Report on

Fuel Cost Analysis

plus Sensitivity Analysis

for the

Western Development Commission

by Enercomm International Consultants Ltd

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1. Introduction And Background

1.1 Introduction

This report, commissioned by the Western Development Commission, is to examine the relative fuel costs for space heating, hot water and cooking as they apply to domestic households and commercial enterprises. In addition, the study examines relative fuel costs for process heating, space heating, hot water and cooking for an industrial enterprise.

A sensitivity analysis, detailed in Section 10, has been included for three price scenarios. These examine the impact of changes in the prices of natural gas, oil and LPG relative to those applying on 1st July 2007 (termed the basecase); these are (S1) prices applying or expected to apply on 1st Nov 2007, (S2) increases of 15% relative to the basecase and (S3) decreases of 15% on the basecase. The new electricity tariffs come into operation of 1st Nov 2007 and are used in the sensitivity analysis S1. The gas tariffs used in the sensitivity analysis S1 are those that came into operation on 1st Oct 2007, i.e. the beginning of the new gas year.

1.2 Energy Users Studied

The study considered four typical energy users that would be broadly representative of those in Irish towns; these energy users are described as:

1. A Factory/Production Facility using process heat
2. A Medium Commercial/Service Enterprise
3. A Small Commercial/Service Enterprise
4. A Domestic Household

1.3 Energy Sources Considered

Six energy sources are considered in the study, on a fuel-only basis and also taking account of capital costs together with annual operating & maintenance costs. The energy sources are electricity, LPG, oil/kerosene, natural gas, biomass and solar panels. CHP fired on natural gas was also considered for the Factory/Production Facility.

In the case of biomass, costs relating to wood pellets have been modelled for the Small Commercial/Service Enterprise and the Domestic Household, while both wood pellets and wood chips have been modelled for the Factory/Production

Facility and the Medium Commercial/Service Enterprise.

The cost of electricity for electrical applications such as motors, lighting, office equipment, household appliances etc has not been considered in this study. Rather the focus has been on comparing the relative costs of providing space heating, hot water (plus process heat for the industrial enterprise) and cooking from a number of different fuel sources.

2. Interpretation of Results & Typical Figures Used

It is important to understand that while typical figures were employed throughout these should not be taken as specifically representative of individual cases. For example, the capital cost of installing a pellet-fired biomass boiler and its associated storage facility can vary considerably depending on the physical layout, topography and access to the particular site. Another example is where many boiler manufacturers claim their products have thermal efficiencies considerably in excess of 90%; nevertheless a more global figure of 85% for all boilers whether biomass, oil or gas has been adopted for this study.

3. Results

A cost comparison, based on the total annual cost excluding annual capital and O&M costs is shown in Table 1 (BC) below. Essentially this is a fuel only comparison and as expected solar power providing hot water and space heating only is the cheapest – electric cooking is assumed. In each case this is the annual cost (excluding capital and O&M costs) for providing space heating, hot water and cooking from different fuel sources. In the cases of oil, biomass and solar, electric cooking is assumed. This Table 1 (BC) is the basecase for the sensitivity analysis where the details and results are set out in Section 10.

Table 1 (BC): Total Annual Cost exclud. Annual Capital + O&M Cost (Space Heating + Hot Water + Cooking)

Note: Gas, electricity, LPG, oil and biomass prices on 1st July 2007 as Basecase

All Costs in Euro	Factory/Production Facility	Medium Commercial /Service Enterprise	Small Commercial /Service Enterprise	Domestic Household
Electricity	220,757	7,914	5,237	1,405
LPG	218,222	8,150	4,976	1,463
Oil/Kerosene	151,602	5,597	3,516	994
Natural Gas	104,003	4,807	3,133	884
Biomass (wood pellets)	91,433	3,503	2,288	654
Biomass (wood chips)*	74,183	2,871	-	-
Solar Power	5,207	342	311	106
CHP with Natural Gas**	49,929	-	-	-

* Assumes wood chips are 20% cheaper than wood pellets with equivalent heat value

** Depends on load profile of Factory/Production Facility + matching energy costs

The 'fuel costs only' results show that:

- Electricity and LPG are highest, but the gap between them is not consistent. This arises due to the fact that each of the four energy users is on a different electricity tariff and load profile. However, as they are relatively close their average provides a broad reference against which to measure the other fuel costs
- Oil is about 30% lower than electricity/LPG
- Natural gas is next to oil and is about 40% lower than electricity/LPG. The gas connection costs in the model at €5,000, €2,000, €1,000 and €132 are reasonable but even trebling the connection cost for the Factory/Production Facility has little impact due to the economy of scale.
- Biomass (pellets) is about 55% cheaper than electricity/LPG, and the saving with wood chips is even greater at about 65%
- As expected, solar power on a fuel only basis comes in the cheapest. However, the application of solar power for a large or medium-sized facility might not be practical immediately

Table 2 below shows the results with capital and annual O&M costs included. As would be expected solar drops to the bottom of the merit order and biomass drops down well; this is due to the high cost of solar panels and the relatively high cost of the biomass boiler, bin storage and installation costs. With regard to solar power, the number of years over which these are depreciated has a significant impact on its competitiveness.

Table 2 (BC): Total Annual Cost includ. Annual Capital + O&M Cost (Space Heating + Hot Water + Cooking)

Note: Gas, electricity, LPG, oil and biomass prices on 1st July 2007 as Basecase

All Costs in Euro	Factory/Production Facility	Medium Commercial /Service Enterprise	Small Commercial /Service Enterprise	Domestic Household
Electricity	220,757	7,914	5,237	1,405
LPG	219,455	8,434	5,210	1,586
Oil/Kerosene	153,452	6,023	3,867	1,179
Natural Gas	105,853	5,338	3,491	1,023
Biomass (wood pellets)	103,686	5,790	3,964	1,402
Biomass (wood chips)*	86,435	5,158	-	-
Solar Power	381,384	13,846	8,229	2,300
CHP with Natural Gas**	85,579	-	-	-

* Assumes wood chips are 20% cheaper than wood pellets with equivalent heat value

** Depends on load profile of Factory/Production Facility + matching energy costs

The fuel plus capital and O&M results show that:

- Electricity and LPG are again the highest, and their average provides a broad reference against which to measure the costs relating to the other fuel sources
- Oil is about 25% lower than electricity/LPG
- Natural gas is next to oil and is about 40% lower than electricity/LPG.
- The savings arising from using biomass (pellets or chips) varies enormously across the four energy users modelled, i.e. from 6% to 60%. Biomass is approx 50% to 60% cheaper for the largest energy user, depending on whether pellets or chips are burned. The domestic household lies at the lower end of savings achieved with only a 6% saving relative to electricity and LPG. It is considerably higher than either natural gas or oil, even with the SEI boiler grant included. However, the biomass savings are highly dependent on the turnkey cost of the biomass boilers/bins/installation/commissioning. As it was difficult to get 'firm' prices from suppliers for this study the relevant costs modelled would need to be modified for individual situations.
- As expected, solar power comes in the most expensive.
- CHP with natural gas, for the Factory/Production Facility, is marginally better than biomass fired on wood chips. Because of the significant capital cost involved in CHP and the greater number of variables, the results are highly dependent on the assumptions in regard to number of years over which the plant is depreciated, the heat and electricity load profiles and also the varying price of electricity. For example, electricity surpluses (exports) may occur only at times of low electricity prices while electricity shortfalls (imports) may occur only at times of high electricity prices. The pattern of each specific case will significantly impact on the result.

4. Purpose of this Study

The purpose of this study is to examine the energy costs of businesses and households, particularly in relation to those areas that can be supplied by natural gas. These are space heating, hot water and cooking. In the case of industrial energy users this would also include hot water for process heat.

5. Methodology Employed

The study modelled the annual energy costs relating to four typical energy users

on both a fuel only basis and then on a fuel plus annual capital and O&M costs. The four energy users are as follows:

1. A Factory/Production Facility using process heat
2. A Medium Commercial/Service Enterprise
3. A Small Commercial/Service Enterprise
4. A Domestic Household

6. Prices Used

The prices used in the basecase are those obtaining on 1st July 2007 and are shown in Table 3 below. These prices include the gas and electricity tariffs in operation on that date and which are approved and published by the Commission for Energy Regulation (CER) in its documents CER/06/251 and CER/06/252 respectively. Also, prices for LPG, oil/kerosene and wood pellets are those quoted on 1st July 2007. As the market for wood chips is still in its development stage there is no single market price for wood chips and so a 20% discount on the price of wood pellets was seen as reasonable for the purposes of this study. VAT has been omitted from all capital and fuel calculations to ensure there is consistency across the comparative results.

The prices used in the sensitivity analysis are detailed in Section 10 of this report. The gas prices for 1st Nov 2007 represent a reduction of approx 10.6% on those applying on 1st July as indicated by the CER

6.1 Electricity Tariffs

It is assumed the four energy users are supplied by ESB PES (Public Electricity Supplier) and are therefore on the appropriate electricity tariffs. These are the current electricity tariffs have been approved by the CER (Commission for Energy Regulation) in its document CER/06/252; these are:

1. Factory/Production Facility – Medium Voltage Seasonal & Time of Day Tariff
2. Medium Commercial/Service Enterprise – Low Voltage Max Demand Tariff
3. Small Commercial/Service Enterprise – General Purpose Nightsaver Tariff with Storage Heating
4. Domestic Household - Urban Domestic Tariff with Storage Heating

6.2 Natural Gas

Following on from the four typical energy users referred to above, four BGE gas tariffs were selected for the basecase as appropriate. These are the gas tariffs applying on 1st July 2007, which were approved by the CER (Commission for Energy Regulation) in its document CER/06/251. These are:

1. Factory/Production Facility – Demand & Commodity 2, I&C Tariff
2. Medium Commercial/Service Enterprise – Standard I&C Tariff
3. Small Commercial/Service Enterprise – Standard I&C Tariff
4. Domestic Household - Residential Standard Tariff

To ensure consistency, the residential tariff was adjusted to VAT exclusive, in line with the I&C (Industrial & Commercial) tariffs.

6.3 LPG and Oil

While there is some variation in these prices across the country, this is quite a competitive sector; large energy users normally enjoy a discount relative to smaller users. The LPG prices are those quoted by Flogas Ireland while Fourways Oil Company quoted the oil prices.

6.4 Biomass

Balcas Ltd in Northern Ireland quoted the price for wood pellets, and as stated earlier the price of wood chips is taken as 20% less than wood pellets

6.4 Solar Panels

The pricing information on solar panels was received from Ecologics. While the solar panel prices have been scaled up proportionally to meet the space heating and hot water requirements of all four energy users in the study, this may not be strictly correct. The ability of solar panels to deliver large quantities of hot water in an industrial setting in Ireland and any economies of scale arising are not fully proven.

Table 3: Fuel/Variable Prices					
1. Factory/Production Facility	**kWh/unit**	**Unit**	**€/Unit**	**€/kWh**	**Info Source**
Cost of Wood Pellets	4.80	kg	0.15000	0.03125	Balcas
Cost of LPG	7.22	l	0.56000	0.07756	Flogas
Cost of Natural Gas	1.00	kWh	0.03389	0.03389	BGE Tariffs
Cost of Kerosene	9.43	l	0.50000	0.05305	*Fourways Oil Co.
Cost of Solar	1.00	kWh	0.00001	0.00001	*Ecologics
Heating per m2 (kWh/annum)	100				
Quantity of water heated by 1 kWh	10				
Additional Electrical Heating % Cost	8.00				
2. Medium Commercial/Service Enterprise	**kWh/unit**	**Unit**	**€/Unit**	**€/kWh**	**Info Source**
Cost of Wood Pellets	4.70	kg	0.15000	0.03191	Balcas
Cost of LPG	7.22	l	0.56000	0.07756	Flogas
Cost of Natural Gas	1.00	kWh	0.04548	0.04548	BGE Tariffs
Cost of Kerosene	9.43	l	0.50000	0.05305	*Fourways Oil Co.
Cost of Solar	1.00	kWh	0.00001	0.00001	*Ecologics
Heating per m2 (kWh/annum)	100				
Quantity of water heated by 1 kWh	14				
Additional Electrical Heating % Cost	8.00				
3. Small Commercial/Service Enterprise	**kWh/unit**	**Unit**	**€/Unit**	**€/kWh**	**Info Source**
Cost of Wood Pellets	4.70	kg	0.16000	0.03404	Balcas
Cost of LPG	7.22	l	0.58000	0.08033	Flogas
Cost of Natural Gas	1.00	kWh	0.04963	0.04963	BGE Tariffs
Cost of Kerosene	9.43	l	0.52000	0.05517	*Fourways Oil Co.
Cost of Solar	1.00	kWh	0.00001	0.00001	*Ecologics
Heating per m2 (kWh/annum)	110				
Quantity of water heated by 1 kWh	14				
Additional Electrical Heating % Cost	8.00				
4. Domestic Household	**kWh/unit**	**Unit**	**€/Unit**	**€/kWh**	**Info Source**
Cost of Wood Pellets	4.70	kg	0.16000	0.03404	Balcas
Cost of LPG	7.22	l	0.58000	0.08033	Flogas
Cost of Natural Gas	1.00	kWh	0.03604	0.03604	BGE Tariffs
Cost of Kerosene	9.43	l	0.52000	0.05517	*Fourways Oil Co.
Cost of Solar	1.00	kWh	0.00001	0.00001	*Ecologics
Heating per m2 (kWh/annum)	125				
Quantity of water heated by 1 kWh	14				
Additional Electrical Heating % Cost	8.00			* following discussions with Company	

7. Energy Assumptions & Conversion Efficiencies

The breakout of energy consumption by the four 'typical' energy users is set out in the Table 4 below. The total energy for each user is deemed to be measured 'at the front gate'. The actual consumed energy for space heating, hot water, process heat and cooking are all adjusted by a factor of 0.85 to take account of the energy conversion process. However, in contrast to this, the conversion of electrical energy is taken as unity (100% efficient).

7.1 Factory/Production Facility

The Factory/Production Facility is assumed to consume 4 GWh (4 million units) annually and is comprised of:

- 30% on electrical power for lighting, motors, office equipment etc
- 33% on space heating

- 36% on process heat and hot water
- 1% on cooking in staff canteen

While it is difficult to say that this is a typical industrial energy user in Ireland it is nevertheless a reasonable energy breakdown.

7.2 Medium Commercial/Service Enterprise

The Medium Commercial/Service Enterprise (large garage or supermarket) is assumed to consume approx 146,000 units annually comprising of:

- 30% on electrical power for lighting, motors, office equipment etc
- 56% on space heating
- 12% on hot water
- 2% on cooking in staff canteen

7.3 Small Commercial/Service Enterprise

The Small Commercial/Service Enterprise (ladies hair-dressing salon with accommodation overhead) is assumed to consume approx 89,000 units annually comprising of:

- 33% on electrical power for lighting, motors, office equipment etc
- 40% on space heating
- 25% on hot water
- 2% on cooking in accommodation and staff/customers facilities

7.4 Domestic Household

The Domestic Household consumption is taken directly from the Sustainable Energy Ireland document 'Energy in Ireland 1990 – 2005). This states "in 2005 the "average" dwelling consumed a total of 21,755 kWh of energy based on climate corrected data. This was comprised of 16,865 kWh (78%) in the form of direct fossil fuels and the remainder (4,890 kWh) as electricity." (page 69 Energy in Ireland 1990 – 2005) http://www.sei.ie/index.asp?locID=70&docID=-1

From these figures the breakdown of usage is calculated/assumed to be:

- 22% on electrical power for lighting, motors, office equipment etc
- 54% on space heating
- 20% on hot water
- 4% on cooking

Table 4: Annual Energy Consumption Break-out						
Energy Users	**Total %**	**Elec Only %**	**Space Heating %**	**Pro/Hot Water %**	**Cooking %**	
1. Factory/Production Facility	100	30	33	36	1	
2. Medium Commercial/Service Enterprise	100	30	56	12	2	
3. Small Commercial/Service Enterprise	100	33	40	25	2	
4. Domestic Household	100	22	54	20	4	
Annual Energy Consumption 'at Front Gate'	**Total kWh**	**Elec Only**	**Space Heating**	**Pro/Hot Water**	**Cooking**	**Ave kW/h Cooking**
1. Factory/Production Facility	4,000,000	1,200,000	1,320,000	1,440,000	40,000	8
2. Medium Commercial/Service Enterprise	145,700	43,710	81,592	17,484	2,914	3
3. Small Commercial/Service Enterprise	89,379	29,495	35,751	22,345	1,788	2.6
4. Domestic Household	21,755	4,786	11,748	4,351	870	1.9

7.5 Space Heating Assumptions - Area and Heating Requirement per m2

In the absence of firm recent data on average house sizes, it was assumed here that the "average" house size is 1,200 sq ft, which equates to 111 m2. This assumption was made following discussion with a local planning authority. This is the area of a typical 3-bedroom semi-detached house Taking the annual heating requirement as 125 kWh per m2, this ties in with the SEI "average" energy consumption figure.

7.6 Energy Conversion Efficiencies

The energy conversion efficiencies, based on a net calorific value basis, are taken as 85% for all boilers (LPG, natural gas, oil and biomass) and also for CHP. The energy conversion for electrical heating is taken as 100%.

8. Capital Costs and O&M Costs

8.1 Cost of Biomass Boiler/Bins

The cost of these has been calculated from SEI figures below[1] and have been adjusted to take account of the 30% SEI grants in industrial and commercial settings, and the €4,200 grant for domestic situations. For the purposes of this study it is assumed that the cost of industrial and commercial biomass boilers/bins

[1]SEI Application Guide, http://www.sei.ie/index.asp?docID=1003

employed is the same whether operating with wood pellets or wood chips.

Maximum Capacity Costs for Biomass Boilers	
Plant scale ranges kW	Maximum Capacity Cost €/kW
≤20 kW	€1,500 / kW
>20 kW and ≤ 50 kW	€650 / kW
>50 kW and ≤ 250 kW	€500 / kW
>250 kW and ≤ 500 kW	€350 / kW
>500 kW and ≤ 1000 kW	€250 / kW
>1000 kW	See Below (€150 / kW)

8.2 Capital Costs and Annual O&M %

The capital costs relating to each of the fuel sources modelled fort he four energy users, together with annual percentages for O&M, are set out in Table 5 below. These costs only relate to the energy supply side, i.e. they include boiler and auxiliary equipment, installation and commissioning costs but do not include any costs on the energy demand side such as storage heaters, radiators or water systems.

Table 5: Capital Costs and O&M %

Customer Type ---------->	Factory/Production Facility	Medium Commercial /Service Enterprise	Small Commercial /Service Enterprise	Domestic Household	Annual O&M (%)
Boiler Size (kW)	618	44	33	24	
Biomass-fired Boiler/Bin (€)	108,112	20,181	14,792	6,600	3
LPG Gas-fired Boiler (€)	10,000	2,300	1,900	1,000	4
* Natural Gas-fired Boiler (€)	15,000	4,300	2,900	1,132	4
Oil-fired Boiler/Tank (€)	15,000	3,450	2,850	1,500	4
Solar Panels/Systems (€)	4,906,667	176,135	103,282	28,620	1
* CHP 280 kWe Plant (€)	345,000				2
* Connection Cost Contribution added (€)	5,000	2,000	1,000	132	

8.3 Annual Capital and O&M Costs (Table 6)

These are crucial in comparing the relative costs of supplying energy from different energy sources in that they enable a more complete picture to be presented and can radically alter the merit order based on fuel cost only. For example, the annual cost of biomass (wood pellets) for a domestic household is the cheapest source of energy (excluding solar power) on a fuel only basis, i.e. €654

versus the dearest at €1,463 (LPG). However, when annual capital and O&M costs are included the cost of biomass moves to the other end of the scale where it is quite expensive, i.e. €1,402 versus the cheapest at €1.023 (natural gas).

Table 6: Annual Capital and O&M Costs (€)

Customer Type ---------->	Factory/Production Facility	Medium Commercial /Service Enterprise	Small Commercial /Service Enterprise	Domestic Household	Straight Line Depreciation over no. of years
Biomass (€)	12,253	2,287	1,676	748	12
LPG (€)	1,233	284	234	123	12
Natural Gas (€)	1,850	530	358	140	12
Oil (€)	1,850	426	352	185	12
Solar (€)	376,178	13,504	7,918	2,194	15
CHP Fired on Natural Gas (€)	35,650				12

9. Treatment of Other Charges

9.1 Electricity Supply Charge

For the Factory/Production Facility the electricity supply charge will be reduced by approx 30% if the space heating/hot water/cooking are provided by energy sources other than electricity. Even though the majority of this load is provided at night a higher contracted MIC (Maximum Import Capacity) is required to accommodate this. Therefore, 30% of the annual standing charge (with electrical heating) is included as an annual supply charge when comparing the relative costs for space heating/hot water/cooking; the remaining 70% annual charge will exist irrespective of how space heating/hot water/cooking is provided.

Similarly, where the Medium Commercial/Service Enterprise uses electricity to provide space heating/hot water/cooking only 30% of the annual standing charge (with electrical heating) is included as an annual supply charge.

If the Small Commercial/Service Enterprise has electrical storage heating then the annual storage heating standing charge is included as an annual supply charge

Similarly, where the Domestic Household has electrical storage heating then the annual storage heating standing charge is included as an annual supply charge

9.2 Gas Tariff Standing Charge

In the case of natural gas the appropriate annual charge is included as an annual supply charge. Where the gas tariff standing charge is a set on a monthly basis, this is multiplied by 12 (or by 6 for domestic households on the bi-monthly tariff) to give an annual figure.

9.3 Lease of LPG Tank

This is accounted for as an annual supply charge (standing charge) varying in amounts from €100 for a Domestic Household to €500 for a Factory/Production Facility.

10. Sensitivity Analysis for Three Scenarios

The basecase, termed (BC), refers to the prices that obtained on 1st July 2007. This sensitivity analysis covers three different scenarios in order to examine the impact of fuel prices change. In some instances the figures are rounded and so slight variances occur, but these not significant.

The scenarios studies were as follows:

- Oil, LPG and Natural Gas and Electricity Prices Applying on 1st November 2007 (in practice the oil and LPG prices were acquired in mid-October)
- Oil, LPG and Natural Gas prices 15% higher than in the Basecase for this Study
- Oil, LPG and Natural Gas prices 15% lower than in the Basecase for this Study

10.1 Scenario 1 Prices (excluding VAT):

- Kerosene prices quoted by Fourways Oil Company are 54.75 c/litre for domestic and small business customers and 52.75 c/litre for medium and large customers; this is the quoted price for 16th October, and assumed to obtain on 1st Nov 2007 for the purposes of this sensitivity analysis. The reason the date of 1st Nov is chosen is due to the fact that the new electricity tariffs are due to come into operation on that date. The current gas tariffs are in operation since 1st Oct, the beginning of he gas year.

- LPG prices quoted by Flogas Ireland are 56 c/litre for domestic and small business customers and 54 c/litre for medium and large customers; this is the quoted price for 16th October, and assumed to obtain on 1st Nov 2007 for the purposes of this sensitivity analysis. The discount for larger quantities to bigger customers, in both LPG and oil (kerosene) is quoted as

approx 2 cent per litre. Of course this depends on the annual quantities being purchased and may not be the same discount from all LPG and oil suppliers.

- Gas prices are taken from the CER decision documents namely the current gas tariffs for Residential and Smaller Commercial and Industrial (Non-Daily Metered) customers on 3rd Sep 2007 (CER/07/130). There is no fixed gas tariff published for Medium Commercial and Industrial (Non-Daily Metered) customers as the tariffs are treated differently and explained below. For this reason equivalent gas rates are developed for both the Factory/Production Facility and the Medium Commercial/Service Enterprise. This is done by taking the tariffs for the last gas year (1st Oct 2006 to 30th Sep 2007) and applying a 10.6% reduction for each. In September 2007 the Commission approved BGE's allowed revenue for the year 2007/8 which equates to an average decrease of 10.6% in NDM (Non-Daily Metered) tariffs (CER/07/130).

- Gas prices therefore are:

Scenario 1	Standing Charge (€pa)	Unit Rate c/KWh
Factory/Production Facility	8871	3.008
Medium Commercial/Service Enterprise	50	4.146
Small Commercial/Service Enterprise	50	4.509
Domestic	50	4.509

The price of wood pellets, wood chips and solar installations are assumed to be those obtaining on 1st July 2007, i.e. the basecase prices.

Electricity prices used in this scenario are those indicative tariffs published by the CER (document CER/07/159) on 27th September 2007. These fixed tariffs for all low voltage customers only (those connected below 10kV/20kV) for the period 1st November 2007 to 30th September 2008, to coincide with the gas year. The electricity tariff structure for Medium and Large customers (those connected at 10kV/20kV and above) is treated differently and no fixed tariffs have been published for these groups, only transitional tariffs for the four winter months and

indicative tariffs for the following seven non-winter months. In these circumstances the same unit rates as that of the Medium Commercial/Service Enterprise is used. The CER will formally approve the new electricity tariffs before 1st Nov 2007.

Comment of the July – November Price Changes

The significant reduction of 10.6% in gas prices used for the basecase (July 2007) and scenario 1 (Nov 2007) arises because of the reduction in the gas tariffs rather than changes in gas prices during that actual period.

LPG prices, while influenced by oil and natural gas prices, generally do not follow the same price patterns. For example, short and medium term oil prices are frequently driven by geopolitical events, while those for natural gas may by driven by gas interconnection constraints. It is not surprising therefore that the July to mid-October LPG price shows a slight reduction whereas the price of oil is increasing.

Explanatory Note on Gas Prices for Scenario 1

The gas year runs from 1st October each year to the following 30th September. The CER approved the current gas tariffs for Residential and Smaller Commercial and Industrial (Non-Daily Metered) customers on 3rd Sep 2007 (CER/07/130). These are in the public domain and readily known. The gas tariff structure for Medium Commercial and Industrial (Non-Daily Metered) customers (termed the FVT - fuel variable tariff) is treated differently and should reflect the varying price of gas from month to month throughout the coming year. Therefore, it is not a fixed tariff and cannot be plugged into a spreadsheet, requiring 'equivalent' tariffs to be calculated. This applies to the two largest customers in this study.

10.2 Scenario 2 Prices (excluding VAT):

In this scenario it is assumed that the prices of LPG, oil and gas increase by 15%. However, in order to maintain consistency the price of electricity should also be proportionally increased. In his address to the Joint Oireachtas Committee on 7th March 2007 Mr Tom Reeves, Chairman of the Commission for Energy Regulation, stated that "fuel costs make up about one third of the final price of electricity". Therefore a 15% increase in the price of oil and gas should translate roughly into a 5% increase in the price of electricity.

It is recognised here that fuel costs make up a different proportion of the final price of electricity, depending on the type of customer; nevertheless it is assumed that a 15% increase translates into a 5% for all customers in this study.

The following prices therefore are used:

- Kerosene prices of 59.8 c/litre for domestic and small business customers and 57.5 c/litre for medium and large customers; these represent a 15% increase on the basecase prices
- LPG prices of 66.7 c/litre for domestic and small business customers and 64.4 c/litre for medium and large customers; these represent a 15% increase on the basecase prices
- Gas prices with a 15% increase in both the standing charge and unit rate correctly reflect an 15% increase in gas prices
- Because the focus of this scenario is on oil and gas prices, no increase in the price of wood pellet and wood chip prices is assumed
- To maintain consistency with the increase in oil and gas prices, as referred to above, all charge elements in each electricity tariff are increased by 5%.

10.3 Scenario 3 Prices (excluding VAT):

In this scenario, oil, natural gas and LPG prices decrease by 15% for all customers and therefore a corresponding decrease of 5% in the price of electricity is assumed. The following prices apply in this scenario:

- Kerosene prices of 44.2 c/litre for domestic and small business customers and 42.5 c/litre for medium and large customers; these represent a 15% decrease on the basecase prices
- LPG prices of 47.6 49.3 c/litre for domestic and small business customers and 47.6 c/litre for medium and large customers; these represent a 15% decrease on the basecase prices
- Gas prices with a 15% decrease in both the standing charge and unit rate correctly reflect an 15% decrease in gas prices
- Because the focus of this scenario is on oil and gas prices, no decrease in the price of wood pellet and wood chip prices is assumed

- To maintain consistency with the increase in oil and gas prices, as referred to above, all charge elements in each electricity tariff are decreased by 5%.

10.4 Sensitivity Analysis Results

The results of the sensitivity analyses are presented below in tabular form. Table 1 (S1) refers to Table 1 Scenario 1 gives the total annual cost (excluding annual capital and O&M costs) for space heating, hot water and cooking.

Table 2 (S1) gives the total annual cost (including annual capital and O&M costs) for space heating, hot water and cooking for Scenario 1.

Table 3 (S1) details the differences between total annual cost (excluding annual capital and O&M costs) for space heating, hot water and cooking for Scenario 1 and those for the 1st July 2007 basecase figures (excluding annual capital and O&M costs).

Because no changes were made to the capital and O&M costs in the sensitivity analysis, a 'differences' table including annual capital and O&M costs would be identical to Table 3, which gives the total annual cost (excluding annual capital and O&M costs).

10.5 Detailed Tables in Appendices 11, 111 and IV

Appendices II, III and IV show the detailed Tables for the three sensitivities.

Appendix II shows the Tables relating to scenario (S1); these are:
Table 7.1 (S1) Electricity only (for large factory)
Table 7.2 (S1) LPG (for large factory)
Table 7.3 (S1) Oil (for large factory)
Table 7.4 (S1) Natural gas (for large factory)
Table 7.7 (S1) CHP fired on natural gas (for large factory)

Tables 8.1 to 8.4, 9.1 to 9.4 and 10.1 to 10.4 are for the medium commercial, small commercial and domestic customers, similar to those above for the large factory, except of course there is no Table corresponding to the CHP Table for the large factory.

Appendix III shows the Tables relating to scenario (S2); the layout is similar to Appendix II except that no Tables are shown for 7.1 (S2), 8.1 (S2), 9.1 (S2) and 10.1 (S3). In these four cases the 'electricity only' figures were calculated by multiplying the corresponding basecase figures by 5%, to represent the electricity increase arising from the 15% increase in oil and gas prices. Appendix IV gives the Tables relating to scenario (S3) and has the same layout and format as Appendix III.

10.6 Scenario 1 Results:

The results of Scenario 1 (termed S1) are as follows:

Table 1 (S1): Total Annual Cost exclud. Annual Capital + O&M Cost (Space Heating + Hot Water + Cooking)				
Note: Gas, electricity, LPG and oil prices as expected to be on 1st Nov 2007				
All Costs in Euro	Factory/Production Facility	Medium Commercial /Service Enterprise	Small Commercial /Service Enterprise	Domestic Household
Electricity	199,140	7,423	5,117	1,391
LPG	210,446	7,867	4,809	1,416
Oil/Kerosene	158,688	5,852	3,668	1,040
Natural Gas	93,308	4,300	2,764	815
Biomass (wood pellets)	90,466	3,469	2,271	653
Biomass (wood chips)*	73,216	2,837	-	-
Solar Power	4,240	308	293	105
CHP with Natural Gas**	33,498	-	-	-
* Assumes wood chips are 20% cheaper than wood pellets with equivalent heat value				
** Depends on load profile of Factory/Production Facility + matching electricity costs				

Table 2 (S1): Total Annual Cost includ. Annual Capital + O&M Cost (Space Heating + Hot Water + Cooking)				
Note: Gas, electricity, LPG and oil prices as expected to be on 1st Nov 2007				
All Costs in Euro	Factory/Production Facility	Medium Commercial /Service Enterprise	Small Commercial /Service Enterprise	Domestic Household
Electricity	199,140	7,423	5,117	1,391
LPG	211,680	8,150	5,044	1,539
Oil/Kerosene	160,538	6,278	4,019	1,225
Natural Gas	95,158	4,830	3,122	955
Biomass (wood pellets)	102,719	5,756	3,947	1,401
Biomass (wood chips)*	85,469	5,124	-	-
Solar Power	380,418	13,812	8,212	2,299
CHP with Natural Gas**	69,148	-	-	-
* Assumes wood chips are 20% cheaper than wood pellets with equivalent heat value				
** Depends on load profile of Factory/Production Facility + matching electricity costs				

Table 3 (S1): CHANGES v. BASECASE (pos. values indicate increases and neg. values indicate decreases)				
Same for Total Annual Cost excluding Annual Capital + O&M Cost and Total Annual Cost including Annual Capital + O&M Costs, if 'excluding' compared with 'excluding' and 'including' compared with 'including'				
All Costs in Euro	Factory/Production Facility	Medium Commercial /Service Enterprise	Small Commercial /Service Enterprise	Domestic Household
Electricity	- 21,617	- 491	- 121	- 14
LPG	- 7,776	- 284	- 167	- 47
Oil/Kerosene	7,086	255	152	45
Natural Gas	- 10,695	- 508	- 369	- 68
Biomass (wood pellets)*	- 967	- 34	- 17	- 1
Biomass (wood chips)*	- 967	- 34		
Solar Power*	- 967	- 34	- 17	- 1
CHP with Natural Gas**	- 16,431	-	-	-
* Cost reduces to to reduction in electric cooking costs				
** Depends on load profile of Factory/Production Facility + matching electricity costs				

10.7 Scenario 2 Results:

The results of Scenario 2 (termed S2) are as follows:

Table 1 (S2): Total Annual Cost exclud. Annual Capital + O&M Cost (Space Heating + Hot Water + Cooking)				
Note: 15% increase in price of LPG, Oil and Natural Gas, also resultant 5% increase in electricity price				
All Costs in Euro	Factory/Production Facility	Medium Commercial /Service Enterprise	Small Commercial /Service Enterprise	Domestic Household
Electricity	232,067	8,489	5,516	1,481
LPG	250,880	9,343	5,701	1,668
Oil/Kerosene	173,824	6,556	4,012	1,133
Natural Gas	119,603	5,528	3,603	1,016
Biomass (wood pellets)	91,692	3,674	2,304	659
Biomass (wood chips)*	74,442	3,042	-	-
Solar Power	5,466	513	326	112
CHP with Natural Gas**	73,182	-	-	-
* Assumes wood chips are 20% cheaper than wood pellets with equivalent heat value				
** Depends on load profile of Factory/Production Facility + matching electricity costs				

Table 2 (S2): Total Annual Cost includ. Annual Capital + O&M Cost (Space Heating + Hot Water + Cooking)				
Note: 15% increase in price of LPG, Oil and Natural Gas, also resultant 5% increase in electricity price				
All Costs in Euro	Factory/Production Facility	Medium Commercial /Service Enterprise	Small Commercial /Service Enterprise	Domestic Household
Electricity	232,067	8,489	5,516	1,481
LPG	252,114	9,627	5,936	1,791
Oil/Kerosene	175,674	6,982	4,363	1,318
Natural Gas	121,453	6,059	3,961	1,156
Biomass (wood pellets)	103,945	5,961	3,980	1,407
Biomass (wood chips)*	86,695	5,329	-	-
Solar Power	381,644	14,016	8,245	2,306
CHP with Natural Gas**	108,832	-	-	-
* Assumes wood chips are 20% cheaper than wood pellets with equivalent heat value				
** Depends on load profile of Factory/Production Facility + matching electricity costs				

Table 3 (S2): CHANGES v. BASECASE (pos. values indicate increases and neg. values indicate decreases)				
Same for Total Annual Cost excluding Annual Capital + O&M Cost and Total Annual Cost including Annual Capital + O&M Costs, if 'excluding' compared with 'excluding' and 'including' compared with 'including'				
All Costs in Euro	Factory/Production Facility	Medium Commercial /Service Enterprise	Small Commercial /Service Enterprise	Domestic Household
Electricity	11,310	575	278	76
LPG	32,658	1,193	725	204
Oil/Kerosene	22,222	959	496	139
Natural Gas	15,600	721	470	133
Biomass (wood pellets)*	259	171	16	5
Biomass (wood chips)*	259	171		
Solar Power*	259	171	16	5
CHP with Natural Gas**	23,253	-	-	-
* Cost increases corresponding to reduction in electric cooking costs				
** Depends on load profile of Factory/Production Facility + matching electricity costs				

10.8 Scenario 3 Results:

The results of Scenario 3 (termed S3) are as follows:

Table 1 (S3): Total Annual Cost exclud. Annual Capital + O&M Cost (Space Heating + Hot Water + Cooking)				
Note: 15% decrease in price of LPG, Oil and Natural Gas, also resultant 5% decrease in electricity price				
All Costs in Euro	Factory/Production Facility	Medium Commercial /Service Enterprise	Small Commercial /Service Enterprise	Domestic Household
Electricity	209,473	7,503	4,961	1,330
LPG	185,564	6,958	4,251	1,259
Oil/Kerosene	129,380	4,792	3,019	856
Natural Gas	88,402	4,086	2,663	751
Biomass (wood pellets)	91,174	3,486	2,273	649
Biomass (wood chips)*	73,924	2,854	-	-
Solar Power	4,948	325	295	101
CHP with Natural Gas**	26,675	-	-	-
* Assumes wood chips are 20% cheaper than wood pellets with equivalent heat value				
** Depends on load profile of Factory/Production Facility + matching electricity costs				

Table 2 (S3): Total Annual Cost includ. Annual Capital + O&M Cost (Space Heating + Hot Water + Cooking)				
Note: 15% decrease in price of LPG, Oil and Natural Gas, also resultant 5% decrease in electricity price				
All Costs in Euro	Factory/Production Facility	Medium Commercial /Service Enterprise	Small Commercial /Service Enterprise	Domestic Household
Electricity	209,473	7,503	4,961	1,330
LPG	186,797	7,242	4,485	1,382
Oil/Kerosene	131,230	5,217	3,371	1,041
Natural Gas	90,252	4,617	3,021	891
Biomass (wood pellets)	103,427	5,773	3,949	1,397
Biomass (wood chips)*	86,177	5,141	-	-
Solar Power	381,125	13,829	8,214	2,295
CHP with Natural Gas**	62,325	-	-	-
* Assumes wood chips are 20% cheaper than wood pellets with equivalent heat value				
** Depends on load profile of Factory/Production Facility + matching electricity costs				

Table 3 (S3): CHANGES v. BASECASE (pos. values indicate increases and neg. values indicate decreases)				
Same for Total Annual Cost excluding Annual Capital + O&M Cost and Total Annual Cost including Annual Capital + O&M Costs, if 'excluding' compared with 'excluding' and 'including' compared with 'including'				
All Costs in Euro	Factory/Production Facility	Medium Commercial /Service Enterprise	Small Commercial /Service Enterprise	Domestic Household
Electricity	- 11,284	- 412	- 277	- 75
LPG	- 32,658	- 1,193	- 725	- 204
Oil/Kerosene	- 22,222	- 805	- 496	- 139
Natural Gas	- 15,600	- 721	- 470	- 133
Biomass (wood pellets)*	- 259	- 17	- 16	- 5
Biomass (wood chips)*	- 259	- 17		
Solar Power*	- 259	- 17	- 16	- 5
CHP with Natural Gas**	- 23,253	-	-	-
* Cost reduces corresponding to reduction in electric cooking costs				
** Depends on load profile of Factory/Production Facility + matching electricity costs				

APPENDIX I (Basecase Tables)

Table 7.1: Electricity Only (Factory/Production Facility)		
Annual Electricity Cost for Space Heating, Hot Water & Cooking		
	Equiv Annual Elec 'Non-Space heating' (kWh)	2,680,000
	Annual Space Heating Usage (kWh)	1,122,000
Space Heating		
	Area to be heated (m2)	11,220
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	1,122,000
	Energy to Electricity (100% effic)	1,122,000
	Cost per kWh (€)	0.0659
	Additional heating	5,915.18
	Space heating cost (€)	**79,855**
Hot Water (Process Heating & Staff Facilities)		
	Quantity to be heated/day (litres)	33,534
	Water (lts) raised through 90 C by 1 kWh	10
	Heating per day (kWh)	3,353
	Annual Heating requirement (kWh)	1,224,000
	Energy to Electricity (100% effic)	1,224,000
	Cost per kWh (€)	0.1056
	Hot Water heating cost (€)	**129,268**
Cooking		
	Hours per year cooking	5,000
	Cooking requirement (kWh per hour)	8.00
	Annual Heating requirement (kWh)	40,000
	Energy to Electricity (100% effic)	40,000
	Cost per kWh (€)	0.1296
	Cooking cost (€)	**5,183**
Supply Charge		
	Annual Standing Charge	6,451
	Supply charge (€)	**6,451**
	Annual Capital and O&M Cost (€)	-
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**220,757**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**220,757**

Table 7.2: LPG (Factory/Production Facility)		
Annual LPG Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	11,220
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	1,122,000
	Energy to LPG (Boiler effic)	1,320,000
	Cost per kWh	0.07756
	Space heating cost (€)	**102,382**
Hot Water		
	Quantity to be heated/day (litres)	33,534
	Water (lts) raised through 90 C by 1 kWh	10
	Heating per day (kWh)	3,353
	Annual Heating requirement (kWh)	1,224,000
	Energy to LPG (Boiler effic)	1,440,000
	Cost per kWh	0.07756
	Hot Water heating cost (€)	**111,690**
Cooking		
	Hours per year cooking	5,000
	Cooking requirement (kWh per hour)	8
	Annual Heating requirement (kWh)	40,000
	Energy to LPG (Cooker effic 80%)	47,059
	Cost per kWh	0.07756
	Cooking cost (€)	**3,650**
Supply Charge		
	Annual Standing Charge	500.00
		-
	Supply charge (€)	**500**
	Annual Capital and O&M Cost (€)	**1,233**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**218,222**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**219,455**

Table 7.3: Oil (Factory/Production Facility)		
Annual Oil/Kerosene Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	11,220
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	1,122,000
	Energy to Oil/Kerosene (Boiler effic)	1,320,000
	Cost per kWh	0.05305
	Space heating cost (€)	**70,027**
Hot Water		
	Quantity to be heated/day (litres)	33,534
	Water (lts) raised through 90 C by 1 kWh	10
	Heating per day (kWh)	3,353.42
	Annual Heating requirement (kWh)	1,224,000
	Energy to Oil/Kerosene (Boiler effic)	1,440,000
	Cost per kWh	0.05305
	Hot Water heating cost (€)	**76,393**
Cooking	(Use Electric)	
	Hours per year cooking	5,000
	Cooking requirement (kWh per hour)	8.00
	Annual Heating requirement (kWh)	40,000
	Energy to Electricity (100% effic)	40,000
	Cost per kWh (€)	0.1296
	Cooking cost (€)	**5,183**
Supply Charge		
	Annual Standing Charge	-
		-
	Supply charge (€)	-
	Annual Capital and O&M Cost (€)	**1,850**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**151,602**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**153,452**

Table 7.4: Natural Gas (Factory/Production Facility)		
Annual Natural Gas Cost for Space Heating, Hot Water & Cooking		
	Total Gas Consumption (kWh)	2,807,059
Space Heating		
	Area to be heated (m2)	11,220
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	1,122,000
	Energy to Natural Gas (Boiler effic)	1,320,000
	Cost per kWh	0.03389
	Space heating cost (€)	**44,735**
Hot Water		
	Quantity to be heated/day (litres)	33,534
	Water (lts) raised through 90 C by 1 kWh	10
	Heating per day (kWh)	3,353
	Annual Heating requirement (kWh)	1,224,000
	Energy to Natural Gas (Boiler effic)	1,440,000
	Cost per kWh	0.03389
	Hot Water heating cost (€)	**48,802**
Cooking		
	Hours per year cooking	5,000
	Cooking requirement (kWh per hour)	8.00
	Annual Heating requirement (kWh)	40,000
	Energy to Natural Gas (Cooker effic)	47,059
	Cost per kWh	0.03389
	Cooking cost (€)	**1,595**
Supply Charge		
	Annual Standing Charge	8,871
		-
	Supply charge (€)	**8,871.47**
	Annual Capital and O&M Cost (€)	**1,850**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**104,003**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**105,853**

Table 7.5: Biomass (Factory/Production Facility)		
Annual Biomass Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	11,220
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	1,122,000
	Energy to Biomass (Boiler effic)	1,320,000
	Cost per kWh	0.03125
	Space heating cost (€)	**41,250**
Hot Water		
	Quantity to be heated/day (litres)	33,534
	Water (lts) raised through 90 C by 1 kWh	10
	Heating per day (kWh)	3,353
	Annual Heating requirement (kWh)	1,224,000
	Energy to Biomass (Boiler effic)	1,440,000
	Cost per kWh	0.03125
	Hot Water heating cost (€)	**45,000**
Cooking	(Use Electric)	
	Hours per year cooking	5,000
	Cooking requirement (kWh per hour)	8.00
	Annual Heating requirement (kWh)	40,000
	Energy to Electricity (100% effic)	40,000
	Cost per kWh (€)	0.12957
	Cooking cost (€)	**5,183**
Supply Charge		
	Annual Standing Charge	-
		-
	Supply charge (€)	-
	Annual Capital and O&M Cost (€)	**12,253**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**91,433**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**103,685**

Table 7.6: Solar Power (Factory/Production Facility)		
Annual Solar Power Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	11,220
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	1,122,000
	Solar Energy (100%)	1,122,000
	Cost per kWh	0.00001
	Space heating cost (€)	**11**
Hot Water		
	Quantity to be heated/day (litres)	33,534
	Water (lts) raised through 90 C by 1 kWh	10
	Heating per day (kWh)	3,353
	Annual Heating requirement (kWh)	1,224,000
	Solar Energy (100%)	1,224,000
	Cost per kWh	0.00001
	Hot Water heating cost (€)	**12**
Cooking	(Use Electric)	
	Hours per year cooking	5,000
	Cooking requirement (kWh per hour)	8.00
	Annual Heating requirement (kWh)	40,000
	Energy to Electricity (100% effic)	40,000
	Cost per kWh (€)	0.12957
	Cooking cost (€)	**5,183**
Supply Charge		
	Annual Standing Charge	-
		-
	Supply charge (€)	-
	Annual Capital and O&M Cost (€)	**376,178**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**5,206**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**381,384**

Table 7.7: CHP with Natural Gas (Factory/Production Facility)		
Annual CHP Cost for Space Heating, Hot Water & Cooking		
Total Gas Quantity (kWh)		4,312,513
Total Gas Cost (€)		146,151
Electricity Saving (€)	(Assume €10,000 load-matching cost)	105,094
Space Heating		
	Area to be heated (m2)	11,220
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	1,122,000
	Energy to CHP	2,040,000
	Cost per kWh	0.03389
	Space heating cost (€)	**69,136**
Hot Water		
	Quantity to be heated/day (litres)	33,534
	Water (lts) raised through 90 C by 1 kWh	10
	Heating per day (kWh)	3,353
	Annual Heating requirement (kWh)	1,224,000
	Energy to CHP	2,225,455
	Cost per kWh	0.03389
	Hot Water heating cost (€)	**75,421**
Cooking		
	Hours per year cooking	5,000
	Cooking requirement (kWh per hour)	8
	Annual Heating requirement (kWh)	40,000
	Energy to Natural Gas (Cooker effic)	47,059
	Cost per kWh	0.03389
	Cooking cost (€)	**1,595**
Supply Charge		
	Annual Standing Charge	8,871
	Supply charge (€)	**8,871**
	Annual Capital and O&M Cost (€)	**35,650**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**49,929**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**85,579**

Table 8.1: Electricity Only (Medium Commercial/Service Enterprise)		
Annual Electricity Cost for Space Heating, Hot Water & Cooking		
	Equiv Annual Elec 'Non-Space heating' (kWh)	64,108
	Annual Space Heating Usage (kWh)	69,353
Space Heating		
	Area to be heated (m2)	694
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	69,353
	Energy to Electricity (100% effic)	69,353
	Cost per kWh (€)	0.0680
	Additional heating	377.28
	Space heating cost (€)	**5,093**
Hot Water (Process Heating & Staff Facilities)		
	Quantity to be heated/day (litres)	570
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	40.72
	Annual Heating requirement (kWh)	14,861
	Energy to Electricity (100% effic)	14,861
	Cost per kWh (€)	0.1008
	Hot Water heating cost (€)	**1,498**
Cooking		
	Hours per year cooking	971
	Cooking requirement (kWh per hour)	3.00
	Annual Heating requirement (kWh)	2,914
	Energy to Electricity (100% effic)	2,914
	Cost per kWh (€)	0.1171
	Cooking cost (€)	**341**
Supply Charge		
	Annual Standing Charge	982
	Supply charge (€)	**982**
	Annual Capital and O&M Cost (€)	-
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**7,914**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**7,914**

Table 8.2: LPG (Medium Commercial/Service Enterprise)		
Annual LPG Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	694
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	69,353
	Energy to LPG (Boiler effic)	81,592
	Cost per kWh	0.07756
	Space heating cost (€)	**6,328**
Hot Water		
	Quantity to be heated/day (litres)	570
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	40.72
	Annual Heating requirement (kWh)	14,861
	Energy to LPG (Boiler effic)	17,484
	Cost per kWh	0.07756
	Hot Water heating cost (€)	**1,356**
Cooking		
	Hours per year cooking	971
	Cooking requirement (kWh per hour)	3.00
	Annual Heating requirement (kWh)	2,914
	Energy to LPG (Cooker effic 80%)	3,428
	Cost per kWh	0.07756
	Cooking cost (€)	**266**
Supply Charge		
	Annual Standing Charge	200.00
		-
	Supply charge (€)	**200.00**
	Annual Capital and O&M Cost (€)	**284**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**8,150**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**8,434**

Table 8.3: Oil (Medium Commercial/Service Enterprise)		
Annual Oil/Kerosene Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	694
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	69,353
	Energy to Oil/Kerosene (Boiler effic)	81,592
	Cost per kWh	0.05305
	Space heating cost (€)	**4,328**
Hot Water		
	Quantity to be heated/day (litres)	570
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	40.72
	Annual Heating requirement (kWh)	14,861
	Energy to Oil/Kerosene (Boiler effic)	17,484
	Cost per kWh	0.05305
	Hot Water heating cost (€)	**928**
Cooking	(Use Electric)	
	Hours per year cooking	971
	Cooking requirement (kWh per hour)	3.00
	Annual Heating requirement (kWh)	2,914
	Energy to Electricity (100% effic)	2,914
	Cost per kWh (€)	0.1172
	Cooking cost (€)	**341**
Supply Charge		
	Annual Standing Charge	-
		-
	Supply charge (€)	-
	Annual Capital and O&M Cost (€)	**426**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**5,597**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**6,023**

Table 8.4: Natural Gas (Medium Commercial/Service Enterprise)		
Annual Natural Gas Cost for Space Heating, Hot Water & Cooking		
	Total Gas Consumption (kWh)	102,504
Space Heating		
	Area to be heated (m2)	694
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	69,353
	Energy to Natural Gas (Boiler effic)	81,592
	Cost per kWh	0.0455
	Space heating cost (€)	**3,711**
Hot Water		
	Quantity to be heated/day (litres)	570
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	40.72
	Annual Heating requirement (kWh)	14,861
	Energy to Natural Gas (Boiler effic)	17,484
	Cost per kWh	0.0455
	Hot Water heating cost (€)	**795**
Cooking		
	Hours per year cooking	971
	Cooking requirement (kWh per hour)	3.00
	Annual Heating requirement (kWh)	2,914
	Energy to Natural Gas (Cooker effic)	3,428
	Cost per kWh	0.0455
	Cooking cost (€)	**156**
Supply Charge		
	Annual Standing Charge	145.44
		-
	Supply charge (€)	**145.44**
	Annual Capital and O&M Cost (€)	**530**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**4,807**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**5,338**

Table 8.5: Biomass (Medium Commercial/Service Enterprise)		
Annual Biomass Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	694
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	69,353
	Energy to Biomass (Boiler effic)	81,592
	Cost per kWh	0.0319
	Space heating cost (€)	**2,604**
Hot Water		
	Quantity to be heated/day (litres)	570
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	40.72
	Annual Heating requirement (kWh)	14,861
	Energy to Biomass (Boiler effic)	17,484
	Cost per kWh	0.0319
	Hot Water heating cost (€)	**558**
Cooking	(Use Electric)	
	Hours per year cooking	971
	Cooking requirement (kWh per hour)	3.00
	Annual Heating requirement (kWh)	2,914
	Energy to Electricity (100% effic)	2,914
	Cost per kWh (€)	0.11717
	Cooking cost (€)	**341**
Supply Charge		
	Annual Standing Charge	-
		-
	Supply charge (€)	-
	Annual Capital and O&M Cost (€)	**2,287**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**3,503**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**5,791**

Table 8.6: Solar Power (Medium Commercial/Service Enterprise)		
Annual Solar Power Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	694
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	69,353
	Solar Energy (100%)	69,353
	Cost per kWh	0.00001
	Space heating cost (€)	**1**
Hot Water		
	Quantity to be heated/day (litres)	570
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	40.72
	Annual Heating requirement (kWh)	14,861
	Solar Energy (100%)	14,861
	Cost per kWh	0.00001
	Hot Water heating cost (€)	**0**
Cooking	(Use Electric)	
	Hours per year cooking	971
	Cooking requirement (kWh per hour)	3.00
	Annual Heating requirement (kWh)	2,914
	Energy to Electricity (100% effic)	2,914
	Cost per kWh (€)	0.11717
	Cooking cost (€)	**341**
Supply Charge		
	Annual Standing Charge	-
		-
	Supply charge (€)	-
	Annual Capital and O&M Cost (€)	**13,504**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**342**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**13,846**

Table 9.1: Electricity Only (Small Commercial/Service Enterprise)		
Annual Electricity Cost for Space Heating, Hot Water & Cooking		
	Equiv Annual Elec 'Non-Space heating' (kWh)	53,627
	Annual Space Heating Usage (kWh)	30,389
Space Heating		
	Area to be heated (m2)	276
	Heating per m2 (kWh/annum)	110
	Annual Heating requirement (kWh)	30,389
	Energy to Electricity (100% effic)	30,389
	Cost per kWh (€)	0.0695
	Additional heating	168.96
	Space heating cost (€)	**2,281**
Hot Water (Process Heating & Staff Facilities)		
	Quantity to be heated/day (litres)	728
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	52.04
	Annual Heating requirement (kWh)	18,993
	Energy to Electricity (100% effic)	18,993
	Cost per kWh (€)	0.1389
		-
	Hot Water heating cost (€)	**2,638**
Cooking		
	Hours per year cooking	688
	Cooking requirement (kWh per hour)	2.60
	Annual Heating requirement (kWh)	1,788
	Energy to Electricity (100% effic)	1,788
	Cost per kWh (€)	0.1736
		-
	Cooking cost (€)	**310**
Supply Charge		
	Annual Standing Charge	-
	Annual Storage Heating Standing Charge	8.03
	Supply charge (€)	**8.03**
	Annual Capital and O&M Cost (€)	-
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**5,237**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**5,237**

Table 9.2: LPG (Small Commercial/Service Enterprise)		
Annual LPG Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	276
	Heating per m2 (kWh/annum)	110
	Annual Heating requirement (kWh)	30,389
	Energy to LPG (Boiler effic)	35,751
	Cost per kWh	0.0803
	Space heating cost (€)	**2,872**
Hot Water		
	Quantity to be heated/day (litres)	728
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	52.04
	Annual Heating requirement (kWh)	18,993
	Energy to LPG (Boiler effic)	22,345
	Cost per kWh	0.0803
	Hot Water heating cost (€)	**1,795**
Cooking		
	Hours per year cooking	688
	Cooking requirement (kWh per hour)	3
	Annual Heating requirement (kWh)	1,788
	Energy to LPG (Cooker effic 80%)	2,103
	Cost per kWh	0.0803
	Cooking cost (€)	**169**
Supply Charge		
	Annual Standing Charge	140.00
		-
	Supply charge (€)	**140.00**
	Annual Capital and O&M Cost (€)	**234**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**4,976**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**5,210**

Table 9.3: Oil (Small Commercial/Service Enterprise)		
Annual Oil/Kerosene Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	276
	Heating per m2 (kWh/annum)	110
	Annual Heating requirement (kWh)	30,389
	Energy to Oil/Kerosene (Boiler effic)	35,751
	Cost per kWh	0.0552
	Space heating cost (€)	**1,972**
Hot Water		
	Quantity to be heated/day (litres)	728
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	52.04
	Annual Heating requirement (kWh)	18,993
	Energy to Oil/Kerosene (Boiler effic)	22,345
	Cost per kWh	0.0552
	Hot Water heating cost (€)	**1,233**
Cooking	(Use Electric)	
	Hours per year cooking	688
	Cooking requirement (kWh per hour)	2.60
	Annual Heating requirement (kWh)	1,788
	Energy to Electricity (100% effic)	1,788
	Cost per kWh (€)	0.1736
	Cooking cost (€)	**310**
Supply Charge		
	Annual Standing Charge	-
		-
	Supply charge (€)	-
	Annual Capital and O&M Cost (€)	**352**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**3,516**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**3,867**

Table 9.4: Natural Gas (Small Commercial/Service Enterprise)		
Annual Natural Gas Cost for Space Heating, Hot Water & Cooking		
	Total Gas Consumption (kWh)	60,199
Space Heating		
	Area to be heated (m2)	276
	Heating per m2 (kWh/annum)	110
	Annual Heating requirement (kWh)	30,389
	Energy to Natural Gas (Boiler effic)	35,751
	Cost per kWh	0.04963
	Space heating cost (€)	**1,774**
Hot Water		
	Quantity to be heated/day (litres)	728
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	52.04
	Annual Heating requirement (kWh)	18,993
	Energy to Natural Gas (Boiler effic)	22,345
	Cost per kWh	0.04963
	Hot Water heating cost (€)	**1,109**
Cooking		
	Hours per year cooking	688
	Cooking requirement (kWh per hour)	2.60
	Annual Heating requirement (kWh)	1,788
	Energy to Natural Gas (Cooker effic)	2,103
	Cost per kWh	0.04963
	Cooking cost (€)	**104**
Supply Charge		
	Annual Standing Charge	145.44
	Supply charge (€)	**145.44**
	Annual Capital and O&M Cost (€)	**358**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**3,133**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**3,491**

Table 9.5: Biomass (Small Commercial/Service Enterprise)		
Annual Biomass Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	276
	Heating per m2 (kWh/annum)	110
	Annual Heating requirement (kWh)	30,389
	Energy to Biomass (Boiler effic)	35,751
	Cost per kWh	0.03404
	Space heating cost (€)	**1,217**
Hot Water		
	Quantity to be heated/day (litres)	728
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	52.04
	Annual Heating requirement (kWh)	18,993
	Energy to Biomass (Boiler effic)	22,345
	Cost per kWh	0.03404
	Hot Water heating cost (€)	**761**
Cooking	(Use Electric)	
	Hours per year cooking	688
	Cooking requirement (kWh per hour)	2.60
	Annual Heating requirement (kWh)	1,788
	Energy to Electricity (100% effic)	1,788
	Cost per kWh (€)	0.17360
	Cooking cost (€)	**310**
Supply Charge		
	Annual Standing Charge	-
		-
	Supply charge (€)	-
	Annual Capital and O&M Cost (€)	**1,676**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**2,288**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**3,964**

Table 9.6: Solar Power (Small Commercial/Service Enterprise)		
Annual Solar Power Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	276
	Heating per m2 (kWh/annum)	110
	Annual Heating requirement (kWh)	30,389
	Solar Energy (100%)	30,389
	Cost per kWh	0.00001
	Space heating cost (€)	**0**
Hot Water		
	Quantity to be heated/day (litres)	728
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	52.04
	Annual Heating requirement (kWh)	18,993
	Solar Energy (100%)	18,993
	Cost per kWh	0.00001
	Hot Water heating cost (€)	**0**
Cooking	(Use Electric)	
	Hours per year cooking	688
	Cooking requirement (kWh per hour)	2.60
	Annual Heating requirement (kWh)	1,788
	Energy to Electricity (100% effic)	1,788
	Cost per kWh (€)	0.17360
	Cooking cost (€)	**310**
Supply Charge		
	Annual Standing Charge	-
		-
	Supply charge (€)	-
	Annual Capital and O&M Cost (€)	**7,918**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**311**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**8,229**

Table 10.1: Electricity Only (Domestic Household)		
Annual Electricity Cost for Space Heating, Hot Water & Cooking		
	Annual Elect. 'Non-Space heating' Usage (kWh)	10,007
	Annual Space Heating Usage (kWh)	9,986
	Annual Electricity Bill (€)	2,140
Space Heating		
	Area to be heated (m2)	80
	Heating per m2 (kWh/annum)	125
	Annual Heating requirement (kWh)	9,986
	Energy to Electricity (100% effic)	9,986
	Cost per kWh (€)	0.0705
	Additional heating	56.32
	Space heating cost (€)	**760**
Hot Water (Process Heating & Staff Facilities)		
	Quantity to be heated/day (litres)	142
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	10.13
	Annual Heating requirement (kWh)	3,698
	Energy to Electricity (100% effic)	3,698
	Cost per kWh (€)	0.1435
	Hot Water heating cost (€)	**531**
Cooking		
	Hours per year cooking	389
	Cooking requirement (kWh per hour)	1.90
	Annual Heating requirement (kWh)	740
	Energy to Electricity (100% effic)	740
	Cost per kWh (€)	0.1435
	Cooking cost (€)	**106**
Supply Charge		
	Annual Standing Charge	-
	Annual Storage Heating Standing Charge	8.03
	Supply charge (€)	**8.03**
	Annual Capital and O&M Cost (€)	-
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**1,405**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**1,405**

Table 10.2: LPG (Domestic Household)		
Annual LPG Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	80
	Heating per m2 (kWh/annum)	125
	Annual Heating requirement (kWh)	9,986
	Energy to LPG (Boiler effic)	11,748
	Cost per kWh	0.0803
	Space heating cost (€)	**944**
Hot Water		
	Quantity to be heated/day (litres)	142
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	10.13
	Annual Heating requirement (kWh)	3,698
	Energy to LPG (Boiler effic)	4,351
	Cost per kWh	0.0803
	Hot Water heating cost (€)	**350**
Cooking		
	Hours per year cooking	389
	Cooking requirement (kWh per hour)	1.90
	Annual Heating requirement (kWh)	740
	Energy to LPG (Cooker effic 80%)	870
	Cost per kWh	0.0803
	Cooking cost (€)	**70**
Supply Charge		
	Annual Standing Charge	100.00
		-
	Supply charge (€)	**100.00**
	Annual Capital and O&M Cost (€)	**123**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**1,463**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**1,586**

Table 10.3: Oil (Domestic Household)		
Annual Oil/Kerosene Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	80
	Heating per m2 (kWh/annum)	125
	Annual Heating requirement (kWh)	9,986
	Energy to Oil/Kerosene (Boiler effic)	11,748
	Cost per kWh	0.0552
	Space heating cost (€)	**648**
Hot Water		
	Quantity to be heated/day (litres)	142
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	10.13
	Annual Heating requirement (kWh)	3,698
	Energy to Oil/Kerosene (Boiler effic)	4,351
	Cost per kWh	0.0552
	Hot Water heating cost (€)	**240**
Cooking	(Use Electric)	
	Hours per year cooking	389
	Cooking requirement (kWh per hour)	1.90
	Annual Heating requirement (kWh)	740
	Energy to Electricity (100% effic)	740
	Cost per kWh (€)	0.1435
	Cooking cost (€)	**106**
Supply Charge		
	Annual Standing Charge	-
		-
	Supply charge (€)	-
	Annual Capital and O&M Cost (€)	**185**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**994**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**1,179**

Table 10.4: Natural Gas (Domestic Household)		
Annual Natural Gas Cost for Space Heating, Hot Water & Cooking		
	Total Gas Consumption (kWh)	16,969
Space Heating		
	Area to be heated (m2)	80
	Heating per m2 (kWh/annum)	125
	Annual Heating requirement (kWh)	9,986
	Energy to Natural Gas (Boiler effic)	11,748
	Cost per kWh	0.03604
	Space heating cost (€)	**423**
Hot Water		
	Quantity to be heated/day (litres)	142
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	10.13
	Annual Heating requirement (kWh)	3,698
	Energy to Natural Gas (Boiler effic)	4,351
	Cost per kWh	0.03604
	Hot Water heating cost (€)	**157**
Cooking		
	Hours per year cooking	389
	Cooking requirement (kWh per hour)	1.90
	Annual Heating requirement (kWh)	740
	Energy to Natural Gas (Cooker effic)	870
	Cost per kWh	0.03604
	Cooking cost (€)	**31**
Supply Charge		
	Annual Standing Charge	271.88
	Supply charge (€)	**271.88**
	Annual Capital and O&M Cost (€)	**140**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**884**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**1,023**

Table 10.5: Biomass (Domestic Household)		
Annual Biomass Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	80
	Heating per m2 (kWh/annum)	125
	Annual Heating requirement (kWh)	9,986
	Energy to Biomass (Boiler effic)	11,748
	Cost per kWh	0.03404
	Space heating cost (€)	**400**
Hot Water		
	Quantity to be heated/day (litres)	142
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	10.13
	Annual Heating requirement (kWh)	3,698
	Energy to Biomass (Boiler effic)	4,351
	Cost per kWh	0.03404
	Hot Water heating cost (€)	**148**
Cooking	(Use Electric)	
	Hours per year cooking	389
	Cooking requirement (kWh per hour)	1.90
	Annual Heating requirement (kWh)	740
	Energy to Electricity (100% effic)	740
	Cost per kWh (€)	0.14350
	Cooking cost (€)	**106**
Supply Charge		
	Annual Standing Charge	-
		-
	Supply charge (€)	-
	Annual Capital and O&M Cost (€)	**748**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**654**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**1,402**

Table 10.6: Solar Power (Domestic Household)		
Annual Solar Power Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	80
	Heating per m2 (kWh/annum)	125
	Annual Heating requirement (kWh)	9,986
	Solar Energy (100%)	9,986
	Cost per kWh	0.00001
	Space heating cost (€)	**0**
Hot Water		
	Quantity to be heated/day (litres)	142
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	10.13
	Annual Heating requirement (kWh)	3,698
	Solar Energy (100%)	3,698
	Cost per kWh	0.00001
	Hot Water heating cost (€)	**0**
Cooking	(Use Electric)	
	Hours per year cooking	389
	Cooking requirement (kWh per hour)	1.90
	Annual Heating requirement (kWh)	740
	Energy to Electricity (100% effic)	740
	Cost per kWh (€)	0.14350
	Cooking cost (€)	**106**
Supply Charge		
	Annual Standing Charge	-
		-
	Supply charge (€)	-
	Annual Capital and O&M Cost (€)	**2,194**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**106**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**2,300**

APPENDIX II (Sensitivity 1 Tables)

Table 7.1 (S1): Electricity Only (Factory/Production Facility)		
Annual Electricity Cost for Space Heating, Hot Water & Cooking		
	Equiv Annual Elec 'Non-Space heating' (kWh)	2,680,000
	Annual Space Heating Usage (kWh)	1,122,000
Space Heating		
	Area to be heated (m2)	11,220
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	1,122,000
	Energy to Electricity (100% effic)	1,122,000
	Cost per kWh (€)	0.0639
	Additional heating	5,735.66
	Space heating cost (€)	**77,431**
Hot Water (Process Heating & Staff Facilities)		
	Quantity to be heated/day (litres)	33,534
	Water (lts) raised through 90 C by 1 kWh	10
	Heating per day (kWh)	3,353
	Annual Heating requirement (kWh)	1,224,000
	Energy to Electricity (100% effic)	1,224,000
	Cost per kWh (€)	0.0907
	Hot Water heating cost (€)	**111,041**
Cooking		
	Hours per year cooking	5,000
	Cooking requirement (kWh per hour)	8.00
	Annual Heating requirement (kWh)	40,000
	Energy to Electricity (100% effic)	40,000
	Cost per kWh (€)	0.1054
	Cooking cost (€)	**4,216**
Supply Charge		
	Annual Standing Charge	6,451
	Supply charge (€)	**6,451**
	Annual Capital and O&M Cost (€)	-
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**199,140**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**199,140**

Table 7.2 (S1): LPG (Factory/Production Facility)		
Annual LPG Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	11,220
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	1,122,000
	Energy to LPG (Boiler effic)	1,320,000
	Cost per kWh	0.07479
	Space heating cost (€)	**98,726**
Hot Water		
	Quantity to be heated/day (litres)	33,534
	Water (lts) raised through 90 C by 1 kWh	10
	Heating per day (kWh)	3,353
	Annual Heating requirement (kWh)	1,224,000
	Energy to LPG (Boiler effic)	1,440,000
	Cost per kWh	0.07479
	Hot Water heating cost (€)	**107,701**
Cooking		
	Hours per year cooking	5,000
	Cooking requirement (kWh per hour)	8
	Annual Heating requirement (kWh)	40,000
	Energy to LPG (Cooker effic 80%)	47,059
	Cost per kWh	0.07479
	Cooking cost (€)	**3,520**
Supply Charge		
	Annual Standing Charge	500.00
		-
	Supply charge (€)	**500**
	Annual Capital and O&M Cost (€)	**1,233**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**210,446**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**211,680**

Table 7.3 (S1): Oil (Factory/Production Facility)		
Annual Oil/Kerosene Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	11,220
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	1,122,000
	Energy to Oil/Kerosene (Boiler effic)	1,320,000
	Cost per kWh	0.05597
	Space heating cost (€)	**73,878**
Hot Water		
	Quantity to be heated/day (litres)	33,534
	Water (lts) raised through 90 C by 1 kWh	10
	Heating per day (kWh)	3,353.42
	Annual Heating requirement (kWh)	1,224,000
	Energy to Oil/Kerosene (Boiler effic)	1,440,000
	Cost per kWh	0.05597
	Hot Water heating cost (€)	**80,594**
Cooking	(Use Electric)	
	Hours per year cooking	5,000
	Cooking requirement (kWh per hour)	8.00
	Annual Heating requirement (kWh)	40,000
	Energy to Electricity (100% effic)	40,000
	Cost per kWh (€)	0.1054
	Cooking cost (€)	**4,216**
Supply Charge		
	Annual Standing Charge	-
		-
	Supply charge (€)	-
	Annual Capital and O&M Cost (€)	**1,850**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**158,688**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**160,538**

Table 7.4 (S1): Natural Gas (Factory/Production Facility)		
Annual Natural Gas Cost for Space Heating, Hot Water & Cooking		
	Total Gas Consumption (kWh)	2,807,059
Space Heating		
	Area to be heated (m2)	11,220
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	1,122,000
	Energy to Natural Gas (Boiler effic)	1,320,000
	Cost per kWh	0.03008
	Space heating cost (€)	**39,706**
Hot Water		
	Quantity to be heated/day (litres)	33,534
	Water (lts) raised through 90 C by 1 kWh	10
	Heating per day (kWh)	3,353
	Annual Heating requirement (kWh)	1,224,000
	Energy to Natural Gas (Boiler effic)	1,440,000
	Cost per kWh	0.03008
	Hot Water heating cost (€)	**43,315**
Cooking		
	Hours per year cooking	5,000
	Cooking requirement (kWh per hour)	8.00
	Annual Heating requirement (kWh)	40,000
	Energy to Natural Gas (Cooker effic)	47,059
	Cost per kWh	0.03008
	Cooking cost (€)	**1,416**
Supply Charge		
	Annual Standing Charge	8,871
		-
	Supply charge (€)	**8,871.47**
	Annual Capital and O&M Cost (€)	**1,850**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**93,308**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**95,158**

Table 7.7 (S1): CHP with Natural Gas (Factory/Production Facility)		
Annual CHP Cost for Space Heating, Hot Water & Cooking		
Total Gas Quantity (kWh)		4,312,513
Total Gas Cost (€)		129,720
Electricity Saving (€)	(Estimated €10,000 load-matching cost)	105,094
Space Heating		
	Area to be heated (m2)	11,220
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	1,122,000
	Energy to CHP	2,040,000
	Cost per kWh	0.03008
	Space heating cost (€)	**61,363**
Hot Water		
	Quantity to be heated/day (litres)	33,534
	Water (lts) raised through 90 C by 1 kWh	10
	Heating per day (kWh)	3,353
	Annual Heating requirement (kWh)	1,224,000
	Energy to CHP	2,225,455
	Cost per kWh	0.03008
	Hot Water heating cost (€)	**66,942**
Cooking		
	Hours per year cooking	5,000
	Cooking requirement (kWh per hour)	8
	Annual Heating requirement (kWh)	40,000
	Energy to Natural Gas (Cooker effic)	47,059
	Cost per kWh	0.03008
	Cooking cost (€)	**1,416**
Supply Charge		
	Annual Standing Charge	8,871
	Supply charge (€)	**8,871**
	Annual Capital and O&M Cost (€)	**35,650**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**33,498**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**69,148**

Table 8.1 (S1): Electricity Only (Medium Commercial/Service Enterprise)		
Annual Electricity Cost for Space Heating, Hot Water & Cooking		
	Equiv Annual Elec 'Non-Space heating' (kWh)	64,108
	Annual Space Heating Usage (kWh)	69,353
Space Heating		
	Area to be heated (m2)	694
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	69,353
	Energy to Electricity (100% effic)	69,353
	Cost per kWh (€)	0.0639
	Additional heating	354.53
	Space heating cost (€)	**4,786**
Hot Water (Process Heating & Staff Facilities)		
	Quantity to be heated/day (litres)	570
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	40.72
	Annual Heating requirement (kWh)	14,861
	Energy to Electricity (100% effic)	14,861
	Cost per kWh (€)	0.0907
	Hot Water heating cost (€)	**1,348**
Cooking		
	Hours per year cooking	971
	Cooking requirement (kWh per hour)	3.00
	Annual Heating requirement (kWh)	2,914
	Energy to Electricity (100% effic)	2,914
	Cost per kWh (€)	0.1054
	Cooking cost (€)	**307**
Supply Charge		
	Annual Standing Charge	982
	Supply charge (€)	**982**
	Annual Capital and O&M Cost (€)	-
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**7,423**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**7,423**

Table 8.2 (S1): LPG (Medium Commercial/Service Enterprise)		
Annual LPG Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	694
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	69,353
	Energy to LPG (Boiler effic)	81,592
	Cost per kWh	0.07479
	Space heating cost (€)	**6,102**
Hot Water		
	Quantity to be heated/day (litres)	570
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	40.72
	Annual Heating requirement (kWh)	14,861
	Energy to LPG (Boiler effic)	17,484
	Cost per kWh	0.07479
	Hot Water heating cost (€)	**1,308**
Cooking		
	Hours per year cooking	971
	Cooking requirement (kWh per hour)	3.00
	Annual Heating requirement (kWh)	2,914
	Energy to LPG (Cooker effic 80%)	3,428
	Cost per kWh	0.07479
	Cooking cost (€)	**256**
Supply Charge		
	Annual Standing Charge	200.00
		-
	Supply charge (€)	**200.00**
	Annual Capital and O&M Cost (€)	**284**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**7,867**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**8,150**

Table 8.3 (S1): Oil (Medium Commercial/Service Enterprise)		
Annual Oil/Kerosene Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	694
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	69,353
	Energy to Oil/Kerosene (Boiler effic)	81,592
	Cost per kWh	0.05597
	Space heating cost (€)	**4,567**
Hot Water		
	Quantity to be heated/day (litres)	570
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	40.72
	Annual Heating requirement (kWh)	14,861
	Energy to Oil/Kerosene (Boiler effic)	17,484
	Cost per kWh	0.05597
	Hot Water heating cost (€)	**979**
Cooking	(Use Electric)	
	Hours per year cooking	971
	Cooking requirement (kWh per hour)	3.00
	Annual Heating requirement (kWh)	2,914
	Energy to Electricity (100% effic)	2,914
	Cost per kWh (€)	0.1054
	Cooking cost (€)	**307**
Supply Charge		
	Annual Standing Charge	-
		-
	Supply charge (€)	-
	Annual Capital and O&M Cost (€)	**426**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**5,852**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**6,278**

Table 8.4 (S1): Natural Gas (Medium Commercial/Service Enterprise)		
Annual Natural Gas Cost for Space Heating, Hot Water & Cooking		
	Total Gas Consumption (kWh)	102,504
Space Heating		
	Area to be heated (m2)	694
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	69,353
	Energy to Natural Gas (Boiler effic)	81,592
	Cost per kWh	0.04146
	Space heating cost (€)	**3,383**
Hot Water		
	Quantity to be heated/day (litres)	570
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	40.72
	Annual Heating requirement (kWh)	14,861
	Energy to Natural Gas (Boiler effic)	17,484
	Cost per kWh	0.04146
	Hot Water heating cost (€)	**725**
Cooking		
	Hours per year cooking	971
	Cooking requirement (kWh per hour)	3.00
	Annual Heating requirement (kWh)	2,914
	Energy to Natural Gas (Cooker effic)	3,428
	Cost per kWh	0.04146
	Cooking cost (€)	**142**
Supply Charge		
	Annual Standing Charge	50.00
		-
	Supply charge (€)	**50.00**
	Annual Capital and O&M Cost (€)	**530**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**4,300**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**4,830**

Table 9.1 (S1): Electricity Only (Small Commercial/Service Enterprise)		
Annual Electricity Cost for Space Heating, Hot Water & Cooking		
	Equiv Annual Elec 'Non-Space heating' (kWh)	53,627
	Annual Space Heating Usage (kWh)	30,389
Space Heating		
	Area to be heated (m2)	276
	Heating per m2 (kWh/annum)	110
	Annual Heating requirement (kWh)	30,389
	Energy to Electricity (100% effic)	30,389
	Cost per kWh (€)	0.0700
	Additional heating	170.18
	Space heating cost (€)	**2,297**
Hot Water (Process Heating & Staff Facilities)		
	Quantity to be heated/day (litres)	728
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	52.04
	Annual Heating requirement (kWh)	18,993
	Energy to Electricity (100% effic)	18,993
	Cost per kWh (€)	0.1326
		-
	Hot Water heating cost (€)	**2,518**
Cooking		
	Hours per year cooking	688
	Cooking requirement (kWh per hour)	2.60
	Annual Heating requirement (kWh)	1,788
	Energy to Electricity (100% effic)	1,788
	Cost per kWh (€)	0.1639
		-
	Cooking cost (€)	**293**
Supply Charge		
	Annual Standing Charge	-
	Annual Storage Heating Standing Charge	8.03
	Supply charge (€)	**8.03**
	Annual Capital and O&M Cost (€)	-
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**5,117**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**5,117**

Table 9.2 (S1): LPG (Small Commercial/Service Enterprise)		
Annual LPG Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	276
	Heating per m2 (kWh/annum)	110
	Annual Heating requirement (kWh)	30,389
	Energy to LPG (Boiler effic)	35,751
	Cost per kWh	0.0776
	Space heating cost (€)	**2,773**
Hot Water		
	Quantity to be heated/day (litres)	728
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	52.04
	Annual Heating requirement (kWh)	18,993
	Energy to LPG (Boiler effic)	22,345
	Cost per kWh	0.0776
	Hot Water heating cost (€)	**1,733**
Cooking		
	Hours per year cooking	688
	Cooking requirement (kWh per hour)	3
	Annual Heating requirement (kWh)	1,788
	Energy to LPG (Cooker effic 80%)	2,103
	Cost per kWh	0.0776
	Cooking cost (€)	**163**
Supply Charge		
	Annual Standing Charge	140.00
		-
	Supply charge (€)	**140.00**
	Annual Capital and O&M Cost (€)	**234**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**4,809**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**5,044**

Table 9.3 (S1): Oil (Small Commercial/Service Enterprise)		
Annual Oil/Kerosene Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	276
	Heating per m2 (kWh/annum)	110
	Annual Heating requirement (kWh)	30,389
	Energy to Oil/Kerosene (Boiler effic)	35,751
	Cost per kWh	0.0581
	Space heating cost (€)	**2,077**
Hot Water		
	Quantity to be heated/day (litres)	728
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	52.04
	Annual Heating requirement (kWh)	18,993
	Energy to Oil/Kerosene (Boiler effic)	22,345
	Cost per kWh	0.0581
	Hot Water heating cost (€)	**1,298**
Cooking	(Use Electric)	
	Hours per year cooking	688
	Cooking requirement (kWh per hour)	2.60
	Annual Heating requirement (kWh)	1,788
	Energy to Electricity (100% effic)	1,788
	Cost per kWh (€)	0.1639
	Cooking cost (€)	**293**
Supply Charge		
	Annual Standing Charge	-
		-
	Supply charge (€)	-
	Annual Capital and O&M Cost (€)	**352**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**3,668**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**4,019**

Table 9.4 (S1): Natural Gas (Small Commercial/Service Enterprise)		
Annual Natural Gas Cost for Space Heating, Hot Water & Cooking		
	Total Gas Consumption (kWh)	60,199
Space Heating		
	Area to be heated (m2)	276
	Heating per m2 (kWh/annum)	110
	Annual Heating requirement (kWh)	30,389
	Energy to Natural Gas (Boiler effic)	35,751
	Cost per kWh	0.04509
	Space heating cost (€)	**1,612**
Hot Water		
	Quantity to be heated/day (litres)	728
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	52.04
	Annual Heating requirement (kWh)	18,993
	Energy to Natural Gas (Boiler effic)	22,345
	Cost per kWh	0.04509
	Hot Water heating cost (€)	**1,008**
Cooking		
	Hours per year cooking	688
	Cooking requirement (kWh per hour)	2.60
	Annual Heating requirement (kWh)	1,788
	Energy to Natural Gas (Cooker effic)	2,103
	Cost per kWh	0.04509
	Cooking cost (€)	**95**
Supply Charge		
	Annual Standing Charge	50.00
	Supply charge (€)	**50.00**
	Annual Capital and O&M Cost (€)	**358**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**2,764**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**3,122**

Table 10.1 (S1): Electricity Only (Domestic Household)		
Annual Electricity Cost for Space Heating, Hot Water & Cooking		
	Equiv Annual Elec 'Non-Space heating' (kWh)	10,007
	Annual Space Heating Usage (kWh)	9,986
	Annual Electricity Bill (€)	
Space Heating		
	Area to be heated (m2)	80
	Heating per m2 (kWh/annum)	125
	Annual Heating requirement (kWh)	9,986
	Energy to Electricity (100% effic)	9,986
	Cost per kWh (€)	0.0700
	Additional heating	55.92
	Space heating cost (€)	**755**
Hot Water (Process Heating & Staff Facilities)		
	Quantity to be heated/day (litres)	142
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	10.13
	Annual Heating requirement (kWh)	3,698
	Energy to Electricity (100% effic)	3,698
	Cost per kWh (€)	0.1415
	Hot Water heating cost (€)	**523**
Cooking		
	Hours per year cooking	389
	Cooking requirement (kWh per hour)	1.90
	Annual Heating requirement (kWh)	740
	Energy to Electricity (100% effic)	740
	Cost per kWh (€)	0.1415
	Cooking cost (€)	**105**
Supply Charge		
	Annual Standing Charge	-
	Annual Storage Heating Standing Charge	8.03
	Supply charge (€)	**8.03**
	Annual Capital and O&M Cost (€)	-
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**1,391**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**1,391**

Table 10.2 (S1): LPG (Domestic Household)		
Annual LPG Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	80
	Heating per m2 (kWh/annum)	125
	Annual Heating requirement (kWh)	9,986
	Energy to LPG (Boiler effic)	11,748
	Cost per kWh	0.0776
	Space heating cost (€)	**911**
Hot Water		
	Quantity to be heated/day (litres)	142
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	10.13
	Annual Heating requirement (kWh)	3,698
	Energy to LPG (Boiler effic)	4,351
	Cost per kWh	0.0776
	Hot Water heating cost (€)	**337**
Cooking		
	Hours per year cooking	389
	Cooking requirement (kWh per hour)	1.90
	Annual Heating requirement (kWh)	740
	Energy to LPG (Cooker effic 80%)	870
	Cost per kWh	0.0776
	Cooking cost (€)	**67**
Supply Charge		
	Annual Standing Charge	100.00
		-
	Supply charge (€)	**100.00**
	Annual Capital and O&M Cost (€)	**123**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**1,416**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**1,539**

Table 10.3 (S1): Oil (Domestic Household)		
Annual Oil/Kerosene Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	80
	Heating per m2 (kWh/annum)	125
	Annual Heating requirement (kWh)	9,986
	Energy to Oil/Kerosene (Boiler effic)	11,748
	Cost per kWh	0.0581
	Space heating cost (€)	**682**
Hot Water		
	Quantity to be heated/day (litres)	142
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	10.13
	Annual Heating requirement (kWh)	3,698
	Energy to Oil/Kerosene (Boiler effic)	4,351
	Cost per kWh	0.0581
	Hot Water heating cost (€)	**253**
Cooking	(Use Electric)	
	Hours per year cooking	389
	Cooking requirement (kWh per hour)	1.90
	Annual Heating requirement (kWh)	740
	Energy to Electricity (100% effic)	740
	Cost per kWh (€)	0.1415
	Cooking cost (€)	**105**
Supply Charge		
	Annual Standing Charge	-
		-
	Supply charge (€)	-
	Annual Capital and O&M Cost (€)	**185**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**1,040**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**1,225**

Table 10.4 (S1): Natural Gas (Domestic Household)		
Annual Natural Gas Cost for Space Heating, Hot Water & Cooking		
	Total Gas Consumption (kWh)	16,969
Space Heating		
	Area to be heated (m2)	80
	Heating per m2 (kWh/annum)	125
	Annual Heating requirement (kWh)	9,986
	Energy to Natural Gas (Boiler effic)	11,748
	Cost per kWh	0.04509
	Space heating cost (€)	**530**
Hot Water		
	Quantity to be heated/day (litres)	142
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	10.13
	Annual Heating requirement (kWh)	3,698
	Energy to Natural Gas (Boiler effic)	4,351
	Cost per kWh	0.04509
	Hot Water heating cost (€)	**196**
Cooking		
	Hours per year cooking	389
	Cooking requirement (kWh per hour)	1.90
	Annual Heating requirement (kWh)	740
	Energy to Natural Gas (Cooker effic)	870
	Cost per kWh	0.04509
	Cooking cost (€)	**39**
Supply Charge		
	Annual Standing Charge	50.00
	Supply charge (€)	**50.00**
	Annual Capital and O&M Cost (€)	**140**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**815**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**955**

APPENDIX III (Sensitivity 2 Tables)

Table 7.2 (S2): LPG (Factory/Production Facility)		
Annual LPG Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	11,220
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	1,122,000
	Energy to LPG (Boiler effic)	1,320,000
	Cost per kWh	0.08920
	Space heating cost (€)	**117,740**
Hot Water		
	Quantity to be heated/day (litres)	33,534
	Water (lts) raised through 90 C by 1 kWh	10
	Heating per day (kWh)	3,353
	Annual Heating requirement (kWh)	1,224,000
	Energy to LPG (Boiler effic)	1,440,000
	Cost per kWh	0.08920
	Hot Water heating cost (€)	**128,443**
Cooking		
	Hours per year cooking	5,000
	Cooking requirement (kWh per hour)	8
	Annual Heating requirement (kWh)	40,000
	Energy to LPG (Cooker effic 80%)	47,059
	Cost per kWh	0.08920
	Cooking cost (€)	**4,197**
Supply Charge		
	Annual Standing Charge	500.00
		-
	Supply charge (€)	**500**
	Annual Capital and O&M Cost (€)	**1,233**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**250,880**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**252,114**

Table 7.3 (S2): Oil (Factory/Production Facility)		
Annual Oil/Kerosene Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	11,220
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	1,122,000
	Energy to Oil/Kerosene (Boiler effic)	1,320,000
	Cost per kWh	0.06101
	Space heating cost (€)	**80,531**
Hot Water		
	Quantity to be heated/day (litres)	33,534
	Water (lts) raised through 90 C by 1 kWh	10
	Heating per day (kWh)	3,353.42
	Annual Heating requirement (kWh)	1,224,000
	Energy to Oil/Kerosene (Boiler effic)	1,440,000
	Cost per kWh	0.06101
	Hot Water heating cost (€)	**87,851**
Cooking	(Use Electric)	
	Hours per year cooking	5,000
	Cooking requirement (kWh per hour)	8.00
	Annual Heating requirement (kWh)	40,000
	Energy to Electricity (100% effic)	40,000
	Cost per kWh (€)	0.1361
	Cooking cost (€)	**5,442**
Supply Charge		
	Annual Standing Charge	-
		-
	Supply charge (€)	-
	Annual Capital and O&M Cost (€)	**1,850**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**173,824**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**175,674**

Table 7.4 (S2): Natural Gas (Factory/Production Facility)		
Annual Natural Gas Cost for Space Heating, Hot Water & Cooking		
	Total Gas Consumption (kWh)	2,807,059
Space Heating		
	Area to be heated (m2)	11,220
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	1,122,000
	Energy to Natural Gas (Boiler effic)	1,320,000
	Cost per kWh	0.03897
	Space heating cost (€)	**51,445**
Hot Water		
	Quantity to be heated/day (litres)	33,534
	Water (lts) raised through 90 C by 1 kWh	10
	Heating per day (kWh)	3,353
	Annual Heating requirement (kWh)	1,224,000
	Energy to Natural Gas (Boiler effic)	1,440,000
	Cost per kWh	0.03897
	Hot Water heating cost (€)	**56,122**
Cooking		
	Hours per year cooking	5,000
	Cooking requirement (kWh per hour)	8.00
	Annual Heating requirement (kWh)	40,000
	Energy to Natural Gas (Cooker effic)	47,059
	Cost per kWh	0.03897
	Cooking cost (€)	**1,834**
Supply Charge		
	Annual Standing Charge	10,202
		-
	Supply charge (€)	**10,202.19**
	Annual Capital and O&M Cost (€)	**1,850**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**119,603**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**121,453**

Table 7.7 (S2): CHP with Natural Gas (Factory/Production Facility)		
Annual CHP Cost for Space Heating, Hot Water & Cooking		
Total Gas Quantity (kWh)		4,312,513
Total Gas Cost (€)		168,074
Electricity Saving (€)	(Estimated €10,000 load-matching cost)	105,094
Space Heating		
	Area to be heated (m2)	11,220
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	1,122,000
	Energy to CHP	2,040,000
	Cost per kWh	0.03897
	Space heating cost (€)	**79,506**
Hot Water		
	Quantity to be heated/day (litres)	33,534
	Water (lts) raised through 90 C by 1 kWh	10
	Heating per day (kWh)	3,353
	Annual Heating requirement (kWh)	1,224,000
	Energy to CHP	2,225,455
	Cost per kWh	0.03897
	Hot Water heating cost (€)	**86,734**
Cooking		
	Hours per year cooking	5,000
	Cooking requirement (kWh per hour)	8
	Annual Heating requirement (kWh)	40,000
	Energy to Natural Gas (Cooker effic)	47,059
	Cost per kWh	0.03897
	Cooking cost (€)	**1,834**
Supply Charge		
	Annual Standing Charge	10,202
	Supply charge (€)	**10,202**
	Annual Capital and O&M Cost (€)	**35,650**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**73,182**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**108,832**

Table 8.2 (S2): LPG (Medium Commercial/Service Enterprise)		
Annual LPG Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	694
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	69,353
	Energy to LPG (Boiler effic)	81,592
	Cost per kWh	0.08920
	Space heating cost (€)	**7,278**
Hot Water		
	Quantity to be heated/day (litres)	570
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	40.72
	Annual Heating requirement (kWh)	14,861
	Energy to LPG (Boiler effic)	17,484
	Cost per kWh	0.08920
	Hot Water heating cost (€)	**1,560**
Cooking		
	Hours per year cooking	971
	Cooking requirement (kWh per hour)	3.00
	Annual Heating requirement (kWh)	2,914
	Energy to LPG (Cooker effic 80%)	3,428
	Cost per kWh	0.08920
	Cooking cost (€)	**306**
Supply Charge		
	Annual Standing Charge	200.00
		-
	Supply charge (€)	**200.00**
	Annual Capital and O&M Cost (€)	**284**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**9,343**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**9,627**

Table 8.3 (S2): Oil (Medium Commercial/Service Enterprise)		
Annual Oil/Kerosene Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	694
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	69,353
	Energy to Oil/Kerosene (Boiler effic)	81,592
	Cost per kWh	0.06101
	Space heating cost (€)	**4,978**
Hot Water		
	Quantity to be heated/day (litres)	570
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	40.72
	Annual Heating requirement (kWh)	14,861
	Energy to Oil/Kerosene (Boiler effic)	17,484
	Cost per kWh	0.06101
	Hot Water heating cost (€)	**1,067**
Cooking	(Use Electric)	
	Hours per year cooking	971
	Cooking requirement (kWh per hour)	3.00
	Annual Heating requirement (kWh)	2,914
	Energy to Electricity (100% effic)	2,914
	Cost per kWh (€)	0.1757
	Cooking cost (€)	**512**
Supply Charge		
	Annual Standing Charge	-
		-
	Supply charge (€)	-
	Annual Capital and O&M Cost (€)	**426**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**6,556**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**6,982**

Table 8.4 (S2): Natural Gas (Medium Commercial/Service Enterprise)		
Annual Natural Gas Cost for Space Heating, Hot Water & Cooking		
	Total Gas Consumption (kWh)	102,504
Space Heating		
	Area to be heated (m2)	694
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	69,353
	Energy to Natural Gas (Boiler effic)	81,592
	Cost per kWh	0.05230
	Space heating cost (€)	**4,267**
Hot Water		
	Quantity to be heated/day (litres)	570
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	40.72
	Annual Heating requirement (kWh)	14,861
	Energy to Natural Gas (Boiler effic)	17,484
	Cost per kWh	0.05230
	Hot Water heating cost (€)	**914**
Cooking		
	Hours per year cooking	971
	Cooking requirement (kWh per hour)	3.00
	Annual Heating requirement (kWh)	2,914
	Energy to Natural Gas (Cooker effic)	3,428
	Cost per kWh	0.05230
	Cooking cost (€)	**179**
Supply Charge		
	Annual Standing Charge	167.26
		-
	Supply charge (€)	**167.26**
	Annual Capital and O&M Cost (€)	**530**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**5,528**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**6,059**

Table 9.2 (S2): LPG (Small Commercial/Service Enterprise)		
Annual LPG Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	276
	Heating per m2 (kWh/annum)	110
	Annual Heating requirement (kWh)	30,389
	Energy to LPG (Boiler effic)	35,751
	Cost per kWh	0.0924
	Space heating cost (€)	**3,303**
Hot Water		
	Quantity to be heated/day (litres)	728
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	52.04
	Annual Heating requirement (kWh)	18,993
	Energy to LPG (Boiler effic)	22,345
	Cost per kWh	0.0924
	Hot Water heating cost (€)	**2,064**
Cooking		
	Hours per year cooking	688
	Cooking requirement (kWh per hour)	3
	Annual Heating requirement (kWh)	1,788
	Energy to LPG (Cooker effic 80%)	2,103
	Cost per kWh	0.0924
	Cooking cost (€)	**194**
Supply Charge		
	Annual Standing Charge	140.00
		-
	Supply charge (€)	**140.00**
	Annual Capital and O&M Cost (€)	**234**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**5,701**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**5,936**

Table 9.3 (S2): Oil (Small Commercial/Service Enterprise)		
Annual Oil/Kerosene Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	276
	Heating per m2 (kWh/annum)	110
	Annual Heating requirement (kWh)	30,389
	Energy to Oil/Kerosene (Boiler effic)	35,751
	Cost per kWh	0.0634
	Space heating cost (€)	**2,268**
Hot Water		
	Quantity to be heated/day (litres)	728
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	52.04
	Annual Heating requirement (kWh)	18,993
	Energy to Oil/Kerosene (Boiler effic)	22,345
	Cost per kWh	0.0634
	Hot Water heating cost (€)	**1,418**
Cooking	(Use Electric)	
	Hours per year cooking	688
	Cooking requirement (kWh per hour)	2.60
	Annual Heating requirement (kWh)	1,788
	Energy to Electricity (100% effic)	1,788
	Cost per kWh (€)	0.1823
	Cooking cost (€)	**326**
Supply Charge		
	Annual Standing Charge	-
		-
	Supply charge (€)	-
	Annual Capital and O&M Cost (€)	**352**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**4,012**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**4,363**

Table 9.4 (S2): Natural Gas (Small Commercial/Service Enterprise)		
Annual Natural Gas Cost for Space Heating, Hot Water & Cooking		
	Total Gas Consumption (kWh)	60,199
Space Heating		
	Area to be heated (m2)	276
	Heating per m2 (kWh/annum)	110
	Annual Heating requirement (kWh)	30,389
	Energy to Natural Gas (Boiler effic)	35,751
	Cost per kWh	0.05707
	Space heating cost (€)	**2,040**
Hot Water		
	Quantity to be heated/day (litres)	728
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	52.04
	Annual Heating requirement (kWh)	18,993
	Energy to Natural Gas (Boiler effic)	22,345
	Cost per kWh	0.05707
	Hot Water heating cost (€)	**1,275**
Cooking		
	Hours per year cooking	688
	Cooking requirement (kWh per hour)	2.60
	Annual Heating requirement (kWh)	1,788
	Energy to Natural Gas (Cooker effic)	2,103
	Cost per kWh	0.05707
	Cooking cost (€)	**120**
Supply Charge		
	Annual Standing Charge	167.26
	Supply charge (€)	**167.26**
	Annual Capital and O&M Cost (€)	**358**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**3,603**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**3,961**

Table 10.2 (S2): LPG (Domestic Household)		
Annual LPG Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	80
	Heating per m2 (kWh/annum)	125
	Annual Heating requirement (kWh)	9,986
	Energy to LPG (Boiler effic)	11,748
	Cost per kWh	0.0924
	Space heating cost (€)	**1,085**
Hot Water		
	Quantity to be heated/day (litres)	142
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	10.13
	Annual Heating requirement (kWh)	3,698
	Energy to LPG (Boiler effic)	4,351
	Cost per kWh	0.0924
	Hot Water heating cost (€)	**402**
Cooking		
	Hours per year cooking	389
	Cooking requirement (kWh per hour)	1.90
	Annual Heating requirement (kWh)	740
	Energy to LPG (Cooker effic 80%)	870
	Cost per kWh	0.0924
	Cooking cost (€)	**80**
Supply Charge		
	Annual Standing Charge	100.00
		-
	Supply charge (€)	**100.00**
	Annual Capital and O&M Cost (€)	**123**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**1,668**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**1,791**

Table 10.3 (S2): Oil (Domestic Household)		
Annual Oil/Kerosene Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	80
	Heating per m2 (kWh/annum)	125
	Annual Heating requirement (kWh)	9,986
	Energy to Oil/Kerosene (Boiler effic)	11,748
	Cost per kWh	0.0634
	Space heating cost (€)	**745**
Hot Water		
	Quantity to be heated/day (litres)	142
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	10.13
	Annual Heating requirement (kWh)	3,698
	Energy to Oil/Kerosene (Boiler effic)	4,351
	Cost per kWh	0.0634
	Hot Water heating cost (€)	**276**
Cooking	(Use Electric)	
	Hours per year cooking	389
	Cooking requirement (kWh per hour)	1.90
	Annual Heating requirement (kWh)	740
	Energy to Electricity (100% effic)	740
	Cost per kWh (€)	0.1507
	Cooking cost (€)	**111**
Supply Charge		
	Annual Standing Charge	-
		-
	Supply charge (€)	-
	Annual Capital and O&M Cost (€)	**185**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**1,133**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**1,318**

Table 10.4 (S2): Natural Gas (Domestic Household)		
Annual Natural Gas Cost for Space Heating, Hot Water & Cooking		
	Total Gas Consumption (kWh)	16,969
Space Heating		
	Area to be heated (m2)	80
	Heating per m2 (kWh/annum)	125
	Annual Heating requirement (kWh)	9,986
	Energy to Natural Gas (Boiler effic)	11,748
	Cost per kWh	0.04145
	Space heating cost (€)	**487**
Hot Water		
	Quantity to be heated/day (litres)	142
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	10.13
	Annual Heating requirement (kWh)	3,698
	Energy to Natural Gas (Boiler effic)	4,351
	Cost per kWh	0.04145
	Hot Water heating cost (€)	**180**
Cooking		
	Hours per year cooking	389
	Cooking requirement (kWh per hour)	1.90
	Annual Heating requirement (kWh)	740
	Energy to Natural Gas (Cooker effic)	870
	Cost per kWh	0.04145
	Cooking cost (€)	**36**
Supply Charge		
	Annual Standing Charge	312.66
	Supply charge (€)	**312.66**
	Annual Capital and O&M Cost (€)	**140**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**1,016**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**1,156**

APPENDIX IV (Sensitivity 3 Tables)

Table 7.2 (S3): LPG (Factory/Production Facility)		
Annual LPG Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	11,220
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	1,122,000
	Energy to LPG (Boiler effic)	1,320,000
	Cost per kWh	0.06593
	Space heating cost (€)	**87,025**
Hot Water		
	Quantity to be heated/day (litres)	33,534
	Water (lts) raised through 90 C by 1 kWh	10
	Heating per day (kWh)	3,353
	Annual Heating requirement (kWh)	1,224,000
	Energy to LPG (Boiler effic)	1,440,000
	Cost per kWh	0.06593
	Hot Water heating cost (€)	**94,936**
Cooking		
	Hours per year cooking	5,000
	Cooking requirement (kWh per hour)	8
	Annual Heating requirement (kWh)	40,000
	Energy to LPG (Cooker effic 80%)	47,059
	Cost per kWh	0.06593
	Cooking cost (€)	**3,102**
Supply Charge		
	Annual Standing Charge	500.00
		-
	Supply charge (€)	**500**
	Annual Capital and O&M Cost (€)	**1,233**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**185,564**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**186,797**

Table 7.3 (S3): Oil (Factory/Production Facility)		
Annual Oil/Kerosene Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	11,220
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	1,122,000
	Energy to Oil/Kerosene (Boiler effic)	1,320,000
	Cost per kWh	0.04509
	Space heating cost (€)	**59,523**
Hot Water		
	Quantity to be heated/day (litres)	33,534
	Water (lts) raised through 90 C by 1 kWh	10
	Heating per day (kWh)	3,353.42
	Annual Heating requirement (kWh)	1,224,000
	Energy to Oil/Kerosene (Boiler effic)	1,440,000
	Cost per kWh	0.04509
	Hot Water heating cost (€)	**64,934**
Cooking	(Use Electric)	
	Hours per year cooking	5,000
	Cooking requirement (kWh per hour)	8.00
	Annual Heating requirement (kWh)	40,000
	Energy to Electricity (100% effic)	40,000
	Cost per kWh (€)	0.1231
	Cooking cost (€)	**4,924**
Supply Charge		
	Annual Standing Charge	-
		-
	Supply charge (€)	-
	Annual Capital and O&M Cost (€)	**1,850**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**129,380**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**131,230**

Table 7.4 (S3): Natural Gas (Factory/Production Facility)		
Annual Natural Gas Cost for Space Heating, Hot Water & Cooking		
	Total Gas Consumption (kWh)	2,807,059
Space Heating		
	Area to be heated (m2)	11,220
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	1,122,000
	Energy to Natural Gas (Boiler effic)	1,320,000
	Cost per kWh	0.02881
	Space heating cost (€)	**38,025**
Hot Water		
	Quantity to be heated/day (litres)	33,534
	Water (lts) raised through 90 C by 1 kWh	10
	Heating per day (kWh)	3,353
	Annual Heating requirement (kWh)	1,224,000
	Energy to Natural Gas (Boiler effic)	1,440,000
	Cost per kWh	0.02881
	Hot Water heating cost (€)	**41,481**
Cooking		
	Hours per year cooking	5,000
	Cooking requirement (kWh per hour)	8.00
	Annual Heating requirement (kWh)	40,000
	Energy to Natural Gas (Cooker effic)	47,059
	Cost per kWh	0.02881
	Cooking cost (€)	**1,356**
Supply Charge		
	Annual Standing Charge	7,541
		-
	Supply charge (€)	**7,540.75**
	Annual Capital and O&M Cost (€)	**1,850**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**88,402**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**90,252**

Table 7.7 (S3): CHP with Natural Gas (Factory/Production Facility)		
Annual CHP Cost for Space Heating, Hot Water & Cooking		
Total Gas Quantity (kWh)		4,312,513
Total Gas Cost (€)		124,228
Electricity Saving (€)	(Estimated €10,000 load-matching cost)	105,094
Space Heating		
	Area to be heated (m2)	11,220
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	1,122,000
	Energy to CHP	2,040,000
	Cost per kWh	0.02881
	Space heating cost (€)	**58,765**
Hot Water		
	Quantity to be heated/day (litres)	33,534
	Water (lts) raised through 90 C by 1 kWh	10
	Heating per day (kWh)	3,353
	Annual Heating requirement (kWh)	1,224,000
	Energy to CHP	2,225,455
	Cost per kWh	0.02881
	Hot Water heating cost (€)	**64,108**
Cooking		
	Hours per year cooking	5,000
	Cooking requirement (kWh per hour)	8
	Annual Heating requirement (kWh)	40,000
	Energy to Natural Gas (Cooker effic)	47,059
	Cost per kWh	0.02881
	Cooking cost (€)	**1,356**
Supply Charge		
	Annual Standing Charge	7,541
	Supply charge (€)	**7,541**
	Annual Capital and O&M Cost (€)	**35,650**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**26,675**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**62,325**

Table 8.2 (S3): LPG (Medium Commercial/Service Enterprise)		
Annual LPG Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	694
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	69,353
	Energy to LPG (Boiler effic)	81,592
	Cost per kWh	0.06593
	Space heating cost (€)	**5,379**
Hot Water		
	Quantity to be heated/day (litres)	570
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	40.72
	Annual Heating requirement (kWh)	14,861
	Energy to LPG (Boiler effic)	17,484
	Cost per kWh	0.06593
	Hot Water heating cost (€)	**1,153**
Cooking		
	Hours per year cooking	971
	Cooking requirement (kWh per hour)	3.00
	Annual Heating requirement (kWh)	2,914
	Energy to LPG (Cooker effic 80%)	3,428
	Cost per kWh	0.06593
	Cooking cost (€)	**226**
Supply Charge		
	Annual Standing Charge	200.00
		-
	Supply charge (€)	**200.00**
	Annual Capital and O&M Cost (€)	**284**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**6,958**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**7,242**

Table 8.3 (S3): Oil (Medium Commercial/Service Enterprise)		
Annual Oil/Kerosene Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	694
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	69,353
	Energy to Oil/Kerosene (Boiler effic)	81,592
	Cost per kWh	0.04509
	Space heating cost (€)	**3,679**
Hot Water		
	Quantity to be heated/day (litres)	570
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	40.72
	Annual Heating requirement (kWh)	14,861
	Energy to Oil/Kerosene (Boiler effic)	17,484
	Cost per kWh	0.04509
	Hot Water heating cost (€)	**788**
Cooking	(Use Electric)	
	Hours per year cooking	971
	Cooking requirement (kWh per hour)	3.00
	Annual Heating requirement (kWh)	2,914
	Energy to Electricity (100% effic)	2,914
	Cost per kWh (€)	0.1113
	Cooking cost (€)	**324**
Supply Charge		
	Annual Standing Charge	-
		-
	Supply charge (€)	-
	Annual Capital and O&M Cost (€)	**426**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**4,792**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**5,217**

Table 8.4 (S3): Natural Gas (Medium Commercial/Service Enterprise)		
Annual Natural Gas Cost for Space Heating, Hot Water & Cooking		
	Total Gas Consumption (kWh)	102,504
Space Heating		
	Area to be heated (m2)	694
	Heating per m2 (kWh/annum)	100
	Annual Heating requirement (kWh)	69,353
	Energy to Natural Gas (Boiler effic)	81,592
	Cost per kWh	0.03866
	Space heating cost (€)	**3,154**
Hot Water		
	Quantity to be heated/day (litres)	570
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	40.72
	Annual Heating requirement (kWh)	14,861
	Energy to Natural Gas (Boiler effic)	17,484
	Cost per kWh	0.03866
	Hot Water heating cost (€)	**676**
Cooking		
	Hours per year cooking	971
	Cooking requirement (kWh per hour)	3.00
	Annual Heating requirement (kWh)	2,914
	Energy to Natural Gas (Cooker effic)	3,428
	Cost per kWh	0.03866
	Cooking cost (€)	**133**
Supply Charge		
	Annual Standing Charge	123.62
		-
	Supply charge (€)	**123.62**
	Annual Capital and O&M Cost (€)	**530**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**4,086**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**4,617**

Table 9.2 (S3): LPG (Small Commercial/Service Enterprise)		
Annual LPG Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	276
	Heating per m2 (kWh/annum)	110
	Annual Heating requirement (kWh)	30,389
	Energy to LPG (Boiler effic)	35,751
	Cost per kWh	0.0683
	Space heating cost (€)	**2,441**
Hot Water		
	Quantity to be heated/day (litres)	728
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	52.04
	Annual Heating requirement (kWh)	18,993
	Energy to LPG (Boiler effic)	22,345
	Cost per kWh	0.0683
	Hot Water heating cost (€)	**1,526**
Cooking		
	Hours per year cooking	688
	Cooking requirement (kWh per hour)	3
	Annual Heating requirement (kWh)	1,788
	Energy to LPG (Cooker effic 80%)	2,103
	Cost per kWh	0.0683
	Cooking cost (€)	**144**
Supply Charge		
	Annual Standing Charge	140.00
		-
	Supply charge (€)	**140.00**
	Annual Capital and O&M Cost (€)	**234**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**4,251**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**4,485**

Table 9.3 (S3): Oil (Small Commercial/Service Enterprise)		
Annual Oil/Kerosene Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	276
	Heating per m2 (kWh/annum)	110
	Annual Heating requirement (kWh)	30,389
	Energy to Oil/Kerosene (Boiler effic)	35,751
	Cost per kWh	0.0469
	Space heating cost (€)	**1,677**
Hot Water		
	Quantity to be heated/day (litres)	728
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	52.04
	Annual Heating requirement (kWh)	18,993
	Energy to Oil/Kerosene (Boiler effic)	22,345
	Cost per kWh	0.0469
	Hot Water heating cost (€)	**1,048**
Cooking	(Use Electric)	
	Hours per year cooking	688
	Cooking requirement (kWh per hour)	2.60
	Annual Heating requirement (kWh)	1,788
	Energy to Electricity (100% effic)	1,788
	Cost per kWh (€)	0.1649
	Cooking cost (€)	**295**
Supply Charge		
	Annual Standing Charge	-
		-
	Supply charge (€)	-
	Annual Capital and O&M Cost (€)	**352**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**3,019**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**3,371**

Table 9.4 (S3): Natural Gas (Small Commercial/Service Enterprise)		
Annual Natural Gas Cost for Space Heating, Hot Water & Cooking		
	Total Gas Consumption (kWh)	60,199
Space Heating		
	Area to be heated (m2)	276
	Heating per m2 (kWh/annum)	110
	Annual Heating requirement (kWh)	30,389
	Energy to Natural Gas (Boiler effic)	35,751
	Cost per kWh	0.04219
	Space heating cost (€)	**1,508**
Hot Water		
	Quantity to be heated/day (litres)	728
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	52.04
	Annual Heating requirement (kWh)	18,993
	Energy to Natural Gas (Boiler effic)	22,345
	Cost per kWh	0.04219
	Hot Water heating cost (€)	**943**
Cooking		
	Hours per year cooking	688
	Cooking requirement (kWh per hour)	2.60
	Annual Heating requirement (kWh)	1,788
	Energy to Natural Gas (Cooker effic)	2,103
	Cost per kWh	0.04219
	Cooking cost (€)	**89**
Supply Charge		
	Annual Standing Charge	123.62
	Supply charge (€)	**123.62**
	Annual Capital and O&M Cost (€)	**358**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**2,663**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**3,021**

Table 10.2 (S3): LPG (Domestic Household)		
Annual LPG Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	80
	Heating per m2 (kWh/annum)	125
	Annual Heating requirement (kWh)	9,986
	Energy to LPG (Boiler effic)	11,748
	Cost per kWh	0.0683
	Space heating cost (€)	**802**
Hot Water		
	Quantity to be heated/day (litres)	142
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	10.13
	Annual Heating requirement (kWh)	3,698
	Energy to LPG (Boiler effic)	4,351
	Cost per kWh	0.0683
	Hot Water heating cost (€)	**297**
Cooking		
	Hours per year cooking	389
	Cooking requirement (kWh per hour)	1.90
	Annual Heating requirement (kWh)	740
	Energy to LPG (Cooker effic 80%)	870
	Cost per kWh	0.0683
	Cooking cost (€)	**59**
Supply Charge		
	Annual Standing Charge	100.00
		-
	Supply charge (€)	**100.00**
	Annual Capital and O&M Cost (€)	**123**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**1,259**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**1,382**

Table 10.3 (S3): Oil (Domestic Household)		
Annual Oil/Kerosene Cost for Space Heating, Hot Water & Cooking		
Space Heating		
	Area to be heated (m2)	80
	Heating per m2 (kWh/annum)	125
	Annual Heating requirement (kWh)	9,986
	Energy to Oil/Kerosene (Boiler effic)	11,748
	Cost per kWh	0.0469
	Space heating cost (€)	**551**
Hot Water		
	Quantity to be heated/day (litres)	142
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	10.13
	Annual Heating requirement (kWh)	3,698
	Energy to Oil/Kerosene (Boiler effic)	4,351
	Cost per kWh	0.0469
	Hot Water heating cost (€)	**204**
Cooking	(Use Electric)	
	Hours per year cooking	389
	Cooking requirement (kWh per hour)	1.90
	Annual Heating requirement (kWh)	740
	Energy to Electricity (100% effic)	740
	Cost per kWh (€)	0.1363
	Cooking cost (€)	**101**
Supply Charge		
	Annual Standing Charge	-
		-
	Supply charge (€)	-
	Annual Capital and O&M Cost (€)	**185**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**856**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**1,041**

Table 10.4 (S3): Natural Gas (Domestic Household)		
Annual Natural Gas Cost for Space Heating, Hot Water & Cooking		
	Total Gas Consumption (kWh)	16,969
Space Heating		
	Area to be heated (m2)	80
	Heating per m2 (kWh/annum)	125
	Annual Heating requirement (kWh)	9,986
	Energy to Natural Gas (Boiler effic)	11,748
	Cost per kWh	0.03064
	Space heating cost (€)	**360**
Hot Water		
	Quantity to be heated/day (litres)	142
	Water (lts) raised through 60 C by 1 kWh	14
	Heating per day (kWh)	10.13
	Annual Heating requirement (kWh)	3,698
	Energy to Natural Gas (Boiler effic)	4,351
	Cost per kWh	0.03064
	Hot Water heating cost (€)	**133**
Cooking		
	Hours per year cooking	389
	Cooking requirement (kWh per hour)	1.90
	Annual Heating requirement (kWh)	740
	Energy to Natural Gas (Cooker effic)	870
	Cost per kWh	0.03064
	Cooking cost (€)	**27**
Supply Charge		
	Annual Standing Charge	231.10
	Supply charge (€)	**231.10**
	Annual Capital and O&M Cost (€)	**140**
Total Annual Cost exclud. Annual Capital + O&M Cost (€) --->		**751**
Total Annual Cost includ. Annual Capital + O&M Cost (€) --->		**891**