SUBMISSION FROM MITSUBISHI ELECTRIC

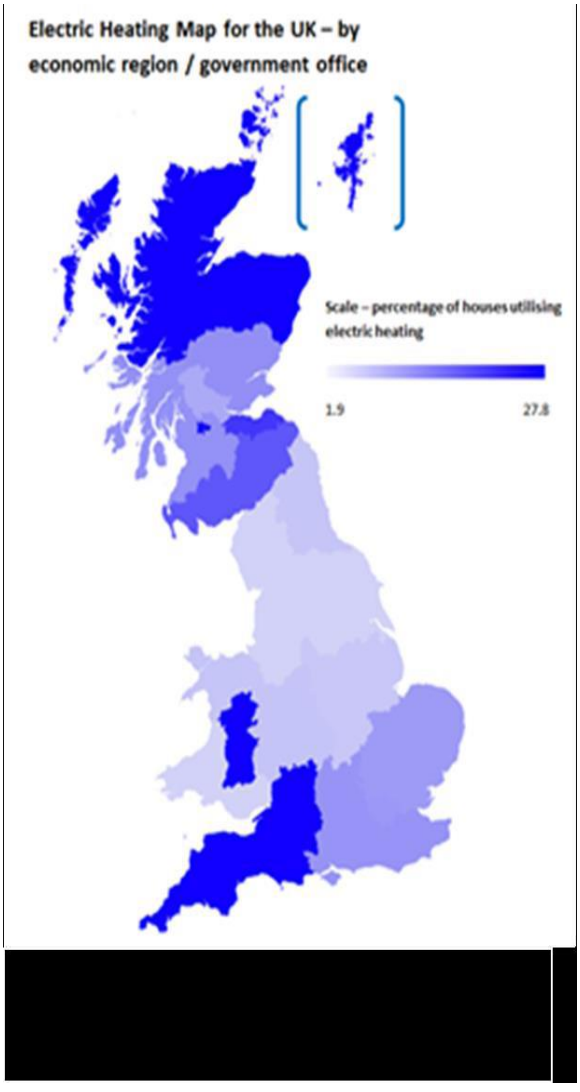
The context of electrical heating in Scotland

1. In Scotland, a far higher proportion of households are electrically heated than across the UK as a whole. The distribution of such properties is concentrated in rural areas with some pockets of urban dwellings relying principally on this manner of heating their houses as well.

2. The Scottish House Conditions Survey (2013) highlights that 13 percent of houses across Scotland utilise electric energy for heating purposes. Conventional electric heating systems can be more expensive than other fuel sources. Only 2% of gas-heated dwellings received an F or G Energy Performance Certificate (EPC) rating compared with 11% of electrically heated dwellings. 1

3. As depicted in Figure 1, the proportion of houses in rural areas reliant on electric heating is far higher- many of these areas being away from the gas grid. Some housing types in urban areas too, have a higher proportion of electric heating. For example, 82 percent of purpose built, high-rise flats in Scotland are heated by electricity.

Figure 1:



4. The map to the right has a strong correlation with high rates of fuel poverty.

5. Addressing fuel poverty first and foremost should be actioned through improving energy efficiency. This, according to analysis by the Sustainable Energy Association (based on DECC's *pathways* figures) is cost effective, and could save the UK treasury over £12 billion compared with other options.3

6. MEUK would acknowledge the useful progress the Scottish Government has made towards addressing a lack of energy efficiency in the building stock. The share of homes with lofts insulated to 100 mm or more grew by 10 percentage points up to 2013 to reach 92%. Lofts insulated to 200 mm or more now account for more than 62% of homes with lofts, compared to 35% in 2010. Levels of cavity wall insulation have risen above 69% of all cavity wall dwellings.

7. However, at 11%, the share of insulated solid wall dwellings has remained unchanged since 2010. Households without gas heating are more likely to live in homes that are older, solid walled and have poor energy efficiency standards.

8. Taking a 'whole-house' policy perspective, it is clear that policy should take special measures to address the needs of off-gas households when it comes to energy supply.

Policy and electrically heated households

9. UK policies such as the Energy Company Obligation, Renewable Heat Incentive, Feed in Tariff, Warm Home Discount all offer direct benefits to householders. These range from discounts to bills, installation of energy efficiency measures to supplements to income derived from generating/ selling of electricity. These policies are useful in delivering societal goods at volumes which render the means to achieve these societal goods more cost-effective. They make an important contribution to reducing fuel poverty, improving health outcomes, lowering carbon emissions and lightening the UK's environmental impact.

10. The Scottish Government has had notable success in augmenting UK policy with its HEEPS suite of policies. On the tenth of June 2015, the Scottish Government stated that energy efficiency will be considered a National Infrastructure Priority. MEUK welcomes this – and hopes to see this transformative process deliver optimal benefits.

11. However, it is of note that only 3.0% of Scotland's non-electrical heat demand in 2012 was sourced from renewable technologies which missed the 2012 milestone of 3.5%. This target will be difficult to achieve without recourse to more radical policy measures.

12. However, taking a 'whole-house' policy perspective, it is clear that policy should take special account of the context of off-gas, and particularly electric heating schemes. As of now, electrically heated households (across the UK) pay 18.9 percent of the total cost of domestic energy policies aimed at efficiency, yet only receive 6.8 percent of all measures deployed.4

4 Consumer Futures: *The hardest hit. A report by CSE on the impact of energy policy on consumers' bills* (2013).

13. MEUK would argue that modern, efficient renewable heating technologies such as MEUK's *Ecodan heat pumps* can deliver heat more cost-effectively than many older heating technologies. Heat pumps have improved in both efficiency and design over recent years and consumers are seeing further benefits as the market for this product has matured.

14. Heat pumps use far less energy and have a lower peak power demand than traditional storage heaters, and so are better placed to deliver energy cost-effectively to households. A useful moment of intervention for policy would be to ensure that out-dated storage heater systems are converted with more modern heat pumps when storage systems are replaced at the end of their product lifespan. It is not appropriate to install a replacement storage heater – which will likely ensure a consumer continues to pay overly high energy bills until the heater is replaced, potentially many years later.

15. Specifically with regard to conversion of an older electrical system toward a more modern renewable one, there are several further advantages that a cohesive policy for such properties could access.

Electric heat as smart energy

16. The principle of using smart appliances to assist grid management is not a new concept. National Grid has previously issued contracts under Demand Side Balancing Reserve (DSBR) which enabled parties to drop demand (often heavy industry units) from the national grid in return for recognition of the value of that service.
In future, Short Term Operating Reserve (STOR) will be the principle tool for demand side response which will be utilised by National Grid in this manner. Demand side response adds value by preventing black outs and reducing the immediate need for grid upgrades. It is this value which can then be redirected to a participant in DSR services.

17. The Scottish Government has acknowledged the potential of grid management activities in its new *Heat Policy Statement. Towards decarbonising heat; maximising opportunities for Scotland*, section 2.16.

18. According to National Grid, a STOR facility provider (either as aggregated gensets or as a single unit) must be able to:

- Offer a minimum of 3MW or more of generation or steady demand reduction (this can be from more than one site)
- Deliver full MW within 240 minutes or less from receiving instructions from National Grid; The ability to respond fast is a key element in securing these contracts; heat pumps have this capability
- Provide full MW for at least 2 hours when instructed;
- Have a Recovery Period after provision of Reserve of not more than 1200 minutes (20 hours);
- Be able to provide STOR at least 3 times a week.

19. This is where the connection to heating exists. An aggregator would operate by linking together smaller units which would be capable of removing themselves from the grid in order to reduce demand at peak periods. Such units could include heat pumps, amongst others. Heat pumps use around a third of the energy of conventional storage heaters, and produce significantly less carbon as well.5 As such, heat pumps reduce the strain on the grid when replacing traditional electrical heating technologies. There are dense groups of households which could be targeted for installation- for example in housing associations. Furthermore, groups of heat pumps can make a notable contribution to grid management, as depicted in figure 2. Such an aggregator could control their units remotely through a significant variety of means.

Figure 2:

number of heat pumps	heat pump(s) capacity	HP efficiency	HP input electricity (kW)	HP input electricity (MW)
1	7.5	275%	3	0.002727273
250	1875	275%	682	0.681818182
500	3750	275%	1,364	1
1000	7500	275%	2,727	2.7
5000	37500	275%	13,636	13.64

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20. Well-insulated houses could easily lower the output a heating system from the grid for short periods of time, without causing any discomfort to occupiers. The numbers of heat pumps required are already being installed across Scotland. For instance, the Hebridean Housing Partnership has installed 250 Mitsubishi Electric Ecodan heat pumps in its properties in the Western Isles. There is clear potential for some local parties to cooperate in order to provide demand side response services – and receive payment for this added value.

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21. It is of particular note that in grid-constrained areas of Scotland, such as the Western Isles and the South-East of Scotland, that smart response could also see heat output from units **increased**, sapping excess power supply from the grid whilst heating homeowners properties. Further exploration of the policy around this is required- but it could in a useful way reduce the requirement for grid constraint payments to be made to generators who cannot contribute power to the national grid due to limited capacity. It would be of worth for local actors to consider whether a localised over-supply demand-side response would be possible as well.

22. As such, it can be seen that smart heating systems could deliver significant further benefits to communities capable of pooling their efforts and equipment in order to realise this opportunity. Value created by such actions could increase the return provided to installers of such heating systems, making low-carbon technologies substantially more affordable. Smart heating, therefore, represents a useful way to secure energy supply, affordably and sustainably and generate maximum value for local communities who engage with these systems.

23. Mitsubishi Electric UK would welcome the opportunity to discuss how policy might be best scoped to deliver optimal outcomes to stakeholders. Our members have technologies and capabilities which could be utilised in this regard. As such, we would hope that the Economy, Energy and Tourism committee would consider seriously how the Scottish Parliament might explore this opportunity. MEUK representatives would be happy to submit further evidence to the committee at any stage.