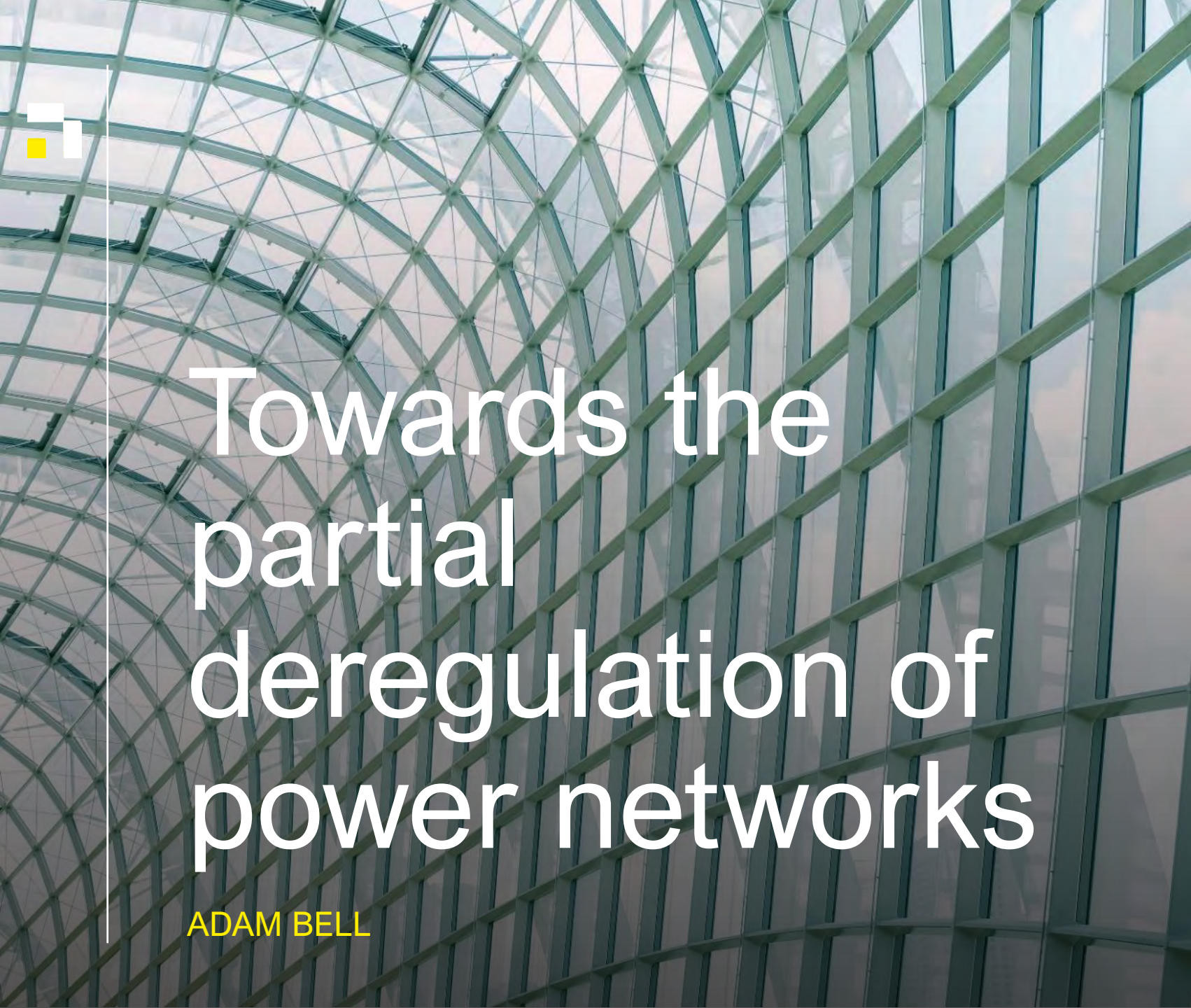




Towards the partial deregulation of power networks

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A SHGH Company



Problem Statement

01



Two interrelated problems

Technological change...

- Storage and solar have declined in cost dramatically over last decade
- Considerable work undertaken on what this means for 'grid defection'
- Regulators have responded through changes to network charging, primarily converting volumetric charges to fixed charges

...giving networks a different value proposition

- Part of the original value of networks was *demand smoothing*, enabling thermal plant to run efficiently and maximise value of assets
- Cheap storage means that thermal plant can run efficiently while servicing a single site
- Value of networks is therefore now *bulk supply* and *security of supply*.



Since 2015

70%

Decline in lithium-ion
battery prices

80%

Decline in solar PV prices

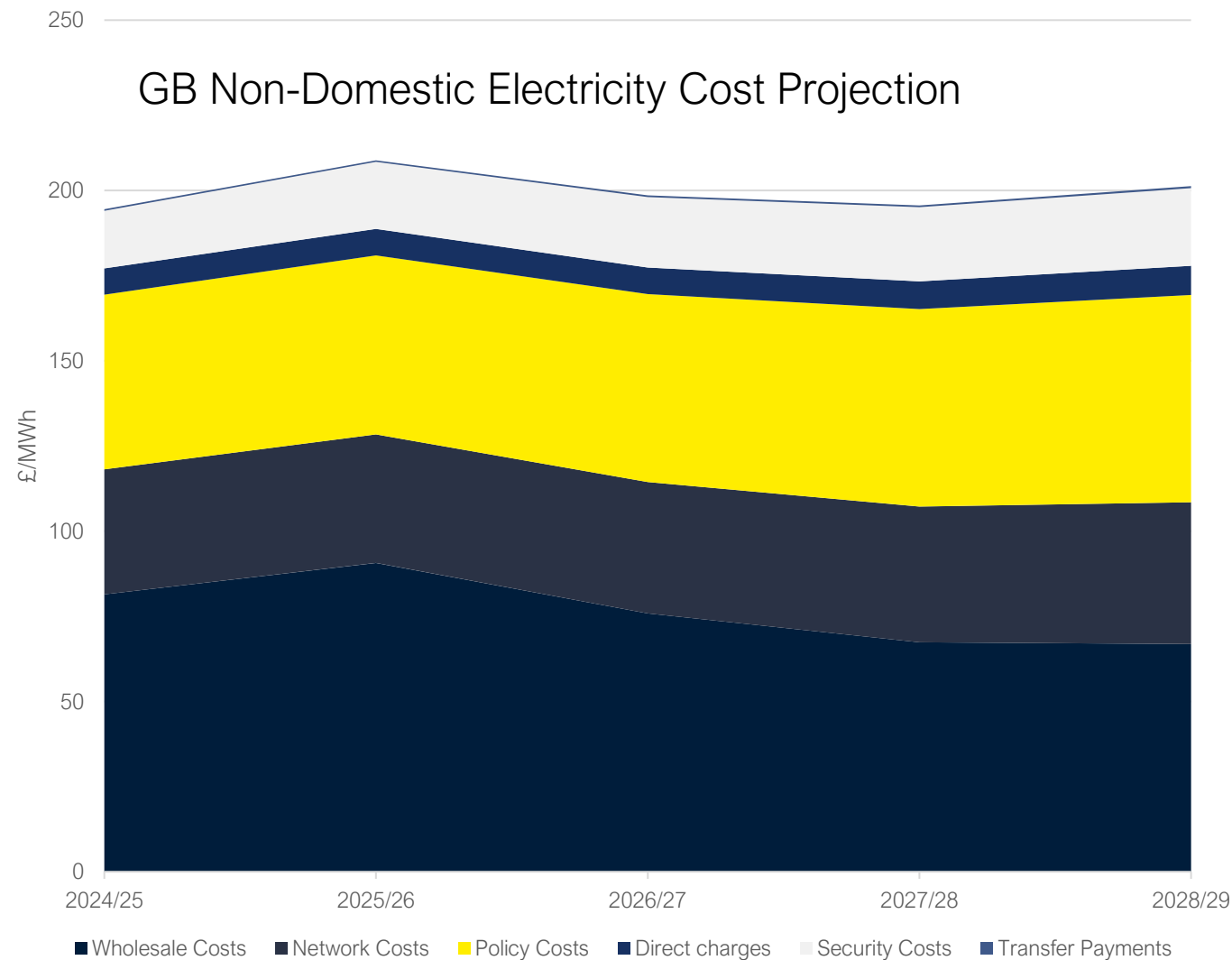
Source: Bloomberg NEF





Issues with bulk supply

- Bulk supply is only valuable if it is cheaper than self-generation.
- Costs of capital-intensive assets are dominated by cost of finance and inflation at FID
- Cost of bulk supply therefore determined by point in business cycle at which FID takes place
- Site operators able to time FID may therefore devalue bulk supply



Source: Brownlow Utilities



The value proposition of networks has changed to heavily favour security of supply.

This is not reflected in current approaches to network charging.



Current framework

02



“

The primary objective of network pricing is to ensure economic efficiency (cost reflectivity).

Professor Goran Strbac & Dr
Joseph Mutale
Framework and Methodology for
Pricing of Distribution Networks with
Distributed Generation (2005)

”



Strbac & Mutale, 2005

Forward-looking charges

- The actual impact of a given network user on that network, determined through a reference model that examines the marginal cost of adding that user to the network

Residual charges

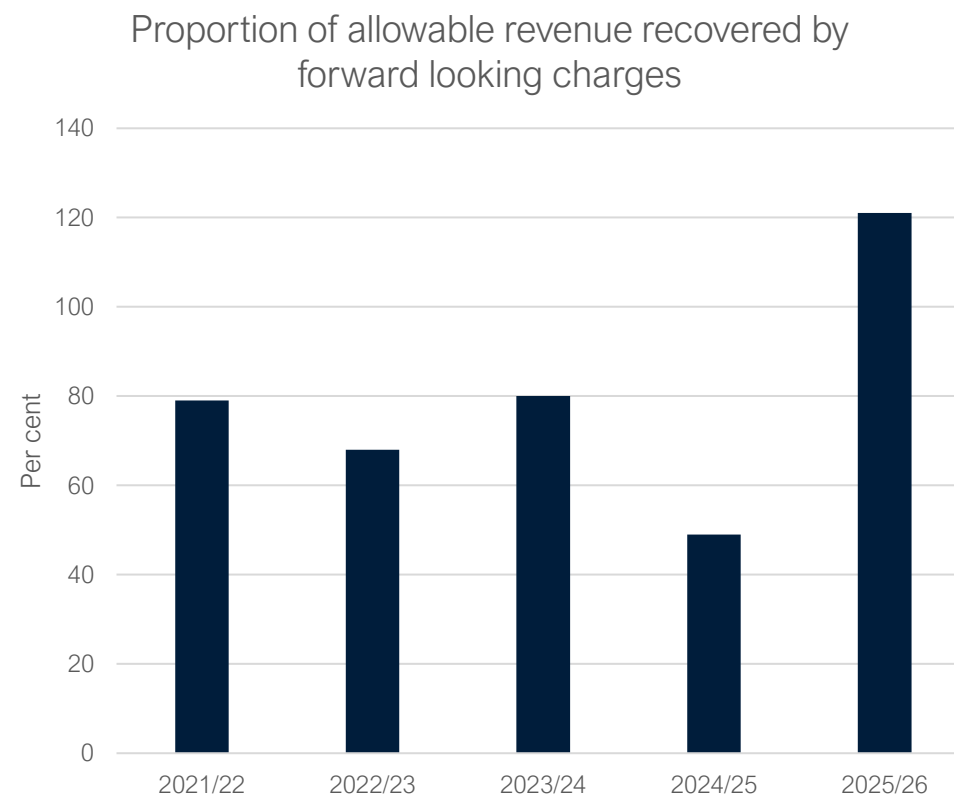
- The amount the regulator has agreed that the network can recover, minus forward-looking charges.



Ofgem's Targeted Charging Review 2019

- Driven by excessive returns by behind-the-meter generators able to reduce volumetric contribution to residual charges.
- Residual charges removed from transmission connected generators and moved to demand consumers.
- Residual charges changed from a volumetric basis to a purely fixed basis.
- Residual charges have subsequently become unstable.

Source: Explanatory note providing further information on the priority issue relating to the Common Distribution Charging Methodology (CDCM) discussed during the Distribution Charging update at the March 2024 Charging Futures Forum (2024)





Issues with the framework

03



‘MIC Shaving’

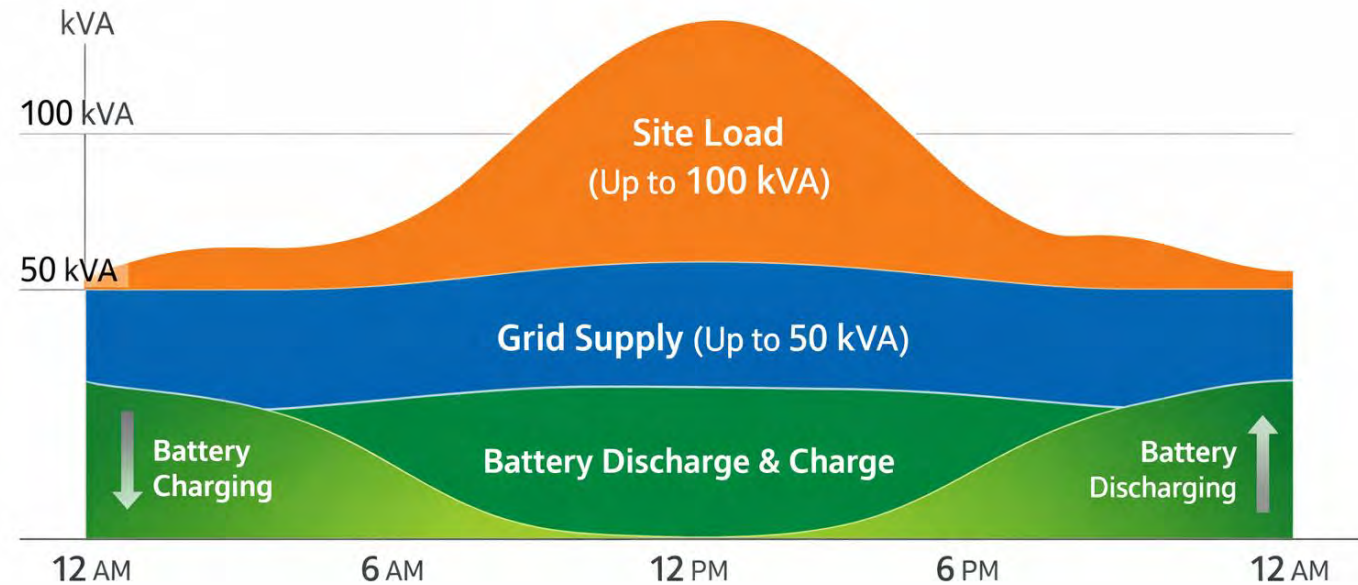
- Site operators are able to reduce their exposure to residual charges by reducing their Maximum Import Capacity.
- Physical assets remain in place.
- Charges are levied on pro rata kVA basis even if MIC exceeded.
- Site operators retain security of supply at lower cost.
- Residual charges redistributed to other system users.





Monopoly's End

- N-X security at XkVA options historically only available via electricity network
- Site operators can now buy N-1 options from on-site assets to cover percentages of demand
- N-X asset arrays possible, typically with LOLE at 1-2%.
- Whether networks are now monopolies is now dependent on individual sites' value of lost load



Source: Purely illustrative and ludicrously inaccurate AI image



The FLC/residual framework does not include the value of security of supply – or more specifically, the value of the network to the user.

It does not reflect the reality that networks no longer have a monopoly on providing electrical services.



Efficient levels of defection

If networks are no longer a monopoly, we can update Strbac & Mutale to:

The objective of network policy is to maximise public welfare through the lowest cost provision of electrical services

If we assume network resources are limited and that demand in particular locations is not, then allocation of network resources is best served by an efficient level of defection.

Under the current framework this is given by sites where:

Forward Looking Charge (FLC) > Cost of self generation + Value of Lost Load (VoLL) @XkVA

However, the current system delivers the following levels of defection:

FLC + residual charges + bulk supply levies > Cost of self generation + VoLL @XkVA

This means that the current framework is unlikely to maximise public welfare.



An alternative framework

04



Principles for a framework

1. Appropriate allocation of technological risk (risk that change further degrades the value of networks for users).
2. Appropriate allocation of bulk supply cost risks.
3. Enables cost recovery for networks, in order to minimise additional burden on financing
4. And applies appropriate incentives to all participants, while achieving our goal of minimising the overall cost of providing electrical services.



Framework components

Tech risk

Network users cannot reasonably manage this, and so it must be managed by network operators

Bulk supply

Preferentially managed by the market but in reality by governments

Cost recovery

No fixed framework for sites at risk of defection in order to manage site-specific VoLL

Potential to split cost recovery between finance classes, with gearing limits

Incentives

Efficient levels of defection suggests some level of forward-looking charges

These should reflect networks' internal costs, not regulator estimates



Site specific price discovery

Enable network operators to negotiate with site operators to determine a contract for networks that includes a price and period. By locking in revenues for a set period network operators can manage technological risk.

Applicable only to sites of an appropriate size, likely connecting at 33kv and above ('Extra High Voltage')

Apply a RAB haircut sized in line with connections to these sites and the marginal cost of connection as determined by forward-looking charges

This creates an incentive on network operators to maximise revenue from these sites up to a threshold of FLC plus their internal costs and for site operators to install efficient levels of generation

In scope:

2000-3000

sites, representing

30-60TWh

of demand

“

Regulation is essentially a means of preventing the worst excesses of monopoly; it is not a substitute for competition. It is a means of "holding the fort" until the competition arrives.

”

House of Lords Select Committee on Regulators (2007)

Following evidence from Stephen Littlechild



Electricity Act 1989

1989 CHAPTER 29

d functions of a Director General of Electricity Supply and
provision with respect to the supply of electricity through
h supply; to abolish the Electricity Consumers' Council;
7; to provide for the vesting of the property, rights and li
nated by the Secretary of State and the subsequent
nancial assistance in connection with the storage and
active waste and the decommissioning of nuclear instal
d the Local Government (Scotland) Act 1973; and for co