SUBMISSION FROM CALOR GAS

Summary

Calor is pleased to be able to provide a response to the Economy, Energy and Tourism Committee's (EETC) inquiry into the security of Scotland's energy supply.

In particular, we welcome the EETC's focus on supply and the Scottish Government's plans to achieve a decarbonised electricity grid by 2030. Calor recommends that the EETC should also take into account the Scottish Government's Draft Heat Generation Statement as part of this inquiry as Scotland's future heat strategy also places demands on electricity generation as a means of meeting Scotland's renewable heat targets.

Calor's evidence below focuses on two elements of the inquiry's terms of reference.

Supply – what decarbonising the electricity grid means in practice (and the associated targets of decarbonising heat).

Demand – the role of decentralised generation and micro-combined heat and power (mCHP) as an alternative means of decarbonising our energy supply and improving the nation's energy security.

Supply – do not look at decarbonising Scotland's electricity in isolation from heat demand

The EETC is well aware of the pressure on Scotland's supply of electricity from thermal plant in light of Longannet's premature closure. While Scotland is on course to meeting its electricity demand from renewables by 2020, Calor believes that too much emphasis is placed on Scotland's renewable electricity generation to meet this demand without importing electricity from thermal plant elsewhere in the UK. This problem is exacerbated by growing demand for renewable electricity to meet Scotland's heat demand.

- The Scottish Government's Draft Heat Generation Statement (published in 2014) places too much emphasis on the future role of electricity to provide an increasing proportion of Scotland's heat supply.

- Calor questions whether Scotland's heat demand can be met by a pure play electricity strategy due to the unpredictable nature of both heat demand and renewable electricity generation.

- Calor cautions that placing heat demand on a pure electric basis is risky, especially if Scotland becomes reliant on its baseload electricity being generated by intermittent renewable sources such as wind.

- This is because heat demand is 'spiky'. National Grid predicts that by 2050 the 31 coldest days of the year will account for 20% of the UK's annual heat demand (Fig 1). Climate change is likely to lead to more extreme winters and even greater heat spikes.

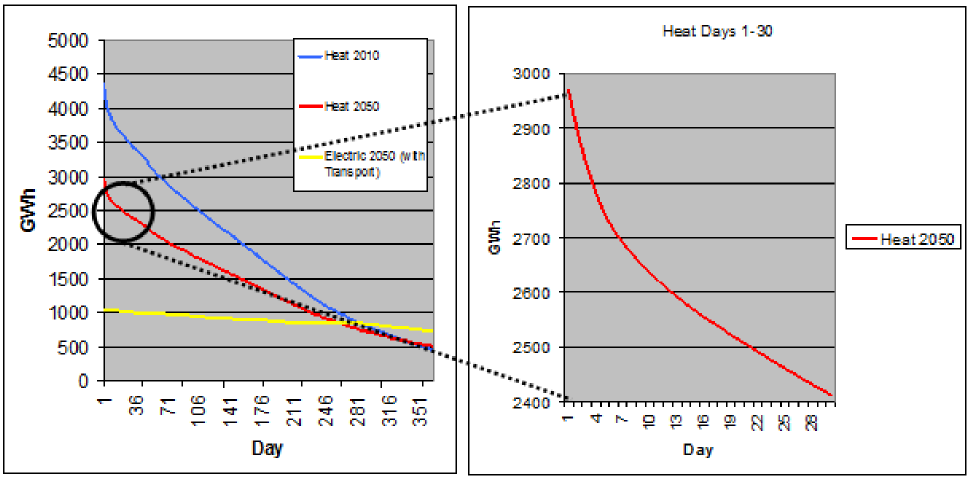

Fig. 1 - Heat curve flattens with improved insulation but still peaky compared with electric

- The Scottish Government's Draft Heat Generation Statement does not take into the account the likely impact of wide-scale adoption of heat pumps on Scotland's electricity network. A report from E&Y, commissioned by Calor, found that for low levels of heat pump deployment, the cumulated cost of reinforcing the UK network is estimated to be £0.5bn by 2030 and £1.7bn by 2050. For high levels of heat pump deployment, this cost rises to £4.5bn by 2030 and £12.4bn by 2050.

- Heat pump under-performance could lead to significant additional network reinforcement costs if this under-performance leads to a reliance on resistive back-up heating. The average network reinforcement cost per heat pump is approximately four times higher in rural areas than on a GB-wide basis.

- The UK Government's Revised NPS (October 2010) revealed the full implications of a pure electricity play including the electrification of heat: "Generation capacity will need at least to double to meet this demand and, if a significant proportion of our electricity is supplied from intermittent sources, such as wind, solar, or tidal, then the total installed capacity might need to triple" (para.1.66). This is a major driving factor behind the rising cost of energy to householders.

The energy consultancy Pöyry[1] has found that gas is a lower risk alternative to meeting Scotland and the UK's transition to a low carbon economy. There are no major security of gas supply concerns and a low carbon plan which favoured gas could also give time to establish the renewable supply chain and develop and commercialise other technologies including CCS, district heating, micro-generation and large scale biomethane. These new technologies can be used in off gas grid areas and are able to utilise legacy heating systems such as radiators and circulating pumps. These include Flue Gas Heat Recovery, mCHP (micro combined heat and power) and Gas Absorption Heat Pumps – all low carbon or renewable gas technologies which can be readily retrofitted on to a home's existing central heating system.

Supply - Decentralised generation and mCHP

[1] Gas: At the centre of a low carbon future, Pöyry, September 2010

Projects are underway to decarbonise gas (deploying biomethane or biopropane) but meanwhile we can make the fossil fuel work harder by deploying micro-generation – if decarbonised gas comes down the pipeline then lock-in disappears as a problem because we are dealing with bridging technology rather than a temporary fix. mCHP involves the use of gas to generate both heat and electricity. It is a low cost solution delivering secure low carbon electricity. One possible component of the domestic heating scenarios contemplated in DECC's "Pathways Analysis" is mCHP – reaching up to 90% of the technology mix in one illustrated case, and with a maximum penetration of 36 million households by 2050.

Owners of compliant mCHP units can sell electricity back to the grid. So, mCHP will lower, not raise, household energy bills and could be an antidote to fuel poverty.

mCHP units are compatible with existing grid infrastructure. What is more, mCHP benefits security of supply because the electricity is generated at or near the point of use, and when it is needed. This obviates losses in transmission (accounting for about 7% of all power generated), reduces the demand for electricity from the grid and the need for investment in central generation and the transmission and distribution network, thus lessening the otherwise crippling cost of the energy strategy (estimated at £376bn by 2030). mCHP also enhances protection against the risk of power cuts occurring after 2015, since the majority of the electricity needed by a typical home will be generated on site, and mCHP can support grid generation at times of peak demand. Indeed, mCHP tends to generate more power at times of peak demand (evenings and winters) and insofar as it is deployed will lessen the need to operate very expensive fossil-fuel peaking plant. A financial benefit has been calculated of 6.2p/kWh of electricity generated from avoided capacity, energy and emission costs provided there is widespread mCHP deployment.

Significant reliance on fossil fuel capacity is dictated for decades to come to compensate for the intermittency of wind, and the slow modulation of nuclear (if indeed it can be financed and built in time to meet demand). It is this peaking and balancing fossil plant that mCHP displaces so delivering carbon savings. As long as there is fossil plant in the grid mCHP delivers carbon savings.

Gas Absorption Heat Pumps

Gas Absorption Heat Pumps are almost 50% more efficient than high-efficiency condensing boilers. Such economical use of gas (or LPG) readily ensures a reduction of up to 50% in energy bills and CO_2 emissions. The potential of GAHPs has been solidly acknowledged in DECC's published heat strategy which foresees a strategic role for GAHPs beyond 2050. We welcome the commitment by the Scottish Government to consider GAHPs as a viable technology in the 2014 building standards and the Draft Heat Statement. The installation of 50,000 Gas Absorption Heat Pump units as opposed to the same capacity of A-Rated Condensing Boiler units would:

- Reduce fuel consumption by 1,660 GWh per year, equivalent to 6% of annual domestic gas consumption in Scotland.

- Generate monetary savings of £56 million per year, equivalent to 74% of the 2013/2014 budget allocated to the Home Energy Efficiency Programmes for Scotland (HEEPS); designed to improve energy efficiency and tackle fuel poverty.

- Provide CO_2 savings of 0.3 Mt per year, equivalent to about 170,000 4Kw solar PV units.[2]

Government intervention, business innovation and individual action

Calor has significant concerns regarding the technologies currently supported by the Scottish Government in order to decarbonise the electricity grid and reduce carbon emissions. The Scottish Government's target of sourcing 11% of heat demand from renewable sources by 2020, whilst laudable, will require a significant change in the way technology is used by households to provide heat.[3] Energy Saving Trust Scotland statistics show that Scotland currently generates 2.8% of heat demand from renewable sources, indicating that significant progress will need to be made before the end of the decade.

Governments across the UK continue to try and pick winners when it comes to market intervention and new technologies to meet climate change and emissions targets. The current Draft Heat Statement continues to place a great deal of emphasis on the role air and ground source heat pumps could play towards meeting domestic energy demand to 2050

A study of installed heat pump performance published by the Energy Saving Trust on 8 September 2010—"Getting Warmer: a field trial of heat pumps" revealed that the actual performance of heat pumps installed in the UK was surprisingly poor. The study was financed by the heat pump industry and based on a sample of sites where pumps had been installed pre-selected by the industry. The pumps were installed and accredited through the Microgeneration Certification Scheme's immediate predecessor, the Clear Skies programme. The study showed that only one of the 22 properties with Ground Source Heat Pumps (GSHPs) achieved the implicit minimum EU Directive CoP, and only nine of the 47 sites with ASHPs achieved the standard. REF commented on this report: "The risk of premature adoption and consumer disenchantment is clearly real, thus raising the spectre of a UK heat pump tragedy… On the basis of this study, there seems a distinct risk that some heat pumps will be subsidised even though they fail to meet the minimum standard for being considered a renewable energy source. If, on the other hand, government withdraws subsidies from such installations, well-meaning householders may discover after investing heavily in a heat pump that their installations fail to come up to the required EU standard, and thus forfeit entitlement to RHI payments" ("Renewable Heat Initiative", September 2010).

In Scotland, the average daily temperature is below 7°C in December, January, February and March. In England the average daily temperature is below 7°C in January and February; the risk is, then, that for substantial parts of the year, varying by location, heat pumps will struggle to deliver heat when it is cold outside. Recent experience of cold winters emphasises this point. Met Office statistics for December 2010 show mean temperatures for the UK of -1°C, -0.5°C for England, -0.4°C for Wales and -1.9°C for Scotland. Indeed, in 2010, Met Office statistics show the mean temperature for the year to be 8°C in England and 6.5°C in Scotland—note below the 7°C reference point on average for the whole year. Perhaps it should come as no surprise that ASHPs should not prove so efficient when installed in the UK, and particularly in Scotland, as their comparative systems in warmer continental countries.

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[2] Energy Saving Trust, 'Solar PV Savings' – based on 4Kw unit saving 1.8 tonnes CO_2 per year.

[3] IPPR North, Warmth in a changing Climate, September 2011

DECC is also well aware of the problem: “We are aware that systems installed in the past have not always worked as well as they should” (Para. 199, DECC Consultation on the RHI, 20 September 2012) and again: “It is a common feature in field trials and assessments that there is a significant gap between expected and actual performance” (para. 1.23, Microgeneration Strategy Consultation, DECC, 22 December 2010).

The Energy Savings Trust published Phase 2 of its testing on pumps (“The Heat is On”) in May 2013. The bulk of this work involved a series of interventions on 32 of the failing Phase 1 sites over a three year period. In 12 cases the “interventions were “major”. In 10 cases, the interventions involved the complete replacement of the pump systems. Even with all this no doubt expensive intervention: “Some sites did not improve, even with major and medium interventions”. The deficiency in performance was especially marked for ASHPs with 6 out of 15 still failing to make the renewable grade. They would be ruled out as renewable by the EU and energy they generate would not count towards the UK’s renewable targets. The average performance of ASHPs was under the bar of being counted as renewable.

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