Decarbonisation & Electrical Heat Technology

Background

In the UK we use the Standard Assessment Procedure to calculate the carbon compliance rating of a dwelling for domestic building regulations applied to new build homes. Both SAP and the building regulation itself (Part L) utilises a CO2 related emissions figure and fuel factor that heavily penalises electrical heat technologies (both heat pumps and resistance heating). Both SAP and Part L use 'spot' carbon figures for the regulatory period to assess the carbon rating of a dwelling despite the fact a heating system will last for 20 years and a home over 60 years in policy terms. A 'spot' figure does not reflect the longer term de-carbonisation trend of grid electricity, much prevalent as a key policy platform for reducing emissions in the UK.

The Industrial Problem

Manufacturers need some leadership from Government if they are to invest in technology development in the UK and play their role in de-carbonising heat. Unless there is a method whereby we can reflect the de-carbonising nature of electricity to properly rate heating technologies in new homes then resistance heating manufacturers will close and create redundancies and investment in heat pump development will be stifled due to market uncertainty and the creation of policy barriers. The latest SAP consultation recommends 0.59kg CO2/kWh be used in its calculation based on the current generation mix. This will eliminate electric heating from its core market – small low occupancy flats and multi-residential- and wipe out the enhanced benefits of heat pumps being identified in the current Government funded SAP Q energy efficiency scheme.

The Recommended Solution

A balanced and equitable approach to encouraging electric heat technologies in new build dwellings is needed. The Climate Change Committee reported in December that to reach an 80% emission reduction the UK will need to de-carbonise electricity. It laid out a trajectory and the Government supported the report in signing up to the new reduction target (increased from 60%). If we assume this commitment to 80% is based on the CCC report being achievable, we would suggest the Government now use a more realistic future CO2 emission figure for SAP new build calculations. This does not suggest we should use this figure for EPC ratings or on-going SAP ratings which must reflect today's situation on a 'spot' basis.

In the BEAMA SAP consultation response we have recommended that the Government uses **0.3kg CO2/kWh in SAP 2009** for new build compliance calculations which is the likely de-carbonisation staging post for 2020 (according to the CCC report). This allows for even lower emissions beyond 2020 to 2030 but is a fair reflection that in the period up to 2020, there will be a higher CO2 content for grid electricity. This is a balancing effect. The solution is best deployed by using an alternative 'Future CO2' button for new build compliance calculation.

An additional option for electric resistance heating is to allow resistance heating in dwellings that comply with Minergie standards of passive house performance i.e. 38kWh/m2/a (incl. hot water) or the Passiv Haus standard of 15kWh/m2/pa (excl. hot water). However, this is an option probably best considered in the context of setting minimum energy efficiency or carbon compliance standards for building regulations from 2013 and relates to previously suggested primary energy consumption limits for dwellings.

The Background Noise

The Climate Change Committee report (December 2008) opened the door to a future for electric cars and electric heating:

Renewable generation could make a significant contribution to power sector decarbonisation ... wind generation could make a significant contribution... and major source of electricity in the UK (e.g. 30% by 2020 and more beyond), particularly in combination with new energy storage and load balancing technologies such as smart metering.

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Emission reductions in buildings and industry can be achieved through energy efficiency improvement and the introduction of new technologies...further emission cuts will require the introduction of new technologies based on electricity (e.g. heat pumps, storage heating).

The radical decarbonisation of power generation by 2030...increasing application of electricity to surface transport from 2015 onwards and to heat productio from the 2020s onwards.

If we do not protect and grow the electric heating and heat pump industry in the UK now then there will be little or no UK manufacturing or specialist distribution by 2020.

Fit With Broader Policy

Use of electric storage water heaters allows use of base load electricity provided by nuclear generation and provides a cost effective hot water option for householders

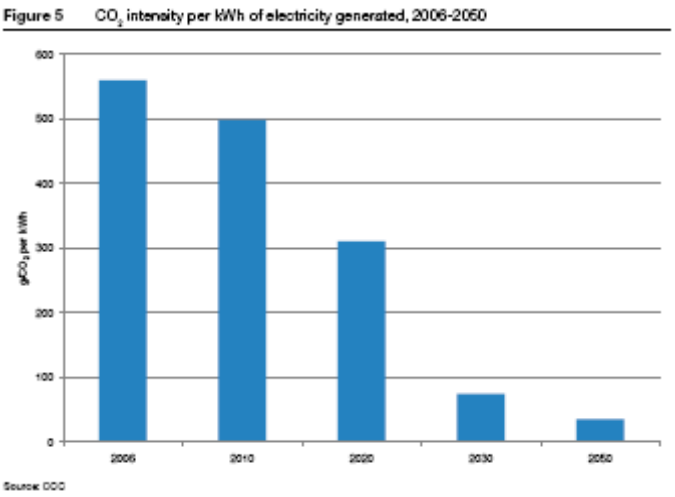
Low heat demand dwellings (Zero Carbon Homes) only require tactical 100% efficient at point of use electric heaters but these are held back by the spot CO2 figure pushing builder towards district heating in nearly all cases

Encouraging the use of heat pumps of all types will help Government reach its 15% renewables target by 2020 but new build deployment will be constrained by the spot carbon figure

Electric heating with thermally efficient store (water heaters or store connected heat pumps) can work in tandem with smart meters to encourage useful 'permission based' consumption of intermittent renewables when used with smart meters (rolling out up to 2010)

Electric heating and hot water with storage (resistance or heat pump) are enabling technologies for load shifting within a smart electricity network (Smart Grids)

The Future Trajectory For Grid Carbon Intensity



Climate Change Committee Report (December 2008)

Practical Implications For Buildings

Electric heating and hot water will emit 49% less carbon than a gas system over a 50 year period from 2010 (small flat)

An air source heat pump will emit 64% less carbon than a gas system over a 50 year period from 2010 (limited deployment in flats)

A building deploying appropriate infrastructure from 2010 can accommodate decarbonisation beyond 2020 and effectively utilise base load and intermittent renewable

Benefits for sustainable carbon reduction and security of supply

Source: The Electric Heating & Ventilation Association 2008