An Electric Heat Pathway – Looking Beyond Heat Pumps
Webinar 1 - Storage heaters: the Cinderella solution in the heat de-carbonisation debate
Maxine Frerk, Grid Edge Policy
Introduction
Steven Gough, Distributed System Operator
Technical Authority Lead
Questions

• Smart Phone at the ready...

• Visit [www.sli.do](http://www.sli.do)

• Event code #Heat
Agenda

• Storage heating today
• New smart storage heating
• A role in heat de-carbonisation?
• Barriers and enablers
• Conclusions
• Questions

• Note: Webinar 2 (tomorrow) to focus on more technical issues
A small but significant number of homes have storage heating today

• Latest GB figures (2018):
  ◦ 2.2 million electric heated homes of which..
  ◦ 1.4 million with storage heaters
• Storage heater numbers falling (GB: 1.7m in 2013)
• Total electric heated constant
  ◦ more direct electric (cheaper to install)
The link with fuel poverty

• Fuel poverty rate (%) is twice as high in electric heated homes as gas

• But this is due to a range of factors:
  ◦ Electric heated homes tend to be lower income
  ◦ Electric heated homes tend to be less energy efficient
  ◦ Higher cost of electricity:
    • Policy costs account for 20% of electricity bill, 2% on gas

• Storage heating generally better than direct electric heating
Poor consumer experience

• Citizens Advice Scotland – the experience gap
• 85% satisfaction for gas heating cf 43% for electric storage heating
• Cost and comfort the key concerns
  ◦ “Inadequate heating system” the key issue
  ◦ But draughts and poor insulation also feature heavily
• Legacy storage heaters have limited controls and leak heat through the day:
  ◦ Too hot in the morning
  ◦ Too cold in the evening -> use of expensive supplemental heating
Poor understanding and lack of control

• Basic input / output controls not well understood / not used
• Citizens Advice “False Economy” report on legacy TOU tariffs:
  ◦ A quarter unsure of hours when different rates applied
  ◦ Suppliers unable to advise on suitable tariff

Call for Ofgem to consider in context of “treating customers fairly” obligation – and to learn lessons for future TOU world
Metering and tariff complexity = added risks

- Range of metering types / combinations:
  - Economy 7 / white meter – separate registers
  - Meters with separate circuits for heating / other use
  - More complex arrangements – RTS with two separate meters
- Hard to understand!
- Risk of significant detriment if wrongly wired, time clock out of step, inappropriate tariff
- Limits ability to engage in the market
  - CMA remedy
  - Citizens Advice Best Practice Guide
RTS (Radio-Teleswitch System)

• Allows for staggered schedules of charging and (in extremis) load shedding to avoid network reinforcement
• Provided by BBC – but due to be de-commissioned 2021/22
• Smart metering as the solution? – “variant” meter due later this year
• 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
• Unclear what happens when RTS switched off – varies by property

Need for Ofgem and industry focus
New storage heating – smart and less leaky

• Dimplex Quantum heaters:
  ◦ High Heat Retention Storage heater (SAP)
  ◦ Can programme up to a week ahead – set temperature by room
  ◦ Determines input / output rate taking account of projections of external temperature

• Some significant pilots – Real Value (Ireland), NINES (Shetland) – and many smaller scale ones (NEA)

• All found significant improvements in comfort and control

• Dimplex cost modelling shows 27% saving cf traditional storage heating

• Ovo now marketing to home owners – including app interface
Retrofit of smart can add some value

- Kenny Cameron - Connected Response (ex VCharge)
- Uses weather forecasts and temperature monitoring to set input / output rates
- Some NEA pilots and ongoing discussions on commercial projects (primarily tower blocks with “heat as rent”)
- Evidence that can improve comfort – but not cost (though up front cost much lower)
Hot water tanks getting smarter too

• Mixergy (British Gas):
  ◦ Heat the amount of hot water you need
  ◦ See how much hot water you have
  ◦ More hot water from the same tank
  ◦ Smartphone app

• Pilots looking at hot water tanks to provide DSR

• Innovations around thermal storage:
  ◦ SunAmp heat battery
  ◦ Electric heat boilers
But the people dimension still matters

• The RealValue project highlighted the importance of:
  ◦ Comfort
  ◦ Cost
  ◦ Control
  ◦ Care
  ◦ Connectivity

• All trials included a level of hand-holding (“care”) that wouldn’t normally be there but is critical – to size the system appropriately and to help with managing the controls / suitable tariffs

• Crucial for any “future heat” solution

Thought needed on how best to provide this support
The heat de-carbonisation challenge

• Domestic heating accounts for 14% of UK carbon emissions
• Range of future heat pathways: hydrogen or electrification
• Winter peak load creates a particular challenge for electrification
• The need to effect change in people’s homes and their experience of heat is an even greater challenge
• BEIS considering policy options – early 2020s?
• General consensus (eg Energy Systems Catapult) that the answer will be a combination of technologies
Current electrification pathways largely ignore storage heating (and hot water)

- CCC Net Zero report – single reference
- National Grid FES scenarios – storage heating flat or declining
- BEIS “evidence report” – a few peripheral mentions
  - and acknowledgment that little is known about hot water storage

BUT

- Flexibility increasingly important
- Electrification (heat pump) pathways all assume significant levels of thermal storage to limit strain on the grid
- Assumed to be through (large) hot water tanks / buffer tanks
Only role identified is as a niche for “hard to de-carbonise” properties = left until last

• Element Energy and UCL report for CCC
• Space constrained properties (13% of housing stock)
• Storage heating suitable for 70-80% (rest = communal heating)
• But viewed as “speculative” because high cost /tCO2e
  ◦ Limited carbon savings from smaller properties
• Hence assume not rolled out until 2045
• A concern given what we know about who lives in these properties!
Horses for courses – scoping the opportunity

• Best suited to smaller, more energy efficient properties
• Size matters in terms of space for heat pump
• Size and energy efficiency matter in terms of relative cost
• Storage heaters - lower up front cost but higher running cost
• Indicative analysis (for NEA) puts the cut-off at around 7.5MWh pa
• 20% of homes are flats in England – 36% in Scotland
• Lifestyle and behaviour matter too
Hot water tanks – an endangered species

• In 1996 12% of homes were without hot water tanks rising to 54% in 2016
• Driven by move to combi-boilers and desire for more storage space
• Assumed not to be such an issue in electric heated homes
• BEIS Clean Growth strategy acknowledged need to future-proof homes by including hot water tanks – but not included in new Future Homes Standard
Barriers and enablers: Appliance and building standards

• Appliance standards (Lot 20) drive smart electric heat solutions
  BUT:
  ◦ Add cost
  ◦ Preclude simple interfaces
  ◦ No requirement for connectivity (smart grid)

• Future Homes Standard:
  ◦ Ignores potential for solutions other than heat pumps
  ◦ Ignores requirement for thermal storage
  ◦ No sense of horses for courses

• SAP10 acknowledges that electricity is now more de-carbonised
  ◦ Will improve the environmental credentials of storage heating
  ◦ But not forward-looking
  ◦ Will take time to incorporate in RdSAP (existing buildings)
Barriers and enablers: Consumer information

• Low awareness of need to de-carbonise heat
• Little independent advice on heating solutions
  ◦ And worrying examples of mis-selling
• Unclear where ongoing support should come from
• Advice on a suitable tariff – Ofgem should be monitoring
• Redress when things go wrong
Barriers and enablers: Regulation

• Price signals (network charging):
  ◦ Electric versus gas: policy costs
  ◦ Peak versus off-peak
  ◦ Standing charge versus unit cost
  ◦ Capacity based charges?

• Other regulation:
  ◦ Fuel Poor Network Extension Scheme
  ◦ Obligation to provide and maintain gas connections
Barriers and enablers: Funding

• ECO3 – only if all storage heaters broken (or to replace direct electric heating alongside other measures). Low take-up
• New Home Upgrade Grant Scheme (HUGs) – detail still awaited
• Scotland – interest-free loans for high heat retention electric storage heaters 😊
• RIIO funding for flexibility solutions
• Innovation funding (but large scale funding directed to hydrogen, heat pumps and district heating)
• VAT still at 20%
Conclusion

Storage heating – the Cinderella solution

• Long term:
  ◦ Heat de-carbonisation strategy needs to include storage heating as part of “horses for courses”
  ◦ Critical for “no-one left behind in the shift to net zero”
• Short term:
  ◦ Smart metering for these customers needs careful monitoring
  ◦ Range of barriers and enablers that need addressing
Thank you.

Any Questions?