



Review of Electricity Market Arrangements

Richard Green

Wholesale market - location	National pricing		Zonal pricing		Nodal pricing		
Wholesale market - tech	Unified market			Split by characteristic			
Wholesale market – balancing	National			Local then national			
Wholesale market – price formation	Pay-as-clear			Pay-as-bid			
Wholesale market – dispatch	Self-dispatch			Central dispatch			
Mass low carbon power	Existing CfD	CfD with more price exposure	Deemed generation CfD	Supplier obligation	Revenue cap and floor	Dutch subsidy	Equiv. firm power auction
Flexibility	Optimised CM	CM with flex enhancements	Supplier obligation (inc. CPS)				
Capacity adequacy		Capacity payment	Centralised reliability option	Decentralised reliability option	Targeted tender	Strat. reserve	
Operability	BAU	BAU+	Local markets	Changes to CfD/CM design	Co-optimisation	Dedicated support scheme	

Figure 8 - options under consideration



What should we want?

Objectives for an electricity market

1. ensure efficient day-to-day operation;
2. signal the need for investment;
3. promote efficient locational choices for investments;
4. compensate (sufficiently) the owners of existing assets;
5. be as simple, transparent and stable as possible; and
6. be politically implementable.

The wholesale market

BEIS' main choices

- Geography: National – Zonal – Nodal
- Technology: Unified – Split
- Balancing: National – National then Local
- Pricing: Pay as Clear – Pay as Bid
- Dispatch: Self-dispatch – Central dispatch

The range of choices...

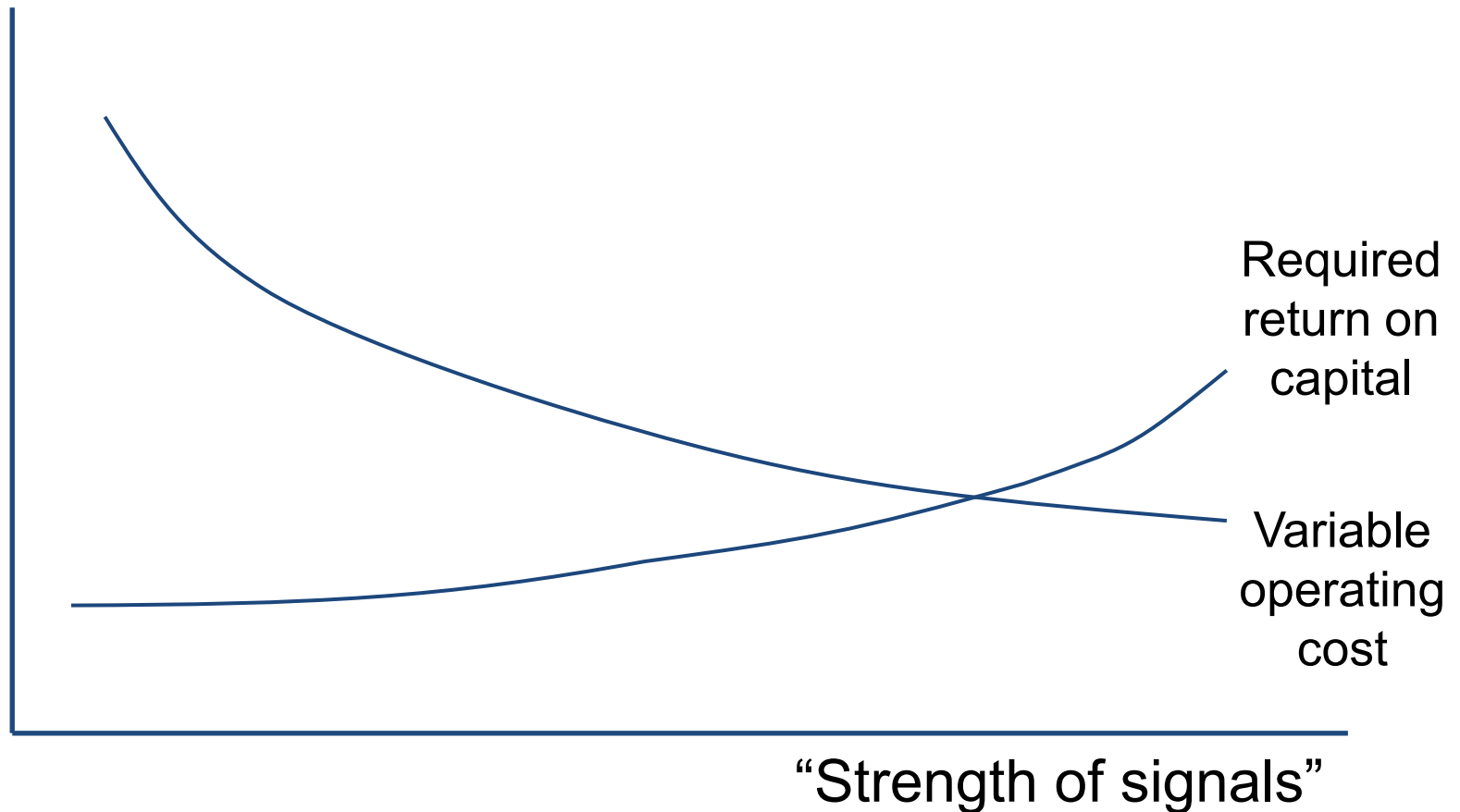
		Great Britain	Ireland	Denmark	Germany	Italy	Spain	South Australia	California	New York	Texas (ERCOT)
Bulk Energy Trading	Bilateral	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Auction with PAB										
	Auction with pay-as-clear	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bidding	Free	✓ ^a	✓ ^a	✓ ^a	✓ ^a	✓ ^a	✓ ^a	✓	✓	✓	✓
	Cost-based		?						M	M	M
Dispatch	Self-dispatch	✓		✓	✓		✓				
	Central dispatch		✓			✓		✓	✓	✓	✓
Reserve, etc.	Separated	✓	✓	✓	✓	✓	✓				
	Integrated							✓	✓	✓	✓
Spatial differentiation	Market-wide	✓	✓								
	Zonal			S	N	S	N	S			
	Nodal								✓	✓	✓

N: nation-wide in multinational market S: sub-national zones in operation



Signals vs stability

£/MWh



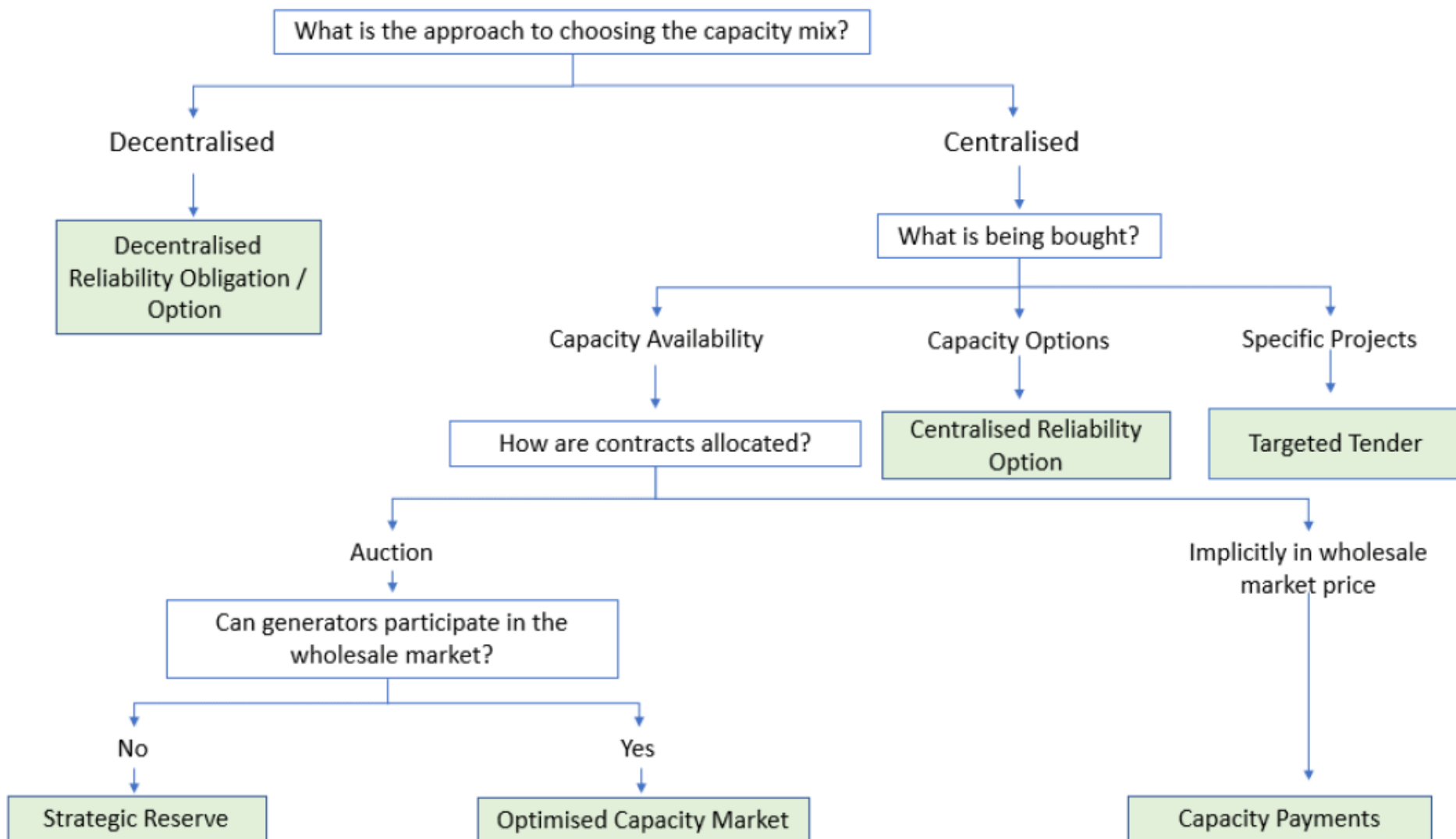
Rent-reducing market design

- Please can we have pay-as-bid so as to benefit from the nuclear stations willing to bid zero into the Pool? (1995)
- Pay-as-bid will solve the problem of gas-fired plants getting the price set by coal (RETA, 1997)
- Pay-as-audited-bid (© Chinese Communist Party) so you can dispatch stations in order of average total cost instead of variable cost...

The wrong side of the fence?

- 1990: which sites had 1 MW maximum demand?
- 1994: Trading Outside the Pool to avoid Uplift charges
- 1997: “getting the prices right in PJM” (Hogan)
 - do you take the locational or the non-locational price?
- 2022: gas-priced market or low-priced market?

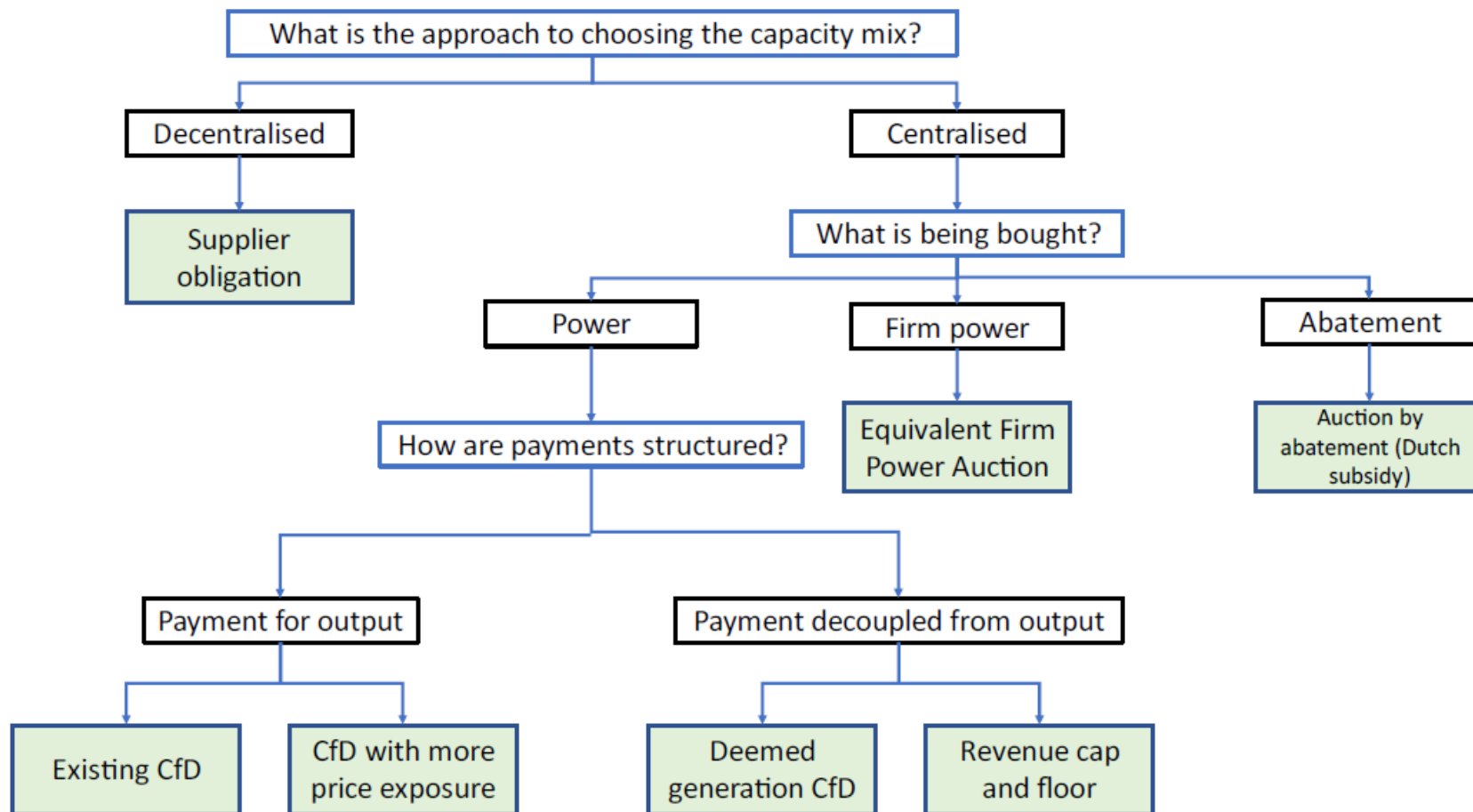
Capacity adequacy



The range of choices...

		Great Britain	Ireland	Denmark	Germany	Italy	Spain	South Australia	California	New York	Texas (ERCOT)
Capacity	Energy-only			✓				✓	✓		✓
	Strategic Reserve				✓						
	Capacity Market	✓	✓							✓	
	Reliability Option					✓					
	Capacity Payment						✓				

Low-carbon support



Output-limited deemed generation

- Covers the first X MWh per MW of output
 - Calculated from e.g. 15 years of expected output
 - Marginal output will (eventually) get market price
- Eligible output per period linked to forecast regional wind
 - De-couples support from own generation without making it completely independent of it
- Strike price at a premium to the forecast wind-weighted price for that region
 - Gives incentive to locate where output is more valuable

https://www.eprg.group.cam.ac.uk/wp-content/uploads/2021/08/D.-Newbery_RESS-policy-brief_Aug2021.pdf

The range of choices...

		Great Britain	Ireland	Denmark	Germany	Italy	Spain	South Australia	California	New York	Texas (ERCOT)
Competitive Retail		✓	✓	✓	✓	✓	✓	✓	(X)	✓	✓
Renewable Support	Fixed price	(✓)	(✓)						↑ ↓		
	Contract for Differences	✓	✓	✓ ^b		✓	✓ ^d				
	Put Option				✓ ^c						
	Market price plus fixed premium			^b							✓
	Market plus traded certificate	(✓)				(✓)		✓		✓	
	Renewable Portfolio Standard									✓	
	None				^c						

What do you need to believe for a supplier obligation to make sense?

- Decision-making capacity
- Credit-worthiness (Low-Carbon Contracts Company)
- Secondary trading
- Customer stability



Personal Carbon Credits

Customers in the “as-available” market

- What happens when you reach the front of the queue at the petrol station and you’ve run out of credits?

The status quo

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“The optimiser’s answer”

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			Dedicated support scheme
			Supplier obligation
			Revenue cap and floor
			Dutch subsidy
			Equiv. firm power auction
			Strat. reserve
			Targeted tender
			Decentralised reliability option

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“Suppliers in the lead”

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A quick poll

Vote at slido.com with #1675631

- Do you support pay-as-bid pricing?
- Do you support more geographical pricing?
- Do you support a separate market for low variable cost, low-carbon, generators?





Thank you for listening

Discussion!