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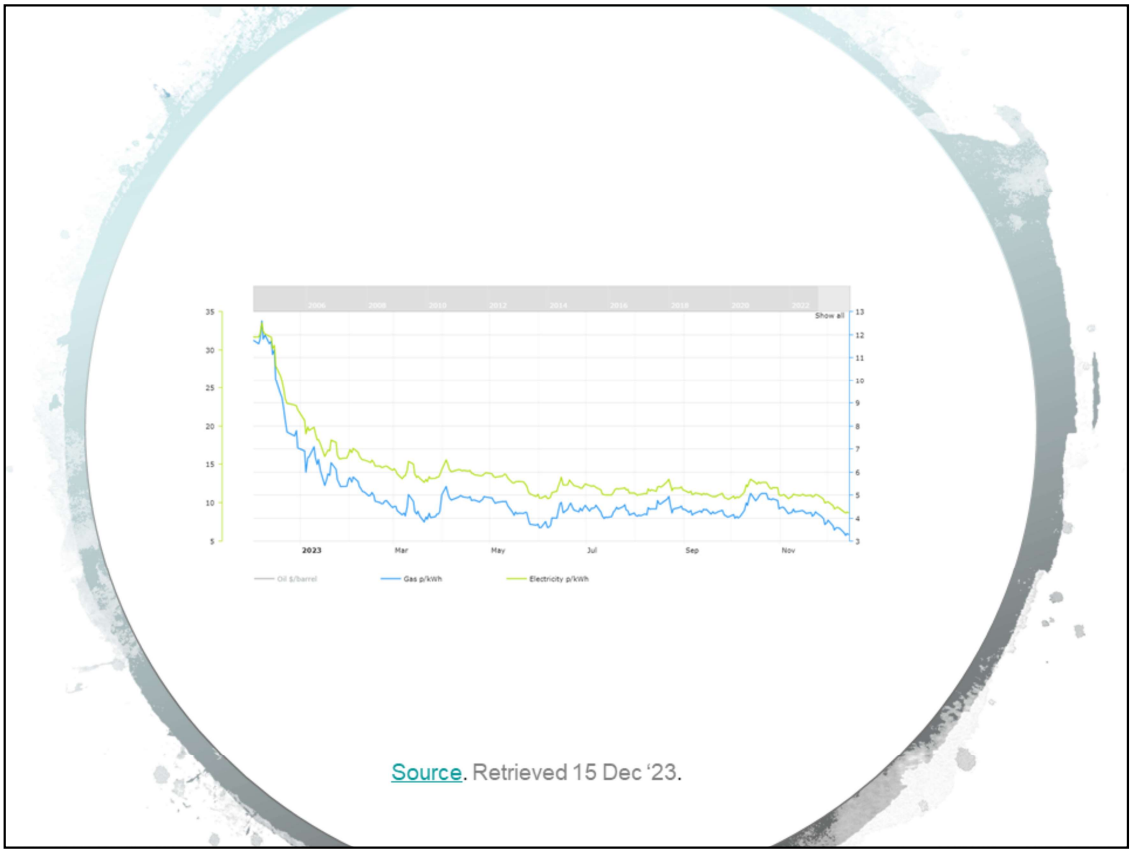
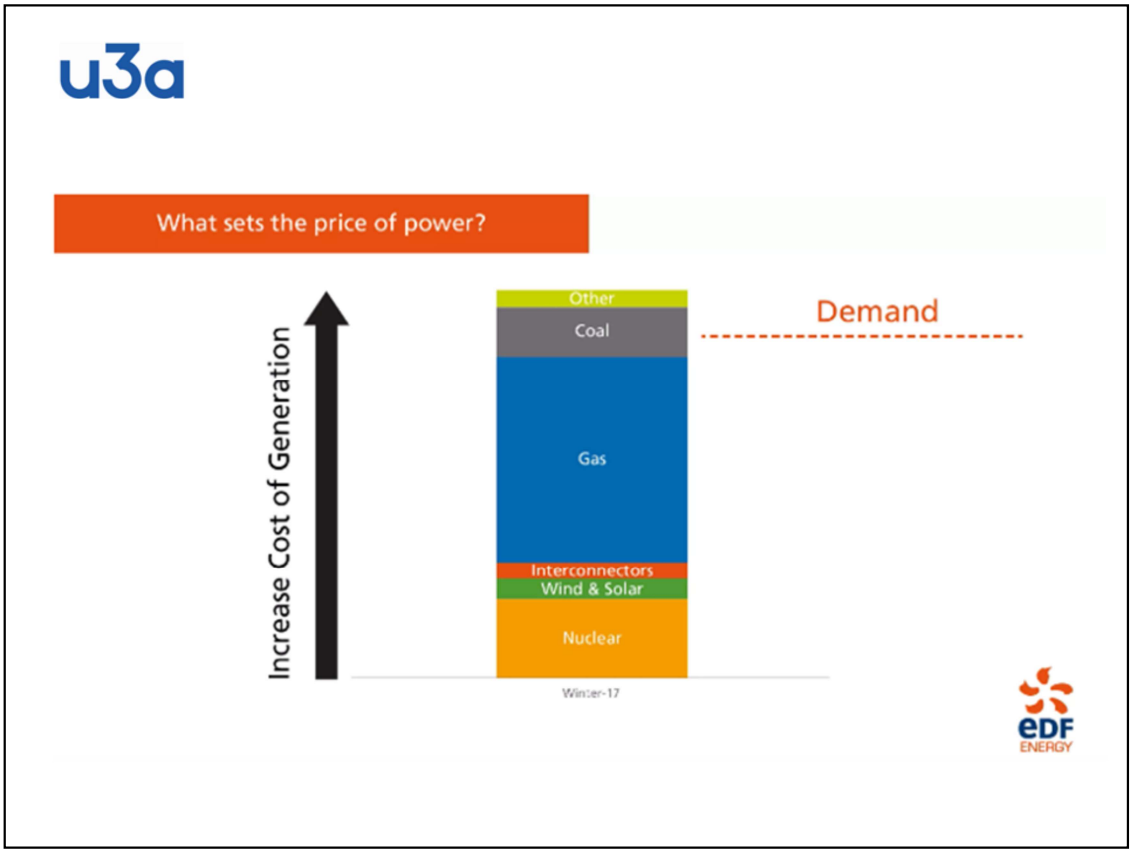
Why does the electricity price follow the gas price?

More at https://u3asites.org.uk/climate-change/page/130313.



Source. Retrieved 15 Dec '23.

Electricity prices in green; gas prices in blue.



The price we pay for power is set by the Marginal Generation Unit – the supplier that meets peak demand – and it is nearly always a gas-powered station; so if the MGU asks £110 all generators get paid £110 for that Settlement Period, even if gas is only 5% of the generation mix. Adding cheaper renewables has only an indirect effect – without them the MGU would be a less-efficient unit lower in the merit order.

In 2022 the government, presumably realising that the market is dysfunctional, announced a Review of Electricity Market Arrangements. One idea discussed is a split of the electricity market into an 'on-demand' market (for gas and coal) and an 'as-available' market for renewables. Storage I guess would play in both markets; where nuclear would go I'm not sure. The price in the on-demand market would be set largely by the cost of fuel, and in the as-available market largely by the capital cost of plant. This would mean that cheap renewables would have greater influence on the wholesale price.

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The grid matches Supply and Demand

During a Settlement Period Supply has to track demand. This is known as BALANCING. There are different markets for balancing service:

- Frequency response. ESO aims to keep mains frequency between 49.5 Hz and 50.5 Hz
- Reserve. There is a pool of fast-reserve stations which contract to deliver 20 MW within 2 mins of receiving a dispatch from ESO.
- Reactive power.

In winter 2022/23 balancing market costs were £1.2bn. ESO issued an average of 1800 daily balancing instructions, and balancing services regularly exceed 50% of demand. The average was just 5% in 2012.

In Dec '23 the first stages of ESO's Open Balancing Platform (OBP) have gone live. It enables hundreds of smaller units to receive instructions from the ESO control room via the bulk dispatch of battery storage and small Balancing Mechanism Units (BMUs).

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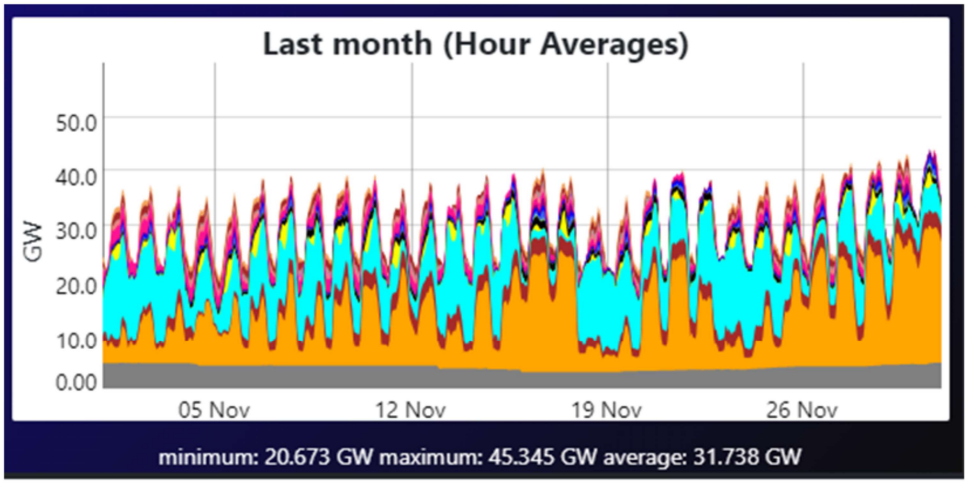
Carbon intensity varies through the day

UK Generation by type, Nov ‘23



It seems to me that renewables only work in the mix if there is a backup generator ready to take over when the wind doesn’t blow. Renewable power might not look so cheap if windfarms and the like had to pay for this backup.

Source: www.gridwatch.co.uk.

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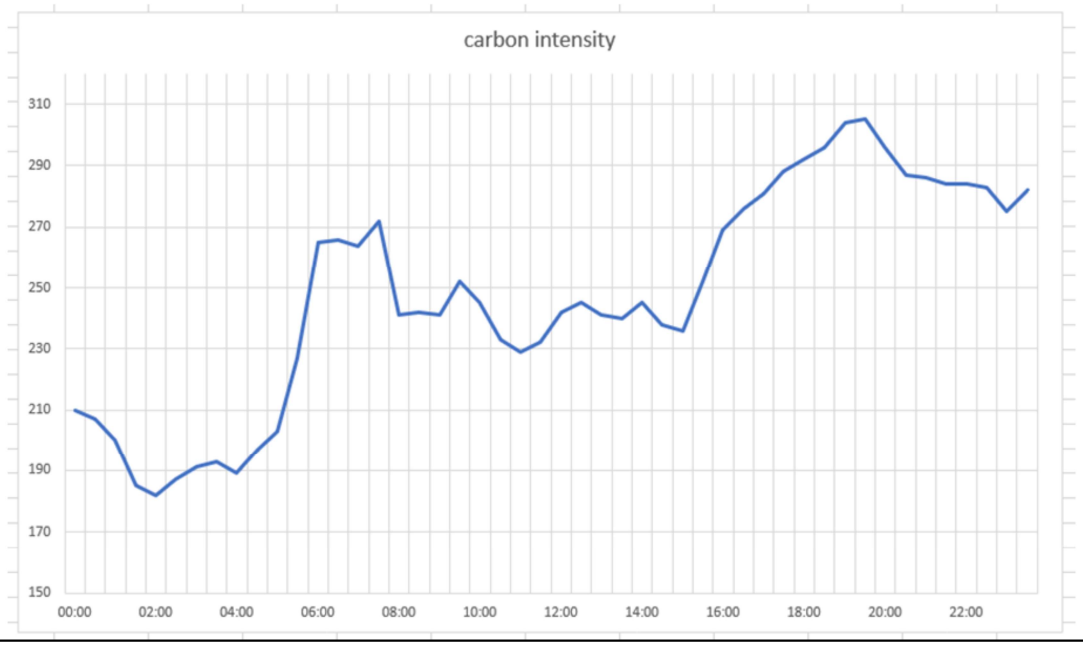
London region, 22 Jan 2022

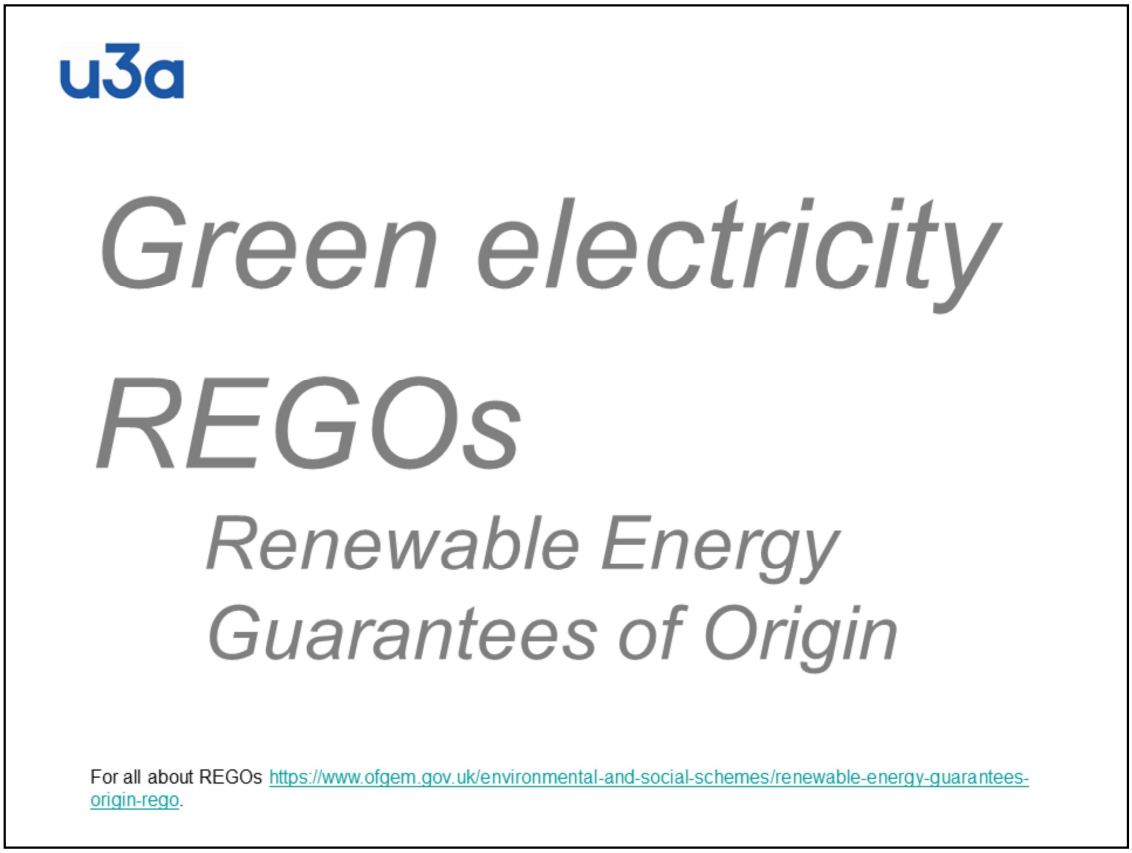


The carbon intensity of GB electricity varies with the generation mix. This is the afternoon of 13th August 2022, showing a factor of two between 14:00 and 22:00. The wee small hours are not always the greenest time.

System restoration (sometimes called black start) – rebooting the grid or a region of the grid if it goes down. It's easy to do this if you can call on big power stations and not so easy with distributed small generators such as windfarms. Nevertheless ESO has recently demonstrated that it can be done.

Green inertia services mimic the effect of a power station but without using fossil fuels. One is a repurposed gas generating station. When these services are not available the grid has been known to power up coal stations just to get the inertia. To date investment in green inertia, including measurement tools, total around £336m,

Demand Flexibility Services pay businesses and consumers to reduce consumption at certain periods, notified a day or so in advance. It was trialled in GB over winter 2022/23 and reckoned to have achieved about 3300 MWh of reduction – enough to power all our 20m homes for about half an hour – and will run again this winter. DFS features prominently in ESO's plans to achieve net zero. You need smart meters to make it work.



There's really no such thing as 'green electricity': unless you make your own, you get the same electricity that your neighbours get. However by deciding who you buy from you can influence the generation mix.

Which? divides green suppliers into three categories:

- 'Dark green' suppliers. No supplier can sell you 100% green power 100% of the time, but these generate as much as they sell, averaged over time.
- 'Mid green' suppliers generate some of their own power and get some from Power Purchase Agreements with anaerobic digesters and the like, and may top up by buying REGOs.
- 'Pale green' suppliers just buy REGOs. These are traded bits of paper issued by generators, one REGO for each MWh generated. The problem is that they are cheap as chips – in March this year consultants Cornwall Insight reported that it cost £11.28 to green the average household bill by buying REGOs. Assuming that the average householder uses 3.1MWh/yr, this means that a REGO costs £3.64: at that price, suppliers are paying 0.36p per unit to green their electricity.

So is the system working? Maybe. A windfarm might be selling its power to ESO and collecting £45/MWh, so the extra £3.64 from creating a REGO is a nice bonus. Some money flows to the generators, but a lot more seems to be flowing somewhere else.

The Climate Change Committee has said that the ability to unbundle REGOs from the power generated "could mean that the supplier of the green tariff is not actually purchasing renewable electricity but is simply purchasing the certificate“.

Questions