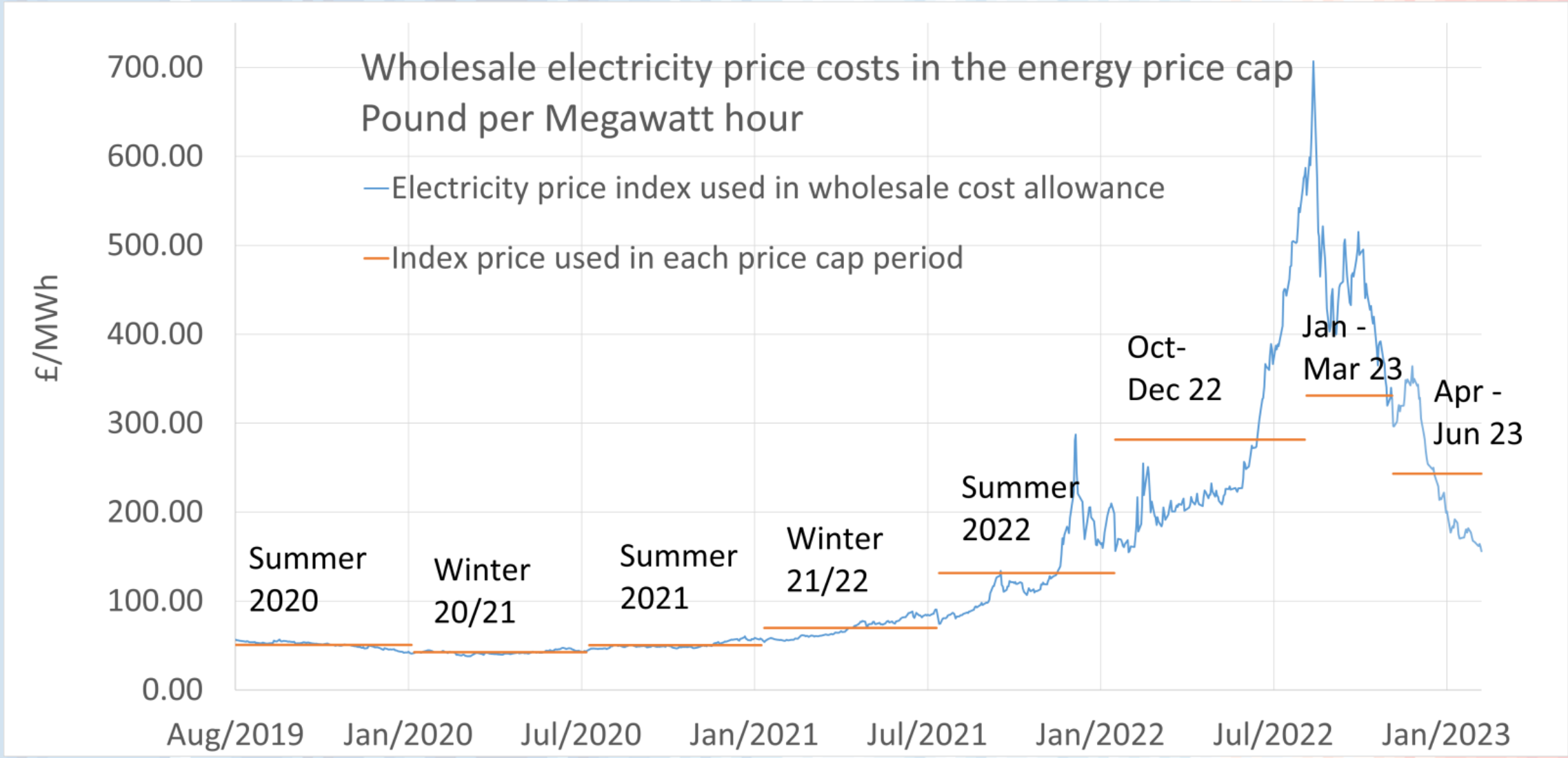
Saving Energy, Money and CO2 this Winter

Wholesale Electricity Prices



Case Studies

- Toby Roberts
- Juliet Davenport
- Rob Cawthorne
- Fiona Walthall
- Rob Jones

Toby

- Shetlands, Far End
- Bench marking exercise

Personal perspective on

- Reducing oil consumption
- Heating system settings
- Top tips
- Wood burners?
- What next for Shetlands

Shetlands Summary

Grade II listed stone cottage
Built 1683, refurbished 2016
Stone/rubble walls
3 stories, floor area 116 m2
3 bedrooms, 2 occupants (full time)

Floor/roof insulation
No wall insulation
No drafts
Single/double/triple glazing

Under-floor heating all rooms
Oil boiler + hot water tank
Wood burner (external air draw, kiln dried logs)

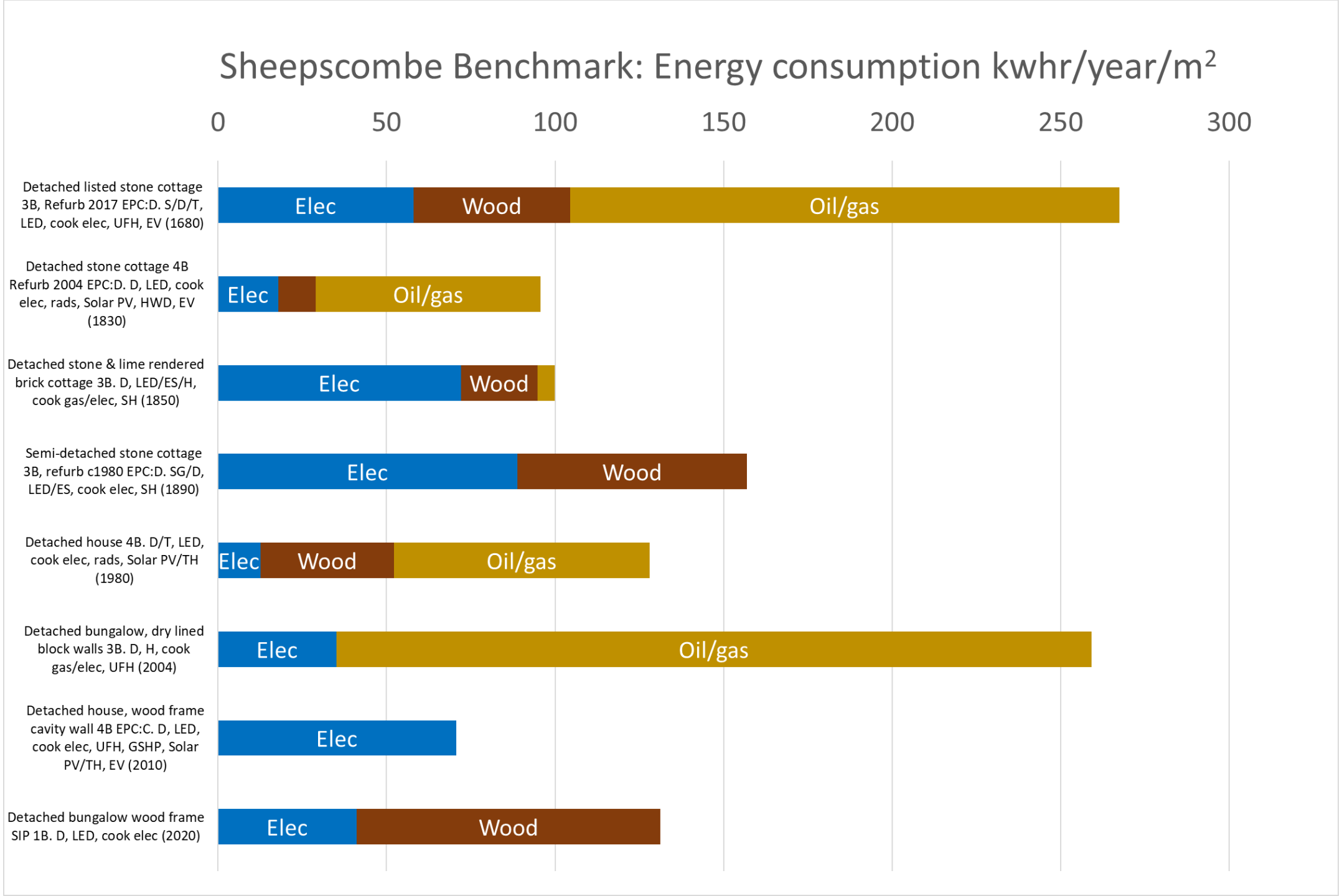
Very high thermal mass
Slow to heat up / Slow to cool down
Boiler significantly over sized (normal!)
Boiler fixed output (no load compensation)

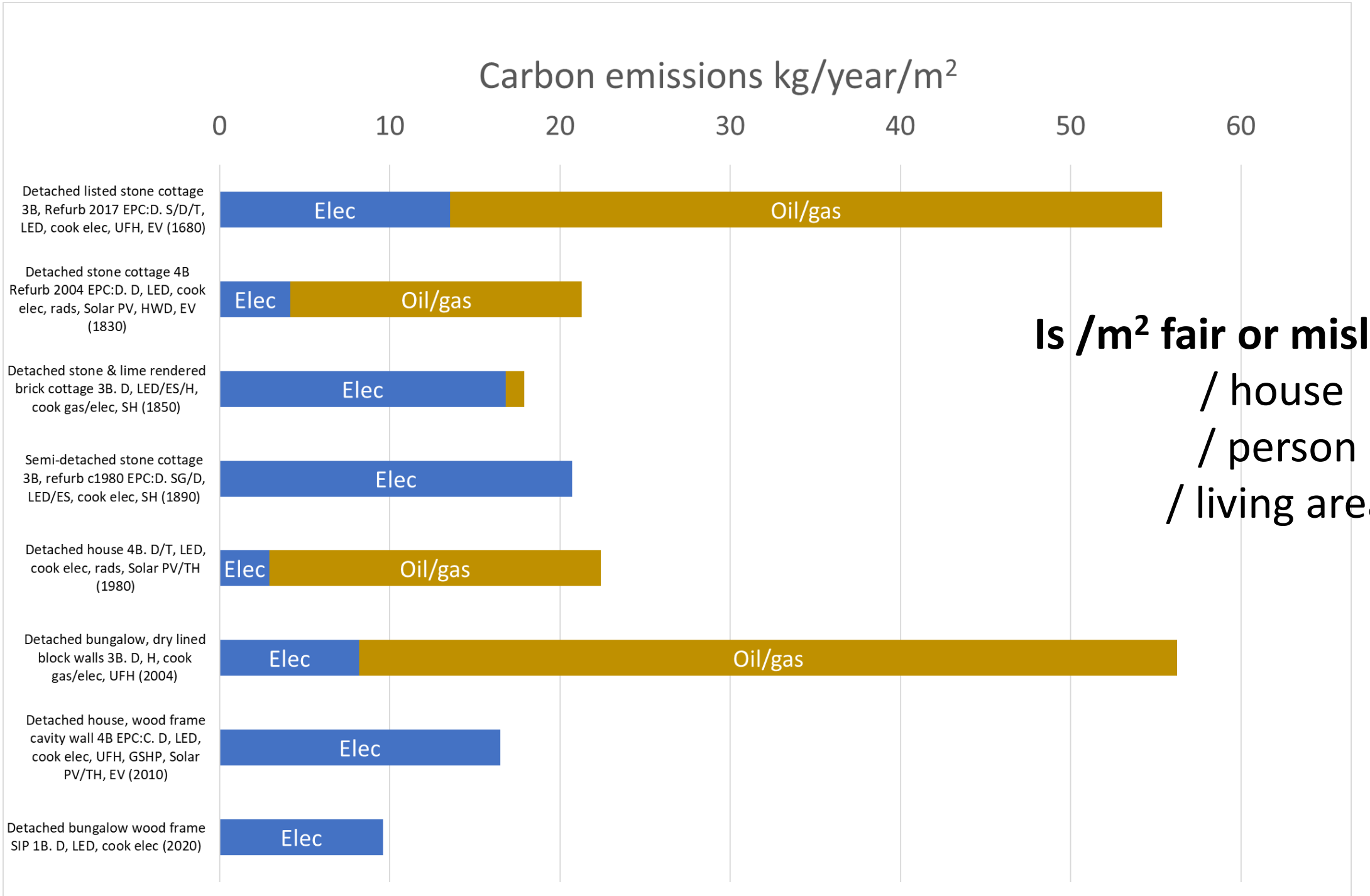
Conventional advice

- Run heating at low thermostat temperature setting for long periods, even at night in cold periods (use weather compensation)

But….

- My dear wife is sensitive to any noise
- Running an oversized boiler at low level for extended period makes no sense to me


Sheepscombe Benchmark: Energy consumption kwhr/year/m2
0
50
100
150
200
250
300
Detached listed stone cottage 3B, Refurb 2017 EPC:D. S/D/T, LED, cook elec, UFH, EV (1680)
Elec
Wood
Oil/gas
Detached stone cottage 4B Refurb 2004 EPC:D. D, LED, cook elec, rads, Solar PV, HWD, EV (1830)
Elec
Oil/gas
Detached stone & lime rendered brick cottage 3B. D, LED/ES/H, cook gas/elec, SH (1850)
Elec
Wood
Semi-detached stone cottage 3B, refurb c1980 EPC:D. SG/D, LED/ES, cook elec, SH (1890)
Elec
Wood
Detached house 4B. D/T, LED, cook elec, rads, Solar PV/TH (1980)
Elec
Wood
Oil/gas
Detached bungalow, dry lined block walls 3B. D, H, cook gas/elec, UFH (2004)
Elec
Oil/gas
Detached house, wood frame cavity wall 4B EPC:C. D, LED, cook elec, UFH, GSHP, Solar PV/TH, EV (2010)
Elec
Detached bungalow wood frame SIP 1B. D, LED, cook elec (2020)
Elec
Wood



Is /m² fair or misleading?

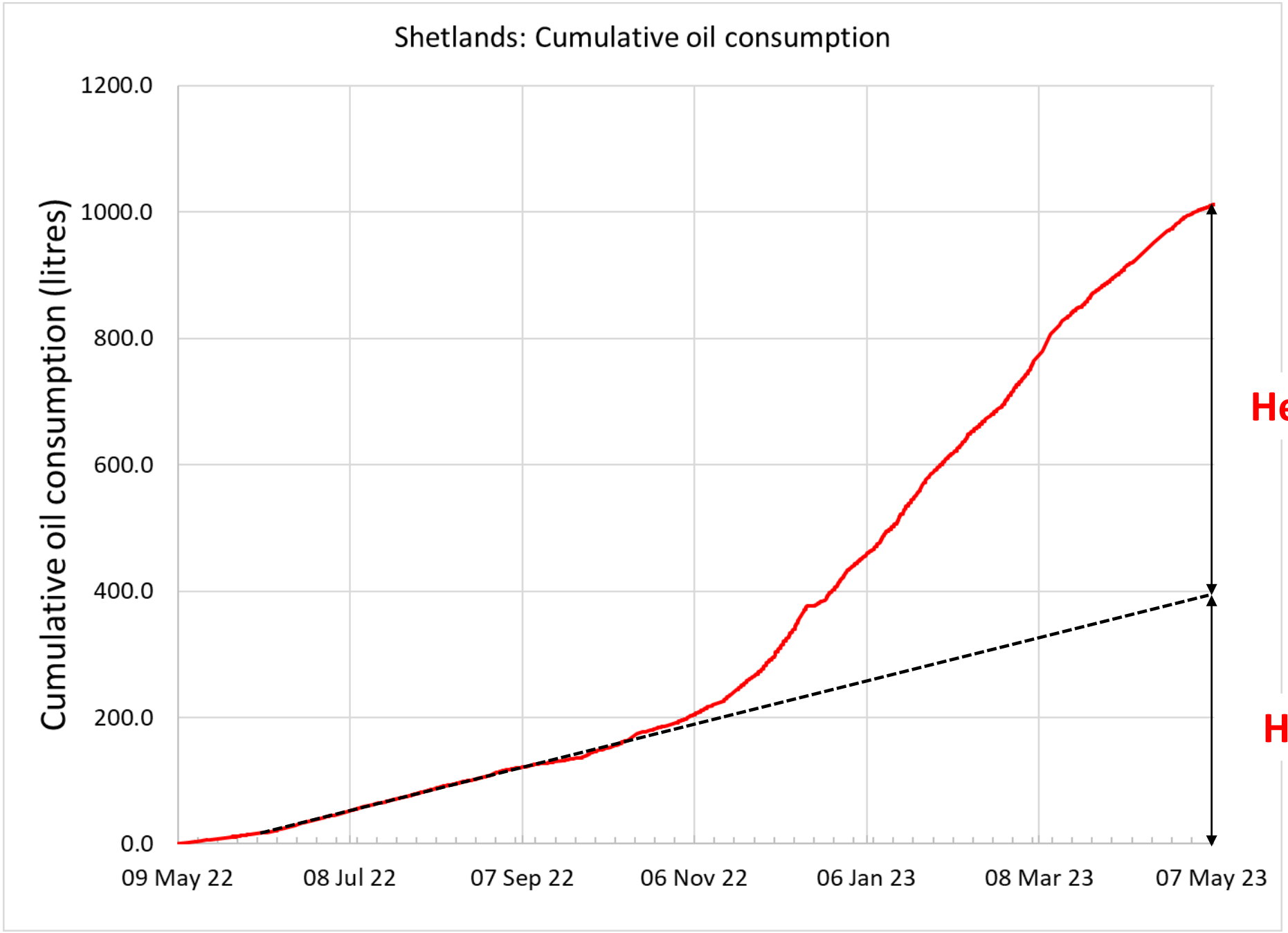
/ house

/ person

/ living area

Shetlands Plan and outcome 22/23 (note down rated boiler)

Fuel	Used for	Consumption 21/22	Plan for 22/23	Consumption 22/23
Elec Single phase 80 amps	Appliances Cooking Lighting EV charging Bike charging	**6,700 kw/yr**	No change	**8,360 kw/yr** ↑25% EV miles
Oil: Mazoutman Smart meter Worcester boiler (2016) 21.5 kw **down rated 22 to 18 kw** Hot water tank 239 liters Under floor heating all floors 1 radiator (Bedroom) 2 towel rails	Hot water Heating	**1,700 l/yr**	Summer • 35 l/month • 210 l, 6 months Winter • 150 l/ month? Total 1,110 l/yr	**1,010 l yr** ↓41%
Wood Clearview: 8 kw **External air intake**	Supplementary heating	**2 m^3 / year**	No change / modest increase?	**2.5 m^3 / year** ↑25%

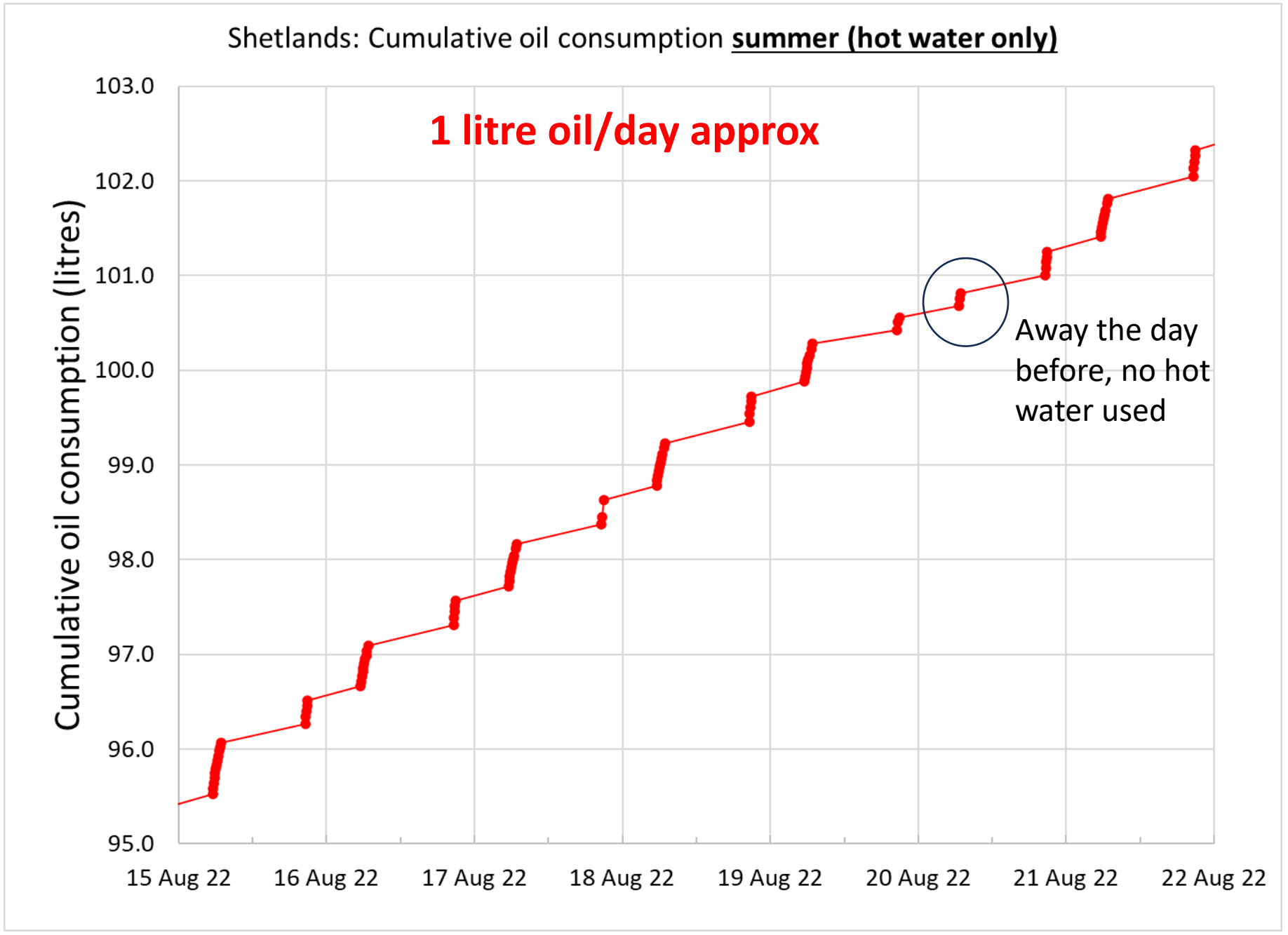


Minimal evidence of impact from external temperature: Thermostat target temperature not reached.

In winter, the thermostat is acting solely as a timer!

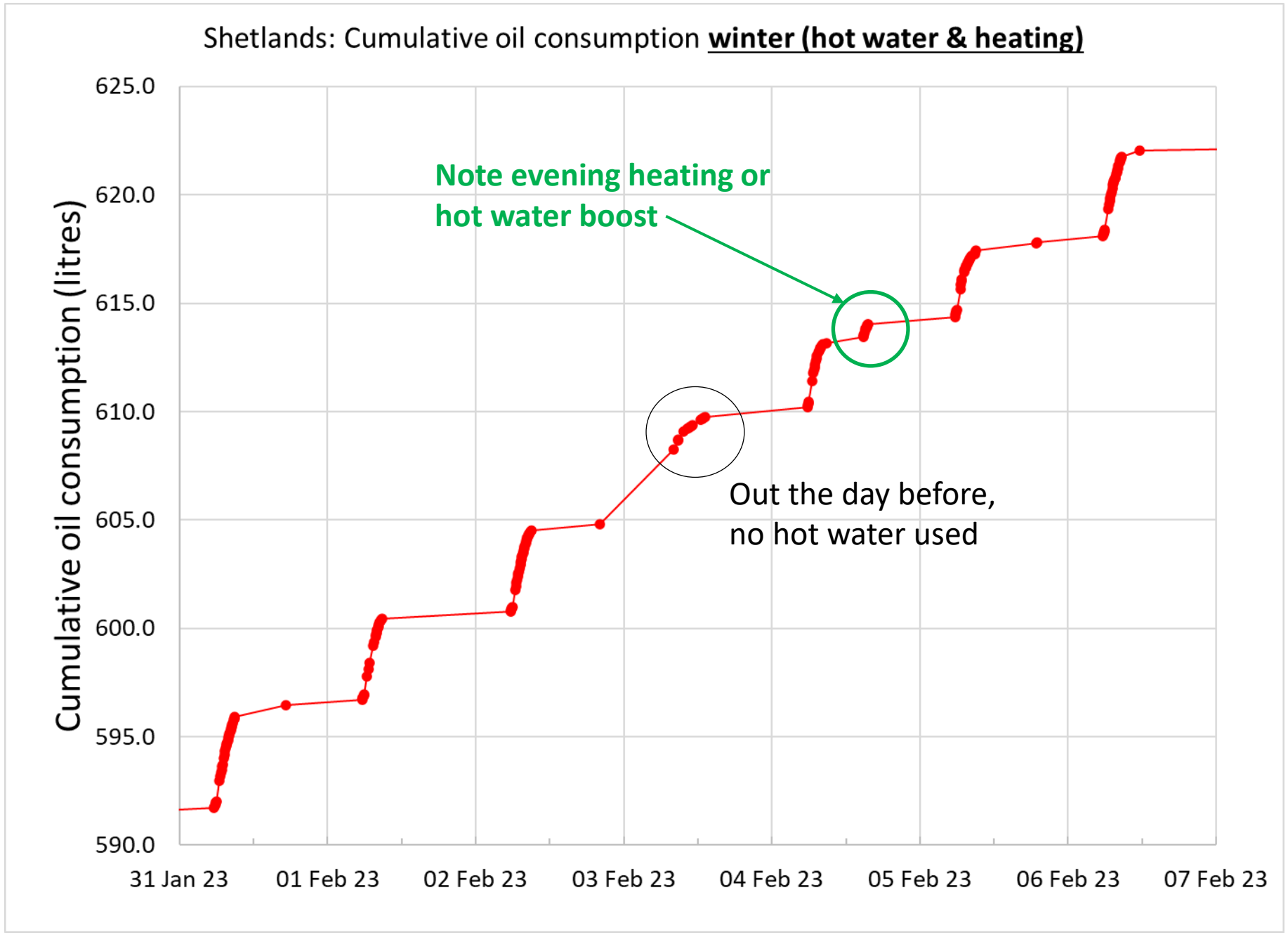
Heating ≈600 l

Hot water ≈400 l



Summer settings
Hot water heating morning 1hr and evening 0.5 hr.

Evening heating subsequently stopped, use boost when needed instead



1 l/day for hot water
3.5 l/day heating

Winter settings
Hot water heating morning, 1 hr only (as summer)

Heating morning only
6.30am to 10.am

Evening heating by wood burner when we feel cold
Start 4 to 8 pm typically

Top tips for old houses with high thermal mass:

Professional advice is worth listening to but…

- Only you know when you feel too cold or too warm
- You have more time and interest to tweak your controls & system than the plumber
- Get good advice when **installing** a new system/components

Temperature is a blunt instrument for controlling heating systems

- What you wear makes a difference
- What you are doing makes a difference
- Drafts make a huge difference (triple glazing and wood burner with external air draw)
- Humidity makes a big difference

If you are not using the boost function regularly then your system is not set up efficiently

- Set the heating to the minimum that works for you most days – then boost if needed
- Only heat the water you need each day – then boost if needed

Is it better to use a wood burner or burn oil in Sheepscombe?

Headlines in the Guardian in the last 12 months

‘A serious threat’: calls grow for urgent review of England’s wood-burning stoves

Wood burners emit more particle pollution than traffic, UK data shows

Headlines in the Telegraph in last 12 months

The woodburning stove crackdown is hypocritical insanity

How log burners are dividing Britain’s middle-class neighbourhoods

My monitoring shows no internal particle emissions from wood burner at Shetlands

Bonfires a much bigger concern!

What next for Shetlands?

Turn down boiler thermostat at next boiler service. Operating efficiency of all heating systems, including oil condensing boilers, improves when operated at lower temperature

Temperature must be high enough to avoid risk of legionella bacteria

- Stored hot water >60^{o}C
- Circulating hot water >50^{o}C

Alternatives to oil boiler?

No chance of PV due to listed status and roof pitch (car port?)

Air source heat pump should work well with underfloor heating but location and fitting a challenge + would still need the wood burner

Juliet

Rob C


MITSUBISHI ELECTRIC
ZUBADAN
R32

Cost Information for Electricity Usage at Beechdene

Month	2022	2023	Amount difference	% Difference
January	£232	£370	£138	59%
February	£224	£415	£191	85%
March	£179	£341	£162	90%
April	£164	£229	£65	39%
May	£139	£196	£57	41%
June	£112	£159	£47	42%
July	£109	£118	£9	8%
Total for 7 months	£1159	£1828	£669	57%

Cost Information for Electricity Usage at Beechdene

January – July 2022/ 2023

1. Air Source Heat Pump installed August /September 2022
2. Fixed tariff at 18.9p/kwh from August 2021 until August 2023 (tariff expired in August, compromising direct comparison thereafter).
3. Figures include charging for one electric/hybrid car
4. Figures do not take account of any government payments
5. Separate Studio heated by electricity in both periods
6. Oil costs not shown - this would be in addition to electricity charges. Oil charges for first 7 months of 2022 estimated at £600
7. Heating in winter supplemented by JetMaster open woodburner, and occasional use of fan heater
8. Percentage costs reflect variabilities of the weather

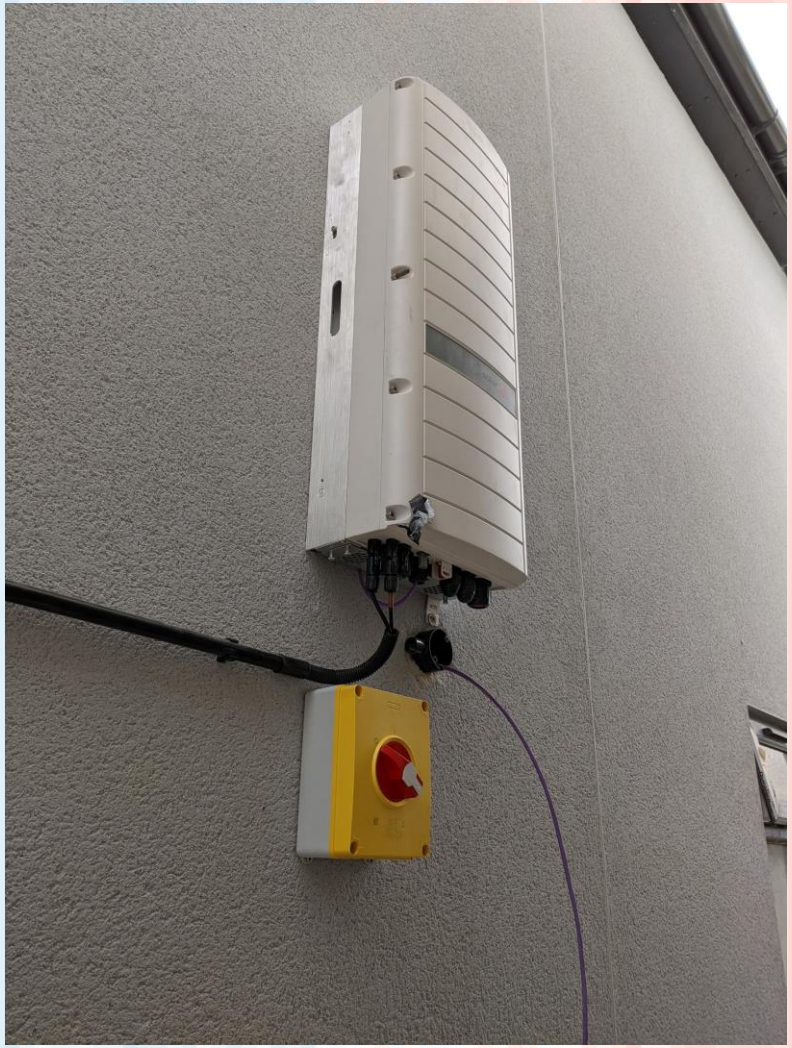
Fiona

Hawthorns

An All Electric House

The whole house is designed to capitalise on the maximum number of solar panels that would fit on the roof space. This turned out to be:

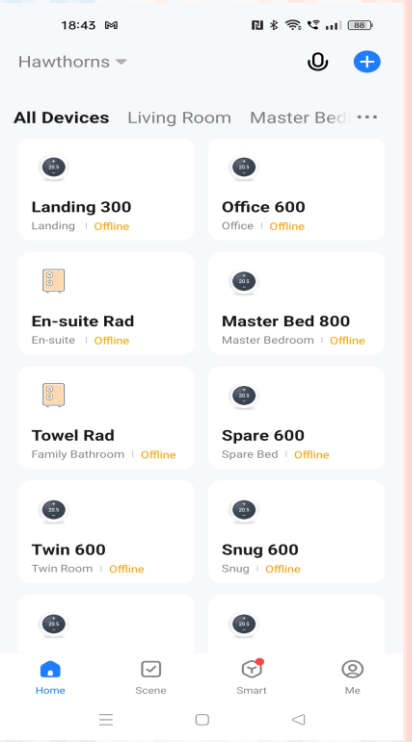
- 16 panels on south facing roof – inset in tiles
- 3 panels on east facing – on top of tiles
- 3 panels on west facing – on top of tiles
- Total capacity = 8.47 kWh
- Solar Edge – optimises each panel
- 3 phase invertor for 3 phase power supply



Energy Efficiency Features

- Insulation – walls 150mm, roof space 400mm, floor 150mm
- Heating – Infra Red panels on ceilings in every room, individual thermostats
- Secondary heating – log burning stove
- Cooker – Everhot electric cooker and background heat
- Water heating – excess solar power using Eddi solar diverter
- Car charging – excess solar power using Zappi
- Batteries – coming!
- Net result = EPC ‘A’ !!!!!!!!!!!!

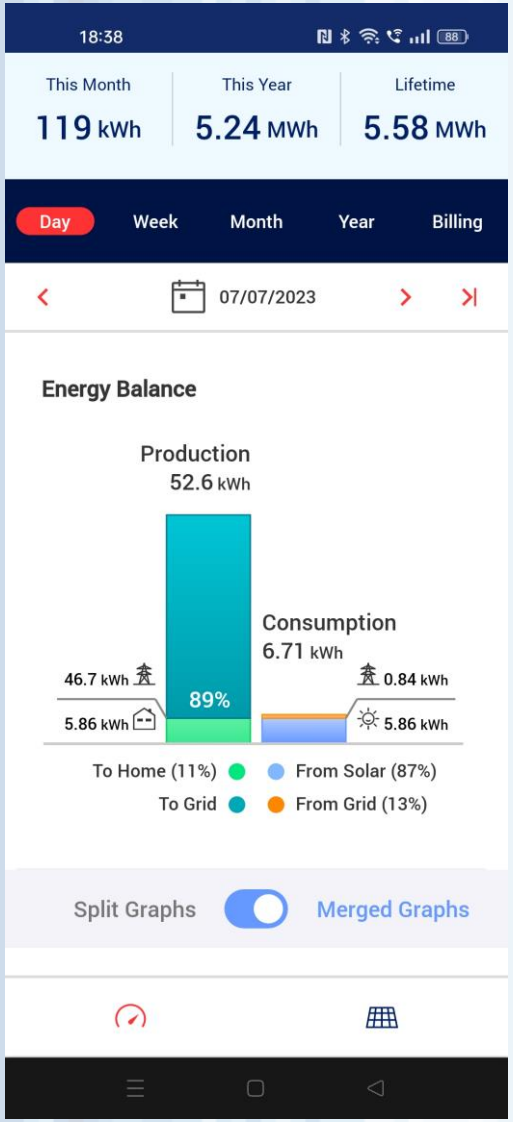

20.0
11:42

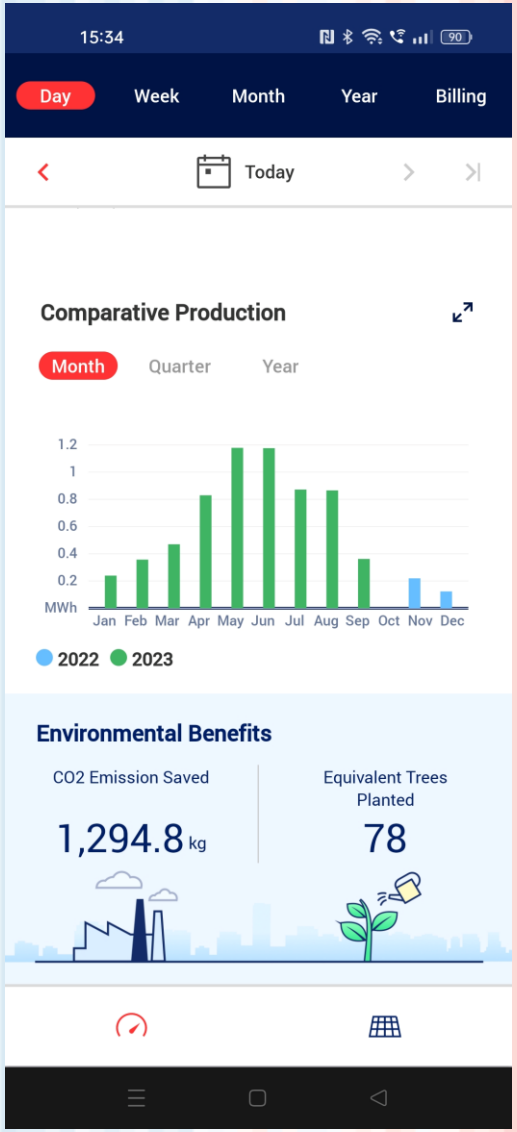

18:43
Hawthorns
All Devices
Living Room
Master Bed
Landing 300
Landing | Offline
Office 600
Office | Offline
En-suite Rad
En-suite | Offline
Master Bed 800
Master Bedroom | Offline
Towel Rad
Family Bathroom | Offline
Spare 600
Spare Bed | Offline
Twin 600
Twin Room | Offline
Snug 600
Snug | Offline
Home
Scene
Smart
Me

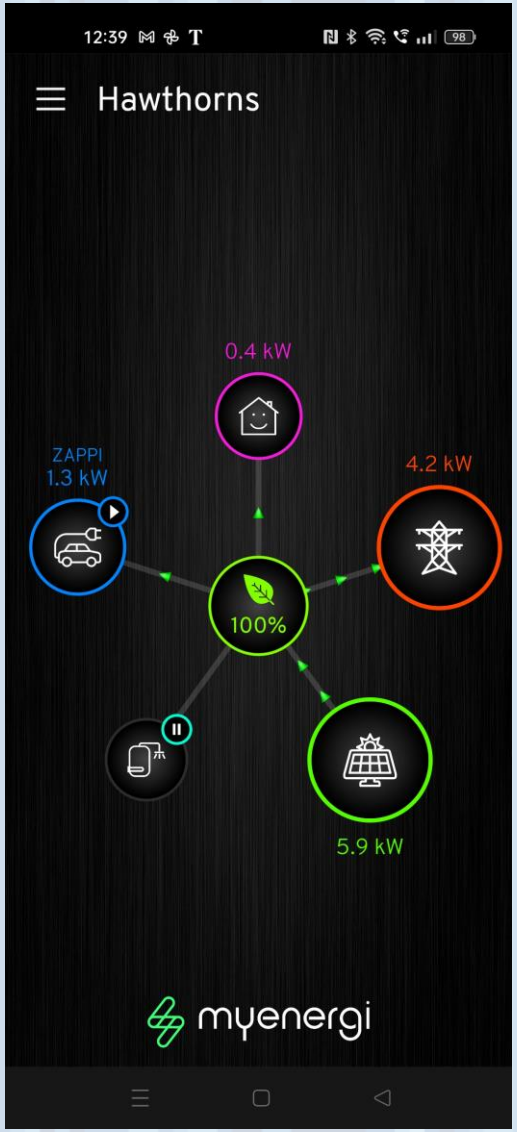

myenergi
eddi
microgeneration energy diverter
Max Temp Reached
menu
boost
varisine technology

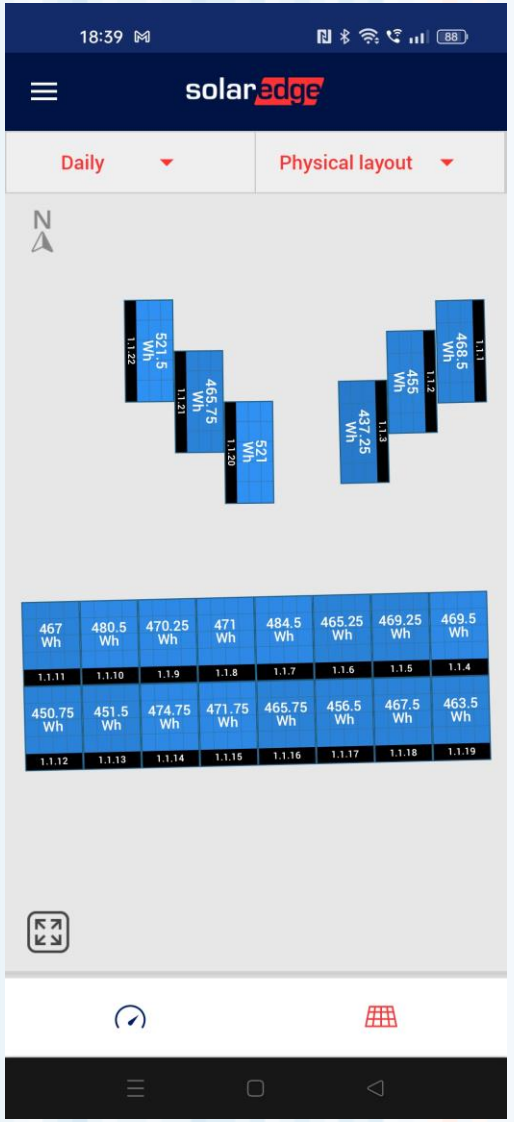

myenergi
zappi


15:36
solaredge
Updated 1 minute ago
Production Today
7.27 kWh
18 °C
1.77 kW
Solar Power Now
0.11 kW
1.66 kW
Energy Produced
This Month
362 kWh
This Year
6.35 MWh
Lifetime
6.69 MWh
Day
Week
Month
Year
Billing
Today
Energy Balance


18:38
This Month
119 kWh
This Year
5.24 MWh
Lifetime
5.58 MWh
Day
Week
Month
Year
Billing
07/07/2023
Energy Balance
Production
52.6 kWh
Consumption
6.71 kWh
46.7 kWh
89%
0.84 kWh
5.86 kWh
5.86 kWh
To Home (11%)
From Solar (87%)
To Grid
From Grid (13%)
Split Graphs
Merged Graphs


15:34
Day
Week
Month
Year
Billing
Today
Comparative Production
Month
Quarter
Year
1.2
1
0.8
0.6
0.4
0.2
MWh
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
2022
2023
Environmental Benefits
CO2 Emission Saved
1,294.8 kg
Equivalent Trees Planted
78


12:39
Hawthorns
0.4 kW
ZAPPI
1.3 kW
4.2 kW
100%
5.9 kW
myenergi


18:39
solaredge
Daily
Physical layout
N
521.5 Wh
1.1.22
465.75 Wh
1.1.21
521 Wh
1.1.20
437.25 Wh
1.1.3
455 Wh
1.1.2
468.5 Wh
1.1.1
467 Wh
480.5 Wh
470.25 Wh
471 Wh
484.5 Wh
465.25 Wh
469.25 Wh
469.5 Wh
450.75 Wh
451.5 Wh
474.75 Wh
471.75 Wh
465.75 Wh
456.5 Wh
467.5 Wh
463.5 Wh

Month	Consumed pd kWh	Exported pd kWh	Cost pm	Income pm	Profit/Loss pm
Feb	20.46	1.58	£203.03	£6.55	£(196.48)
Mar	13.25	5.22	£170.56	£26.52	£(144.04)
Apr	7.8	16.92	£86.06	£66.18	£(19.88)
May	4.05	26.86	£50.92	£112.54	£61.62
Jun	2.06	29.51	£41.28	£154.94	£113.66
Jul	2.22	21.04	£32.52	£88.38	£55.86
Aug	3.17	18.44	£47.94	£94.04	£46.10
3-17 Sep					£16.87

Octopus Energy

- Import Tariff
  - Flexible Octopus – prices follow wholesale costs
    - Rate 28.2p per kWh as at 1 Sep 23
    - Standing charge 49.83p per day

- Export Tariff
  - Outgoing Octopus 12 months fixed
    - 15p per kWh

Rob J

Standard & Smart Electricity Tariffs

Standard	28.2p per kwh + 49.83p per day
Economy 7	33.76p per kwh (day) 14.99p per kwh (night)

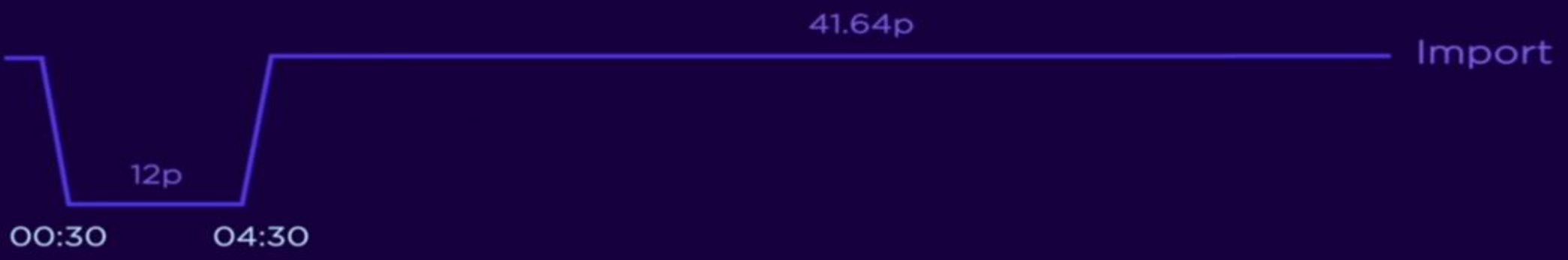
Smart tariffs tailored to users and help smooth demands on grid

Smart meter needed!

Current Smart Octopus Tariffs per kwh

- Fixed export (solar – currently 15p)
- Intelligent (EV)
- Go (EV + battery)
- Flux (solar + battery)
- Cosy (heat pump + battery)
- Agile (half hourly rates)
- Several others, more to come

Octopus Go

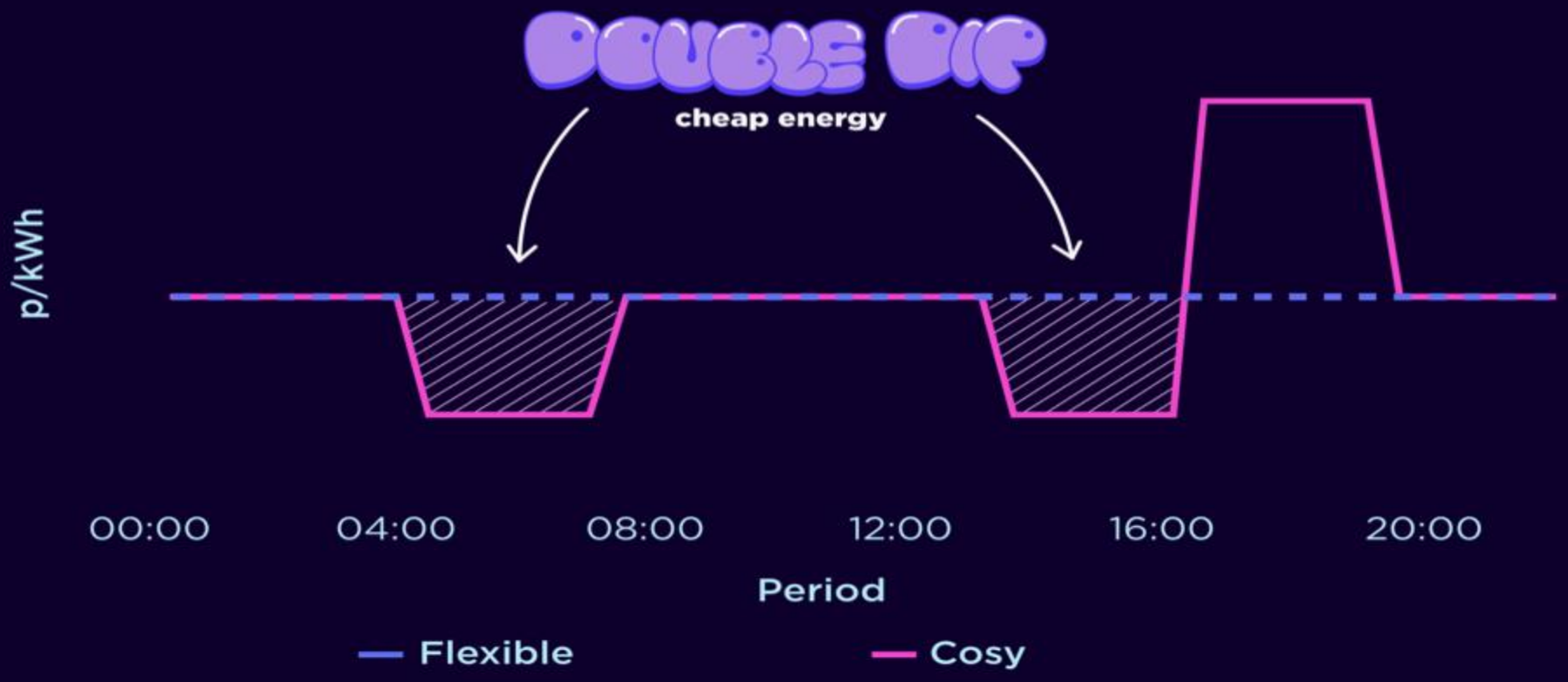

41.64p
Import
Import
12p
00:30
04:30
Export
Export
4.1p via Octopus Smart Export Guarantee (SEG) Tariff
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
00:00

Octopus Flux

Comparison of Octopus Tariff Import Rates

How does it work?

Cosy Octopus is a 3 rate tariff with double dip Cosy Hours every day: six hours of super cheap electric to warm your home.



Our Electricity Bills – last 12 months

	Import (£)	*Export (£)*	*Net (£)*	*Import tariff*	*Export tariff*
October	111	73	37	Flexible	Agile
November	83	3	81	Go	SEG
December	69	1	68	Go	SEG
January	66	1	65	Go	SEG
February	54	6	48	Go	SEG
March	38	6	32	Go	SEG
April	52	44	9	Flux	Flux
May	41	87	-46	Flux	Flux
June	28	216	-188	Flux	Flux
July	36	103	-67	Flux	Flux
August	25	84	-58	Flux	Flux
September	32	84	-52	Flux	Flux
	635	707	-70		
2022 total	932	716	216		
2021 total	590	244	346		

Our Electricity Bills – last 12 months

Consumption charge only (excludes standing charge and VAT		
Excl government support		
Incl EV charging		
		£
Net cost - last 12 months		- 70
Flexible tariff (7975kwh@30p)		2,393
Saving - last 12 months		2,463
2022 saving		2,177
2021 saving		1,594
Saving - last 12 months		2,463
Petrol costs avoided:		
9000 miles @35mpg x 3.8 @£1.50		1,466
		3,929

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Heat Geek

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Heat Geek

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4K

intro | 100mm centers are difficult | DIfferent DT's |... 9 chapters

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