

GCE LEVEL

FACT FILE

## Environmental Technology

For first teaching from September 2013

For first award in Summer 2014

**Microgeneration – the  
small scale generation  
of heat and power**



environmental  
technology

## Microgeneration – the small scale generation of heat and power



### Specification Content

#### Students should be able to:

- define microgeneration as the small scale generation of heat and power;
- list the main sources of microgeneration in microelectricity technologies (solar PV, wind), and microheat technologies (solar thermal, ground source heat pumps, biomass);
- identify the main benefits of home/community microgeneration, including reduced energy costs, contribution to environmental targets, enhanced security of supply and financial incentives;



### Course Content

#### Microgeneration

The term **microgeneration** generally refers to the small-scale generation of heat and electrical power by individuals, communities and small businesses to meet their own needs, as alternatives or as additional source of supply to traditional macrogenerated power. This can be motivated by practical considerations, such as unreliability of supply or location providing difficulty in connecting to the grid supply. However, the term is used currently for both an environmentally conscious alternative which aspires to the lowering of a carbon footprint and for personal economic benefit. It is not to be confused with micropower as it is primarily concerned with fixed power supplies rather than mobile ones.

#### Sources of microgeneration

Microgeneration sources can be classified into two groups – those which generate **electricity** and those which are used to generate **heat**.

Sources of electricity;

- Solar PV
- Wind

Sources of heat

- Solar thermal
- Ground source heat pumps
- biomass

Using microgeneration techniques involves the purchase and set up of equipment at the location e.g. family house or community resource. Electrical energy generated by the equipment can then be used in the home to supplement or replace that derived from national sources. The user can also supply excess energy to the national system so receiving a financial return in addition to that saved. Solar panels and wind generators can be used in this way when fitted to a domestic or community resource.



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Microgeneration of heat involves the use of:

- Solar panels which convert heat from the sun's rays into heat which can then be used e.g in domestic hot water supply.



- Ground source heat pumps which use heat from underneath the earth's surface to provide a source of domestic hot water.



- For additional information see <http://www.energysavingtrust.org.uk/Generating-energy/Choosing-a-renewable-technology/Ground-source-heat-pumps?gclid=CPW26oftvrcCFVDJtAodnS0Alw#how>



<http://www.which.co.uk/energy/creating-an-energy-saving-home/guides/ground-source-heat-pumps-explained/>

- Biomass which involves the combustion of natural material e.g. wood to produce heat in the home. Agricultural waste can also be used to generate biogas that can be used for heating e.g. Bethlehem Abbey, Portglenone. (<http://dspace.dial.pipex.com/town/terrace/ae198/digesters.html#anchor1558768>)



## The main benefits of home/community microgeneration.

Main benefits of home/community microgeneration include:

- **reduced energy costs,**
  - Heat and electricity can both be generated in the same process at the point of use.
  - Some microgeneration systems can provide benefits all year round, reducing fuel bills and cutting carbon emissions, regardless of building orientation or weather.
- **contribution to environmental targets,**
  - Reduction in carbon emissions by using renewable energy sources rather than fossil fuels, helping to combat climate change.
  - Using renewable energy supplies does not deplete the Earth's resources.

- Energy generation efficiency is improved as more than 90% of the fuel is converted to energy, as opposed to traditional power stations which can waste over half of the fuel in transportation before it even reaches the consumer.
- **enhanced security of supply,**
  - Because the energy being used by the consumer is being generated at the point of use i.e the home or local community there is less likelihood of an interruption to supply being caused by inclement weather.
- **financial incentives;**
  - Microgeneration uses freely available resources such as the wind and the Sun, so overall energy costs can be vastly reduced.
  - The user is less likely to be affected by energy price fluctuations.
  - Many microgeneration technologies qualify for government grants. This means the consumer will receive a fixed payment for energy generated, and another fixed payment for any surplus energy exported back to the grid.



## Activity 1

Using information from <http://www.energysavingtrust.org.uk/Generating-energy/Choosing-a-renewable-technology> list the benefits of the following technologies-

Ground source heat pumps

Solar water heating

Wood fuelled heating

Solar panels (PV)

Wind turbines



## Activity 2

Use the internet to find out how a ground source heat pump works. Draw and label a diagram showing the main parts.

