Treatment of electrically-led micro-CHP in SAP

From Bruce Young, BRE, 31 January 2011

There is already in SAP a method of treatment for heat-led micro-CHP, which has been available since the SAP 2005 edition. Products are tested in accordance with BSI PAS-67 and the results are converted to annual energy and carbon emission figures by a SAP routine known as the Annual Performance Method. The product is regarded as heating plant installed to serve heating needs, and it has been made clear that this treatment is available only to products that comply with certain operating restrictions. The most important of the restrictions are that it should be grid-connected and controlled by heat demand from the building so as to ensure that neither electrical output nor heat are wasted.

In the case of electrically-led micro-CHP there may be no controls to ensure that heat is not wasted. If the product continues to operate in the absence of heat demand from the building it is behaving solely as an electrical generator, instead of as a generator and heater. Indeed, there may be products which do not make use of any of the heat they generate and which cannot properly be described as micro-CHP. The question for SAP is whether the performance of plant that is burning fuel for the purpose of generating electricity, but not supplying useful heat to the building, can be taken into account in the energy and emission ratings of the building.

In developing a method of treatment for electrically-led micro-CHP in SAP three alternative approaches have been identified as explained below. With nos. 1) and 2) any credit is directly related to the heat produced that is made available to, and is used by, the building to satisfy demand for space and water heating. Approach 2) is an extension of the existing basis for heat-led micro-CHP. Approach 3) allows credit to be given for electricity produced from fuel without utilising any associated heat, which is new territory for SAP.

1) Utilisation of 'waste heat'

There is already provision in a SAP assessment for waste heat supplied from a large power station to a community heating scheme. The useful heat (ie, heat required by the building) is given a low unit price and CO_2 emissions factor. The same approach could be adopted for electrically-led micro-CHP in an individual dwelling. It would be necessary to establish whether heat will be available at all times, and how much of the building needs can be supplied from the micro-CHP unit. None of the fuel burned by the micro-CHP or its electrical output would be counted.

2) Functional apportionment: duty as CHP

An attempt is made to apportion the function of the product, separating duty as CHP from duty as a generator alone. In this context, duty as CHP means the extent to which heat produced is useful to the building, expressed as a fraction of its total function. Useful heat will be determined by the lower of the building demand and the heat available. Duty as CHP might be the fraction

useful heat ÷ total heat produced

using daily quantities, but other formulae are possible.

For duty as CHP the product would be treated in the same way as a heat-led micro-CHP unit; ie, the fuel input, electrical input, useful heat output, and electrical output are counted in the performance evaluation. The useful heat output to the building will vary from day to day in accordance with a demand profile that would have to be developed. Duty as a generator alone is the fraction (1 – duty as CHP), and this fraction of the total input and output energy figures would be disregarded.

3) Functional apportionment: duties as both CHP and generator alone

This approach is similar to no. 2) but also takes into account the energy input and output for duty as a generator alone. The costs and CO_2 emission factors associated with the electricity need not (and arguably should not) be the same as those applied to duty as CHP. The questions here are (a) whether duty as a generator alone can be regarded as contributing to the energy performance of a building when a limited resource (the fuel) is being consumed, and (b) whether there is any conflict with other government policies that seek to influence how limited resources are used for electricity generation.