Why Renewable Energy?

Renewable energy makes sense, why continue to use fuel which cannot be renewed when it is possible to either replace this fuel or supplement it with energies that are renewed again and again and again?

People generally implement renewable energy for one of three reasons:
they want to reduce their increasing fuel costs, either domestically or commercially
they are required to implement renewable technology as part current building regulations
they want to do their bit to lower co2 emissions

What is Solar Thermal?

Solar thermal is the harvesting of heat from the sun and storing it as hot water to be used for washing and bathing.

There are a number of different collector systems and the type you install will depend upon the site that you wish to use them for.

Solar energy is made up of both visible and infrared radiation, with a very small amount of ultraviolet radiation. Solar panels make use of all this radiation.

Solar thermal energy is far more efficient than solar PV (photovoltaic for electricity), since the process is simply a storing of the heat harvested by the panels. A panel array of around 3m2 will generally provide up to 70% of the average household's hot water requirement (PV will require a 10m2 array to provide around 30% of the same household's electricity requirement).

Solar thermal is suitable for both commercial and domestic projects and there are many different types of solar collector, one of which will normally be suitable for your unique location. Panels can be roof mounted as a retro fit to existing buildings or integrated into the structure of the roof on both new build and existing buildings.

What is Wind Power?

The oldest form of renewable energy on the planet, wind power has been harvested for over 2,000 years.

The implications of the wide-scale take up of wind power cannot be underestimated, wind has the potential to meet a large proportion of our energy demand for future generations. Throughout Europe, a greater emphasis is being placed on the development of wind power then other renewable energies. Wind power also has major pluses for micro-generation.

Wind turbines create electricity by utilising the movement of air against aerodynamic blades which are faced towards the wind. Lift forces cause the blades to turn which rotate, turning a shaft attached to a generator - this is what produces the electricity. Control mechanisms within the turbine allow the turbine head to turn and rotate at different speeds depending upon the strength and direction of wind. If wind strength becomes too high the turbines have an override which shuts them down.

There are various size of turbine, from those utilised on smaller stand alone site, to the large offshore wind farms. Domestic turbines are also available which are designed to bolt onto the side of a house. In order to specify the correct size for your needs, it is important to undertake a thorough analysis of your usage. When we undertake this for you, we will also consider seasonal variances in demand.

Smaller turbines generate DC (direct current electricity) therefore an inverter is required to produce AC (alternating current) for electrical appliances. If it is an off-grid system then batteries will also be required to store the energy.

What are Photovoltaics (PV)?

Photovoltaics convert light into electricity, without getting too technical the process utilises semi-conducting materials like silicon.

When exposed to light, these semi-conductors release electrons, creating an electric field across 2 or more layers of semi-conductor thereby creating an electric current.

There are different types of photovoltaic cell, which range in efficiency - of course this is a technology in continuous development and as such, more efficient cells will be launched - these are currently the most common:
the most efficient at around 15% are monocrystalline cells. These are very fine slices cut from a single silicon crystal.

Polycrystalline cells have an efficiency of around 13% and are fine slices cut from a block of silicone crystals.

Least efficient at around 7% and the amorphous cells - these are constructed of a fine layer of silicon atoms which are then bonded to a glass or metal base. They tend to be used for smaller scale application (calculators for example).

Modern PV cells do not require direct sunlight and will work in normal daylight conditions. However, because photovoltaic cells have poor conversion efficiencies at the moment it will generally require a panel array of around 10m2 to make up approximately 30% of the average household electricity requirements over the course of a year. In terms of commercial projects, we generally look at the annual demand and aim to meet a solar fraction of this demand.

Panels can be roof mounted or integrated into the structure of the roof, and it is even possible to use PV cells which look like slates, this is important since it is generally a large amount of roof space which needs to be utilised.

What are Ground Source Heat Pumps?

A way of extracting heat from the ground and then pumping it into a building to provide space heating (and heating for domestic hot water usage).

It is also possible to reverse the process thereby providing cooling in the summer. The technology is essentially the same as that used in refrigeration.

The ground at a certain depth maintains a fairly consistent temperature of between 11 - 13c, a ground source heat pump extracts this heat and transfers it where required.

There are two approaches, the first is to lay the ground loop horizontally at a depth of approximately 2 metres, this is covered in and the heat extracted. This is generally the cheapest option but does require quite a lot of land in order to be efficient. In commercial premises, car-parks can be a good option.

The second approach is via a bore hole, which may go down as far as 150 metres, this is more expensive, but requires less ground area and also extracts a higher temperature.

The heat pump in each case works by promoting evaporation and condensation. This is moves heat to where it is required, a heat exchanger then transfers the heat from the anti-

freeze / water mix in the ground loop. A compressor is used to raise the temperature at which the ground loop liquid condenses (around 40c) and provides heat to hot water storage for distribution.

The ideal application is underfloor heating as this requires temperatures of between 30 - 40c, whereas central heating needs temperatures of up to 80c.

Sizing of the system needs to be accurate to ensure that demand is correctly met, it is possible to meet 100% of the space heating requirements. This should be done in conjunction with other energy saving measures and is something that we would be delighted to discuss with you in more detail.

What is Biomass?

Biomass is generally woody materials from plants or trees which is then burnt to provide heat. The material can come in pellet form or as the traditional log.

The biomass burners come in all shapes and sizes (and budgets!), ranging from the traditional multi-fuel boiler to commercial burners with commercial applications. Efficiency is pretty good, with the traditional stove burning at 75%, the newer ceramic wood pellet burners offer impressive levels of up to 95%.

Burners can be independent, that is heating just the room they are located in, or they can be connected to your hot water storage / central heating to provide hot water for space heating and washing and bathing.

How can burning biomass be eco-friendly? It's a question of the sourcing, provided that the material comes from a sustainably managed source, then the process is pretty much zero-carbon. It is important to try and source a local suppler as well in order to cut down on the transportation impact.

If you are fortunate enough to have land, then it is possible to source your biomass needs from your own property. Coppicing, for example, is one way of doing this sustainably.

Sunwoven

Many thanks to Simon Sharp at Sunwoven for supplying this article:

Sunwoven is a renewable energy consultancy, we only specify what will work, what will meet your needs and what you can afford.

Whether you just want to use us a consultancy to assess potential and advise accordingly, or whether you'd like us to manage the whole process from initial specification right through to final installation, we have the expertise and experience to make sure that it all happens with the minimum of fuss and the maximum quality.

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