



Digitalisation of Green Energy series – Scottish Capabilities

21st November 2023

Digitalisation of Green Energy

What more can be done?
....and how do we involve everyone?

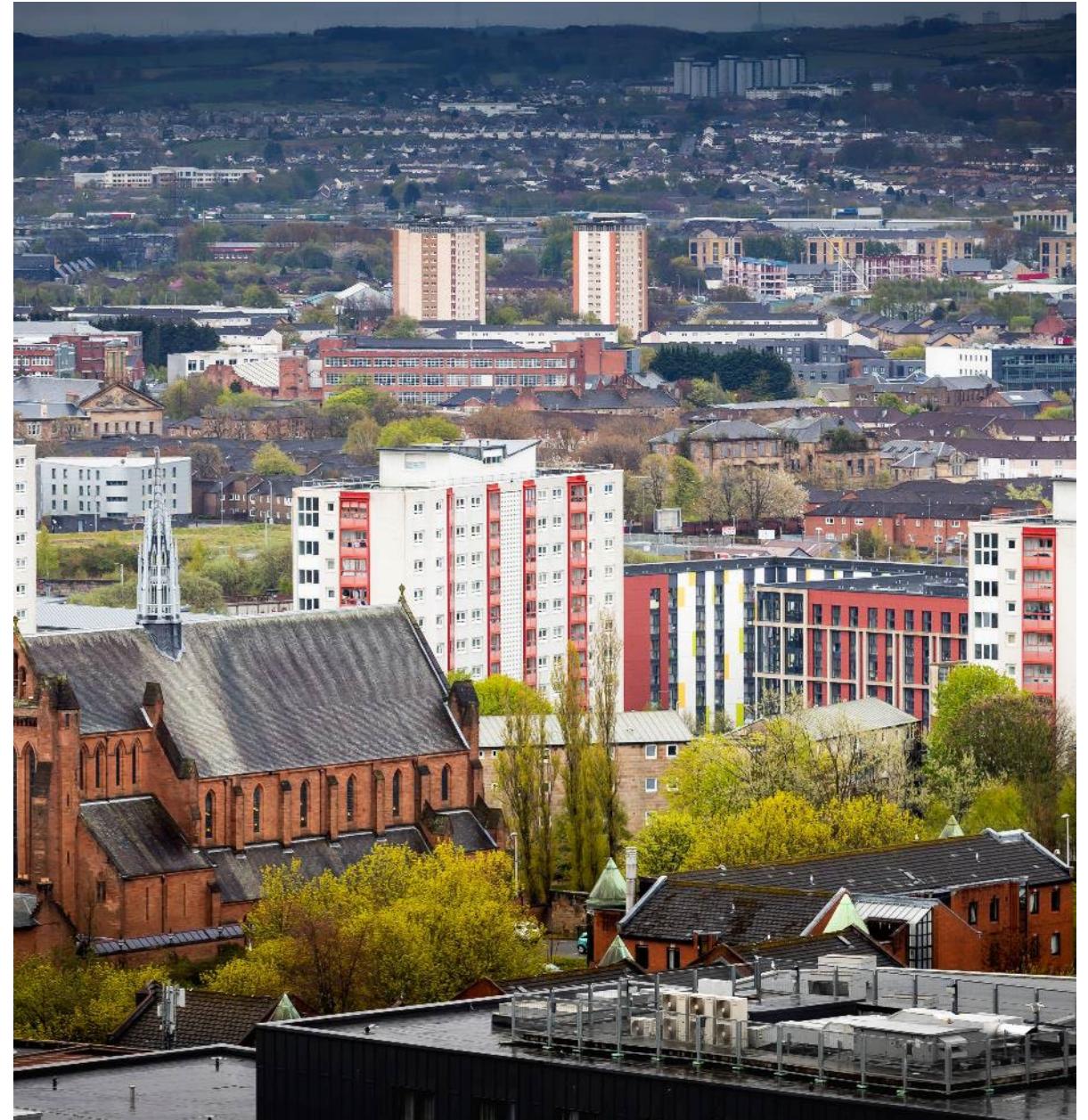
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Electric Fireplace



Fan Heater



2-bar Electric Heater

Oil-filled Radiator



Supplementary heating at 30.7p per kWh

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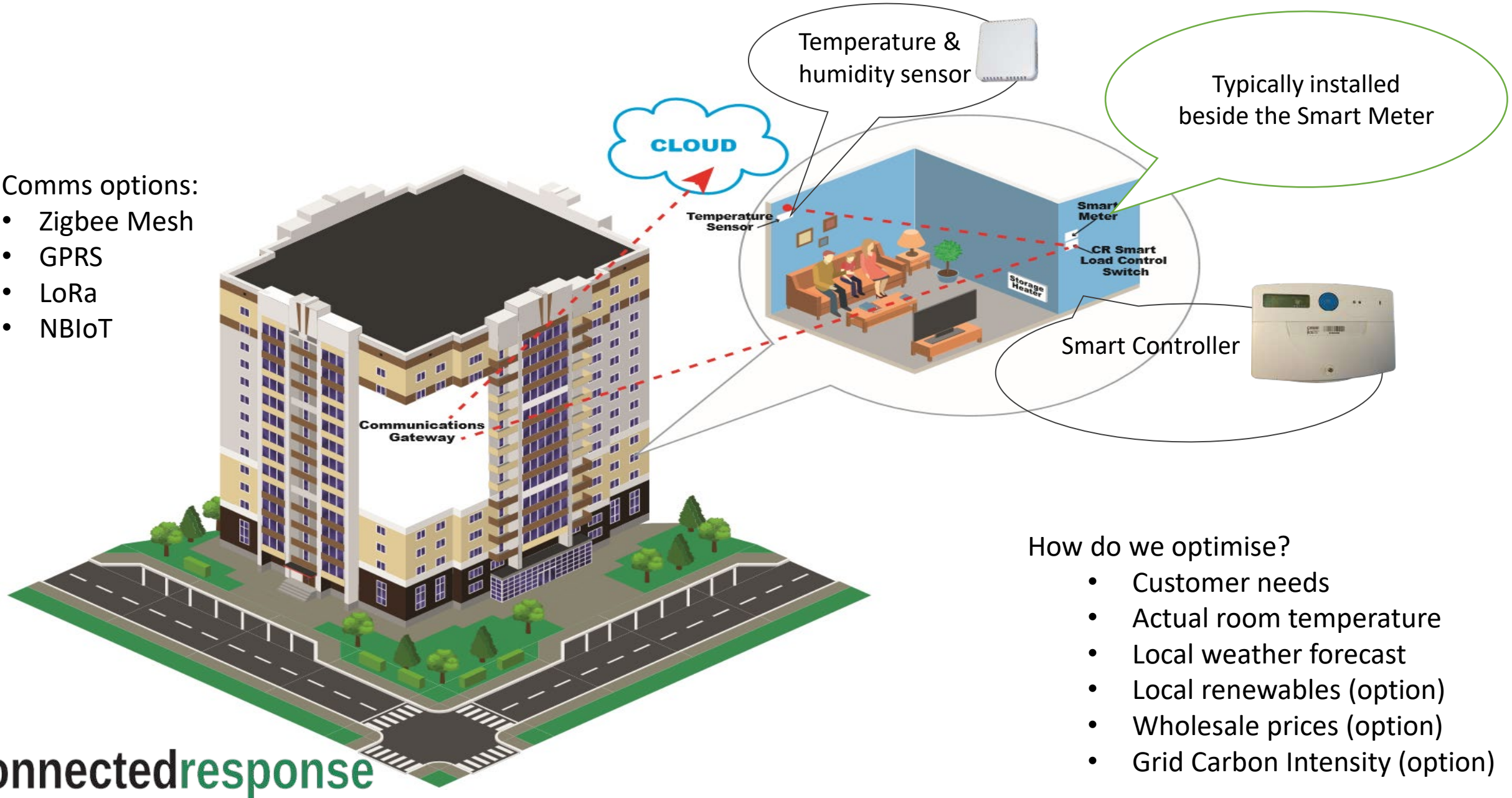
Smart control heating at 15.3p per kWh

Prices shown are Scottish Power Economy 10 tariff for PrePayment as of November 2023

SMART-CHARGING EXISTING ELECTRIC STORAGE HEATING AND HOT WATER SYSTEMS

Comms options:

- Zigbee Mesh
- GPRS
- LoRa
- NBloT



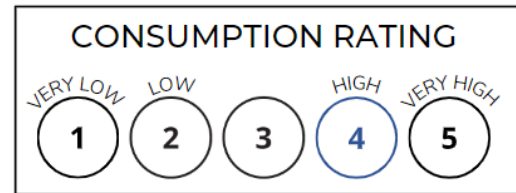
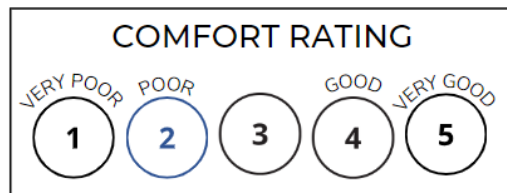
How do we optimise?

- Customer needs
- Actual room temperature
- Local weather forecast
- Local renewables (option)
- Wholesale prices (option)
- Grid Carbon Intensity (option)

BEFORE

“By late morning, I was already needing to put my house-coat on and sometimes even wrap a blanket around me!”

“It would get cold around mid-day and I would need to use additional heating in the afternoon – it was rubbish!”

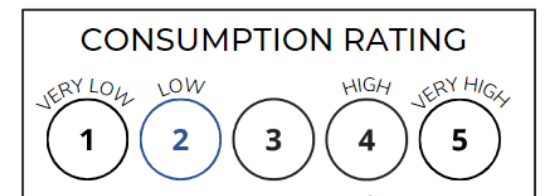
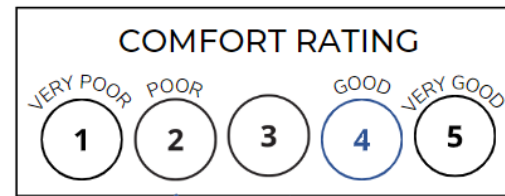


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AFTER

“The controls have made a big difference – I had bought myself a new electric fire and fireplace during lockdown, but I’ve not had to switch it on for over two years.”

“It’s been great! My children are always playing between the rooms so it’s great brilliant to have the entire flat warm throughout the whole day, regardless of how hot or cold it is outside.”



Overall Aggregated Consumption Reduction in Wheatley Properties



Case Study 1 - Using Local Renewable Energy in Local Communities

- EnergyLocal enables households to show when they are using local renewable power
- Better for renewable generation, residents, and the grid
- Initial project in Bethesda in North Wales using National Trust Hydro generation
- Connected Response Consumer Access Device (CAD) installed in each property reads the smart meter and report to EnergyLocal

A screenshot of a web application window titled "EL CAD server". The window has a menu bar with "Administration", "Filter", "View", "Help", and "Refresh". Below the menu is a table with columns: "Plot", "Node description", "Last contact", "Status", and "Location". The table contains multiple rows of data, each representing a different meter or plot. The data includes meter IDs, software versions, last contact times, and status information.

Plot	Node description	Last contact	Status	Location
EL-501	Meter CAD B20BG20501-ESME Software ID 26, version 11, built at 1728 on 26/04/22	03:07 GMT today	15589.183 KWh, 0.293 KW, read at 03:07 GMT today.	0.0.0
Unknown	Meter CAD B20BG20419-001C550000008091 Software ID 26, version 11, built at 1728 on 26/04/22	03:07 GMT today	11682.871 KWh, 0.136 KW, read at 03:07 GMT today.	0.0.0
EL-504	Meter CAD B20BG20504-001C550000001316 Software ID 26, version 11, built at 1728 on 26/04/22	03:07 GMT today	13116.995 KWh, 0.156 KW, read at 03:07 GMT today.	0.0.0
EL-286	Meter CAD B20BG20286-ESME Software ID 26, version 11, built at 1728 on 26/04/22	03:07 GMT today	6813.266 KWh, 0.052 KW, read at 02:56 GMT today.	0.0.0
Unknown	Meter CAD B20BG20450-001C550000004001A5 Software ID 26, version 11, built at 1728 on 26/04/22	03:07 GMT today	12957.661 KWh, 0.052 KW, read at 03:07 GMT today.	0.0.0
Unknown	Meter CAD B20BG20173-001C5500000003315 Software ID 26, version 11, built at 1728 on 26/04/22	03:08 GMT today	12786.121 KWh, 0.248 KW, read at 03:05 GMT today.	0.0.0
EL-508	Meter CAD B20BG20508-001C550000001354 Software ID 26, version 11, built at 1728 on 26/04/22	03:08 GMT today	10048.502 KWh, 0.088 KW, read at 03:08 GMT today.	0.0.0
Unknown	Meter CAD B20BG20509-001C55000000032AD Software ID 26, version 11, built at 1728 on 26/04/22	03:08 GMT today	10210.828 KWh, 0.163 KW, read at 03:08 GMT today.	0.0.0
EL-514	Meter CAD B20BG20514-ESME Software ID 26, version 11, built at 1728 on 26/04/22	03:08 GMT today	9743.165 KWh, 0.156 KW, read at 03:08 GMT today.	0.0.0
EL-516	Meter CAD B20BG20516-ESME Software ID 26, version 11, built at 1728 on 26/04/22	03:08 GMT today	21485.089 KWh, 0.205 KW, read at 03:08 GMT today.	0.0.0
EL-519	Meter CAD B20BG20519-001C550000001004D1 Software ID 26, version 11, built at 1728 on 26/04/22	03:08 GMT today	10529.547 KWh, 0.081 KW, read at 03:08 GMT today.	0.0.0
Unknown	Meter CAD B20BG20519-ESME Software ID 26, version 11, built at 1728 on 26/04/22	03:08 GMT today	9694.560 KWh, 0.013 KW, read at 03:08 GMT today.	0.0.0
EL-345	Meter CAD B20BG20345-19M00009600 Software ID 26, version 11, built at 1728 on 26/04/22	03:08 GMT today	162443.606 KWh, 2.727 KW, read at 03:06 GMT today.	0.0.0
CR-KC	Meter CAD B20BG20538-ESME Software ID 26, version 11, built at 1728 on 26/04/22	03:08 GMT today	17098.505 KWh, 0.056 KW, read at 03:08 GMT today.	0.0.0
EL-231	Meter CAD BTeBleegies—17K0505936 Software ID 26, version 11, built at 1728 on 26/04/22	03:08 GMT today	19940.053 KWh, 0.000 KW, read at 03:08 GMT today.	0.0.0
EL-415	Meter CAD B20BG20415-001C5500000001356 Software ID 26, version 11, built at 1728 on 26/04/22	03:08 GMT today	5740.195 KWh, -0.004 KW, read at 09:01 GMT on Thursday 9th November 2023.	0.0.0
EL-385	Meter CAD B20BG20385-001C5500000002D88 Software ID 26, version 11, built at 1728 on 26/04/22	03:08 GMT today	12201.320 KWh, 0.602 KW, read at 03:07 GMT today.	0.0.0
EL-468	Meter CAD B20BG20468—18K0063720 Software ID 26, version 8, built at 0258 on 29/05/21	03:08 GMT today	6619.527 KWh, 0.021 KW, read at 03:07 GMT today.	0.0.0

Connected Response CAD Server for EnergyLocal



Connected Response CAD

Case Study 2 - Matching Loads with Network Needs

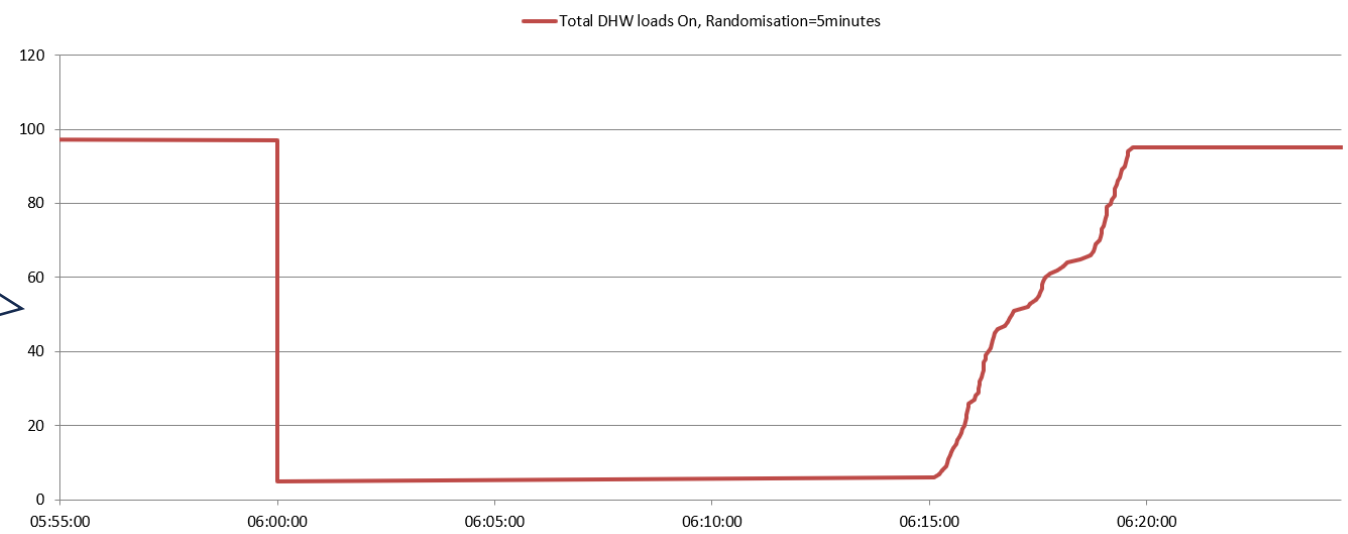
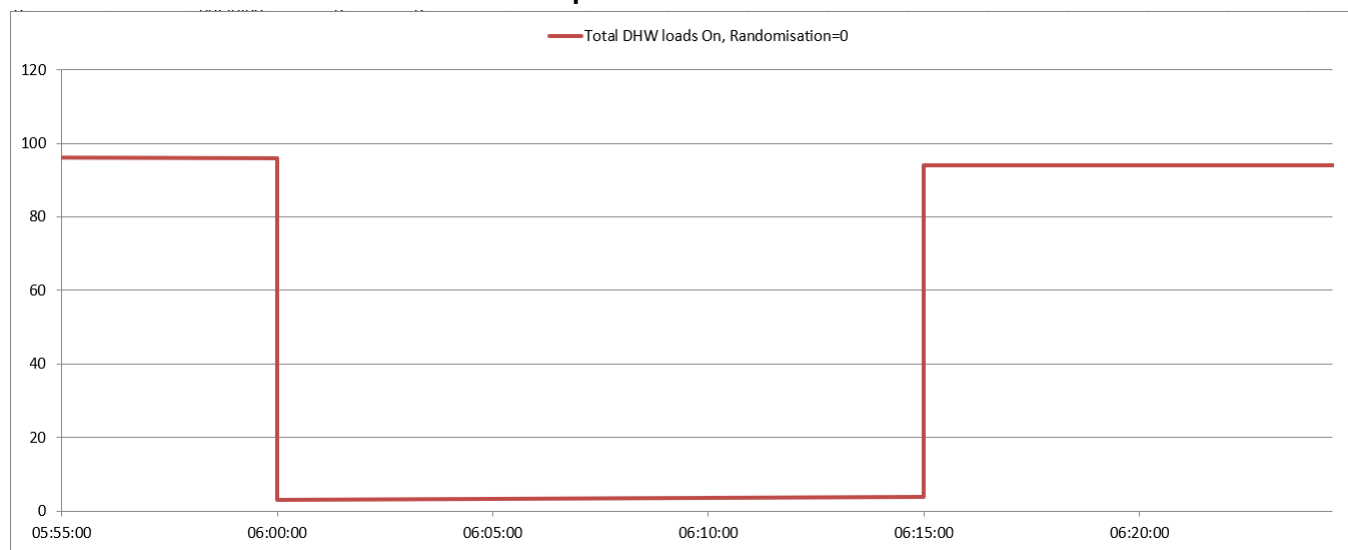
- Flexible Tower Network Innovation Allowance Project - activities included:
 - Cold start random delay after power cut
 - Shift loads to lower peak transformer power



What happens now

Connected Response smart controls can be set to 5 minute randomise restart

Number of flats with heating loads 'on' during & after a 15 minute power cut



Case Study 3 - Matching Hot Water Charging with Curtailed Wind

Energy Cloud Scotland trial to dynamically switch hot water charging to match curtailment



Wind Curtailment for 15 November 2023

Curtailed Wind

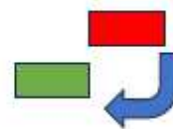
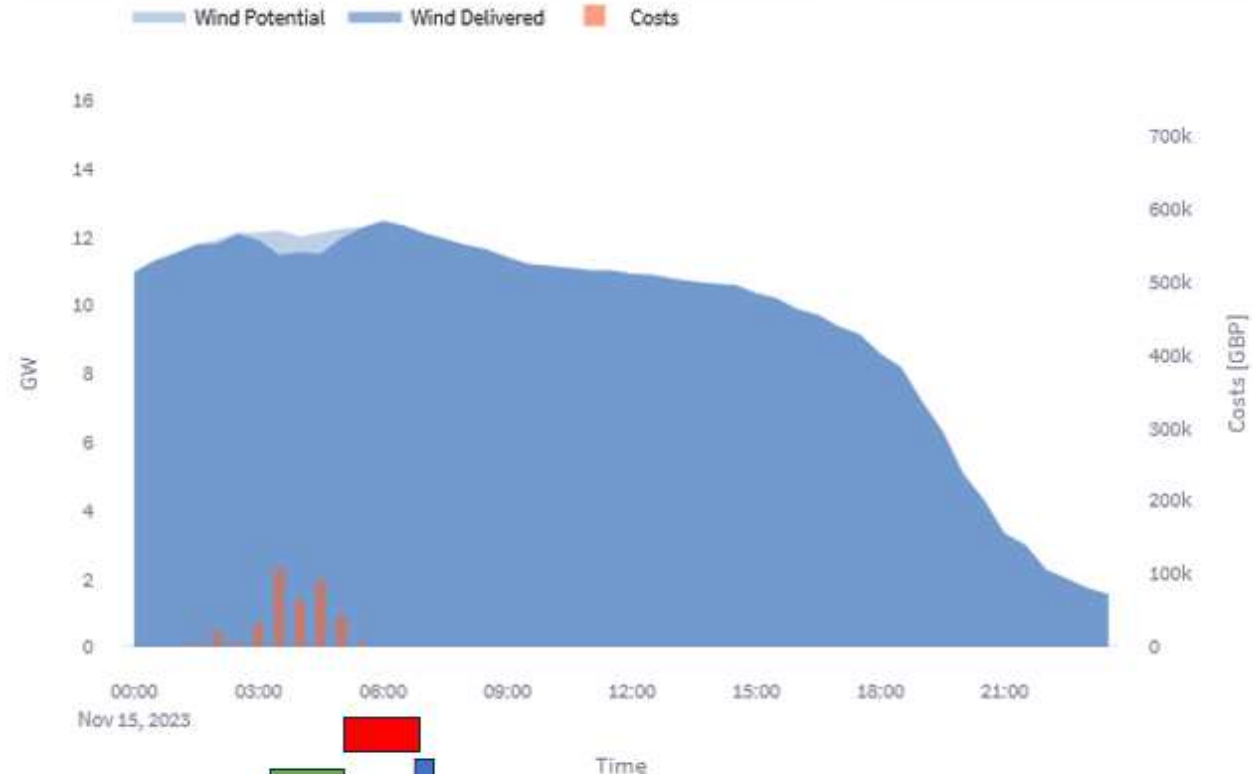
1.2 GWh

Cost

£357.5K

CO2 Emissions

0.5kt



WHG tenants hot water heated 3-5am not the standard 5-7am

Case Study 4 - Charging in line with grid carbon intensity

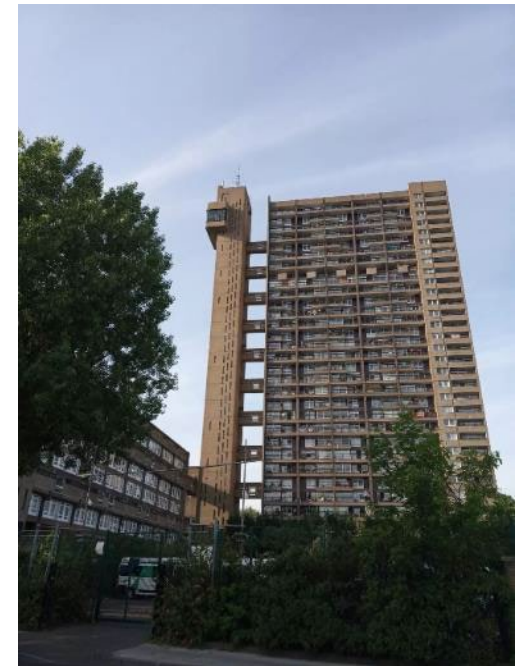
- Working with Peer Carbon and Energy Unlocked (London-based SMEs)
- Do flexibility services deliver lower carbon?
- 9 to 14% carbon reduction by moderate flexing without resident comfort or cost compromise



Storage Heater



Hot Water Cylinder



Trellick Tower Smart Controls
Installed 2020

Conclusions

Digitalisation and Smart Dynamic control:

- can better utilise renewables locally
- can match heating load with national renewables
- can help address fuel poverty.....and years of gross inequity
- can fast-track decarbonisation

But.....

- not solely for middle-class early adopters
- must engage Low Income Vulnerable households
- “Do it for them, not to them” - *Social-Licence-to-Automate*

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