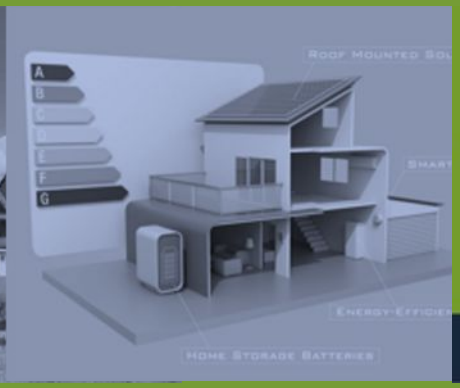




Affordable Net Zero Homes

Neutral Home

https://www.neutralhome.co.uk

Part funded by:

UKRI Innovate UK

Who are we ?

Experts in energy management and sustainability

Bringing 20+ years experience from the commercial sector to the UK residential sector

We are technology agnostic so we bring together the best available combinations for each project

Who we are and what we do?

Affordable Retro-fit net zero homes, open to all, that save lots of money

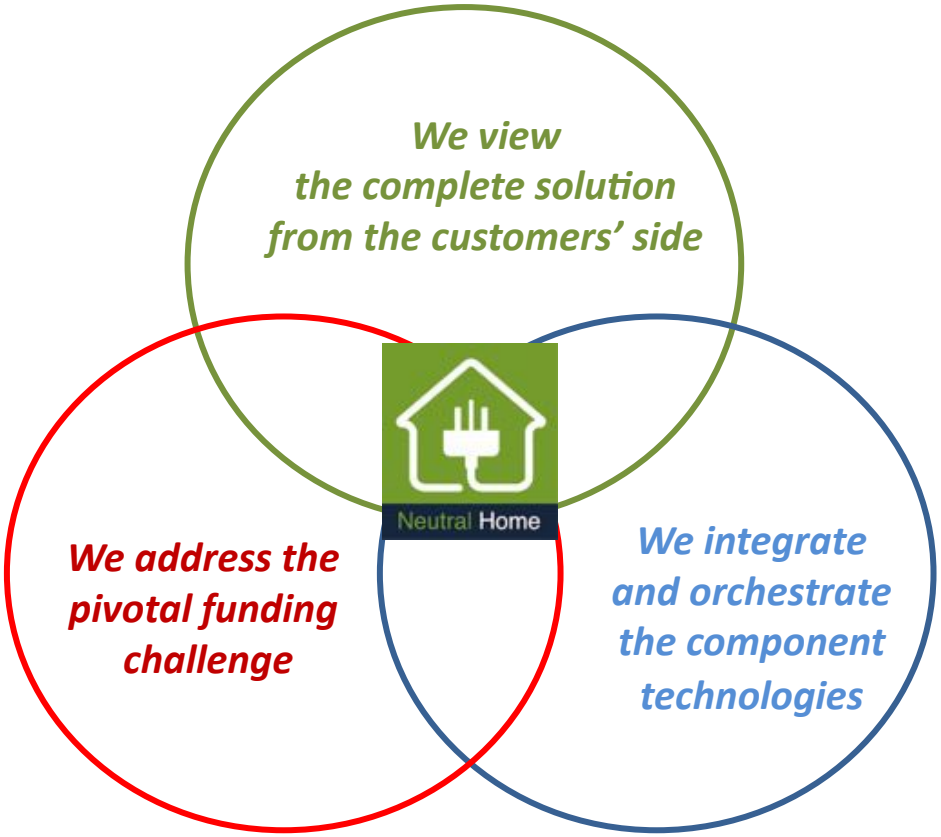
29m homes

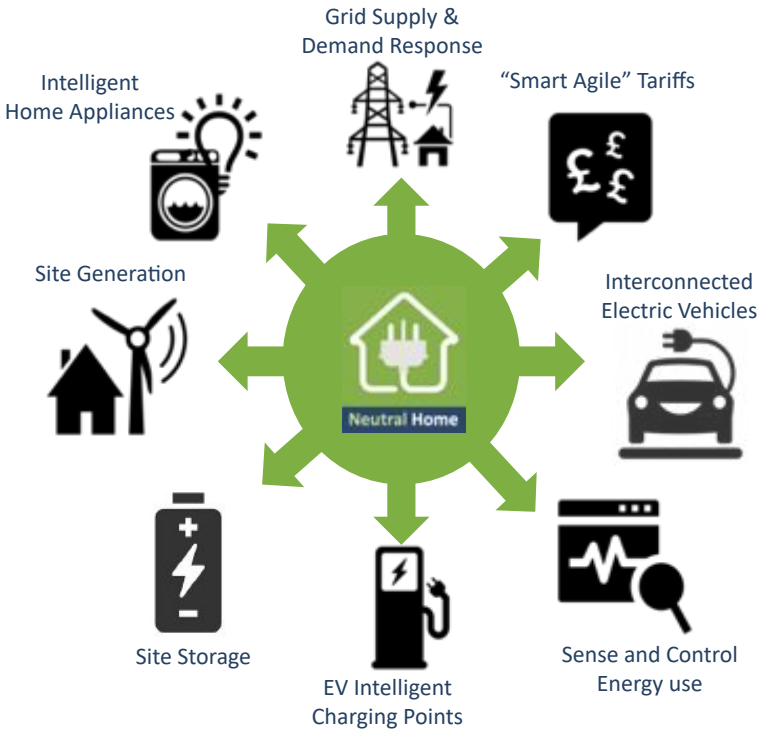
- Net zero aspiration
- £ 150+ per month energy bill
- The paid upfront model

- Address fuel poverty
- £ 50-150 per month energy bill
- Aggregation synergies
- The funded model

What do we mean by integration - The Brain

Connecting all the pieces of the energy puzzle together…….and add the missing piece.





Three steps to radically reduce energy bills

Build the energy foundations *…then double up* *…and double again*

1: Home *Start* + **2: Home *Store*** + **3: Home *Sum*** =

An affordable net zero home

and up to 80% lower cost

You Save 20%

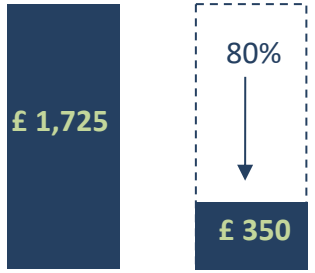
You Save 20%

You Save 20%

You Save 20%

You Save 20%

You Save up to 40%



Annual energy cost (2020)

Average size detached home with two cars

20%

Deploy the Home Brain:

- Energy consumption manager
- Voltage Optimizer
- Temperature Optimization
- Create the future business case

40%

Use the Home Brain :

- Move to Time of Use Tariffs
- Add House battery
- Use brain to store/use power at the optimum times of day
- Power outage back-up
  (NB Battery must store 20% daily consumption)

EV Integration (Future):

- Optimum time to charge
- Flexible use of car battery for home

Up to 80%

Deploy Solar PV Generation with the Home Brain

- Model the optimum PV system
- Manage generated power with TOU tariffs:
  - When to use
  - When to store
  - When to export

PV Generation < 67% annual consumption)

Active Demand Management (Future):

- Instantaneous grid load shedding
- Instantaneous grid storage

Neutral Home Projects – Detached Houses

Project 1:
Future proofing a property

Status/Results:
Complete

60% expansion in space
75% reduction in energy cost

Project 2:
Deliver to a fixed budget/ROI

Status/Results:
Underway

Insulation/Windows upgrade
Energy monitoring
Solar PV & battery storage
Agile tariff & demand management

Project 3:
New Build Potential

Status/Results:
Build started: 90% reduction in energy cost
Four year payback

Neutral Home Projects – Apartment Complex

A Housing Association development with 56 tenants

- Conversion from commercial to residential in 2015
- All electric systems
- Single incomer and landlord supply contract on commercial terms

Thermal Image (8 Dec 2020 9.40am)

56 Flat Consumption: 378,150 kWh p.a.

Site Consumption: 144,900 kWh p.a.

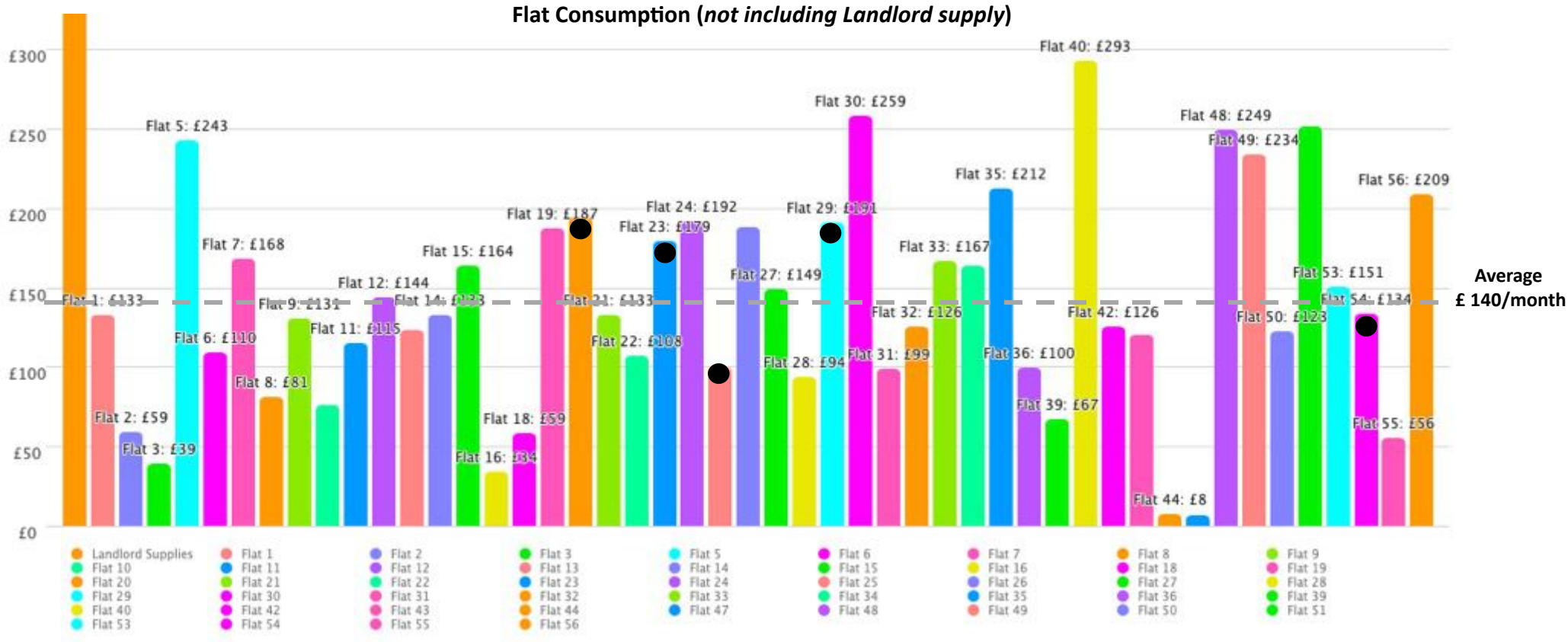
Total 523,050 kWh p.a.

Energy Cost p.a. **£ 81,090 p.a.**

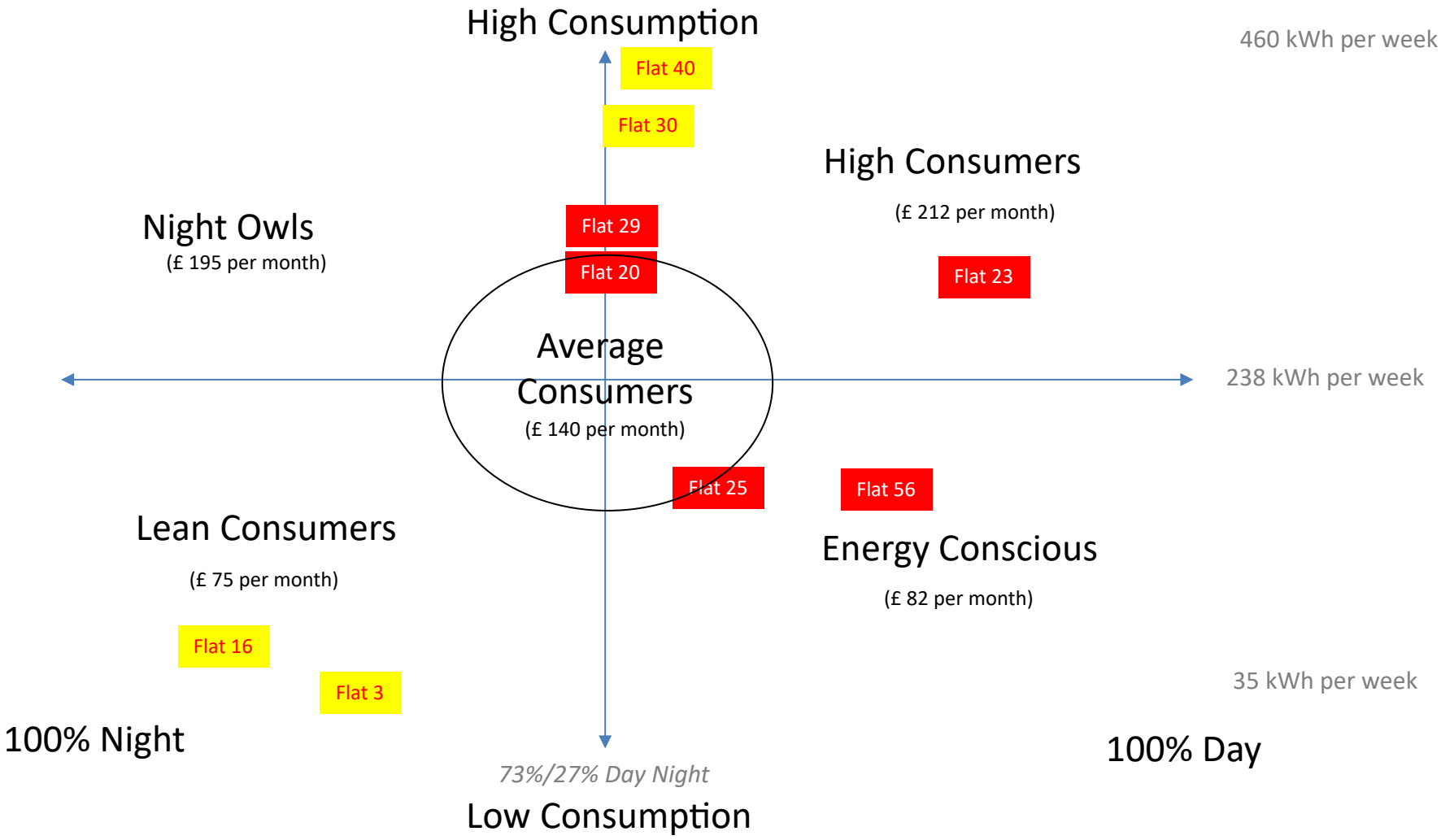
A third of the residents will have bills above £ 200 in January

There are **seventeen** residents whose bills will be above £ 200 per month, and **six** above £ 250 for January

● Residents that have previously complained about excessive energy bills



Tenant segmentation and selection



Building Micro grid

We project 20% of the annual consumption can be generated onsite, taking the full site off-grid for 3 months p.a. and allowing it to move up to 20% of the consumption to lower cost tariffs in the winter

Grid
Energy Provider

xyz kWh

Exported back to Grid
(after any other storage opportunities)

PV Generation System
= 95,500 kWh p.a.

Annual Consumption
= 513,000 p.a.

Voltage
Optimizer
400 Amps

xyz kWh

Imported directly
Energy from Grid

xyz kWh

Consumed at Peak Times
(Autumn/Winter)

xyz Wh

Consumed
Between sunset/rise

xyz kWh

Consumed at the time of generation
During day light hours

xyz kWh

Battery Arbitrage in Autumn/Winter
(Buy at low cost times of day)

Site Modular Battery
= 312 kWh

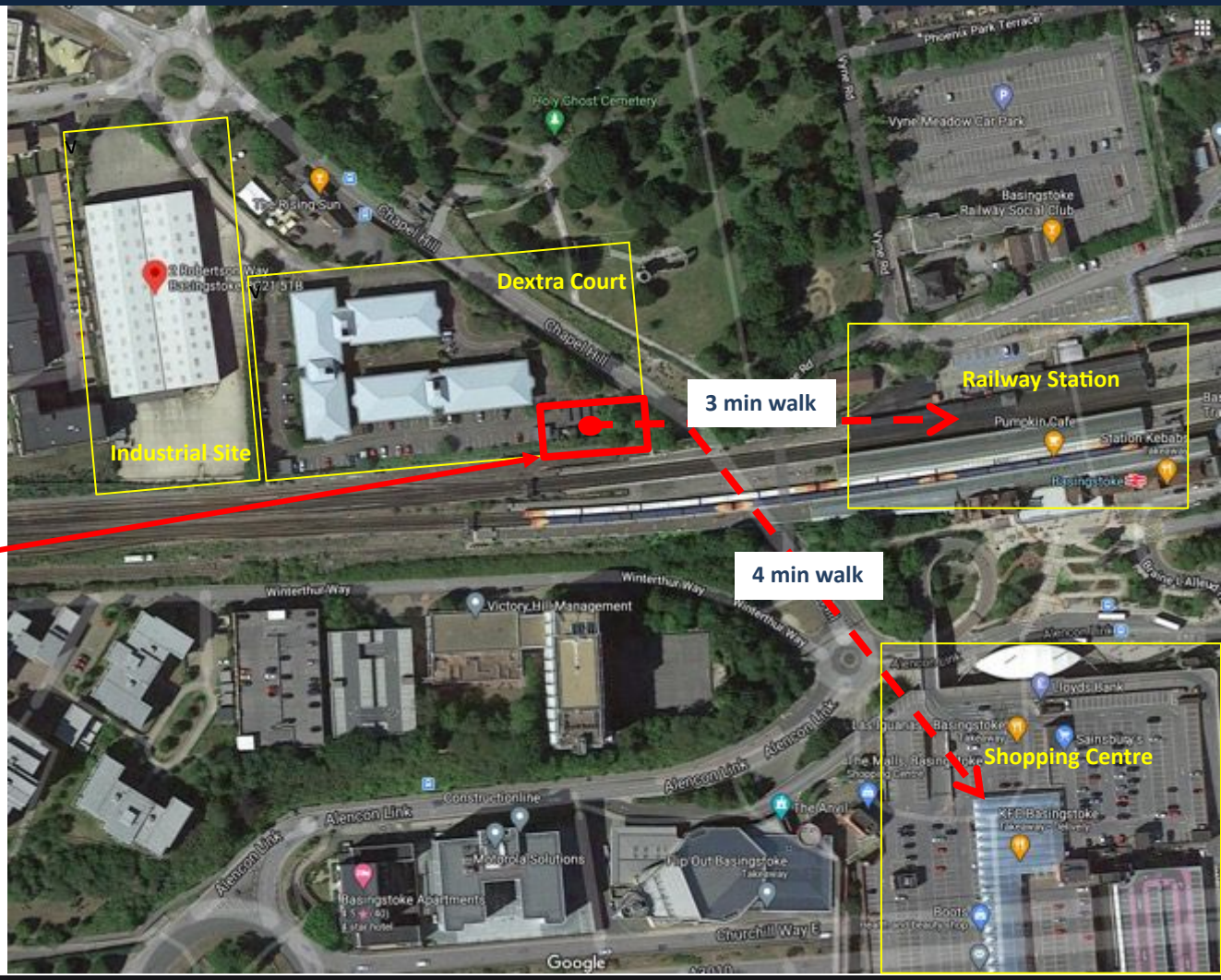
xyz kWh

Stored in battery for use later
Spring/Summer

Dextra Court has excess parking capacity and is close to many amenities

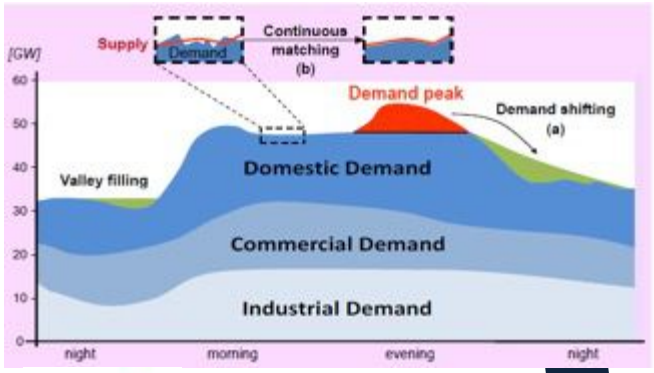
Shared EV Charging Station

- Dextra Court Residents
- Train Commuters
- Shoppers
- Courier Fleet overnight parking



4: Future Eco-system Infrastructure

Demand Side Response



Flexitricity

- Frequency Response
- Load balancing
- Peak Shaving
- Storage

Revenue generation selling utilized Capacity to the grid

Up to 300kVA supply
Up to 0.5 mWh storage

Dextra Court Energy Eco-system

Onsite Electric Vehicle Charging Capability

- Residents
- Commuters
- Fleet owners

Fuuse

- Hardware Infrastructure
- Software Management Platform
- Vehicle to Grid

13

2: Flat Level Solution: Smart Heat

Smart Heat solution is made up of three IOT solutions connected together on its own Wifi communications infrastructure.

1: TADO Smart Room Thermostat

Manage Air Temperature

- Monitors and records temperature
- Controls temperature to variable time blocks across the day
- Detects window/door open
- Detects when you have left home
- Monitors air quality (including carbon monoxide)

Manage Water Heating

- Reduce unnecessary heating events
- Water temperature optimization
- Move heating events to low cost tariffs
- Store heat during excess generation
- Legionella control management

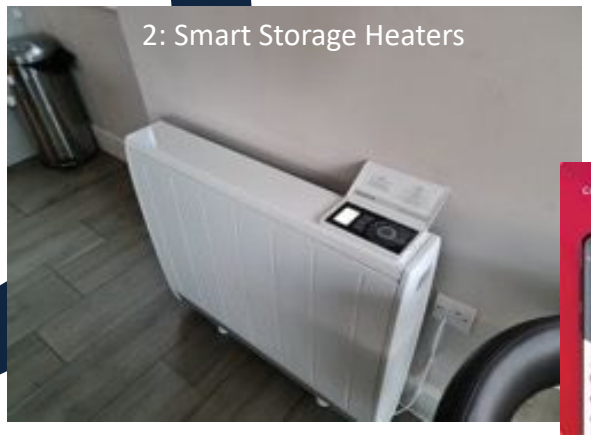
Standalone local control

3: Tsmart Water Thermostat

4G “Mifi” Connector
(Flat infrastructure)

Manage Heat

- Stores heat during low cost tariffs
- Releases heat progressively thru day
- Adaptive learning to use conditions
- Store heat during excess generation



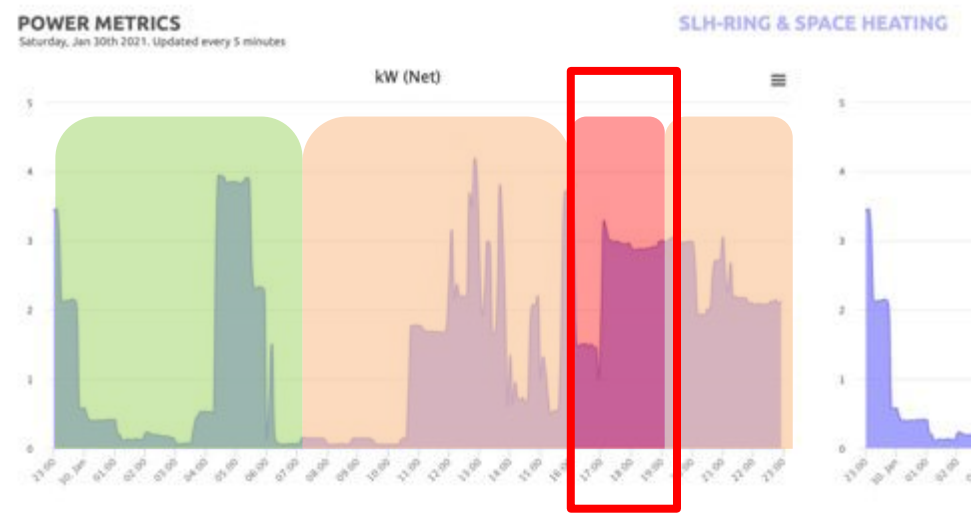
2: Smart Storage Heaters

Standalone local control

Smart Storage Heaters – 25-32% saving cost per day

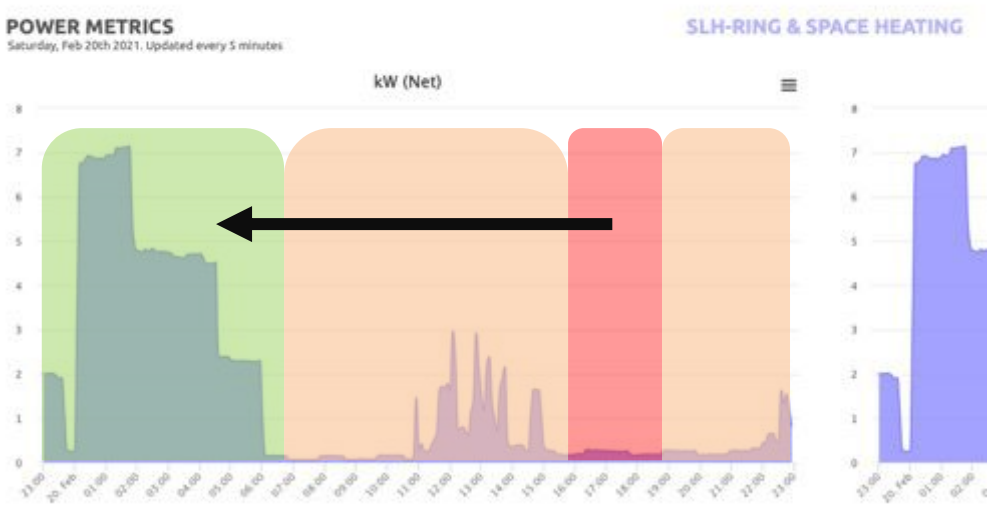
Before: Total Daily Consumption 37 kWh

Night 25% Day 75%



After: Daily Consumption 37 kWh

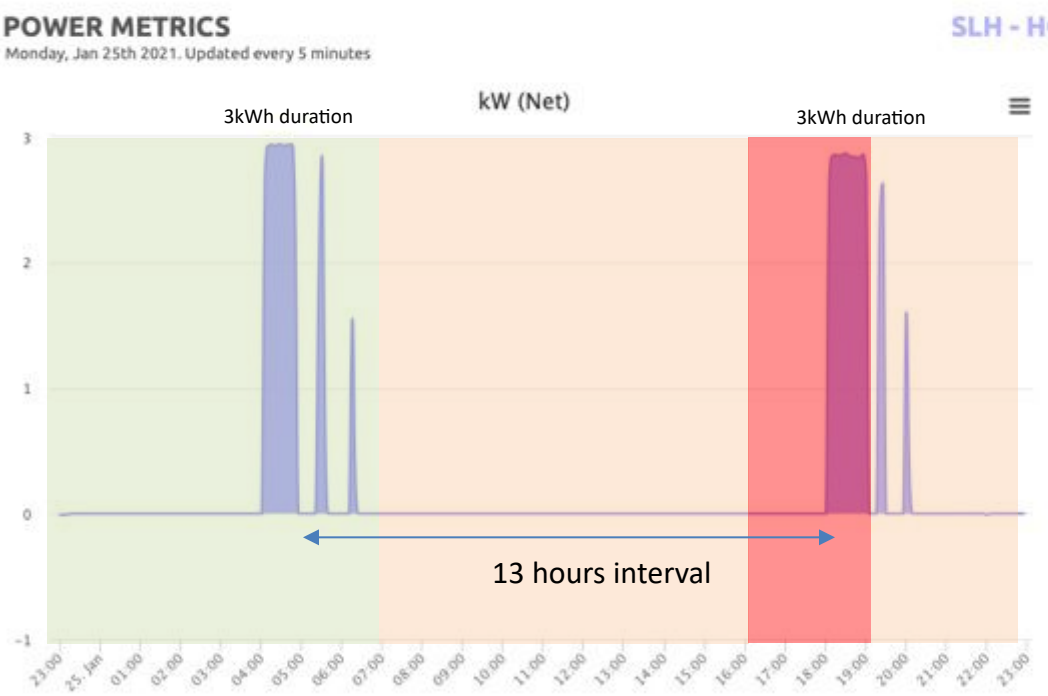
Night 79% Day 21%



	Before		After	
Tariff Type	**Cost/Day**	**%**	**Cost/Day**	**%**
Flat Rate	**£ 5.71**	**100%**	**£ 5.71**	**100%**
Day/Night	£ 5.52	97%	£ 4.27	75%
Tri Band	**£ 5.68**	**99%**	**£ 3.89**	**68%**
Agile	£ 4.77	84%	£ 3.36	59%

Smart Water Heater – Saving

How the Tsmart will be controlled by optimizing heating events and timings



	Energy	Time	Tariff	Cost
DHW event 1:	3kWh	04.00-05.00	9.99p	£ 0.299
DHW event 2:	3kWh	18.00-19.00	31.3p	£ 0.939
Daily Total	**6kWh**	**2 hours**	**13.7p**	**£ 1.24**
Monthly				£ 38.38
Annual				£460.54

Set Temperature: 45 C
Switch on: 41 C
Switch off: 49 C
Measured cooling rate: 0.6 C per hour

Proposed Action:
1: Event 1: Heat until **4C** (49+3*0.6= 50.8C)
2: Event 2: Bring switch on to **15.00** (Day zone)
3: Event 2: Heat until **45C** (41=7*0.6=45.2C)

Saving 48% (£ 18.26 per month)

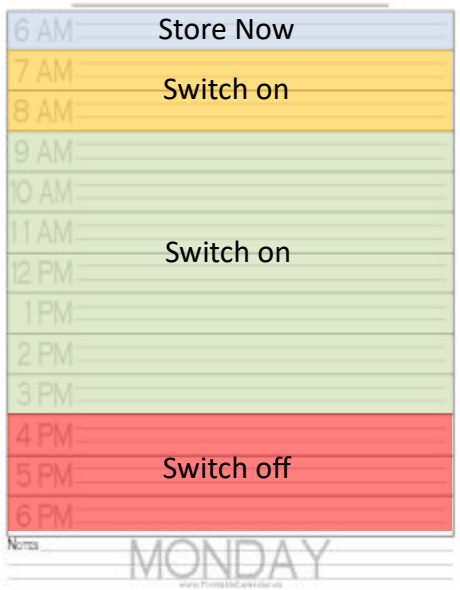
2: Smart Heat - Event Manager

Local Event Detected
- Heat required/Not required
- Open window
- Left home

Switch on/off Store Now Signal

Local Boost Signal Detected
- Heat wanted Now
- Hot water wanted now

Regular Events Manager



Specific Events Manager

Read my Tariff

Regular tariff periods
Assign: Red, Amber Green, Blue Status
To hourly periods

Switch on (Time to store):
1. Export solar generation detected
2. Import "price plunge" detected

Switch off:
1. DSR request switch off signal
2. High tariff period start

Tenant Engagement - The Language of Money

Issues with Smart Meters*

1.The word "Smart-Meter" is toxic

2.Smart meters don't work"

3.Smart meters don't save money

3.Smart meters stop them from "switching"

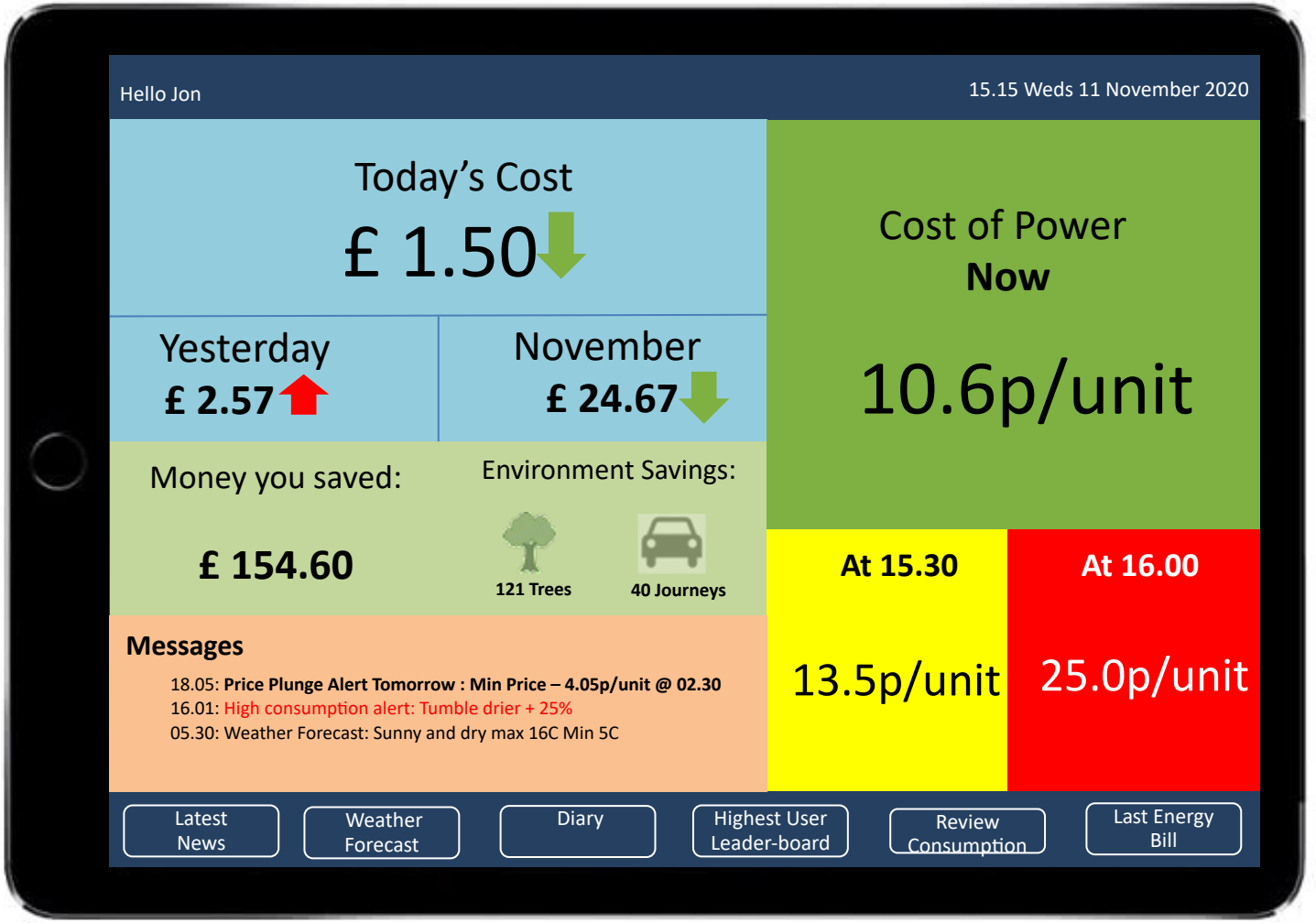
4.Smart meters are a trojan horse

6.Don't try and change my behaviour

7.I know where the "off switch" is

8.Believe it's a way to save on meter readers

** Recent survey in The Guardian*

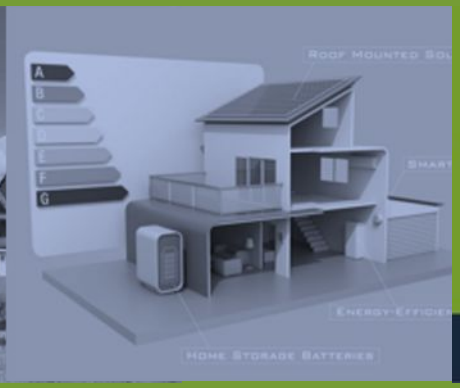


The Vision

To contribute to the decarbonization of the UK housing stock

To make an affordable and accessible pathway for householders to save money by entering the new agile energy market

To integrate the best technologies for each project and optimize the business case for energy efficiency

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