

Greener UK Home Heating

Rhymes with Financial
Derivatives!

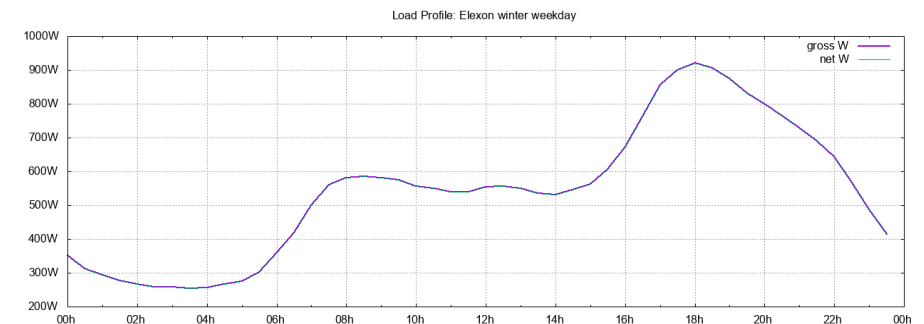
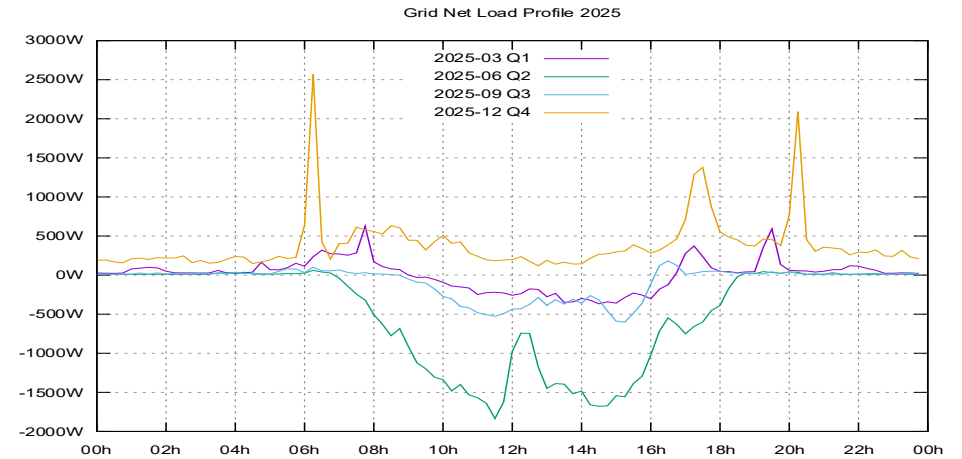
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Introduction

- History doesn't repeat, but sometimes rhymes
- What fixing the climate can learn from finance
- A take-home tweak that you could try tonight!

- Damon Hart-Davis d.hart-davis@surrey.ac.uk
- PhD research in decarbonising home heating
- Previously: multiple startups, finance, AI&CS



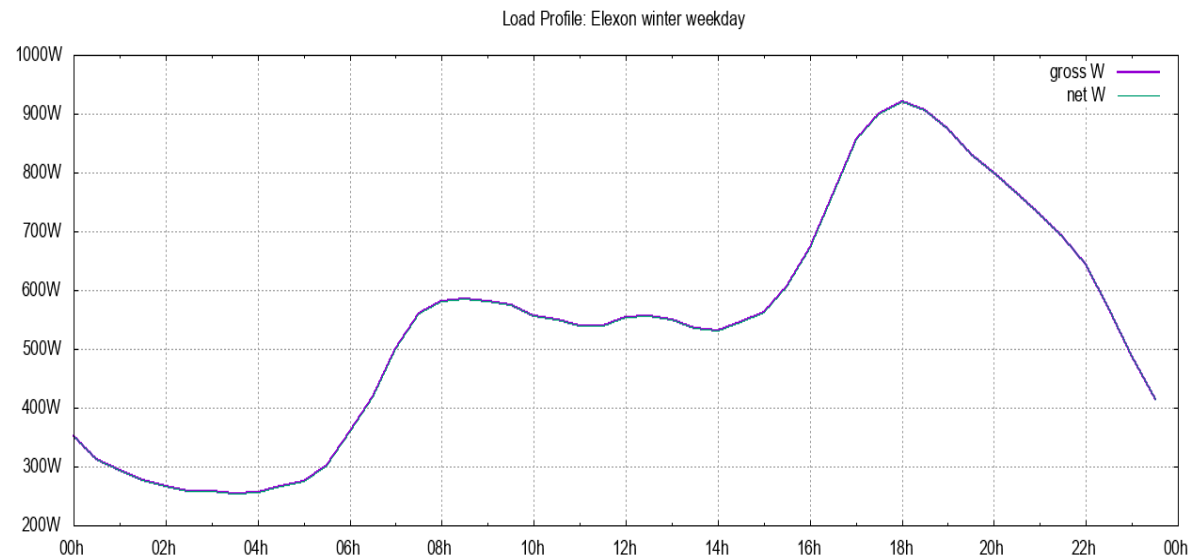
Distributed, Derivative, Decarboning

- A long-term interest has been distributed computing systems, including the Internet (I created an early ISP) and grid (micro) renewables.
- I spent a long time working in Fixed Income Derivatives in the City.
- Insights from the two help decarbonise the country!



Home Heat Decarbonisation

- To eliminate the ~15% of UK greenhouse gas emissions due to home heating most of us will move to heat pumps.
- Electrifying heating will roughly double peak demands on the grid.
- The grid has to be sized to meet peak demand — so flattening peaks saves lots of money!
- But not everyone has to do the exact same thing to help fix the issue...



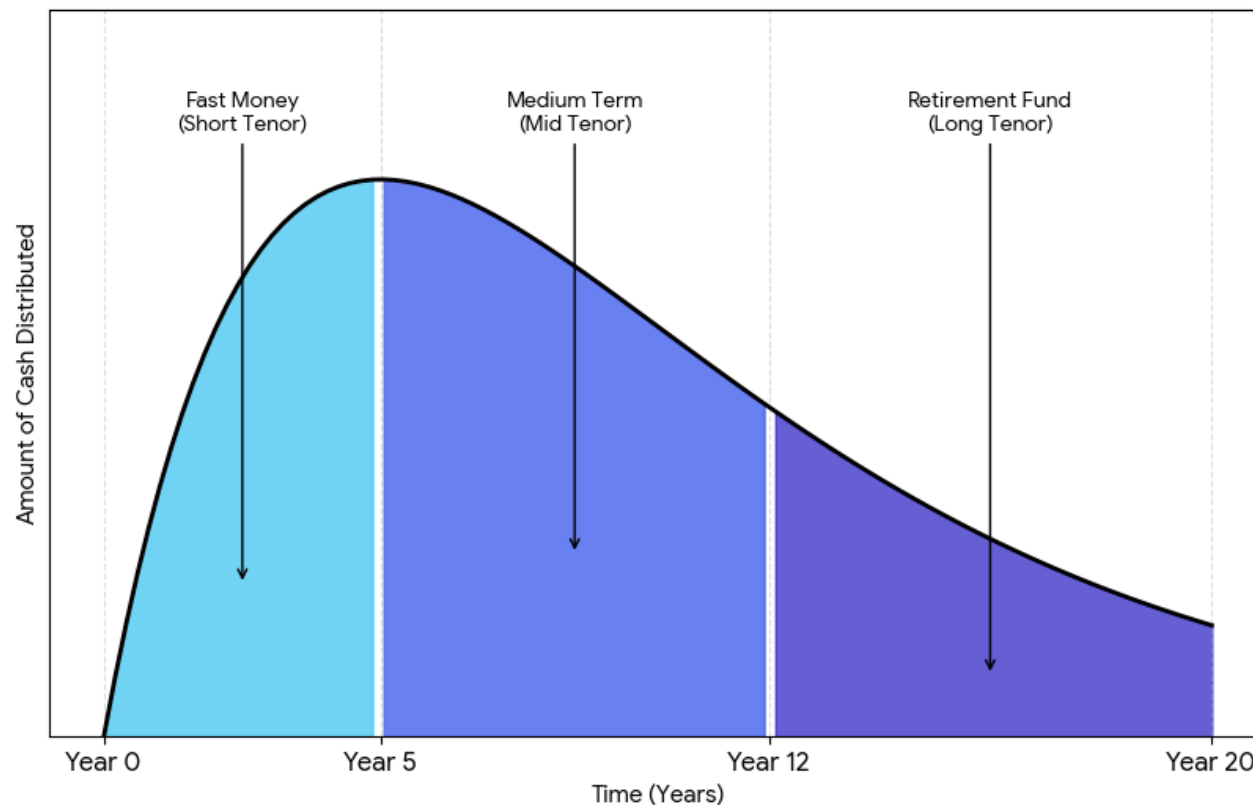
Cut Carbon, Then Time Your Energy Use

- First cut your carbon – replacing a gas boiler with a heat pump may be the biggest single saving you can make.
- (Extra grant for oil and LPG boilers!)
- Maybe go EV instead of ICE car, or do more active/public transport.
- And time your energy use – especially as more wind and sun powers the grid – to save more carbon and cash!



What Financial Markets Do...

- You are a bank with 1000 mortgages on your books — some householders will pay off quickly, some will plod through exactly as on the original offer to the very end, and some ... will fail to pay much at all.
- Some in the financial markets want the low-risk early money, pension funds may want longer-term to match payouts for their long-lived pensioners, and some are happy to take risky stuff for a better interest rate.
- Slice and dice, CMO derivatives...

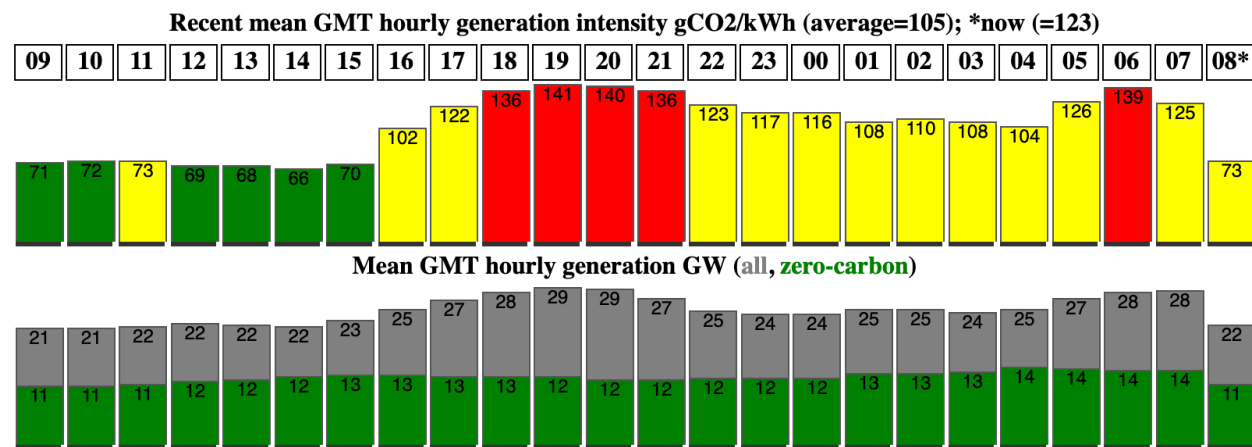


Peak Shaving vs Dynamic Flexibility

- Static response to shave peaks and avoid some grid building: move your power use away from evening and morning peaks by setting your heating and hot water programmer once.
- Dynamic response: when there is less sun or wind than forecast on the day or during 'Dunkelflauten', just let your laundry basket pile up or run a cold(er) wash or turn the heating down a degree!
- Electricity is already half price or less if you can do these, with a smart meter, and a battery can help.

GB Grid Intensity

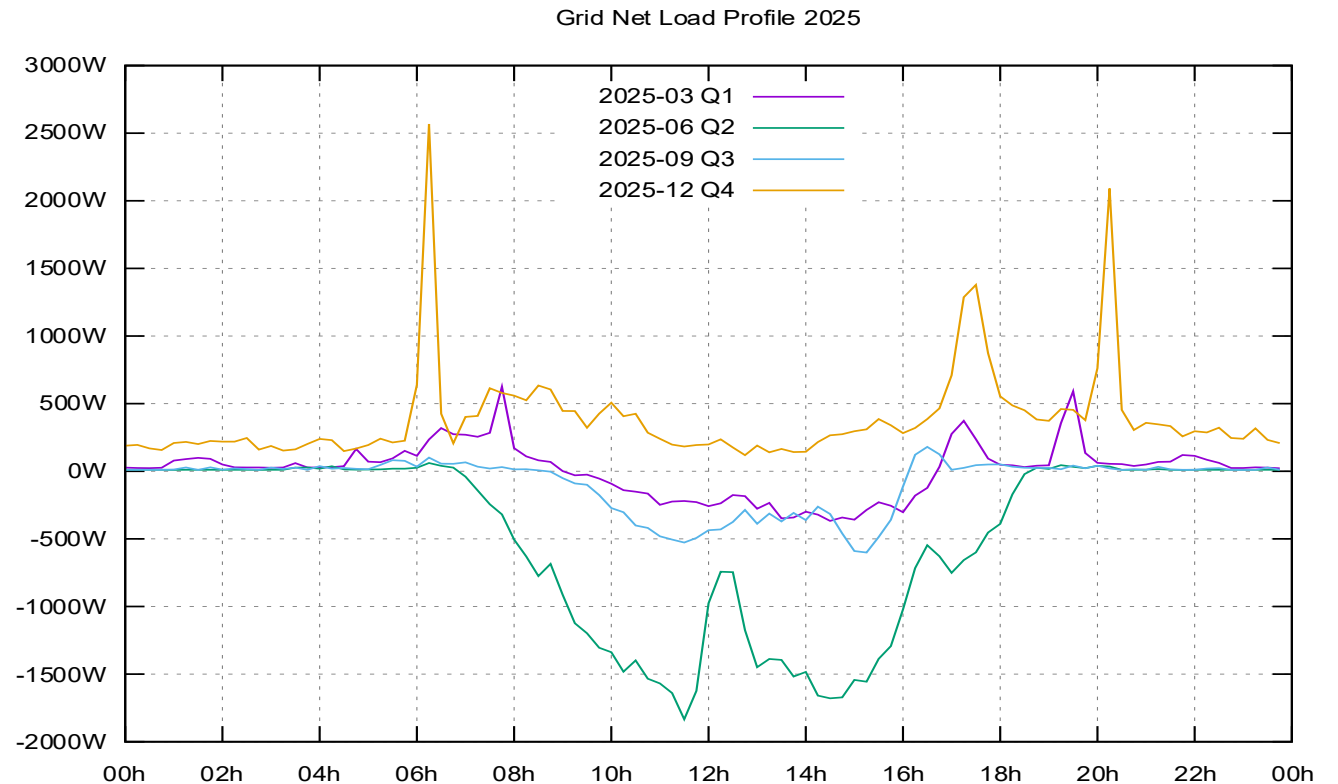
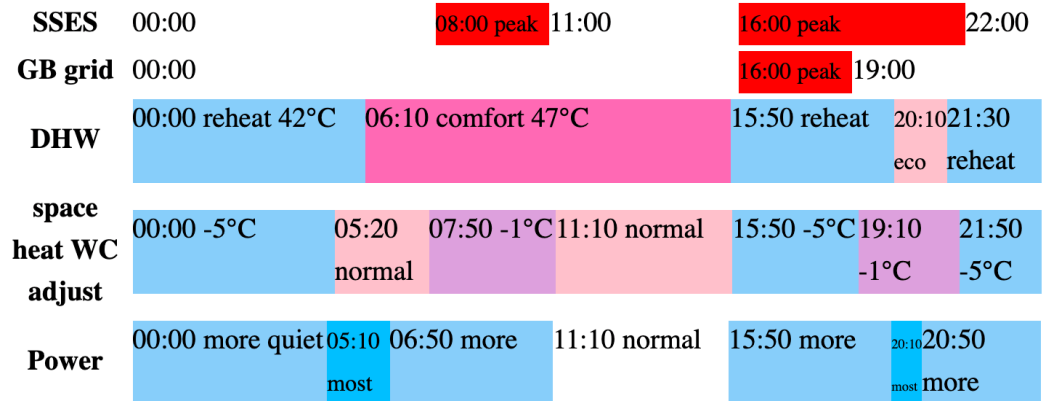
- When you use electricity also determines how much carbon emissions are produced, though the CP2030 plan aims to make that near zero by 2030.
- At peak times typically more expensive and inefficient fossil fuel generators are run. Another reason to shave peaks!



What I Have Done: Static

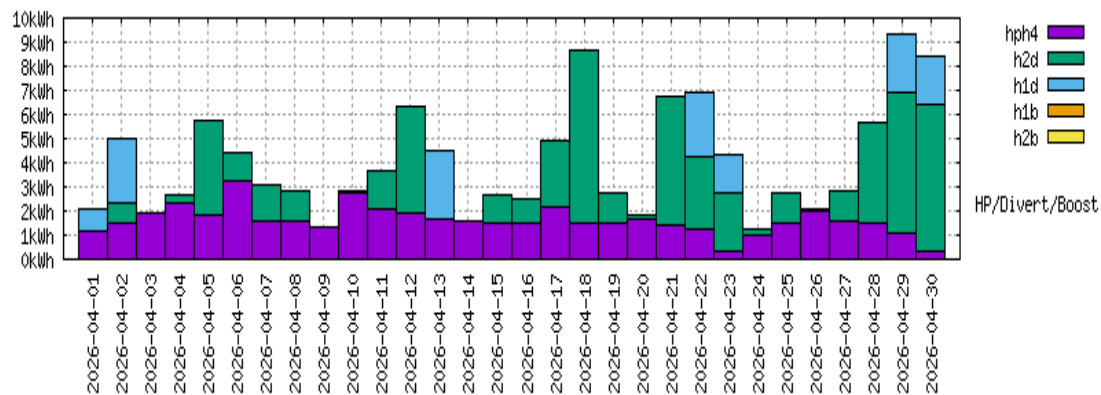
- Static: shifted my heat pump hot water times away from peaks.

daily 24h schedule, local time



What I Have Done: Dynamic

- Dynamic: top up directly from solar PV when there is lots of green energy on the grid.



What You Can Do Tonight, Free!

- **Program your heating off 5pm to ~7pm** and coast, even for gas!
- Don't run the dishwasher just after your evening meal: **4am** or noon is better!
- (GB SSES 'off-peak' times are 10pm to 8am, 11am to 4pm.)
- You don't need to be content with a warm feeling inside: various Time of Use tariffs will **pay you** to do this, eg Octopus Agile or EDF FreePhase.





Summary

- This complicated distributed puzzle has a piece-by-piece solution.
 - You can be part of that solution and **bank your good behaviour**.

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