Markets for Solar Thermal and Heat Pump Technologies in the Commercial, Industrial, Services and Public Sectors

Final

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1. Summary

The market for solar thermal systems is essentially any building or premises with a significant hot water demand. Typical applications include hotels, guest houses, leisure centres, sports clubs and buildings with showering facilities.

The total estimated market is almost 600,000 m^2 of solar or €300 million. This is significantly less than the accessible resource estimate of over 5 million m^2 (*Renewable Energy Resources in Ireland for 2010 and 2020*) but is based on specific markets that have been identified as suitable for solar thermal. The largest potential markets are hotels, education and nursing homes.

In general, companies active in the solar thermal industry have built up from a base established to service the domestic market. Accordingly they are generally small and have limited human and financial resources. The exception to this is Precision Heating which is a well established company and who installed 1,500 m^2 of solar thermal in commercial applications in 2006. It is therefore likely that the market will be constrained by the capacity of the industry to promote and deliver solar thermal installations in the short term.

In a market survey of the larger companies active in the solar thermal business, a total target of €2.6 million (or 5,200 m^2) for 2007 was estimated. However, it is considered that this is ambitious and a more likely market would be in the order of €1 million.

The market for heat pumps will be largely confined to new buildings due to the need for integrated design of heat pump and heat distribution systems. The main exception to this is leisure centres and swimming pools where heat pumps can be readily retro-fitted. These form the largest potential market for heat pumps followed by education, office buildings, nursing homes and hotels. Offices may be especially suited to heat pumps due to the fact that air conditioning is provided in almost all new offices and the possibility of installing reverse cycle heat pumps for heating and cooling.

It is estimated that heat pumps could supply c. 170 GWh/year for space heating in the markets identified. Based on an assumed utilisation factor of 20% and installed cost of €1,500/kW this equates to a market of almost €150 million. However, unlike solar, as new building are built and the building stock replenished, this market would be likely to grow.

The leading companies supplying heat pumps are larger and more established than their counterparts in the solar business. It is therefore likely that these will be better resourced and better positioned to service a new market in the short term, which would correspond to the experience gained from the Greener Homes Scheme. Notwithstanding this, many of the companies surveyed identified the availability of qualified personnel as the main impediment to growing their business.

In a market survey, heat pump suppliers and installers estimate a market of €4.3 million for heat pumps in 2007. Allowing for off the cuff, ambitious estimates from a number of suppliers, a market of €2 million for 2007 may be reasonable.

Finally, it is noteworthy that even the most ambitious targets for 2007 represent only a small proportion of the total estimated markets for heat pumps and solar thermal technologies.

2. Introduction

2.1. General

In the 2007 Budget announcement additional funding was made available for supporting renewable heating technologies in the commercial, public, services and industrial sectors. This report contains a summary appraisal of the markets for these technologies and the particular technologies suited to these markets.

The principal method of appraising the market has been to discuss technologies, costs and existing and anticipated markets with the principal suppliers of the relevant technologies and place this in the context of space heat and hot water demands in the services sector. The report does not address economic factors or attempt to quantitatively assess penetration rates into the markets identified.

3. Technologies and Markets

3.1. Solar

Solar technologies are scalable, and the technologies suited to the commercial market will be the same as those suited to the domestic market (both flat plate and evacuated tube), albeit with greater storage capacity in more complex systems.

The market for solar thermal is basically any building with a significant hot water demand such as hotels, guest houses, leisure centres, nursing homes, GAA clubs and commercial and public sector buildings with showering facilities. Swimming pools are also suitable applications.

The market for solar thermal in the industrial sector will be limited due to the lack of demand for low temperature hot water.

The estimated accessible resource for solar in the commercial and public sectors is 2,837,000 m^2 and 2,338,000 m^2 respectively[1]. Assuming an output of 400 kWh/m^2/year, the total resource in these sectors is 2,070 GWh/year.

3.2. Heat Pumps

Unlike solar, the technologies suitable for the domestic market are not directly scalable for larger applications. In particular ground source heat pumps (GSHPs) with horizontal collectors are generally unsuited for larger applications due to constraints on areas available for collectors. Even with vertical bore collectors the applicability of heat pumps can be constrained by land area available for collectors. The technologies suitable are:

- Water to water heat pumps (where water is available)
- Air to Water heat pumps
- Ground source with vertical boreholes

The market for heat pumps is more general and, provided that the low temperature heat source is available for the collectors, heat pumps can directly replace any boiler in a new building. In retrofit applications the viability may be limited by the lower temperature of water supplied.

[1] Renewable Energy Resources in Ireland for 2010 and 2020 – A Methodology, SEI, 2004

The use of heat pumps in the industrial sector will be limited by the upper limit on the temperature of the heat available (50°C – 53°C with technologies on the market) and the limited use for low temperature heat in the industrial sector. Notwithstanding this, Oranmore Precast is reported to have recently installed a heat pump for low temperature drying in their brick factory.

There are no estimates of the resource available through heat pumps. However it is reasonable to assume that the penetration of heat pumps will be constrained by factors other than available resources in the short to medium term.

3.3. Markets

On the basis that both solar thermal and heat pumps produce low temperature heat, for which there is a limited requirement in industry, it is assumed that the market for these technologies in the industrial sector is negligible.

The principal market for the technologies is then the services sector. Particular sub-sectors within the services sector, such as hotels, leisure centres and nursing homes are more suitable for RE Heat technologies than others. While the full list of sub sectors comprising the services sector has not been definitively laid out, following is a list of some of the main sub-sectors and a qualitative comment on their suitability for heat pumps and solar.

As a general comment it is worth noting that both solar thermal and heat pumps will compete in the market with other alternative energy sources and with CHP and biomass boilers in particular. As both heat pumps and solar systems have practical limitations on the size of systems that can viably be installed, the market for these technologies will tend to be in sites with a lower space heating and hot water demand; although a solar system could be installed to provide a proportion of the hot water demand in a site with a larger demand than area available for solar.

The market for heat pumps will be primarily in the new build market due to the need for integrated design of the heat distribution system and the heat pump. A notable exception to this is in swimming pools where heat pumps could be readily retrofitted.

Hotels

Hotels are ideal applications for solar thermal systems due to their large demand for hot water and the seasonal nature of the demand – the demand for hot water is greater during the summer. Solar would be suitable in both new build and retrofit applications.

The market for heat pumps in hotels would be limited by the area available for collectors and by the large heat demand. There may be niche markets in smaller hotels with an available low temperature heat source such as a nearby river, lake or shallow aquifer. Heat pumps would be limited to the new build market due to the lower temperature water generated and the need to design the heat distribution system and emitters accordingly.

Recreation & Sport

Gyms, leisure centres, swimming pools and sports clubs fall into this category. These are ideal applications for solar hot water due to the large hot water demand.

Heat pumps are also suitable for swimming pools due to the large low temperature heat demand and the opportunity to use exhaust air heat pumps to recover energy from the large quantity of air extracted from swimming pools. The heat pump would be sized to maintain temperature in the pool and compensate for heat loss.

A significant market for small scale solar in GAA clubs has been reported by some market actors. There are 2,500 GAA clubs in Ireland.

Healthcare (Hospitals and Nursing Homes)

These are ideal applications both for solar and for heat pumps due to the hot water demand and the large space heating demand. As discussed above the principal markets will be in smaller sites[2].

As with all heat pump applications, the viability will be constrained by size and by the availability of a low temperature heat source and would be largely confined to the new build market.

Offices

The Energy Performance of Buildings Directive, Building Energy Rating and the requirement to consider alternative energy sources will tend to create a market for alternative energy sources in new build commercial buildings.

This will include solar thermal in offices with a significant hot water demand (eg offices with showering facilities) and heat pumps (for heating and cooling) in offices with an available low temperature heat source. As the majority of new office buildings built incorporate air conditioning this may create a significant market for heat pumps in offices.

Education

The education sector has a large heat and hot water demand. While it was not identified as an important market by the industry, it is considered that solar could supply a portion of the hot water demand.

Heat pumps may be suitable for smaller, new build schools.

Defence

The defence forces have approximately 1,000 buildings in 30 locations and about 30,000 personnel using the facilities. There is a large demand for space heating and for hot water. The Defence Forces are actively engaged with SEI and are seeking means of reducing their energy consumption. There is a 20m^2 solar installation and a vertical bore GSHP installed in the barracks in Haulbowline, Cork.

Other sub sectors

There are a number of sub-sectors where the market for solar and for heat pumps will be low due to the lack of a hot water demand and difficulty in integrating heat pumps with existing heating and cooling systems.

These include: wholesale; retail; restaurants, bars and catering; post and telecommunications; IT services; garages and motor trade; rail stations and bus depots; cultural; and community (courts, prisons, fire, ambulance etc). Notwithstanding this there are likely to be some niche applications within these sectors.

[2] In a discussion with Donal Deering of the HSE he stated that he is recommending evacuated tube solar in all sites <1,000 m^2. For larger sites he considers that biomass boilers or CHP are more cost effective.

4. Market Analysis

4.1. Energy Use in the Services Sector

4.1.1. 2005 Data[3]

In 2005, the Total Final Energy Consumption (TFC) in the services sector was 1,735 ktoe, comprising 728 ktoe of electricity, 390 ktoe of natural gas and 587 ktoe of oil. The services sector is further broken down into the Commercial Services and Public Services sectors. The TFC in the Commercial Services sector was 1,100 ktoe (520 ktoe electricity and 580 ktoe oil and gas) and the TFC in the Public Services sector was 630 ktoe (206 ktoe electricity and 424 ktoe oil and gas).

The contribution of renewable energy sources to the TFC was 3 ktoe.

4.1.2. Breakdown in 1999

In 1999 the CSO Annual Service Inquiry collected information on the energy use in the services sector[4]. The survey and analysis covered 11 sub-sectors and accounted for a total consumption of 432 ktoe or c.30% of the TFC in the services sector. Sectors not covered included: health, education, defence, which are obviously significant consumers of energy and part of the market for RE Heat technologies.

The breakdown did include health and recreation which are two of the main sub-sectors identified as markets for RE Heat.

The energy use in hotels was 55 ktoe (3.8% of the total) comprising c. 13 ktoe oil, 24 ktoe gas and 18 ktoe electricity. The energy use in recreation was 14.8 ktoe comprising 8 ktoe electricity, 3 ktoe gas and 4 ktoe oil.

4.1.3. Breakdown in 2002

BRE carried out a market characterisation of the services sector for SEI in 2002[5]. The methodology employed was to use the 1999 ASI data together with 2002 energy balance data and to apply the end use consumption patterns from the UK's N-DEEM model to develop a breakdown. This data is reproduced in Tables 1 & 2.

[3] Energy in Ireland 1990 – 2005, SEI, 2006
[4] Profiling Energy and CO_2 Emissions in the Services Sector, SEI, 2005
[5] Potential for Energy Savings in the Services Sector in Ireland – A Market Characterisation, BRE, 2004

Table 1: Total energy consumption in the service sector broken down by end use - 2002

GWh pa	Grand Total								
Sector	catering	hot water	lighting	office equ	other	process	space coo	space hea	Total
motor trade	5	20	71	3	32	115	4	517	768
Wholesale trade	43	32	183	14	13	101	22	245	653
Retail Trade	326	63	891	69	267	31	94	671	2,412
Hotels and Restaurants	780	431	564	9	218	19	58	870	2,949
Post and Telecommunications	5	3	35	7	14	0	1	93	158
Real Estate Activities	4	5	54	10	12	0	1	72	159
Computer and Related Activities	6	7	81	15	18	0	1	96	224
Research and Development	1	3	20	1	9	10	1	34	80
Other Business Activities	13	16	116	42	35	13	58	250	544
Recreational, Cultural and Sporting Activities	29	27	63	3	40	5	14	131	312
Other Service Activities	8	36	66	2	30	47	4	210	403
Central Government (OPW)	31	35	47	7	13	12	7	318	471
Health	117	488	295	14	47	2	0	2,778	3,740
Higher and Further Education	28	34	116	12	31	6	-	554	782
Secondary Education	52	104	40	11	6	20	-	1,339	1,572
Primary Education	34	72	15	4	2	13	-	938	1,080
Education Private	12	20	14	2	222	1	-	68	338
Defence	37	57	40	6	12	17	6	533	707
Garda Stn (OPW) + Prisons	2	4	9	4	3	1	3	150	177
Local Authorities	70	21	63	30	26	1	39	372	621
State Bodies C&NC	91	28	16	73	53	0	1	466	727
Total Service Sector	1,695	1,505	2,798	337	1,103	415	314	10,707	18,875

Table 2: Total energy consumption in the service sector broken down by fuel -2002

GWh pa	Grand Total				
Sector	electricity	gas	oil	solid	Total
motor trade	169	11.81	586	1	768
Wholesale trade	424	73.72	155	0	653
Retail Trade	1,990	84.95	337	1	2,412
Hotels and Restaurants	1,723	483.99	737	5	2,949
Post and Telecommunications	132	11.80	14	0	158
Real Estate Activities	117	9.45	32	0	159
Computer and Related Activities	177	18.03	30	0	224
Research and Development	48	2.10	30	0	80
Other Business Activities	349	74.80	120	0	544
Recreational, Cultural and Sporting Activities	191	31.68	89	0	312
Other Service Activities	157	105.68	139	1	403
Central Government (OPW)	123	99.01	247	1	471
Health	467	932.72	2,330	10	3,740
Higher and Further Education	229	157.56	394	2	782
Secondary Education	76	426.28	1,065	4	1,572
Primary Education	30	299.33	748	3	1,080
Education Private	28	88.31	221	1	338
Defence	104	171.69	429	2	707
Garda Stn (OPW) + Prisons	26	42.92	107	0	177
Local Authorities	204	118.68	297	1	621
State Bodies C&NC	236	139.79	349	1	727
Total Service Sector	7,001	3,384	8,455	35	18,875

4.2. Hotels

A detailed discussion on the data available on energy consumption in hotels is contained in Appendix 1. For the purpose of this exercise, the demand for hot water in hotels is assumed at 200 GWh per year, and the demand for space heating at 410 GWh/year.

Assuming that it is practical to install solar in all existing hotels and guest houses, there are over 1,300 sites which could potentially have a solar thermal system installed for hot water. The total estimated demand for hot water in hotels is 200 GWh/year. Assuming that 50% of this could technically be supplied by solar thermal systems a total area of 250,000 m^2 of solar panels would be required.

For heat pumps the market is primarily in smaller new build hotels. The rate of hotel building is not currently available. As an estimate it is considered that 1% of the overall heat demand could be supplied by heat pumps.

4.3. Health

The health sector is the largest sub-sector in terms of energy consumption. An estimated 3,740 GWh of energy was used in the health sector in 2002. Of this, 2,778 GWh was used for space heating and 488 GWh was used for hot water.

There are 53 acute hospitals, 14 non-acute hospitals and over 440 private nursing homes[6] in Ireland. There are over 24,000 non-acute care beds for older people comprising 11,400 Health Board beds and 12,600 private beds[7]. This would indicate that, assuming HSE operated nursing homes have the same number of beds per facility on average, there are about 800 nursing homes in Ireland.

The remainder of the health sector comprises smaller sites which would have a lower potential for solar thermal or heat pump systems.

The top 55 sites in the health sector are assumed to be hospitals and have a total consumption of 795 GWh per annum (comprising 590 GWh space heating and 104 GWh hot water). The next 800 are assumed to be nursing homes and have an estimated energy consumption of 1,385 GWh per annum (comprising 1,028 GWh space heating and 180 GWh hot water).

Assuming that the market for heat pumps in hospitals is minimal due to constraints on size and difficulties in retrofitting, the principal market for RE Heat appliances in the health sub-sector is then solar in hospitals and nursing homes and heat pumps in new nursing homes.

4.4. Recreation and Sport

This sub-sector includes gyms, leisure centres, swimming pools and sports clubs.

The total estimated energy demand is 312 GWh/year including 131 GWh for space heating and 27 GWh for hot water.

If 50% of the 27 GWh/year demand for hot water in the recreation and sport sector were to be supplied by solar thermal systems 33,000 m^2 of solar panels would be required.

For heat pumps the market is primarily in leisure centres with swimming pools. There are 100 hotels with swimming pools, and c. 600 leisure facilities in total[8]. Assuming an average surface area of 100 m^2 per pool and a heat demand of 5,200 kWh/m^2/year the total demand per pool is 0.5 GWh/year. A rough estimate of heat demand in swimming pools is then 100 GWh/year. Assuming that 20% of this can be supplied by heat pumps, the potential output from heat pumps is 20 GWh/year.

[6] www.hse.ie
[7] Review of the Nursing Home Subvention Scheme, DOHC, 2002
[8] Institute of Leisure and Amenity Management

Table 3 – Typical energy consumption in leisure centres (kWh/m2/year)

Type	Good practice— fossil fuel	Good practice— electricity	Typical— fossil fuel	Typical— electricity
25m Swimming pool centre	573	152	1336	237
Centre with leisure pool	573	164	1321	258
Combined centre	264	96	598	152
Swimming Pool Surface only	3500		5200	

4.5. Education

There are 3,328 First Level, 763 Second Level and 59 third level institutions in Ireland[9]. The demand for hot water in these sub-sectors was estimated at 72 GWh/year, 104 GWh and 34 GWh respectively. There is a large potential to provide the hot water demand with solar thermal in these buildings.

Assuming that 50% of the estimated hot water demand was met by solar the total installed solar capacity would be 90,000 m^2, 139,000 m^2 and 29,000 m^2 in primary, secondary and tertiary education respectively. This would equate to an average solar thermal area per site of 27 m^2, 170 m^2 and 500 m^2 for primary, secondary and tertiary respectively. In secondary and tertiary institutions the installed area will be likely to be constrained by available area.

Assuming that the available area for solar is 25m^2, 50 m^2 and 100 m^2 in primary, secondary and tertiary education facilities, the potential market for solar is 125,000 m^2 in the education sector.

The market for heat pumps would be in smaller, new build schools. The number of primary and secondary level schools reduced from 1994 to 2004 and while some old schools will have been replaced by new schools this would indicate that the rate of building new schools is not high and that the market for heat pumps is low.

4.6. Defence

The defence sub-sector has an estimated energy consumption of 700 GWh per annum including a demand of 530 GWh for space heating and 57 GWh for hot water. However, as these estimates are disaggregated based on transposing UK sectoral demands it is considered that it is an overestimate of consumption in Ireland.

In 2002, the estimated energy spend in the defence forces was €4m for electricity, €1.5m for gas and €1m for oil. Using 2002 fuel price data the estimated fuel use is then c. 100 GWh per annum. The estimated use is 90 GWh for space heating and 10 GWh for hot water.

The Defence Forces are currently engaged with SEI through the Enhanced Agreements Programme for SMEs.

[9] www.cso.ie

4.7. Local Authorities

Local Authorities have an estimated energy consumption of 620 GWh per annum including a demand of 370 GWh for space heating and 21 GWh for hot water.

4.8. Offices

Energy use in offices is not specifically extracted or reported. However assuming that the category of 'other business activities' comprise energy use in offices, the total consumption is estimated at 544 GWh/year including 250 GWh for space heating, 16 GWh for hot water and 58 GWh for cooling. The market for solar in offices will be limited due to the low hot water demand, however, there may be a greater market for heat pumps for heating and cooling as air conditioning systems will be installed.

Dublin is the principal location for new office developments in Ireland. 230,000 m^2 of office space was built in Dublin 2006 compared to 90,000 m^2 in 2004. Taking a broad assumption of 200,000 m^2 of office space with an average area of 4,000 m^2[10] this would equate to 50 new developments per year.

[10] This was the average area of new offices in 2005.

Table 4 – Summary of Market Analysis

Sector	Solar Thermal						Heat Pump	
	HW Demand (GWh/year)	50% of HW Demand (GWh/year)[1]	Number of sites	m^2/site	Feasible m^2/site[2]	Adjusted Potential for Solar(m^2)	Space Heat Demand (GWh/year)	Heat Pump Potential (GWh/year)
Hotels	200	100	1400	179	179	250,000	410	4.1[3]
Health								
Hospitals	104	52	50	2600	300	15,000	590	5.9[3]
Nursing Homes	180	90	800	281	100	80,000	1028	10.3[3]
Recreation and Sport	27	13.5	2500	14	14	33,750	131	100[4]
Education	199	99.5	4150	60	30	124,500	2831	28.3[3]
Defence	57	28.5	30	2375	500	15,000	530	5.3[3]
Local Authority	21	10.5	-	-	50	26,250	372	3.72[3]
Central Government (OPW)	35	17.5	200	219	219	43,750	318	3.18[3]
Office	16	8				5,000[5]	250	12.5[6]
Total estimated market						**588,250 m^2**		**173.3 GWh**
Total estimated market value (€ M)						**€294 M**		**€148 M[7]**

Notes:

1) Assumed technical limit of 40% of hot water demand
2) Where the hot water demand exceeds the available solar resource based on area an assumed limit on available area is made. This is particularly relevant for the health sector which has a very large hot water demand.
3) The market for heat pumps is primarily in smaller new build premises. An arbitrary assumption of 1% of total space heat demand in the sector is assumed to represent these sites.
4) This is the total estimated demand for heating in swimming pools. This market is suitable for retrofitting heat pumps and is a large potential market.
5) Due to the low hot water demand in most offices it is assumed that 25% of the potential demand for hot water from solar can feasibly be realised.
6) Due to the additional drivers for heat pumps in the commercial office sector a 5% potential for heat pumps has been assumed for this sector.
7) Heat pump market value is estimated based on an installation cost of €1,500 per kW and an average utilisation factor of 20%.

5. RE Heat Market Capacity

At present the supply and demand chain for RE Heating in the commercial sector is developing from a very low initial base. It is likely that the commercial markets will be served by the more established suppliers of RE Heat systems to the domestic sector in the first instance. It is possible that the initial penetration of these technologies will be constrained by capacity constraints in the supply and installation of the technologies rather than the demand for the technologies. Indeed, the availability of qualified personnel was raised by some technology suppliers as the principal constraint to growing their business.

A process of consultation with the major suppliers and installers of RE Heat technologies was carried out to appraise their readiness for the development of a new market in the commercial sector, their view of the market and appropriate technologies, their capacity to supply the market and their estimated activity level for 2007 where appropriate.

6. Industry Consultation

6.1. Solaris

Technology	Solar. (Solar Air product specifically tailored for SMEs).
Markets Identified	Public Sector, Hotels, Leisure Centres, general commercial buildings with a hot water demand.
Aware of RE Heat	No
No. Installed	2 x solar installations in combination with geothermal in Motor Tax Office and Texaco Office.
Typical Cost	Varies according to the site Has priced 400 m^2 solar for a leisure centre @ €200k
Assessment of market	No concrete predictions. They have noted a significant increase in enquiries for commercial installations over the past 6 months. Believes there is a 'massive market' in hotels.

6.2. Shamrock Solar

Technology	Solar.
Markets Identified	GAA Clubs, Golf Clubs, Local Authorities..
Aware of RE Heat	No
No. Installed	None to date.
Typical Cost	Varies according to the site – no examples
Assessment of market	They are largely involved in the domestic sector but would be interested in expanding into the commercial sector in future.

6.3. Precision Heating

Technology	Solar, Heat Pump (ground source), Wood Pellet.
Markets Identified	Leisure Centres, Hotels, Offices, OPW, swimming pools for solar. Swimming pools are ideal for heat pumps.
Aware of RE Heat	Yes – waiting to see what happened
No. Installed	1,500 m^2 of solar installed in commercial sites in 2006.
Typical Cost	*Solar* 45 m^2 of solar in Charlotte Quay costed at €21k. 108 m^2 of solar in a swimming pool in Clondalkin costed at €55k. *Heat Pump* The cost is a barrier and is largely composed of borehole costs. The cost for boreholes for a 100 kW heat pump is over €50k.
Assessment of market	*Solar* Large market potential. Consulting engineers and architects are key to accessing the market. Can double 1,500 m^2 to 3,000 m^2 in 2007. The new Part L and the requirement to assess alternative energy sources will be a significant driver. *Heat Pump* The market may be limited by practicality of installing collectors and the large number and area of boreholes. The industrial market will be limited by the maximum return temperature (24 ^oC) and flow temperature (53 ^oC). .

6.4. Heatlink

Technology	Solar, Heat Pump (ground source).
Markets Identified	'Commercial Market is Huge'. Nursing homes mentioned in particular.
Aware of RE Heat	No
No. Installed	Heat pump in a nursing home in Portumna.
Typical Cost	No information.
Assessment of market	Heatlink are specifically targeting the commercial sector in 2007. They see heat pumps as being competitive with biomass due to ease of use and fuel supply/storage issues with biomass. They recently organised an event for architects and consulting engineers in the Ramada hotel in conjunction with ActionRenewables. The event was very well attended and has generated a high level of interest. They are targeting €0.5million sales in the commercial sector in 2007.

6.5. Pure Energy Technology

Technology	Solar, Heat Pump (ground source).
Markets Identified	Hotels are a large market. Leisure centres and nursing homes are also a market.
Aware of RE Heat	No
No. Installed	Have had a couple of large solar projects that fell through.
Typical Cost	Solar is about €500/kW installed, but in retrofit application may be higher due to roofing modifications and integration costs. There are limited economies of scale for heat pumps as they must necessarily be vertical borehole collectors. There are some economies of scale for air source heat pumps.
Assessment of market	They are reluctant to spend time and resources designing, specifying and costing installations ad think that support for feasibility studies is key. They are targeting 6-12 commercial installations in 2007.

6.6. Energy Master

Technology	Heat Pump (air source), Solar. (Energy Master have an air to water heat pump up to 2MW with a COP of 3.9)
Markets Identified	Creche, nursing home.
Aware of RE Heat	No
No. Installed	None.
Typical Cost	A 800 kW Air source heat pump for a 110 bed hotel was costed at €600k.
Assessment of market	Aiming for 10 commercial projects in 2007. They see heat pumps as an alternative to biomass which is less popular due to fuel supply issues.

6.7. Universal Solar

Technology	Solar and Biomass
Markets Identified	Hotels, nursing home. New schools – Department of Education.
Aware of RE Heat	Yes – engaged with SEI.
No. Installed	None.
Typical Cost	No indication.
Assessment of market	No Specifics.

6.8. Dunstar

Technology	Heat Pump (ground source).
Markets Identified	Creche, nursing home, leisure centre (c 100 kW – 200 kW) Are costing and quoting for 5 large commercial sites on the Liffey Quays at present ranging from 200 kW – 1,000 kW.
Aware of RE Heat	No
No. Installed	Limited at present but €1million of commercial tied up.
Typical Cost	Water to Water - €1,000/kW Vertical Bore - €1,400-1,500/kW. There are no economies of scale due to borehole costs.
Assessment of market	They have 8-9 on the books and another 5 in thepipeline. There are over 100 commercial enquiries in their system. They are targeting €2-3 million per annum.

6.9. HeatMerchants

Technology	Solar, Heat Pump (ground source), biomass.
Markets Identified	Hotels, OPW, hospitals, new build commercial. Hotels are ideal for solar due to high HW demand in the summer.
Aware of RE Heat	No
No. Installed	Focused on domestic sector. Are tendering for 15 hospitals at present.
Typical Cost	100 kW heat pump - €130k 200 kW heat pump - €240k There are no economies of scale due to borehole costs.
Assessment of market	Receiving an increasing number of enquiries for commercial installations. No specific assessment.

6.10. Unipipe

Technology	Heat Pump (ground source and air source).
Markets Identified	Guest houses, nursing homes, gyms, schools. Some offices.
Aware of RE Heat	No
No. Installed	Estimates 30 in 2006 Examples; equestrian centre, JP McManus's house, hotel with nearby river.
Typical Cost	Variable
Assessment of market	Receiving an increasing number of enquiries for commercial installations. 30 + in 2007.. Biggest bottleneck is installer resources which will be shared with the domestic sector. Availability of drillers is also a bottleneck.

6.11. Dimpco

David McConnell was not aware of the expansion of the BioHeat programme and could not appraise the technologies or the market. He will consider and revert with some input.

7. Summary of Consultation Responses

- The existing level of concrete activity and number of installations is low, with a couple of exceptions: Precision Heating for Solar and Dunstar for Heat Pumps.
- The majority of suppliers intend to target the commercial sector in 2007 and many have ambitious targets.
- The level of awareness of the plan to extend the BioHeat Programme is low.
- The majority of suppliers reported an increased interest in, and number of enquiries from, the commercial sector.
- The typical range of markets was reported with a strong emphasis on hotels, where solar is especially suitable. Other markets include crèches, nursing homes, swimming pools and leisure centres. Public sector buildings – schools and OPW buildings are also a candidate market, as are commercial buildings in general.
- There was a consensus that GSHP costs do not decrease with size due to borehole costs. The cost estimate ranged from €1,200/kW to €1,500/kW.
- Air source heat pumps are not so constrained. The estimated cost from one supplier was €750/kW. Economies of scale will apply but were not quantified.
- Solar installation costs were c. €500/kW where given. Some economies of scale apply but installation costs are site specific. Costs are lower in new build than retrofit.
- The total predicted installation for ’07, where given is estimated at €4.7M.

Table 5 – Summary of Industry Feedback

	Supplier										Summary
	Solaris	Shamrock Solar	Precision Heating	Heatlink	PET	Energy Master	Universal Solar	Dunstar	Unipipe	Heat Merchants	
Aware of RE Heat	No	No	Yes	No	No	No	Yes	No	No	No	-
Technology	Solar	Solar	All	Solar, HP	Solar, HP	Solar, ASHP	Solar, Biomass	GSHP, WSHP	ASHP, GSHP	All	-
No. Installations	2	-	1,500 m^2 solar	1	-	-	-	9 on books	Est. 30	-	-
Cost	400m^2 = €200k €500/m^2	-	Solar 45m^2 = €21k 108m^2 = €55k c. €500/m^2 HP (bore) €50k for 100 kW	-	Solar: €500/kW	800 kW ASHP = €600k	-	WSHP: €1,000/kW GSHP: €1,400-€1,500/kW	-	GSHP 100 kW = €130k 200kW=€240k	Solar: €500/m^2 GSHP: €1,300-1,500/kW ASHP: €800/kW WSHP: €1,000/kW
Specific Market	General	GAA/LAs	General	General	General	Creche, nursing home	Hotels, nursing homes	General	Guest houses, gyms, nursing homes, schools	Hotels, OPW, hospitals, new commercial	-
'07 Target Solar	No specific	No specific	3,000 m^2 est €1.5M	€0.5M	6-12 installation est €750k	10 installation est €1M	No specific	No specific		No specific	€2.6M
'07 Target HP	No specific	No specific	No specific				No specific	€1M '07 €2-3M/yr	30 +	No specific	€4.3M

Appendix 1 - Energy Consumption in Hotels

The energy consumption in hotels in 1999, reported in the 2005 Services Report, was 55 ktoe (640 MWh comprising 210 MWh electrical and 430 MWh fuel). Based on increased energy consumption in the services sector of 34% from 1999 to 2005, the estimated energy consumption in hotels is 74 ktoe (855 GWh/year); comprising 200 GWh of oil, 375 GWh of gas and 280 GWh of electricity.

Table – Hotels by category and Typical Energy Consumption[11]

Categories Per Room Size	IHF Membership	Estimate of non IHF Hotels	Total Hotels & Guesthouses	Cumulative Number of Hotels	Average number of rooms per category	Rooms per category	Cumulative Rooms	Typical Electricity Consumption	Typical Thermal Consumption	Estimated Electricity kWh	Estimated Thermal kWh
					Rooms	Rooms	Rooms	kWh/room	kWh/room	kWh	kWh
>151	38		38	38	211.2	8025	8025	9915	23325	79,569,660	187,182,630
100-150	56		56	94	120.2	6733	14758	9915	23325	66,759,193	157,046,810
71-100	79		79	173	86.2	6812	21570	7699	19277	52,447,771	131,313,620
51-70	83		83	256	61.8	5129	26699	7699	19277	39,489,815	98,870,751
41-50	54		54	310	46.6	2516	29215	5975	16356	15,033,307	41,151,897
31-40	59		59	369	36.4	2150	31365	5975	16356	12,846,427	35,165,572
21-30	101	108	209	578	32.6	6823	38188	5975	16356	40,767,987	111,597,534
10-20	172	108	280	858	19.0	5320	43508	5975	16356	31,787,438	87,014,345
Guesthouses	283	203	486	1344	11.0	5357	48865	5975	16356	32,008,516	87,619,520
Total	**925**	**419**	**1344**			**48865**				**370,710,114**	**936,962,679**

The table above contains the number of hotels and breakdown by size based on data obtained by SEI from the Irish Hotels Federation in 2004. Applying standard energy consumption data for hotels the estimated TFC in hotels is 371 GWh/year electrical and 937 GWh/year thermal.

The data from the 1999 survey and the data based on the number of hotels and the typical energy consumption in hotels accord reasonably well although the estimates based on the number of hotels exceed the 1999 ASI based estimates by about 50%.

The estimated range of demand for thermal energy in the hotels sub-sector is 575-937 GWh/year. In the BRE study, hotel and restaurants are aggregated into a single sector with a total energy consumption of 2,949 GWh/year. The largest 780 enterprises in this sector are estimated to have an energy consumption of 1,393 GWh/year.

It would appear that the energy consumption in hotels reported in the services sector report is lower than other estimates. This may be due to a more limiting definition, and a smaller number, of hotels assumed for the purposes of the report. However, there was not sufficient information available to resolve the discrepancies in the estimates.

[11] Based on energy consumption data in Action Energy's ECG 36 – Energy Efficiency in Hotels. This table has been copied from data processed by Alan O'Hanlon & Patrick Liddy of SEI.