

My Low-Carbon Home



Michael de Podesta

@Protons4B

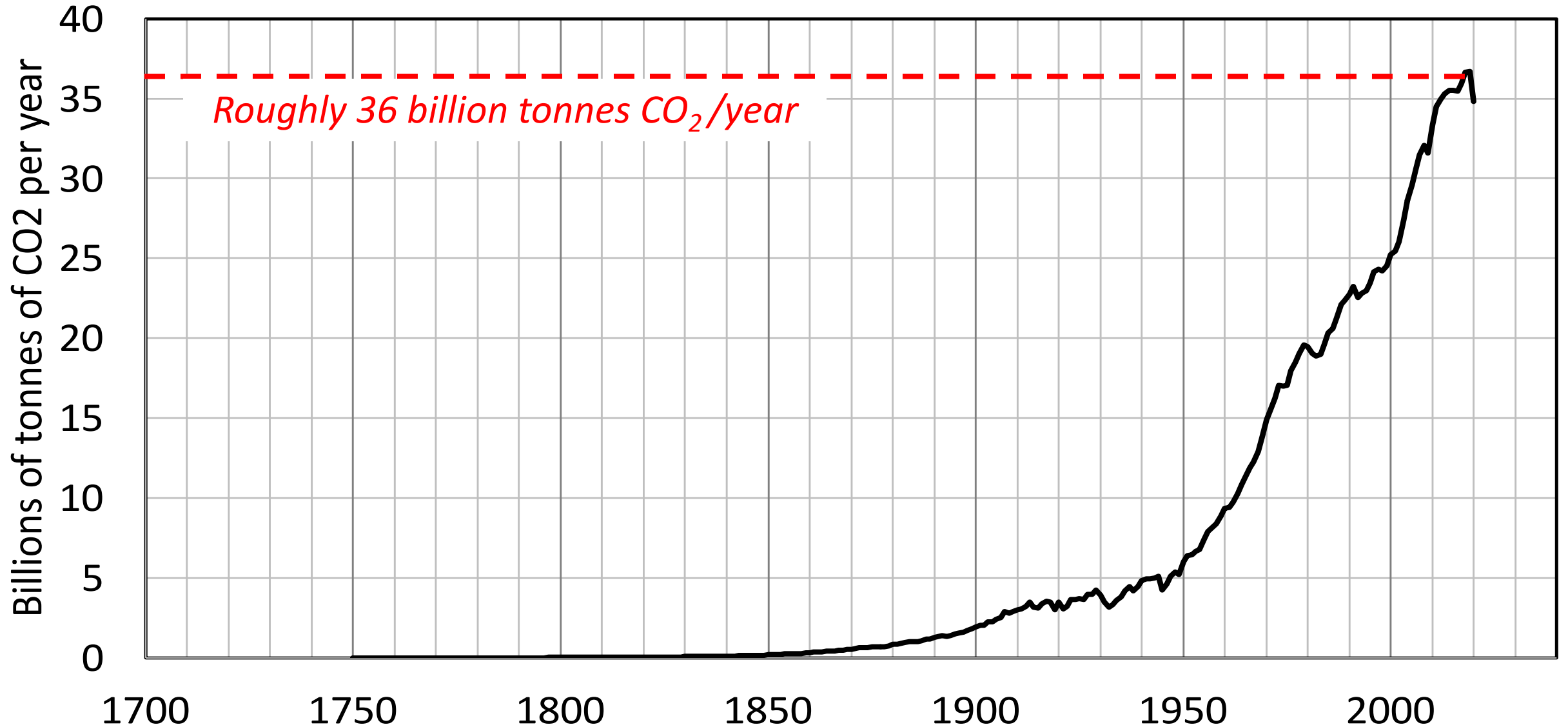
<http://protonsforbreakfast.org>

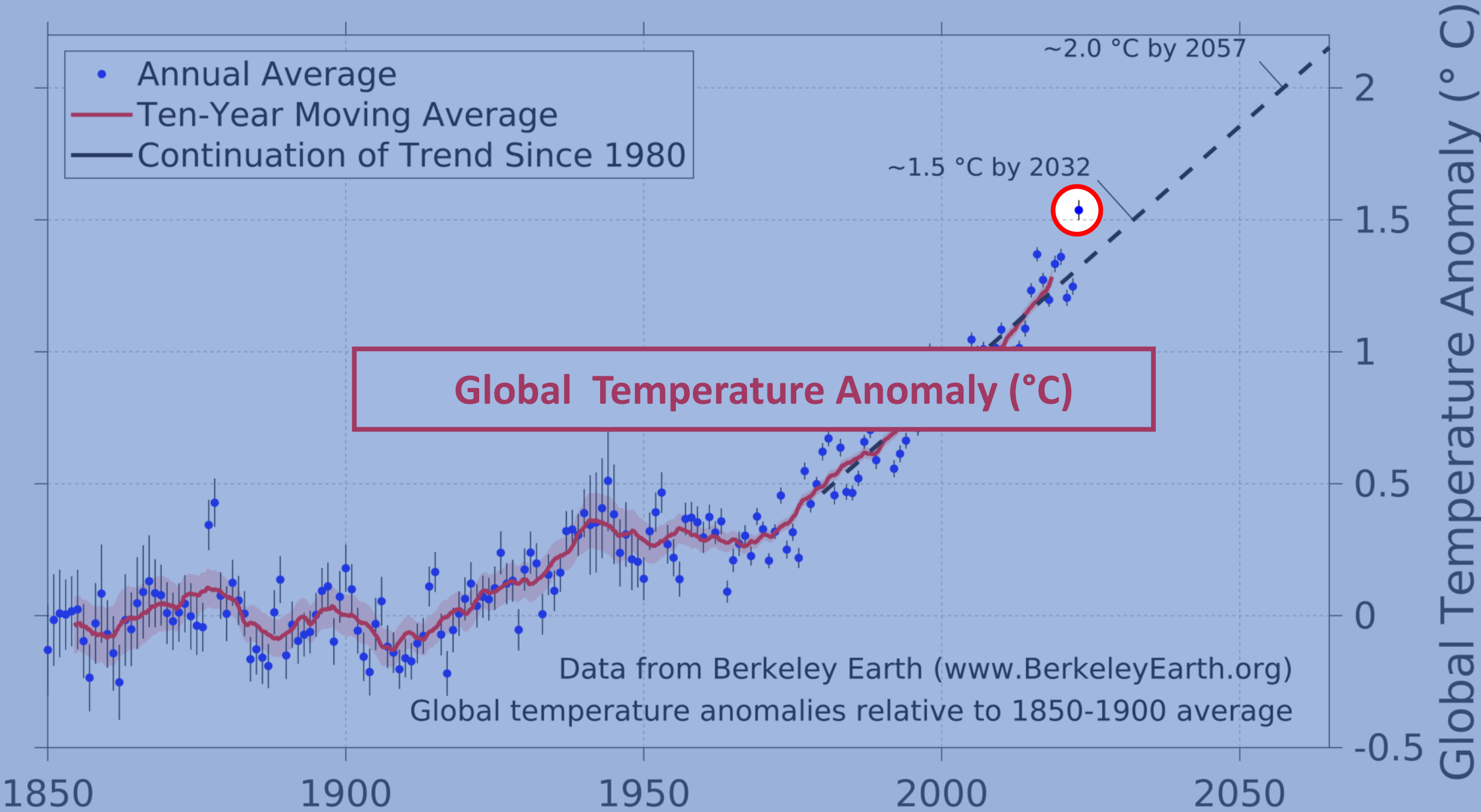
Brill, 18th February 2024



Climate Crisis: Carbon Dioxide Emissions

Yearly Human Emissions of Carbon Dioxide





- Annual Average
- Ten-Year Moving Average
- Continuation of Trend Since 1980

Global Temperature Anomaly (°C)

Data from Berkeley Earth (www.BerkeleyEarth.org)
Global temperature anomalies relative to 1850-1900 average

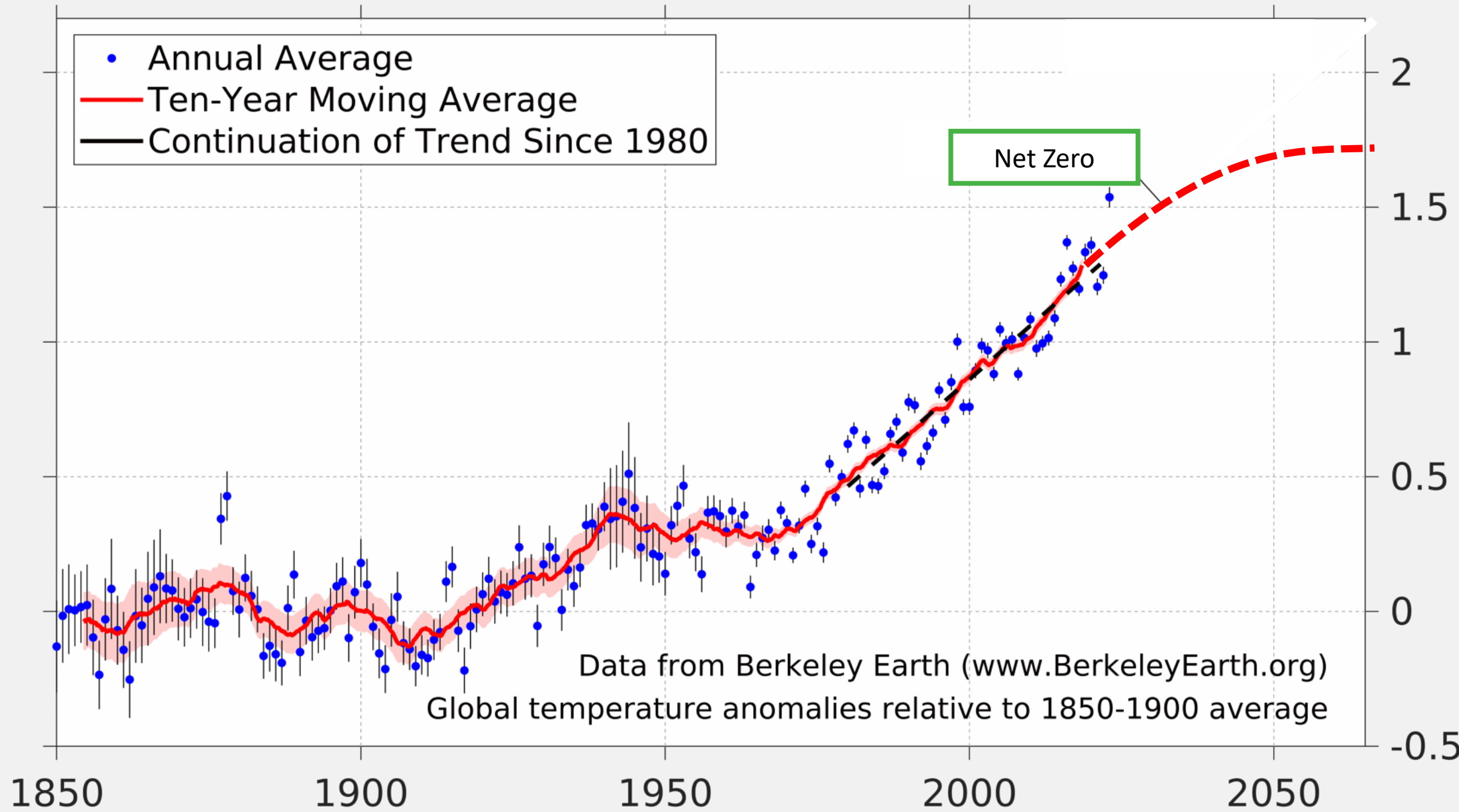
~2.0 °C by 2057

~1.5 °C by 2032



1850 1900 1950 2000 2050

Global Temperature Anomaly (°C)



Global Temperature Anomaly (°C)

Data from Berkeley Earth (www.BerkeleyEarth.org)
Global temperature anomalies relative to 1850-1900 average

Here son, I saved all this money for your future



The Climate that we grew up in is gone. Forever.

Even if we emit zero CO₂ the Earth won't cool.

However hot the Earth gets, *that's it.*

But, *if we try very hard,* we can still avoid the worst outcomes

We just need to stop emitting CO₂!



**More than 30% of
total UK emissions!**



*from our
homes*

How do we stop emitting CO₂?



*It's to do with
how we use energy...*

CO₂ emissions from a typical home

In 2022:

Each kWh of **gas** *or* **electricity** ⇒ ~0.23 kg CO₂ emissions.

Typically
2,900 kWh



667 kg CO₂

0.7 tonnes CO₂



Typically
12,000 kWh



2,760 kg CO₂

2.7 tonnes CO₂

How to estimate CO₂ emissions from your home

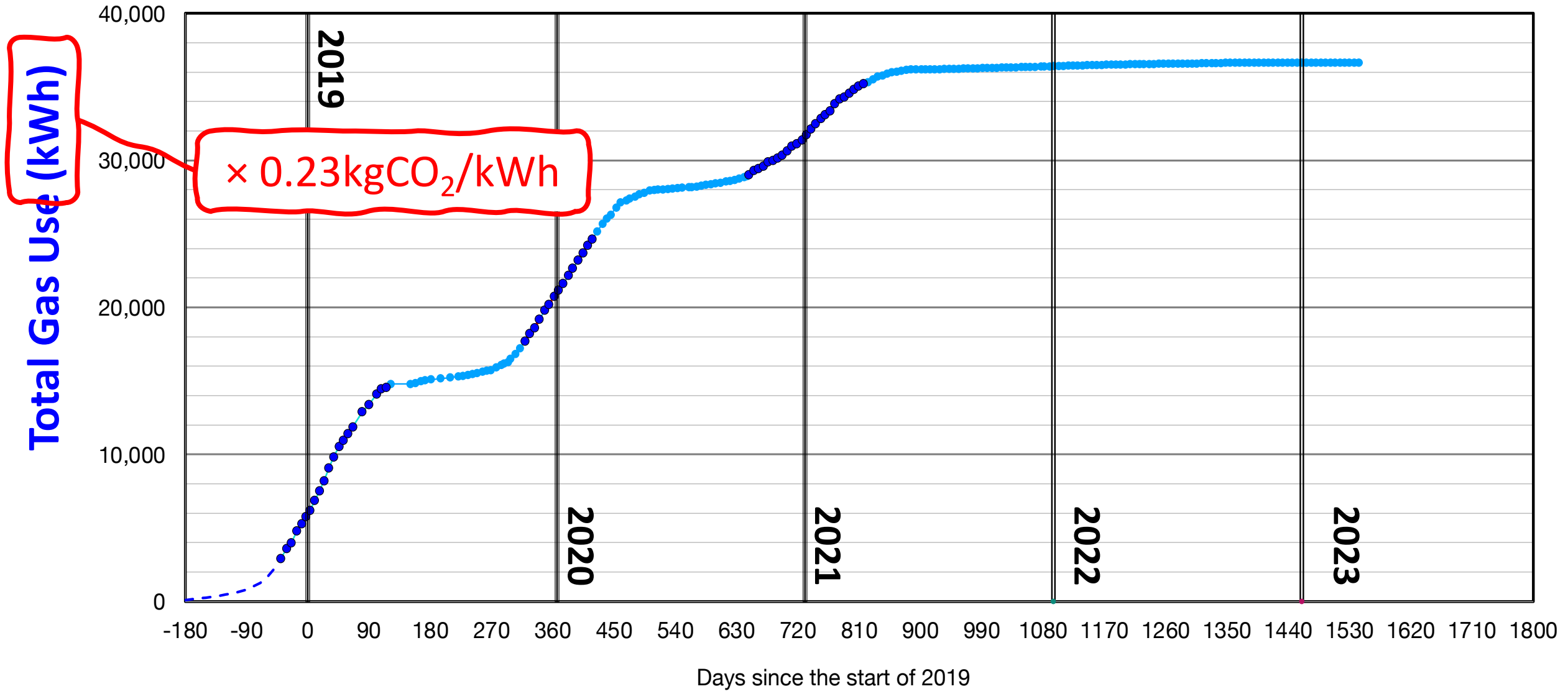
Read your meters once a week

Carbon dioxide emissions from my house

Gas

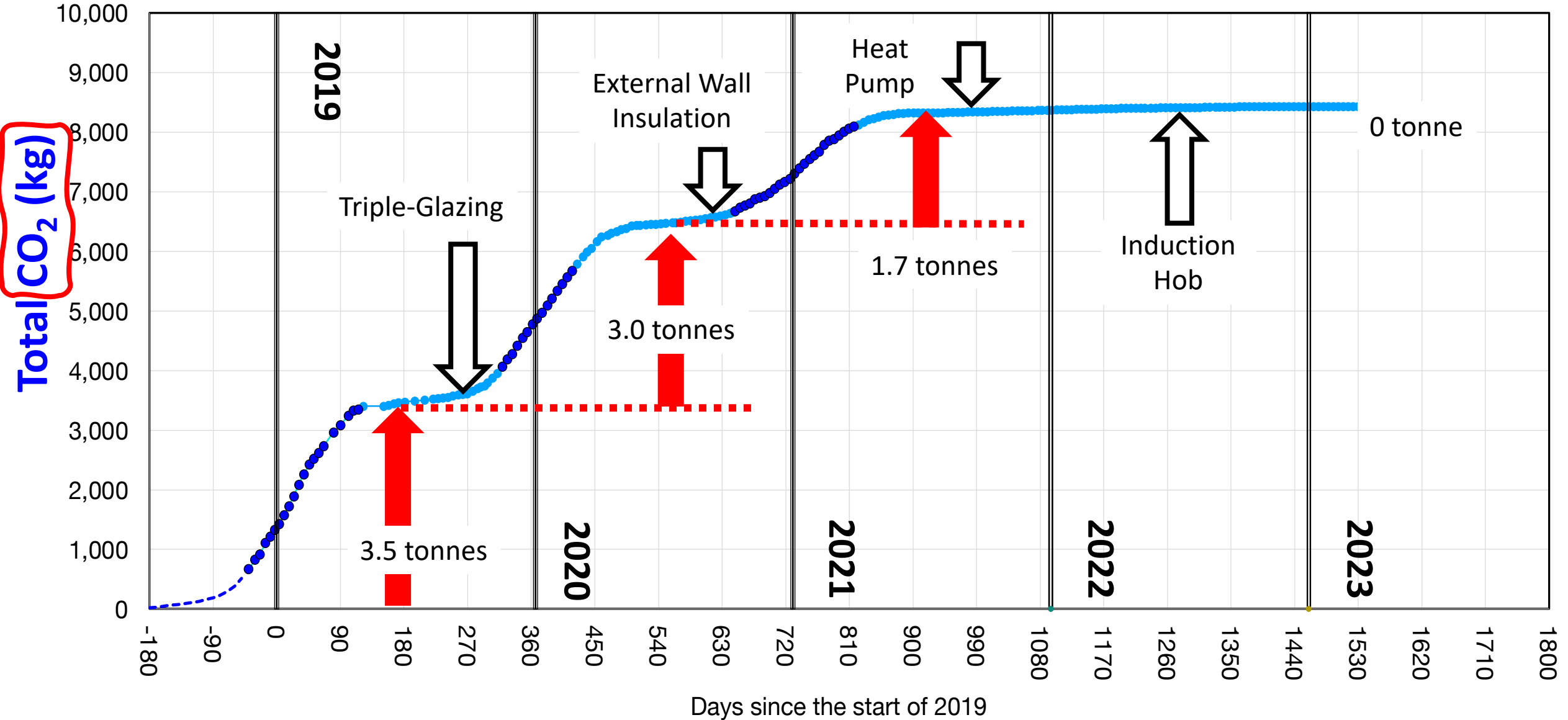
Total Gas Use (kWh)

Gas Consumption



CO₂ emissions from Gas (kg)

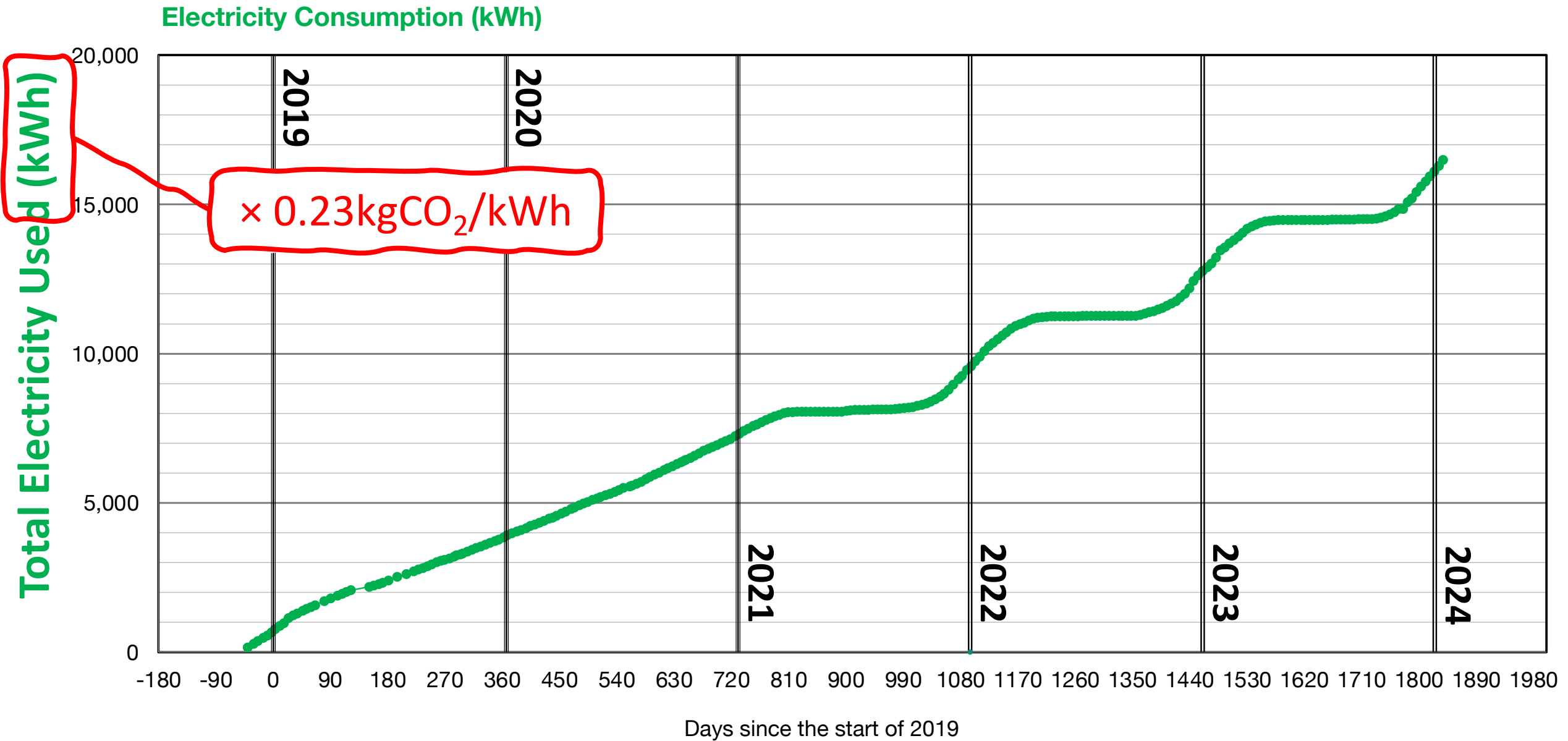
Carbon Dioxide Emissions from Gas



Carbon dioxide emissions from my house

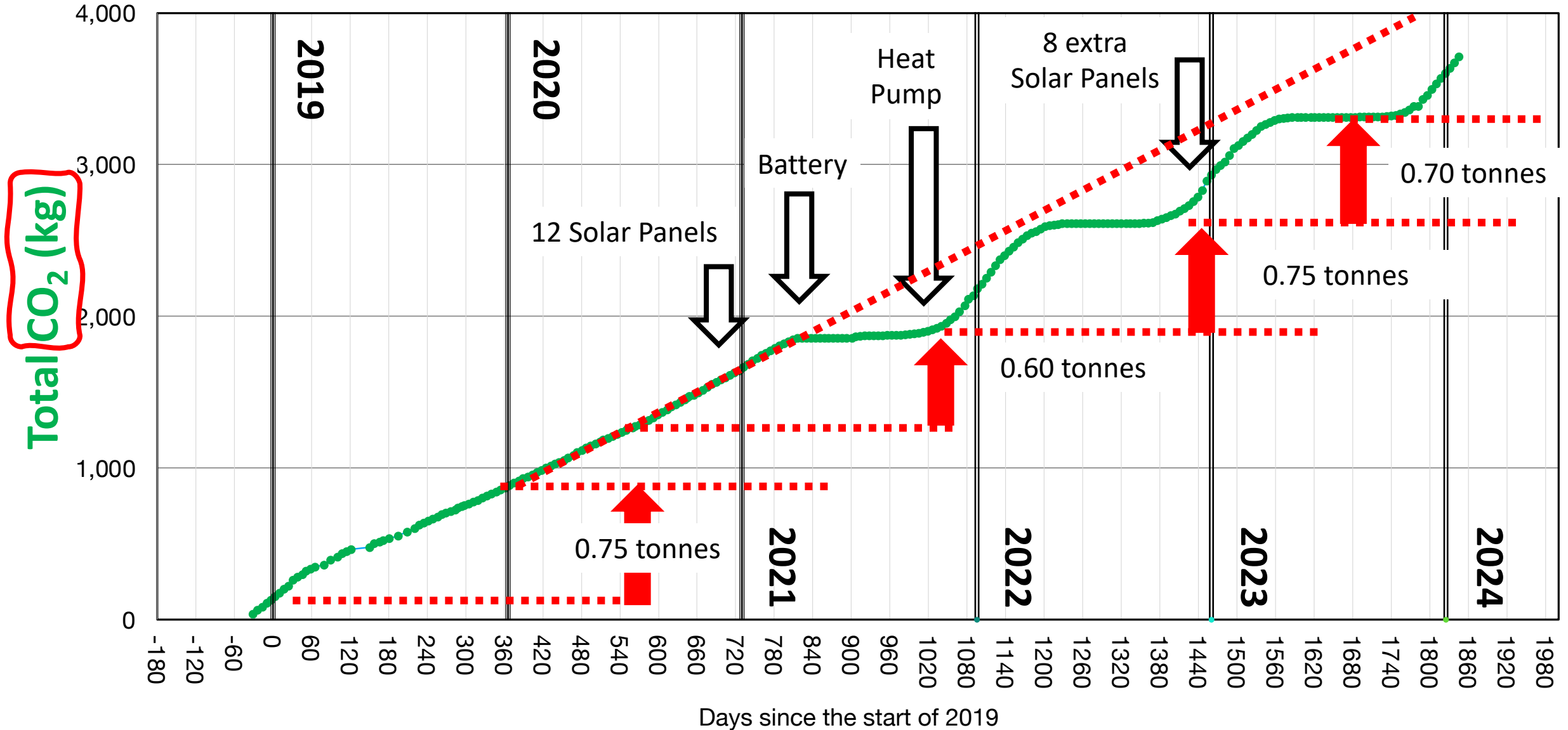
Electricity

Total Electricity Use (kWh)



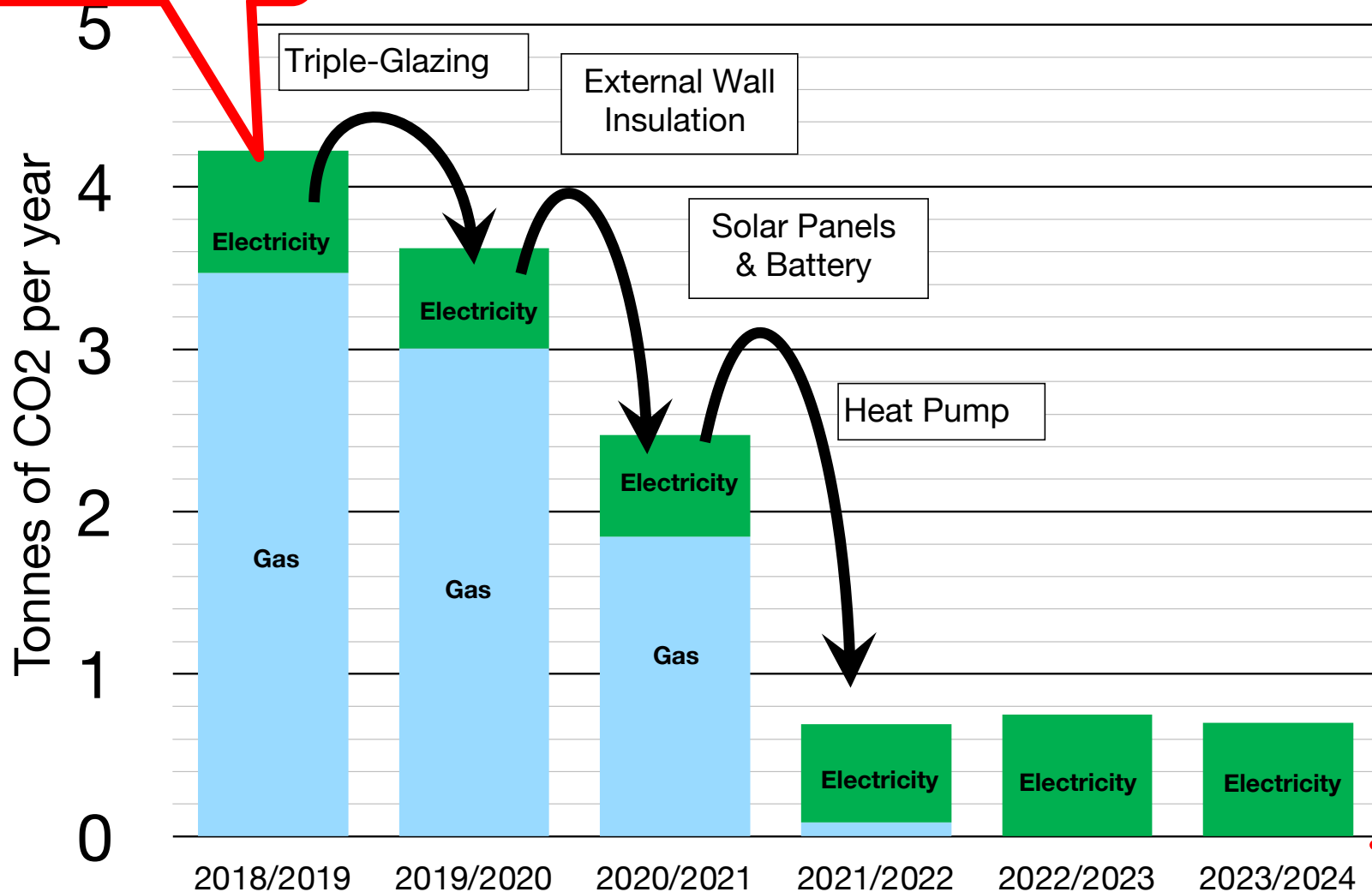
CO₂ emissions from Electricity (kg)

Carbon Dioxide Emissions from Electricity



How much CO₂ do I emit?

4.2 tonnes



- I estimate the carbon dioxide emissions from my home by reading my gas and electricity meters each week
- I have reduced carbon dioxide emissions from my home by around 80%.
- In future years this will improve slightly to about 90%.
- **No loss of quality of life.**

0.70 tonnes

How did I reduce my CO₂ Emissions?



How to reduce CO₂ Emissions

Reduce Heat Losses

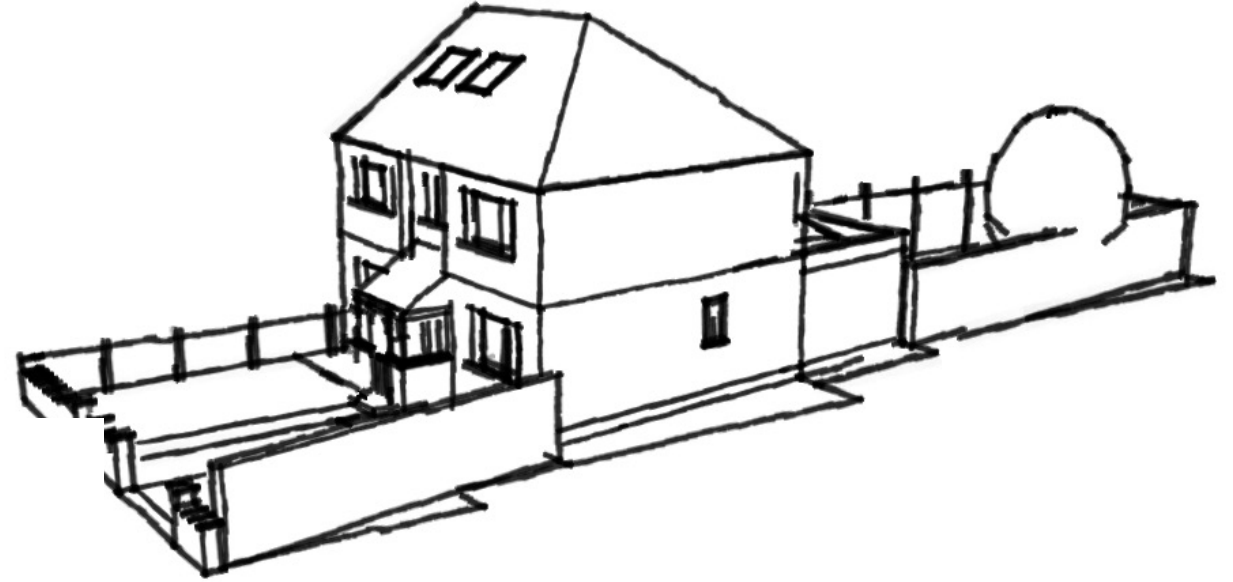
- Triple-Glazing
- External Wall Insulation

Generate Renewable Electricity

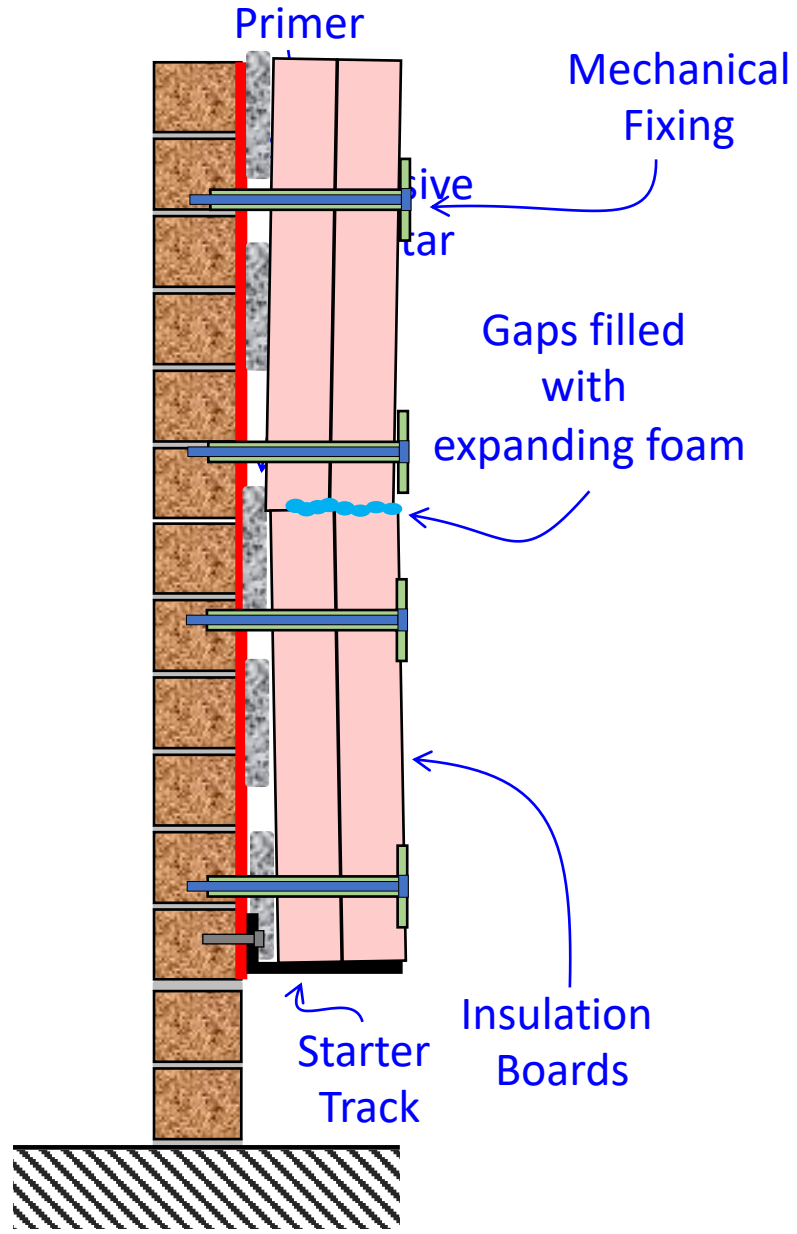
- Solar Panels
- Battery

Stop Burning Gas

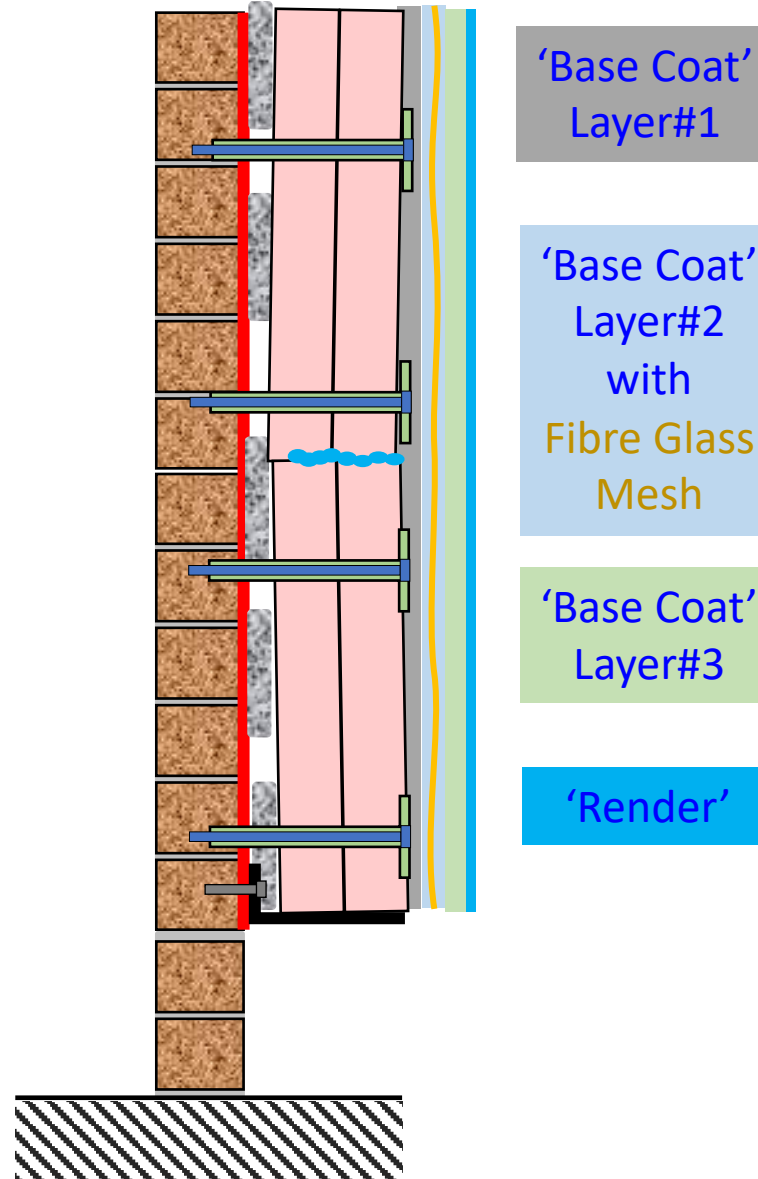
- Heat Pump



External Wall Insulation



External Wall Insulation





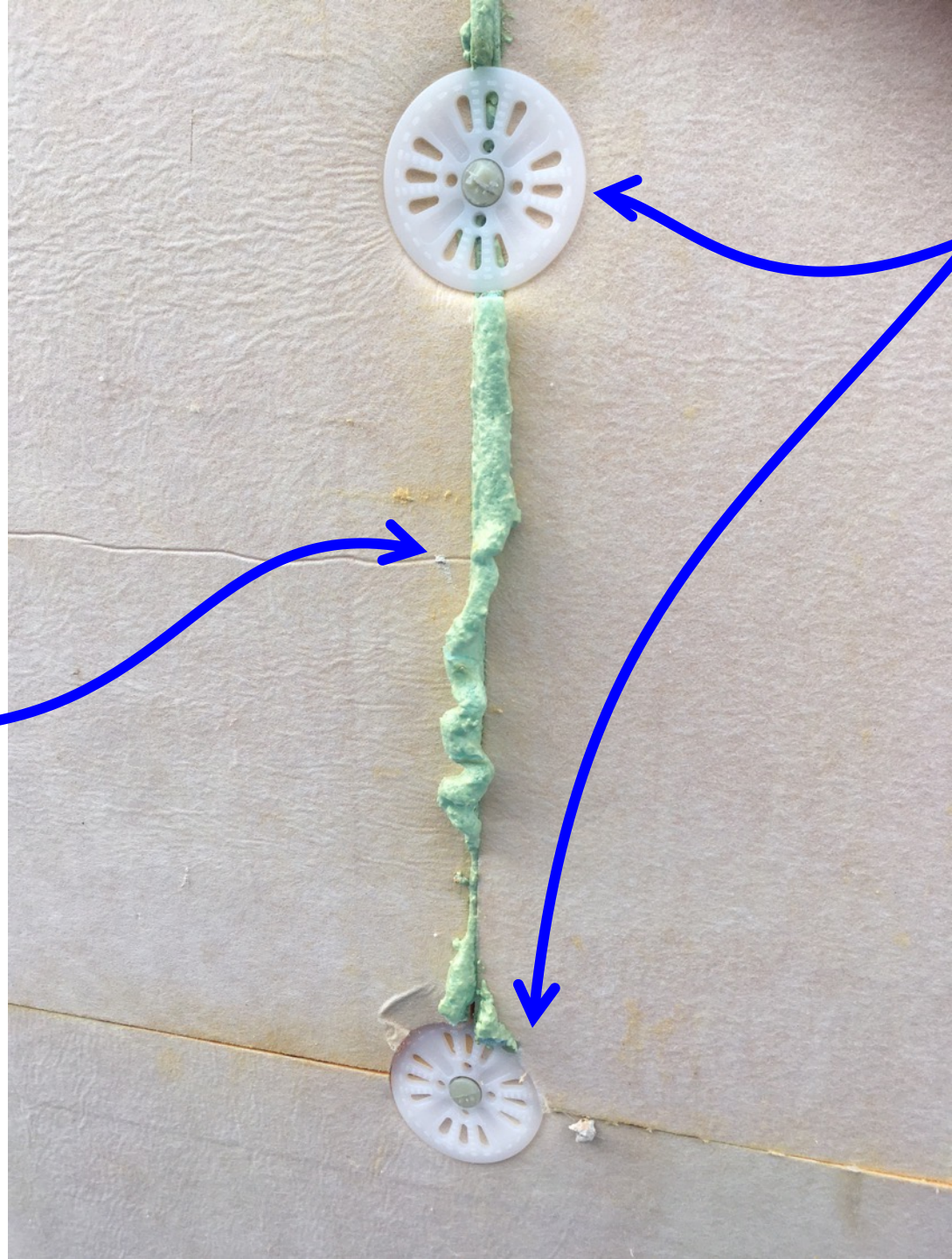
Applying
Primer to
the existing
surface of
the walls.



New roof
insulates and
encapsulates
the old roof

Mechanical
fixings

Expanding foam
insulation in the
cracks





100 mm
'recess' at
windows is not
too visually
offensive



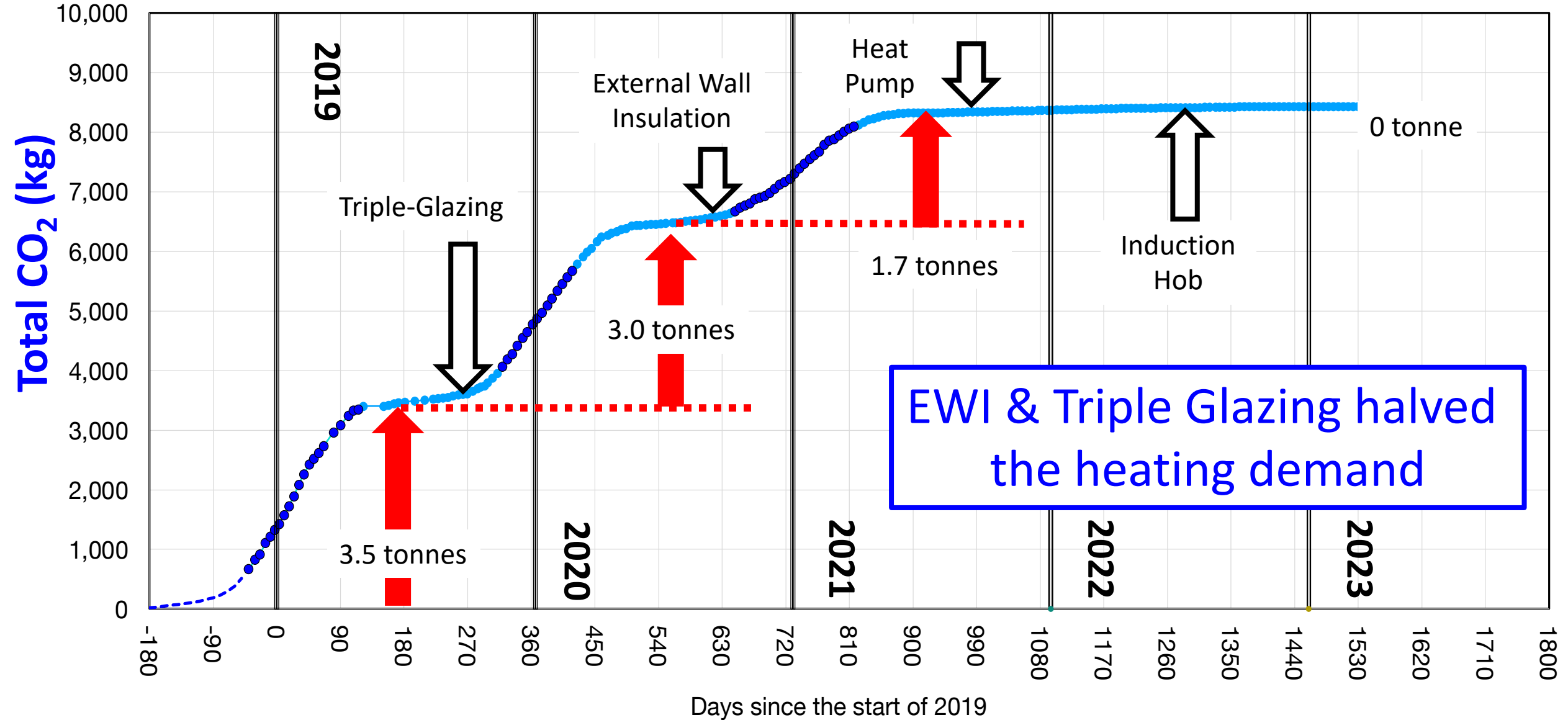






CO₂ emissions from Gas (kg)

Carbon Dioxide Emissions from Gas



How to reduce CO₂ Emissions

Reduce Heat Losses

- Triple-Glazing
- External Wall Insulation

Generate Renewable Electricity

- Solar Panels
- Battery

Stop Burning Gas

- Heat Pump



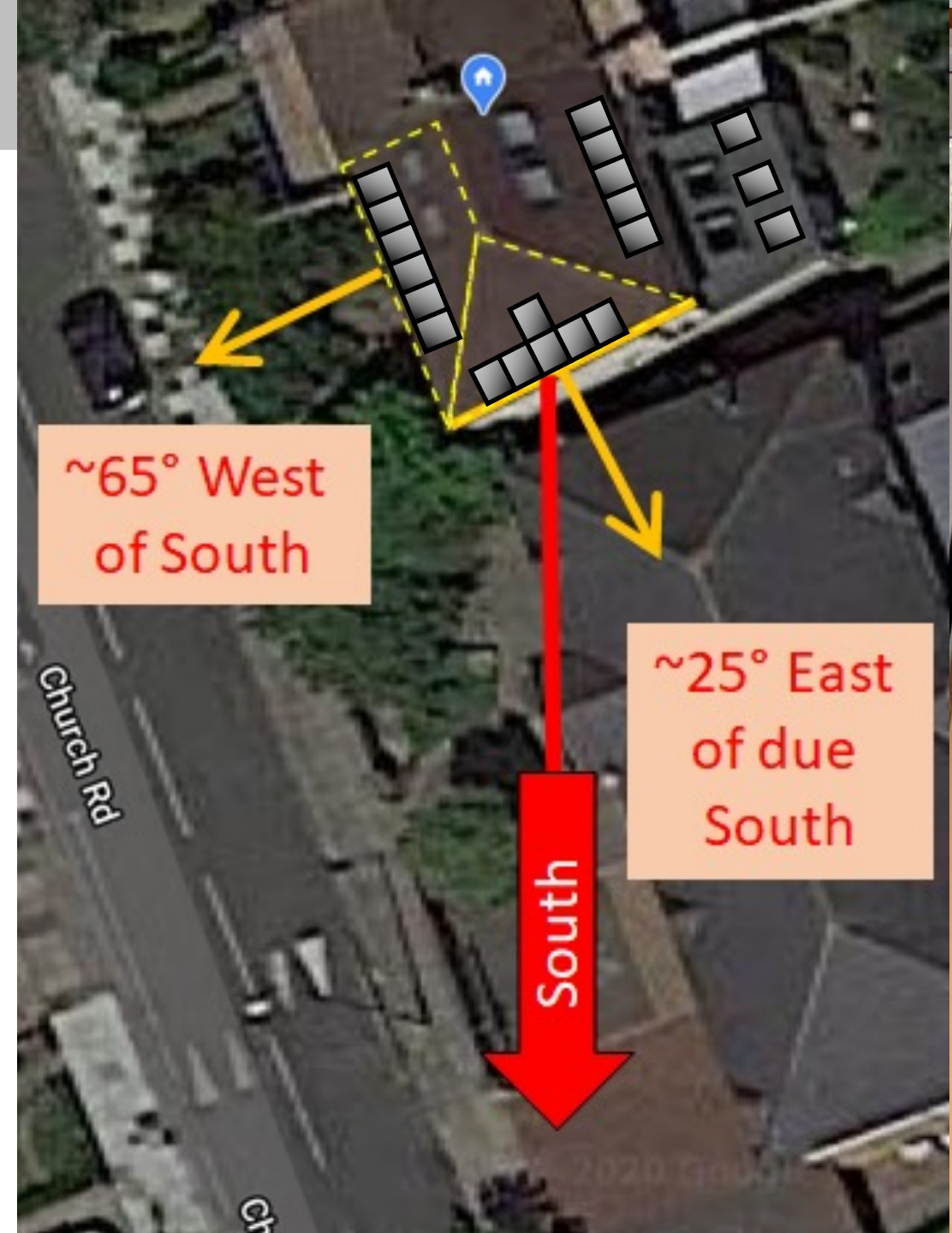
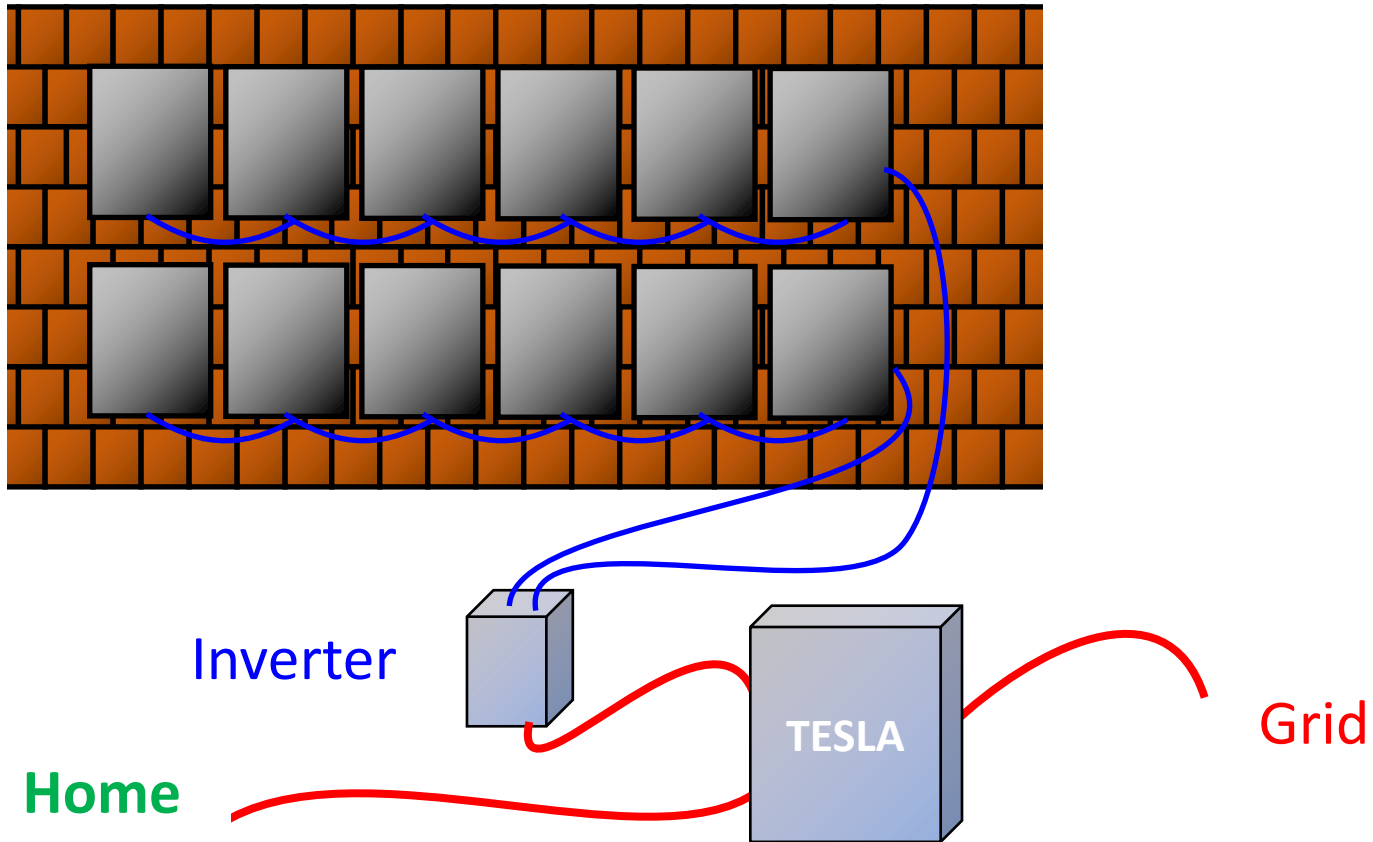
Solar PV & Battery

12 x Q-Cells panels = 4 kW peak

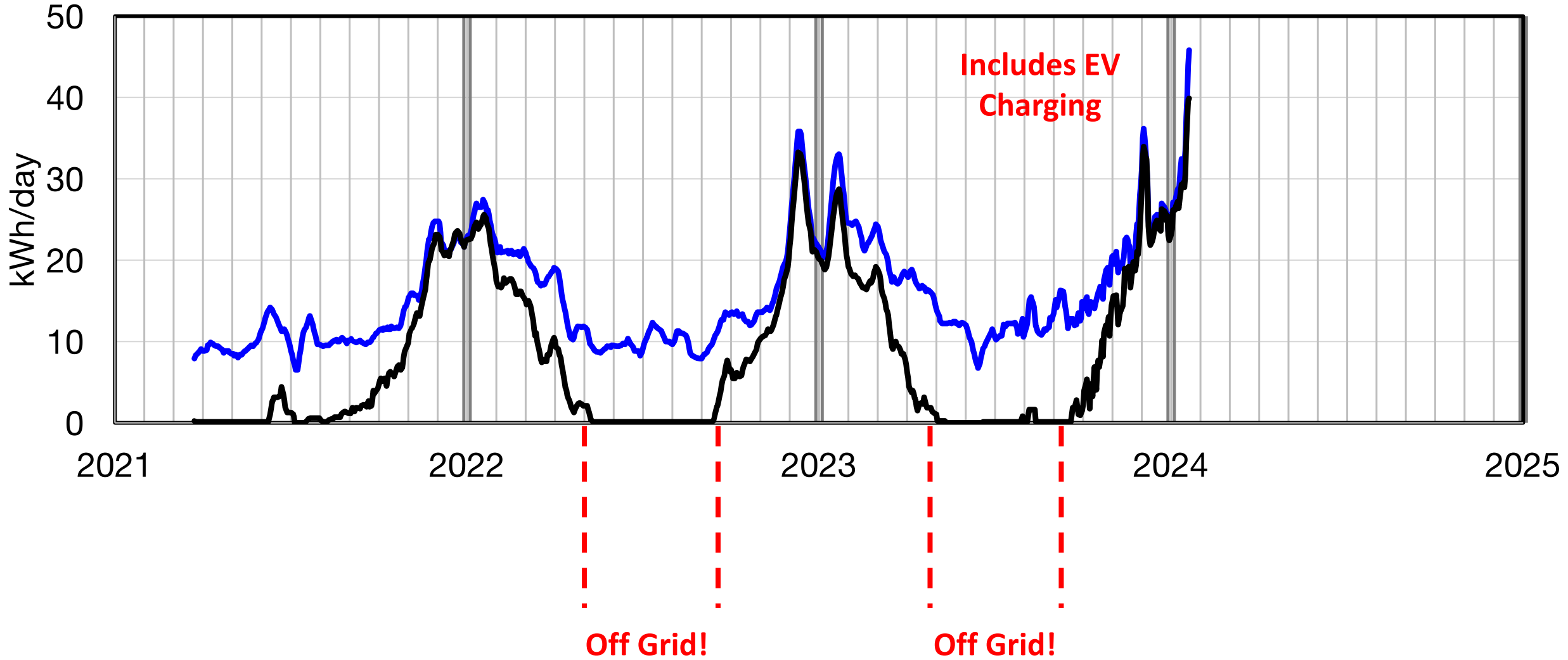
- ~15 kWh/day in Summer
- ~2 kWh/day in Winter

Tesla Powerwall
13.5 kWh storage

- ~ 1 day's use
- ~ 30% of EV battery

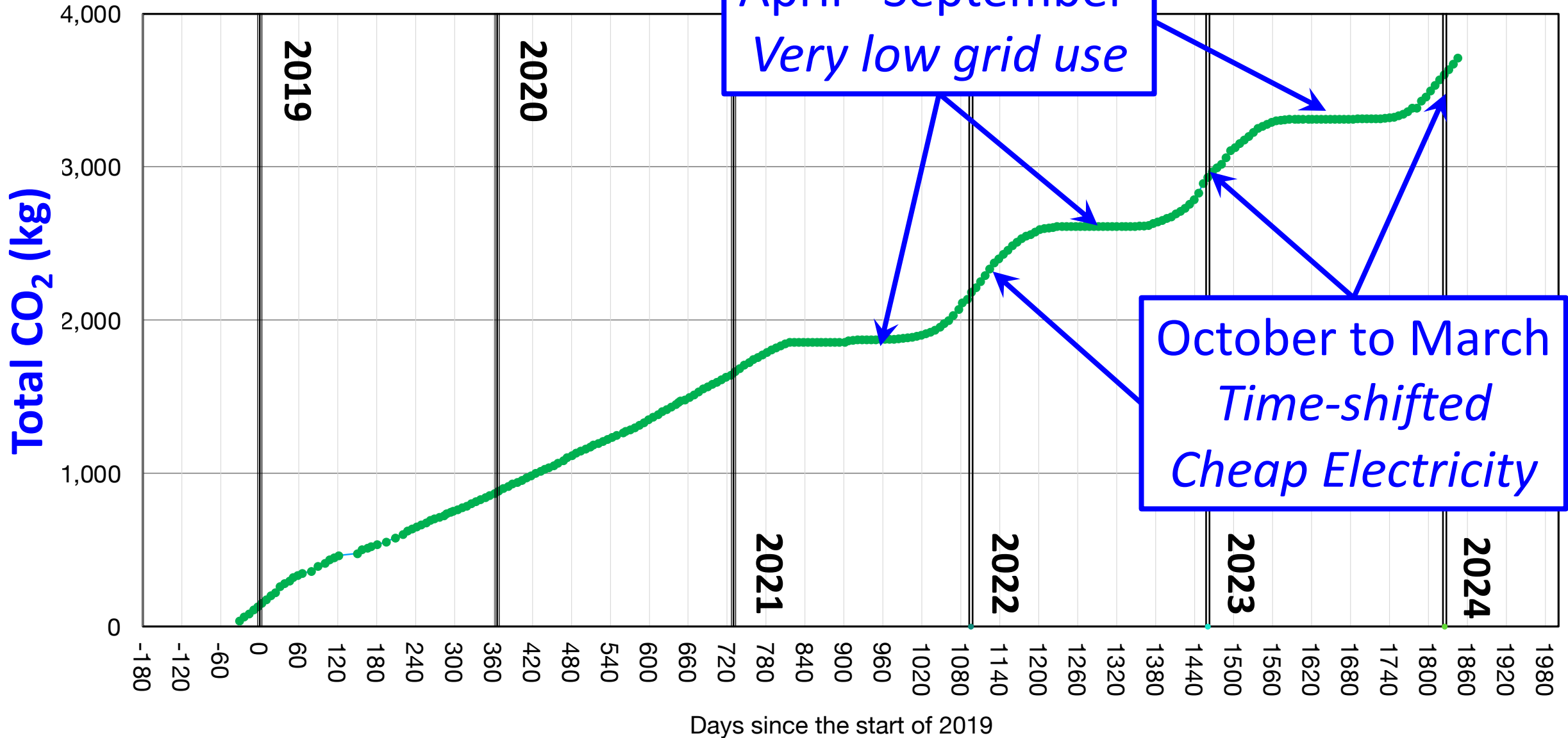


Domestic Consumption and Grid consumption



CO₂ emissions from Electricity (kg)

Carbon Dioxide Emissions from Electricity



How to reduce CO₂ Emissions

Reduce Heat Losses

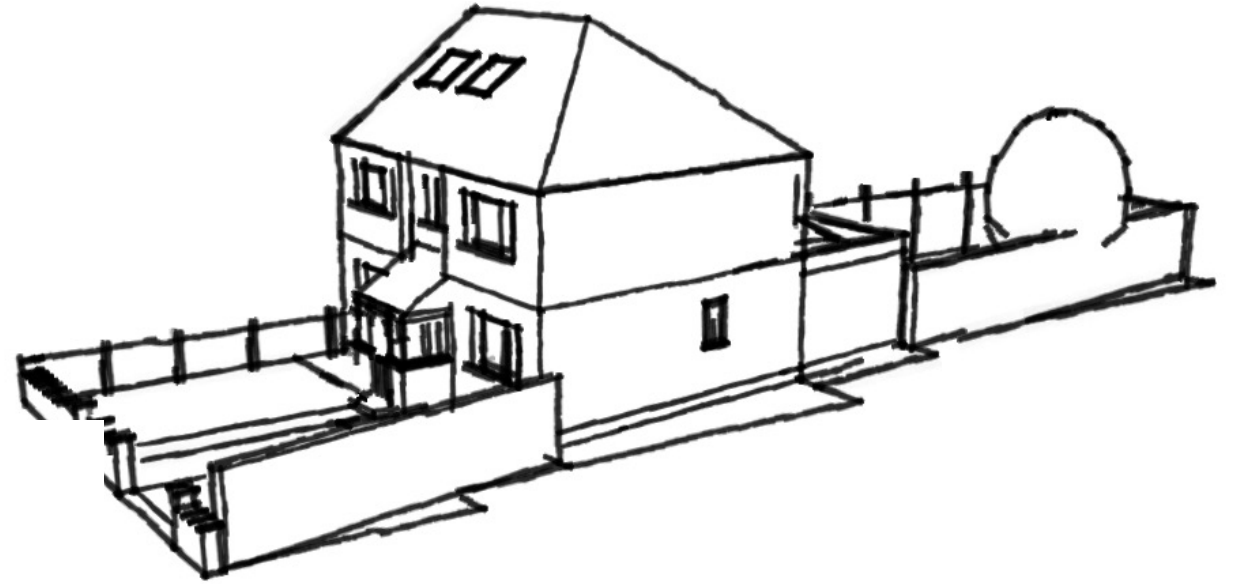
- Triple-Glazing
- External Wall Insulation

Generate Renewable Electricity

- Solar Panels
- Battery

Stop Burning Gas

- Heat Pump



Heat Pump



Heat Pump



Air Source Heat Pump

Replaces Gas Boiler

5 kW heating

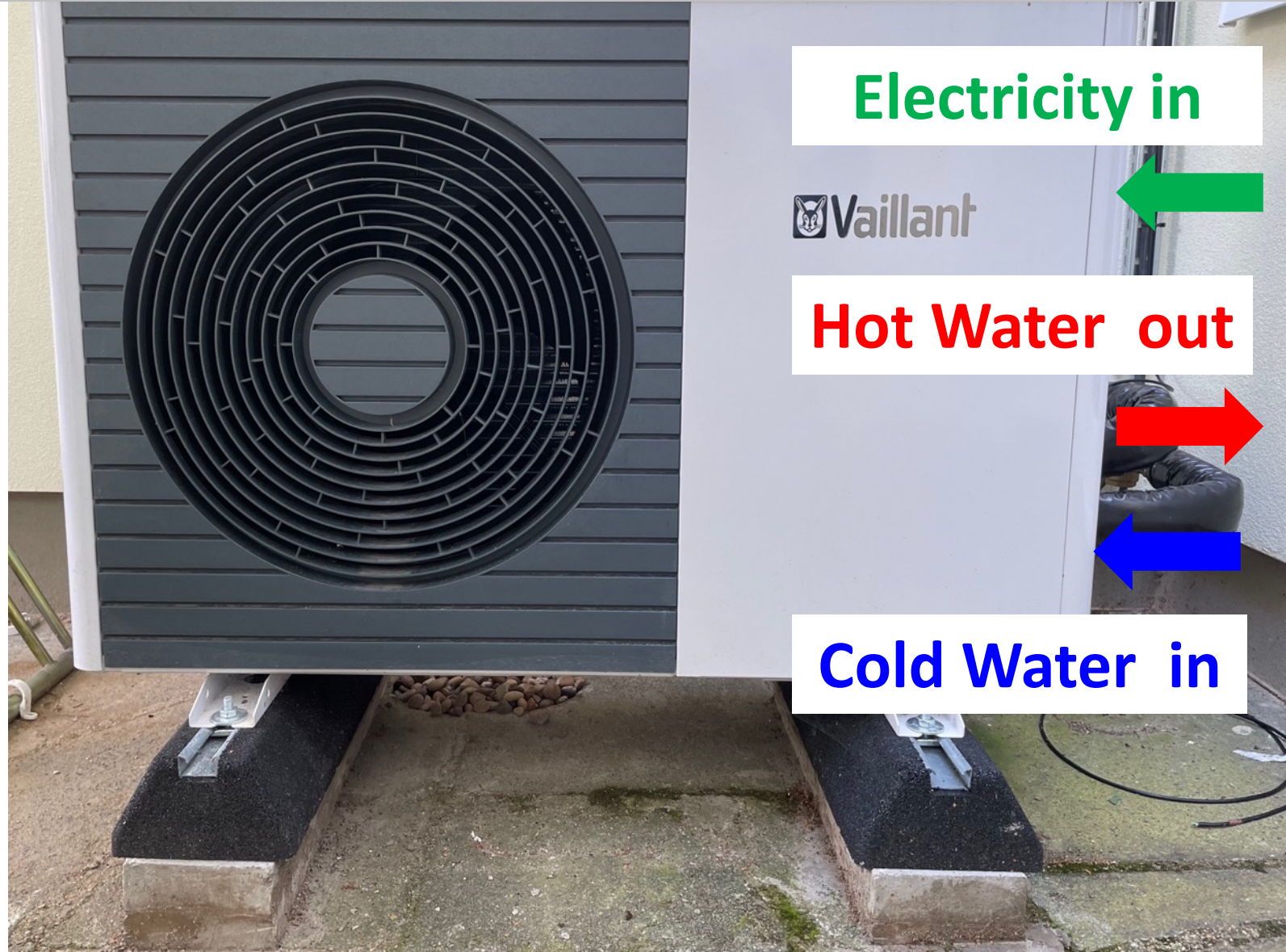
- **Uses 1.5 kW electricity!**
- **More than 300% efficient!**

Supplies hot water to:

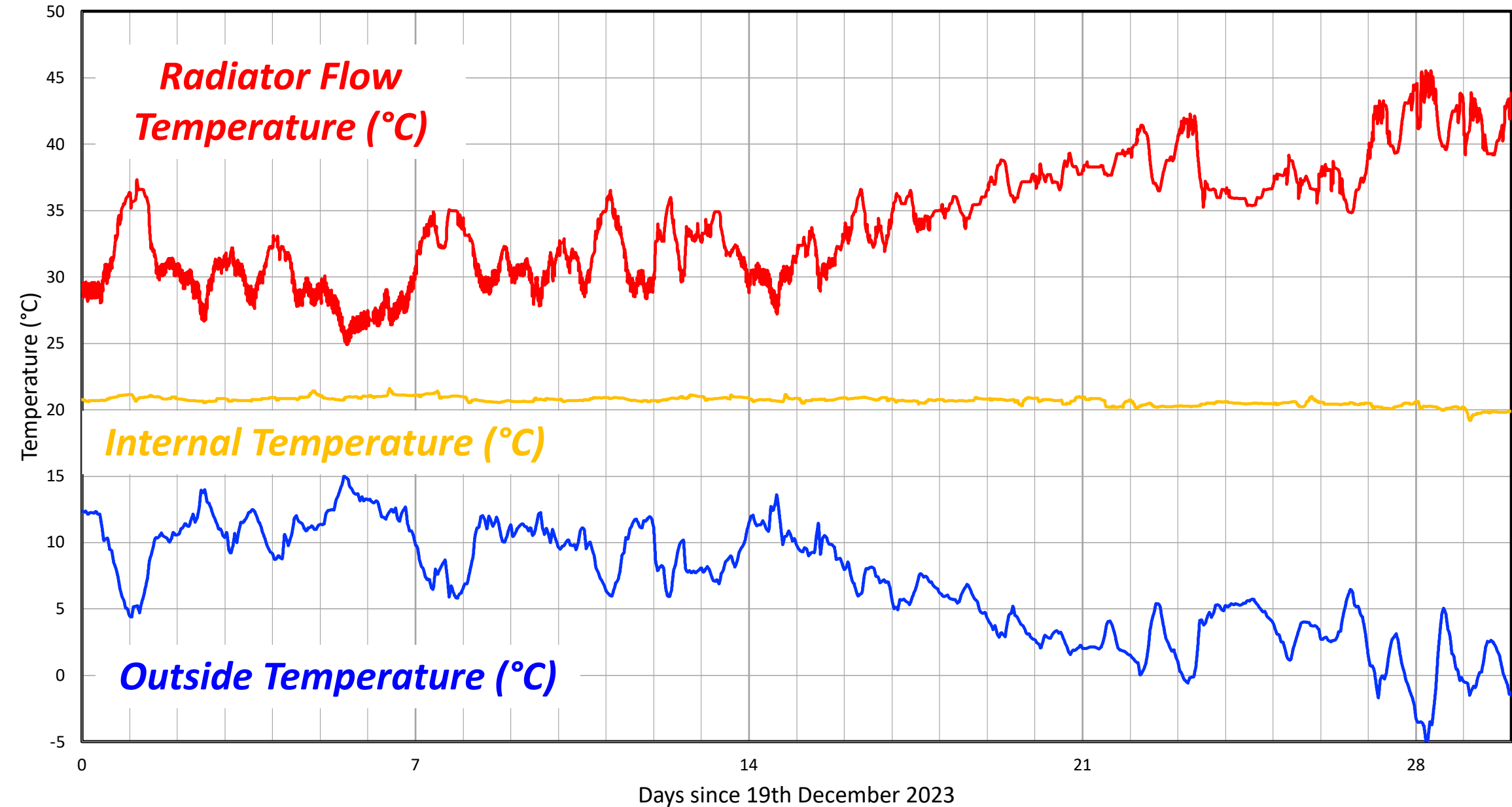
- Radiators
- Hot Water Cylinder

Heat Pump Size:

- Rule of Thumb:
- ~Annual Gas kWh/2,900



Heat Pump: Weather Compensation



What did it all cost?



Capital Costs

Main Works

Date		Notes	Cost	
September 2019	Triple Glazing	9 windows & 1 door	£7,200	
August 2020	Triple Glazing	2 windows & 1 door	£3,080	£10,280
November 2020	External Wall Insulation		£25,790	£25,790
November 2020	Solar Panels		£4,231	£4,231
March 2021	Battery		£10,585	£10,585
January – July 2021	Heat Pump		£8,036	
	Heat Pump Wiring		£984	£9,020

£59,996

Other Works

Date		Notes	Cost	
April 2021	EPC Rating		£90	£90
May 2021	Heat Pump Monitoring		£1,156	£1,156
May 2021	Air Conditioning		£5,832	£5,832
Jun-21	Bathroom Refurbishment		£5,700	
Jun-21	Bathroom Components		£2,125	£7,825
				£14,903

Running Costs (approximate)

Before (when energy was cheap!)

	Rate	Notes	Annual Cost	
Gas	@3.5 p/kWh	15,000	£525	
Electricity	@25p/kWh	3,800	£950	£1,475
Gas Standing Charge	@25 p/day	365 days	£91	
Electricity Standing Charge	@25 p/day	365 days	£91	£181

£1,656

Now (when energy is expensive!)

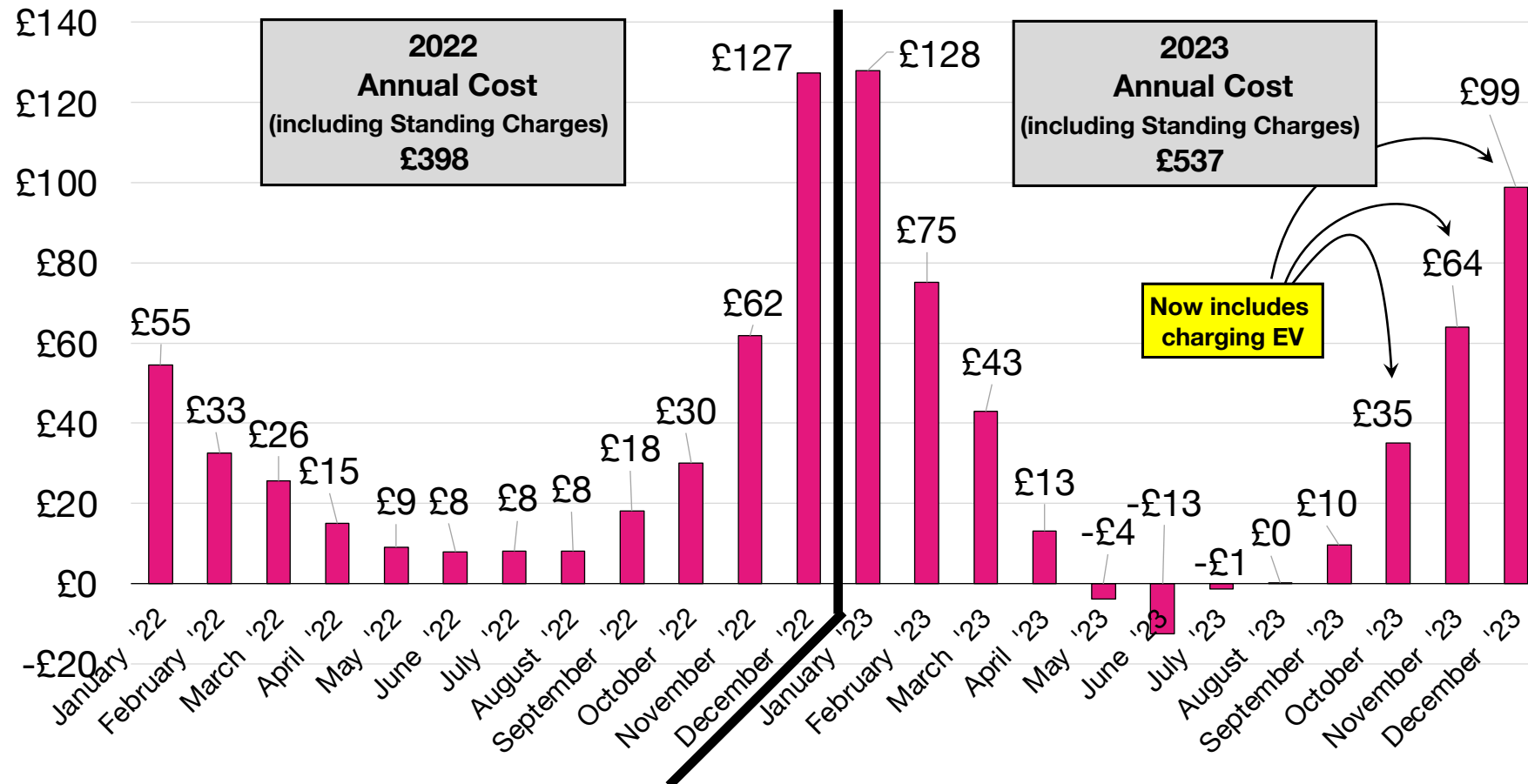
	Rate	Notes	Annual Cost	
Electricity (peak rate)	Expensive @42p/kWh	~100	£42	
Electricity (cheap rate)	@7.5p/kWh	~3,000	£225	
Electricity (Exports)	@4.3p/kWh	~1100 kWh	£47	
Electricity Standing Charge	@40 p/day	365 days	£146	£366

£366

Return on Investment (approximate)

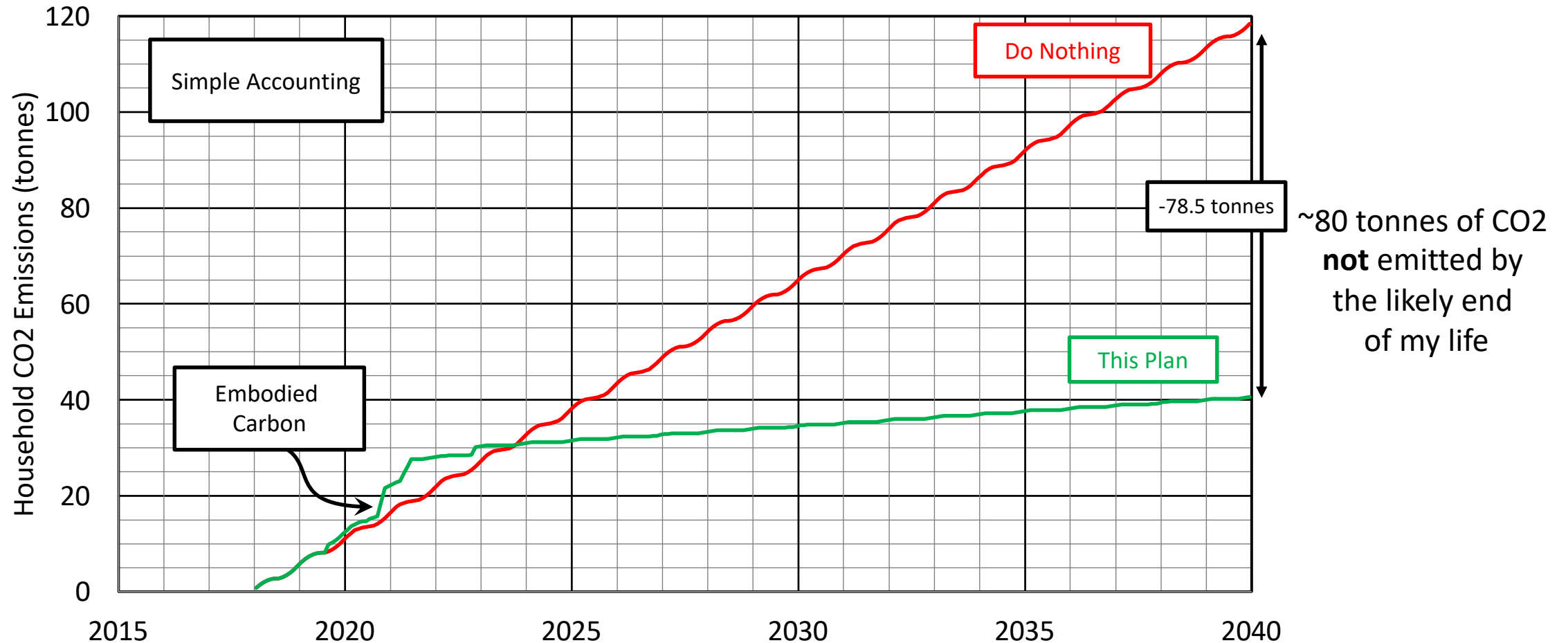
Expenditure	Saving	Notes
£60,000	£2,000/pa	3.2%

Monthly cost for heating, cooking and electricity



Return on Investment (approximate)

Expenditure	Saving	Notes
	3.4 tonnes of CO ₂ /per year	



What can you do?

- 1. Don't beat yourself up!*
- 2. Take your time*
- 3. Find out how much heating your dwelling uses in a year.*
 - Try reading your meters once a week*
- 4. Reduce heating demand.*
 - Draughtproofing is cheap*
 - Consider a heat loss survey*
- 5. If you have the means:*
 - Think about solar panels & a battery.*
 - Buy a fraction of a wind turbine or solar park through Ripple*
<https://rippleenergy.com> .

A Short Talk about my Low-Carbon Home



*Good Luck
with your
endeavours!*



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