

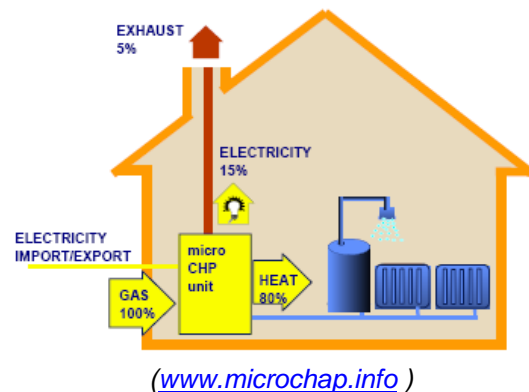
Micro CHP

MCHP or Micro Combined Heat and Power, is a unit available for installation within the home which could replace the existing conventional boiler. Like a boiler it provides heating and hot water, but also produces electricity, therefore saving energy. Essentially it is like having your own mini power station within the home. To be generating, the micro CHP needs to produce both heat and electricity so installing it in tandem with a thermal store will increase the efficiency and also ensure that heat is ready for use as and when required. The major benefits of using micro CHP is increased efficiency, and reduction in associated CO₂ emissions.

Basic working principles and construction

Micro Combined Heat and Power (CHP) also known as micro co-generation should not be thought of as simply just a scaled down version of conventional CHP systems used in large scale industrial applications and commercial buildings.

Natural gas is consumed in a Stirling engine (or other prime mover) to provide heat and electricity for use within the home. A total of around 70-80% (Gross Calorific Value) of the energy value of the gas is converted into heat, principally in the form of hot water which is used for space heating and domestic hot water as in a normal central heating system. Between 10-25% is converted into electricity, and the remainder (5-15%) is lost in the flue gases. This compares with a conventional 'A'-rated gas central heating boiler where c.a. 90% of the energy in the gas is converted into heat and the remaining 10% is lost in the flue gases.



The conversion of the heat into electricity is made using a small gas engine, utilising the Stirling cycle which drives an electrical generator. The waste heat is then used in the primary circuit to fulfil the house's heating requirements and the electricity is either used in the house if there is a demand or exported to the grid, for which the consumer will be paid by an electricity provider.

Thermal output will be lower than the boiler which it replaces, though this does not imply inadequate performance. Intelligent controls, with or without thermal buffering can significantly enhance the effective output although this leads to extended pre-heat periods. However this can improve comfort and it is thought that UK homes will begin to follow the European practice of having 'set back' as opposed to simple on/off controls.

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The micro CHP system could replace the existing household boiler, as the system is thermally led, i.e. responding to the house's heat requirement, with electricity produced as a by-product. This is significant as CHP generation is 'peak following', which means it will be in use primarily on cold winter days in the early morning and evening when grid demand is at its highest. Generally speaking at these times the UK electricity demand is met by coal fired power stations and open cycle gas turbines which are used to provide flexible load following capacity. Therefore micro CHP displaces carbon intensive generation well above the UK average generation carbon emissions, and also provides essentially free electricity at this expensive period.

Types of system

Micro CHP is available with on and off grid capabilities, the off grid system is designed to charge batteries in homes which are off grid, boats or other mobile applications. The on-grid micro CHP is used in the home, and operates as discussed above. The generators can be adapted to run on a variety of fuels including natural gas, diesel, kerosene, or LPG. Although in the home a connection to the gas network is most effective.

Size / noise

The size of the in-house micro CHP is approximately the same as a standard household dishwasher. The unit has to be installed at ground level not wall mounted as a traditional boiler. This tends to mean a good sized space is required, for example in a utility room. There are systems in development which may have the capability of being wall mounted.



(Whispergen Micro CHP)

During operation there is relatively little noise emitted from the generator, as the Stirling engine is a quiet method of electricity production; the noise level is comparable to and quieter than most other household equipment. It can be assumed that the noise level will be unobtrusive.

Suitability

Micro CHP does not respond well to rapid on/off cycling and the engine is designed to meet around 60% of the design peak load, therefore allowing maximisation of useful running hours under average winter conditions, this leads to the bulk of annual demand being met by the primary system. However in un-insulated housing or in severe weather a form of supplementary heating may be required and also to achieve rapid warm up when the house has been unoccupied for some time.

The expected market price of a micro CHP system will be in the region of £3000.

Environmental benefits

As micro CHP is thermally led, essentially making the electricity a by-product; no CO₂ is produced during its generation. The actual savings in CO₂, SO_x, and NO_x are dependant on the annual operating

hours and also the time of day generating (due to peak loads being produced by “dirty” sources i.e. coal).

Availability

Currently some micro CHP technologies have been on trial in the UK, however units are expected to be commercially available in early 2009.

Grants

Currently there are no grants available under the Low Carbon Buildings Programme due to the fact there are no accredited installers. However once appropriate standards have been developed grants will be made available see www.lowcarbonbuildings.org.uk for the latest information.

More Information

Installers

No accredited installers are currently available. Please refer to the Low Carbon Buildings Programme's approved installer list for grant-funded installations, This will be updated as and when installers become available. You can call them on 0800 9150990 or go to www.lowcarbonbuildings.org

Some installers operating in Cornwall:

No installers currently listed.

We advise that you obtain at least 2 comparable written quotes from different installers and check the VAT discount for renewable technologies has been applied. For more information on VAT discounts, please see:

http://customs.hmrc.gov.uk/channelsPortalWebApp/channelsPortalWebApp.portal?_nfpb=true&_pageLabel=pageVAT_ShowContent&id=HMCE_CL_000514&propertyType=document#downloadopt

Other information:

Cornwall Energy Efficiency Advice Centre

0800 512012

www.cep.org.uk

Energy Saving Trust

www.energysavingtrust.org.uk

Micro combined heat and power

www.microchap.info

Powergen – likely to be the first company to mass launch micro CHP systems

www.powergen.co.uk/At-Home/Products/Technology-And-Initiatives

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