

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



Grid Edge Policy
Regulation • Energy • Consumers



Scottish & Southern
Electricity Networks

Introduction

Steven Gough, Distributed System Operator Technical Authority Lead

Questions

- Smart Phone at the ready...
- Visit 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 decarbonise” 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

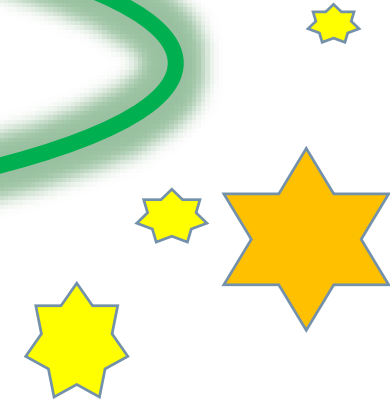
Barriers and enablers: Funding

- 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 😊
- RII0 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?

