CIBSE
Homes For The Future Group

Delivering low carbon, low running cost future homes

CIBSE
Homes For The Future Group

Welcome and House Keeping

Tom Lelyveld
Chair Homes for the Future Group

CIBSE
Homes For The Future Group

Agenda

Future Homes – Considerations – Ben Stroud – AECOM

Piloting the Future Homes Standard – James Parker – Latimer

Why When Matters – Nigel Banks – Octopus Energy

Q & A and Panel Discussion

Drinks

Close 19:30

Future Homes – Considerations

CIBSE Homes for the Future Group

Delivering low carbon, low running cost future homes

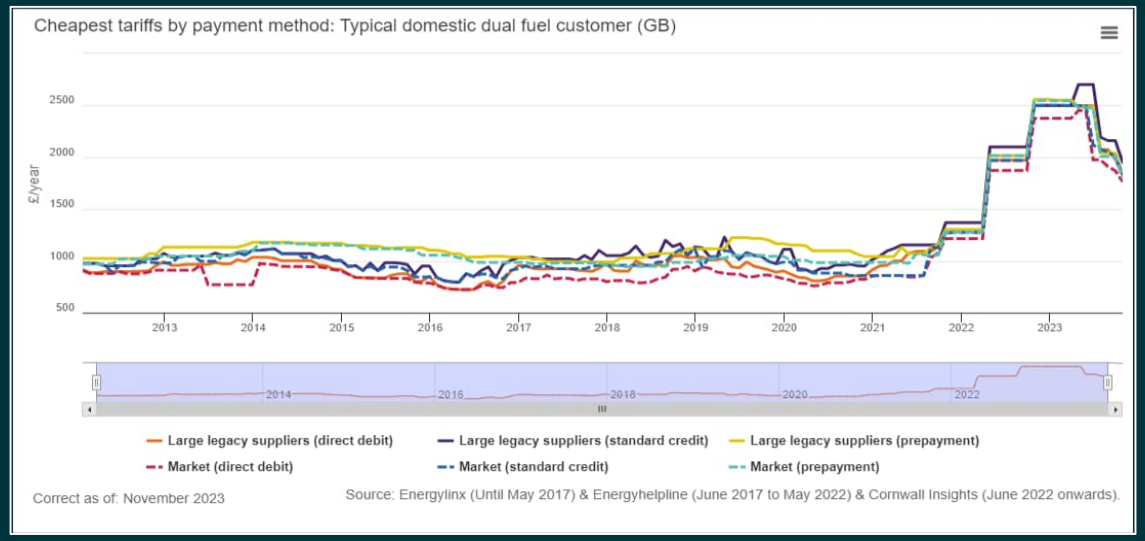
Ben Stroud - AECOM

Direction of Travel

Published Policy Direction

Part L 2021

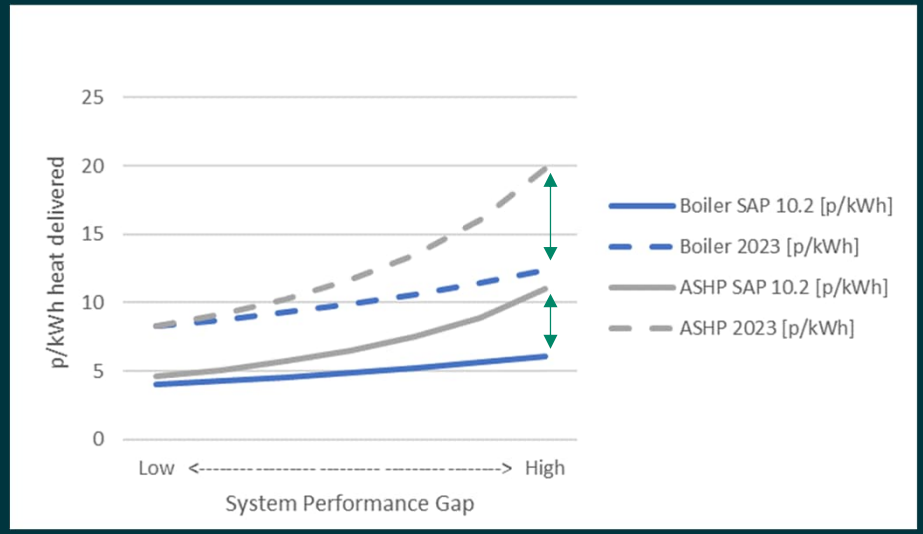
- Boilers, energy efficiency and solar PV
- Part L 2021 Notional Dwelling was cheap to run – assumed gas price was low and electricity generation well utilised – real world suggest similar scenario
- Fabric energy efficiency challenging – industry has been on a journey on thermal bridging
- Part O / Part L alignment can be challenging



Low Carbon Heating

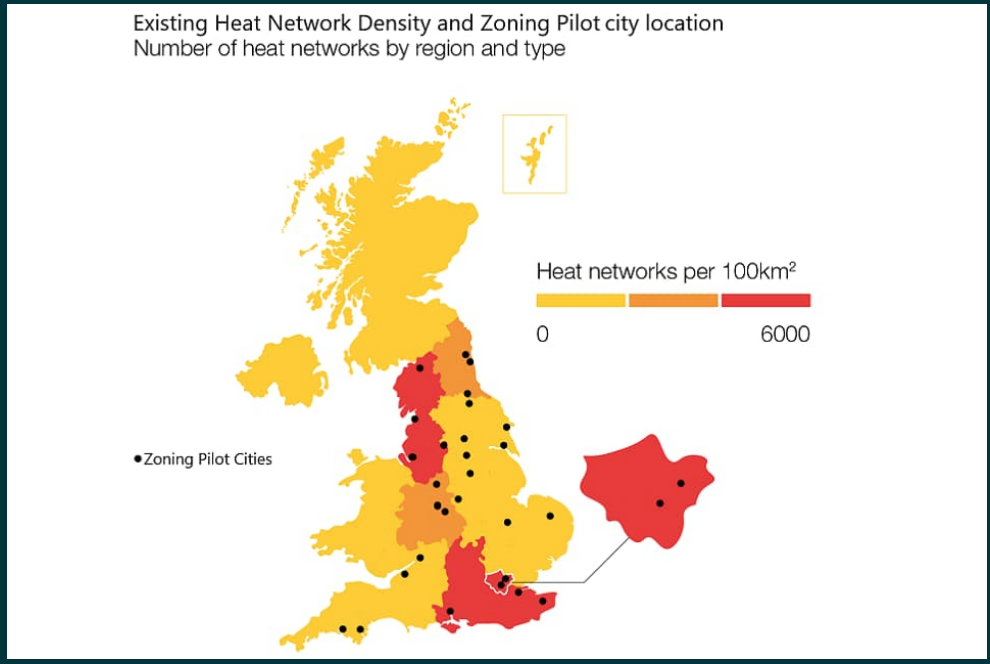
- Evolving industry (manufacturers, installation, commissioning, homeowner understanding)
- Operated and sized differently to boilers - more sensitive to controls
- Spark gap and SCOP ≈ Spark gap and SPF – up to 50% larger difference in cost of delivered heat
- SCOP impacts CO_2 savings & MAC of fabric measures
- Sensitive to other legislation and certification pressures (F-gas/MCS)

Annual Regulated Running Costs
Typical Boiler Home vs Typical Heat Pump Home



Heat Networks

- Significant policy development and investment in heat networks
- Future regulation will need to accurately capture the benefits
- Needs to promote efficient DH solutions – more so following a transition to Heat Pumps
- Heat pumps unlikely to be best solution for all dwellings
- Potential for greater demand flexibility at a larger scale



Changing game

New tools for assessment

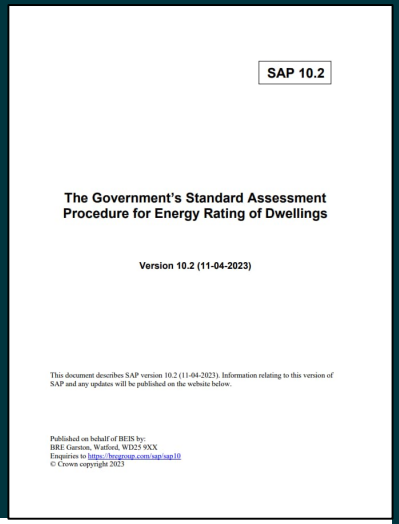
Delivering a better world

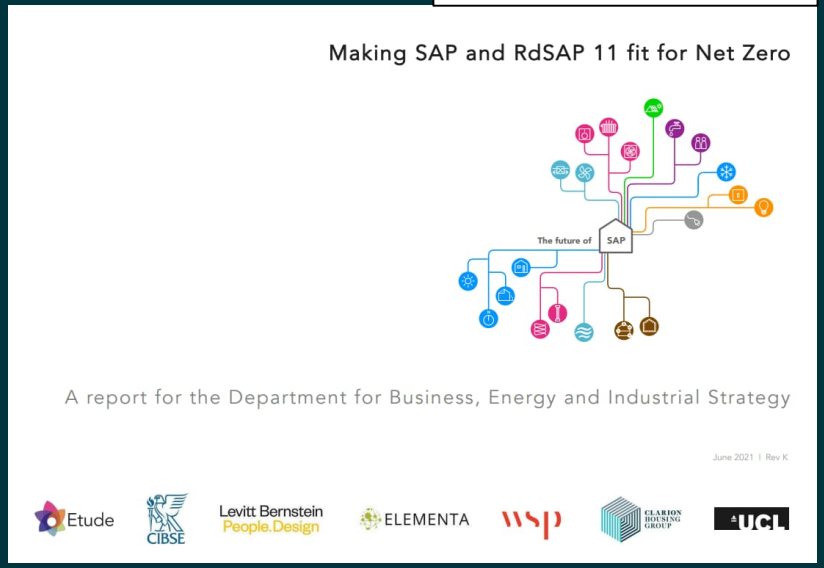
aecom.com

New Tools

- Different tools = different conclusions
- Move from SAP 10.2 to more detailed calculations could also predict different demand and system performance
- Different demand and performance estimates will impact CO_2 savings potential and MAC of specific measures
- Developing industry (manufacturers, installation, commissioning, homeowner understanding)
- Potential for industry to engage and make sure the tools enable successful outcomes

DSM





Challenges and Opportunities

Getting it right in the future

Challenges

- The performance gap – stakes are higher than ever (HTC, electricity prices, heat pump SCOP and SPF)
- Heat pumps are sensitive to the specific climate that they are operating in.
- A question of when??? how and when should heat pumps be operated
- Accurate estimation of energy flexibility benefits will require reliable grid data.
- Validity of an average national grid factor may vary with geography

Opportunities

- Cross industry focus on heat pumps, heat networks and demand management
- New tools may offer opportunity to better understand system design, controls and flexibility
- Case for PV is improving
- Sensitivity to daily variations in weather and carbon factors could be tested.
- Emerging technologies could be better modelled and understood (ambient loop with water-to-water heat pumps)
- Future consultations to give opportunity for cross-industry feedback

Piloting the Future Homes Standard

CIBSE Homes for the Future Group
Delivering low carbon, low running cost future homes

James Parker

LATIMER
by Clarion Housing Group

Why pilot the Future Homes Standard?

- Clarion Housing Group – largest HA in England
  - Latimer (the development arm) delivers circa 2000 new homes a year
- Utilising small sites to test new approaches and technologies
- Tests feed into future specifications and larger developments
- Understanding of cost, supply chain and technical implications
- Understand the implications on residents

Future Homes Standard Pilot

Peasecroft at Cottered, Herts

- 7 new homes being built to indicative FHS
- 75% carbon reduction over Part L
- 2 Bungalows and 5 terraced houses
- Testing tech led and fabric led approaches
- Masonry Construction
- Start on site March 2023
- Completion expected end of Feb 2024

LIFEBUILD. building clients for life

Pollard Thomas Edwards

Testing different approaches – “Technology Led”

- Heating and Hot water from ASHPs
- Fabric Notional FHS from 2021 consultation
- Ventilation – MEV
- Air tightness = 3 $m^3/m^2.hr$
- 2.6 kWp of PV

Testing different approaches – "Fabric Led"

- Hot water from Mixergy smart tanks with PV diverters
- Heating
  - 3 homes electric panel heaters
  - 2 homes electric Infrared panels
- Fabric U-values Notional FHS from 2021 consultation
- Ventilation – MVHR
- Air tightness = 1 $m^3/m^2.hr$
- 3.35 kWp of PV

What has been installed

- Integrated PV
- Centralised MEV
- MVHR
- Semi-rigid Ducting
- Passive Purple

Knowledge

- Information on the Future Homes Hub demonstrators Map
  - https://www.futurehomes.org.uk/peascroft
- Monthly inspections during construction
- Key lessons so far:
  - High performing doors difficult to get hold of cost effectively for small quantities
  - Required lintels not stocked by merchants – caused delays
  - Critical trades for airtightness detailing, ASHPs and MVHR are in short supply
  - Planners cautious on ASHP placement
- 12 to 18 months Post occupancy evaluation
  - Occupant surveys
  - Monitoring of internal temperatures, humidity, CO2 and energy consumption

Thank you

LATIMER
by Clarion Housing Group

Why ‘when’ matters…

CIBSE Homes for the Future Group

Delivering low carbon, low running cost future homes

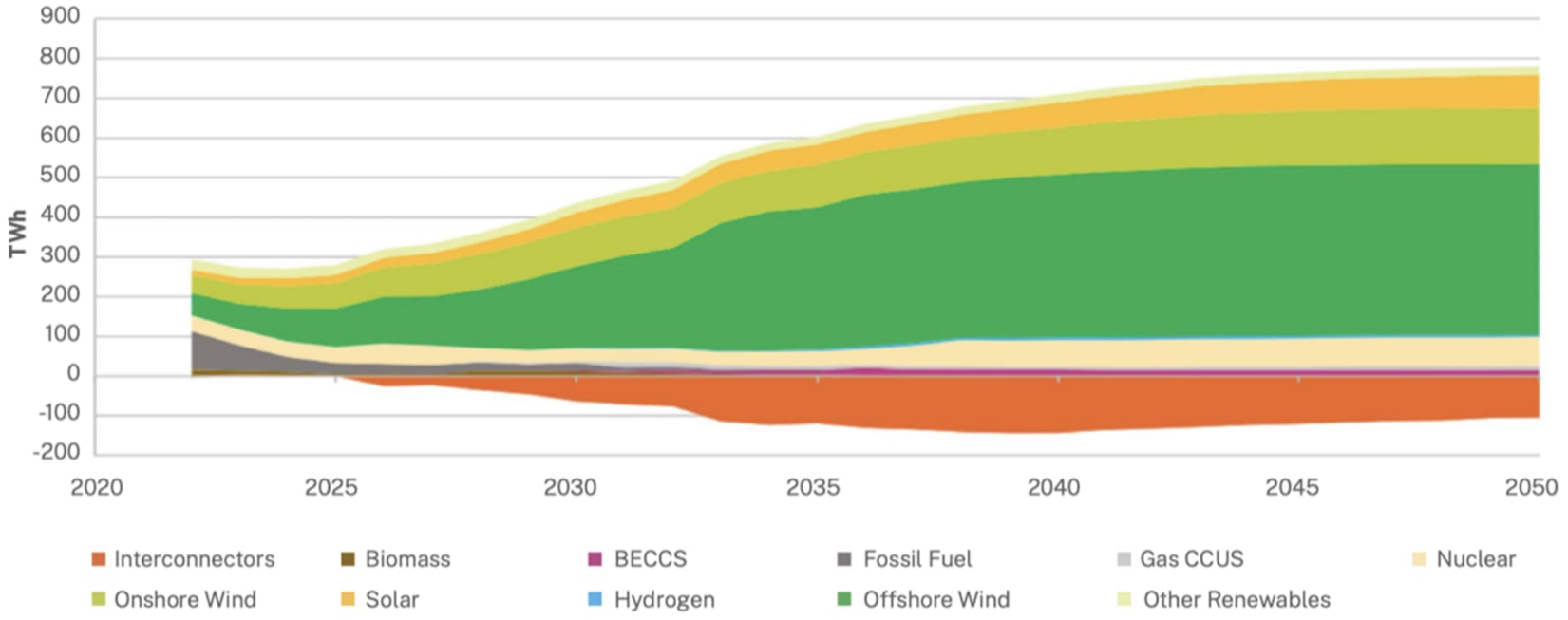
Nigel Banks

Tuesday, 12th December 2023

FLEXIBILITY

KEY IN A SYSTEM POWERED BY RENEWABLES

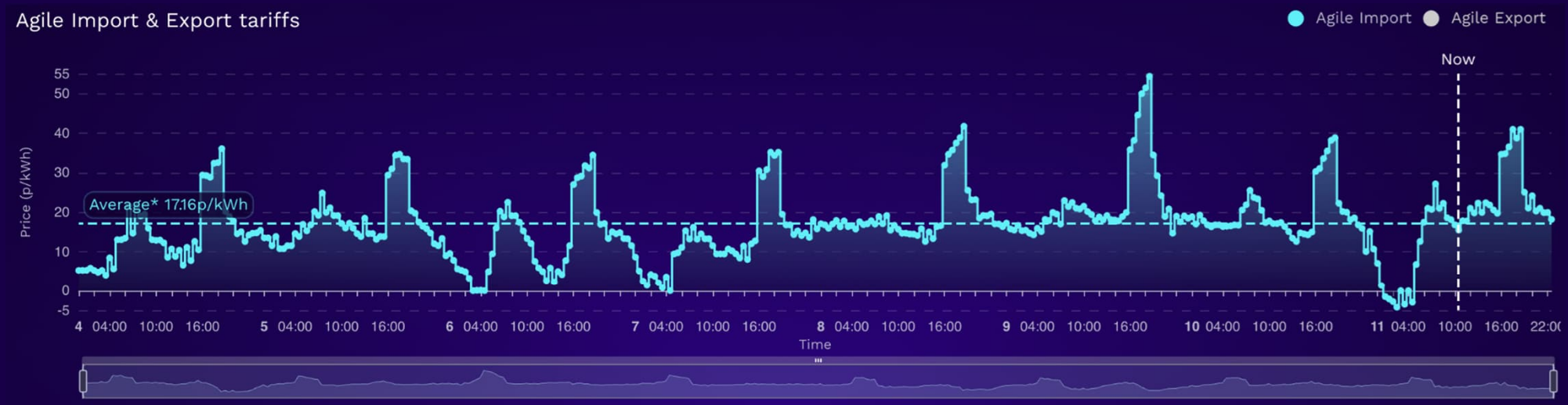
National Grid ESO's Future Energy Scenarios show growing electricity demand met by increasing share of intermittent renewables in the UK[6]



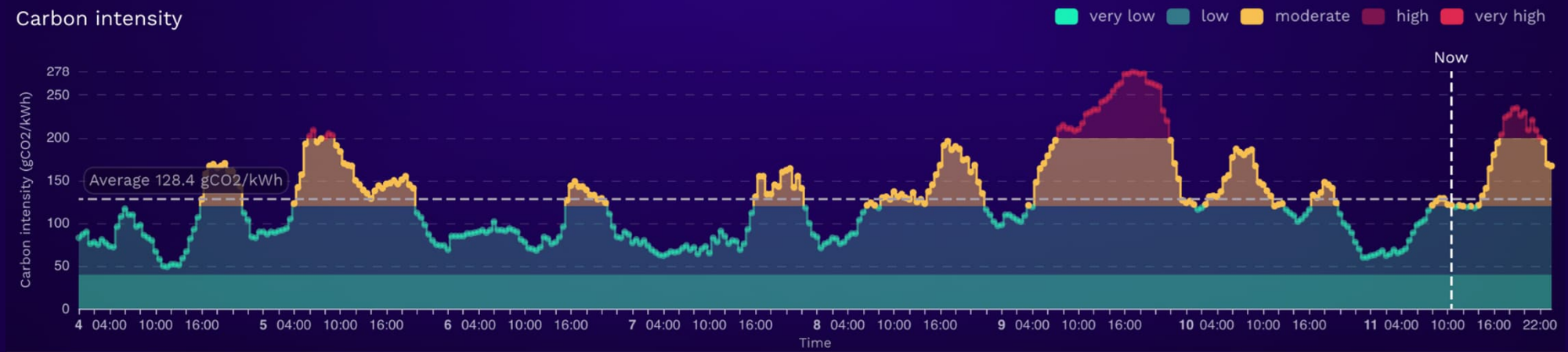
Tariffs - the third factor in performance

$$\frac{\text{Demand } (kWh/yr)}{\text{Efficiency } (\%)} \times \text{Tariff } (£/kWh) = \text{Running Cost } (£/yr)$$

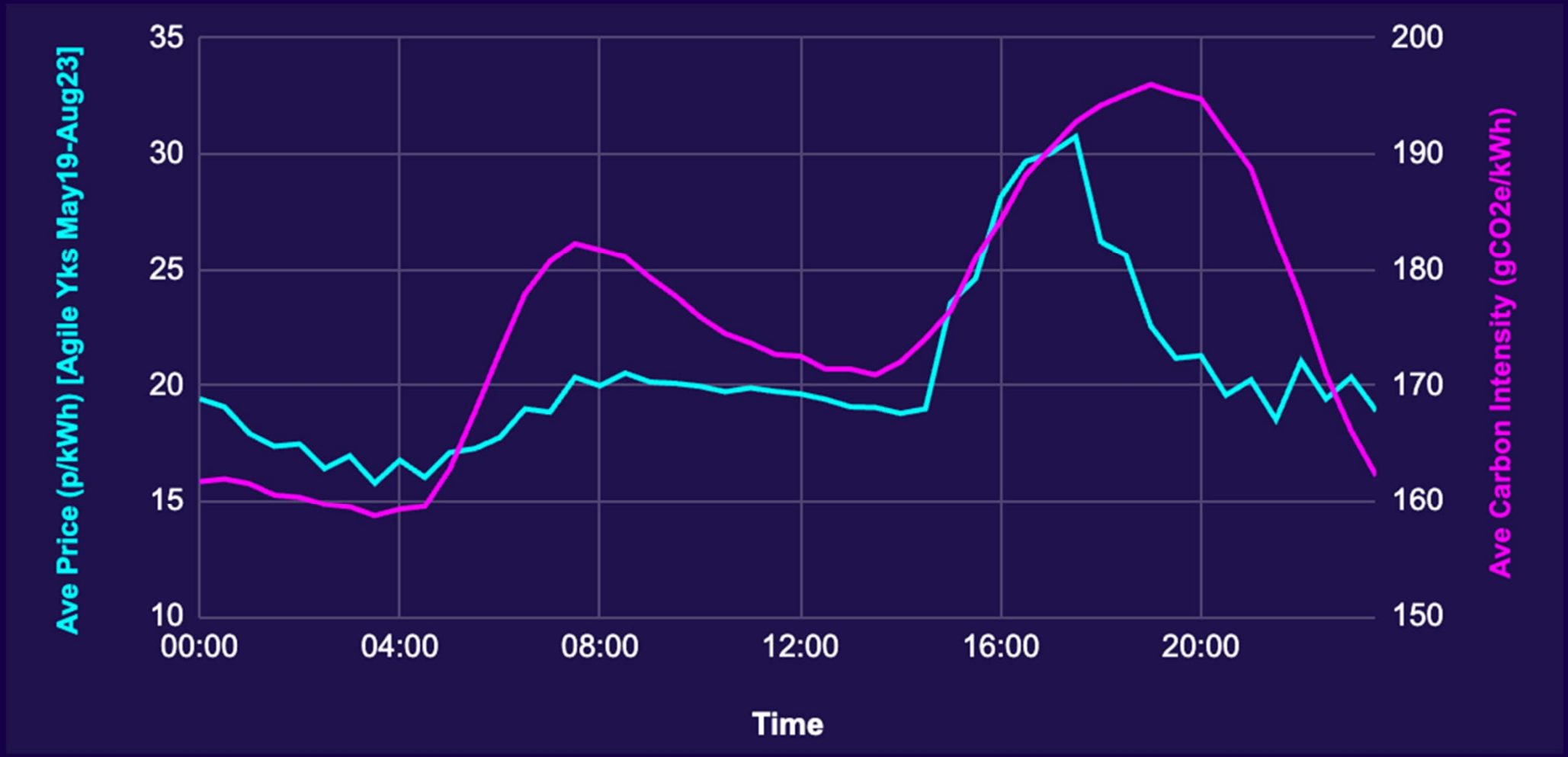
Smart tariffs drive use of low carbon electricity



* "Average" is quite subjective - you don't consume the same amount each half-hour, so if your consumption is heavily skewed to 4.00pm-7.00pm you will have a much higher average than if, for example, you charge an EV overnight. Your monthly statement has the actual average you've achieved. The Average on these graphs is therefore only a guide to what you might achieve if you consumed exactly the same amount of energy every single half hour of the day.



Smart tariffs drive use of low carbon electricity



Smart tariffs drive use of low carbon electricity

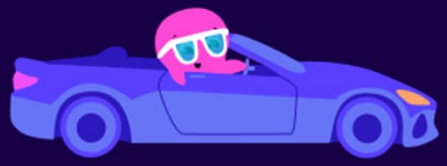
$$\frac{\text{Demand } (kWh/yr)}{\text{Efficiency } (\%)} \times \text{Tariff } (£/kWh) = \text{Running Cost } (£/yr)$$

$$\frac{\text{Demand } (kWh/yr)}{\text{Efficiency } (\%)} \times \text{Carbon Intensity } (kgCO_2e/kWh) = \text{Operational Carbon } (kgCO_2e/yr)$$

Example: Petrol *vs* EV *vs* smart EV

$$\frac{10{,}000 \text{ (miles/yr)}}{11 \text{ (miles/litre petrol = 50mpg)}} \times 1.60 \text{ (£/litre petrol)} = £1{,}454.54 \text{ (£/yr)}$$

$$\frac{10{,}000 \text{ (miles/yr)}}{4 \text{ (miles/kWh)}} \times 0.27 \text{ (£/kWh) } \textbf{\textit{Standard Tariff}} = £675 \text{ (£/yr)}$$

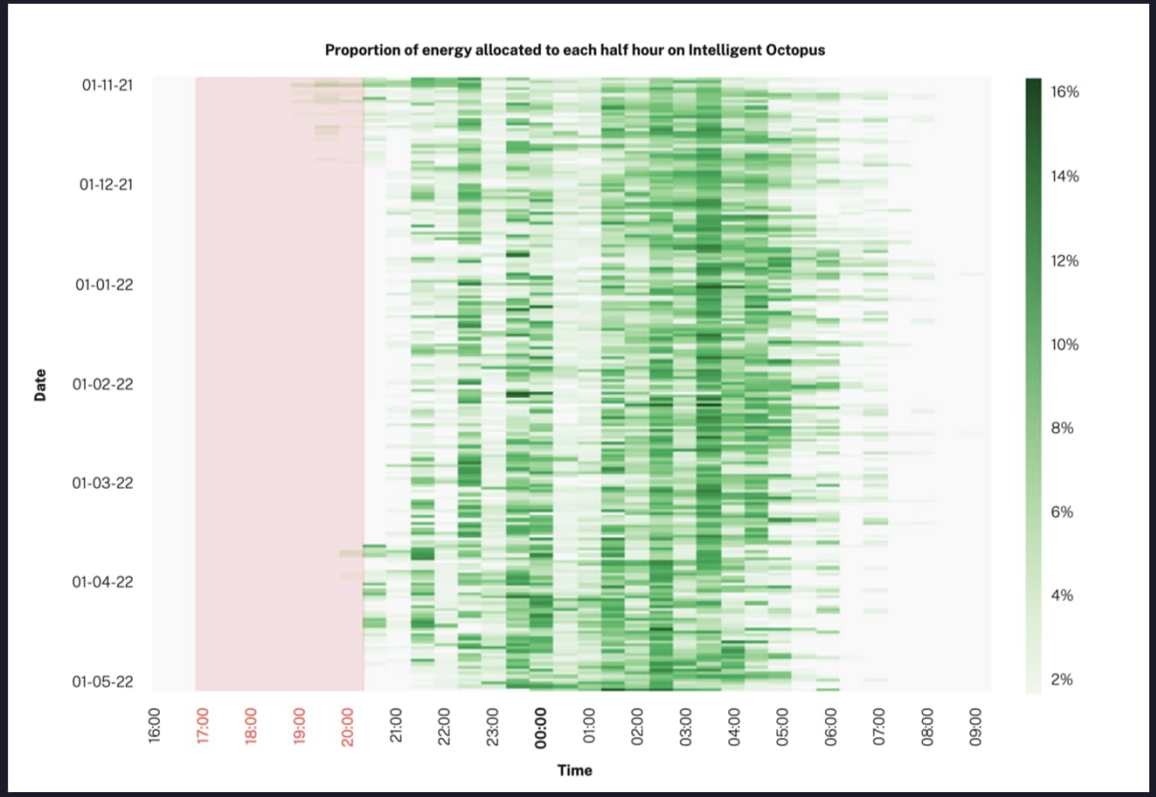


$$\frac{10{,}000 \text{ (miles/yr)}}{4 \text{ (miles/kWh)}} \times 0.075 \text{ (£/kWh) } \textbf{\textit{Intelligent Octopus Go}} = £187.50 \text{ (£/yr)}$$

LOW CARBON TECHNOLOGIES
LCTs
& SMART ELECTRIFICATION

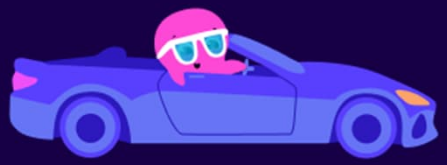
Automation will increasingly become the norm. CNZ's analysis suggests households are more likely to engage in flexibility if they have a degree of automation, while price responsiveness is greater for consumers with LCTs.

"Smart" energy assets can allow flexibility providers to better manage energy flows behind the scenes, making demand optimisation increasingly automated and empowering consumers to easily respond to dynamic price or carbon signals.



Octopus tariffs for specific devices

EV's



Intelligent Octopus Go

Plus many more!

Solar & Storage

Intelligent Octopus Flux

Plus many more!

Heat Pumps

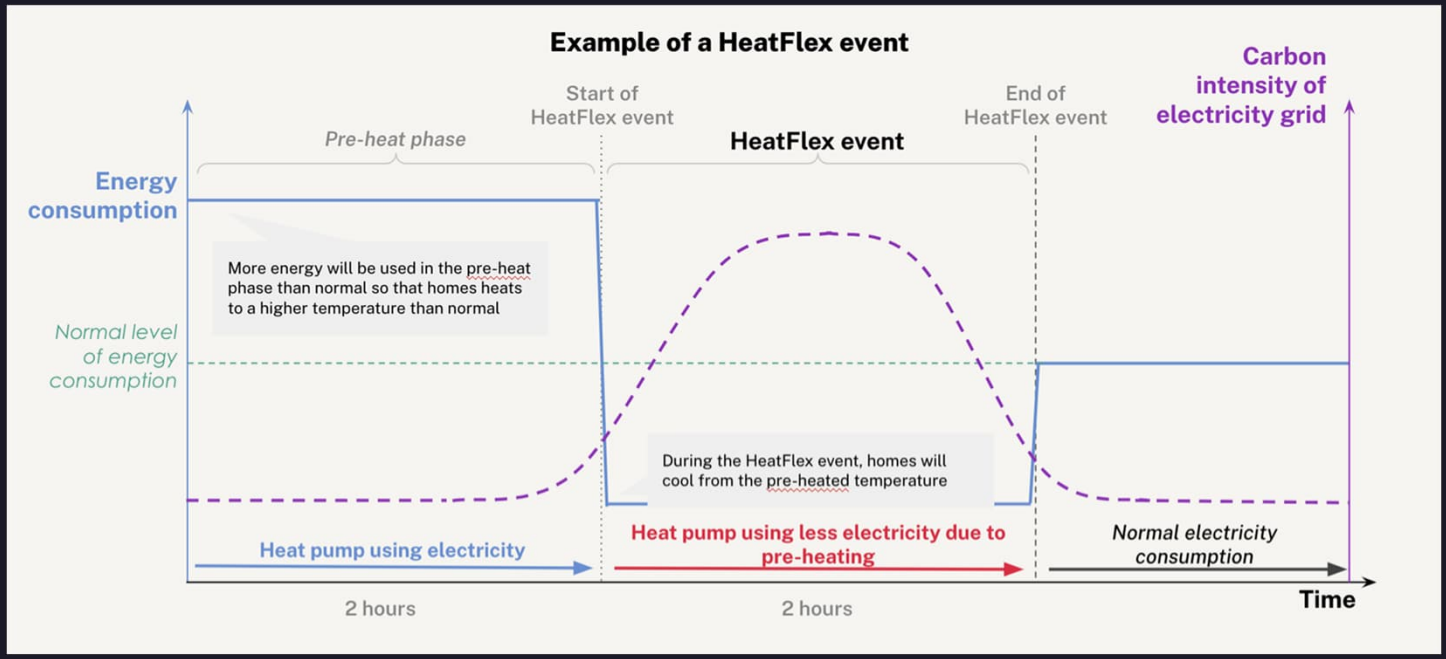
Intelligent Octopus Cosy

Plus many more!

LOAD SHIFTING IN ACTION

HEATFLEX - PILOT

Designed to investigate heat pump flexibility, consumer preferences and how these are affected by third-party automation and pre-heating



nesta

LOAD SHIFTING IN ACTION

HEATFLEX - PILOT

Key findings

1 Indicative evidence that we were able to move electricity consumption to different points in the day

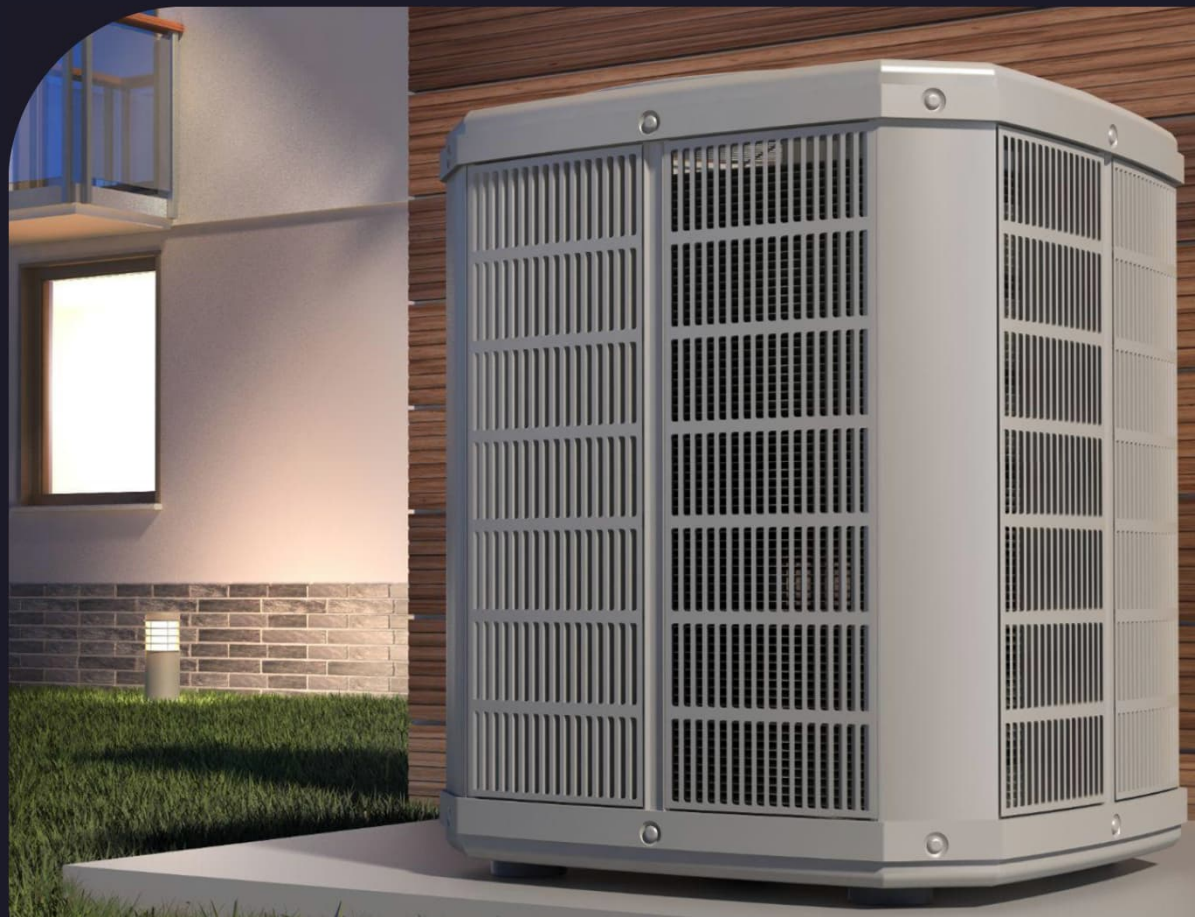
2 No evidence that days with HeatFlex events had different total electricity consumption to days without an event

3 9/10 participants reported that the automation of their heating was acceptable

4 Participants were less accepting of morning events than afternoon events

5 Temperatures generally decreased during the flexibility window by 0.3°C on average from start to end

📄 Check out the full report on our website centrefornetzero.org



ZERO BILLS

PAY NOTHING FOR 5 YEARS

octopus energy

Panel Discussion and Q & A