NERA
ECONOMIC CONSULTING

THE ECONOMIC POTENTIAL OF DISTRIBUTED ENERGY RESOURCES, AND HOW TO MONETISE IT

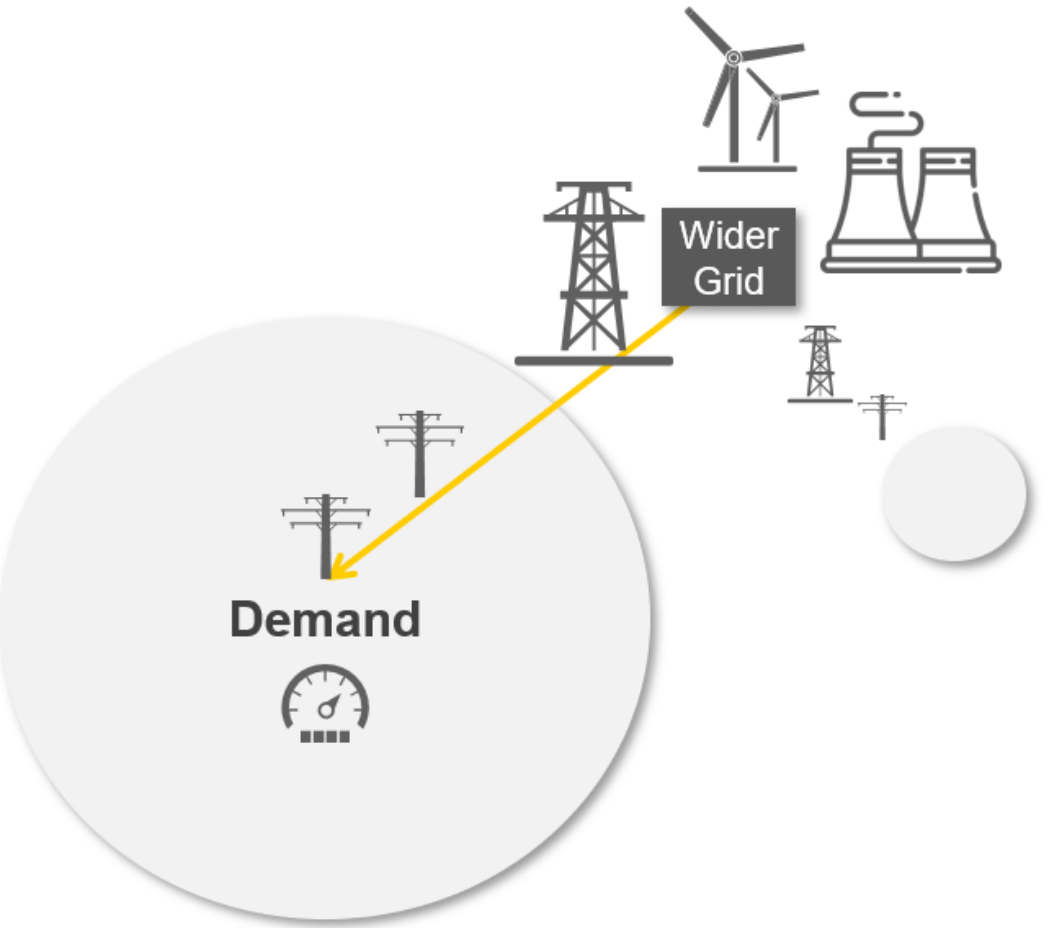
Richard Druce
Director

10th Anniversary Cleanpower Smart Grids Conference
www.cir-strategy.com/events

Insight in Economics™

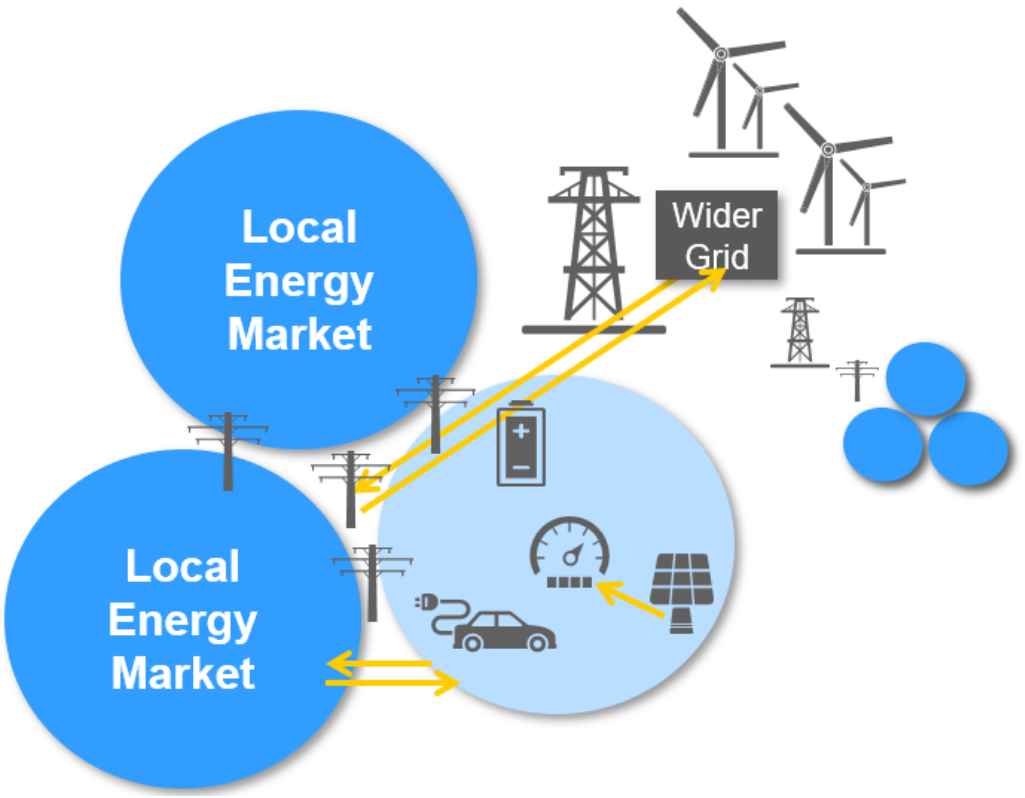
Power market design and regulation has been established to move electricity in one direction

- Wholesale power markets established for trading of energy generated during 30-minute periods within wide geographic areas (countries)
- Aptly-named “ancillary” services to support balancing, accounting for a tiny share of the value
- Network charges to recover infrastructure costs



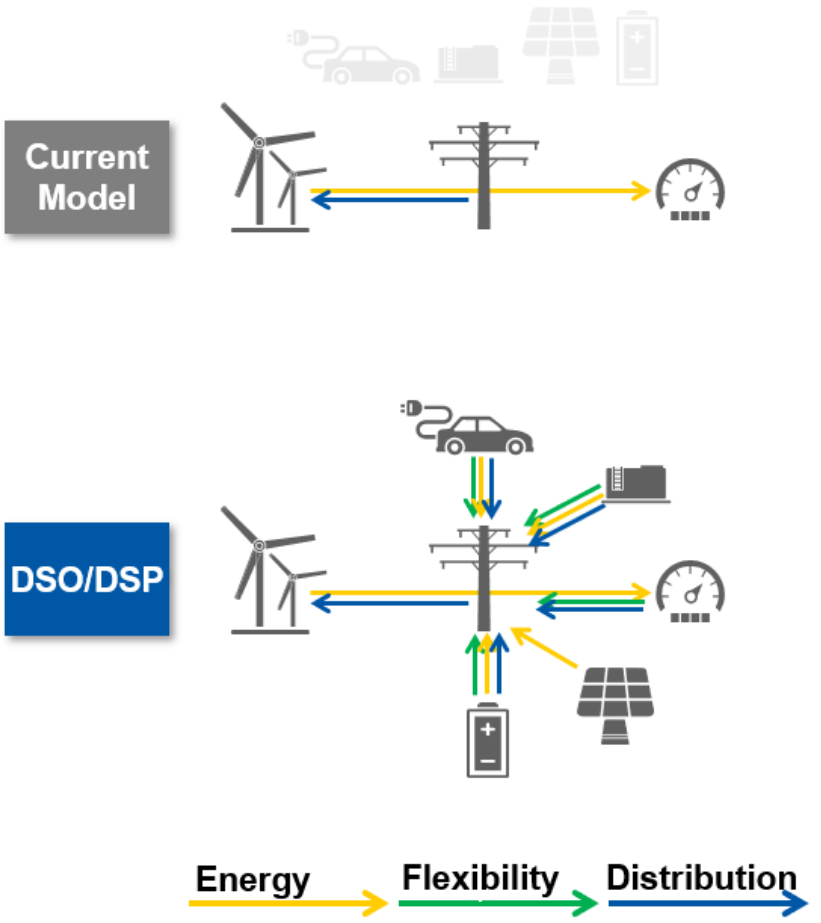
New commercial mechanisms will be needed to monetise the full benefits of DERs

- Emergence of DERs and intermittent generation means bulk transport to end-customers is no longer clearly the most economic solution
- Market design and regulation should reflect this in more granular locational and time of use signals



Distribution networks can help create the “missing markets” currently preventing the full development of DERs

- Under the current model, distributors are passive conveyors of energy, regulated to encourage them to maximise efficiency and ensure reliability. They invest when network capacity is exhausted and maintain existing infrastructure.
- Going forward, they will need to do more. Future regulation could promote efficiency by creating competition between incumbent distribution companies and DERs.



Charging reform could promote DERs, but it would require more complexity than the current method

- Tariffs predominantly linked to energy, not capacity
- No locational signal, e.g. of where in the network DERs can help reduce network capex
- Very blunt time of use signals for LV HH metered customers
- Tariffs fixed ex ante, not adjusting dynamically with network conditions

Example: From the UKPN Charging Statement for East Anglia

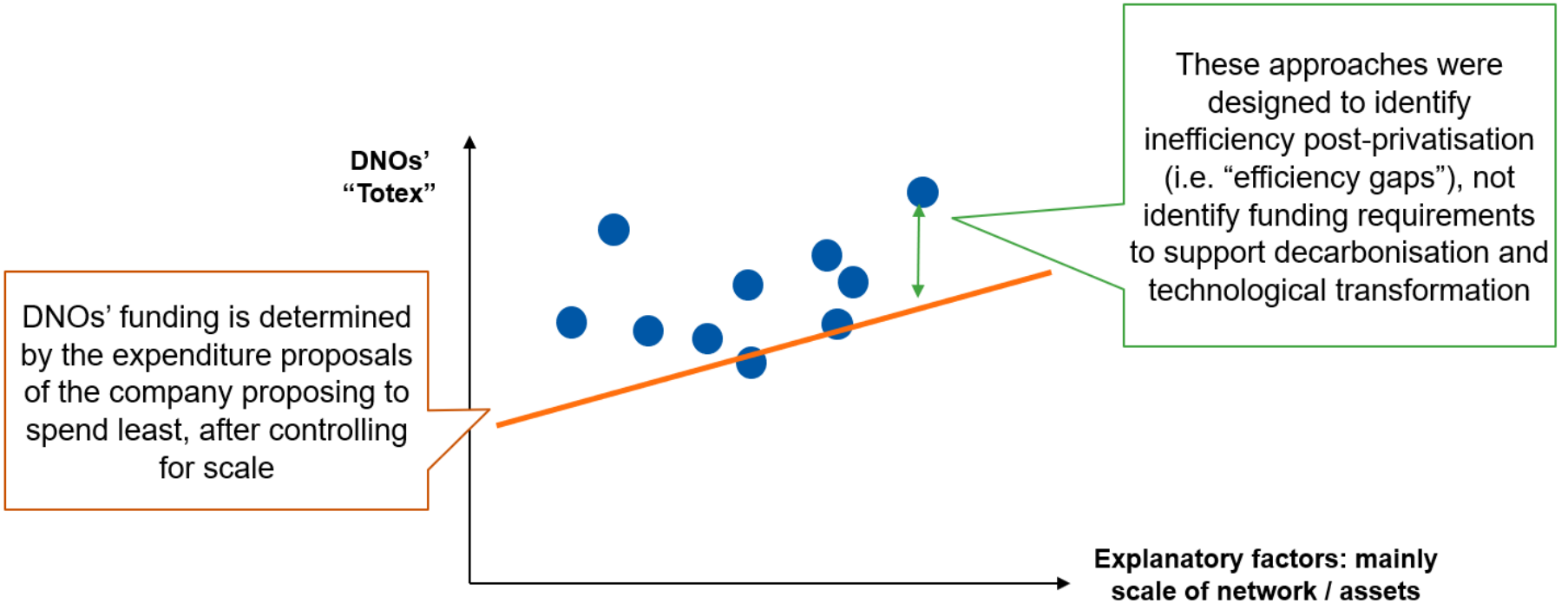
RED: Mon-Fri (16:00-19:00)
AMBER: Mon-Fri (07:00-16:00, 19:00-23:00)
GREEN: Mon-Fri (23:00-07:00) and All Day Sat-Sun

Tariff name	Unit charge 1 (NHH) or red/black charge (HH) p/kWh	Unit charge 2 (NHH) or amber/yellow charge (HH) p/kWh	Green charge(HH) p/kWh	Fixed charge p/MPAN/day	Capacity charge p/kVA/day	Reactive power charge p/kVArh	Exceeded capacity charge p/kVA/day
Domestic Unrestricted	2.005			4.59			
LV HH Metered	10.976	0.078	0.014	14.26	3.14	0.330	3.14
LV Generation Intermittent	-0.885			0.00		0.282	
LV Generation Non-Intermittent	-9.428	-0.088	-0.015	0.00		0.282	

Source: UK Power Networks

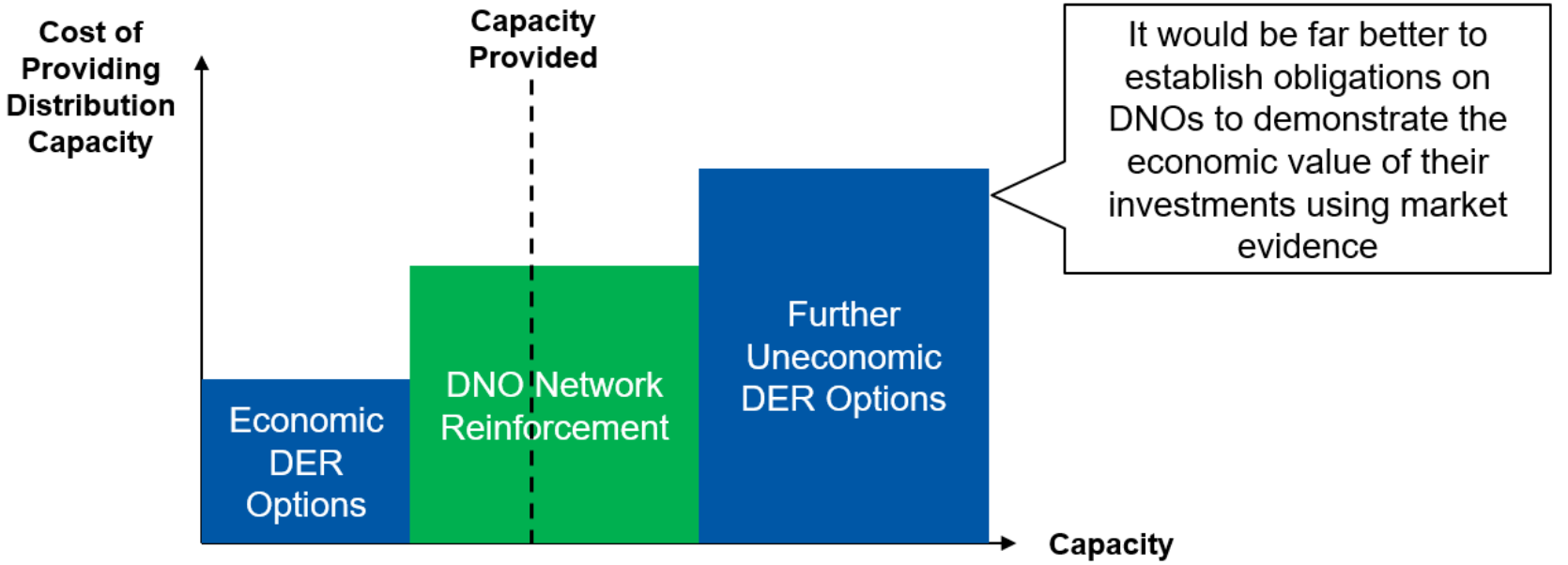
Ofgem should challenge regulated companies to enhance asset planning processes and use of markets, not just reward low expenditure

- The “RIIO” model rewards “totex” solutions, encouraging opex/capex trade-offs, but Ofgem still effectively acts as the “buyer” of distribution services determining funding
- It should move away from very imprecise econometric modelling and judgment of companies’ funding requirements towards market mechanisms to determine funding
- Obligations on distributors to deliver particular asset solutions (changes in loading and asset heath indices) also inhibit DERs



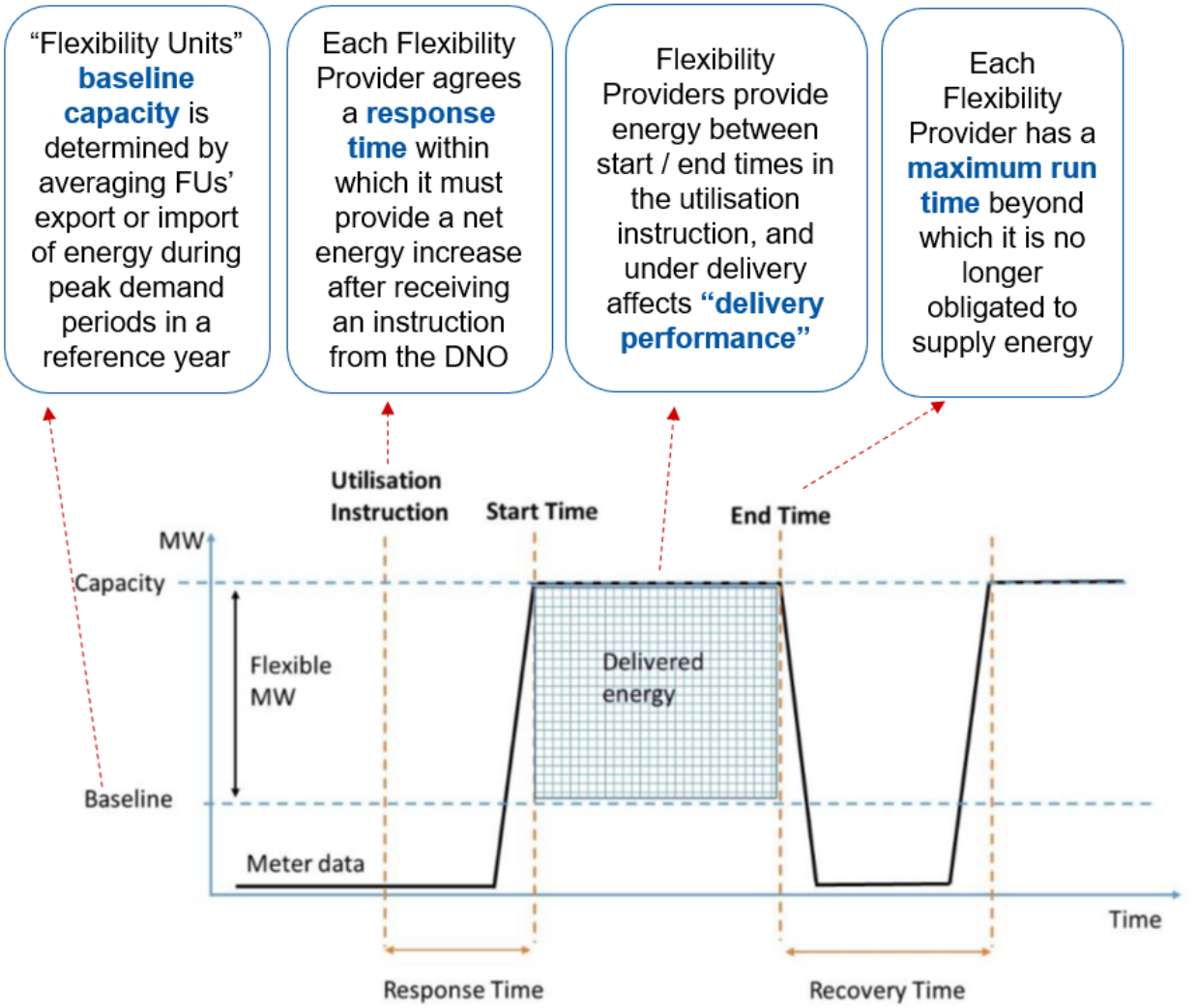
Ofgem should challenge regulated companies to enhance asset planning processes and use of markets, not just reward low expenditure

- The “RIIO” model rewards “totex” solutions, encouraging opex/capex trade-offs, but Ofgem still effectively acts as the “buyer” of distribution services determining funding
- It should move away from very imprecise econometric modelling and judgment of companies’ funding requirements towards market mechanisms to determine funding
- Obligations on distributors to deliver particular asset solutions (changes in loading and asset heath indices) also inhibit DERs



DNOs are developing promising markets for the services DERs provide to support the distribution systems

- For instance, UKPN defines flexibility services as “any technology or process that can shave or shift peak demand – importing less or exporting more power to the distribution network…relative to its baseline operations”.
- DERs receive availability payments linked to their “delivery performance”.

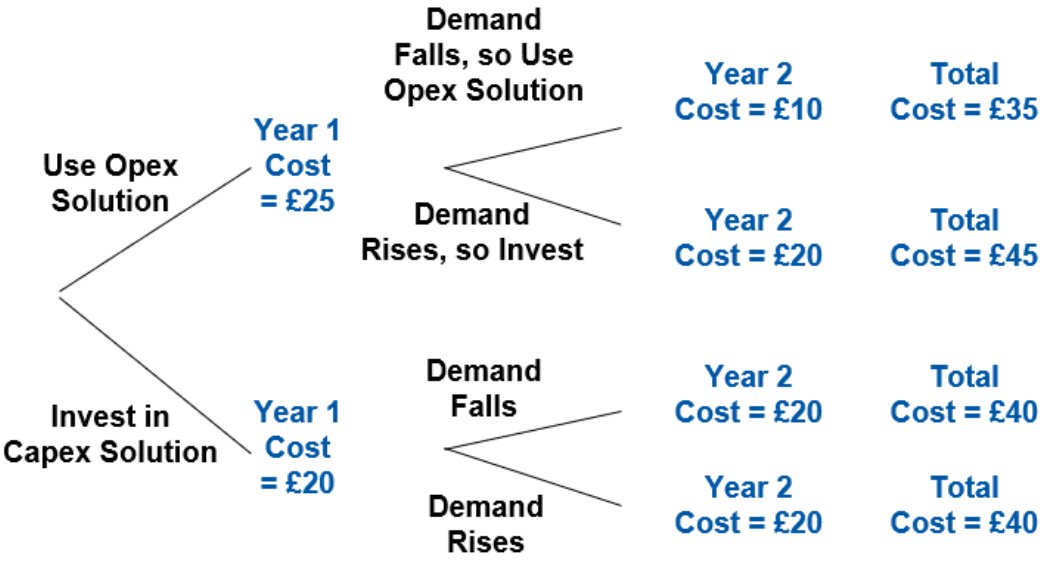


Source: UKPN (December 2018), Flexibility Services Invitation to Tender – 2018/19

DNOs will also need to use new asset planning techniques to properly value DER, like “real options” and “least worst regret”

- Using a relatively expensive DER solution today can still be preferable to a capex solution if it provides a value from waiting for uncertainty about the future to resolve

Timing	Today	Tomorrow	
		Demand Falls	Demand Rises
Cost Opex Solution	£25/yr	£10/yr	NA
Capex Solution	£20/yr	£20/yr	£20/yr



Conclusions

- The structure of power systems is changing, with implications for the regulation of networks
- DERs have the potential to contribute materially to the transformation of the power system, but existing regulatory mechanisms and planning practices do not recognize this adequately
- Charging reform will be needed to encourage *efficient* DER deployment (especially at a very small scale)
- Addressing this (at the distribution level) is a major challenge for Ofgem and DNOs for the "RIIO-2" process which will define investment incentives and provide funding through to 2030

NERA
ECONOMIC CONSULTING

CONTACT US

Richard Druce
Director
London
+44 20 7659 8540
richard.druce@nera.com

Insight in Economics™

NERA

ECONOMIC CONSULTING