

SUBMISSION FROM COMBINED HEAT AND POWER

The Combined Heat and Power Association (CHPA) welcomes the opportunity to provide evidence to the Scottish Economy, Energy and Tourism Committee during its review of the Renewables Obligation (Scotland) Amendment Order 2013 [Draft].

Based on some of the comments made by stakeholders during the Committee's hearing on 6 March 2013, the CHPA thought it would be helpful to provide further information about combined heat and power (CHP is also referred to as Cogeneration by the European Commission) and the Renewables Obligation (Scotland).

The CHPA is the leading advocate of an integrated approach to delivering energy services using combined heat and power and district heating. The CHPA works to promote a greater awareness and understanding of CHP and district heating and to create a strong, dynamic and sustainable environment for its members and the communities, businesses and households they serve.

What is combined heat and power (CHP)?

Combined heat and power is the simultaneous generation of both heat and electricity in one highly efficient process, and is strongly supported by a wide range of organisations, including the CBI, Greenpeace and the International Energy Agency.¹

CHP contrasts with conventional ways of generating electricity, where a vast amount of heat is simply wasted via cooling towers and heat needs have to be met by boilers. In today's coal and gas fired power stations, up to two thirds of the overall energy consumed is lost as heat, often seen as a cloud of vapour rising from cooling towers.

CHP plant can run on a range of fuels, including bioenergy (biomass, bioliquids and biogas), energy from waste and fossil fuels. No matter which fuel is used, CHP represents the optimal use of that fuel.

CHP plant are most commonly used in industrial processes, where their energy efficiency helps users improve their competitiveness and reduce their carbon emissions. CHP is also commonly used on district heating schemes, and increasingly in the public sector, such as hospitals.

How combined heat and power saves energy

The CHPA believes some recent concerns raised about the efficiency levels of CHP plant have been caused by an essential misunderstanding of the benefits of combined heat and power.

Comparing CHP to separate generation of heat and power

The primary benefit of CHP is the reduction in fuel needed to produce a given quantity of heat and electricity. Put another way, it is the energy in comparison to the

¹ <http://www.iea.org/chp/>

separate generation of heat and electricity. **This saving, is the key metric for CHP and is known as the primary energy saving.**

The primary energy savings gained through combined heat and power's increased efficiency ensure that limited biofuels are used in the best possible way to reduce carbon and deliver maximum renewable energy from a given amount of fuel compared to separate heat and power production.

UK regulations are designed to ensure that CHP plant deliver 10% primary energy saving compared to the separate generation of heat and power. However, energy savings secured are typically greater than this minimum threshold.

Some commentators have observed that CHP plants have lower conversion efficiencies than boilers. Whilst true, this 'lower efficiency' still represents a better use of the fuel. The reason for this is the usefulness of the energy produced is of a higher quality in a CHP plant.

Electricity and heat are not interchangeable

Put simply, electricity and heat are not interchangeable forms of energy; whilst electricity can always be converted into heat, heat cannot always be converted into electricity. Electricity (and high temperature heat) can do more 'work' than low temperature heat, or as an economist would say, it has greater 'utility'. This principle is known as exergy.

In an industrial process using high temperature steam, there will always be a level of energy loss that is higher than in a system using hot water (such as a heat network). This fundamental law of physics is what has led to the current misunderstanding that CHP plants are somehow inefficient. It is for this reason that the best comparator for CHP is by making reference to the primary energy saving.

Therefore, while a boiler produces one output, heat, a CHP plant is able to meet both a necessary demand for renewable heat, as well as meet Scotland's demand for renewable electricity. If the same amount of high temperature heat and electricity generated by a CHP station were to be produced separately, from a biomass power plant and a biomass boiler, the result would be less efficiency, more biomass used and more carbon released. It is for this reason that Scottish policymakers are right to prefer CHP over separate generation.

Support for biomass CHP secures optimal biomass use for the Scottish economy. For example, the dedicated biomass CHP station currently under construction at the Tullis Russell paper mill will provide renewable heat and power and facilitate the competitiveness of this key industrial site. It is vital to note that this plant will produce high grade heat and electricity far more efficiently than separate generation.

Article 13(6) in the EU Renewable Energy Directive

Several references were made to the Committee about Article 13(6) in the EU Renewable Energy Directive. On closer inspection this Article refers specifically to building regulations and heating-only systems ("With respect to their building

regulations and codes ... ”).² Bioenergy efficiency is instead addressed in a subsequent report by the European Commission, which states that “Member States should in their support schemes for electricity, heating and cooling installations differentiate in favour of installations that achieve high energy conversion efficiencies, such as high-efficiency cogeneration plants”.³

It is important to note that, apart from CHP, neither Scotland nor the UK require minimum efficiency levels for renewable electricity production. The lack of efficiency requirements for renewable electricity plant serves in direct contrast with combined heat and power stations, which are required to meet minimum efficiency criteria under the CHP Quality Assurance (CHPQA) scheme.

CHP Quality Assurance (CHPQA) scheme for renewable CHP

The energy savings delivered by CHP are underpinned in law and through supporting regulations. This legal requirement, which must be met to qualify for most forms of public support, is enacted in the UK through the CHP Quality Assurance (CHPQA) programme.

The current aim of the CHPQA certification process for renewable CHP is to ensure all renewable CHP stations provide 10% primary energy savings. A CHP plant is required to show the CHPQA that over the previous year it has met these criteria in order for it to continue to receiving CHP-specific support.

Current DECC proposals under consultation will improve CHPQA’s design further, strengthening its ability to ensure that renewable CHP plant achieve the minimum primary energy savings. These proposals to improve the scheme design would apply to both new and existing CHP plant.

Exclusion of CHP from 15MW biomass cap

The Scottish Government recognised in its consultation, *Renewables Obligation Banding Review 2012-13*, the importance of excluding CHP from the biomass cap. This was also recognised by the UK Government in its response to its own consultation, *Biomass Electricity and CHP Plants – Ensuring Sustainability and Affordability*.

For a CHP plant to be excluded from the biomass cap, the Scottish Government will require the CHP plant to be accredited as ‘good quality’ by the CHPQA in its first year of operation. It cannot begin operating in its first year without CHPQA accreditation, and achieve the required energy savings, and avoid the biomass cap.

In addition, if a CHP plant loses its CHPQA accreditation for more than five one-year periods over the lifetime of the RO (20 years), it will lose its exclusion from the biomass cap and therefore lose all RO support.

² Article 13(6) begins “With respect to their building regulations and codes, Member States shall promote the use of renewable energy heating and cooling systems and equipment that achieve a significant reduction of energy consumption.”

³ Report from the Commission to the Council and the European Parliament on sustainability requirements for the use of solid and gaseous biomass sources in electricity, heating and cooling SEC(2010) 65 final SEC(2010) 66 final /* COM/2010/0011 final

The reason for allowing CHP plant to have a five one-year exclusion periods is that because a CHP plant's heat demand can fluctuate over the lifetime of a plant. Examples of market conditions which could cause this effect include if a heat customer reduced their heat use. The CHP plant would temporarily lose its CHPQA accreditation until it finds demand returns. In addition, in both industrial and district heating projects, variable heat output across the year often occurs.

Without the five one-year exclusions, a 20MW biomass CHP plant losing its heat load would then lose both the RO CHP 'uplift' and any the 1.5 ROCs for dedicated biomass power-only plant. Effectively the entire RO support could fall away should the heat load disappear due to external market forces. This would add significant risk for investment in CHP plant larger than 15MW, and would effectively cap any investment in CHP plant larger than 15MW.

Combined Heat and Power

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