

# An Electric Heat Pathway – Looking Beyond Heat Pumps

Webinar 1 - Storage heaters: the Cinderella solution in the heat de-carbonisation debate

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**Grid Edge Policy**  
Regulation · Energy · Consumers



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# Introduction

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# 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 /tCO<sub>2</sub>e
  - 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

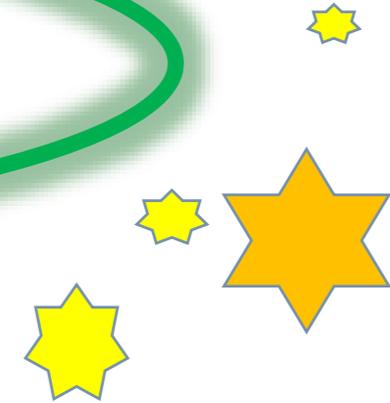
# Barriers and enablers: Funding

- 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?**

