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UNIVERSITY OF  
CAMBRIDGE | Energy Policy  
Research Group

# RETAIL AND WHOLESALE ELECTRICITY MARKETS UNDER STRESS

## Have we learned the lessons?



With thanks to:

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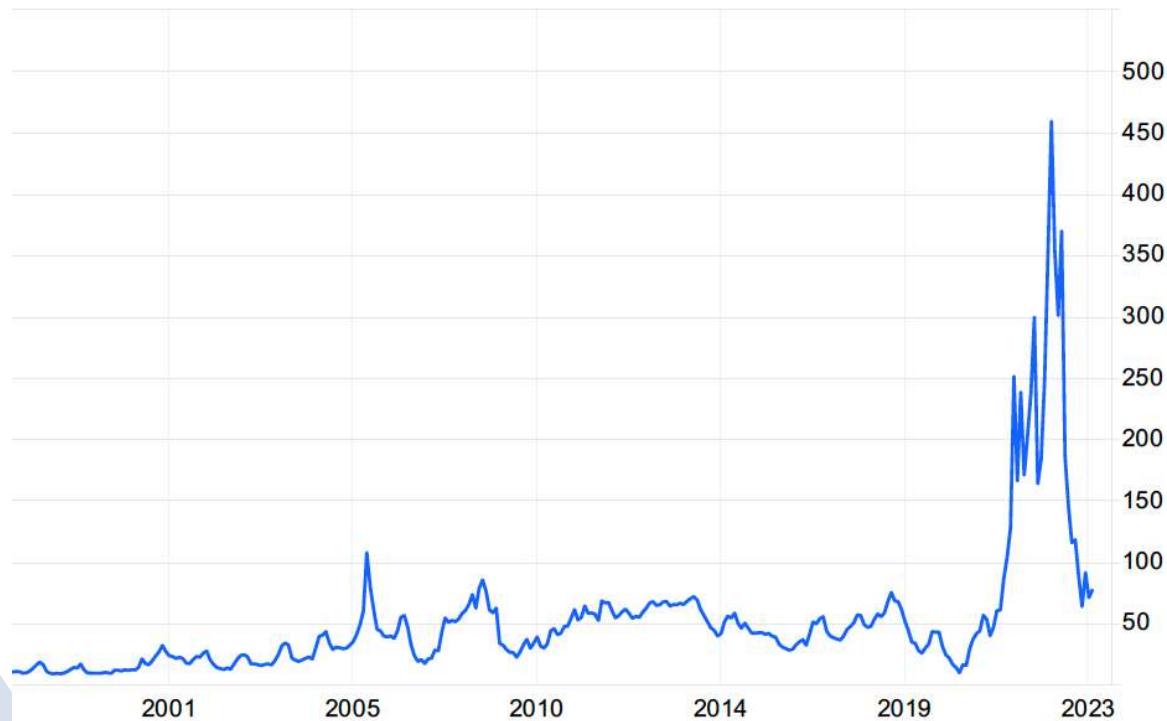
**Michael Pollitt**  
**Judge Business School**  
**University of Cambridge**

**Nordic Electricity Conference**  
**21 August 2023**



## Wholesale natural gas prices reached historically unprecedented levels

Natural Gas UK GBP



source: tradingeconomics.com

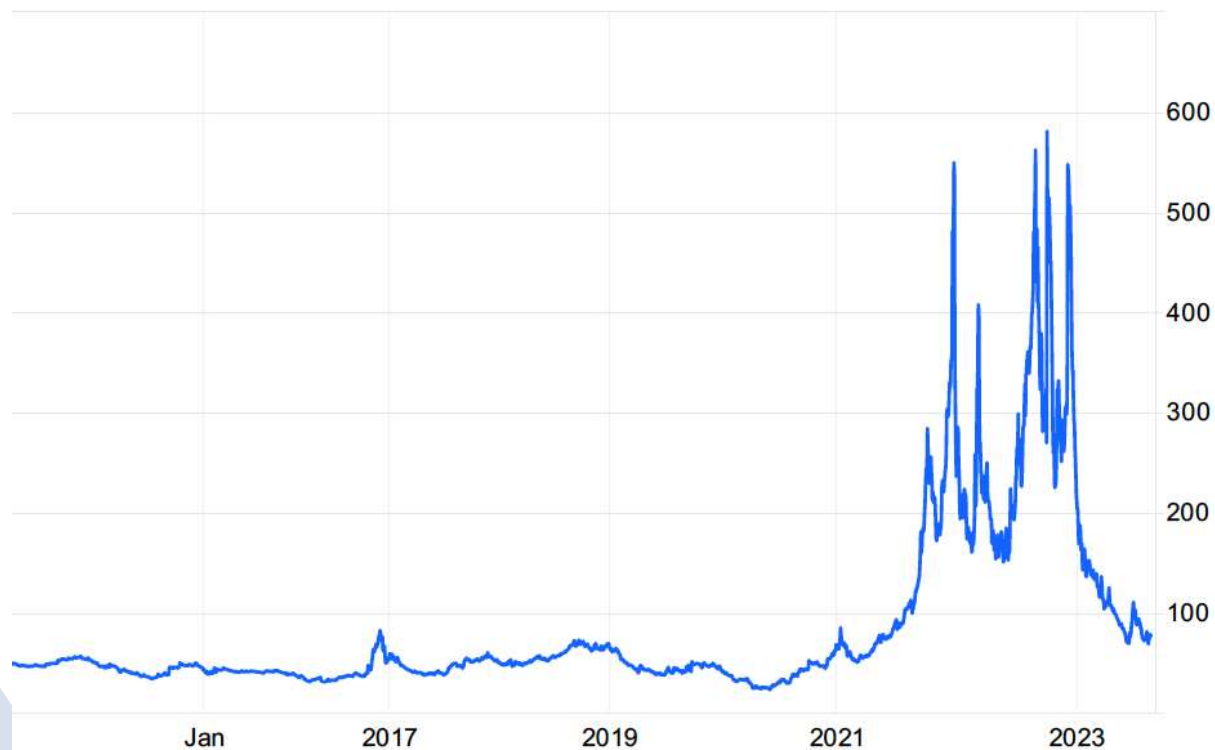
GBP pence per therm

In August 2021, 41% of residential gas bill was wholesale costs.

x 6 rise =  
300% rise in residential price

## Wholesale electricity prices were at historically high levels

UK Electricity Spot Prices



source: tradingeconomics.com

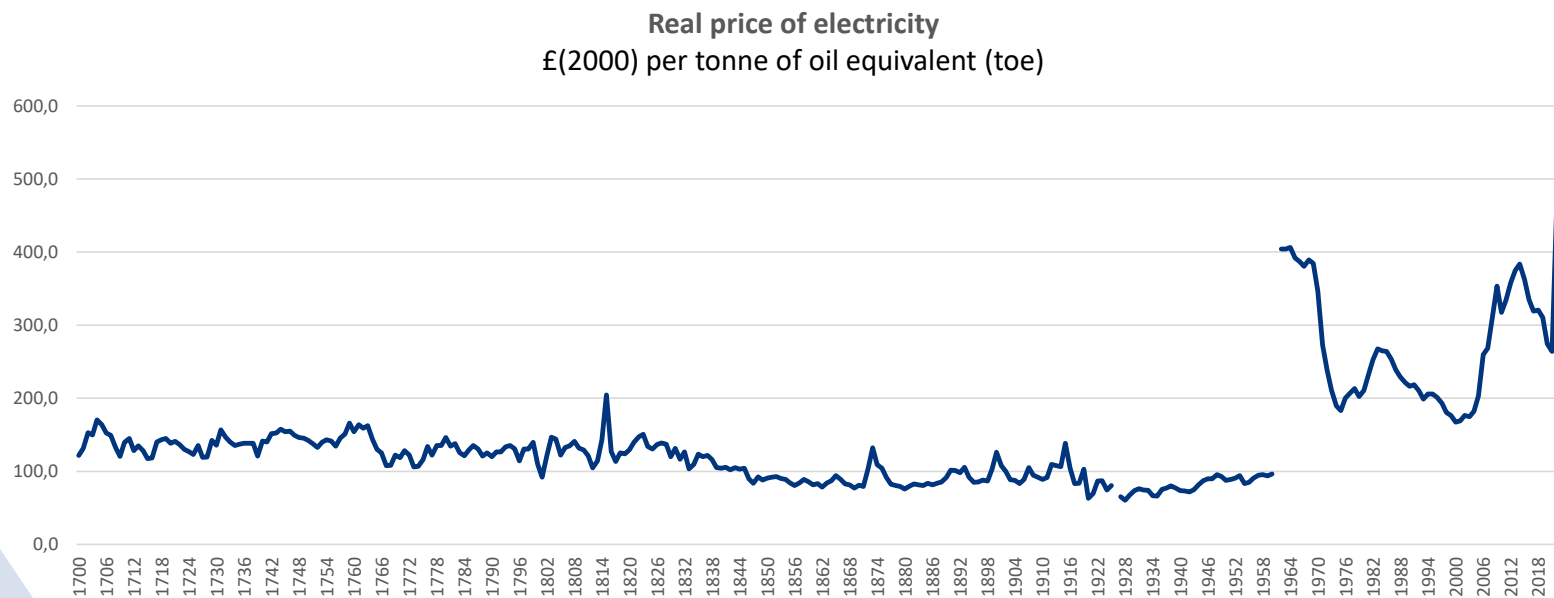
GBP £ per MWh

In 2020/21, 34% of residential bill was wholesale cost.

x 5 wholesale price =  
x 2.5 in  
residential price

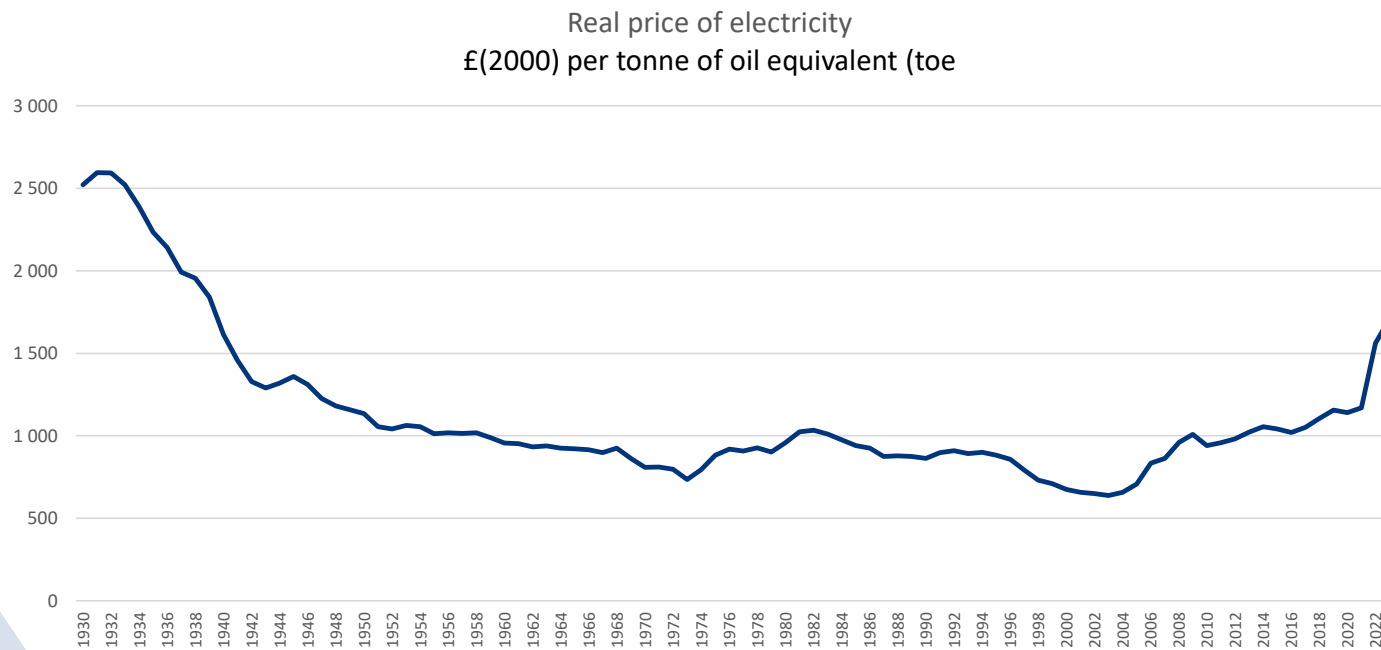
(Note: 30% increase in RPI since May 2019)

## UK retail heating fuel prices are higher than at any time in recorded history



Source: Fouquet (2020), updated to June 2023 using ONS data

# UK retail electricity prices are at levels not seen since the period of mass electrification

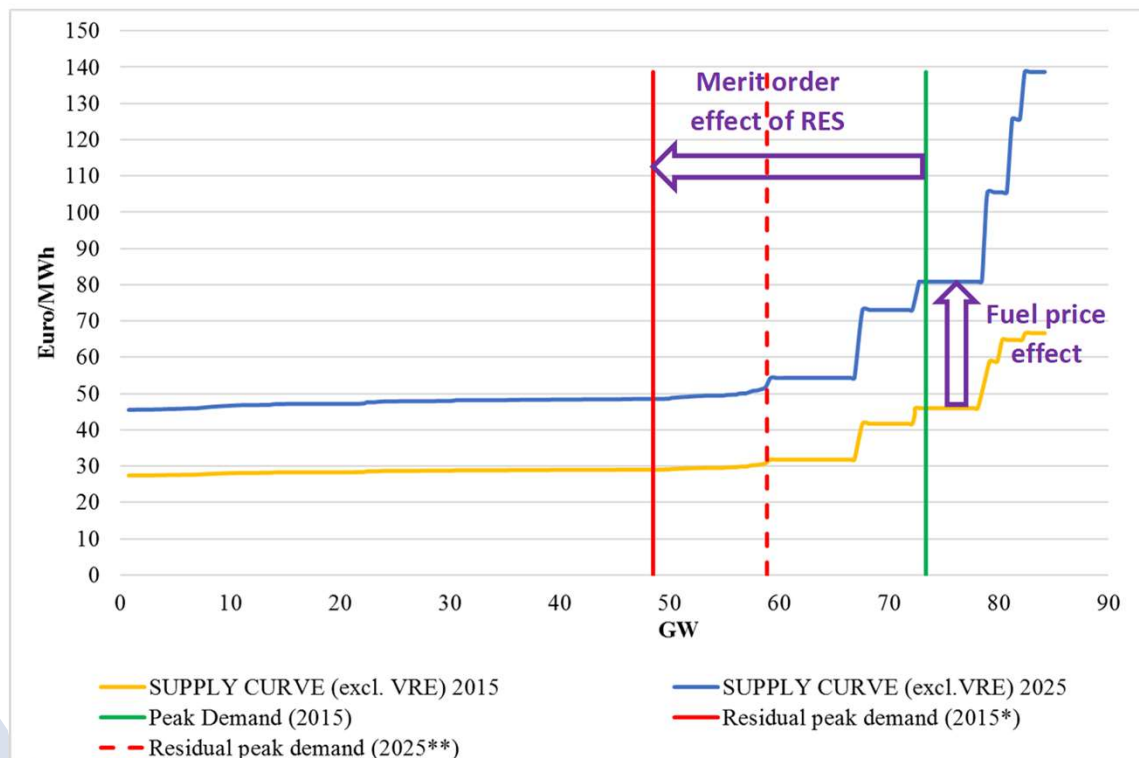


Domestic Electricity demand fell 5.9% in 2022

(Domestic gas demand fell 19% in 2022)

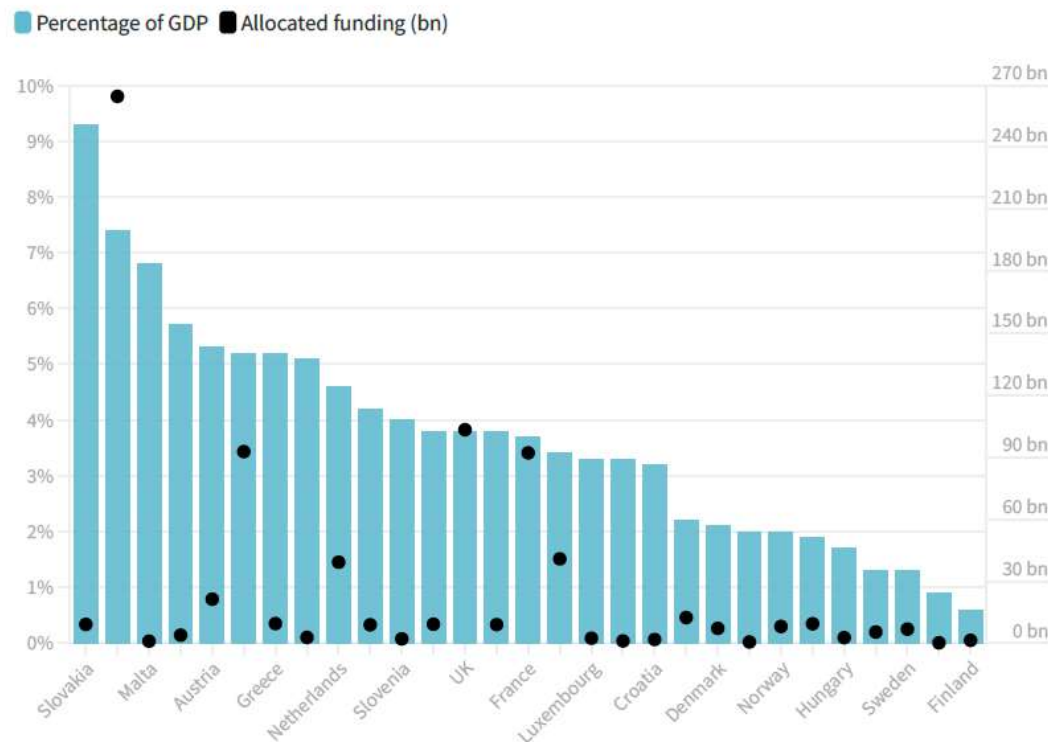
Source: Fouquet (2020), updated to June 2023 using ONS data, Energy Trends March 2023

## Is a new market design really necessary? Might not be.



1. An empirical question requiring some modelling
2. Depends on fossil fuel/carbon prices, VRE capacity in a generation mix

## The scale of the fiscal intervention is huge and globally embarrassing



758 bn Euros allocated since September 2021 to January 2023.

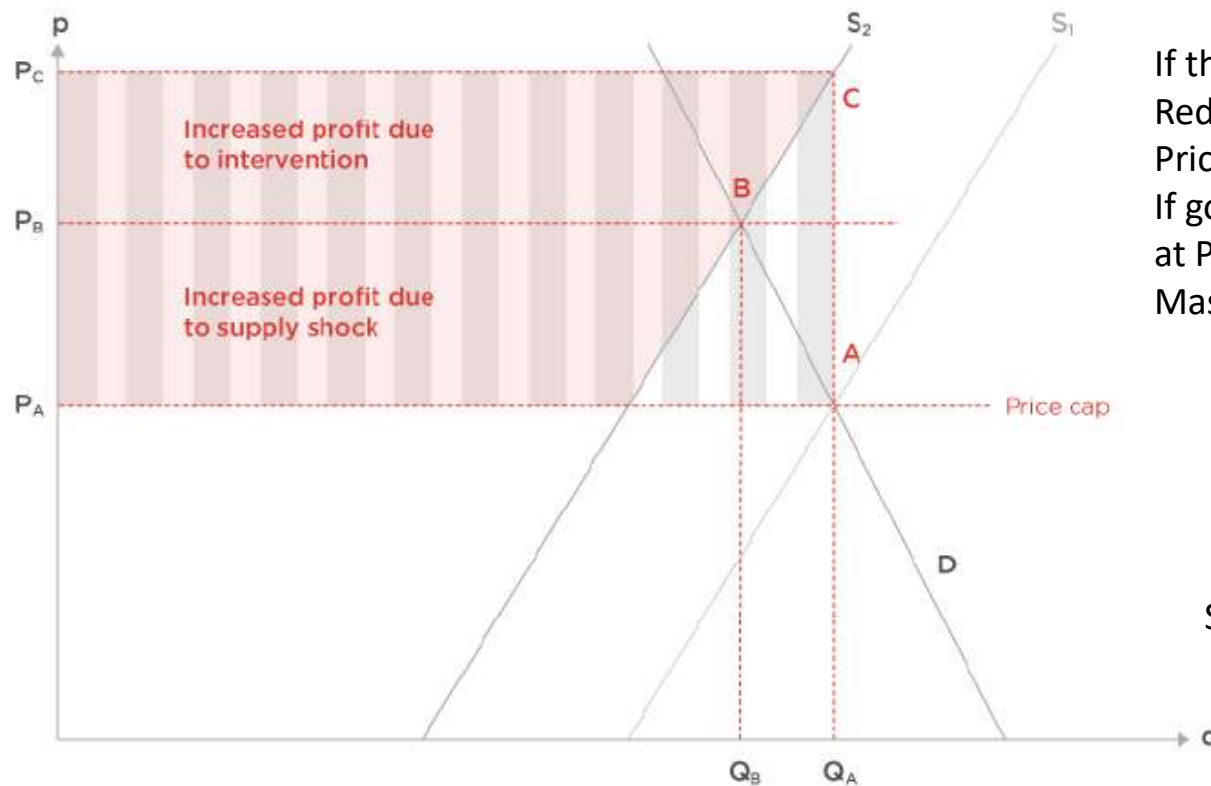
\$440bn was reported global fossil fuel subsidies by the IEA in 2021.

IEA reported \$1000 bn + in 2022, mostly in Europe?

Source: Sgaravatti, G., S. Tagliapietra, G. Zachmann (2021) updated to 26 June 2023.

## Responsive demand in key in net zero: Cost of untargeted price suppression

Figure 4: Impact of universal subsidies



If there is a supply shock  
Reducing supply from  $S_1$  to  $S_2$ .  
Price should rise from  $P_A$  to  $P_B$ .  
If government subsidises consumption  
at  $P_A$  then market price rises to  $P_C$ .  
Massively increasing total subsidy cost.

Source: Perkins and Rainaut (2023).



## Have we learnt what to do next time?

- EU Emergency intervention on retail prices, subject to three conditions (Suggested 14/03/23)...
- 'Very high prices in wholesale electricity markets at least two and a half times the average price during the previous five years occur which are expected to continue for at least 6 months;
- Sharp increases in electricity retail prices of at least 70% occur which are expected to continue for at least 6 months;
- The wider economy is being negatively affected by the increases in electricity prices' (EC, 2023c, p.89).
- Regulated tariff interventions should introduce rising block tariffs...
- Two tier approach and restricts regulated prices to 80% of the median consumption for households,
- and to 70% of historical consumption for SMEs...

## CfDs – The great hope for the future?

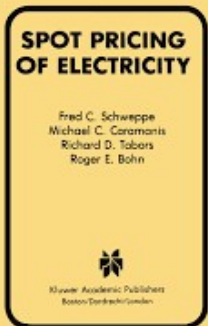
### Two-way CfD



- Two-way – seems obvious...
- For how many years?
- New generation only?
- Indexed to inflation (% of price and for how long)?
- What about merchant generation?
- Can corporates grab available RES via PPAs?
- How to recover and allocate locational rent: CfD vs seabed auction vs annual leasing charge?

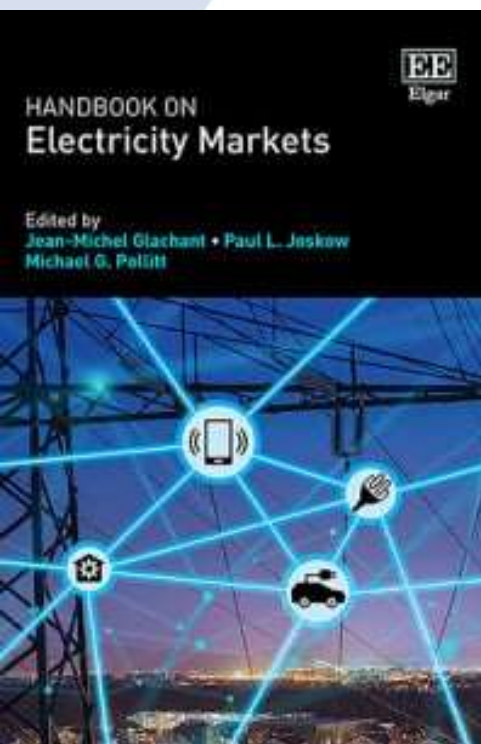
## A move to US Standard Market Design? Locational marginal prices (LMPs)

- The single electricity market in Europe is characterized by self-dispatch and zonal pricing.
- A move towards a US style SMD being debated in the UK as part of a Review of Electricity Market Arrangements (REMA).
- Nodal pricing is a proven method of providing short run pricing signals to the marginal value of injections and withdrawals from the electricity network.
- The overall efficiency benefits of nodal pricing are small, but it may be valuable in signaling scarcity of transmission capacity in a system characterized by increasingly active distributed energy resources (DERs).
- However the distributional implications for potentially large for consumers and generators, the impact on long run transmission investment small and investment impact of exposure to nodal pricing negative for energy transition.
- This suggests not likely to deliver much benefit in the short run.



## We need to think more radically for Net Zero: The internet of energy?

- A fully flexible system would have every device prioritized and supplied on the basis of customer specified priority.
- Customers might be able to override contracted priorities for a fee or choose more or less items in higher priorities for higher fees.
- This sort of market design whereby demand was rationed by priority order would move the emphasis from price flexibility to quantity flexibility.
- This is what happens with the internet, whereby users can pay for the size of their connection but packet speeds are reduced for everyone when the internet is congested at peak times, rather than rationed by price via charging more at the peak times to maintain packet speeds.
- This would be a true internet of energy, even though it would – no doubt – be complex to set up.



## Further Reading

- Chyong, C.K. and Pollitt, M. (2018), *Europe's electricity market design: 2030 and beyond*, Centre on Regulation in Europe. <https://cerre.eu/publications/europes-electricity-market-design-2030-and-beyond/>
- European Commission (2023c), *Commission Staff Working Document – Reform of Electricity Market Design*, 14.03.23, Strasbourg: European Commission.
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- von der Fehr, N-H., Banet, C., Le Coq, C., Pollitt, M. and Willems, B. (2022), *Retail Energy Markets under Stress – Lessons Learned for the Future of Market Design*, Brussels: Centre on Regulation in Europe. <https://cerre.eu/publications/retail-energy-markets-under-stress/>