was developed for Options 1 and 2a. The key financial risks of the project were discussed with the Council and sensitivities agreed. The results of the financial analysis are set out in the remainder of this section.

### 2 OVERVIEW OF THE DELIVERY MODELS

- 2.1.1 The key assumptions made in relation to the options identified are set out in Table 1.

Key Assumptions		
Costs	Revenue sources	Funding
<ul style="list-style-type: none"> <li>• Gas import for CHP</li> <li>• Power Import</li> <li>• O&amp;M costs for CHP</li> <li>• Capital costs for CHP</li> <li>• SPV costs</li> </ul>	<ul style="list-style-type: none"> <li>• Heat sales to stakeholders</li> <li>• Power sales to stakeholder</li> <li>• Power export to grid</li> </ul>	Public sector funding (Prudential Borrowing)

Table 1 Schemes and the key financial modelling assumptions

### 3 HEAT AND POWER SALES TARIFFS

#### 3.1 Tariff baselines

3.1.1 For the defined options the main cash in-flow within the financial model is the income from the sale of heat and power which is sold to users as set out in Table 2. Any reduction in carbon reduction commitment payments are assumed to accrue to the individual organisations and are not included in the project cashflow. The main cash out-flows within the financial model are in the form of gas purchase, power import, maintenance and financing costs.

3.1.2 As a result of the technical requirements of the project it is assumed that the entity operating the district heating network will meet all of the electrical demand of the University of Winchester and the Royal Hampshire County Hospital. This demand will be met by a combination of power generated from the CHP engine and power imported from the grid. It is assumed that the entity operating the district heating network will import power from the grid at the same terms as the University; this is a working assumption that utilises the highest tariff under the project as it therefore the most conservative approach.

Scheme	Power Sales	Heat Sales
<b>Base case</b>		
Option 1	University of Winchester Royal Hampshire County Hospital	University of Winchester Royal Hampshire County Hospital
Option 2a	University of Winchester Royal Hampshire County Hospital	University of Winchester Royal Hampshire County Hospital Elizabeth II Court North & West Elizabeth II Court South
<b>Upside</b>		
Option 2b1	University of Winchester Royal Hampshire County Hospital	University of Winchester Royal Hampshire County Hospital Elizabeth II Court North & West Elizabeth II Court South North Connection 102, Registrars Office 86, Victoria House Capital House Discovery Centre Gladstone Street Car Park Record Office Worthy Lane Car Park
Option 2b2	University of Winchester Royal Hampshire County Hospital	University of Winchester Royal Hampshire County Hospital Elizabeth II Court North & West Elizabeth II Court South North Connection 102, Registrars Office 86, Victoria House Capital House Discovery Centre Gladstone Street Car Park Record Office Worthy Lane Car Park HM Prison
Option 2b3	University of Winchester Royal Hampshire County Hospital	University of Winchester Royal Hampshire County Hospital Elizabeth II Court North & West Elizabeth II Court South North Connection 102, Registrars Office 86, Victoria House Capital House Discovery Centre

Scheme	Power Sales	Heat Sales
		Gladstone Street Car Park Record Office Worthy Lane Car Park HM Prison Police HQ
Option 2b4	University of Winchester Royal Hampshire County Hospital	University of Winchester Royal Hampshire County Hospital Elizabeth II Court North & West Elizabeth II Court South North Connection 102, Registrars Office 86, Victoria House Capital House Discovery Centre Gladstone Street Car Park Record Office Worthy Lane Car Park HM Prison Police HQ Law Courts
Option 2b5	University of Winchester Royal Hampshire County Hospital	University of Winchester Royal Hampshire County Hospital Elizabeth II Court North & West Elizabeth II Court South North Connection 102, Registrars Office 86, Victoria House Capital House Discovery Centre Gladstone Street Car Park Record Office Worthy Lane Car Park HM Prison Police HQ Law Courts River Park Leisure Centre

**Table 2 Scheme heat users**

3.1.3 The current heat and power sales tariffs of the stakeholders were determined through consultation. The heat and power tariffs are set out in Table 3. No tariff information was available for the heat loads associated with options 2b1-2b5, the University heat tariff was therefore used as a proxy.

Tariff	Value	Source	Comments
Heat Sales Tariff 1	2.956p/kWh	Hampshire County Council	Based on gas price and boiler efficiency of 82%
Heat Standing Charge 1	£7,647 per annum	Hampshire County Council	Based on £ 20.95 per day
Heat Sales Tariff 2	2.950p/kWh	Hampshire County Council	Based on gas price and boiler efficiency of 82%
Heat Standing Charge 2	£12,691 per annum	Hampshire County Council	Based on £34.77 per day
Heat Sales Tariff 3	4.463p/kWh	University of Winchester	Based on gas price and boiler efficiency of 80% Average of 2014 including CCL
Heat Standing Charge 3	N/A	University of Winchester	None applied
Heat Sales Tariff 4	2.945p/kWh	Royal Hampshire County Hospital	Based on gas price and boiler efficiency of 80%
Heat Standing Charge 4	£48,203 per annum	Royal Hampshire County Hospital	Based on £573.85 per building and 7 buildings
Power Sales	11.450p/kWh	Hampshire County Council	Day rates

Tariff	Value	Source	Comments
Tariff 1			
Power Standing Charge 1	£5,964 per annum	Hampshire County Council	Based on £49.70 per day
Power Sales Tariff 2	11.806p/kWh	Hampshire County Council	Day rates
Power Standing Charge 2	£5,964 per annum	Hampshire County Council	Based on £49.70 per day
Power Sales Tariff 3	11.510p/kWh	University of Winchester	Day rates
Power Standing Charge 3	N/A	University of Winchester	N/A
Power Sales Tariff 4	11.510p/kWh	Royal Hampshire County Hospital	No values provided – University figures used
Power Standing Charge 4	N/A	Royal Hampshire County Hospital	No values provided
Gas Import Tariff	2.918p/kWh	DECC Energy and Emissions Projections September 2014	Reference Scenario, Services 2014
Power Export Tariff	4.493p/kWh	DECC Energy and Emissions Projections September 2014	Wholesale prices 2014
Electricity Import Tariff	11.510p/kWh	University of Winchester	Day rates

**Table 3 Energy Tariffs**

3.1.4 The base case analysis is based on the assumption that the provision of heat and power from the network would cost no more than the provision of energy under each of the key stakeholder's current arrangements, taking into account all of the costs elements, i.e. tariffs, standing charges, operational costs, etc.<sup>1</sup>. This is achieved through adjustment of the variable tariffs (p/kWh) as all other cost elements are fixed costs. It was assumed that any adjustment to the heat and power tariff would be applied equally. Goal Seek analysis resulted in the following variable tariff for the key stakeholders under Option 1 and Option 2a.

3.1.5 Sensitivity analysis was run to establish whether a further reduction in the tariffs could be provided to the key stakeholders. The reduction represents a discount against their current costs and an incentive to connect to the project. The results of this sensitivity are set out in 6.5.

Tariff	Key Stakeholder	Original Tariff (p/kWh)	Option 1		Option 2a	
			Percentage reduction from current tariff (%)	Resulting tariff (p/kWh)	Percentage reduction from current tariff (%)	Resulting tariff (p/kWh)
Heat Sales Tariff 1	Hampshire County Council	2.956	N/A	N/A	6.30	2.770
Heat Sales Tariff 2	Hampshire County Council	2.950	N/A	N/A	6.30	2.764
Heat Sales Tariff 3	University of Winchester	4.463	0.24	4.445	0.30	4.449
Heat Sales Tariff 4	Royal Hampshire County Hospital	2.945	4.29	2.818	4.39	2.282
Power Sales Tariff 1	Hampshire County Council	11.450	N/A	N/A	6.30	10.728
Power Sales	Hampshire County Council	11.806	N/A	N/A	6.30	11.062

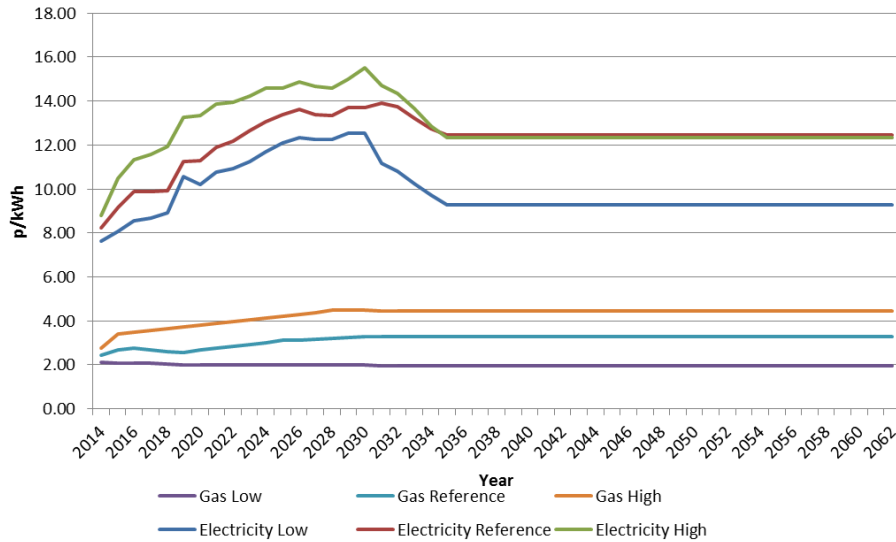
<sup>1</sup> It should be noted that the heat and power tariffs are indicative and based on the levels of usage under Option 1 and Option 2a. Should the project be progressed detailed discussions will be required to establish appropriate tariff structures that reflect the risk allocation and volume of usage of key stakeholders in the selected project.

Tariff	Key Stakeholder	Original Tariff (p/kWh)	Option 1		Option 2a	
			Percentage reduction from current tariff (%)	Resulting tariff (p/kWh)	Percentage reduction from current tariff (%)	Resulting tariff (p/kWh)
Tariff 2						
Power Sales Tariff 3	University of Winchester	11.510	0.24	11.482	0.30	11.476
Power Sales Tariff 4	Royal Hampshire County Hospital	11.510	4.29	11.016	4.39	11.004

**Table 4 Base case energy tariffs**

### 3.2 Energy Price Indexation Forecasts

- 3.2.1 In order to estimate future heat and power prices, projections from the Department of Energy and Climate Change (DECC) were used. The movement in the underlying gas tariff (real) was used as the basis for the movement in the heat tariff and the electricity movement for all electricity tariffs.
- 3.2.2 The DECC forecasts are based on three scenarios, being Low, Reference and High. The base case financial model used the DECC Reference Scenario forecasts as the basis for the increases to the underlying tariffs, with the alternative scenarios (Low and High prices) being considered as part of the sensitivity testing.
- 3.2.3 It is important to note that forecasting fuel prices into the future is challenging, as they depend on a large number of political, social and economic factors. DECC have provided forecasts of the real tariff prices from 2014 to 2035. Beyond this period it is not possible to predict the energy market accurately or the impact of any legislation. As a result the assumption used in the financial model is that the underlying real increase to the tariffs is assumed to be 0% per annum.
- 3.2.4 The steady increase over time between 2014 and 2035 is the impact of energy and climate change policies on electricity prices is primarily due to the EU Emissions Trading System (EU ETS) and Renewables Obligation (RO). Future changes will be impacted by the Energy Market Reform and FIT Contract for Difference. The Renewable Heat Incentive (RHI) is estimated to have the biggest impact on gas prices.
- 3.2.5 Additional factors include future economic growth, the development of new technologies, global climate change policies and the strategies of resource holders (such as OPEC). The DECC figures are recognised in the energy industry as the best available forecasts for future energy prices, as they take into account government policy and wider industry information in their projects. As such we have used the range of DECC forecasts as the basis of our work whilst recognising the inherent difficulty in forecasting future energy prices.
- 3.2.6 It should be noted that any changes to these policies at either a national or European level could significantly impact the headline estimates of future prices.
- 3.2.7 Figure 1 below shows the real increase in the gas and electricity prices based on the data available as part of the three DECC scenarios and used in the financial model.

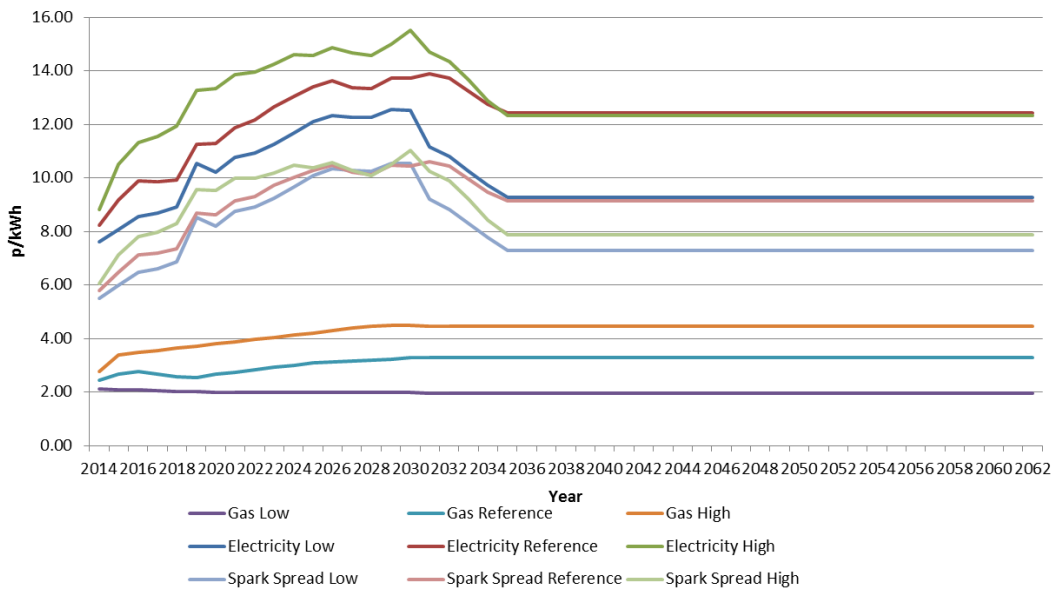


**Figure 1 Graph of real gas and electricity prices 2014 -2062**

3.2.8 It can be seen that under the reference scenarios there is a real uplift in gas price between 2014 and 2030 while the low scenario decreases slightly between 2014 and 2018 then remains broadly at the same level from 2018 until 2029. It can also be seen that there is significant fluctuation in the electricity forecasts over the period 2014 to 2015, with an overall increase from 2014 to 2030 and a decrease from 2030 to 2035.

3.2.9 While the initial price of the different tariffs included in the financial model (import, export and usage) the variations described by the DECC forecast apply to all three elements with slightly greater fluctuation in the retail prices as a result of policy changes.

3.2.10 Figure 2 shows the graph again with the fluctuation in spark spread (difference between the purchase price of gas and sale price of electricity for the project). It can be seen that the most significant influence on the spark spread is the electricity forecast fluctuations as the gas forecast is more stable.



**Figure 2 Graph of real gas and electricity prices 2014 -2062 with 'spark spread escalation'**

- 3.2.11 In order to convert the above real tariffs into nominal tariffs an additional input, assuming a 2.5% increase per annum to factor in inflation, has been included. The assumed DECC forecast in the base case is the reference scenario. The impact of this forecast is moderate for the project as the gas price remains consistent throughout the majority of the project term.
- 3.2.12 Table 5 sets out the average increase per annum over the lifetime of the project based on the DECC forecasts + 2.5% RPI inflation and a flat increase of 5% per annum (including inflation). Full references for the basis of the DECC forecasts is included in Appendix 1.

Indexation element	Average rate (%) over 45 years	Average rate (%) over 21 years of DECC projections
Flat rate (including inflation)	5.0	5.0
<b>DECC Reference</b>		
Heat Export	3.2	4.0
Gas Import	3.3	4.2
Electricity Import	3.6	5.3
Electricity Export	3.6	5.3
Electricity Usage	3.7	5.2

**Table 5 DECC Reference Scenario Indexation assumptions compared to HCC 5% total annual increase**

- 3.2.13 It can be seen that the DECC reference scenario is broadly comparable over the first 21 years of the project, the period over which the energy prices can be reasonably predicted. Beyond this period greater uncertainty results in future energy prices and any potential impact on the project viability. The key tool for mitigating this risk will be the heat and power supply agreements which will need to be established with each of the end users. Such contracts typically include clauses which provide a mechanism by which the heat and power sales prices are benchmarked, market testing and adjusted and the timings/triggers for the review.

## 4 FUNDING

### 4.1 Funding Assumptions

- 4.1.1 The funding assumptions for the base case options are set out in the following table:

Option	Capital Expenditure (£'000) <sup>2</sup>	Indexed to 2018/2019 prices at 2.5% p.a. (£'000)	Interest during construction (£'000)	Total funding requirement (£'000)
1	6,528	7,205	251	7,457
2a	8,431	9,307	325	9,631

**Table 6 Funding assumptions for each scheme**

- 4.1.1.1 Based on discussion with the Council at a workshop held on 25<sup>th</sup> March 2015 it was agreed that the base case would be to assume public sector funding for both options in the form of prudential borrowing. It is possible that other forms of funding could be available to support the project, including funding from the Green Investment Bank and European Funds.
- 4.1.1.2 The public sector funding requirement is fulfilled through a combination of prudential borrowing and pinpoint share capital (£0.025m). The pinpoint share capital is the equity injected, by the Council, into the project company to capitalise it. A rate of 3.5% has been assumed for the base case, with a sensitivity modelled at 4.0%.

<sup>2</sup> The capital expenditure excludes the cost of connection of the proposed private wire to the existing DNO assets or removal and disposal of the existing DNO assets as this cost has not yet been established. A request to the DNO has been made, however this is estimated to be in the region of £330k. For further details refer to the Parsons Brinckerhoff "Detailed viability assessment of a Winchester District Energy Scheme".

4.1.1.3 The debt is drawn down in a single tranche and repayments are on an annuity basis. Under the base case repayments are made on a forty five year basis, a further sensitivity is made on a twenty five year basis. Interest charged during construction is capitalised into the loan. The forty five year basis is common in the district heating sector and reflects the large upfront capital investment, lifecycle of the plant and equipment and steady, long term revenue streams which characterise such projects.

4.1.2 The funding assumptions reflect the project risk profiles which are heavily dependent on the public heat loads.

## **4.2 Working Capital, Tax, VAT and Accounting Assumptions**

4.2.1 The financial model has been developed on a cash basis, and therefore does not include any calculations, workings or assumptions for working capital, corporation tax or VAT. In addition neither IFRS nor UK GAAP accounting treatment has been applied to the financial model outputs.

## 5 RESULTS

### 5.1 Base case summary

- 5.1.1 The results of the base case options modelled over a 45 year period are outlined in Table 7. There are a number of precedents for long term district heating contracts in the UK, with multiple contracts with a project period of 40-80 years.
- 5.1.2 A detailed breakdown of the capital, lifecycle and operational elements<sup>3</sup> is provided in Parsons Brinckerhoff report “Detailed viability assessment of a Winchester District Energy Scheme”.<sup>4</sup>

Result	Option 1 £'000 Nominal	Option 2a £'000 Nominal
Total Gross Revenue	215,415	223,881
Total Operating Costs	(165,296)	(166,509)
Total Net Revenue	50,118	57,372
Total Capital Expenditure	7,205	9,307
Total Debt Drawdown + Equity Drawdown	7,457	9,631
Total Debt Interest and Repayment	(14,926)	(19,294)
Total Nominal Surplus	35,418	38,378
NPV of Surplus	9,026	9,672

**Table 7 Base case results over 45 years**

- 5.1.3 The base case scenarios result in a positive surplus on a total basis and on a Net Present Value basis assuming the standard HM Treasury nominal discount rate of 5.58%, (3% real) for the 45 year model and 6.09% (3.5% real) for the 25 year model assuming a RPI of 2.5%.
- 5.1.4 A lifecycle sinking fund for the project is included; this sets aside revenue for the purpose of undertaking lifecycle replacement. The fund is structured such that the payments into it will amortise the forecast lifecycle expenditure, i.e. regular payments will be made into the fund to cover future lifecycle costs. Details of the lifecycle replacement elements and associated costs are included in Parsons Brinckerhoff report “Detailed viability assessment of a Winchester District Energy Scheme”.
- 5.1.5 The first six years of operational cash flows for Option 1 and Option 2a are shown in Table 8 and Table 9 below. The cashflows for the full Project are provided in section 13 and 14 of this document.

<sup>3</sup> Business rates are not included in the operational costs for the project as the value is currently unknown. These would need to be included in future development of the project but are not expected to materially impact the viability of the project.

<sup>4</sup> It should be noted that it is proposed that the majority of power generated on the site will be sold through a private wire to the University of Winchester and the Royal County Hospital. As a result of this, the capacity of the plant and need to meet end user requirements the requirements for STOR cannot be met and are therefore not included within the model. Similarly TRIADs have not been included. Should the ability to utilise either of these mechanisms exist in the future this would represent a potential upside to the project.

**Winchester DE Scheme  
Affordability Model  
09/04/2015**

*All figures £'000 unless stated*

Start Date	01/04/2014	01/04/2015	01/04/2016	01/04/2017	01/04/2018	01/04/2019	
End Date	31/03/2015	31/03/2016	31/03/2017	31/03/2018	31/03/2019	31/03/2020	
Model Period	1	2	3	4	5	6	
Heat Income	30,703	0	0	0	0	330	
Electricity Income	175,501	0	0	0	0	1,949	
Electricity Export Income	9,035	0	0	0	0	103	
CRC Saving	0	0	0	0	0	0	
Operating Costs - Maintenance	-10,100	0	0	0	0	-129	
Operating Costs - SPV	-2,666	0	0	0	0	-34	
Operating Costs - Gas Import	-68,938	0	0	0	0	-694	
Operating Costs - Electricity Import	-79,505	0	0	0	0	-905	
Lifecycle - Sinking Fund (Contribution)/Release	1,648	0	0	0	0	-93	
Lifecycle Costs	-5,736	0	0	0	0	0	
<b>Net Operating Cashflow</b>	<b>49,943</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>527</b>	
Construction Costs	-7,205	0	0	0	-7,205	0	
<b>Pre-Finance Cashflow</b>	<b>42,738</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-7,205</b>	<b>527</b>	
Equity or Share Capital Injections	25	0	0	0	25	0	
Debt Drawdown	7,432	0	0	0	7,432	0	
Interest	-7,494	0	0	0	-251	-260	
Debt Repayment + Interest	-7,432	0	0	0	0	-73	
<b>Post-Finance Cashflow</b>	<b>35,268</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>193</b>	
Net Cashflow B/F		0	0	0	0	0	
Release of Share Capital	-25	0	0	0	0	0	
Dividends	-35,243	0	0	0	0	-193	
Net Cashflow C/F		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>Project IRR - based on pre-financing cashflow</b>	<b>10.85%</b>	0	0	0	0	-7,205	527

**Table 8 First six years cashflow of full operations for Option 1**

**Winchester DE Scheme  
Affordability Model  
09/04/2015**

*All figures £'000 unless stated*

Start Date	01/04/2014	01/04/2015	01/04/2016	01/04/2017	01/04/2018	01/04/2019
End Date	31/03/2015	31/03/2016	31/03/2017	31/03/2018	31/03/2019	31/03/2020
Model Period	1	2	3	4	5	6
Heat Income	36,146	0	0	0	0	390
Electricity Income	175,501	0	0	0	0	1,949
Electricity Export Income	12,234	0	0	0	0	139
CRC Saving	0	0	0	0	0	0
Operating Costs - Maintenance	-12,867	0	0	0	0	-164
Operating Costs - SPV	-2,666	0	0	0	0	-34
Operating Costs - Gas Import	-81,169	0	0	0	0	-818
Operating Costs - Electricity Import	-65,571	0	0	0	0	-747
Lifecycle - Sinking Fund (Contribution)/Release	1,744	0	0	0	0	-96
Lifecycle Costs	-5,980	0	0	0	0	0
<b>Net Operating Cashflow</b>	<b>57,372</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>621</b>
Construction Costs	-9,307	0	0	0	-9,307	0
<b>Pre-Finance Cashflow</b>	<b>48,065</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-9,307</b>	<b>621</b>
Equity or Share Capital Injections	25	0	0	0	25	0
Debt Drawdown	9,606	0	0	0	9,606	0
Interest	-9,688	0	0	0	-325	-336
Debt Repayment + Interest	-9,606	0	0	0	0	-95
<b>Post-Finance Cashflow</b>	<b>38,403</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>190</b>
Net Cashflow B/F		0	0	0	0	0
Release of Share Capital	-25	0	0	0	0	0
Dividends	-38,378	0	0	0	0	-190
Net Cashflow C/F		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Project IRR - based on pre-financing cashflow</b>	<b>9.92%</b>	0	0	0	-9,307	621

**Table 9 First six years cashflow of full operations for Option 2a**

5.1.6 The extracts from the financial model shows the capital expenditure costs in 2018/19 and full operations from 2019/20. The prudential borrowing principal repayments are shown using the annuity method of repayment.

## 5.2 Project IRR

5.2.1 The potential project return, or IRR, is based on the nominal pre-finance, pre-corporation and shareholder tax cashflow. The project IRR is a useful indication of the underlying viability of a proposed investment as it calculates the level of return which is available to share between debt and equity holders, based on a set revenue and cost profile. It should be noted however that the project cashflows do not include any reference to corporation tax or VAT, which could reduce the returns available.

5.2.2 The project IRR for Option 1 is 10.89% and for Option 2a is 9.92%.

## 5.3 Payback and Surplus

5.3.1 The profile of the distribution of the pre debt service cashflows for Option 1 and Option 2a are outlined in Figure 3 and Figure 4.

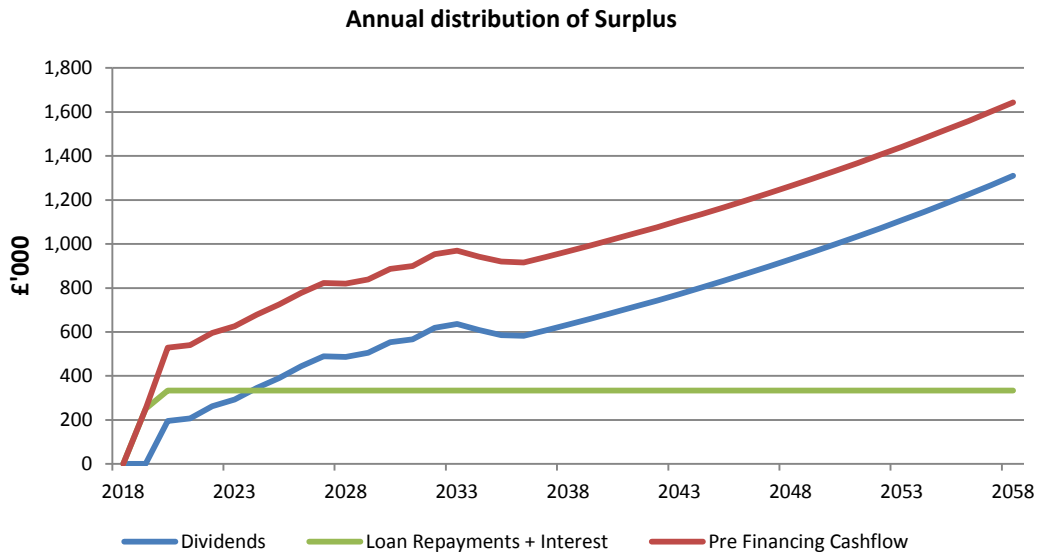


Figure 3 Graph of annual distribution of surplus – Option 1

During the first year of the project, no surplus is made as there are no revenues due to the fact the project is under construction. As such the interest cost charged at this time is capitalised within the prudential drawdown. Once the project is operational the project makes a distribution (in the form of a dividend) from year one of £195k, which increased to £1,353k in the final year of the project.

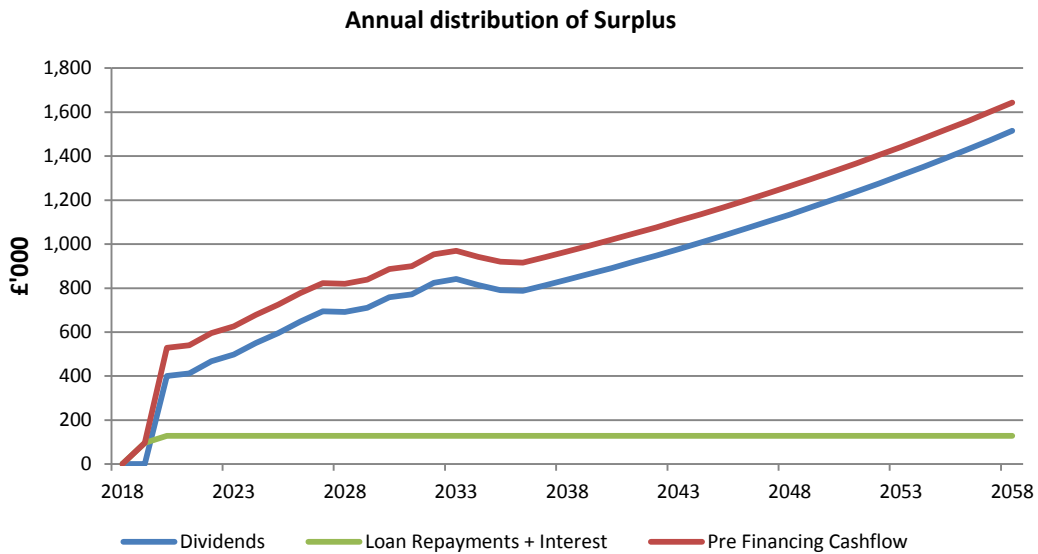


Figure 4 Graph of annual distribution of surplus – Option 2a

During the first year of the project, no surplus is made as there are no revenues due to the fact the project is under construction. As such the interest cost charged at this time is capitalised within the prudential drawdown. Once the project is operational the project makes a distribution (in the form of a dividend) from year one of £190k, which increased to £1,488k in the final year of the project.

## 5.4 Risk Analysis

5.4.1 There are a number of commercial and financial risks associated with development and operation of district energy systems which have a quantifiable financial impact and for which sensitivities can be used to address. The key financially quantifiable risks to the Option 1 and Option 2a identified within Winchester are outlined below.

	Risk	Description	Mitigation
1	Movement in the gas tariff.	The future price of energy prices are difficult to forecast reliably and are subject to significant volatility as a result of national and worldwide economic and political factors. The future price of gas will impact the price of heat input to the system from the energy centre and the price at which heat can be sold to users. The difference between these two prices is a key supported revenue to the project.	The operator of the network would need to ensure that the heat purchase and heat sales contracts are aligned to minimise the risk to project revenue. It may be possible to transfer this risk to either the generation entity or to the user through appropriate contract structuring, e.g. take or pay arrangements with heat users.
2	Increase in construction cost – delay or cost Over-run	There is a risk that the overall construction cost will increase due to cost over runs or delays by the contractor.	The operator of the heat network may be able to manage this risk, where appropriate, by contracting on a fixed price basis with a construction provider. At such an early stage in the project the uncertainty associated with the price of capital expenditure is 20%. This sensitivity has been modelled, showing the impact if the capital expenditure were to increase or decrease by 10%. The results of this sensitivity are outlined in section 6.2 of this report.
3	Increase in maintenance/lifecycle (operational) costs	There is a potential risk for maintenance or lifecycle costs to be higher than anticipated due to higher levels of product failure than anticipated thus resulting in increased maintenance costs, or be incurred earlier than expected due to a failure in the boiler.	The risk of increased maintenance costs may be mitigated by entering into a fixed price contract. Sensitivity analysis has been run to understand the impact of a 10% increase in maintenance cost. The results to this sensitivity are outlined in section 6.2
4	Movement in inflation	Inflation will have an impact on the non-tariff driven operating costs (e.g. maintenance) and construction costs. On the basis that a separate sensitivity has been already been modelled, examining the impact of increased maintenance cost, only one further sensitivity was modelled, being an additional increase to the inflation rate on construction from 2.5% to 5% per annum.	The mitigation strategy will be similar to that of increasing tariffs, in that the operator of the heat network is unable to directly control movements in inflation. As such the only mitigation strategy is to pay off the debt as quickly as possible. A sensitivity has been run to enable the Council to understand the impact of the construction cost suffering inflation at today's rate (c. 5%), rather than the base case assumption of 2.5%. The results to this sensitivity are outlined in section 6.2.
5	Insufficient take up of heat and / or power export by third party customers	This is the risk that there is insufficient take up of heat and/or power customers.	It is noted that the public sector will currently use 100% of the heat and power generated by the scheme. Whilst this is a risk that the operator of the heat network can potentially influence (e.g. through appropriate marketing or through offering discounts for long term contracts) it cannot control the overall take up. On this basis a sensitivity has been modelled, demonstrating the impact of any of the stakeholders leaving the scheme. The results to

			this sensitivity are included in section 6.3.1 and 6.4
6	Heat sales price	The price at which heat is sold to the Project stakeholders is critical to securing long term heat contracts and therefore the long term viability of the project.	The base case assumes that the stakeholder will pay no more for their heat from the network than through their current provision. A sensitivity was run to establish whether a discount on the volumetric tariff could be offered. The results are outlined in section 6.5.
7	Power sales price	The price at which power generated by the CHP engine is sold to Project stakeholders through a private wire is critical to the viability of the project.	The base case assumes that the stakeholders will pay no more for their power provided through the private wire than through their current provision. A sensitivity was run to establish the impact of provide a discount on the volumetric tariff could be offered. The result are outlined in section 6.5
8	Changed to spark spread	The difference between the gas purchase price and electricity sales price is a key factor in determining the viability of gas fired CHP district heating networks. The difference between these two prices is a key supported revenue to the project.	The operator of the heat network would need to ensure that the gas purchase and electricity sales contracts are aligned to minimise the risk to project revenue. A sensitivity has been run to enable the Council to understand the impact of increased or reduced spark spread on the viability of the project. The results to this sensitivity are included in section 6.1.
9	Movement in the electricity tariff.	The future price of energy prices are difficult to forecast reliably and are subject to significant volatility as a result of national and worldwide economic and political factors. The future import and export price of electricity will the project viability as the difference between these two prices is a key supported revenue to the project.	The operator of the network would need to ensure that the electricity purchase and electricity sales contracts are aligned to minimise the risk to project revenue. It may be possible to transfer this risk to either the generation entity or to the user through appropriate contract structuring.
10	Change in law	The introduction of new legislation for district heating may impact the project viability	Future changes in law are difficult to predict and are most likely to impact the capital and/or operational costs associated with the project.
11	Business Rates	Business rates will be an additional cost to the project	The District Valuer will need to make an assessment of the project in order to establish the correct level of business rates payable. While these will increase the operational costs of the project compared to the current assumptions they are not expected to material impact project viability.

**Table 10 Financial risks and associated mitigating actions**

## 6 SENSITIVITIES

### 6.1 Energy price forecasts

- 6.1.1 A number of sensitivities have been modelled on the financial model for the Option 1 and Option 2a. All sensitivities are modelled over a 45 year project term, unless stated otherwise.
- 6.1.2 The initial sensitivity analysis analysed the various DECC forecasts for gas and electricity prices for Low and High DECC scenarios. As noted in the assumptions section, the gas index is used as a proxy for heat tariff indexation. The results of the initial sensitivities on the base case are shown in Table 11 with the heat purchase price remaining constant.

Sensitivity	Option 1		Option 2a	
	Surplus (£'000)	NPV of surplus (£'000)	Surplus (£'000)	NPV of surplus (£'000)
Base Case (DECC – Central)	35,418	9,026	38,378	9,672
DECC – Low	49,623	12,658	52,536	13,420
DECC –High	15,706	4,628	15,993	4,659

**Table 11 DECC scenarios sensitivity results**

- 6.1.3 Under the varying DECC forecasts; there is an impact on the NPV of the surplus for Option 1 and Option 2a, with maximum variations from the base case of £4,398k and £5,013k respectively by using the “High” assumptions.
- 6.1.4 The movements in the NPV of the surplus are significant (up to 49% for Option 1 and 52% for Option 2) suggesting that the DECC assumptions have a material impact on the results of the financial model. It should be noted that the sensitivity models the impact on the project assuming that the heat and power tariffs charged to end users would remain constant. In fact changes to the energy price forecasts would also impact the BAU comparator and hence would require a change in the heat and power tariffs. This would be managed through the inclusion of the appropriate clauses within the heat and power supply contracts with end users. The clauses would typically include a mechanism for benchmarking and adjusting the tariffs charged. A process by which a review, e.g. time barred or change in law, would be triggered would also be included.
- 6.1.5 A key factor that impacts on the viability of district heating networks with gas-fired CHP generation is the difference in the forecasts for gas import cost versus power sales, known as spark spread. Table 12 sets out the impact of changes to the spark spread on the project viability.

Sensitivity	Option 1		Option 2a	
	Surplus (£'000)	NPV of surplus (£'000)	Surplus (£'000)	NPV of surplus (£'000)
Base Case (DECC – Central)	35,418	9,026	38,378	9,672
Reduced spark spread (Electricity DECC Reference, Gas DECC High)	26,279	6,387	27,413	6,506
Increased spark spread (Electricity DECC Reference, Gas DECC Low)	49,193	12,571	54,867	13,917

**Table 12 Spark spread sensitivity results**

- 6.1.6 It can be seen that the spark spread has a material impact on the project viability. The reduced spark spread sensitivity results in a reduction of 29% in the NPV of surplus for Option 1 and 33% for Option 2a. The increased spark spread sensitivity results in a 39% and 44% increase in the NPV of the surplus for Options 1 and 2a respectively.

## 6.2 Inflation and cost increases

6.2.1 Three further sensitivities have been modelled to test the sensitivity to cost increases. These are set out together with the results in Table 13.

Sensitivity	Option 1		Option 2a	
	Surplus (£'000)	NPV of surplus (£'000)	Surplus (£'000)	NPV of surplus (£'000)
Base case	35,418	9,026	38,378	9,672
10% increase in maintenance costs	34,408	8,738	37,091	9,306
10% increase in capital costs	34,191	8,596	36,793	9,117
10% reduction in capital costs	36,645	9,456	39,963	10,228
5% rate of inflation on capital costs	33,928	8,504	36,453	8,999

**Table 13 Sensitivity analysis – cost impacts**

6.2.2 The results of the additional sensitivities suggest that a viable project exists under each scenario outlined. In addition, reducing the capital expenditure inflation to zero would increase the nominal and NPV surplus, but not by a material amount.

## 6.3 Reducing heat revenue

6.3.1 Four sensitivities have been modelled on the potential reduction in heat revenue which could be sustained by the project. They consider, based on one of the risks identified within Section 3, the implications of one of the stakeholders withdrawing their heat demand from the project; it is assumed that the power would continue to be supplied to end users.

Sensitivity	Option 1		Option 2a	
	Surplus (£'000)	NPV of surplus (£'000)	Surplus (£'000)	NPV of surplus (£'000)
Base case	35,418	9,026	38,378	9,672
Withdrawal of University of Winchester heat load	25,482	6,257	28,946	7,044
Withdrawal of Royal Hampshire County Hospital heat load	14,628	3,214	18,433	4,093
Withdrawal of Elizabeth II Court North & West heat load	N/A	N/A	36,144	9,046
Withdrawal of Elizabeth II Court South heat load	N/A	N/A	33,842	8,402

**Table 14 Sensitivity results – heat revenue reduction**

6.3.2 For Option 1 the sensitivity shows that the withdrawal of the revenue associated with the University of Winchester and the Royal Hampshire County Hospital heat load materially impacts the NPV of surplus associated with the project. The withdrawal of the revenue associated with heat load of the Royal Hampshire County Hospital has the largest impact on the project viability with only a small surplus being generated.

6.3.3 For Option 2a the sensitivity shows that the withdrawal of the revenue associated with the University of Winchester and the Royal Hampshire County Hospital heat load materially impacts the NPV of surplus associated with the project. The withdrawal of the revenue associated with heat load of the Royal Hampshire County Hospital has the largest impact on the project viability with only a small surplus being generated. The withdrawal of Hampshire County Council loads at Elizabeth II Court has a small impact on the NPV of surplus for the project.

## 6.4 Reducing power revenue

6.4.1 Two sensitivities have been modelled on the potential reduction in power revenue which could be sustained by the project. They consider, based on one of the risks

identified within Section 3, the implications or one of the stakeholders withdrawing from the project.

Sensitivity	Option 1		Option 2a	
	Surplus (£'000)	NPV of surplus (£'000)	Surplus (£'000)	NPV of surplus (£'000)
Base case	35,418	9,026	38,378	9,672
Withdrawal of University of Winchester power load	0	0	0	0
Withdrawal of Royal Hampshire County Hospital power load	0	0	0	0

**Table 15 Sensitivity results – power revenue reduction**

6.4.2 The sensitivity shows that the withdrawal of the revenue associated with the University of Winchester or Royal Hampshire County Hospital under either Option 1 or Option 2a results in a non-viable project. This illustrates the dependency of the project on the private wire to these two key stakeholders. It should be noted that the sensitivity analysis undertaken assumes that the project operator continues to import power from the grid therefore reflecting its position as the sole power provider to the University of Winchester and the Royal Hampshire County Hospital.

## 6.5 Heat and power sales price analysis

6.5.1 The retention of heat and power demand to the scheme is critical to the success of the project. One possible incentive for attracting and retaining customers is to provide heat and power at discounted rate. A sensitivity was run to understand the impact of selling heat and power at an additional 10% and 5% discount from the tariffs required to reach a 'break even' position compared to the BAU for each stakeholder (see section 3.1). It was assumed that the standing charge element would remain constant and the tariffs would continue to be subject to the movements in price under the DECC forecasts (plus inflation).

Sensitivity	Option 1		Option 2a	
	Surplus (£'000)	NPV of surplus (£'000)	Surplus (£'000)	NPV of surplus (£'000)
Base case	35,418	9,026	38,378	9,672
10% discount on heat tariff for all heat users	32,698	8,268	35,264	8,805
10% discount on power tariff for power take offs	17,348	3,885	20,308	4,532
10% discount on heat and power tariff	14,627	3,134	17,194	3,674
5% discount on heat tariff for all heat users	34,058	8,647	36,821	9,239
5% discount on power tariff for power take offs	26,383	6,455	29,343	7,102
5% discount on heat and power tariff	25,023	6,076	27,786	6,668

**Table 16 Sensitivity results – heat and power sale price**

6.5.2 For Option 1 the results show that while providing heat and power at a 10% discount from the current rate being paid by the heat and power users reduces the NPV of the surplus by a maximum of 65% it does not make the project non-viable. A similar result is seen for Option 2a where the NPV of the surplus is reduced by 44% for the same 10% reduction in tariffs.

6.5.3 For Option 1 the results show that while providing heat and power at a 5% discount from the current rate being paid by the heat and power users reduces the NPV of the surplus by a maximum of 62% it does not make the project non-viable. A similar result is seen for Option 2a where the NPV of the surplus is reduced by 31% for the same 5% reduction in tariffs.

## 6.6 Financing assumptions

6.6.1 Three sensitivities have been modelled on the financing assumptions for the project. The first considers the impact of an increase in PWLB interest rate from 3.5% to 4%. The second considers the potential impact of reducing the project term from 45 years in the base case to 25 years. The third considers the impact of the Council making an upfront financial contribution to the project. This contribution can be either in the form of a grant, with no associated interest and no repayment of principal or in the form of a zero cost loan, where the principal is repaid, but there are no interest costs. In both cases the contribution is made at project commencement.

Sensitivity	Option 1		Option 2a	
	Surplus (£'000)	NPV of surplus (£'000)	Surplus (£'000)	NPV of surplus (£'000)
Base case	35,418	9,026	38,378	9,672
Increase in PWLB interest rate to 4%	34,103	8,566	36,678	9,077
25 year project term	9,244	5,389	9,091	5,712
Grant of £4m	44,442	12,186	47,401	12,832
Zero cost loan of £4m	43,593	11,889	46,553	12,535
Zero cost loan of £1m	37,462	9,742	40,422	10,388
Zero cost loan of £2m	39,506	10,458	42,465	11,104

**Table 17 Sensitivity results – financing assumptions**

6.6.2 The sensitivity shows that while a small increase (0.5%) in PWLB interest rates does not materially impact the project under either option, the reduction in the project term from 45 years to 25 years would reduce the surplus generated by 40% for Option 1 and 41% for Option 2a.

6.6.3 A grant of £4m increases the NPV by 35% for Option 1 and 33% for Option 2a. It would also result in an increase in the Project IRR to 23.9% for Option 1 and 17.0% for Option 2a.

6.6.4 A £4m zero cost loan increases the NPV by 23% for Option 1 and 21% for Option 2a. It has no impact on the project IRR which is calculated on the pre-finance cash flow.

## 6.7 Combined impact of financing and heat pricing assumptions

6.7.1 Two further sensitivities were run to determine the impact of:

- a £4m grant and 5% discount of heat, power and heat and power tariffs
- b £4m zero cost loan and 5% discount heat, power and heat and power tariffs.

The results of the combined sensitivities are set out in the table below.

Sensitivity	Option 1		Option 2a	
	Surplus (£'000)	NPV of surplus (£'000)	Surplus (£'000)	NPV of surplus (£'000)
Base case	35,418	9,026	38,378	9,672
£4m grant	44,442	12,186	47,401	12,832
£4m zero cost loan	43,593	11,889	46,553	12,535
£4m grant and 5% heat discount	43,082	11,807	45,845	12,399
£4m grant and 5% power discount	35,407	9,615	38,366	10,261
£4m grant and 5% heat and power discount	34,046	9,236	36,809	9,828
£4m zero cost loan and 5% heat discount	42,233	11,510	44,996	12,161
£4m zero cost loan and 5% power discount	34,558	9,318	37,518	9,964
£4m zero cost loan and 5% heat and power discount	33,198	8,939	35,961	9,530

**Table 18 Sensitivity results – combined impact of financing and heat pricing assumptions**

6.7.2 For Option 1 the results show that the combination of a £4m grant and 5% heat and power discount reduces the NPV of the surplus by 24% compared with the £4m grant only and by 25% when a zero costs loan is assumed.

6.7.3 For Option 2 the results show that the combination of a £4m grant and 5% heat and power discount reduces the NPV of the surplus by 23% compared with the £4m grant only and by 24% when a zero costs loan is assumed.

## 6.8 Sensitivity combinations

6.8.1 The sensitivity testing undertaken reflects the impact of individual risk on the project viability. It is possible that one or more risk may coincide and this section considers the potential impact of providing a 5% discount in energy prices to end users in combination with the energy prices following the DECC High forecasts.

Sensitivity	Option 1		Option 2a	
	Surplus (£'000)	NPV of surplus (£'000)	Surplus (£'000)	NPV of surplus (£'000)
Base case	35,418	9,026	38,378	9,672
DECC High price forecast	15,706	4,628	15,993	4,659
DECC High price forecast and 5% heat discount	14,088	4,175	14,142	4,141
DECC High price forecast and 5% power discount	7,396	2,166	7,684	2,201
DECC High price forecast and 5% heat and power discount	5,778	1,720	5,832	1,705

**Table 19 Impact of 5% discount and DECC high energy price forecasts**

6.8.2 It can be seen that the project remains viable under the combination of sensitivities; however the NPV of the surplus is significantly reduced. The likelihood of this risk occurring is considered to be low as a result of the mitigation measures that would be included in the heat and power supply agreements with end users (see section 6.1.4).

## 6.9 Carbon Reduction Commitment analysis

6.9.1 Each of the heat users has the potential to benefit financially from a reduction in carbon emission as a result of utilising heat from the network. Table 20 sets out the carbon benefit in tonnes CO<sub>2</sub>e per annum and associated financial benefit (based on the current and forecast Carbon Reduction Commitment price per tonne of CO<sub>2</sub>) over the project lifetime for each of the stakeholders under Option 1 and Option 2.

Stakeholder	Option 1		Option 2a	
	Tonnes CO <sub>2</sub> e per annum	£'000 over project lifetime	Tonnes CO <sub>2</sub> e per annum	£'000 over project lifetime
University of Winchester	759	1,054	751	1,042
Royal Hampshire County Hospital	1,993	2,765	1,972	2,735
HCC (Elizabeth Court II North & West and South)	N/A	N/A	636	882

**Table 20 Carbon benefit over project lifetime**

## 6.10 BAU Comparator

6.10.1 A Business as Usual (BAU) comparator was developed for Options 1 and 2a. As set out in in section 3.1.4 the heat and power tariffs under the base cases were set to ensure that the individual stakeholders received heat and power from the proposed project at a cost which is no more than under their current supply. This analysis excluded the benefit result from reduced carbon reduction commitment payments. The lifetime benefits of these are set out in Table 20.

6.10.2 It should be noted that while that savings indicated would accrue to the individual stakeholder the operator of the scheme would also be required to meet any CRC or EU ETS payments associated with the purchase of gas for the project. This is currently not included within the model due to the uncertainty of how the project would be delivered. Overall it would be expected that a breakeven position would be achieved, i.e. any savings accrued to the stakeholders would be equivalent to the cost of carbon to the overall project. As a result while the stakeholders would gain a reputational benefit from the reduced carbon emissions the financial benefits are likely to be minimal.

## 6.11 Potential upside from additional heat load

6.11.1 A number of additional heat loads exist on both the West and East side of the city which could represent an upside to the base case projects. The additional heat loads are a combination of existing buildings and future developments. Connection to some of the loads require a short spur from the main pipework and others and extension to the main network. Table 21 sets out the identity of the additional heat loads, potential year of connection to the district heating network and associated comments.

6.11.2 It should be noted that the dates of connection are based on best knowledge of the project team and there is considerable uncertainty regarding if and when the additional heat loads would be connected. No sensitivity analysis has been undertaken at this stage in relation to the date of connection.

Tariff	Additional loads	Date of construction	Date of operation	Comments
Option 2b1	North Connection 102, Registrar's Office 86, Victoria House Capital House Discovery Centre Gladstone Street Car Park Record Office Worthy Lane Car Park	2018	2019	A combination of existing heat loads and future developments. It is assumed that all loads would connect following extension to the future developments which would be required to connect as part of their planning obligations
Option 2b2	North Connection 102, Registrar's Office 86, Victoria House Capital House Discovery Centre Gladstone Street Car Park Record Office Worthy Lane Car Park HM Prison	2021	2022	HM Prison is a significant existing load. During consultation HM Prison has indicated that it does not wish to connect to the district heating network. Discussions between the Ministry of Justice and the Department of Energy and Climate Change are ongoing and should these be successful it is envisaged that HM Prison may connect in 3 years.
Option 2b3	North Connection 102, Registrar's Office 86, Victoria House Capital House Discovery Centre Gladstone Street Car Park Record Office Worthy Lane Car Park HM Prison Police HQ	2024	2025	The police HQ is a future development. It is estimated that this may be completed and connected within the next 10 years.
Option 2b4	North Connection 102, Registrar's Office 86, Victoria House Capital House Discovery Centre Gladstone Street Car Park Record Office Worthy Lane Car Park	2025	2026	The law courts are an existing heat load requiring an extension to the network to establish a connection. It is estimated that this would be undertaken once a successful scheme is in operation

Tariff	Additional loads	Date of construction	Date of operation	Comments
	HM Prison Police HQ Law Courts			
Option 2b5	North Connection 102, Registrar's Office 86, Victoria House Capital House Discovery Centre Gladstone Street Car Park Record Office Worthy Lane Car Park HM Prison Police HQ Law Courts River Park Leisure Centre	2027	2028	The River Park Leisure Centre is an existing load that requires a significant expansion to connect. It is expected that this would only be completed once the additional North Connection has been established.

**Table 21 Additional heat loads**

6.11.3 The funding assumptions for the upside options are set out in the following table:

Option	Capital Expenditure (£'000)	Indexed to 2018/2019 prices at 2.5% p.a. (£'000)	Interest during construction (£'000)	Total funding requirement (£'000)
2b1	9,266	10,228	357	10,585
2b2	9,598	10,622	1,367	11,989
2b3	9,761	10,832	2,780	13,611
2b4	10,205	11,413	2,513	13,926
2b5	10,752	12,168	2,962	15,131

**Table 22 Funding assumptions for upside options (not cumulative)**

6.11.3.1 The connections to additional heat loads are assumed to be public sector funded in the form of prudential borrowing. Similarly to the base case the public sector funding is fulfilled through a combination of prudential borrowing and pin point share capital (£0.025m). The debt is drawn down in multiple tranches depending on the date of connection of the additional loads. Repayments are made on an annuity basis on a forty five year basis. Interest charged during construction is capitalised into the loan and 25% of revenue generated during construction is used as a funding source to support the capital costs.

6.11.4 The impact on the project viability of connecting the additional loads to Option 2a as set out in Table 21 is shown in Table 23.

Sensitivity	Surplus (£'000)	NPV of surplus (£'000)	Project IRR
Base case (Option 2a)	38,378	9,672	9.92%
Option 2b1	44,322	11,283	10.25%
Option 2b2	49,076	12,116	10.51%
Option 2b3	45,074	12,499	10.30%
Option 2b4	48,642	11,097	9.97%
Option 2b5	57,822	12,851	10.62%

**Table 23 Sensitivity results – additional heat load**

6.11.5 It can be seen that each of the proposed extensions to the base case Option 2a result in a viable project based on the assumptions made regarding heat loads, date of connection and heat tariffs.

6.11.6 The connection of additional heat loads also has the potential to reduce the carbon emissions for those entities connecting. Table 24 sets out the potential carbon emission reduction and associated financial benefit, based on the price per tonne of carbon under the Carbon Reduction Commitment, for the connection of the additional loads over the base case Option 2a.

Sensitivity	Tonnes CO2e per annum	£'000 over project lifetime
Base case	3,359	4,660
Option 2b1	3,566	4,947
Option 2b2	3,876	5,349
Option 2b3	4,348	5,923
Option 2b4	4,571	6,204
Option 2b5	5,065	6,836

Table 24 Sensitivity results – additional heat load carbon benefit over project lifetime

## 7 FINANCIAL SUMMARY

7.1.1 The financial model base cases and the associated downside sensitivity results suggest that on the basis of the assumptions modelled, two options for a robust project, with a financial surplus of £35m for Option 1 or £38m for Option 2a could potentially be achieved.

7.1.2 The main economic drivers and key risk factors for the two options are:

- a The ability to retain a long term heat sales agreements with the University of Winchester and the Royal Hampshire County Hospital. The current working assumption is that the University and Hospital should not pay any more for heat supplied through the network than under their current business as usual operations.
- b The technical requirements of the electrical connection require the operator of the proposed district heating network to be the sole power supplier to the University of Winchester and Royal Hampshire County Hospital. This would require a power purchase agreement to be established with both entities. Similarly to the heat sales, the current working assumption is that the University and Hospital would not pay any more for power supplied from the district heating project than under their current business as usual operations.

It should be noted that while the private wire connection has the potential to significantly improve the financial viability of the proposed project options there is existing case law in relation to the operation of private wire networks:

*In May 2008, the European Court of Justice delivered a judgment on a case known as 'Citiworks', which was concerned with the rights of suppliers to access customers on local distribution systems run as private wires. The judgment noted that a fully open market must allow all consumers to choose their suppliers freely and all suppliers to deliver to their customers freely. To allow for this, suppliers should have the right to access all the different distribution systems that carry electricity to customers.*

*The Electricity and Gas (Internal Markets) Regulations 2011 introduce new obligations including a duty to facilitate third party access by private wire operators to their electricity networks. This duty to give third party access will not apply if it can be demonstrated that increased capacity of the distribution system would be required and that either:*

- *it is not technically feasible to provide the increase in capacity; or*
- *providing the necessary increase would have a significant and adverse effect impact on the distribution exemption holder or any other person.*

While it is not expected that the above would apply assuming a suitable power purchase agreement can be established with the University and Hospital that is

comparable or lower in cost than the market alternative, however this is a risk to the project and it is recommended that the Council seek legal advice should they wish to progress the project.

7.1.3 The sensitivity analysis undertaken as part of the financial analysis indicates that:

- a A small discount in the variable heat and power tariff is required to ensure that the working assumption that the cost of heat and power provision from the district heating networks is no greater than under the key stakeholders' current arrangements. The discount is applied to reflect the requirement of individual stakeholders to maintain a separate back-up and top-up gas boiler facility with associated utility connection.
- b DECC Scenarios - The two options remain viable under a range of DECC scenarios from 'Low' to 'High' although the surplus is significantly reduced under the 'Low' scenario.
- c Spark spread – The two options remain viable under the reduced spark spread sensitivity and the NPV of the surplus is significantly increased under the increased spark spread sensitivity.
- d Heat Loads - It is possible for any of the heat loads to be removed from the two base case options and the options to retain a positive NPV. The removal of the Royal Hampshire County Hospital heat load has the largest impact on the financial viability.
- e Power Loads – Removal of either power load from the base case options results in a non-viable project.
- f Tariff discounts - It is possible to provide heat and power to users at a 5 or 10% discount from their current heat tariff (volumetric) as an incentive to connect to the network under either of the base case options.

7.1.4 The project IRR for the base case Option 1 is 10.85% and 9.92% for Option 2a (pre-finance, pre-corporation and shareholder tax cashflow). Based on our experience of the funding market this level of project IRR would be at the lower level of return that a private sector would seek. Based on the discussions with the Council on 25<sup>th</sup> March 2015 it was assumed that the project would be funded through Prudential Borrowing, however there may be a number of alternative potential funding options for the Project as set out below. It should be noted that the terms of each of these funding sources would need to be established and their impact on the viability of the project.

- a Green Investment Bank – the Council may wish to consider the use of a Green Loan from the Green Investment Bank which has the advantages of also providing due diligence support for the project and providing borrowing capacity outside of the Council's current capital programme. Discussion with the GIB would be required to establish whether the capital requirements of the proposed project are of sufficient scale; however the GIB has established a dedicated district heating debt finance fund as well as two managed equity funds. While a minimum level of investment is likely to be required, this may be in the region of £10m and other projects would be considered on a case by case basis.
- b Crowd funding – there are a number of entities within the market who are able to arrange crowd funding for local energy projects. This type of funding would typically have a cost in the region of 6-9% and could be used for all or a proportion of the funding requirement for the Project. A key consideration would be the ability to align the crowd funding term with the heat and power sales agreement contract length to ensure that the debt could be serviced. It is also possible that a guarantee would be required from the Council, or other public sector body, to secure the debt.
- c Corporate finance – the relatively small scale nature of the Project would indicate that project finance would not be an option; however it is possible that

a private sector corporate finance solution could be sought, potentially as a joint investment with the Council.

- d European Funds – there are a number of emerging structural funds that may have the potential to support the project. Details of these funds are not yet established and the Council would need to explore the eligibility and terms of each.

## PART II – ESCO STRUCTURE AND PROCUREMENT APPROACH

### 8 ESCO STRUCTURE

#### 8.1 Delivery chain

8.1.1 For the purpose of identifying the preferred option(s) for the ESCo structure it is assumed that:

The ESCo would initially encompass the following parts of the delivery chain for operating a district heating network:

- i Generation –including the development, construction and operation of the energy centre
- ii Transmission – including the development, installation and operation of the main connecting pipelines for the scheme.
- iii Management – including the construction, installation and operation of the distribution pipework, customer contract management, metering reading and billing.

#### 8.2 Options analysis

8.2.1 There are a number of ESCo structures that could potentially deliver the elements of a district heating network as set out above in Winchester. These are set out in Table 25 below and the potential benefits, risks and issues associated with the long list of options are included in appendix 4.

Option	Description
1	Entirely public sector funded operated and owned, delivered using in-house resources
2	Fully public sector owned delivery vehicle with private sector delivery partner
3	Public private sector partnership with joint development, delivery and financing responsibilities
4	Private sector led development and delivery with finance from public sector
5	Private sector led development and delivery with public sector commitment in elements of the project, e.g. commitment to long term heat take off contract
6	Full private sector development, delivery and financing

Table 25 Long list of ESCo structures

8.2.2 The remainder of this section reviews these potential options and identifies those applicable to the technical options identified for the project, Option 1<sup>5</sup> and Option 2a, based on the outcome of the financial analysis and the workshop held with Council officers on 25<sup>th</sup> March 2015.

8.2.3 During the workshop the following key Council objectives were identified as:

- a The scheme must connect directly to the Council's estate either immediately or during the operation of the project
- b Any investment made by the Council must generate an associated return.
- c The Council wishes to retain an element of control over the future expansion of the project
- d The Council wishes to retain some of the benefits of investment.

<sup>5</sup> It should be noted that Option 1 in which heat and power are supplied to the University of Winchester and the Royal Hampshire County Hospital could potentially be delivered without any direct involvement from Hampshire City Council, however this would likely limit any future expansion of the scheme. This has therefore been disregarded from the analysis.

- 8.2.4 The long list of options in Table 25 were reviewed against these Council objectives and the following short listed ESCo structure options were identified.
- a Entirely public sector funded, operated and owned (HCC only)
  - b Entirely public sector funded, operated and owned (HCC in partnership with other public sector stakeholders)
  - c Public – private partnership
- 8.2.5 The identification of this short list was further underpinned by the results of the financial analysis of the two technical options, Option 1 and Option 2a. With project returns of 10.85% and 9.92% respectively it was concluded that public sector investment is likely to be required as the returns are below that which a private sector would seek.
- 8.2.6 At this stage in the development of the project it is not possible to identify a single preferred ESCo structure due to a number of uncertainties which are yet to be resolved, these include:
- a Identifying the preferred technical option for the project, i.e. Option 1 or Option 2a.
  - b Determining whether and on what basis the Council wish to invest in the project.
  - c Determining the appetite and conditions for connection of the University of Winchester and the Royal Hampshire County Hospital.
  - d Determining the appetite for other public sector bodies to invest/ take ownership in the project

## 9 PROCUREMENT APPROACH

### 9.1 Short listed options

- 9.1.1 The full details of the procurement approach will need to be determined following identification of the preferred technical solution and associated ESCo structure. Should the Council be considering a public-private partnership informal market consultation should be undertaken with potential private sector projects to establish interest in the proposed project. It is, however, anticipated that the three short listed ESCo structures could be procured as set out in Table 26.

Option	ESCo Structure	Procurement Approach
1	Entirely public sector funded, operated and owned (HCC only)	Procurement of: Design and Build, Operation and Maintenance, and Management and Billing. The procurement may be made on a phase by phase basis or as a strategic procurement to include future phases of work.
2	Entirely public sector funded, operated and owned (HCC in partnership with other public sector stakeholders)	Procurement of: Design and Build, Operation and Maintenance, and Management and Billing. The procurement may be made on a phase by phase basis or as a strategic procurement to include future phases of work.
3	Public – private partnership	Procurement of a long term private sector partner for the proposed project and potentially include future district heating networks within the city. May include: development, design, construction, finance, operation and maintenance, and billing.

**Table 26 Short listed ESCo structures and procurement approaches**

9.1.2 Careful consideration will need to be given to the following during the development of the required procurement documentation:

- a Technical specification of the initial heat network;
- b Drafting of contracts for the sale of heat and power, and
- c Pricing mechanism for heat purchase and sales and transfer of risk.

9.1.3 It is difficult to accurately determine the potential cost of the procurement given the uncertainties. In addition the level of negotiation required for the heat and power sales contracts is difficult to quantify. It is however estimated that the cost could be between £350 and 500k

9.1.4 While additional HNDU funding may be available to support further technical development of the heat network this would be subject to availability at the time of application.

## **9.2 Additional considerations**

9.2.1 This section sets out a number of additional issues the Council will need to consider in developing the Project in readiness for procurement.

## **9.3 Risk allocation**

9.3.1 There are a number of commercial and financial risks associated with district heating systems, the financial risks associated with the Project and the sensitivity analysis undertaken is discussed in detail in the Financial Analysis section. This section considers a number of key risks, seeks to identify the entity best placed to manage the risk and assesses the potential impact the chosen business model may have on the proposed risk allocation.

- a Heat Load – establishing and retaining customers to the network is a key risk as it will directly impact the revenues for the project. Under Option 2a the Council has a role in creating the anchor loads for the network which will provide revenue certainty for the Project. It should be noted that the viability of Option 1 and Option 2a, based on the current assumptions, is primarily dependent on securing and retaining power sales to the University of Winchester and the Royal Hampshire County Hospital.
- b Planning and routing – the pipeline will require planning permission and access to undertake street works. Ensuring timely access to the pipeline route in order to meet demand will be important to the success of the Project. Although planning decisions are made on an independent basis, understanding of the processes will be valuable in developing the Project and the Council will have a key role in managing this risk.
- c Default risk – the sale of heat to customers will require a billing and collection facility. The entity providing this may also take either all or some of the customer credit risk, although this is more likely to sit with the financial investor for the Project.
- d Design risk –the design risk will sit with the investing organisation it is anticipated that this would be allocated to a suitable qualified and experienced supplier either through a consortium or suitable subcontractor agreement.
- e Operation and maintenance – it is anticipated that O&M contracts can be established with a suitably qualified and experienced supplier either through a partnership or suitable subcontractor agreement. The contract should seek to ensure that any outages of the network are minimised.

9.3.2 The risks, particularly revenue and demand risks, when taken together with the substantial up-front investment required for the Project would further support the ongoing involvement of the Council in the delivery of the Project.

## **9.4 Exit strategy**

9.4.1 One of the key considerations for the Project is the flexibility that it would give the Council to potentially exit from any investment it has made in the Project through divestment to a third party subject to market interest in investing in the district energy system.

9.4.2 In broad terms there are three potential economic scenarios under which the Council may wish to reconsider any investment it has made in the Project, these are:

- 1 The Project has demonstrated commercial returns through the development / build out of the network and the connection of a strong customer base. In this scenario the Project has achieved business stability generating financial returns potentially at the level required to attract interest from third party buyers.
- 2 The Project has reached a potential at which it is capable of self-financing its operations but it is not generating returns at the level required to attract interest from private sector investors, and
- 3 The Project has failed to achieve financial independence and is unable to maintain solvency without on-going financial support.

9.4.3 In the case of scenario 1 there may be a number of potential private sector investors interested in acquiring the Council's interest in the Project.

9.4.4 In scenario 2 the lower financial returns are expected to act as a barrier to private sector investment. However, providing the Project is operating on an economically sustainable basis it may be possible for the Council to divest its holding into a 'social enterprise', perhaps in the form of a local district heating company in which ownership is vested in a community or co-operative trust.

9.4.5 In the scenario 3 the Council would need to consider how best to exit from what is in effect an insolvent or distressed entity. The appropriate route will depend on how significant the issues are and the extent to which it is possible to restructure the Project to allow at least part of the system to continue to function as a going concern and/or to recover value from the disposal of underperforming assets to buyers specialising in this type of opportunity.

## **10 SUMMARY**

10.1.1 This report reflects both the knowledge and views of the project team and our experience of developing district heating projects for public sector organisations to identify two potential technical options and three ESCo structure options for the implementation of the proposed Project.

- a A fully Council owned vehicle, financed by the Council through surpluses, PWLB, GIB or European funding and constructed by a private sector entity.
- b A fully multi public sector owned vehicle, financed by the public sector, through surpluses, PWLB, GIB or European funding and constructed by a private sector entity.
- c A potential future partnership between the Council and a private sector partner to develop, deliver and finance the Project with the option of developing and delivering future heat networks across the city.

- 10.1.2 The preferred options are based on the proposed technical solutions (Option 1 or Option 2a) providing a project that is expected to be financially sound. If the technical solutions were to change this position may change.
- 10.1.3 The Council should note, as concluded in the Financial Analysis Appendix, that the level of returns are at the lower end of that expected to attract private sector financing based on the current scale, risk profile and level of return. Should the Council wish to pursue a public- private partnership model informal market testing should be undertaken at the next stage to determine the market appetite in the project.
- 10.1.4 The Finance Analysis Appendix outlines a number of important risks to the Project that could significantly impact on the projected Project return; the critical risk to the project is securing long term heat and power sales contracts. The Council will need to consider its mitigation strategies for the risks as the Project progresses.

## 11 NEXT STEPS

- 11.1.1 The next steps the Council will need to undertake to progress the Project:
- a Identify the preferred base case option to progress – both options are financially viable, however Option 2a has the potential to facilitate an immediate connection to the Council's estate and delivers increased carbon emission reduction potential.
  - b Determine whether the Council wishes to invest in the Project either as the sole investor or in partnership with a (on a long or short term basis), it must establish a clear view on its funding principles, including:
    - i Rates of return and payback periods – The Council may wish to take a long terms view on the project term (limited to 45 years – HMT Green Book) and may be willing to accept lower levels of return than the private sector where wider strategic objectives are being addressed and non-financial benefits generated.
    - ii Revenue stream – The Council has the potential to generate an ongoing revenue stream as a result of a financial investment into the Project. A sole financial investment will, in general, yield higher returns; however this must be balanced against the Council's appetite to manage a number of the key risks associated with the Project.
    - iii Re-investing surpluses – Any returns generated from the Project could be retained and reinvested in the Project to reduce the debt tenor. Alternatively the Council could consider retaining a fund which could be used to support future expansion of the network.
  - c Engage with the University of Winchester and Royal Hampshire County Hospital to set out the benefits of connecting to the project and agree terms of heat supply agreement and power purchase agreement.
  - d Engage with future developments to understand the development plan and where possible align the further development of the network to connect to loads in accordance with this plan.
  - e Engage with additional stakeholders along the route to establish the barriers to connection.

Assumption	Value	Source
<b>Dates</b>		
Construction Phase Start	1st April 2018	PB
Operations Start	1st April 2019	PB
Operations End	31st March 2063	PB
Length of Operating period	45 years	PB
Price base date for inflation	1st April 2014	EnergyDirection
Annual modelling period	1st April – 31st March	EnergyDirection
<b>Funding</b>		
Type of Debt	Prudential Borrowing	EnergyDirection
Method of Repayment	Annuity	EnergyDirection
Tenor of debt	45 years	EnergyDirection
Interest Rate	3.5%	EnergyDirection
Capitalisation of SPV	£25k	EnergyDirection
Discount Rate for NPV calculation	3% real, 5.58% nominal	HM Treasury
<b>Revenue/Cost (all real inputs) (Option 1)</b>		
Capital Expenditure	£6,528k (real)	PB
Lifecycle requirement	£8,599k (real)	PB
Maintenance (p.a.)	£113.6k (real)	PB
SPV running costs (p.a.)	£30k (real)	EnergyDirection
<b>Revenue/Cost (all real inputs) (Option 2a)</b>		
Capital Expenditure	£8,431 (real)	PB
Lifecycle requirement)	£8,920k (real)	PB
Maintenance (p.a.)	£114.8k (real)	PB
SPV running costs (p.a.)	£30k (real)	EnergyDirection
<b>Heat and Power – Tariff (Option 1)</b>		
Heat Sales Tariff 1	N/A	Hampshire County Council
Heat Standing Charge 1	N/A	Hampshire County Council
Heat Sales Tariff 2	N/A	Hampshire County Council
Heat Standing Charge 2	N/A	Hampshire County Council
Heat Sales Tariff 3	4.445p/kWh	University of Winchester
Heat Standing Charge 3	N/A	University of Winchester
Heat Sales Tariff 4	2.818p/kWh	Royal Hampshire County Hospital
Heat Standing Charge 4	£48,203 per annum	Royal Hampshire County Hospital
Power Sales Tariff 1	N/A	Hampshire County Council
Power Standing Charge 1	N/A	Hampshire County Council
Power Sales Tariff 2	N/A	Hampshire County Council
Power Standing Charge 2	N/A	Hampshire County Council
Power Sales Tariff 3	11.482p/kWh	University of Winchester
Power Standing Charge 3	N/A	University of Winchester
Power Sales Tariff 4	11.016p/kWh	Royal Hampshire County Hospital
Power Standing Charge 4	N/A	Royal Hampshire County Hospital
<b>Heat and Power – Tariff (Option 2a)</b>		
Heat Sales Tariff 1	2.770p/kWh	Hampshire County Council
Heat Standing Charge 1	£7,647 per annum	Hampshire County Council
Heat Sales Tariff 2	2.764p/kWh	Hampshire County Council
Heat Standing Charge 2	£12,691 per annum	Hampshire County Council
Heat Sales Tariff 3	4.449p/kWh	University of Winchester
Heat Standing Charge 3	N/A	University of Winchester
Heat Sales Tariff 4	2.282p/kWh	Royal Hampshire County Hospital
Heat Standing Charge 4	£48,203 per annum	Royal Hampshire County Hospital
Power Sales Tariff 1	10.728p/kWh	Hampshire County Council
Power Standing Charge 1	£5,964 per annum	Hampshire County Council

Assumption	Value	Source
Power Sales Tariff 2	11.062p/kWh	Hampshire County Council
Power Standing Charge 2	£5,964 per annum	Hampshire County Council
Power Sales Tariff 3	11.476p/kWh	University of Winchester
Power Standing Charge 3	N/A	University of Winchester
Power Sales Tariff 4	11.004p/kWh	Royal Hampshire County Hospital
Power Standing Charge 4	N/A	Royal Hampshire County Hospital
<b>Heat and Power – Tariff (Both)</b>		
Gas Import Tariff	2.918p/kWh	DECC Energy and Emissions Projections September 2014
Power Export Tariff	4.493p/kWh	DECC Energy and Emissions Projections September 2014
Electricity Import Tariff	11.510p/kWh	University of Winchester
<b>Indexation</b>		
Heat (Import and Export)	Real DECC Reference scenario assumptions (Gas Industrial) + 2.5% inflation p.a.	DECC
Power (Import and Export)	Real DECC Reference scenario assumptions (Electricity Industrial ) +2.5%	DECC
Power Usage	Real DECC Reference scenario assumptions (Electricity Services) +2.5%	DECC
Indexation on all other costs	2.5% p.a.	EnergyDirection
RPI	2.5% p.a.	EnergyDirection

**Table 27 Financial model assumptions**

## 13

## APPENDIX 2 - FINANCIAL MODEL OUTPUT – OPTION 1

Winchester DE Scheme  
Affordability Model  
09/04/2015

All figures £'000 unless stated

Start Date	01/04/2014	01/04/2015	01/04/2016	01/04/2017	01/04/2018	01/04/2019	01/04/2020	01/04/2021	01/04/2022	01/04/2023	01/04/2024	01/04/2025	01/04/2026	01/04/2027	01/04/2028	01/04/2029	
End Date	31/03/2015	31/03/2016	31/03/2017	31/03/2018	31/03/2019	31/03/2020	31/03/2021	31/03/2022	31/03/2023	31/03/2024	31/03/2025	31/03/2026	31/03/2027	31/03/2028	31/03/2029	31/03/2030	
Model Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Heat Income	30,703	0	0	0	0	330	348	365	383	401	420	440	454	469	484	501	
Electricity Income	175,501	0	0	0	0	1,949	2,017	2,167	2,273	2,420	2,558	2,701	2,819	2,849	2,919	3,061	
Electricity Export Income	9,035	0	0	0	0	103	106	114	120	128	135	142	148	149	152	161	
CRC Saving	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Operating Costs - Maintenance	-10,100	0	0	0	0	-129	-132	-135	-138	-142	-145	-149	-153	-157	-161	-165	
Operating Costs - SPV	-2,666	0	0	0	0	-34	-35	-36	-37	-37	-38	-39	-40	-41	-42	-43	
Operating Costs - Gas Import	-68,938	0	0	0	0	-694	-741	-785	-830	-877	-926	-977	-1,012	-1,047	-1,083	-1,124	
Operating Costs - Electricity Import	-79,505	0	0	0	0	-905	-932	-1,004	-1,053	-1,124	-1,188	-1,250	-1,303	-1,312	-1,339	-1,413	
Lifecycle - Sinking Fund (Contribution)/Release	1,648	0	0	0	0	-93	-93	-93	-93	-93	-93	-93	-93	-93	-93	-93	
Lifecycle Costs	-5,736	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
<b>Net Operating Cashflow</b>	<b>49,943</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>527</b>	<b>539</b>	<b>594</b>	<b>624</b>	<b>676</b>	<b>722</b>	<b>774</b>	<b>821</b>	<b>817</b>	<b>836</b>	<b>884</b>	
Construction Costs	-7,205	0	0	0	-7,205	0	0	0	0	0	0	0	0	0	0	0	
<b>Pre-Finance Cashflow</b>	<b>42,738</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-7,205</b>	<b>527</b>	<b>539</b>	<b>594</b>	<b>624</b>	<b>676</b>	<b>722</b>	<b>774</b>	<b>821</b>	<b>817</b>	<b>836</b>	<b>884</b>	
Equity or Share Capital Injections	25	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	
Debt Drawdown	7,432	0	0	0	7,432	0	0	0	0	0	0	0	0	0	0	0	
Interest	-7,494	0	0	0	-251	-260	-258	-255	-252	-249	-246	-243	-240	-237	-233	-230	
Debt Repayment + Interest	-7,432	0	0	0	0	-73	-76	-79	-81	-84	-87	-90	-93	-97	-100	-104	
<b>Post-Finance Cashflow</b>	<b>35,268</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>193</b>	<b>205</b>	<b>260</b>	<b>291</b>	<b>342</b>	<b>389</b>	<b>441</b>	<b>487</b>	<b>484</b>	<b>503</b>	<b>551</b>	
Net Cashflow B/F		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Release of Share Capital	-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Dividends	-35,243	0	0	0	0	-193	-205	-260	-291	-342	-389	-441	-487	-484	-503	-551	
Net Cashflow C/F		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	
<b>Project IRR - based on pre-financing cashflow</b>	<b>10.85%</b>	0	0	0	0	-7,205	527	539	594	624	676	722	774	821	817	836	884

**Winchester DE Scheme  
Affordability Model  
09/04/2015**

*All figures £'000 unless stated*

Start Date	01/04/2030	01/04/2031	01/04/2032	01/04/2033	01/04/2034	01/04/2035	01/04/2036	01/04/2037	01/04/2038	01/04/2039	01/04/2040	01/04/2041	01/04/2042	01/04/2043	01/04/2044	01/04/2045	
End Date	31/03/2031	31/03/2032	31/03/2033	31/03/2034	31/03/2035	31/03/2036	31/03/2037	31/03/2038	31/03/2039	31/03/2040	31/03/2041	31/03/2042	31/03/2043	31/03/2044	31/03/2045	31/03/2046	
Model Period	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
Heat Income	30,703	519	531	545	558	572	587	601	616	632	648	664	680	697	715	733	751
Electricity Income	175,501	3,137	3,260	3,316	3,295	3,280	3,299	3,381	3,466	3,552	3,641	3,732	3,825	3,921	4,019	4,119	4,222
Electricity Export Income	9,035	165	171	173	171	169	169	173	177	182	186	191	196	201	206	211	216
CRC Saving	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Operating Costs - Maintenance	-10,100	-169	-173	-177	-182	-186	-191	-196	-201	-206	-211	-216	-221	-227	-233	-238	-244
Operating Costs - SPV	-2,666	-45	-46	-47	-48	-49	-50	-52	-53	-54	-56	-57	-58	-60	-61	-63	-65
Operating Costs - Gas Import	-68,938	-1,169	-1,198	-1,228	-1,258	-1,290	-1,322	-1,355	-1,389	-1,424	-1,459	-1,496	-1,533	-1,572	-1,611	-1,651	-1,692
Operating Costs - Electricity Import	-79,505	-1,448	-1,503	-1,523	-1,505	-1,487	-1,486	-1,523	-1,561	-1,600	-1,640	-1,681	-1,723	-1,766	-1,810	-1,855	-1,902
Lifecycle - Sinking Fund (Contribution)/Release	1,648	-93	-93	-93	876	-93	-93	-93	-93	1,806	-93	-93	-93	-93	-93	-93	-93
Lifecycle Costs	-5,736	0	0	0	-969	0	0	0	0	-1,899	0	0	0	0	0	0	0
<b>Net Operating Cashflow</b>	<b>49,943</b>	<b>897</b>	<b>950</b>	<b>966</b>	<b>939</b>	<b>916</b>	<b>912</b>	<b>937</b>	<b>963</b>	<b>989</b>	<b>1,017</b>	<b>1,044</b>	<b>1,073</b>	<b>1,102</b>	<b>1,132</b>	<b>1,162</b>	<b>1,194</b>
Construction Costs	-7,205	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Pre-Finance Cashflow</b>	<b>42,738</b>	<b>897</b>	<b>950</b>	<b>966</b>	<b>939</b>	<b>916</b>	<b>912</b>	<b>937</b>	<b>963</b>	<b>989</b>	<b>1,017</b>	<b>1,044</b>	<b>1,073</b>	<b>1,102</b>	<b>1,132</b>	<b>1,162</b>	<b>1,194</b>
Equity or Share Capital Injections	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Debt Drawdown	7,432	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest	-7,494	-226	-223	-219	-215	-211	-206	-202	-197	-192	-187	-182	-177	-172	-166	-160	-154
Debt Repayment + Interest	-7,432	-107	-111	-115	-119	-123	-127	-132	-136	-141	-146	-151	-156	-162	-168	-173	-180
<b>Post-Finance Cashflow</b>	<b>35,268</b>	<b>564</b>	<b>616</b>	<b>633</b>	<b>605</b>	<b>583</b>	<b>579</b>	<b>604</b>	<b>630</b>	<b>656</b>	<b>683</b>	<b>711</b>	<b>739</b>	<b>768</b>	<b>798</b>	<b>829</b>	<b>860</b>
Net Cashflow B/F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Release of Share Capital	-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dividends	-35,243	-564	-616	-633	-605	-583	-579	-604	-630	-656	-683	-711	-739	-768	-798	-829	-860
Net Cashflow C/F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Project IRR - based on pre-financing cashflow</b>	<b>10.85%</b>	897	950	966	939	916	912	937	963	989	1,017	1,044	1,073	1,102	1,132	1,162	1,194

Winchester DE Scheme  
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All figures £'000 unless stated

Start Date	01/04/2046	01/04/2047	01/04/2048	01/04/2049	01/04/2050	01/04/2051	01/04/2052	01/04/2053	01/04/2054	01/04/2055	01/04/2056	01/04/2057	01/04/2058	01/04/2059	01/04/2060	01/04/2061	01/04/2062	
End Date	31/03/2047	31/03/2048	31/03/2049	31/03/2050	31/03/2051	31/03/2052	31/03/2053	31/03/2054	31/03/2055	31/03/2056	31/03/2057	31/03/2058	31/03/2059	31/03/2060	31/03/2061	31/03/2062	31/03/2063	
Model Period	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	
Heat Income	30,703	770	789	809	829	850	871	893	915	938	961	985	1,010	1,035	1,061	1,088	1,115	1,143
Electricity Income	175,501	4,328	4,436	4,547	4,661	4,777	4,897	5,019	5,145	5,273	5,405	5,540	5,679	5,821	5,966	6,115	6,268	6,425
Electricity Export Income	9,035	222	227	233	239	245	251	257	263	270	277	284	291	298	305	313	321	329
CRC Saving	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Operating Costs - Maintenance	-10,100	-250	-257	-263	-270	-276	-283	-290	-298	-305	-313	-321	-329	-337	-345	-354	-363	-372
Operating Costs - SPV	-2,666	-66	-68	-69	-71	-73	-75	-77	-79	-81	-83	-85	-87	-89	-91	-93	-96	-98
Operating Costs - Gas Import	-68,938	-1,735	-1,778	-1,822	-1,868	-1,915	-1,963	-2,012	-2,062	-2,114	-2,166	-2,221	-2,276	-2,333	-2,391	-2,451	-2,512	-2,575
Operating Costs - Electricity Import	-79,505	-1,949	-1,998	-2,048	-2,099	-2,152	-2,205	-2,261	-2,317	-2,375	-2,434	-2,495	-2,558	-2,622	-2,687	-2,754	-2,823	-2,894
Lifecycle - Sinking Fund (Contribution)/Release	1,648	-93	-93	876	-93	-93	-93	-93	-93	-93	-93	-93	-93	1,806	-93	-93	-93	-93
Lifecycle Costs	-5,736	0	0	-969	0	0	0	0	0	0	0	0	0	-1,899	0	0	0	0
<b>Net Operating Cashflow</b>	<b>49,943</b>	<b>1,226</b>	<b>1,259</b>	<b>1,293</b>	<b>1,327</b>	<b>1,363</b>	<b>1,399</b>	<b>1,436</b>	<b>1,475</b>	<b>1,514</b>	<b>1,554</b>	<b>1,595</b>	<b>1,637</b>	<b>1,681</b>	<b>1,725</b>	<b>1,770</b>	<b>1,817</b>	<b>1,865</b>
Construction Costs	-7,205	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Pre-Finance Cashflow</b>	<b>42,738</b>	<b>1,226</b>	<b>1,259</b>	<b>1,293</b>	<b>1,327</b>	<b>1,363</b>	<b>1,399</b>	<b>1,436</b>	<b>1,475</b>	<b>1,514</b>	<b>1,554</b>	<b>1,595</b>	<b>1,637</b>	<b>1,681</b>	<b>1,725</b>	<b>1,770</b>	<b>1,817</b>	<b>1,865</b>
Equity or Share Capital Injections	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Debt Drawdown	7,432	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest	-7,494	-148	-141	-134	-127	-120	-113	-105	-97	-89	-80	-71	-62	-53	-43	-33	-22	-11
Debt Repayment + Interest	-7,432	-186	-192	-199	-206	-213	-221	-228	-236	-245	-253	-262	-271	-281	-291	-301	-311	-322
<b>Post-Finance Cashflow</b>	<b>35,268</b>	<b>892</b>	<b>925</b>	<b>959</b>	<b>994</b>	<b>1,029</b>	<b>1,066</b>	<b>1,103</b>	<b>1,141</b>	<b>1,180</b>	<b>1,221</b>	<b>1,262</b>	<b>1,304</b>	<b>1,347</b>	<b>1,391</b>	<b>1,437</b>	<b>1,484</b>	<b>1,531</b>
Net Cashflow B/F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Release of Share Capital	-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-25
Dividends	-35,243	-892	-925	-959	-994	-1,029	-1,066	-1,103	-1,141	-1,180	-1,221	-1,262	-1,304	-1,347	-1,391	-1,437	-1,484	-1,506
Net Cashflow C/F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Project IRR - based on pre-financing cashflow</b>	<b>10.85%</b>	1,226	1,259	1,293	1,327	1,363	1,399	1,436	1,475	1,514	1,554	1,595	1,637	1,681	1,725	1,770	1,817	1,865

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## APPENDIX 3 - FINANCIAL MODEL OUTPUT – OPTION 2A

Winchester DE Scheme  
Affordability Model  
09/04/2015

All figures £'000 unless stated

Start Date	01/04/2014	01/04/2015	01/04/2016	01/04/2017	01/04/2018	01/04/2019	01/04/2020	01/04/2021	01/04/2022	01/04/2023	01/04/2024	01/04/2025	01/04/2026	01/04/2027	01/04/2028	01/04/2029
End Date	31/03/2015	31/03/2016	31/03/2017	31/03/2018	31/03/2019	31/03/2020	31/03/2021	31/03/2022	31/03/2023	31/03/2024	31/03/2025	31/03/2026	31/03/2027	31/03/2028	31/03/2029	31/03/2030
Model Period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Heat Income	36,146	0	0	0	0	390	412	431	452	473	495	518	535	552	570	589
Electricity Income	175,501	0	0	0	0	1,949	2,017	2,167	2,273	2,420	2,558	2,701	2,819	2,849	2,919	3,061
Electricity Export Income	12,234	0	0	0	0	139	143	155	162	173	183	192	201	202	206	217
CRC Saving	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Operating Costs - Maintenance	-12,867	0	0	0	0	-164	-168	-172	-176	-181	-185	-190	-195	-200	-205	-210
Operating Costs - SPV	-2,666	0	0	0	0	-34	-35	-36	-37	-37	-38	-39	-40	-41	-42	-43
Operating Costs - Gas Import	-81,169	0	0	0	0	-818	-872	-924	-977	-1,033	-1,091	-1,151	-1,191	-1,233	-1,276	-1,323
Operating Costs - Electricity Import	-65,571	0	0	0	0	-747	-769	-828	-869	-927	-980	-1,031	-1,075	-1,082	-1,105	-1,165
Lifecycle - Sinking Fund (Contribution)/Release	1,744	0	0	0	0	-96	-96	-96	-96	-96	-96	-96	-96	-96	-96	-96
Lifecycle Costs	-5,980	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Net Operating Cashflow</b>	<b>57,372</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>621</b>	<b>632</b>	<b>697</b>	<b>732</b>	<b>793</b>	<b>846</b>	<b>905</b>	<b>958</b>	<b>951</b>	<b>971</b>	<b>1,029</b>
Construction Costs	-9,307	0	0	0	0	-9,307	0	0	0	0	0	0	0	0	0	0
<b>Pre-Finance Cashflow</b>	<b>48,065</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-9,307</b>	<b>621</b>	<b>632</b>	<b>697</b>	<b>732</b>	<b>793</b>	<b>846</b>	<b>905</b>	<b>958</b>	<b>951</b>	<b>1,029</b>
Equity or Share Capital Injections	25	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0
Debt Drawdown	9,606	0	0	0	0	9,606	0	0	0	0	0	0	0	0	0	0
Interest	-9,688	0	0	0	0	-325	-336	-333	-329	-326	-322	-318	-314	-310	-306	-302
Debt Repayment + Interest	-9,606	0	0	0	0	-95	-98	-102	-105	-109	-113	-117	-121	-125	-129	-134
<b>Post-Finance Cashflow</b>	<b>38,403</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>190</b>	<b>201</b>	<b>266</b>	<b>301</b>	<b>361</b>	<b>415</b>	<b>474</b>	<b>526</b>	<b>520</b>	<b>540</b>	<b>598</b>
Net Cashflow B/F		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Release of Share Capital	-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dividends	-38,378	0	0	0	0	-190	-201	-266	-301	-361	-415	-474	-526	-520	-540	-598
Net Cashflow C/F		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Project IRR - based on pre-financing cashflow</b>	<b>9.92%</b>	0	0	0	0	-9,307	621	632	697	732	793	846	905	958	951	1,029

**Winchester DE Scheme  
Affordability Model  
09/04/2015**

*All figures £'000 unless stated*

Start Date	01/04/2030	01/04/2031	01/04/2032	01/04/2033	01/04/2034	01/04/2035	01/04/2036	01/04/2037	01/04/2038	01/04/2039	01/04/2040	01/04/2041	01/04/2042	01/04/2043	01/04/2044	01/04/2045
End Date	31/03/2031	31/03/2032	31/03/2033	31/03/2034	31/03/2035	31/03/2036	31/03/2037	31/03/2038	31/03/2039	31/03/2040	31/03/2041	31/03/2042	31/03/2043	31/03/2044	31/03/2045	31/03/2046
Model Period	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Heat Income	36,146	611	625	641	657	674	690	708	725	743	762	781	801	821	841	862
Electricity Income	175,501	3,137	3,260	3,316	3,295	3,280	3,299	3,381	3,466	3,552	3,641	3,732	3,825	3,921	4,019	4,119
Electricity Export Income	12,234	223	231	234	232	229	229	234	240	246	252	259	265	272	279	285
CRC Saving	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Operating Costs - Maintenance	-12,867	-215	-220	-226	-231	-237	-243	-249	-255	-262	-268	-275	-282	-289	-296	-304
Operating Costs - SPV	-2,666	-45	-46	-47	-48	-49	-50	-52	-53	-54	-56	-57	-58	-60	-61	-63
Operating Costs - Gas Import	-81,169	-1,377	-1,410	-1,445	-1,482	-1,519	-1,557	-1,596	-1,635	-1,676	-1,718	-1,761	-1,805	-1,850	-1,897	-1,944
Operating Costs - Electricity Import	-65,571	-1,194	-1,240	-1,256	-1,241	-1,226	-1,225	-1,256	-1,287	-1,319	-1,352	-1,386	-1,421	-1,456	-1,493	-1,530
Lifecycle - Sinking Fund (Contribution)/Release	1,744	-96	-96	-96	873	-96	-96	-96	-96	1,925	-96	-96	-96	-96	-96	-96
Lifecycle Costs	-5,980	0	0	0	-969	0	0	0	0	-2,021	0	0	0	0	0	0
<b>Net Operating Cashflow</b>	<b>57,372</b>	<b>1,044</b>	<b>1,104</b>	<b>1,121</b>	<b>1,085</b>	<b>1,055</b>	<b>1,046</b>	<b>1,074</b>	<b>1,104</b>	<b>1,134</b>	<b>1,164</b>	<b>1,196</b>	<b>1,228</b>	<b>1,261</b>	<b>1,295</b>	<b>1,330</b>
Construction Costs	-9,307	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Pre-Finance Cashflow</b>	<b>48,065</b>	<b>1,044</b>	<b>1,104</b>	<b>1,121</b>	<b>1,085</b>	<b>1,055</b>	<b>1,046</b>	<b>1,074</b>	<b>1,104</b>	<b>1,134</b>	<b>1,164</b>	<b>1,196</b>	<b>1,228</b>	<b>1,261</b>	<b>1,295</b>	<b>1,330</b>
Equity or Share Capital Injections	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Debt Drawdown	9,606	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest	-9,688	-293	-288	-283	-278	-272	-267	-261	-255	-249	-242	-236	-229	-222	-214	-207
Debt Repayment + Interest	-9,606	-139	-143	-148	-154	-159	-165	-170	-176	-182	-189	-195	-202	-209	-217	-224
<b>Post-Finance Cashflow</b>	<b>38,403</b>	<b>613</b>	<b>673</b>	<b>690</b>	<b>654</b>	<b>624</b>	<b>615</b>	<b>643</b>	<b>673</b>	<b>703</b>	<b>733</b>	<b>765</b>	<b>797</b>	<b>830</b>	<b>864</b>	<b>899</b>
Net Cashflow B/F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Release of Share Capital	-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dividends	-38,378	-613	-673	-690	-654	-624	-615	-643	-673	-703	-733	-765	-797	-830	-864	-899
Net Cashflow C/F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Project IRR - based on pre-financing cashflow</b>	<b>9.92%</b>	1,044	1,104	1,121	1,085	1,055	1,046	1,074	1,104	1,134	1,164	1,196	1,228	1,261	1,295	1,330

Winchester DE Scheme  
Affordability Model  
09/04/2015

All figures £'000 unless stated

Start Date	01/04/2046	01/04/2047	01/04/2048	01/04/2049	01/04/2050	01/04/2051	01/04/2052	01/04/2053	01/04/2054	01/04/2055	01/04/2056	01/04/2057	01/04/2058	01/04/2059	01/04/2060	01/04/2061	01/04/2062	
End Date	31/03/2047	31/03/2048	31/03/2049	31/03/2050	31/03/2051	31/03/2052	31/03/2053	31/03/2054	31/03/2055	31/03/2056	31/03/2057	31/03/2058	31/03/2059	31/03/2060	31/03/2061	31/03/2062	31/03/2063	
Model Period	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	
Heat Income	36,146	906	928	952	976	1,000	1,025	1,051	1,077	1,104	1,131	1,160	1,189	1,218	1,249	1,280	1,312	1,345
Electricity Income	175,501	4,328	4,436	4,547	4,661	4,777	4,897	5,019	5,145	5,273	5,405	5,540	5,679	5,821	5,966	6,115	6,268	6,425
Electricity Export Income	12,234	300	307	315	323	331	339	348	357	365	375	384	394	403	413	424	434	445
CRC Saving	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Operating Costs - Maintenance	-12,867	-319	-327	-335	-344	-352	-361	-370	-379	-389	-398	-408	-419	-429	-440	-451	-462	-474
Operating Costs - SPV	-2,666	-66	-68	-69	-71	-73	-75	-77	-79	-81	-83	-85	-87	-89	-91	-93	-96	-98
Operating Costs - Gas Import	-81,169	-2,042	-2,094	-2,146	-2,199	-2,254	-2,311	-2,369	-2,428	-2,489	-2,551	-2,615	-2,680	-2,747	-2,816	-2,886	-2,958	-3,032
Operating Costs - Electricity Import	-65,571	-1,608	-1,648	-1,689	-1,731	-1,775	-1,819	-1,864	-1,911	-1,959	-2,008	-2,058	-2,109	-2,162	-2,216	-2,272	-2,328	-2,387
Lifecycle - Sinking Fund (Contribution)/Release	1,744	-96	-96	873	-96	-96	-96	-96	-96	-96	-96	-96	-96	1,925	-96	-96	-96	-96
Lifecycle Costs	-5,980	0	0	-969	0	0	0	0	0	0	0	0	0	-2,021	0	0	0	0
<b>Net Operating Cashflow</b>	<b>57,372</b>	<b>1,402</b>	<b>1,440</b>	<b>1,478</b>	<b>1,517</b>	<b>1,558</b>	<b>1,599</b>	<b>1,642</b>	<b>1,685</b>	<b>1,730</b>	<b>1,775</b>	<b>1,822</b>	<b>1,870</b>	<b>1,919</b>	<b>1,969</b>	<b>2,021</b>	<b>2,074</b>	<b>2,128</b>
Construction Costs	-9,307	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Pre-Finance Cashflow</b>	<b>48,065</b>	<b>1,402</b>	<b>1,440</b>	<b>1,478</b>	<b>1,517</b>	<b>1,558</b>	<b>1,599</b>	<b>1,642</b>	<b>1,685</b>	<b>1,730</b>	<b>1,775</b>	<b>1,822</b>	<b>1,870</b>	<b>1,919</b>	<b>1,969</b>	<b>2,021</b>	<b>2,074</b>	<b>2,128</b>
Equity or Share Capital Injections	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Debt Drawdown	9,606	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest	-9,688	-191	-182	-174	-165	-155	-146	-136	-125	-115	-104	-92	-80	-68	-55	-42	-29	-15
Debt Repayment + Interest	-9,606	-240	-249	-257	-266	-276	-285	-295	-306	-316	-327	-339	-351	-363	-376	-389	-402	-417
<b>Post-Finance Cashflow</b>	<b>38,403</b>	<b>971</b>	<b>1,009</b>	<b>1,047</b>	<b>1,086</b>	<b>1,127</b>	<b>1,168</b>	<b>1,210</b>	<b>1,254</b>	<b>1,298</b>	<b>1,344</b>	<b>1,391</b>	<b>1,439</b>	<b>1,488</b>	<b>1,538</b>	<b>1,590</b>	<b>1,643</b>	<b>1,697</b>
Net Cashflow B/F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Release of Share Capital	-25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-25
Dividends	-38,378	-971	-1,009	-1,047	-1,086	-1,127	-1,168	-1,210	-1,254	-1,298	-1,344	-1,391	-1,439	-1,488	-1,538	-1,590	-1,643	-1,672
Net Cashflow C/F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Project IRR - based on pre-financing cashflow</b>	<b>9.92%</b>	1,402	1,440	1,478	1,517	1,558	1,599	1,642	1,685	1,730	1,775	1,822	1,870	1,919	1,969	2,021	2,074	2,128

## APPENDIX 4 – LONG LIST OF ESCO STRUCTURE OPTIONS

Option	Description	Potential Benefits	Risks and Issues
1	Entirely public sector development, delivery and financed using in-house resources	<ul style="list-style-type: none"> <li>Revenues all returned to public sector</li> <li>Potential to utilise existing resources within the Council to deliver services, therefore ensuring use of local resources hence contributing to economic development within the Council.</li> <li>Council retains 100% control and governance of the project.</li> <li>Low development / set up costs</li> </ul>	<ul style="list-style-type: none"> <li>Reduce any ability to transfer risks, e.g. the Council retains all demand risk for the scheme.</li> <li>Very limited opportunity to leverage private sector expertise in delivery of the project.</li> <li>No opportunity to leverage private sector expertise in future expansion and development of the project.</li> <li>Internal delivery may impact ability of the Council to exit from the project through sale or disposal.</li> <li>Requires full public sector funding – availability?</li> <li>All risks remain with public sector – sufficient risk appetite?</li> <li>Use of internal resources may limit available skills and impact on quality of delivery.</li> <li>Vires issues to be considered</li> </ul>
2	Public sector development and financed, delivered by a private sector delivery partner	<ul style="list-style-type: none"> <li>Moderate set up costs</li> <li>Share risks with private sector for delivery (and potential future development) of the Project.</li> <li>Access to private sector expertise</li> <li>Separate legal entity will improve transparency and potentially provide the Council of an exit opportunity through sale or disposal.</li> <li>Potential to utilise existing resources within the Council to deliver services.</li> <li>Council has more flexibility on the Project return relative to the private sector which enables the Council to align to its socio-environmental objectives.</li> <li>Council branded delivery vehicle is likely to be trusted within the community which assists in the ability to secure long term heat contracts with customers.</li> </ul>	<ul style="list-style-type: none"> <li>Council retain demand risk.</li> <li>Private sector takes margin for delivery of their role.</li> </ul>

Option	Description	Potential Benefits	Risks and Issues
3	Public private partnership with joint development delivery and financing responsibilities	<ul style="list-style-type: none"> <li>• Moderate development / set up costs.</li> <li>• Opportunity to leverage private sector expertise through use of a partnership.</li> <li>• Potential to transfer some risks to a private sector partner. The risk will sit with the party best able to manage it.</li> <li>• Project part funded by the private sector</li> <li>• Potential for the Council to dispose of interest in delivery vehicle at a future point in time.</li> <li>• The creation of a partnership would enable the Council to procure a single partner (which may be with a consortium) to provide all construction, operation and maintenance support required for the Project.</li> </ul>	<ul style="list-style-type: none"> <li>• Ability to secure private sector partner is dependent on Project returns. The attractiveness of the Project to a private sector entity will be dependent on the gearing and finance costs and resulting equity IRR as well as the ability of the private sector entity to take a long term view on the investment (currently 45 years).</li> <li>• Loss of some control; private sector involved in decision making</li> <li>• Council in partnership with the private sector may impact on market interest if the Council's exit conditions are unclear.</li> </ul>
4	Private sector led development and delivery with finance support from public sector	<ul style="list-style-type: none"> <li>• Reduced resource requirement from the public sector.</li> <li>• Enables delivery risk to be transferred to private sector, while retaining the opportunity to secure revenue income from the project and to divest interest at a future point in time.</li> <li>• Public sector finance support could be in the form of a guarantee to support future proofing of the project.</li> <li>• Moderate development / set up costs.</li> <li>• Opportunity to leverage private sector expertise through use of a partnership.</li> <li>• Potential to transfer delivery risks to a private sector partner.</li> <li>• Would enable the Council to procure a single partner (which may be with a consortium) to provide all construction, operation and maintenance support required for the Project.</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced control over the future development of the project</li> <li>• Public sector takes financial risk in the project, but has reduced input to future development and delivery of the network.</li> </ul>

Option	Description	Potential Benefits	Risks and Issues
5	Private sector led development, delivery and financing with public sector commitment in elements of the project, e.g. commitment to long term heat take off contract	<ul style="list-style-type: none"> <li>• Reduced resource requirement from the public sector.</li> <li>• No opportunity for future revenue income</li> <li>• Moderate development / set up costs.</li> <li>• Opportunity to leverage private sector expertise through use of a partnership.</li> <li>• Potential to transfer delivery risks to a private sector partner.</li> <li>• No requirement for public sector funding</li> <li>• Would enable the Council to procure a single partner (which may be with a consortium) to provide all construction, operation and maintenance support required for the Project.</li> </ul>	<ul style="list-style-type: none"> <li>• No retained control by the Council.</li> <li>• Ability to secure private sector partner is dependent on Project returns. The attractiveness of the Project to a private sector entity will be dependent on the gearing and finance costs and resulting equity IRR as well as the ability of the private sector entity to take a long term view on the investment (currently 45 years).</li> <li>• Private sector may consider investment where only the profitable elements of the district heating system are included thereby negating the ability of the Council to meet key project objectives such as fuel poverty and economic regeneration.</li> </ul>
6	Full private sector development, delivery and financing	<ul style="list-style-type: none"> <li>• Moderate development / set up costs</li> <li>• Minimal resources requirement from the public sector.</li> <li>• Enables 100% transfer of risk to the private sector</li> <li>• No financial investment would be required from the Council.</li> <li>• Would enable the Council to procure a single partner (which may be with a consortium) to provide all construction, operation and maintenance support required for the Project.</li> </ul>	<ul style="list-style-type: none"> <li>• No retained control by the Council.</li> <li>• Private sector may consider investment where only the most profitable elements of the district heating system are included thereby negating the ability of the Council to meet key project objectives such as fuel poverty and economic regeneration.</li> </ul>

Table 28 Analysis of benefits, risks and issues associated with each of the long listed ESCo options

Term	Definition
CHP	Combined Heat and Power
DECC	Department of Energy and Climate Change
Dividend	A distribution of a portion of the project revenue to project shareholder.
EMR	Energy Market Reform
ESCo	Energy Service Company
EU ETS	European Union Emissions Trading Systems
FiT	Feed in Tariff
GIB	Green Investment Bank
Goal Seek	Excel function that enables 'what if' analysis to be undertaken.
IRR	Internal Rate of Return
OPEC	Organization of the Petroleum Exporting Countries
Pinpoint Share Capital	Nominal equity investment required to capitalise the project. Fully repaid to the Council over the duration of the project.
Pre-financing cashflow	Net cash inflow/outflow before financing.
PWLB	Public Works Loan Board
RHI	Renewable Heat Incentive
RO	Renewable Obligation
STOR	Short Term Operating Reserve -
TRIAD	Method by which Transmission Network Use of System charges are distributed between electricity suppliers
Spark spread	The difference in value between the purchase price of gas for use in the CHP and the sale price of electricity.

Table 29 Definitions

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