An Electric Heat Pathway – Looking Beyond Heat Pumps

Webinar 2 - Radio Tele-switching (RTS) and the lessons for future flexibility services

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Introduction
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AGENDA

• Recap: Storage heating today and its role in heat de-carbonisation
• Barriers and enablers
• The RTS issue and smart metering
• RTS and lessons for the DSO
• Conclusions and discussion
Storage heating today

• Latest GB figures (2018):
  ◦ 2.2 million electric heated homes of which..
  ◦ 1.4 million with storage heaters

• Fuel poverty rate (%) is twice as high in electric heated homes as gas
  ◦ Higher cost of electricity – but other factors too

• Poor consumer experience
  ◦ 85% satisfaction for gas heating cf 43% for electric storage heating
  ◦ Cost and comfort the key concerns
  ◦ Legacy storage heaters have limited controls and leak heat through the day

• Metering and tariff complexity creates added risks
  ◦ Low understanding of legacy TOU tariffs
New storage heating – smart and less leaky

• Dimplex Quantum - High heat retention storage heater
  ◦ Can programme upto a week ahead – set temperature by room
  ◦ Determines input / output rate taking account of projections of external temperature

• Some large pilots – eg NINES (Shetland), RealValue
  ◦ All found significant improvements in comfort and control

• Ovo now marketing to owner occupiers – including app interface

• Retrofit solutions (Connected Response)

• Hot water tanks getting smarter too
The heat de-carbonisation challenge

• Domestic heating accounts for 14% of UK carbon emissions
• Range of future heat pathways – hydrogen or electrification
  ◦ General consensus = a combination of technologies
• Current electric heat pathways largely ignore storage heating
  ◦ But all assume a significant growth in thermal storage
• Niche role envisaged in “space constrained” properties (Element Energy) – but risk being left until last
• Storage heating can provide a source of system flexibility – should be valued
Barriers and Enablers

• Appliance and building standards – not always helpful
  ◦ Lot 20, SAP10, Future Homes Standard
• Consumer information – on heating solutions and tariffs
• Regulatory drivers eg RIIO Fuel Poor Network Extension Scheme
• Funding (ECO3, HUGs, Scot Gov loans, VAT, innovation funding)
Barriers and enablers - Price signals

- Electric versus gas: policy costs
- Peak versus off-peak: network charging modifications are reducing the differential
- Standing charge versus unit cost (TCR)
  - Ofgem have dropped proposal for higher standing charge for Economy 7
- Capacity based charges? Access arrangements?
- Forward looking charges review – impact of increased levels of electric heat?
- Will customers opt in to half hourly settlement?

Ofgem to consider impacts on electric storage heat customers
RTS background

• Radio-teleswitch System installed in 1980s to cope with night time peak from storage heating and avoid need for network reinforcement
• Provided by BBC off the back of long wave radio – but due to be de-commissioned 2021/22
• Allows for staggered schedules of charging and (in extremis) load shedding in designated Load Managed Areas (mainly Scotland)
• SSEN particularly reliant on RTS in more remote areas – significant cost savings from avoiding reinforcement
Metering and tariffs add complexity

- Range of restricted metering types / combinations:
  - Economy 7 / white meter – separate registers
  - Meters with separate circuits for heating / other use
  - More complex arrangements – use RTS with two separate meters
    - Eg SSE Total Heat Total Control, SP Comfort Plus Control

- RTS controls switching between registers / meters:
  - Static – keeps meter and time-switch in synch (1.36m)
  - Semi-static – bank holiday / clock change (105k)
  - Dynamic – inc weather forecast (190k)

- Risk of detriment if wrongly wired, time clock out of step, inappropriate tariff
- Creates obstacle to switching
Smart metering as the solution?

• Needs a “variant” meter that can switch the heating load and allow different tariffs for heat and other uses

• Expected later this year
  ◦ Suppliers have only c 18 months to roll out before RTS switch off

• Complex arrangements -> additional risks for customers
  ◦ Will they retain their special tariffs? Getting the wiring right

• Other challenges in these properties – DCC coverage, Alt-HAN

• Need clarity around what happens if no smart meter at RTS switch-off
  ◦ Will revert to fallback schedule – but precise impact varies

Need for BEIS / Ofgem focus and monitoring
Industry need to understand location of RTS meters
Smart metering and load control

- BEIS envisages load control with smart metering through a range of routes:
  - Auxiliary Load Control - ALCs (in meter)
  - HAN Controlled Auxiliary Load Control - HCALCs
  - Price signal (message sent via HAN)

- As arrangements stand smart metering does not give DNOs (or any third party) the ability to manage loads

- BEIS contemplating changes for Proportional Load Control

- Alternative is third parties do this by-passing the smart meter
  - Not seen as desirable in context of EV charging
Ofgem’s views on the DSO model – attitude to DNO control

- Ofgem focus on competition (pricing and contracts) – naturally resistant to idea of DNO control
- cf SEC Mod on DNO ability to modulate EV chargers by sending message through DCC (SECP0046 - SSEN)
- Ofgem: “whether DNOs should have the capability to modulate EV chargers to resolve network and system needs that could also be met through market mechanisms”
- Mod report highlights highly locational nature of issues, relatively rare occurrence, need for rapid response, properties served by multiple suppliers adding complexity
- Same issues arise with electric heating
What sort of load control is required?

- Shift demand to off-peak time (TOU tariffs can work cf Economy 7)
- Managing constraints / faults - highly location specific and varying over time:
  - Harder to see TOU tariffs working
  - Would suppliers pass such price signals on?
- Don’t just think of storage heating as we know it today – on / off
  - Eg proportional load control could apply here too
- Clarity on nature of flexibility required would help supply chain develop suitable heating solutions
Primary DNO concern is diversity

- RTS provides diversity through mix of schedules
- In relation to smart metering DNOs have progressed code mods to:
  - Provide randomisation (+/- 10 mins) - DCP204
  - Provide visibility of charging schedules - SEC0025 and
  - Enable arrangements with suppliers in Load Managed Areas - DCP326
- Price signals and automation exacerbate the problem
- Contractual arrangements difficult to define – and need a geographical concentration of properties (eg housing associations)
- How will this work in EV world?

SSEN to open discussions with suppliers and others
Raises wider policy considerations

• What should load-shedding look like in a future smart world (lessons from August 9 2019)?
• Ofgem desire to see market solutions will add to costs if DNOs now have to pay for something they previously got for free
  ◦ But a fairer solution (rewarding these customers for their flexibility)
• Understanding different characteristics of EV charging requirements and heat – and interactions between them
  ◦ Overnight charging more important for EVs? – homes don’t move
Conclusions

• Storage heating – but not as we know it
• Smart meter replacements for RTS need strong focus
• What could flexibility services look like in domestic sector:
  ◦ Simple TOU tariffs have a role (but need better customer communication)
  ◦ Highly local and changing constraints -> contract
  ◦ DNOs’ need for DIVERSITY can’t be got through price signals -> contract
  ◦ In extremis DNOs need control (cf rota disconnection)
• SSEN need to engage with suppliers / third parties on provision of services to replace RTS flexibility
• Paying for flexibility they previously got for free – a fairer approach
Thank you

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