Response to ECC Committee
3rd May 2016

HEATING & HOTWATER INDUSTRY COUNCIL

1. About HHIC

The Heating and Hotwater Industry Council (HHIC) are the leading representative body for the UK domestic heating and hot water industry, worth £3-4 billion per year. HHIC's membership base covers approximately 94 percent of heating and hot water solutions available in the UK. HHIC are a division of the Energy and Utilities Alliance (EUA).

2. Response

"Which innovations have the greatest potential to revolutionise energy markets, and why?"

Cogeneration – the simultaneous generation of electricity and useful heat – was first pioneered in Thomas Edison's Pearl Street Station in 1882. Despite this early proof of concept – and the obvious benefits - the concept of centralised cogeneration failed to gain much traction. However, in recent years cogeneration has experience something of a resurgence. Micro combined heat and power (micro-CHP) is an extension of this concept, whereby cogeneration occurs at a household level.

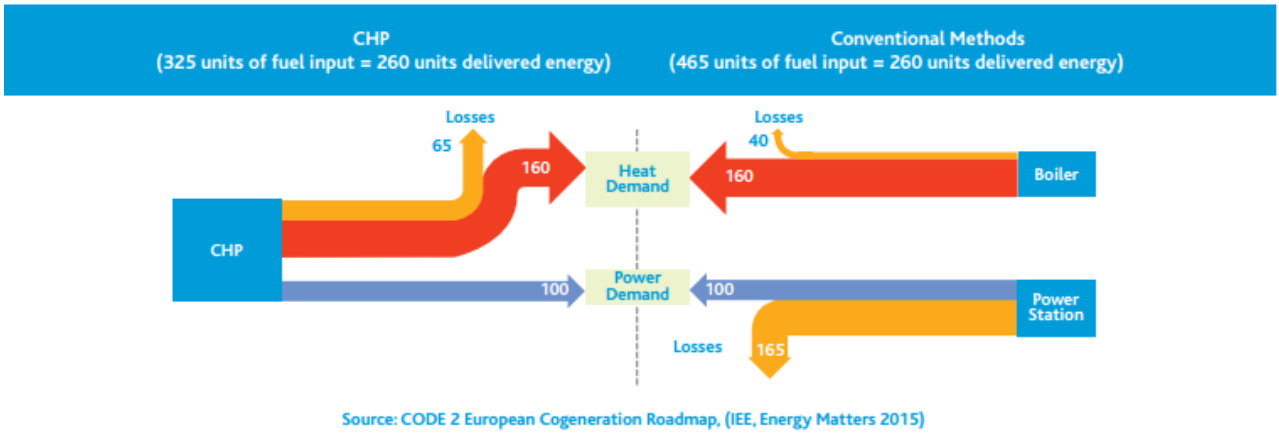
Micro-CHP is a general term for a wide variety of different technologies with a common characteristic. The units meet the space heating and hot water needs of buildings, while generating electricity, in order to replace or supplement demand for grid electricity. The majority of commercially available micro-CHP products are based on Stirling engine, Organic Rankine Cycle or internal combustion engine (ICE) technologies. In addition to this, new micro-CHP products using fuel cells and other technologies are nearing commercial reality. By enabling consumers to produce their own electricity, the widespread deployment of micro-CHP has the potential to revolutionise the UK energy market.

In light of the UK's long term carbon reduction commitments, the efficient use of primary energy is of the utmost importance. According to the Digest of UK Energy Statistics (DUKES), 30% of the UK's electricity in 2014 was generated in gas power stations, resulting in the supply of 87 TWh of electricity. In order to generate this electricity, 190 TWh of gas

Camden House, Warwick Road, Kenilworth, CV8 1TH
T: +44 (0)1926 513777 **F:** +44 (0)1926 511923
E: info@hhic.org.uk **W:** www.centralheating.co.uk

was used, implying an average efficiency of 46%. However, most commercially available micro-CHP devices operate at combined (heat and electricity) efficiency levels of at least 90%, meaning that natural gas can be used far more efficiently than if electricity is generated in a power station.

As also detailed in DUKES, total electricity supply in 2014 stood at 359 TWh. However, nearly 8% of this was lost in transmission and distribution, while a further 8% was used by the energy industry itself. The generation of electricity using micro-CHP devices results in no transmission and distribution losses. Coupled with high efficiencies, this means that the use of micro-CHP results in significant primary energy savings. Analysis conducted by Cogen Europe suggests that micro-CHP can achieve primary energy savings of more than 25%. This is illustrated in the figure below:



Source: CODE 2 European Cogeneration Roadmap, (IEE, Energy Matters 2015)

Discussions about the energy market often conflate “energy” with “electricity”. However, given that heat related activities account for nearly a third of all UK greenhouse gas emissions, it is vital that the use of energy in the heating sector is not ignored. The UK has the largest boiler market in Europe and is therefore well placed to take the lead in the widespread deployment of micro-CHP. Unlike some alternative heating technologies, the installation of micro-CHP would not require larger radiators to be fitted or the installation of sizeable external units. Stirling engine, Organic Rankine Cycle and ICE technologies are characterised by high heat-to-power ratios, making them well suited for the average UK home. Homeowners can use micro-CHP to meet their heating needs while also benefitting from the electricity that is generated. Given the high costs of grid electricity compared to natural gas, generating electricity on-site can result in significant bill savings for consumers.

Also, by offsetting their use of grid produced – and more carbon intensive - electricity, micro-CHP can enable customers to make significant inroads into their carbon footprints.

The majority of micro-CHP products are “heat led” – that is to say that the heat demand profile of the building determines when they are used. A key benefit of micro-CHP stems from the fact that aggregate peak demand of heat and power are fairly closely aligned. By generating electricity at a time when it is most needed by the electricity grid, micro CHP can increase the security of the electricity grid. Renewable electricity generation, in the form of wind and solar energy, is notoriously intermittent and inflexible. As a consequence, the widespread deployment of renewables requires either significant storage capacity or backup generation that will sit unused for much of the year. Micro-CHP is perfectly placed to provide this backup, since it is most used in the winter months when solar generation is at its lowest. The synergy between micro-CHP and renewable generation is in stark contrast to the additional pressures that electric heating would place on the energy system. Rather than increasing peak electrical demand, micro-CHP increases peak capacity. Not only does micro-CHP reduce primary energy usage, but it also enables a reduction of grid carbon intensity through its systemic benefits.

As well as permitting wider deployment of renewable electricity generation, micro-CHP technologies can be developed to utilise a variety of low carbon fuel sources. As with other natural gas technologies, it may transpire that decarbonising grid gas – through the use of biomethane, bio-SNG, hydrogen etc. – will be the most cost effective solution to the UK’s carbon reduction needs. In the short term, micro-CHP can enable the efficient use of fossil fuel gas, but will also be a key enabler of a transition towards low carbon gas in the long term.

Micro-CHP can also play a role in the much hyped “internet of things”. By aggregating multiple micro-CHP units, the technology could form an integral part of a “smart grid” which can be dispatched when needed by the grid. Large power plants often take several years to construct, whereas micro-CHP can be deployed much more quickly. This flexibility is yet another advantage of micro-CHP.

In conclusion, micro-CHP has the potential to revolutionise the energy market. It offers immediate benefits by enabling ultra-efficient use of primary energy, whilst reducing household energy bills and carbon emissions and providing stability and backup generation capacity to the electricity grid. Micro-CHP also has a vital role to play in the future energy

system. It is the perfect complement to renewable electricity generation and could be developed to generate renewable energy in its own right.

3. Contact Details

HHIC would be very pleased to discuss any of the issues raised in this submission. Please contact Graeme Reeves (graeme@eua.org.uk), Economist on 01926 513747.

HHIC
Camden House
Warwick Rd
Kenilworth
CV8 1TH