Electricity

- With every added share of RE the price of electricity goes up!

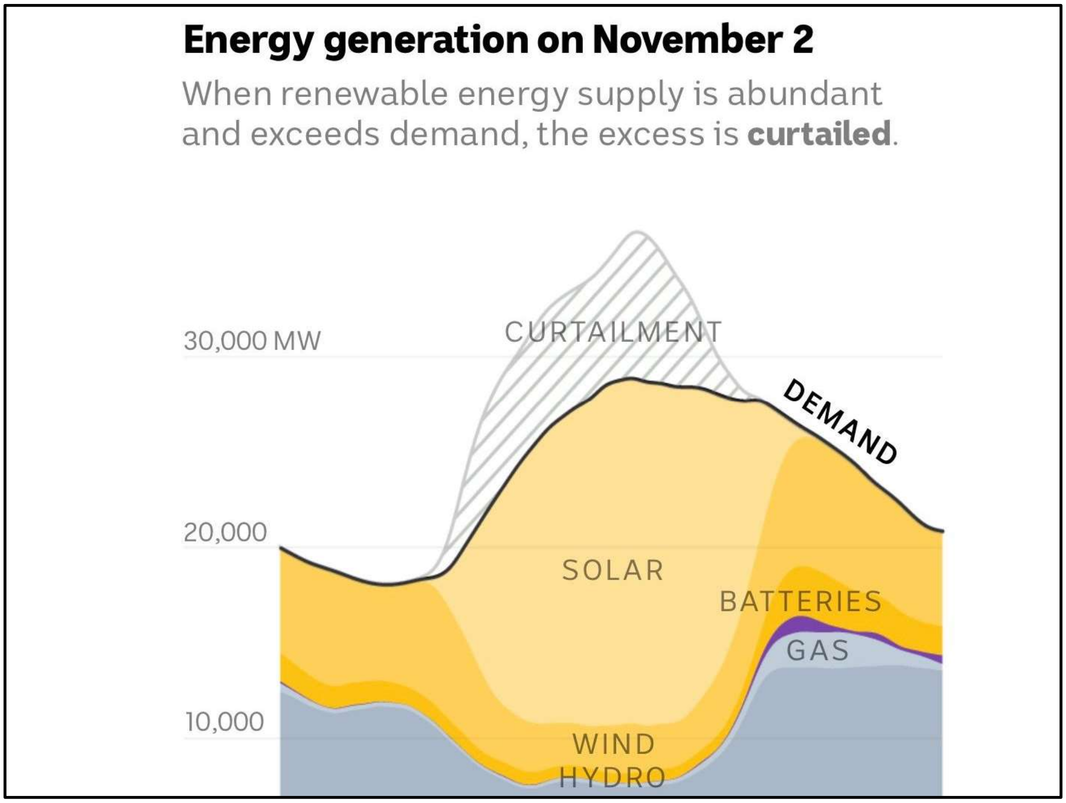
Pause. Does this make sense to you?
The price of electricity creates ripples across our entire society. It goes up, everything gets dearer and harder. For businesses and people alike.

Global phenomenon.
You see it often reported in media as “Network constraints”.

If you add RE to our legacy grids, you will introduce three problems.
Congestion, instability and timing problems.

Congestion means curtailment. We will immediately get a higher price of electricity. And then we have to compensate for all three problems by upgrading and expanding our grid. This raises the price of electricity PLUS it will increase our taxes.

This is what you would call an “inverse investment”. Every dollar into this projects means you have to pay more now and even more in the future.
When did some last suggested to you to join a project going for a reverse investment.
They are pretty rare.
But, it is happening here, right before our eyes.
The reason no one talks about it perhaps?

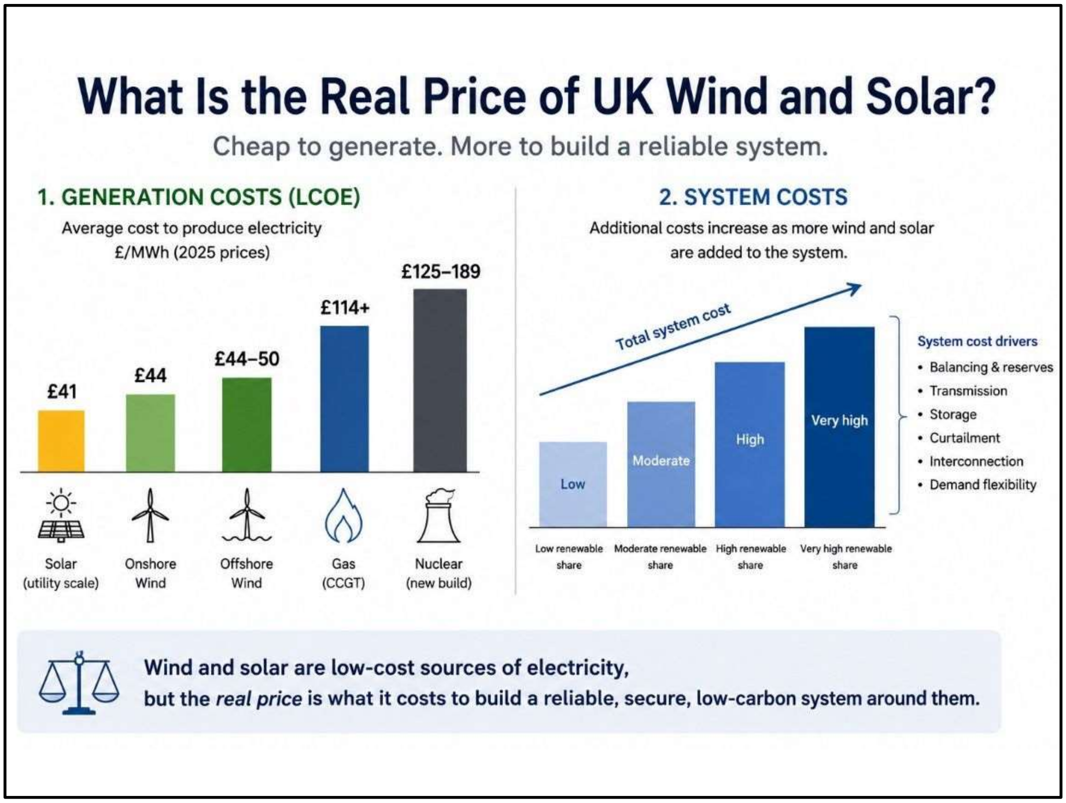


Graphic representation of curtailment.

Shows the NEM. We have a lot of solar in Australia. 35% to 65% curtailment.
https://www.pv-magazine-australia.com/2025/07/14/aemo-forecasts-increased-solar-curtailment-in-nem/

Scotland has the same problem with wind, 37% curtailment.
https://www.theferret.scot/why-are-scottish-wind-farms-paid-billions-to-switch-off/

"This means that only 63% of the energy which could have been generated made it to the grid."
https://felicitymartin.substack.com/p/why-we-dont-need-more-wind-turbines



And this is how Tom Baxter in the UK described the phenomenon on LinkedIn on the 17 May.

Grid A

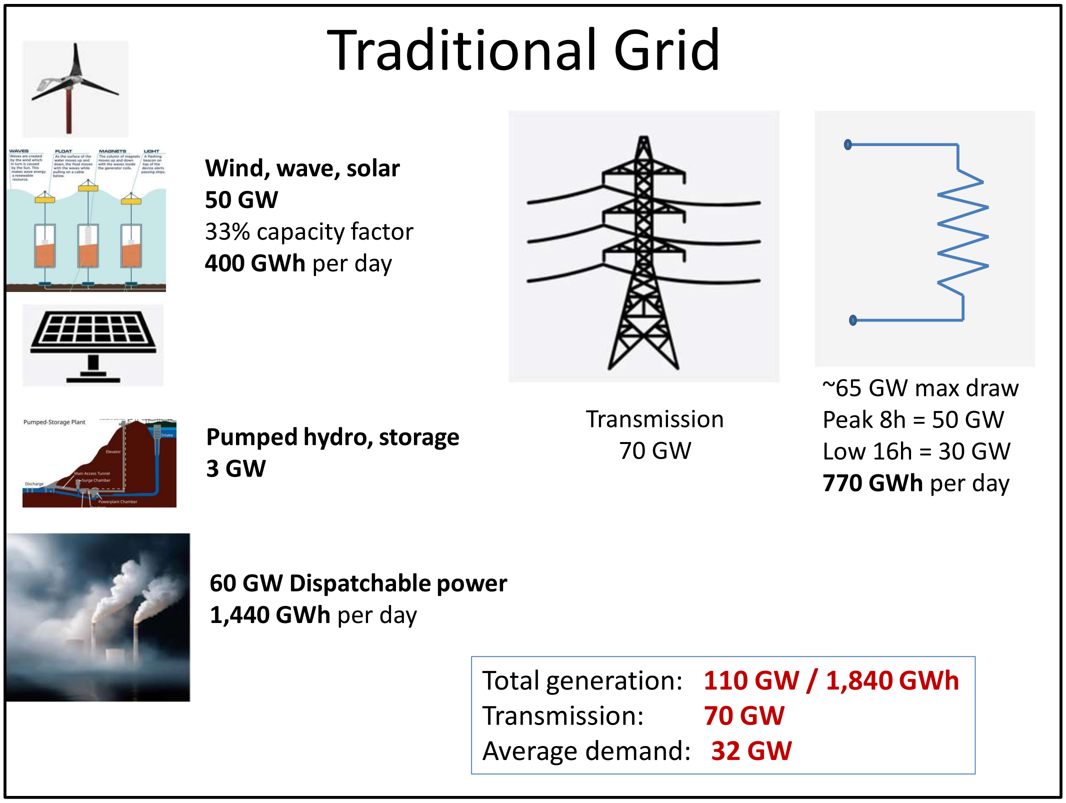
- Becomes more expensive and unreliable the more renewable energy we put into it.
- With every addition of RE, the transition becomes slower.
- Can never become 100% RE

Grid B

- Becomes less expensive and more reliable the more renewable energy we put into it.
  - Will become 100% RE
  - Speeds up the transition as every step forward becomes easier and cheaper.

Grid A	Grid B
▪ Becomes more expensive and unreliable the more renewable energy we put into it.	▪ Becomes less expensive and more reliable the more renewable energy we put into it.
▪ With every addition of RE, the transition becomes slower.	▪ Will become 100% RE
▪ Can never become 100% RE	▪ Speeds up the transition as every step forward becomes easier and cheaper.

Which one do we want?
Do we want the grid that gives us everything we want?
Or do we want the grid that gives us everything we don't want?



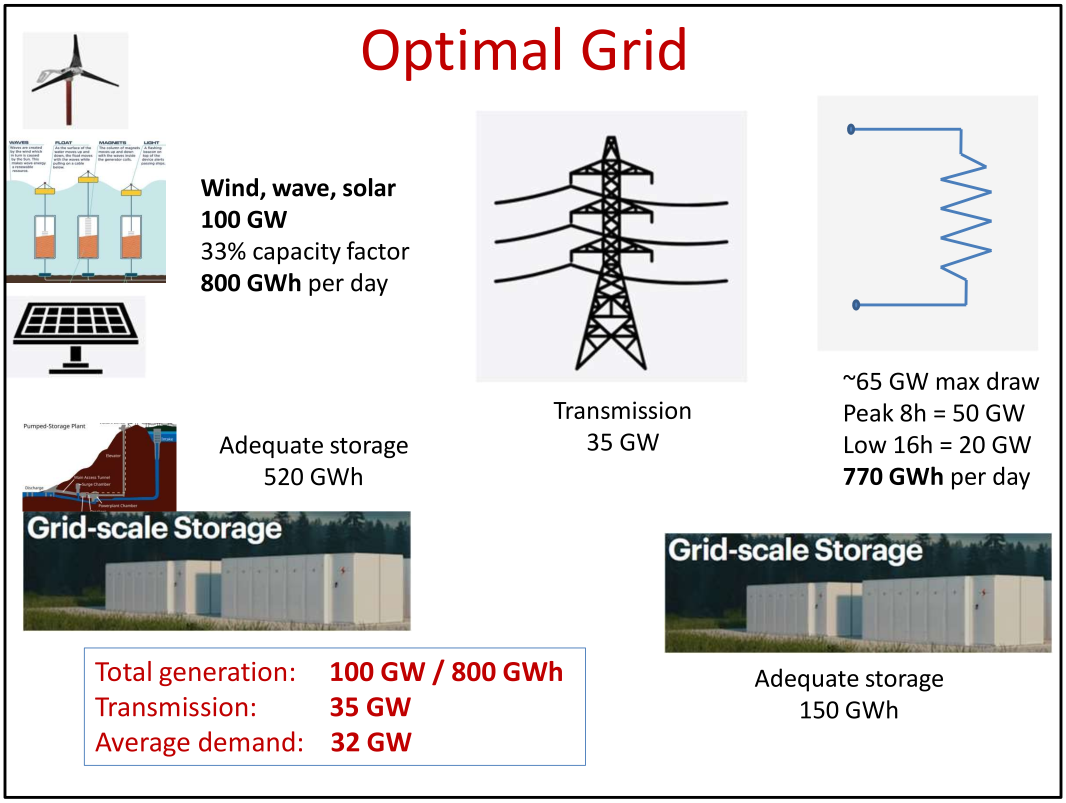
Total installed generation = 110 GW
Max daily production = 1,440 + 400 = 1,880 GWh
x365 => Max annual production = 686 TWh

Peak ever demand ~62 GW => Transmission 70 GW

Dispatchable power Coal, oil, nuclear, other = 60 GW
Wind, wave, solar and hydro = 50 GW

288 TWh annual production => **32 GW average demand** => 768 GWh per day.
Peak demand = ~50 GW

https://www.neso.energy/news/britains-energy-explained-2025-review



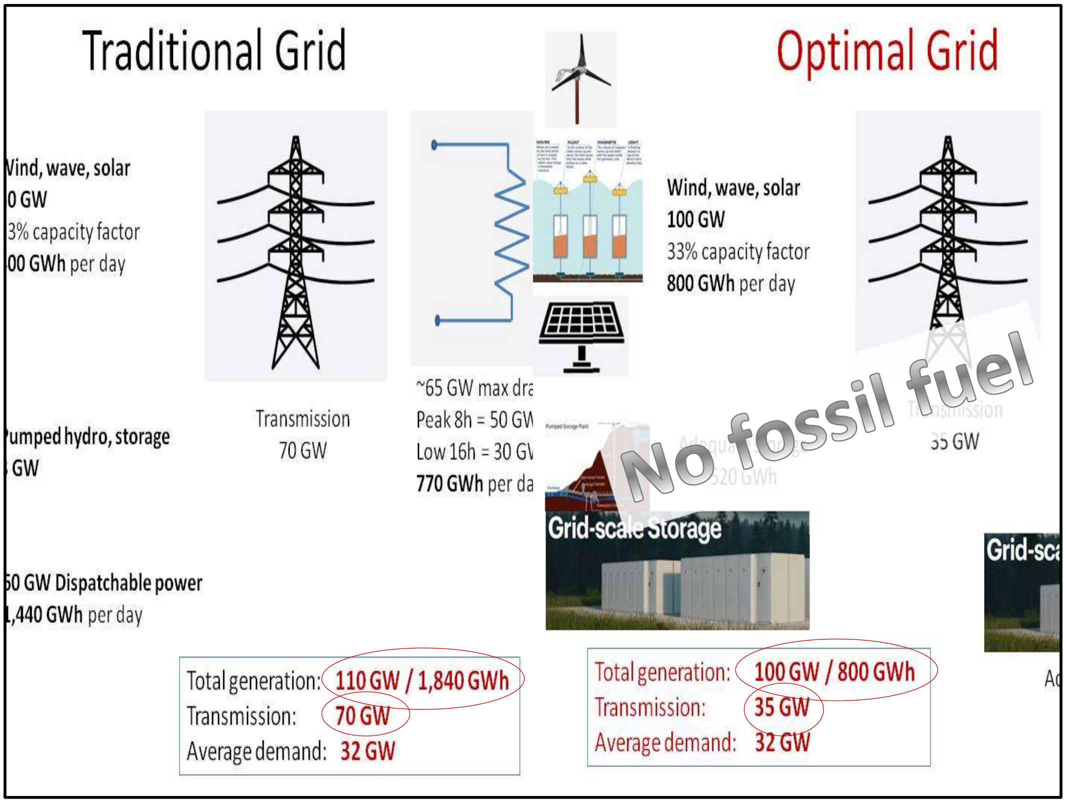
Adequate storage:
Production side:
Surplus: (100 – 32) x8 = 544 GWh -> storage
Draw from storage:
Available power over 16 hours = 0
Deficit = 32 x16 = **512 GWh** required from storage.

Annual production **292 TWh** (Annual demand =288 TWh)

Demand side:
8 hours of 50 GW demand will require 8x (50-32) = 144 GWh from storage
16h will add 16x (33-20) = 280 GWh into our storage.
Required storage = 150 GWh

Production 120 GW excess, 8 hours per day = 960 GWh into storage.
60 GW from storage over 16 hours = 960 GWh

Total demand = 1,400 GWh
Demand 75 GW over 8 hours. 15 GW to be covered by storage = 120 GWh
16h with 10 GW less than average demand = 160 GWh into storage.



Even though we have a much lower capacity factor in the Optimal Grid, we are still able to meet demand with a lower generation than in the Traditional Grid!

And half the transmission, equipment and land!

And NO fossil fuel!

Seasonal variations
30-50%

30-50% seasonal variations.
+/- 20%
288 TWh annual demand. Storage needs to cover 6 months 20% = 288/2 x 0.2 = 28.8 TWh

Adequate seasonal storage
for the German grid

29 TWhrs

29,000 sq. kms. of Li-ion batteries

To counter seasonal variations, how much storage would we need?
About 1 month worth.

1 GWh LI-ion covers about 1 sq. km.
1 TWh => 1,000 sq. kms.
80 TWh => 80,000 sq. kms.

Adequate storage in the UK grid with Hydrogen

58 TWhrs

= 390 Costco warehouses

Underground

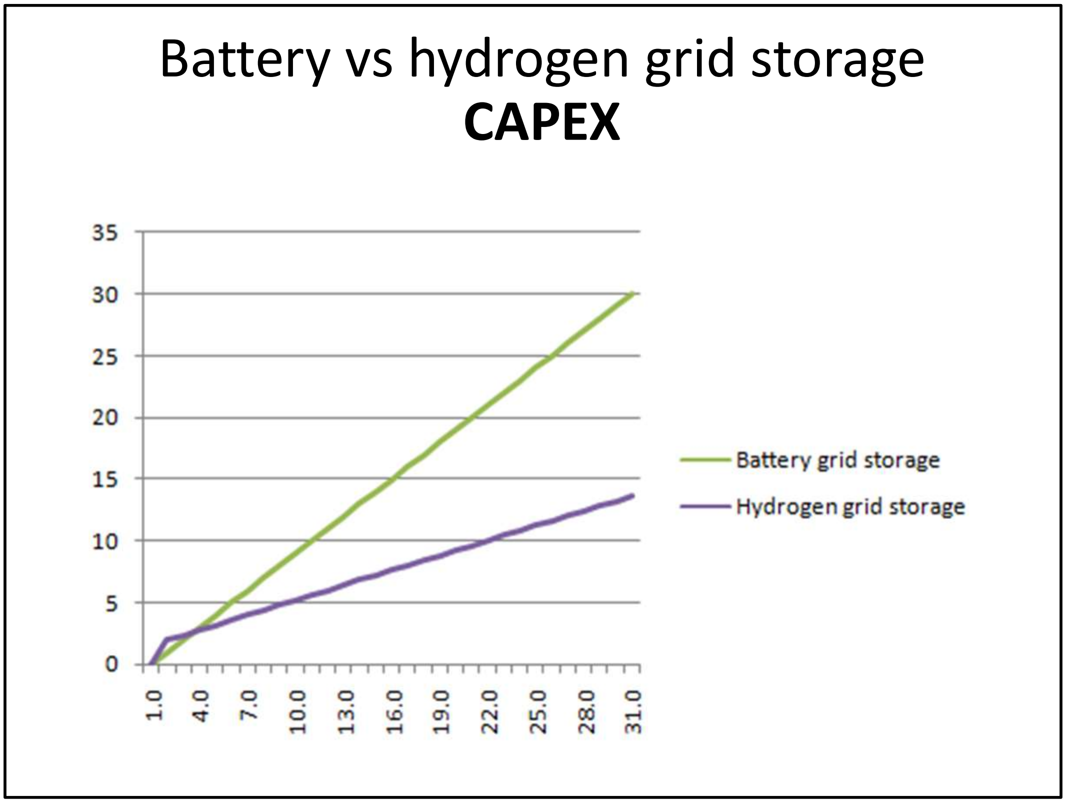
"Costco warehouse" for international reference.

Underground.
We can dig holes, we can bore tunnels.
We wouldn't even see this.

Costco in Ardeer = 16,653 sq m x 10 m = 166,530 cu. m.
A ten m cube holds 40 tonnes at 700 bar = 1.33 MWh
166.5 cubes = 220 GWh
34 TWh => 154 Costco warehouses filled with 700 bar H2

Bunnings is approx. 10,000 sq.m.
About 200 Bunnings warehouses.

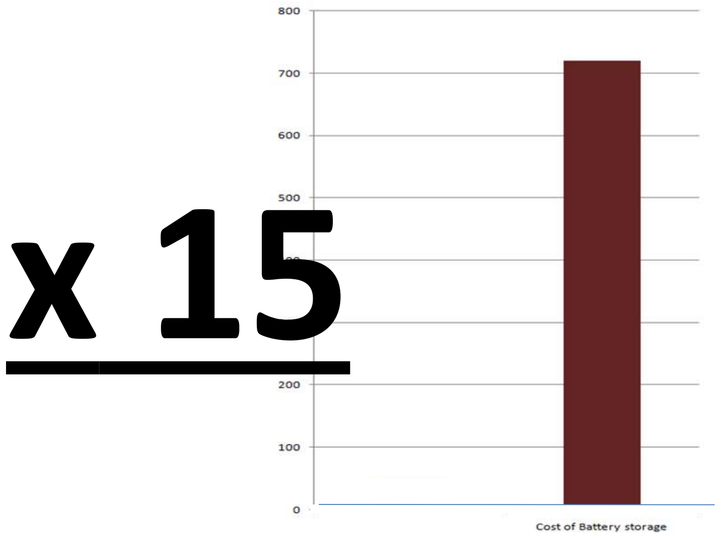
Pilot for 90 tonnes underground H2 storage in Germany:
https://www.hydrogenfuelnews.com/hydrogen-storage-pilot-at-etzel-completes-90-tonnes-underground-filling/



Batteries are simple. If we need twice the storage, we need to double the amount of batteries.
Hydrogen storage however, has three components:
Electrolysers, fuel cells and a tank.
Now to the interesting view, OPEX:

Battery vs hydrogen grid storage

OPEX



The hydrogen storage will provide electricity competitive with the cheapest generation.

The difference here comes from that when it comes to ongoing costs, we are essentially comparing a 720 hour battery solution with a 16 hour hydrogen solution.

The Optimal Grid will give us:

- ✓ Cheaper price of electricity
- ✓ Lower taxes
- ✓ Accelerated transition to renewable energy
- ✓ Pathway to RE growth,

  RE fuels

  and renewable energy security.

And it won't cost a cent to kick it off ...

Finally:

If renewable energy is worth going for, then surely cheap RE is better?

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