RENEWABLE FACT SHEET
AIR SOURCE HEAT PUMPS

JHWalter
SUSTAINABLE RESOURCE MANAGEMENT

What are Air Source Heat Pumps?

Air Source Heat Pumps take energy from the air and raise it to a higher temperature, using a process which is similar to reverse refrigeration. They are similar to ground source heat pumps in terms of technology, but abstract the heat from ambient air as opposed to ground heat. With the ambient temperature as low as -15 ℃, the system will still operate efficiently. The heat generated can be distributed either through water systems (radiators etc) or by circulating warm air. These systems can also be reversed to help cool spaces in periods of hot weather.

How does it work?

This is a system which utilises no external pipes and most of the working elements reside within the building. The air handling unit draws air across a water-anti freeze solution and transfers this energy into the refrigerant. The refrigerant boils and the gases produced are compressed to create temperatures in excess of 100℃.

Electricity is required to power the pump that circulates the air/water. The more efficient a system the more heat will be obtained from same amount of electricity. The efficiency of an air source heat pump is measured using a factor known as the coefficient of performance (COP). Commonly air source heat pumps achieve a 1:3 coefficient although technological improvements are now achieving better results with some pumps quoted at 1:5. i.e. the system is 500% efficient! This can be compared with a gas or oil boiler's efficiency of only 90%.

Where will it work?

These pumps will work in both domestic and commercial situations. For commercial and large spaces a bank of Air Source Heat Pumps (Air Handling Units) may be required along with internal heat pump and pressurised hot water tank for ongoing water usage.

Air Source Heat Pumps can be used in many applications including large commercial projects where land space is restricted. They can be used as a complete solution for room heating using the same distribution system as a ground source heat pump or a traditional system. Air Sourced Heat Pumps are ideal for very tight spaces (e.g. an eco architectural design) or within the design of a building which has large internal spaces such as audience halls and public places

The pumps work best with under-floor or warm air heating systems, and in houses which have good insulation. Consequently before installing such systems in existing structures, upgrading of insulation and draught proofing must be considered.

Radiators with Heat Pumps

Whilst radiators can be used with heat pumps, efficiency is lost as the heat pump operating temperatures are lower than that generated by oil or gas boilers. Commonly wet heating systems use the following water temperatures:

Underfloor heating	30-45
Low temperature radiators	45-55
Conventional radiators	60-90
Air	30-50

Air source heat systems may not be suitable for direct replacement of conventional water-based central heating systems as a wet radiator system usually operates at 60°C to 90°C and a drop in circulating temperature by 20°C would require an increase in emitter surface of 30% to 40% to maintain the same heat output. Measures to improve the thermal efficiency of a building can help e.g. extensive insulation. Ongoing development of low temperature radiator technology means that outputs could be improved which will assist in dealing with first floor heating.

Regulations

The installation of Air Source Heat Pumps will have to comply with Building Regulations, and be installed by an approved installer. Planning permission is not normally required for domestic installations, although Listed Building Consent and or Conservation Area Consent will be required if applicable.

Income/Savings

Savings against existing systems depend on fuel systems being replaced. However compared to oil savings can be in the order of £580 per annum compared to oil (*Energy Savings Trust).* Clearly the size, construction and thermal efficiency of the building will also have a major impact on savings.

Renewable Heat Incentive

The scheme, to be introduced on 1st April 2011 provides for payments not dissimilar to FITs (Feed-in Tariffs) for electricity. The scheme will create a significant shift in the cost/benefit of smaller scale schemes with additional income now being generated from green power generation. Examples of proposed tariffs are shown below. For the smaller and medium installations (up to 350kW) the tariff will be paid on the deemed amount of heat that is used rather than using metering. For more information see the RHI Fact Sheet.

Table of RHI tariff Technology	Scale	Proposed tariff (p/kWh)	Years
Air source	≤45kW	7.5	18
Air source	45- 350kW	2	20

Capital Costs

The cost of installing an air source heat system for a domestic dwelling can be in the order of £7,000 to £10,000.

Grants

Grants for domestic installations are available through the Low Carbons Building Programme. In some situations grant may be available through the Rural Development Programme for England (RDPE)

** Photograph by kind permission of Nu-Heat UK Ltd

JHWalter
SUSTAINABLE RESOURCE MANAGEMENT

Scoping Feasibility Project Management Planning
Environmental Compliance Design Funding Delivery

David Wright
01522 504321
07919 694228
davidwright@jhwalter.co.uk

Henry Leivers
01522 504315
07738 421391
henryleivers@jhwalter.co.uk

Steve Catney
01522 504330
07919 694229
stevecatney@jhwalter.co.uk