Biomass space heating for off-gas-grid SMEs

in Cheshire and Warrington

Northwest REGIONAL DEVELOPMENT AGENCY

Cheshire & Warrington Economic Alliance

THE MERSEY FOREST more from trees

\ Contents

\ Executive summary

Obtaining good quality and up-to-date data on the gas network is extremely difficult. National Grid does issue data[1] mainly for use by other utilities companies and developers but it is in a format for viewing and printing maps over small areas and does not allow transfer to a GIS application for manipulation and interrogation. We obtained some limited data for restricted use but it was not perfect.

Warrington is relatively well served with mains gas. Cheshire has limited connectivity outside the major towns. The least connected area is to the west of Crewe. When we look at businesses in off-gas-grid areas there are some differences to the overall picture. There are around 1500 businesses > 250m away from the gas main network with an estimated heating and hot water use of 185,147 MWh. Eighty to ninety percent of these businesses are estimated to have boiler sizes under 50kW. There is also a clear concentration of businesses west of the M6 and few to the east. By far the highest concentration of off-gas businesses is in what was Crewe and Nantwich Borough Council.

Two surveys of businesses were undertaken to ascertain actual fuel type and potential attitudes to using biofuels. The first was a random group of 27 companies which showed that most used electricity, followed by oil, then LPG. Costs were a major issue and over one third would consider changing fuels/heating systems. The second survey was of 41 SMEs who had already shown some interest in resource efficiency. While most expressed an interest in switching to biofuels it was tempered with a strong cost consideration. The leisure and tourism sector were most receptive as they could see the marketing potential of green power for their business.

Some cost modelling was undertaken of comparative oil/LPG/biomass (pellet) heating systems. The capital cost of biomass equipment is considerably more even taking the exchange rates of the predominantly European equipment into account. To merely level the playing field, a capital grant of 80% needs to be in place. In addition if you cannot order more than 3 tonnes of pellets at a time then they need to be delivered in small bags, manually loaded into the hopper and they are just as expensive as oil. The forthcoming Renewable Heat Incentive (RHI) may help. However under the scenario we used it needs to be in excess of 2.5p/kWh and this amount is best frontloaded to reduce to capital cost of the equipment based on lifetime use. We suspect to get good market penetration in off-gas-grid areas, we believe the RHI needs to be at least 3-3.5p/kWh.

[1] *www.gl-group.com/maps*

\ Recommendations

1. Obtain better gas grid and property data to identify with postal addresses all properties including domestic, off the gas grid.

2. Target the top 20% of largest energy users in off-gas grid areas for further assistance via business support agencies and Carbon Trust's Biomass Accelerator. These may well be subject to the Carbon Reduction Commitment and hence aware of the need to decarbonise their energy supplies.

3. Ensure business support agencies such as Groundwork EBS have sufficient training and resources to assist these businesses.

4. Identify capital funding in advance of RHI to assist the top 20% of businesses to switch to biomass.

5. Lobby DECC via the NWDA to ensure RHI is sufficient to make biomass the replacement heating system of choice from an economic viewpoint.

6. Develop a private sector business model further to penetrate the market.

7. Work with EST/Energy Project Plus on how best to develop information dissemination etc for pellet based systems at the domestic and smaller business end of the market to time with the launch of RHI.

\ Background

Climate change is coming. Along with the rest of England's Northwest we are looking at hotter drier summers and warmer wetter winters. The Regional Intelligence Unit at NWDA[2] has carried out an investigation into the economic impact of failing to address climate change issues. They estimate that the potential lost GVA for the NW region as a whole is £7.8 billion per year, with £1.4 billion per year (or 7% of the sub-regional economy) in C&W. However the recently commissioned *The Economic Implications of Climate Change for Cheshire & Warrington*[3] estimated that by taking action now, that around 500 jobs could be created over five years in the Energy & Environmental Technologies & Services (EETS) sector by developing the local energy efficiency, microgeneration and biomass supply chains. In addition around 400 could be safeguarded in smaller businesses by providing more assistance on reducing their carbon footprints.

Energy is a key consideration and often a major overhead for the business. However in one area things should be accelerating rapidly but aren't. This is bioenergy heating systems in areas that are off the mains gas network. Biofuels are most competitive when compared against heating oil and LPG the main heating fuel alternatives. Basically mains gas is relatively cheap. However market penetration of these systems is relatively low. This study seeks to:

- Identify the areas in Cheshire and Warrington that are not on the mains gas network.
- Identify clusters of businesses/areas with significant numbers of off-grid properties.
- Target at least one of these areas to carry out some initial business engagement with regards attitudes to switching to bioenergy systems.
- Identify the barriers preventing market penetration and necessary actions to remove them.
- Develop a business model to rapidly increase penetration of bioenergy heating systems into selected target areas.

This study has been funded by Cheshire & Warrington Economic Alliance (CWEA) through the North West Development Agency (NWDA).

[2] *http://www.nwriu.co.uk/index.aspx*
[3] *http://www.cwea.org.uk/sites/cwea.org.uk/files/ClimateChangeStudyFeb09.pdf*

\ Identifying areas off-gas-grid

Identifying areas in which the gas network does not exist or will not easily be extended is not easy. Obtaining the data is difficult. Some initial data was obtained giving a broad brush view of the number of households (not businesses) not served by the mains gas network at a local authority level (old Cheshire authorities used) across the North West region. This clearly shows that Cumbria, North Lancashire and Cheshire are the main areas least served by mains gas. The authority with the least amount of gas connectivity is Eden District Council in Cumbria. The former Crewe and Nantwich Borough Council came out third across the region.

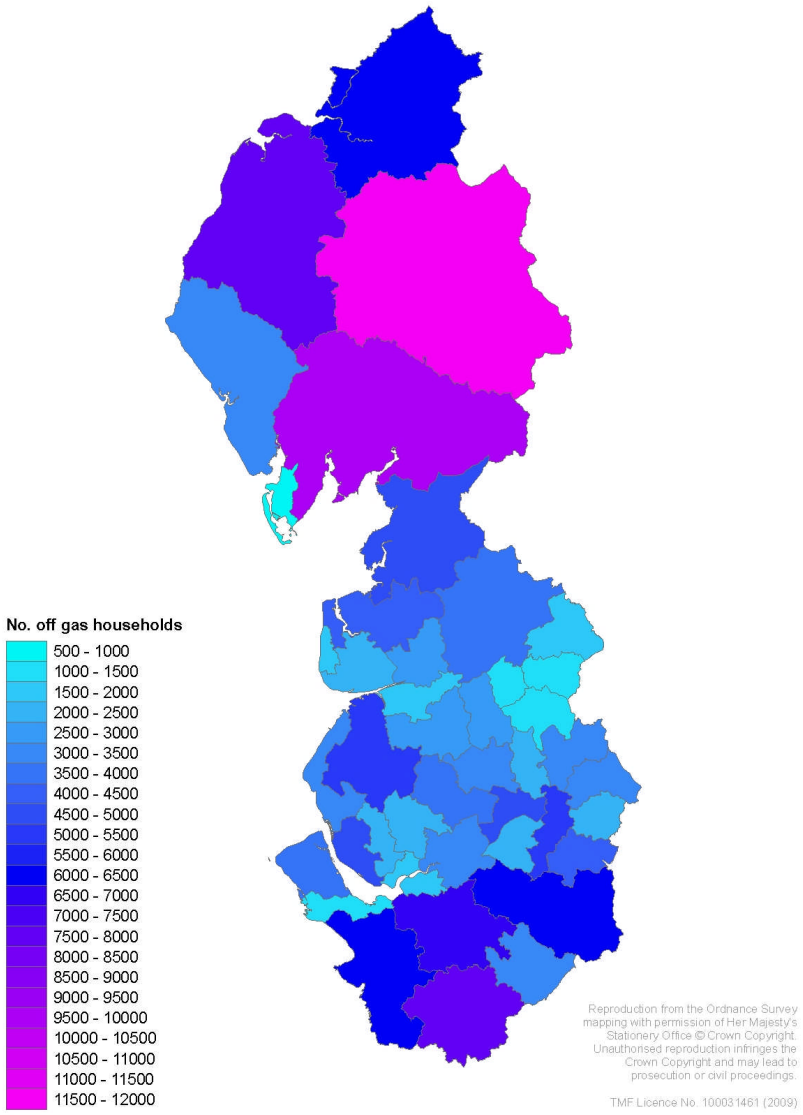


Figure 1 Number of households off the gas mains by Local Authorities in NW England Source: Forestry Commission

Camco[4] who undertook a study on our behalf, eventually managed to access some limited data from National Grid but there were severe restrictions on how the data could by presented and we were unable to access most of the data directly. However in the map below you can identify the route of the gas network in Cheshire as faint olive lines.

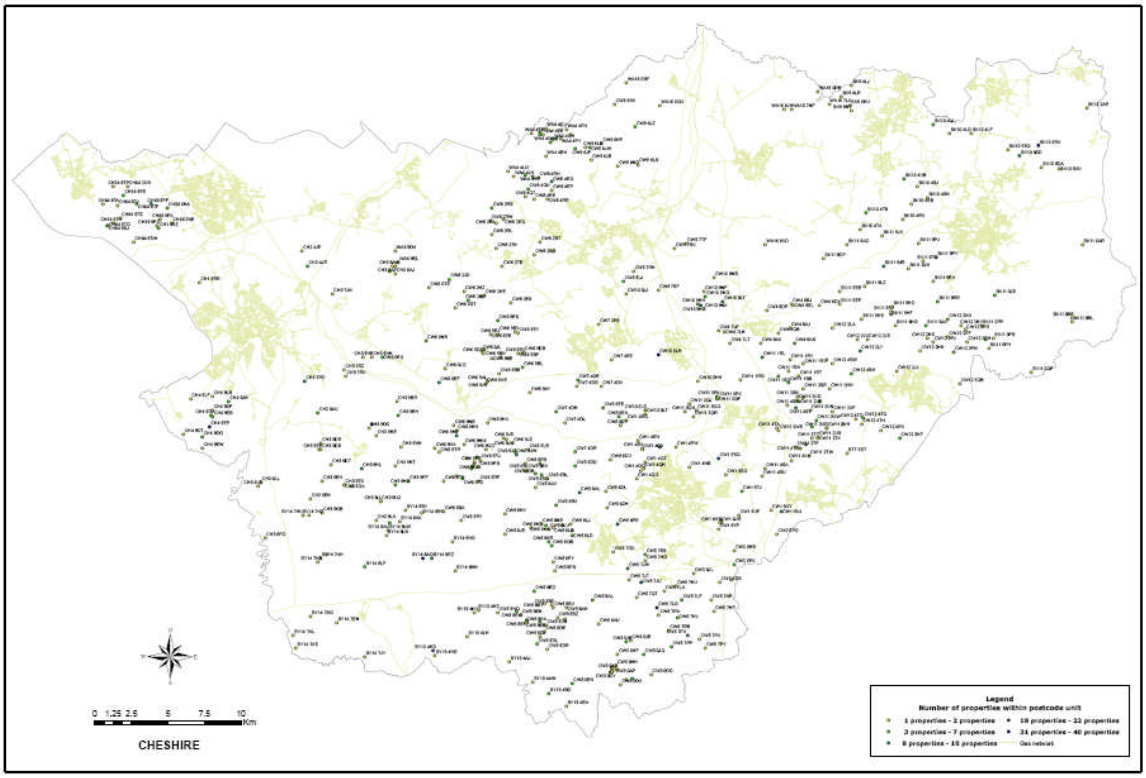


Figure 2 ***The gas network in Cheshire and Warrington (faint olive lines)***

Source: Camco/National Grid

[4] www.camcoglobal.com

We were able to obtain finer level information via The Forestry Commission for households in Cheshire and Warrington using Super Output Areas boundaries.

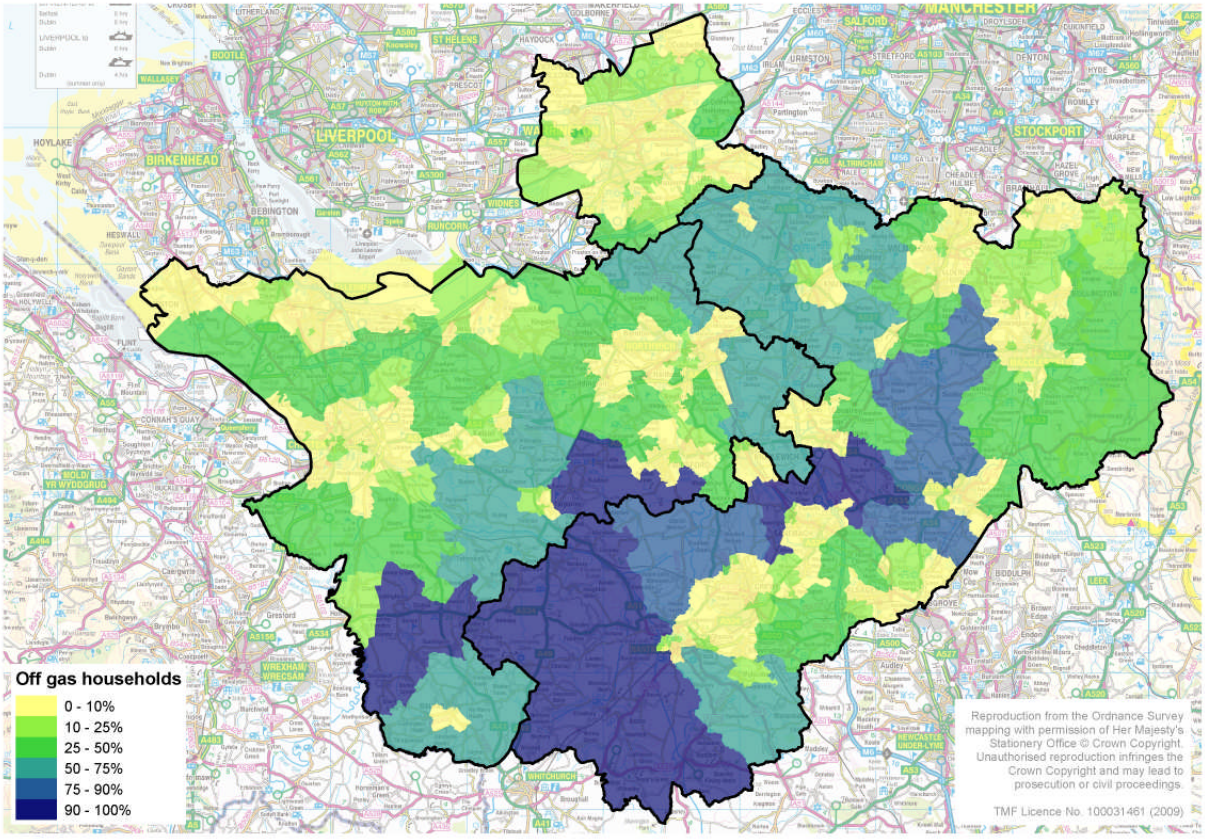


Figure 3 ***Percentage of households off the gas mains*** *by Super Output Areas in Cheshire and Warrington. Source: Forestry Commission*

While the above map show percentages the one below give a slightly different representation based on number of households. This gives a better idea of off-gas-grid heat density. For example, the north east section of Cheshire West and Chester around Antrobus shows a top category below (>500 households) but only a mid range percentage of households.

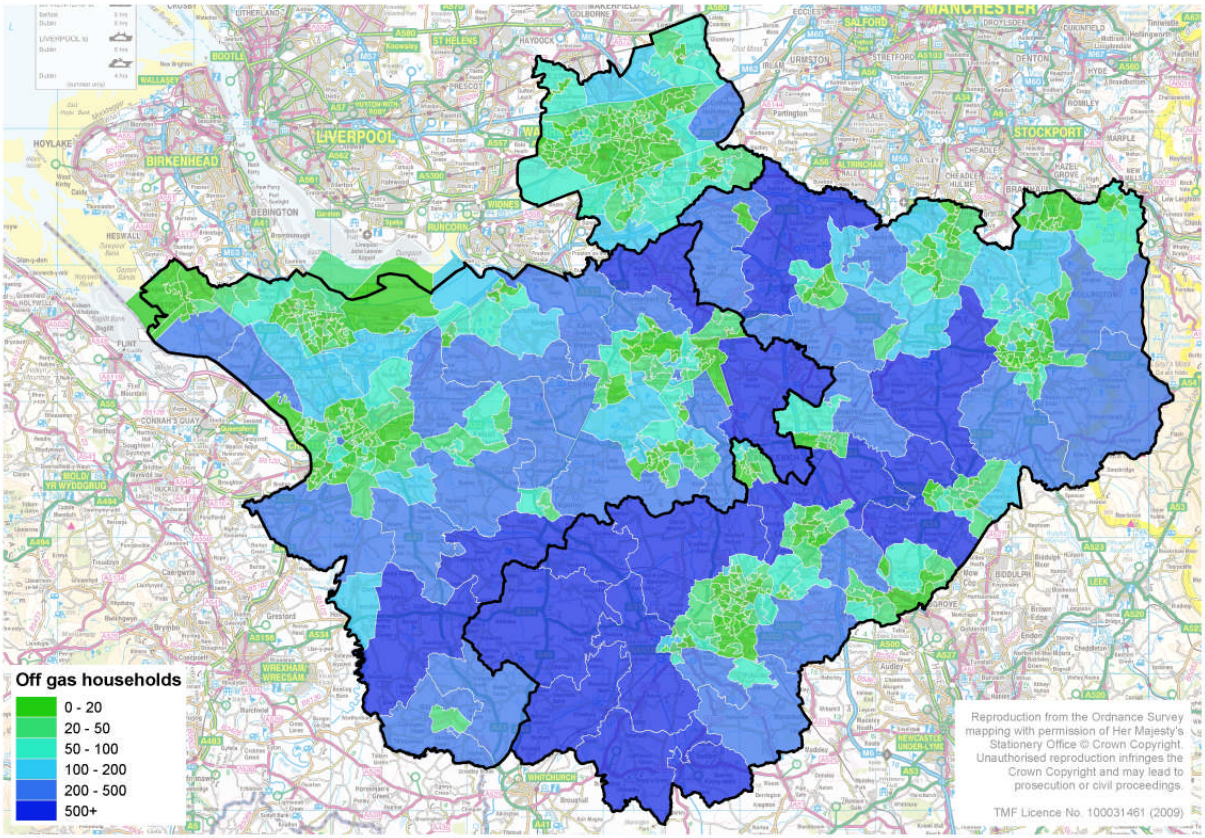


Figure 4 ***Number of households off the gas mains*** *by Super Output Areas in Cheshire and Warrington. Source: Forestry Commission*

However following discussion with National Grid, it was agreed that their gas network data could be used if only identifying commercial properties located away from the mains gas network.

We conducted a GIS analysis to identify those postcode areas with a high probability of only containing premises not connected to the gas network. After cross-referencing against example locations we took a minimum distance of 250m between the gas network and the centre point of the each postcode areas. This plotted below and gives a better indication of areas off-gas-grid.

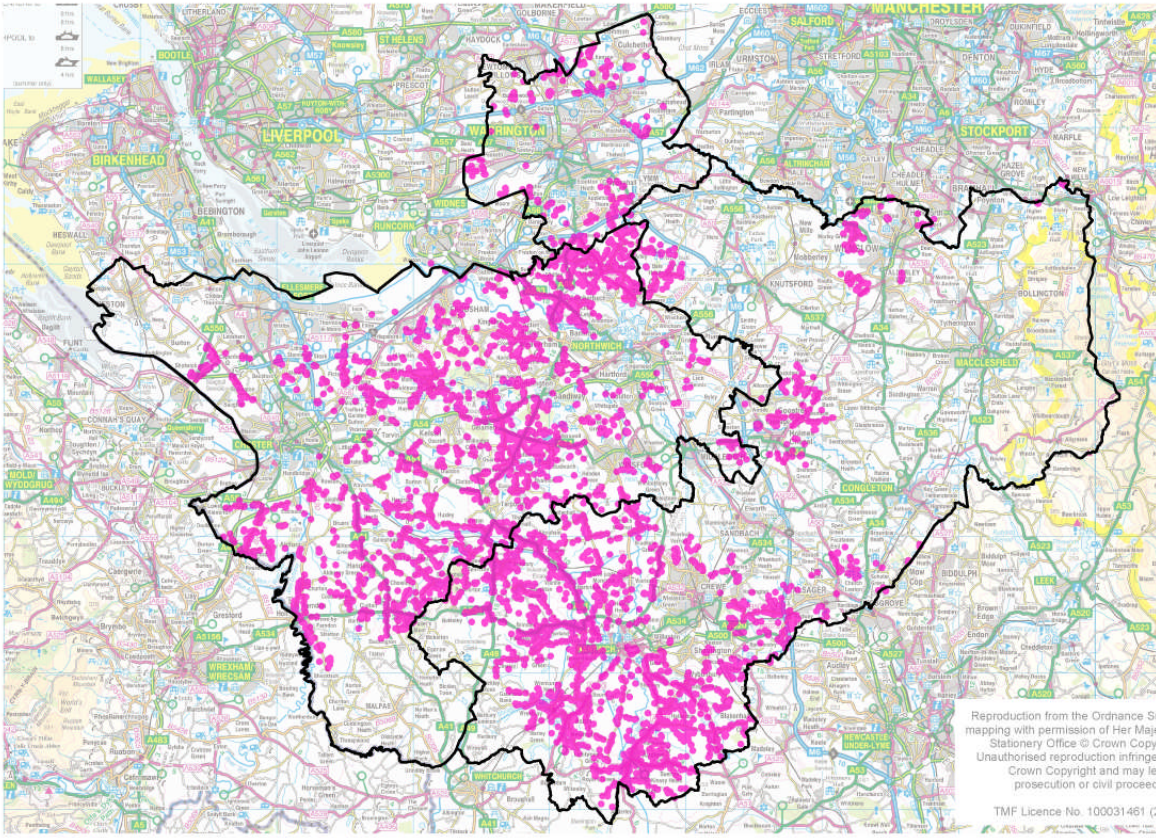


Figure 5 Business premises more than 250m away from mains gas.
Source: National Grid and VOA

\ Conclusions

on identifying areas off-gas-grid

There are marked concentrations of businesses on/off-gas-grid

- Warrington Borough is very well served by mains gas supply.
- East of the M6 is well served by gas supply apart from
    - A small cluster west of Wilmslow and Alderley Edge
    - A cluster to the east and north east of Holmes Chapel
    - Very small clusters to the south west and north east of Alsager
- West of the M6 mains gas supply is sparse outside the urban centres of Chester, Ellesmere Port, Northwich, Winsford, Middlewich, Sandbach and Crewe.

\ Identifying businesses off-gas-grid and their heat demand

Based on the areas off-gas-grid, from this point onwards only Cheshire is considered. Data on SME businesses was derived from the Valuation Office Agency (VOA) database on commercial rate payers in Cheshire.

By utilising CIBSE[5] benchmark figures on typical energy consumption for buildings (based on kWh/m^2 data for different building types) it was possible to estimate the total heat demand for all the business properties assumed not to be connected to the grid. We recognise that there will be certain inaccuracies in this approach; however, for the purposes of this study, it will provide a reasonable estimate of demand across a wide range of businesses. The locational information on the business can then be cross linked to the postcodes that are known to be off-gas-grid.

The heating and hot water energy requirements for businesses not connected to the gas network are given in Table 1. It can be seen that there is a significant demand within Cheshire with heating and hot water energy requirements totalling approximately 185,147MWh. It is worth noting that the demand does not reduce the greater the distance from the network, but is clearly dependant on other factors, possibly the location of industrial clusters.

Table 2 shows how the energy demand is broken down by business type, with miscellaneous, warehouses and workshops accounting for the largest proportions. The distribution of these properties is further illustrated in Appendix 2 which shows the spatial distribution of businesses not connected to the gas network by postcode.

[5] *CIBSE TM46: Energy Benchmarks (see Appendix 1)*

Table 1 Energy requirements for heating and hot water

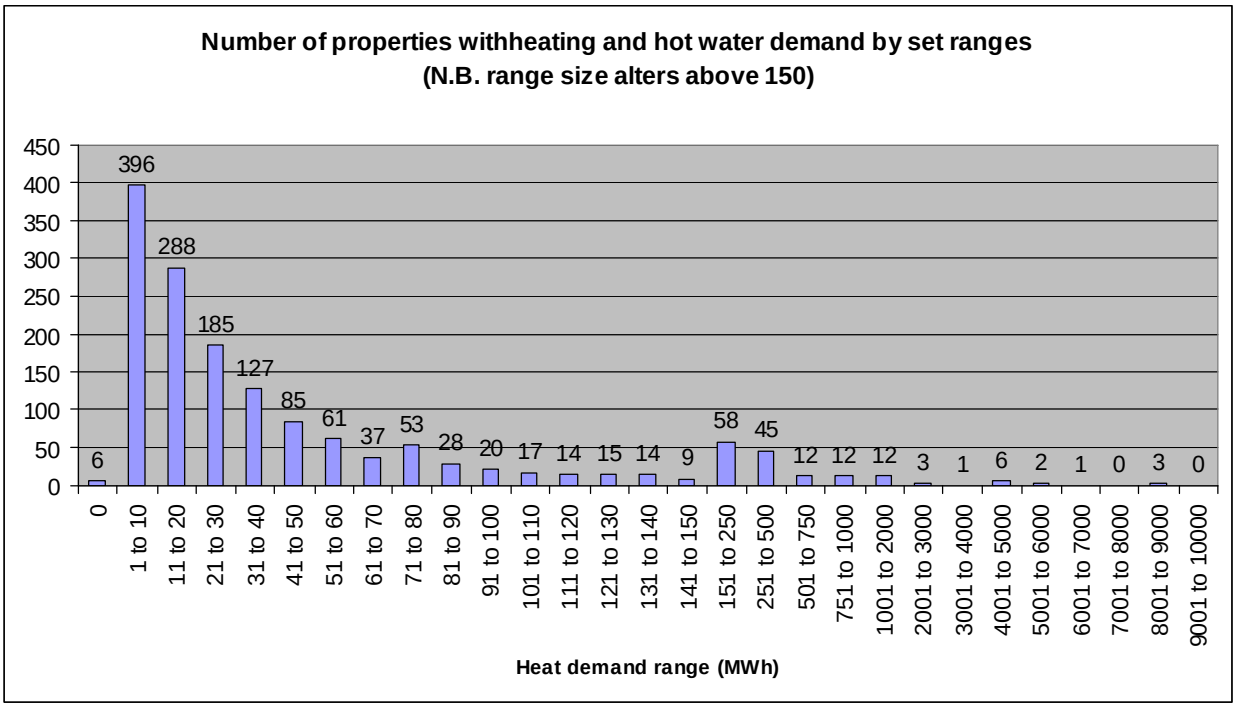
Energy requirements for heating and hot water (MWh)						
Minimum distance from gas network (m)	250	500	750	1000	1500	
Maximum distance from gas network (m)	500	750	1000	1500	above 1500	
						Total
Chester	712	1,450	932	14,389	5,075	**22,558**
Crewe and Nantwich	30,159	1,422	1,182	1,573	73,789	**108,126**
Congleton	1,975	1,720	359	2,698	3,594	**10,346**
Ellesmere Port and Neston	-	74	263	396	6,492	**7,226**
Macclesfield	-	2,976	836	729	6,354	**10,895**
Vale Royal	382	3,736	2,430	13,811	5,622	**25,982**
Warrington	-	-	-	14	-	**14**
	33,228	11,379	6,002	33,612	100,927	**185,147**

Table 2 Breakdown of emissions by business type

Breakdown of emissions by business type			
Business Type	**Total heating and hot water demand (MWh)**	**Min heating and hot water demand (MWh)**	**Max heating and hot water demand (MWh)**
Warehouse	48,660	9	8,342
Office	7,975	1	265
Workshop	47,453	3	805
Store	4,955	4	116
Shop	1,476	2	620
Hall	1,367	11	38
Miscellaneous	73,261	1	1,984
Total	**185,147**		

Figure 6 below shows how the number of properties with fossil fuel demand for heating and hot water decreases as the demand grows with only small numbers requiring greater than 500MWh. The jump in number of properties requiring between 151MWh and 500MWh is not fully understood at this stage and would require further research. This could yield useful results in terms of identifying a geographical or sector focus for energy supply offerings.

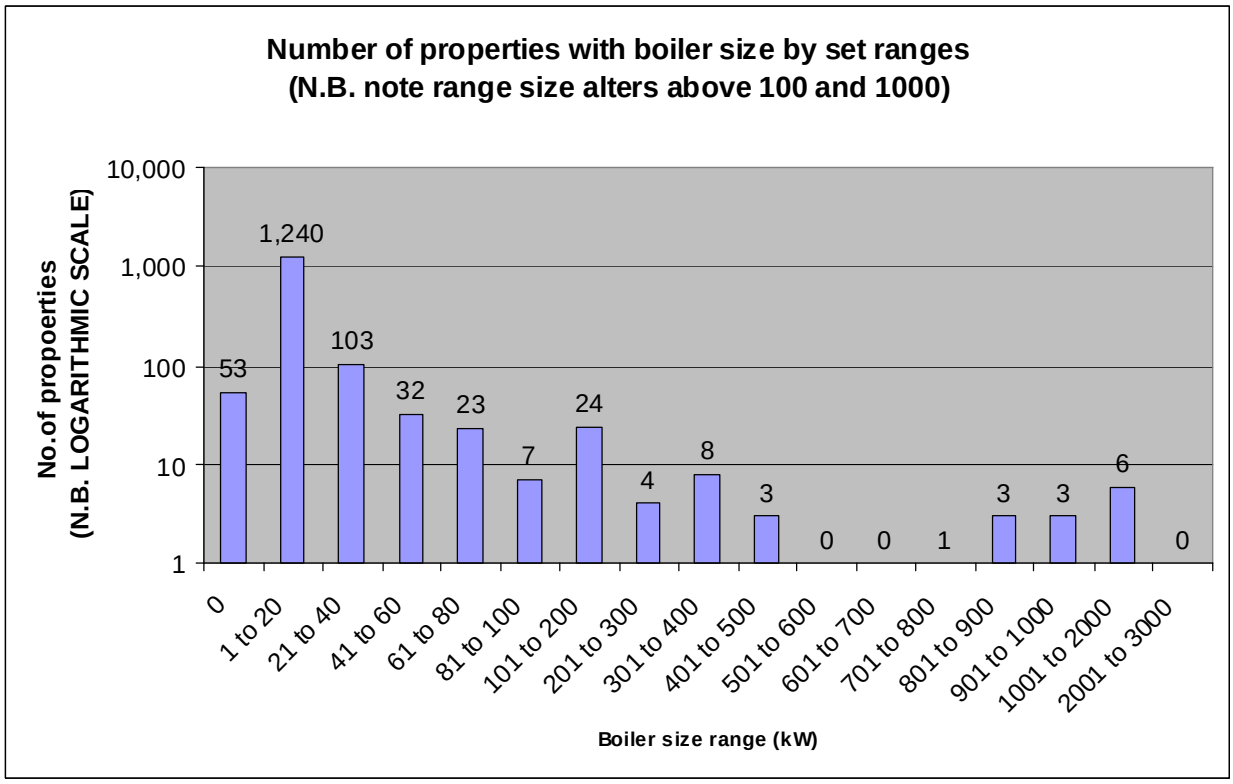
Figure 6 Number of properties with heating and hot water demand by set ranges



This distribution is further analysed to provide an indication of the typical boiler size requirements for these properties. This can be seen in Figure 7 where it should be noted that the vertical axis is provided in a logarithmic scale to accommodate the range of numbers on a single graph. There is a significant peak where the vast majority of properties could be serviced by boilers sized between 1 and 20 kW.

The tables of figures for these graphs can be found in Appendix 3.

Figure 7 Number of properties with boiler size requirements by set ranges



A number of assumptions have been made in undertaking this short study to provide a reasonable level of accuracy:

1. In the boiler size calculations it is assumed that no properties will be or are heated by electricity.
2. All businesses in the Cheshire area have been assigned a business type to match the benchmark categories as provided by CIBSE.
3. Locations of properties have been calculated based on the postcodes centres. Taking a fixed 250m distance between the gas network is likely to have led to a conservative estimate of business numbers.

\ Conclusions

on identifying businesses off-gas-grid and their heat demand

- Significant total non-gas-grid connected energy demand within the county of 185,000MWh. A conservative estimate of 1,500 businesses were identified not to be connected to the gas network, and by extension will use solid fuels, containerised liquid fuels, coal or electricity as an alternative.
- Of the estimated boiler sizes the 1 to 60 kW range is clearly most frequently found (circa 1300 cases), which suggests these are relatively smaller businesses.
- Of the estimated boilers approximately 70 boilers are anticipated to be in the 60kW to 500kW range, with approximately 39 of these between 100kW and 500kW.
- While it is estimated that there are only approximately 13 appliances above 500kW the energy savings to these businesses are considerable.

\ Survey of off-gas-grid businesses

Conducting the business survey was challenging, largely due the nature of the often small rural businesses within the survey population.

Survey 1
The VOA data identified 1506 businesses of which 150 (10%) were directly contacted by phone. A disproportionate number of the larger businesses were unwilling or unable to respond to the survey. The survey process resulted in 27 completed questionnaire responses. Clearly these businesses will be diverse, since the only linking factor is location; hence, the responses yielded can only be indicative of the issues under consideration, but do provide direction for further research.

The following is a summary of the responses received:

Nature of businesses

- There was a wide range of business in size and sector. A number were associated to delivering rural / agricultural services but otherwise companies sit in a range of sectors including Service (restaurants, children's nurseries), Property, Manufacturing and Retail.
- Turnover ranged from £6m to £10,000
- Two were sole traders, the largest had 25 employees and the average number of FTEs was eight

Fuel Usage

- Primary source for heating / hot water (percentage of respondents)

- Electricity 77%
- Oil 35%
- LPG 23%
- Other One company used waste wood (biomass)
- Coal 0%
- Natural Gas 0%

- Amount of fuel used

- 58% didn't know
- Average cost per year - £4300 (but this greater inflated by a few large users. Appears to be clusters around the £8-£10,000 range and £500-£1000 range)
- One had a zero cost (using waste wood)

Fuel suppliers

- Most fossil fuel users purchased fuels from local suppliers
- Electricity users used national utility companies

Nature of supply contract / equipments suppliers

- Fossil fuel users described standard fuel supply arrangement, i.e. no link to plant and equipment such as leasing
- Electricity users described standard supply arrangements
- Most used local contractors for the supply / service of equipment

Advantages and disadvantages of the current heating / hot water systems and the associated fuel supply

- Advantages

- Only those using electricity were able to describe advantages, e.g. "quick", "simple", "reliable", "no need for tanks".

- Disadvantages

- High costs (cited by 19%)
- Price fluctuations (cited by 11%)
- Technical issues (cited by 23%), including "less controllability", "possibility of running out" and "….manual switching required"
- A number stated that electricity was expensive and was less efficient

Would they consider replacement?

- Yes (31%)
- Don't know, e.g. not for their approval (35%)
- No (27%)

Survey 2

A further study was undertaken by Groundwork to contact Small to Medium Enterprises (SME's), previously supported by Groundwork Cheshire's Environmental Business Services, in order to determine which of those SME's are suitable for and are interested in the use of wood fuel or "Bio-oil" as an energy source for their business.

An initial portfolio of 491 SME's was compiled, and of these, 450 companies were immediately rejected due to existing natural gas connections. The remaining 41 companies were then contacted via telephone and their initial opinions sought. These can be summarised as follows:

- Sector breakdown was Tourism – 36%, Manufacturing – 20%, Retail – 14%, Food – 10%, Education – 10%, and Other – 10%.
- All SME's contacted were willing to consider Bio-Fuel as an alternative to their existing fuel if it was proven to provide lower operating costs.
- Most SME's (with the exception of two who produce waste wood), expressed concern over the capital costs of converting to Bio-Fuel.
- Most of the SME's are either located in a rural position or may be considered as supplying products to the rural community (such as nursery plants or leisure products).
- Those SME's associated with the leisure/tourism industry were prepared to give extra consideration to Bio-Fuels if they would help to improve the companies' environmental credentials.
- Of those sites, three would consider a partial conversion from natural gas to Bio-Fuels specifically to improve their environmental credentials providing grants/funding was available for the conversion.
- None of the SME's, unless prompted, considered the availability of Bio-Fuel supply (this may be due to a public perception that Bio-Fuels are readily available).

\ Conclusions

on survey of off-gas-grid businesses

Neither survey provided conclusive results due to the low sample number and the unwillingness or inability of those that did participate to provide critical basic data, particularly regarding business scale, the nature of boiler procurement and of fuel supplies.

The most interesting information uncovered from the **random first survey** was:

- Oil, then LPG are the favoured fossil fuel options but electricity is the most preferable alternative to natural gas
- There was a wide range in fuel costs, from several hundred pounds to £10,000, mirroring the range in scale of the businesses that responded. One respondent reported a zero heating cost (through use of waste wood)
- Almost 50% reported dissatisfaction with their current heating / hot water / fuel system, citing costs, cost fluctuation and a variety of technical issues
- 31% of respondents suggested they would consider replacing their current system. Most of these would only do so if cheaper solutions were available. A further 35% responded “don’t know” to this query, generally because the interviewee was not responsible for approving a new heating system.

The most interesting information uncovered from the **“engaged” second survey** was:

- There was concern over the capital costs of biomass equipment.
- The leisure/tourism industry were prepared to give extra consideration to Bio-Fuels if they would help to improve the companies’ environmental credentials.
- No one consider fuel supply to be an issue.

\ Delivered fuel suppliers in Cheshire

From a desk based survey of the solid and liquid fuels market there are a large number of active companies. 36, 11 ,40 and 6 suppliers of coal, oil, LPG and biomass respectively were identified. Details of these are included in Appendix 4. The majority are located within the Cheshire region but some are regional or national suppliers, particularly in the case of LPG.

\ Off-gas-grid heating costs

Taking the two most popular fossil fuel alternatives for heating (Oil and LPG), we have assessed the comparative Net Present Lifetime costs for each option. We have considered against the following scenarios: (a) user purchase of plant and equipment, and (b) the alternative of the fuel supplier providing plant and equipment with an associated service charge. The cost modelling used the following assumptions:

- A business wishes to replace their current heating boiler which is a 50kW oiled fired system
- The boiler uses the same kWh of fuel a year throughout the examples
- Most of the heat load is in winter but there is a year round hot water requirement.
- All the internal distribution pipework, radiators and controls have recently been replaced so should be discounted
- The fuel tank is assumed to be replaced

We used the exactly the same assumptions and heat use but got actual quotes for two pellet fired biomass systems. Clearly the results shown in table 3 illustrate that oil fuel, in both circumstances, is preferable from a cost perspective due to the higher fuels costs and that, as would be expected, the cheaper option (over the lifetime) is to purchase plant and equipment out right. Illustrations of the lifetime cash flows are shown in Appendix 5. It is worth noting that the business survey did not identify the fuel supplier providing plant and equipment as a popular option. Biomass is not competitive. The pellet price seems to be mirroring oil. To make things competitive either a capital grant of 80% needs to be in place or the forthcoming Renewable Heat Incentive needs to be in excess of 2.5p/kWh for the scenarios below. This merely levels the playing field.

Table 3 Heat cost modelling

	Oil - Client buy	LPG - Client buy	Oil - Fuel Service	LPG - Fuel Service	Biomass Client buy OkoFen	Biomass Client buy Froling
Capital cost	£4,683	£3,140	£ -	£ -	£23,701	£21,245
Annual cost	£3,917	£5,151	£4,482	£5,414	£4,862	£4,862
20 year NPV	-£60,354	-£76,352	-£63,693	-£76,951	-£92,802*	-£90,346*
Annualised 20 yr NPV	**-£3,018**	**-£3,818**	**-£3,185**	**-£3,848**	**-£4640**	**-£4517**

** Calculated using spreadsheet at http://exceltemplates.net/wp-content/uploads/excel/financial2/NPV%20Solution%20Template.xls and a discount rate of 3.5% as per the other models.*

\ Conclusions

on off-gas-grid heating costs

- Most businesses have heating requirements under 50kW and this is generally best suited to pellets systems.
- Capital costs of the biomass equipment is considerably more and may be exacerbated by current exchange rates on the predominantly imported equipment.
- Real market penetration is unlikely to begin unless an 80% capital grant is available.
- Unless pellets are ordered in quantities of over 3 tonnes, they will come delivered in bags and require manual loading into a hopper. Bagged pellets are no cheaper than heating oil. In energy terms the equivalent minimum load of heating oil would be around 1000 litres. Currently the minimum oil delivery is usually 500 litres.

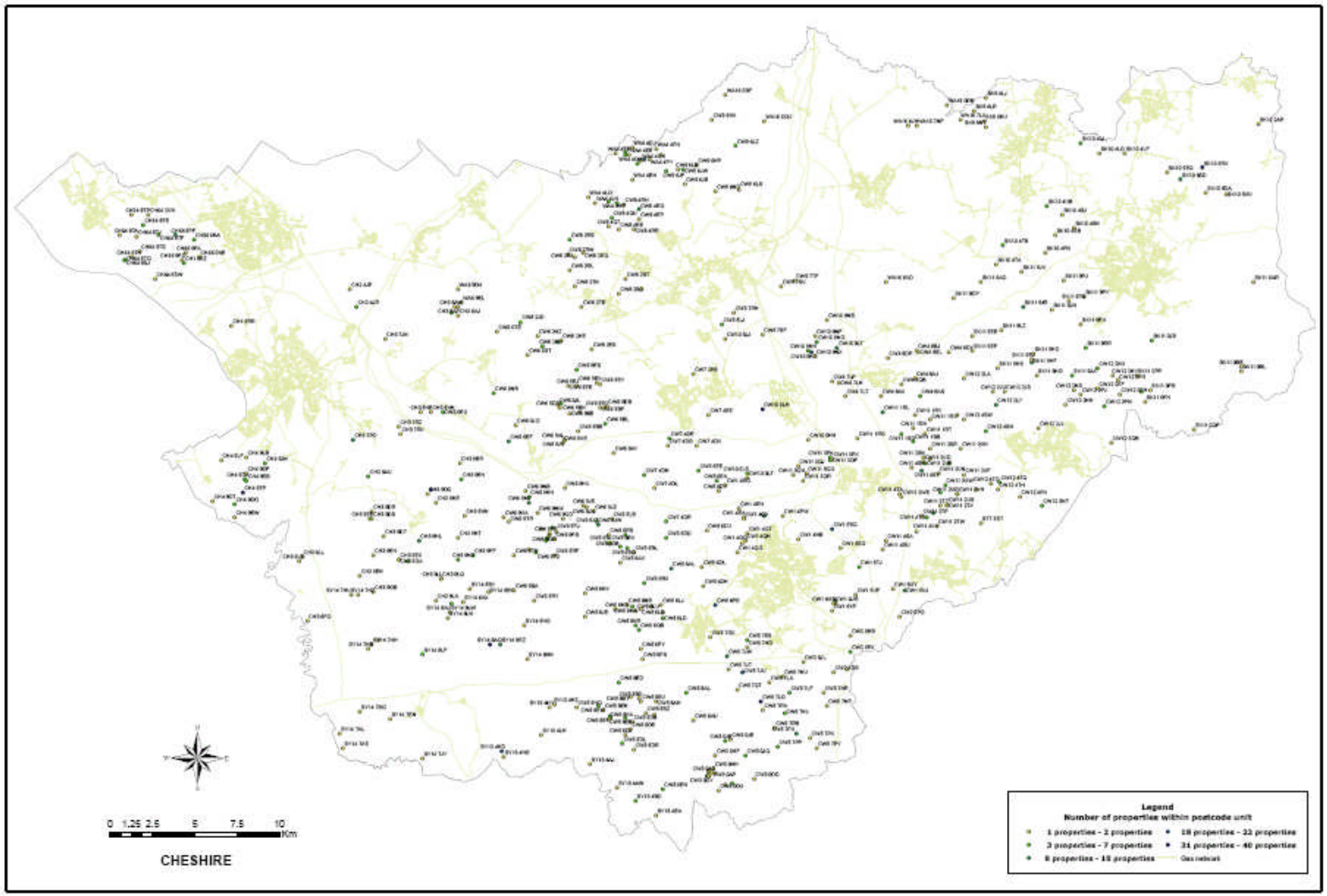
\ Appendices

Appendix 1 – CIBSE Energy Benchmarks

Category	Name	Name in assessment	Electricity Typical benchmark kWh/m2	Fossil-thermal Typical benchmark kWh/m2
1	General office	Office	95	120
		Misc	95	120
2	High street agency	High street agency	140	0
3	General retail	General retail	165	0
4	Large non-food shop	Shop	70	170
5	Small food store	Small food store	310	0
6	Large food store	Large food store	400	105
7	Restaurant	Restaurant	90	370
8	Bar, pub or licensed club	Bar, pub or licensed club	130	350
9	Hotel	Hotel	105	330
10	Cultural activities	Cultural activities	70	200
11	Entertainment halls	Entertainment halls	150	420
12	Swimming pool centre	Swimming pool centre	245	1130
13	Fitness and health centre	Fitness and health centre	160	440
14	Dry sports and leisure facility	Dry sports and leisure facility	95	330
15	Covered car park	Covered car park	20	0
16	Public buildings with light usage	Public buildings with light usage	20	105
17	Schools and seasonal public buildings	Hall	40	150
18	University campus	University campus	80	240
19	Clinic	Clinic	70	200
20	Hospital - clinical and research	Hospital - clinical and research	90	420
21	Long term residential	Long term residential	65	420
22	General accommodation	General accommodation	60	300
23	Emergency services	Emergency services	70	390
24	Laboratory or operating theatre	Laboratory or operating theatre	160	160
25	Public waiting or circulation	Public waiting or circulation	30	120
26	Terminal	Terminal	75	200
27	Workshop	Workshop	35	180
28	Storage facility	Store	35	160
		Warehouse	35	160
29	Cold storage	Cold storage	145	80

CIBSE TM46: Energy Benchmarks (2008)

Appendix 2 – Map of SME propertries not connected to the gas network



Appendix 3 – Results Tables

Table 1 Number of properties with fossil fuel demand by set ranges

Number of properties with fossil fuel demand by set ranges		
Minimum MWh)	Maximum (MWh)	No. Properties
0	0	6
1	10	396
11	20	288
21	30	185
31	40	127
41	50	85
51	60	61
61	70	37
71	80	53
81	90	28
91	100	20
101	110	17
111	120	14
121	130	15
131	140	14
141	150	9
151	250	58
251	500	45
501	750	12
751	1,000	12
1,001	2,000	12
2,001	3,000	3
3,001	4,000	1
4,001	5,000	6
5,001	6,000	2
6,001	7,000	1
7,001	8,000	0
8,001	9,000	3
9,001	10,000	0
		1,510

Table -2 Number of properties with boiler size by set ranges

% of heat demand from new boiler		60%
Estimated running hours		3,000 per annum
Number of properties with boiler size by set ranges		
Min (kW)	**Max (kW)**	**No. Properties**
0	0	53
1	20	1,240
21	40	103
41	60	32
61	80	23
81	100	7
101	200	24
201	300	4
301	400	8
401	500	3
501	600	0
601	700	0
701	800	1
801	900	3
901	1,000	3
1,001	2,000	6
2,001	3,000	0
		1,510

Appendix 4 – Delivered fuel suppliers in Cheshire

Coal Suppliers in the Cheshire area				
Name	**Area**	**Address**	**Phone**	**Website**
CPL Distribution	National	CPL Distribution Customer Service Department, Mill Lane, Wingerworth,		www.coals2u.co.uk
Fergusson Coal	National	Castlecraig Business Park, Players Road, Stirling, FK7 7SG	01786 477222	www.coaldelivery.co.uk
A J Hancock Ltd	Northwich	The Coal Yard Denton Drive Ind Est, Northwich, CW9 7LU	01606 43155	
A McKiernon & Sons	Stockport	Redhouse Lane, Stockport, SK12 2EW	01663 762227	
A W Smith & Sons	Northwich	2 Roberts Road, Lostock Gralam, Northwich, CW9 7PG	01606 45038	
Aj Picton Quality Fuels	Warrington	Arbury Croft Arbury Lane Winwick, Warrington, Cheshire WA2 0RJ	01925 631096	
Alsager	Congleton	65 Bankhouse Dr, Congleton, CW12 2BL	01260 278995	
Arthur Traynor (T/A E E Lockett)	Northwich	51 Queensgate, Castle, Northwich, CW8 1DU	01606 74646	
C Lovatt	Macclesfield	Ashmore House Farm, Rushton, Macclesfield, SK11 0RU	01782 513034	
Calveley Coal Ltd	Tarporley	Station Yard, Nantwich Road, Calveley, Tarporley, CW6 9JT	01829 261199	
Cheshire Town & Country Fuel	Congleton	69A Manchester Road, Congleton, CW12 2HT	01625 860808	
Crosthwaite Bros	Stockport	108 Didsbury Road, Heaton Chapel, Stockport, SK4 2HR	0161 432 4617	
E White	Middlewich	6 Hilton Close, Middlewich, CW10 0PS	01606 833758	

Field Ronald & Son	Chester	The Limes/Capenhurst La, Chester, CH1 6HE	0151 339 2175	
G Fox Coal Merchants	Nantwich	Station Yard, Pillory St, Nantwich, Cheshire, CW5 5SS	01270 624575	
Grangewood Fuels Ltd	Warrington	Grange Farm, Stonecross Lane, Lowton, Warrington, WA3 1JU	01925 290062	
H D Weall	Cheadle	80 Davies Ave, Heald Green , Cheadle, SK8 3PG	0161 437 7542	
Hambleton Fuel Merchants	Stockport	33 Woodstock Av, Stockport, SK57HX	0161 480 9990	
Hargreaves	Congleton	Brunswick Wharf/Brook St, Congleton, CW12 1RG.	01260 272905	
Harrisons	Nantwich	Station Yard, Pillory St, Nantwich, Cheshire CW5 5SS	01270 625323	
Hartley's Fuels	Timperley	8 Clifford Ave, Timperley, WA15 6PB	0161 980 3062	
J Brierley (Macclesfield) Ltd	Macclesfield	Bakestonedale Rd, Pott Shrigley, Macclesfield, SK10 5RX.	01625 573837	
J P Supplies Ltd	Chester	Oakwood House, 76, Llys Derwen, Higher Kinnerton, Chester, Cheshire	01244 661206	
K Bosson & Son	Sandbach	38 Elworth St, Sandbach, CW11 1HA	01270 765588	
Kirk & Co	Macclesfield	Bay Tree House, Hedge Row, Rainow, Macclesfield, SK10 5DA	01625 573131	
Knutsford Solid Fuels	Knutsford	Tabley Grove, Knutsford, WA16 0AP.	01565 621099	
Lloyd T R	Chester	Corner Ways/Saltney Ferry Rd, Saltney Ferry, Chester, CH4 0BN	01244 682480	
McNeil J & Son	Wilmslow	Wardale/Morley Green Rd, Wilmslow, SK95NY	01625 529847	
Miller's Coal Merchant	Northwich	Thorn Tree Farm, Ainsworth Lane, Crowton, Northwich, CW8 2RS	01928 788222	
Pearsons Fuel	Stockport	Rose Hill Station Goods Yard, Marple, Stockport, Cheshire SK6 6PF	0161 427 1260	

Rayner Bros	Stockport	2 Congham Rd, Stockport, SK39PB	0161 480 4600	
Roy Wood	Warrington	Hop Pole Boarding Kennels, Millhouse Lane, Croft, Warrington, WA3 7EX	01925 762264	
Stafford Fuels	Stockport	The Quarry Stockyard, off Marsh Lane, New Mills, Stockport, SK22 4PP	01663 743082	
Tattenhall Coal	Chester	Tattenhall Rd/Newton-by-Tattenhall, Tattenhall, Chester, CH3 9DD	01829 771220	
Taylor-Firth (Runcorn) Ltd	Runcorn	Unit 9, Cormorant Drive, Runcorn, WA7 4UD	01928 572631	
Wynnstay Fuels	Chester	Saighton Lane, Waverton, Chester, Cheshire CH3 7PD	01244 336444	

Oil Suppliers in the Cheshire area				
Name	**Area**	**Address**	**Phone**	**Website**
24/7 Fuel Deliveries	Stockport	Old Moor Road, Bredbury, Stockport, Cheshire SK6 2QE	0161 637 6087	
Bayford & Co Ltd	Manchester	Cobra Court, 6, Lumsdale Road, Stretford, Manchester, Lancashire M32 0UT	0161 865 9733	
Boiler Juice	National	??	??	www.boilerjuice.com
Carlton Fuels	Sandbach	Millbuck Way, Springvale Industrial Estate, Sandbach, Cheshire CW11 3JA	0151 356 4977	www.carlton-fuels.co.uk
Carlton Fuels	Stockport	Bramhall Oil Terminal, Chester Road, Poynton, Stockport, Cheshire SK12 1DS	0161 925 6360	
Carlton Fuels	Warrington	302, Bridgewater Place, Birchwood Park, Birchwood, Warrington, Cheshire WA3 6XG	0151 546 6660	
Conoco Ltd	National	Chester Rd, Poynton, Stockport, Cheshire SK12 1DS	0161 439 3341	
County Oil Group Ltd, Runcorn	Runcorn	Beca House, Ashville Way, Sutton Weaver, Runcorn, Cheshire, WA7 3EZ	01928 718000	
CPL Petroleum	National	302, Bridgewater Place, Birchwood, Warrington, Cheshire WA3 6XG	0845 6021106	
Crown Oil	National			www.crownoil.co.uk
E G S Energy Services Ltd	Wilmslow	Suite 62, 3 Courthill House, Water Lane, Wilmslow, Cheshire SK9 5AJ	01625 856999	
Ebony Solutions Ltd	Warrington	7, Beechwood Avenue, Hartford, Northwich, Cheshire CW8 3AR	01606 301222	
Eco-Oil Ltd	Warrington	Fiddlers Ferry Power Station, Widnes Rd, Cuerdley, Warrington, Cheshire WA5 2UT	0151 420 0438	
EMO Oil Ltd	National	Macon Way, Crewe, Cheshire CW1 6DG	01270 500555	www.shell.com/home/content/uk om/shell_distributors/emo/emo_oil_splash.html

Flaym Fuels	Runcorn	Ashville Industrial Estate, Sutton Weaver, Runcorn, Cheshire WA7 3EZ	01928 718000	
G Force Fuels, Crewe	Crewe	The Stables/Newhouse Farm, Clay Lane, Haslington, Crewe, Cheshire, CW1 5SQ	01270 250586	
GB Oils Ltd	Warrington	302, Bridgewater Place, Birchwood Park, Birchwood, Warrington, Cheshire WA3 6XG	0800 339977	
Heating Oil .co.uk	National	??		www.heatingoil.co.uk
In Fuel Ltd	Crewe	Unit 4-5, Macon Court, Herald Drive, Crewe, Cheshire CW1 6EA	01473 295444	
Knutsford Domestic Fuel Oil Co Ltd	Nantwich	Wardle, Nantwich, Cheshire CW5 6AF	01565 634488	
L D Ltd, Tarporley	Tarporley	Rosemount, Alprham, Tarporly, Cheshire, CW6 9JE	01829 260438	
Malpas Fuel Oils	Nantwich	P.O Box 140, Nantwich, Cheshire CW5 6FY	01948 820514	
Martindale Fuels	Warrington	2nd Floor, 302, Bridgewater Place, Birchwood, Warrington, Cheshire WA3 6XG	01928 566 631	
Morrey Oils Ltd	Chester	Saighton Lane, Waverton, Chester, Cheshire CH3 7PD	01244 332056	
N.W.F Fuels Ltd	Nantwich	Wardle, Nantwich, Cheshire CW5 6AF	01829 260900	
Oil Ignition Lessees Ltd	Altinncham	Bridgewater Rd, Broadheath, Altrincham, Cheshire WA14 1LZ	0161 928 6063	
O'Neill's Fuels, Widnes	Widnes	Macdermott Road, Widnes, Cheshire, WA8 0PF	0151-257 7522	
RGD Services	Knutsford	The Nook, Tabley Rd, Knutsford, Cheshire WA16 0NF	01565 634244	
Ribble Fuel Oils	Manchester	??	0161 872 0861	www.ribblefueloils.co.uk
Rock Oil Co	Warrington	90, Priestley St, Warrington, Cheshire WA5 1ST	01925 636191	
Spot Petroleum Staffordshire Ltd	Chester	Stanney Mill Rd, Little Stanney, Chester, Cheshire CH2 4HX	0151 357 2300	

Swan Petroleum, Middlewich	Middlewich	Middlewich Road, Byley, Middlewich, Cheshire, CW10 9NX	01606 737044	
The Star Tractor & Motor Oil Co.Ltd,	Stockport	Old Moor Rd, Bredbury, Stockport, Cheshire SK6 2QE	0161 406 6558	
Thompson Petroleum	Sandbach	21, Tatton Drive, Sandbach, Cheshire CW11 1DZ	01270 764001	
U.K Fuels Ltd	Crewe	Macon Court, 4-5, Herald Drive, Crewe, Cheshire CW1 6EA	01270 500400	
U.K Fuels Ltd	Crewe	P.O Box 262, Crewe, Cheshire CW2 6GF	01270 655600	
Watson Petroleum Ltd, Stockport	Stockport	Hollingworth Road, Bredbury, Stockport, Cheshire, SK6 2AY	0161-430 4130	
Wirral Heating Oil Ltd	Chester	Dunkirk Estate, By Pass Rd, Dunkirk, Chester, Cheshire CH1 6LZ	01244 851200	
Wynnstay Fuels	Chester	Saighton Lane, Waverton, Chester, Cheshire CH3 7PD	01244 336444	www.wynnstayfuels.co.uk

Biofuel Suppliers in the Cheshire area

Name	Type	Address	Phone	Website
Billington Biofuels	Pellets	Billington Biofuels, Edward Billington & Son Ltd. Cunard Building, Liverpool, L3 1EL	0151 243 9047	www.billingtonbiofuels.com
Liverpool Wood Pellets	Pellets	21 Dublin Street, The Dock Road, Liverpool, L3 7DT	0151 236 9181	www.liverpoolwoodpellets.co.uk
Euro tree wood Fuel	Pellets and Chip	25B Church Street, Frodsham, Cheshire, WA6 6PN	01928 735005	www.eurotreewoodfuel.co.uk
Walkers Organic Solutions	Pellets and Chip	North End Farm, New Causeway, Formby, Merseyside L38 1QA	0151 929 3999	www.wrscompost.co.uk
EcoEnergyDepot	Pellets	48A Wealstone Lane, Chester, Cheshire, CH2 1HB.	01244 630121	www.ecoenergydepot.co.uk
Wood Pellet Stoves	Pellets	Vesta Works, Greg Street, Reddish, Stockport, Manchester SK5 7BS	0161 42 990 42	www.woodpelletstove.co.uk

LPG Suppliers in the Cheshire area				
Name	**Area**	**Address**	**Phone**	**Website**
Air Products plc	Crewe	2 Millennium Gate Westmere Drive, Crewe, Cheshire, CW1 6AP	0800 389 0202	
Alpine Hire Ltd	Warrington	1, Chester Road, Warrington, Cheshire, WA4 6BE	01925 630133	
Brookhouse Agricultural Services Ltd	Crewe	Unit 4,Brookhouse Farm, Madeley, Nr Crewe, Cheshire, CW3 9JT	01782 751582	
Broxton Gates	Malpass	Barton Wells, Barton, Near Malpas, Cheshire, SY14-7HZ	01829-782 549	
Calor Gas	National	Customer Operations Centre, Dockyard Road, Ellesmere Port, Merseyside CH65 4EG	0800 121 4460	
Cheshire Gas	Stalybridge	Staybrite Works Peel Street, Stalybridge, Cheshire, SK15 1PT	0161 303 0709	
Extra Fuel	National	618 Liverpool Road, Patricroft, Eccles, Manchester	?	www.extrafuel.co.uk
Flogas	National	Rayns Way, Watermead Business Park, Syston, Leicester, LE7 1PF	0116 264 9000	
Halton Gas	Widnes	Deacon Road, Widnes, Cheshire, WA8 6EG	0151 4952223	
Morreys(Holmes Chapel)Ltd	Holmes Chapel	8-10,The Square, Holmes Chapel, Cheshire, CW4 7AD	01477 533125	
Warrington Autogas	Warrington	Unit 41, Bank Quay Trading Estate, Slutchers Lane, Warrington, Cheshire WA1 1PJ	01925 577216	

Oil Lifetime Cost model, Fuel Service

Produced by:	*D Worthington*
Checked by:	*R Clark*
Date:	*28/06/2009*
Version:	-

Inputs	**Source / Notes**	**Value**	**Amount**	**Units**
Boiler size (kW)	Camco	50		
Boiler efficiency	SEDBUK	93%		
Boiler annual load factor	Camco estimate	20%		
Fuel cost (£/MWh)	*SAP 2009 - Heating Oil*	40.1	94	MWh
Heat tariff (£/MWh)		0.00	-	MWh
Fuel price escalator (% increase per annum)		0		
Inflation factor		1		
Discount Rate (%)		3.5		

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Discount Factor	1	0.97	0.93	0.90	0.87	0.84	0.81	0.79	0.76	0.73	0.71	0.68	0.66	0.64	0.62	0.60	0.58	0.56	0.54	0.52	0.50
Capital cost (CAPEX)																					
Boiler	*Based on 15/26kW A rated condesing boiler (www.bhl.co.uk)*	£0																			
Flue	www.bhl.co.uk	£0																			
Installation	*http://www.oilfiredup.com/site/news/item/165*	£0																			
Tank	*Bunded tank with remote electronic guage*	£0																			
SUB-TOTAL CAPEX		**£0**																			
Operating Expenditure (OPEX)																					
variable costs																					
Fuel costs		£3,773	£3,773	£3,773	£3,773	£3,773	£3,773	£3,773	£3,773	£3,773	£3,773	£3,773	£3,773	£3,773	£3,773	£3,773	£3,773	£3,773	£3,773	£3,773	£3,773
fixed costs - plant O+M and replacement																					
Lease hire including amotised cost of boiler over 20 years with 10% interest rate and maintenance cost with 10% margin		£709	£709	£709	£709	£709	£709	£709	£709	£709	£709	£709	£709	£709	£709	£709	£709	£709	£709	£709	£709
SUB-TOTAL OPEX		**£4,482**	**£4,482**	**£4,482**	**£4,482**	**£4,482**	**£4,482**	**£4,482**	**£4,482**	**£4,482**	**£4,482**	**£4,482**	**£4,482**	**£4,482**	**£4,482**	**£4,482**	**£4,482**	**£4,482**	**£4,482**	**£4,482**	**£4,482**
Revenue																					
variable charges																					
Heat sales		£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
SUB-TOTAL REVENUE		**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**
CASHFLOW pre-tax	£0	-£4,482	-£4,482	-£4,482	-£4,482	-£4,482	-£4,482	-£4,482	-£4,482	-£4,482	-£4,482	-£4,482	-£4,482	-£4,482	-£4,482	-£4,482	-£4,482	-£4,482	-£4,482	-£4,482	-£4,482
Undiscounted Cumulative Cashflow pre-tax	£0	-£4,482	-£8,963	-£13,445	-£17,926	-£22,408	-£26,889	-£31,371	-£35,852	-£40,334	-£44,815	-£49,297	-£53,778	-£58,260	-£62,741	-£67,223	-£71,704	-£76,186	-£80,668	-£85,149	-£89,631
Discounted Cashflow pre-tax	£0	-£4,330	-£4,184	-£4,042	-£3,905	-£3,773	-£3,646	-£3,522	-£3,403	-£3,288	-£3,177	-£3,070	-£2,966	-£2,866	-£2,769	-£2,675	-£2,585	-£2,497	-£2,413	-£2,331	-£2,252
Cumulative Discounted Cashflow pre-tax	£0	-£4,330	-£8,514	-£12,556	-£16,461	-£20,234	-£23,880	-£27,403	-£30,806	-£34,094	-£37,271	-£40,341	-£43,307	-£46,172	-£48,941	-£51,616	-£54,200	-£56,697	-£59,110	-£61,441	-£63,693

Net Present Value (NPV) over 20 years	-£63,693
Annualised NPV	-£3,185

Oil Lifetime Cost model, User Purchase

Produced by: *D Worthington*
Checked by: *R Clark*
Date: *28/06/2009*
Version: -

Inputs	Source / Notes	Value	Amount	Units
Boiler size (kW)	Camco	50		
Boiler efficiency	SEDBUK	93%		
Boiler annual load factor	Camco estimate	20%		
Fuel cost (£/MWh)	*SAP 2009 - Heating Oil*	40.1	94	MWh
Heat tariff (£/MWh)		0.00	-	MWh
Fuel price escalator (% increase per annum)		0		
Inflation factor		1		
Discount Rate (%)		3.5		

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Year		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Discount Factor		1	0.97	0.93	0.90	0.87	0.84	0.81	0.79	0.76	0.73	0.71	0.68	0.66	0.64	0.62	0.60	0.58	0.56	0.54	0.52	0.50
Capital cost (CAPEX)																						
Boiler	*Based on 15/26kW A rated condesing boiler*	£2,308																				
Flue	www.bhl.co.uk	£356																				
Installation	*http://www.oilfiredup.com/site/news/item/165*	£673																				
Tank	*Bunded tank with remote electronic guage*	£1,346																				
SUB-TOTAL CAPEX		**£4,683**																				
Operating Expenditure (OPEX)																						
variable costs																						
Fuel costs			£3,773	£3,773	£3,773	£3,773	£3,773	£3,773	£3,773	£3,773	£3,773	£3,773	£3,773	£3,773	£3,773	£3,773	£3,773	£3,773	£3,773	£3,773	£3,773	£3,773
fixed costs - plant O+M and replacement																						
Maintenance			£144	£144	£144	£144	£144	£144	£144	£144	£144	£144	£144	£144	£144	£144	£144	£144	£144	£144	£144	£144
SUB-TOTAL OPEX			**£3,917**	**£3,917**	**£3,917**	**£3,917**	**£3,917**	**£3,917**	**£3,917**	**£3,917**	**£3,917**	**£3,917**	**£3,917**	**£3,917**	**£3,917**	**£3,917**	**£3,917**	**£3,917**	**£3,917**	**£3,917**	**£3,917**	**£3,917**
Revenue																						
variable charges																						
Heat sales			£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
SUB-TOTAL REVENUE			**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**
CASHFLOW pre-tax		-£4,683	-£3,917	-£3,917	-£3,917	-£3,917	-£3,917	-£3,917	-£3,917	-£3,917	-£3,917	-£3,917	-£3,917	-£3,917	-£3,917	-£3,917	-£3,917	-£3,917	-£3,917	-£3,917	-£3,917	-£3,917
Undiscounted Cumulative Cashflow pre-tax		-£4,683	-£8,600	-£12,517	-£16,434	-£20,351	-£24,268	-£28,185	-£32,102	-£36,019	-£39,936	-£43,853	-£47,771	-£51,688	-£55,605	-£59,522	-£63,439	-£67,356	-£71,273	-£75,190	-£79,107	-£83,024
Discounted Cashflow pre-tax		-£4,683	-£3,785	-£3,657	-£3,533	-£3,414	-£3,298	-£3,187	-£3,079	-£2,975	-£2,874	-£2,777	-£2,683	-£2,592	-£2,505	-£2,420	-£2,338	-£2,259	-£2,183	-£2,109	-£2,037	-£1,969
Cumulative Discounted Cashflow pre-tax		-£4,683	-£8,467	-£12,124	-£15,657	-£19,070	-£22,369	-£25,555	-£28,634	-£31,609	-£34,483	-£37,260	-£39,942	-£42,535	-£45,039	-£47,459	-£49,797	-£52,056	-£54,239	-£56,348	-£58,385	-£60,354

Net Present Value (NPV) over 20 years	-£60,354
Annualised NPV	-£3,018

LPG Lifetime Cost model, Fuel Service

Produced by: *D Worthington*
Checked by: *R Clark*
Date: *28/06/2009*
Version: -

Inputs	Source / Notes	Value	Amount	Units
Boiler size (kW)	Camco	50		
Boiler efficiency	SEDBUK	93%		
Boiler annual load factor	Camco estimate	20%		
Fuel cost (£/MWh)	*SAP 2009 - Bulk LPG*	52.4	94	MWh
Heat tariff (£/MWh)		0.00	-	MWh
Fuel price escalator (% increase per annum)		0		
Inflation factor		1		
Discount Rate (%)		3.5		

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Year		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Discount Factor		1	0.97	0.93	0.90	0.87	0.84	0.81	0.79	0.76	0.73	0.71	0.68	0.66	0.64	0.62	0.60	0.58	0.56	0.54	0.52	0.50
Capital cost (CAPEX)																						
Boiler, flue, tank and installation	*http://www.oilfiredup.com/site/news/item/165*	£0																				
SUB-TOTAL CAPEX		**£0**																				
Operating Expenditure																						
variable costs																						
Fuel costs			£4,930	£4,930	£4,930	£4,930	£4,930	£4,930	£4,930	£4,930	£4,930	£4,930	£4,930	£4,930	£4,930	£4,930	£4,930	£4,930	£4,930	£4,930	£4,930	£4,930
fixed costs - plant O+M and replacement																						
Tank Rental			£115	£115	£115	£115	£115	£115	£115	£115	£115	£115	£115	£115	£115	£115	£115	£115	£115	£115	£115	£115
Lease hire including amotised cost of boiler over 20 years with 10% interest			£369	£369	£369	£369	£369	£369	£369	£369	£369	£369	£369	£369	£369	£369	£369	£369	£369	£369	£369	£369
SUB-TOTAL OPEX			**£5,414**	**£5,414**	**£5,414**	**£5,414**	**£5,414**	**£5,414**	**£5,414**	**£5,414**	**£5,414**	**£5,414**	**£5,414**	**£5,414**	**£5,414**	**£5,414**	**£5,414**	**£5,414**	**£5,414**	**£5,414**	**£5,414**	**£5,414**
Revenue																						
variable charges																						
Heat sales			£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
SUB-TOTAL REVENUE			**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**
CASHFLOW pre-tax		£0	-£5,414	-£5,414	-£5,414	-£5,414	-£5,414	-£5,414	-£5,414	-£5,414	-£5,414	-£5,414	-£5,414	-£5,414	-£5,414	-£5,414	-£5,414	-£5,414	-£5,414	-£5,414	-£5,414	-£5,414
Undiscounted Cumulative Cashflow pre-tax		£0	-£5,414	-£10,829	-£16,243	-£21,657	-£27,072	-£32,486	-£37,901	-£43,315	-£48,729	-£54,144	-£59,558	-£64,972	-£70,387	-£75,801	-£81,215	-£86,630	-£92,044	-£97,458	-£102,873	-£108,287
Discounted Cashflow pre-		£0	-£5,231	-£5,054	-£4,883	-£4,718	-£4,559	-£4,405	-£4,256	-£4,112	-£3,973	-£3,838	-£3,709	-£3,583	-£3,462	-£3,345	-£3,232	-£3,122	-£3,017	-£2,915	-£2,816	-£2,721
Cumulative Discounted Cashflow pre-tax		£0	-£5,231	-£10,286	-£15,169	-£19,887	-£24,446	-£28,851	-£33,106	-£37,218	-£41,191	-£45,029	-£48,738	-£52,321	-£55,783	-£59,128	-£62,359	-£65,482	-£68,499	-£71,414	-£74,230	-£76,951

Net Present Value (NPV) over 20 years	-£76,951
Annualised NPV	-£3,848

LPG Lifetime Cost model, User Purchase

Produced by: *D Worthington*
Checked by: *R Clark*
Date: *28/06/2009*
Version: -

Inputs	Source / Notes	Value		Amount	Units
Boiler size (kW)	Camco	50			
Boiler efficiency	SEDBUK	93%			
Boiler annual load factor	Camco estimate	20%			
Fuel cost (£/MWh)	*SAP 2009 - Bulk LPG*	52.4		94	MWh
Heat tariff (£/MWh)		0.00		-	MWh
Fuel price escalator (% increase per annum)		0			
Inflation factor		1			
Discount Rate (%)		3.5			

		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Year		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Discount Factor		1	0.97	0.93	0.90	0.87	0.84	0.81	0.79	0.76	0.73	0.71	0.68	0.66	0.64	0.62	0.60	0.58	0.56	0.54	0.52	0.50
Capital cost (CAPEX)																						
Boiler, flue, tank and installation	*http://www.oilfiredup.com/site/news/item/165*	£3,140																				
SUB-TOTAL CAPEX		**£3,140**																				
Operating Expenditure (OPEX)																						
variable costs																						
Fuel costs			£4,930	£4,930	£4,930	£4,930	£4,930	£4,930	£4,930	£4,930	£4,930	£4,930	£4,930	£4,930	£4,930	£4,930	£4,930	£4,930	£4,930	£4,930	£4,930	£4,930
fixed costs - plant O+M and replacement																						
Tank Rental			£115	£115	£115	£115	£115	£115	£115	£115	£115	£115	£115	£115	£115	£115	£115	£115	£115	£115	£115	£115
Maintenance			£106	£106	£106	£106	£106	£106	£106	£106	£106	£106	£106	£106	£106	£106	£106	£106	£106	£106	£106	£106
SUB-TOTAL OPEX			**£5,151**	**£5,151**	**£5,151**	**£5,151**	**£5,151**	**£5,151**	**£5,151**	**£5,151**	**£5,151**	**£5,151**	**£5,151**	**£5,151**	**£5,151**	**£5,151**	**£5,151**	**£5,151**	**£5,151**	**£5,151**	**£5,151**	**£5,151**
Revenue																						
variable charges																						
Heat sales			£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0
SUB-TOTAL REVENUE			**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**	**£0**
CASHFLOW pre-tax		-£3,140	-£5,151	-£5,151	-£5,151	-£5,151	-£5,151	-£5,151	-£5,151	-£5,151	-£5,151	-£5,151	-£5,151	-£5,151	-£5,151	-£5,151	-£5,151	-£5,151	-£5,151	-£5,151	-£5,151	-£5,151
Undiscounted Cumulative Cashflow pre-tax		-£3,140	-£8,292	-£13,443	-£18,594	-£23,745	-£28,897	-£34,048	-£39,199	-£44,350	-£49,502	-£54,653	-£59,804	-£64,956	-£70,107	-£75,258	-£80,409	-£85,561	-£90,712	-£95,863	-£101,014	-£106,166
Discounted Cashflow pre-tax		-£3,140	-£4,977	-£4,809	-£4,646	-£4,489	-£4,337	-£4,191	-£4,049	-£3,912	-£3,780	-£3,652	-£3,528	-£3,409	-£3,294	-£3,182	-£3,075	-£2,971	-£2,870	-£2,773	-£2,679	-£2,589
Cumulative Discounted Cashflow pre-tax		-£3,140	-£8,117	-£12,926	-£17,572	-£22,061	-£26,399	-£30,589	-£34,638	-£38,550	-£42,330	-£45,981	-£49,510	-£52,919	-£56,212	-£59,395	-£62,470	-£65,440	-£68,311	-£71,084	-£73,763	-£76,352

Net Present Value (NPV) over 20 years	-£76,352
Annualised NPV	-£3,818

Schedule 1

ÖkoFen Automatic Wood Pellet Boiler system – Enviro-link
Budget Costings

1	No.	PES 48	ÖkoFEN PES 48kW wood pellet central heating boiler, output: 15 - 48kW (Can be set up to 56kW). Includes: pellet burner, automatic ignition, cleaning system and automatic ash compression, microprocessor-operated, fuel system ready, integrated return water re-circulation.		13,260.00
1	No.	PEASCH	Automatic de-ashing system		INCLUDED
1	No.	5201	PAW boiler safety set. Excludes pressure vessel !		45.67
1	No.	S280 R	ÖkoFen S280 H FlexiTank pellet storage system with laminated wood frame support system, from sustainable timber, Capacity 4.6 – 5.4t. 2870 x 2870 x 1950 high N.B. tanks require space around and above, please contact us when planning. Other tank options available.		1,688.00
1	No.	S 143	Hand filling adaptor for flexi tank		160.00
2	No.	S 106 HK	Filler nozzle + Coupling ring with gasket	118.00	236.00
1	No.	SWS-M	Suction switch with metering		315.00
1	No.	12104720	Vacuum Hose 20m		164.00
1	No.		Clamp fixings, support shells for vacuum hose and 2No. fire protection sleeves	Prov. Sum	200.00
1	No.	ZZR150	Flue draught stabiliser		128.10
1	No.	E1307	PELLETRONIC 1 PLUS System controller		454.00
1	No.	DN20	Distribution unit for: - 1 no. Radiator circuit** [VT] 1 no. Domestic hot water circuit* [CT] Including pumps [Grundfoss UPE** & UPS*], mixer, mixer motor, fully insulated unit with safety set, ¾" x 22/28mm fittings and fixing set.		£950.00
			BOILER EQUIPMENT TOTAL:		**£17,600.77**
1	No.		180mm. S/S insulated twin wall flue with stabiliser, including clean out access. (allowing for 6m high flue)		1,850.00
1	No.		Bring boiler into boiler room, position, install pump station, connect boiler to pump station and existing heating circuit and DHW [terminated by others close to boiler]. Connect flue parts. Partition around boiler and combustion air vents excluded	Prov. Sum	3,000.00
1	No.		Erect flexiTank, exact position TBC		250.00
1	No.		Connect boiler power supply to existing certified power out-let close to boiler. Connect pump station, to boiler power centre and programmer, position and connect sensors. Electrical test to part 'P'	Prov. Sum	700.00
			Test and commission boiler system - hand over		300.00
				TOTAL:	**£23,700.77**

SPECIFICATION & COST	P4 Pellet 48		H-x-xxxx		
Description	**Specification & other notes**	**Qty**	**Subtotals**	**Qty**	**Options**
			£	Opt	£
Design, project management, installation and commissioning					
Project management	Including for 0 site attendances				-
Mechanical design & drawings	Including for 0 meetings				-
Electrical design & drawings	Including for 0 meetings				-
Boiler and fuel extraction installation	Excluding moving into boiler room				-
Commissioning & training	Including for 1 days site attendance				-
Warranty					-
			2,525		-
Wood boiler					
P4 Pellet 48	High efficiency , fully modulating, combustion controlled, 48 kW wood pellet boiler with P3200 controls including control for 2 weather compensated heating circuits and 1 DHW cylinder(sensors not included). Includes ash augers.	1			-
Heating circuit control sensor	Heating circuit control sensors	-		1	38
Heating circuit module	Additional module for control of 2 heating circuits. Up to 8 modules can be used. Includes 1 heating circuit control sensor.	-		1	398
Hydraulic module	Additional module for control of extra buffer tanks and DHW cylinders.	-		1	317
Hydraulic module control sensor	DHW control sensors	-		1	38
Buffer tank management				1	76
SMS - Box	Remote heating ciruit control via mobile	-		1	927
Visualisation software	Remote boiler control and logging	-		1	283
					-
Shipping & delivery, boiler	HGV access required to hard standing adjacent to boiler room	1			-
Craneage / offload & position	Excluded	-			-
			12,578		2,077
Fuel extraction and transfer to boiler					
Pellet Suction Auger					-
basic module pellet suction auger P4		1			-
pellets auger extension 500		1			-
suction hose 12,5 m		1			-
fastening clamp for suction line		4			-
filling coupling set				1	188
baffle mat				1	66
			1,278		253
Flue / chimney system(s)	Excluded				
Energy saving draft stabiliser, 200mm sealed	Supply only	-		1	164
			-		164
Mechanical services					
Buffer tank	Eco-cell tank; 1500 litres, 2.22m high x 1.15m dia. Min opening 0.96m, min store height 2.25m	1			-
Buffer tank insulation	All-round, CFC free	1			-
Shipping & delivery, buffer tank(s)	HGV access required to hard standing adjacent to boiler room	1			-
Craneage / offload & position buffer tank(s)	Excluded	-			-
		-			-
			1,629		-
Wiring and controls	Wood boiler only.				
Wood boiler wiring, included above	Wood boiler & fuel feed only.	1			-
Wood boiler field wiring	Wood boiler pump, back end valve and buffer sensors.	-			-
			-		-
Travel and Accommodation	*site dependent*				
			741		-
TOTAL			18,751		2,494
Maintenance and support contract	Base charge, excluding site specific travel and accomodation		350	per year	

Biomass boiler assumptions;

Boiler efficiency as oil boilers

One tonne pallets @ £235/tonne
Moisture content 8%

Energy Value 18GJ/tonne
Cost £48 MWh

Maintenance and support contract £350/yr

Annual use 94MWh (same as oil and LPG)

Postcode	Existing Fuel	Sector	Would Consider Bio-Fuel	Reason For C =Cost E=Environmental
SK9 7UW	Gas	Food	Yes	C,E
CW6 9ER	LPG	Tourism	Yes	C,E
CW12 4XJ	Elec/Gas	Manufacturing	Yes	C
CW9 6NA	LPG/Oil	Tourism	Yes	C,E
CW8 9ER	Oil	Tourism	Yes	C,E
CW2 5QF	Elec	Retail	Yes	C
SK10 5NZ	Elec	Distribution	Yes	C
SK11 0PS	Oil	Eco - Design	Yes	C,E
CW8 2TN	LPG/Oil	Education	Yes	C
CW10 0JG	Gas	Manufacturing	Yes	C
SK11 9SY	LPG/Oil	Tourism	Yes	C,E
WA6 7EX	Oil	Tourism	Yes	C
CH1 2HU	Oil	Tourism	Yes	C
CH2 1LH	Gas/Oil	Tourism	Yes	C,E
CW1 4RJ	LPG	Food	Yes	C
CW5 8AU	Oil	Tourism	Yes	C,E
SY14 8DY	Oil	Food	Yes	C
CW12 2PE	Oil	Education	Yes	C
CH3 6EN	Oil	Education	Yes	C
CW8 4RG	Oil	Business Park	Yes	C,E
WA6 7HZ	LPG	Tourism	Yes	C
CH4 9EB	LPG	Retail	Yes	C
WA3 6PN	Elec	Manufacturing	Yes	C
WA4 4HP	LPG	Retail	Yes	C
CH3 9EN	Oil	Tourism	Yes	C,E
CH64 4AY	Gas	Tourism	Yes	C,E
CW12 4TJ	LPG	Manufacturing	Yes	C
WA4 4EA	LPG	Manufacturing	Yes	C
CW8 2EB	Elec	Food	Yes	C
CW8 2ES	LPG/Oil	Tourism	Yes	C,E
WA4 4TQ	LPG	Manufacturing	Yes	C
CW4 8RH	Elec	Manufacturing	Yes	C
CW4 8AF	Elec	Manufacturing	Yes	C
SK10 5NU	Oil	Tourism	Yes	C,E
CH66 1JY	Oil	Education	Yes	C
WA6 7JA	Oil	Retail	Yes	C
CW5 6BN	Oil	Retail	Yes	C
CH3 6AD	Gas	Tourism	Yes	C,E
CW12 2JH	Oil	Tourism	Yes	C,E
CW8 2TF	LPG	Retail	Yes	C
WA4 6TB	Oil	Charity	Yes	C,E

Appendix 6 - Groundwork Cheshire's Environmental Business Services businesses study

This report has been produced by The Mersey Forest for Cheshire and Warrington Economic Alliance via funding from the North West Regional Development Agency.

While every effort has been ensure the data collect it accurate, we have not been able to validate all the data provided by third parties.

This document has drawn on several specially commission pieces of work. Notably a detailed report from Camco Global via Robert Clark at the Sheffield Office, a business survey from Groundwork EBS via Stephen Flyn and some data accessed originally by Helen Seagrave at the NWDA and converted by The Forestry Commission and TEP via Peter Fox.

	Paul Nolan	Nigel Blandford	Michael Bray
First check date			
Final check date			

What is The Mersey Forest?

The Mersey Forest is one of the leading environmental regeneration initiatives in the North West of England, planting more than 8 million trees and involving over 100,000 people since 1994 to combat climate change and provide a sustainable environment for all.

We achieve all of this and more through our partnership of seven local authorities (Cheshire West and Chester, Halton, Knowsley, Liverpool, Sefton, St.Helens and Warrington) as well as the Forestry Commission, Natural England and businesses including United Utilities.

The Mersey Forest,
Risley Moss,
Ordnance Avenue,
Birchwood,
Warrington,
WA3 6QX

01925 816217
www.merseyforest.org.uk

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