

**electricity  
north west**

Bringing energy to your door



## **Demand scenarios and innovation projects at Electricity North West**

Dr Geraldine Bryson and  
Dr Rita Shaw

**Stay connected...**



**[www.enwl.co.uk](http://www.enwl.co.uk)**



**electricity  
north west**



Introducing  
Electricity North West

Future demand



Rising to the challenge with  
innovation

Summary and questions



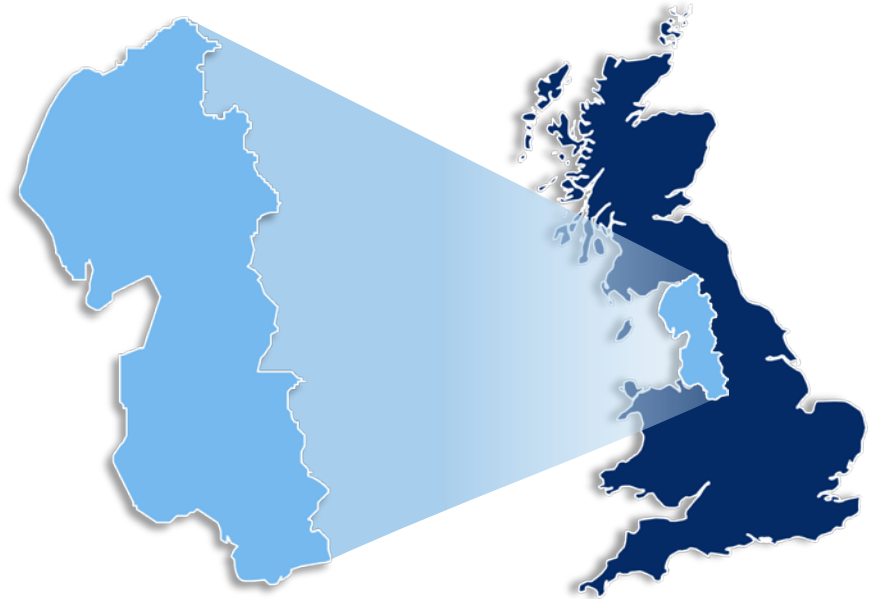
4.9 million



2.4 million



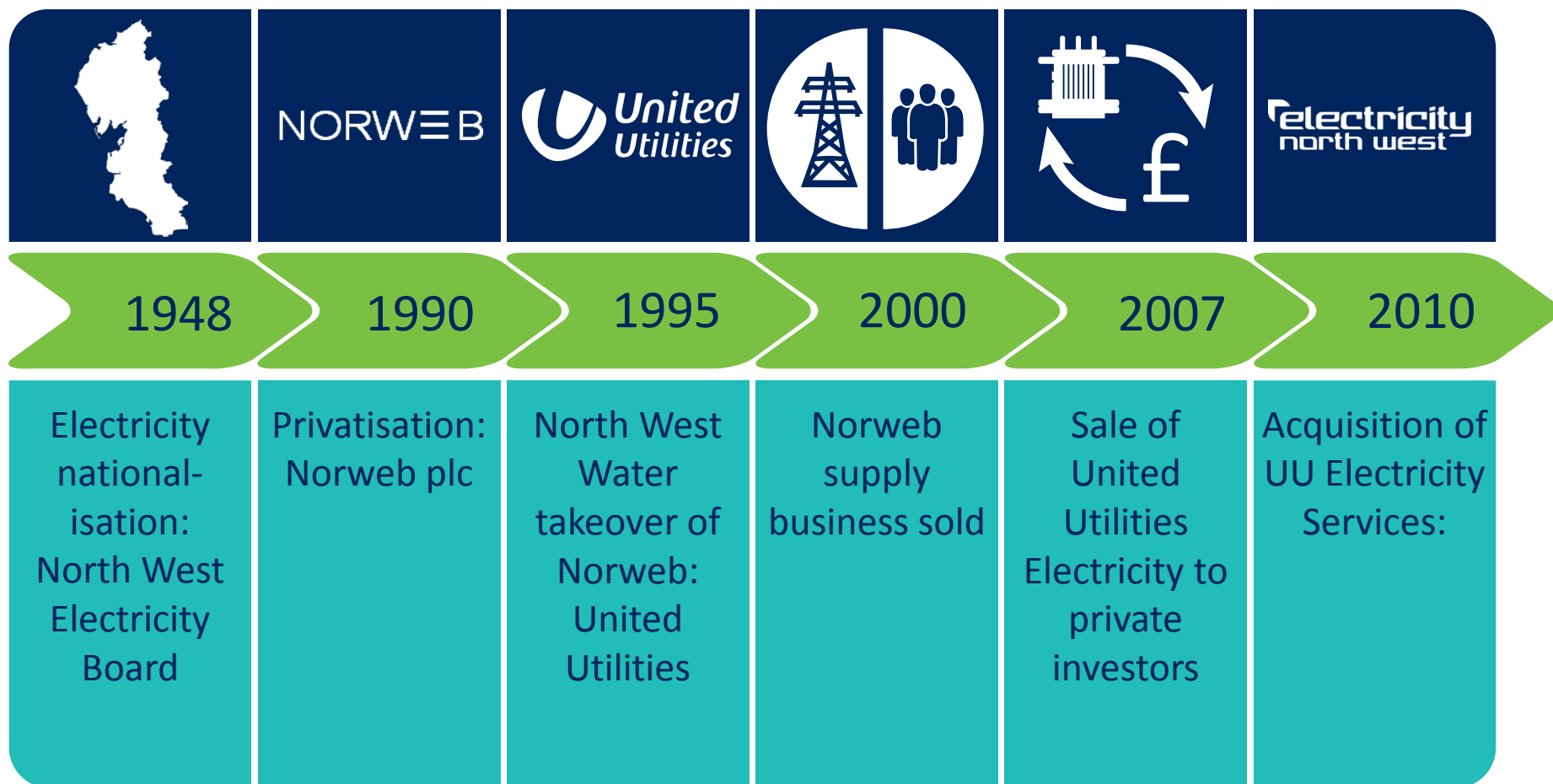
25 terawatt  
hours



£12 billion of network assets

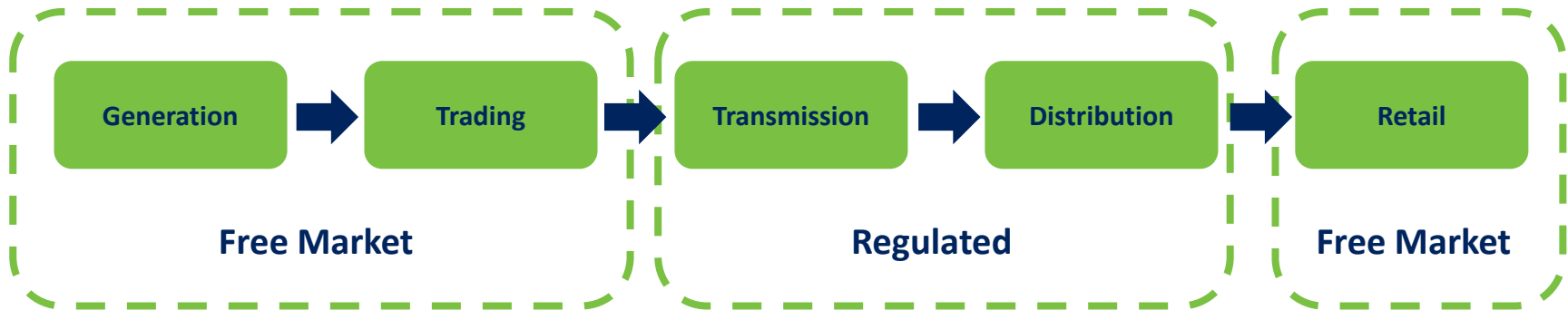
56 000 km of network ● 96 bulk supply substations  
363 primary substations ● 33 000 transformers

# Our heritage





All large generators, suppliers and networks are regulated



But network businesses are the only ones with price regulation



**RIO =**

Revenue = Incentives +  
Innovation + Outputs

ED1 = Electricity  
Distribution  
14 DNO areas  
Eight years

**£1.8  
BILLION**

Total to be  
spent on the  
network  
2015 - 2023



**£24.6  
BILLION**

Total to be spent on the  
network 2015 - 2023

**£10**

Resulting annual  
average savings in  
consumer bills

**8%**

The power  
distribution part  
of a dual fuel bill

Almost  
800k






The length of our  
power network

**30%**

Network reliability  
increase since 2002

# Some of our output commitments in RIIO

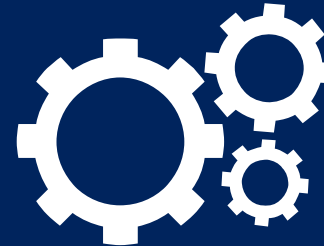


				
Customer service	Environment	Social	Safety	Reliability
90% complaints resolved in one day	Reduce carbon footprint by 10%	Improve services for vulnerable and priority service register customers	Site security investment	Maintain overall network health Improve overall reliability

# How big should our network be?



Understanding the past



Feeding into the business



Future scenarios



Big issues in the next year





GSP, BSP and primary substations



Metered load in each half hour  
Affected by weather and generation  
Manually identify the 'normal' annual peak

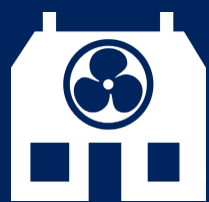
Rest of network = HV feeders, distribution subs, LV feeders



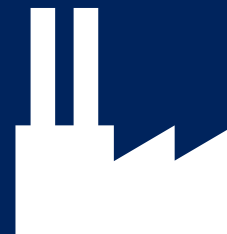
The 'Load Allocation' system *estimates* load in each half hour



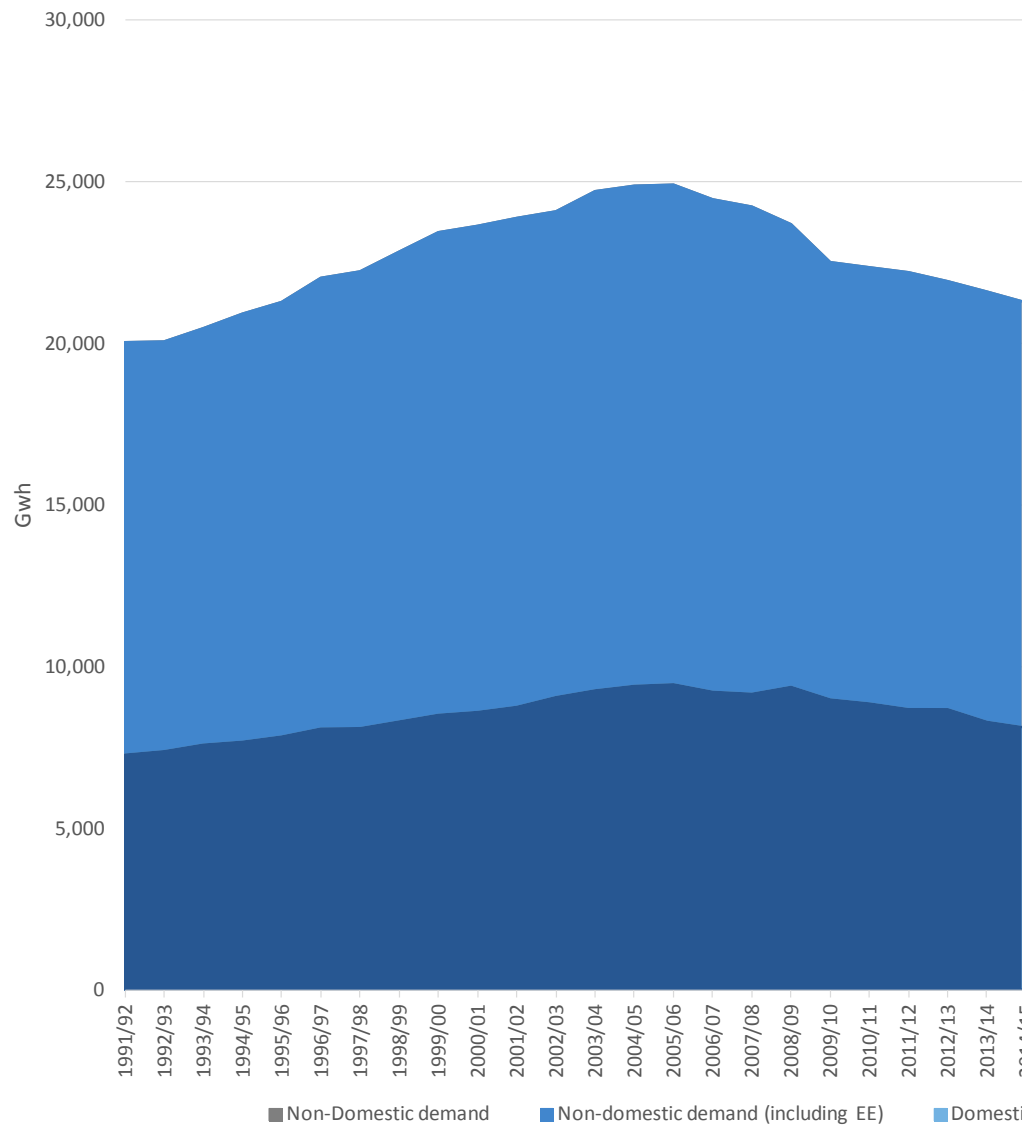
## Why could demand go up?



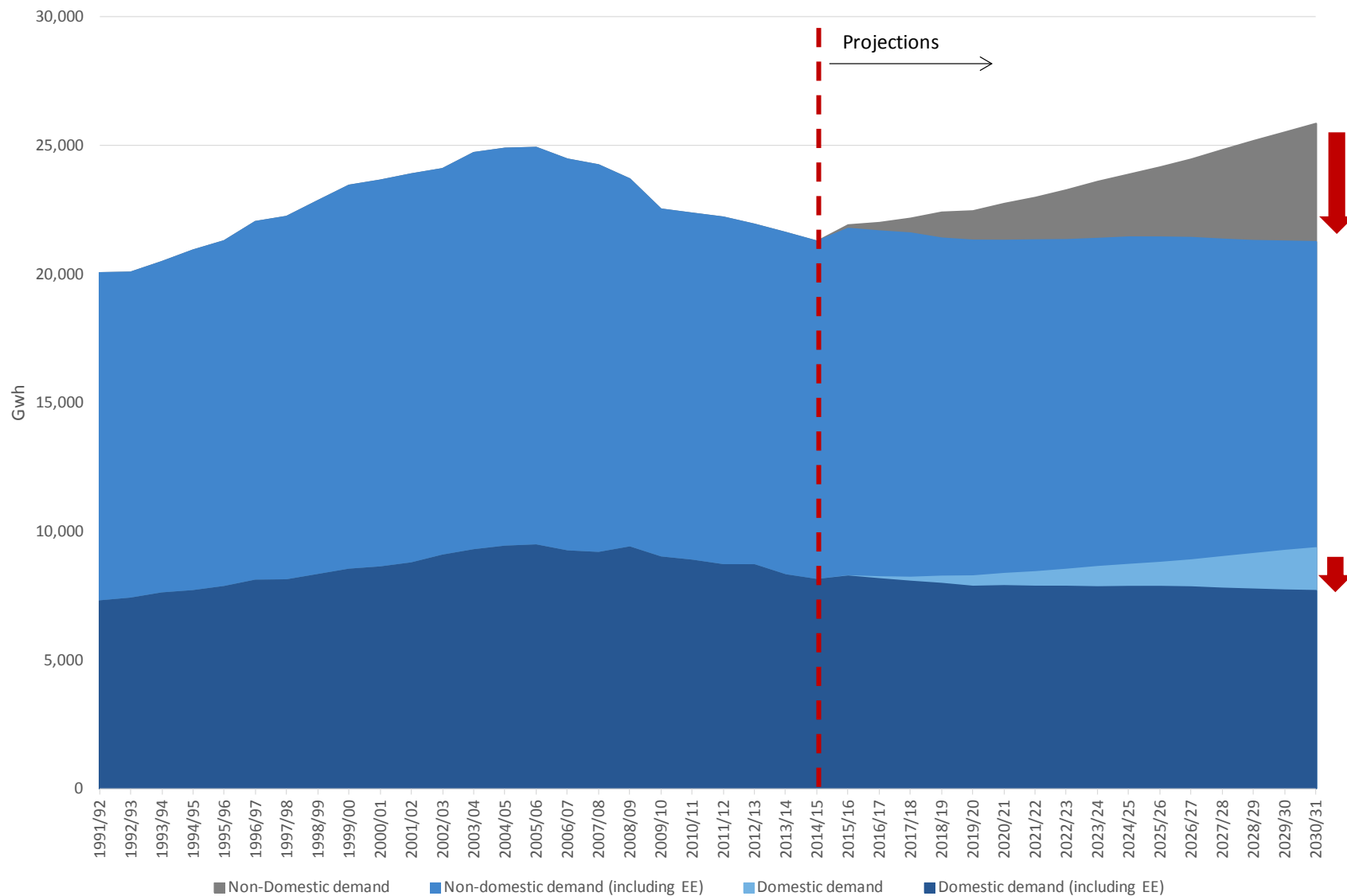
## Why could demand fall?

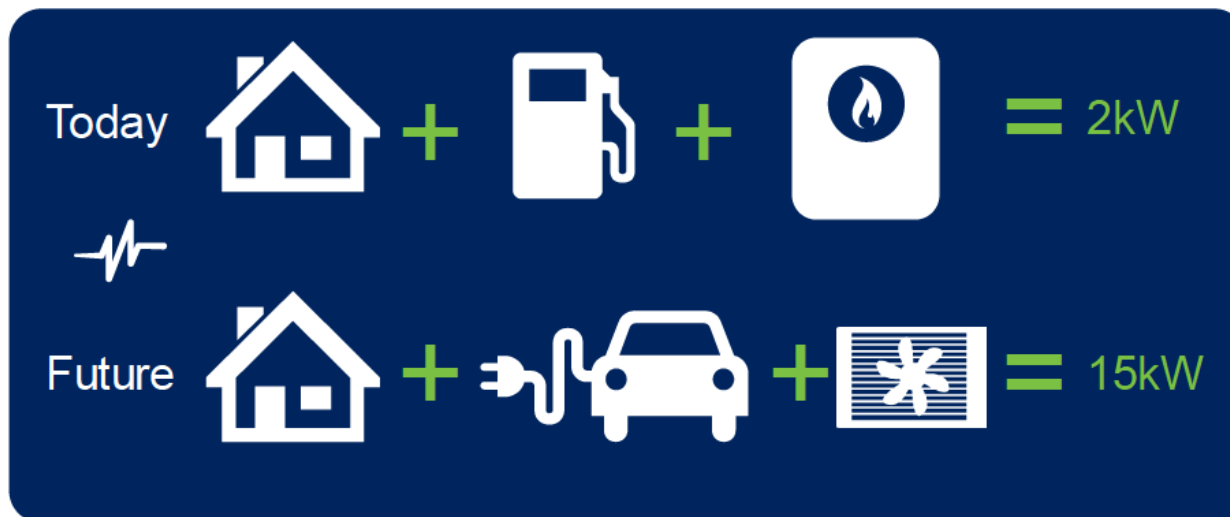


# Past electricity demand (energy)



# ... And 2015 central projection





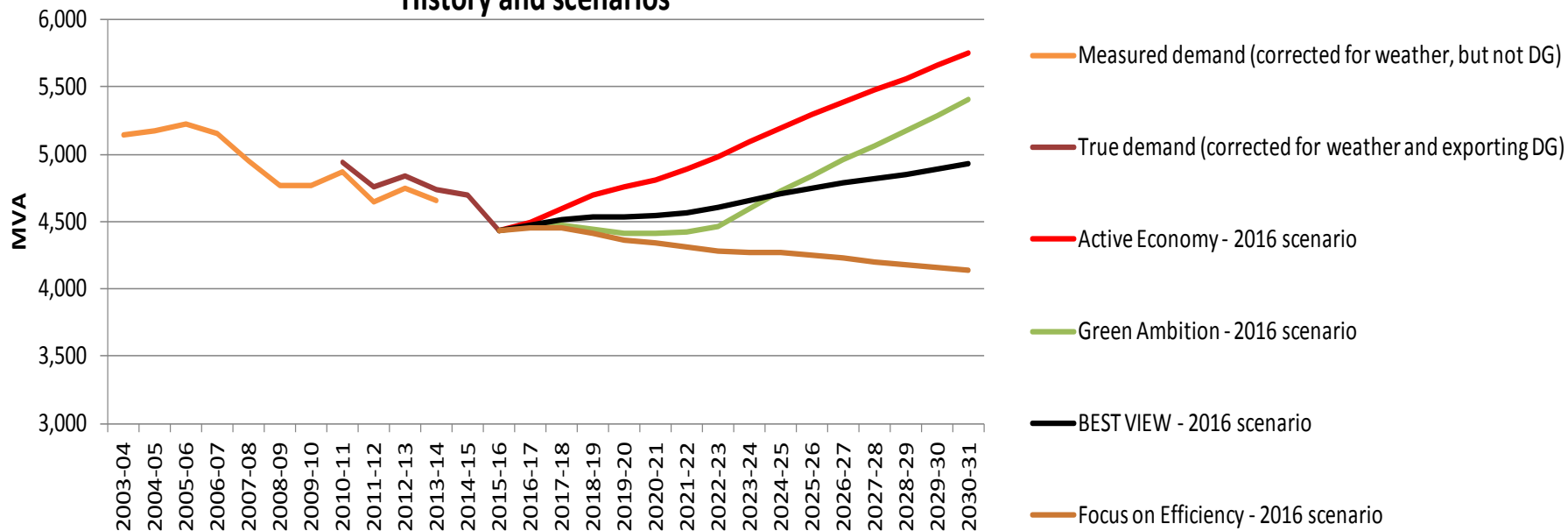
Significant uncertainty,  
so not just a single best-view

Plausible combination of:  
Background trends – econometric  
and policy analysis  
Incremental effect of electric  
vehicles and heat pumps



## Aggregate of weather-corrected annual BSP peak demands

### History and scenarios



Annual update requirement – methodologies being updated

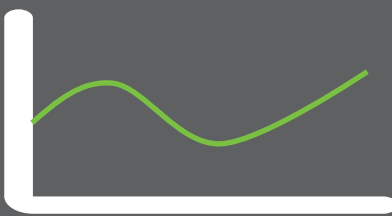
‘ATLAS’ project expanding beyond focus on peak demand



## Views of future demand and generation affect our plans for network capacity



Thermal ratings of equipment – forward and reverse power flows



Allowed range of voltage around statutory limits – demand, generation, reactive



Fault-level ratings for network protection

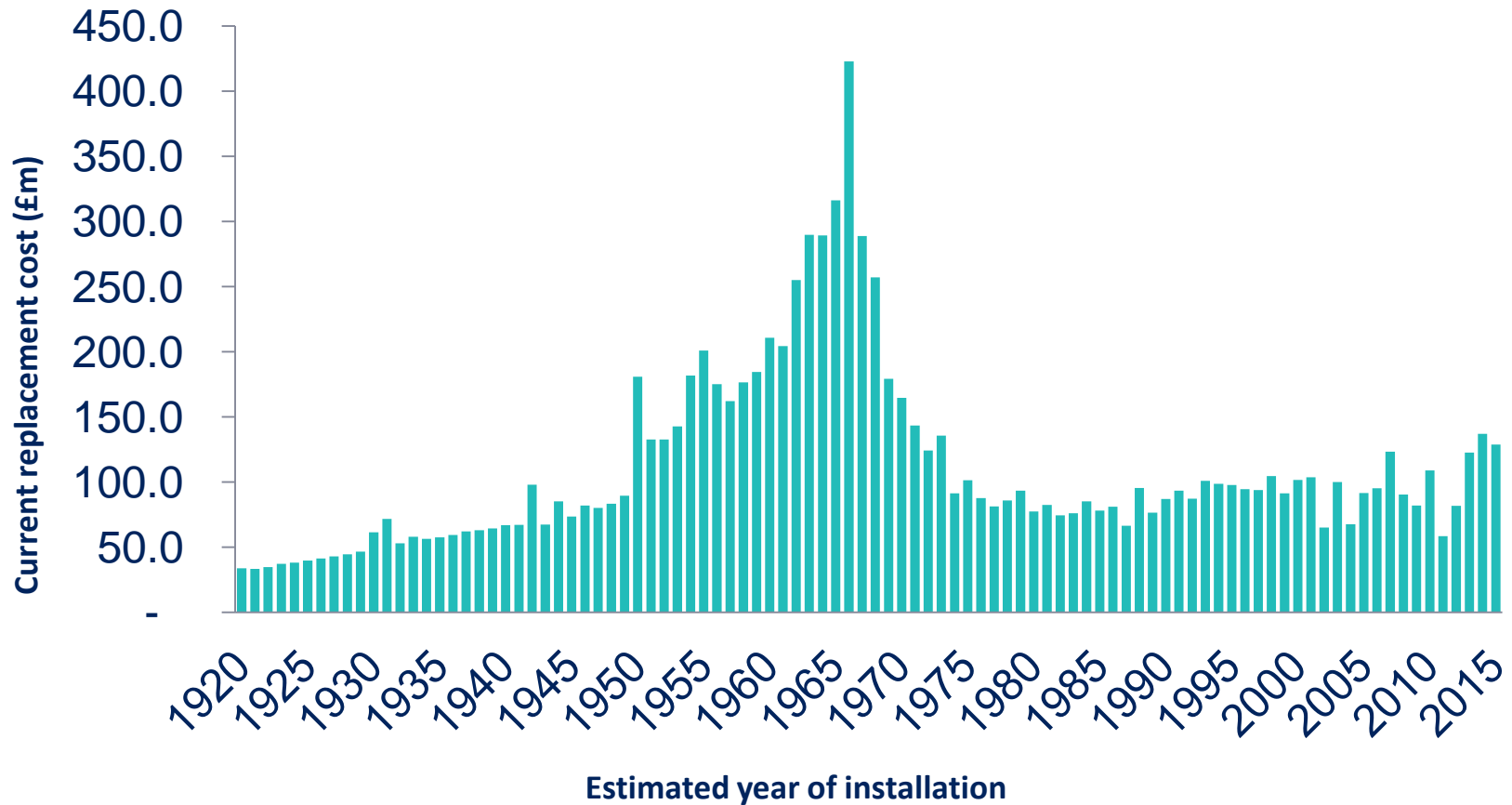
Standards of security of supply including asset redundancy, automation, generation contribution and demand response



Many ways to meet customers' capacity needs



## Age profile of assets

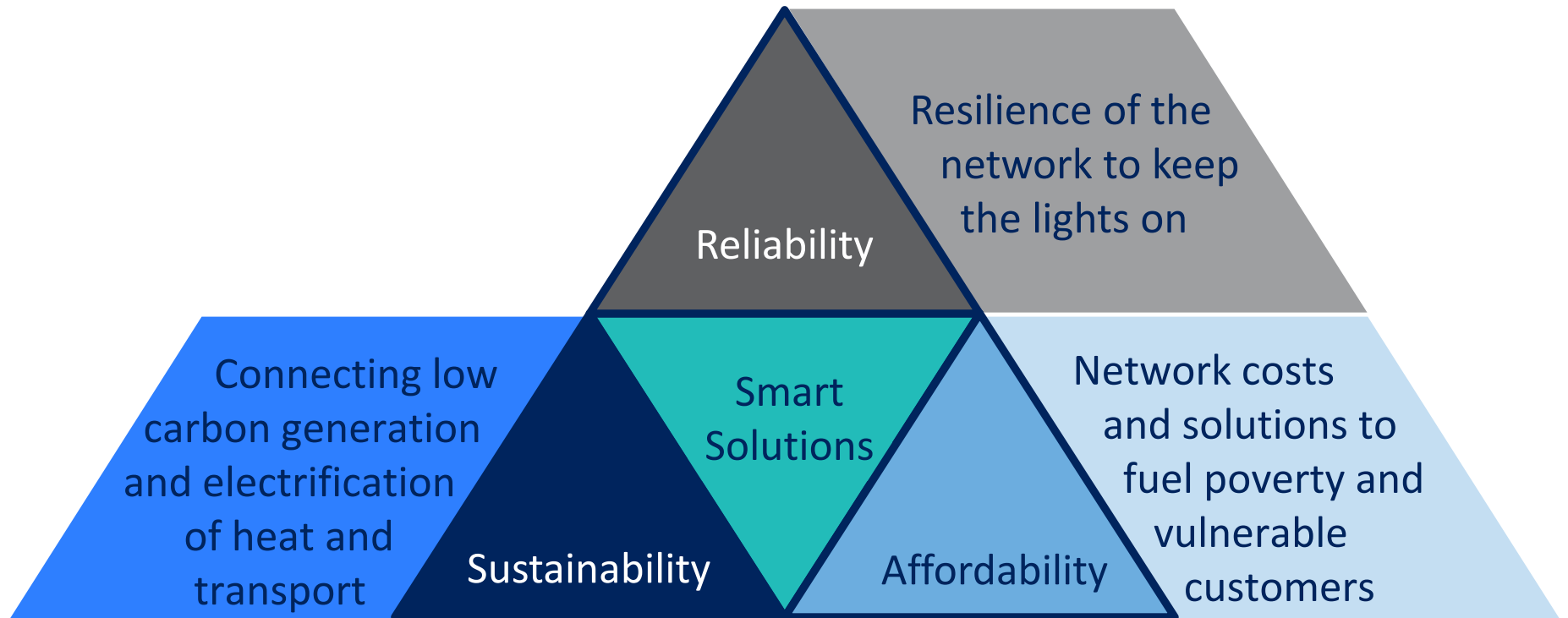




# Why innovate – what's the problem?



## ● The network operator 'Trilemma' ●

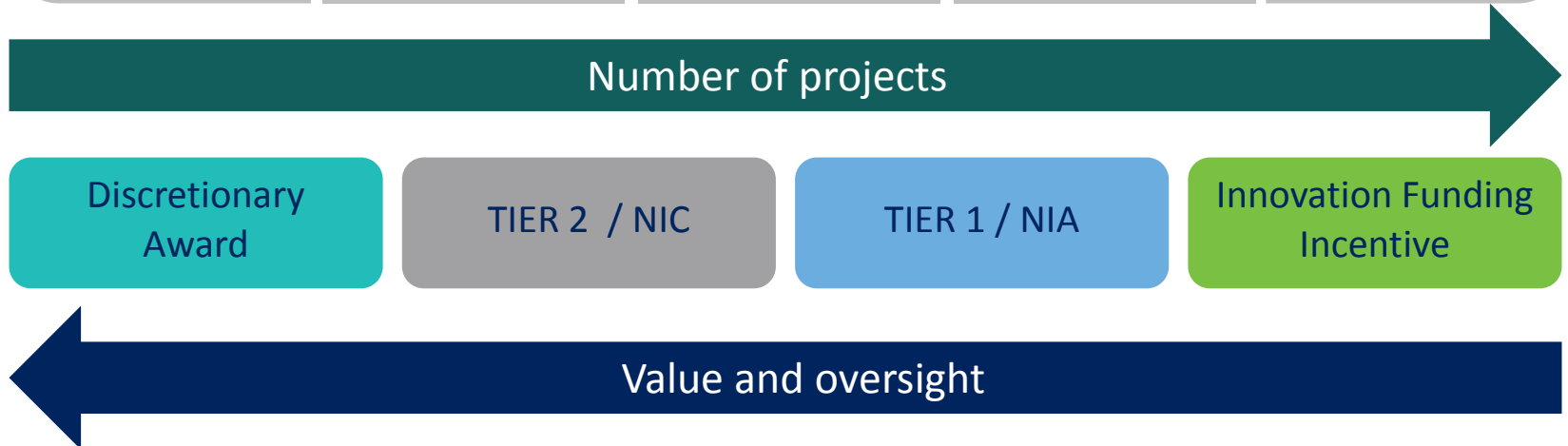


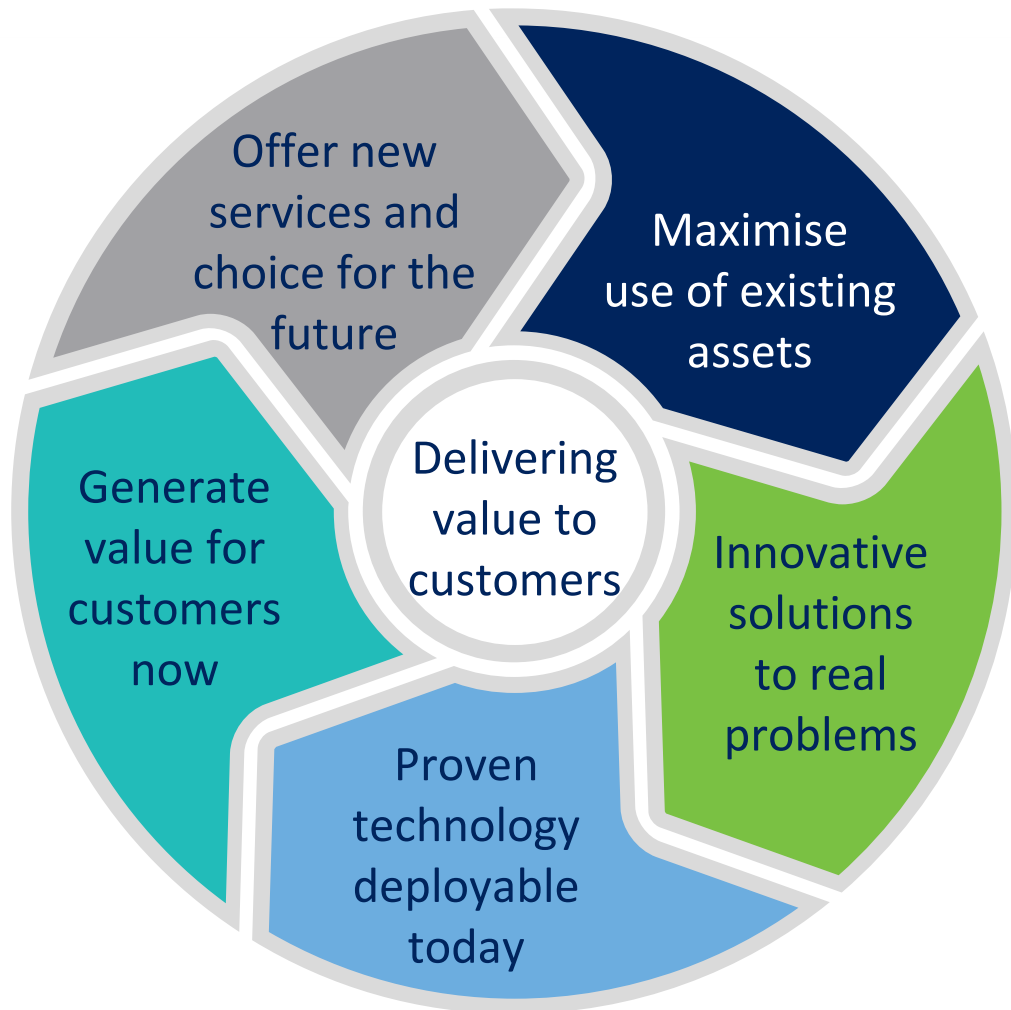
## ● Smart solutions are the key to unlocking this puzzle ●

# Innovation funding



Before RIIO-ED1			RIIO-ED1	
Innovation Funding Incentive	Low Carbon Networks Fund Tier 1	Low Carbon Networks Fund Tier 2	Network Innovation Allowance	Network Innovation Competition
0.5% of price control turnover (£2m/pa)	0.5% of price control turnover Small scale demonstration	Central fund for big projects	Replace IFI & LCN Fund T1 0.7% turnover (£3m/pa)	Central fund for big projects







Five consecutive  
successful second tier  
/ NIC bids



Only DNO to spend all  
of our innovation  
allowance

Leading our industry to  
a low carbon future



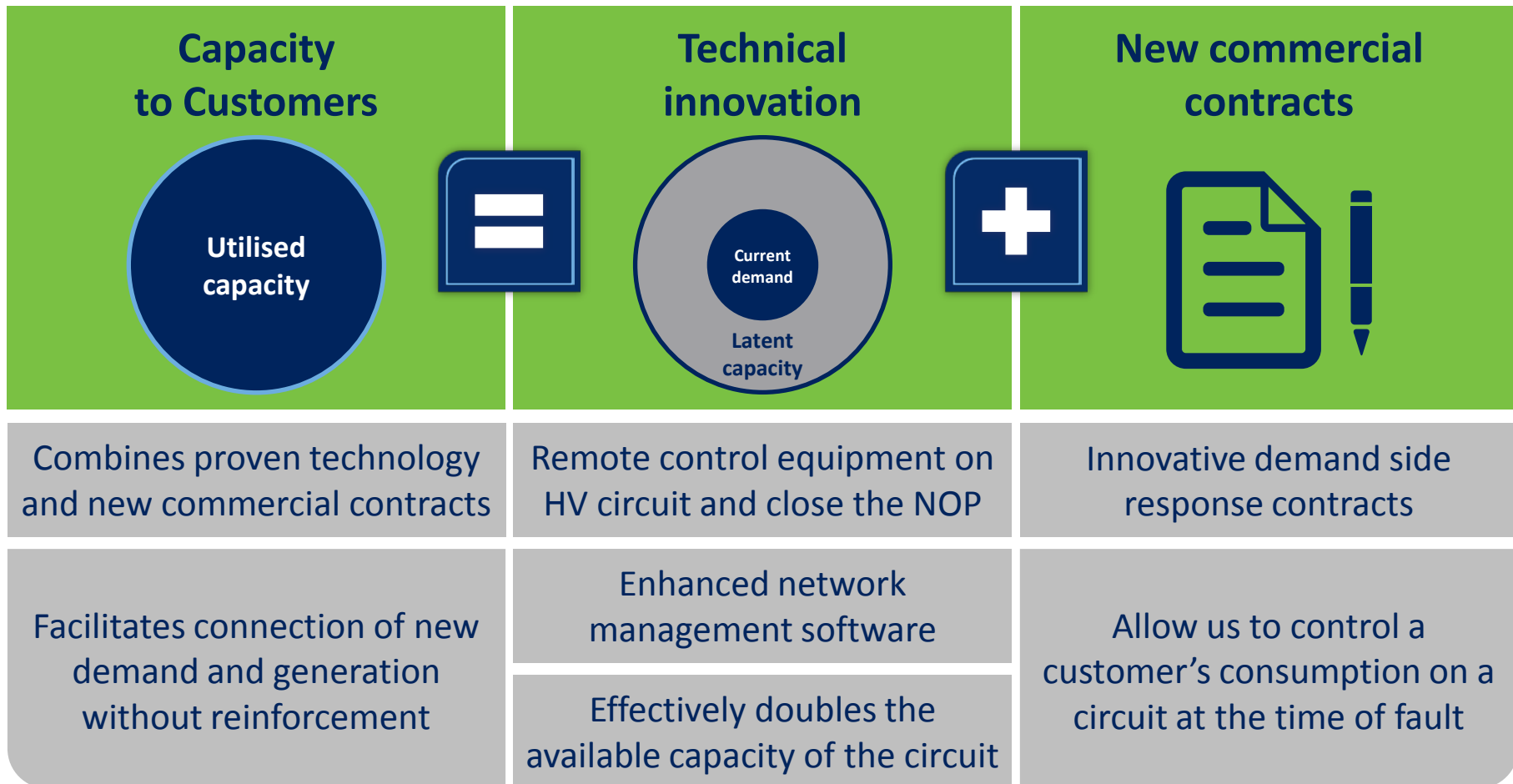
Stimulating supply  
chain development

Collaborative partnerships with SMEs, universities  
and National Grid



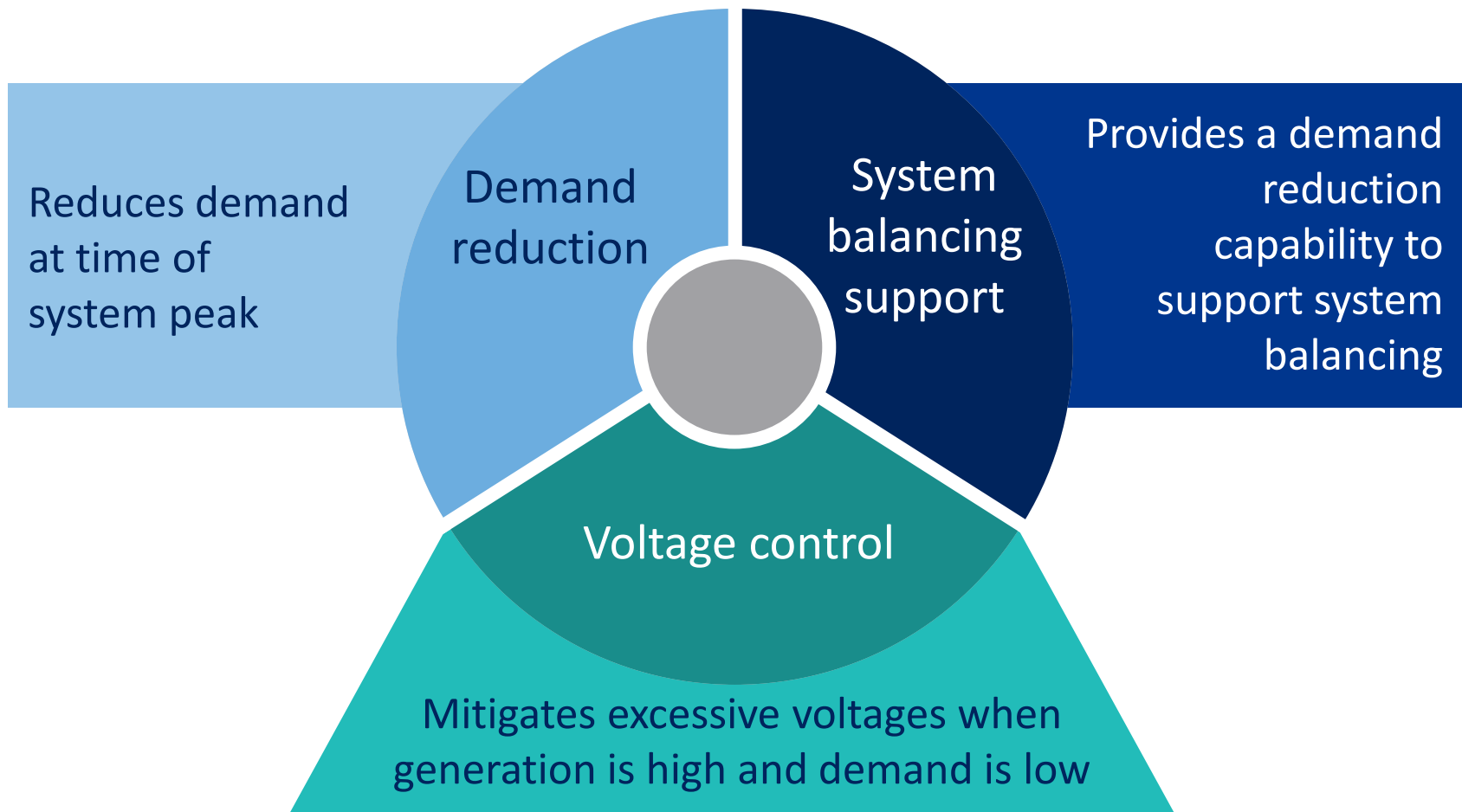


## Capacity to Customers unlocks latent capacity on the electricity network





*CLASS is seeking to demonstrate that electricity demand can be managed by controlling voltage...without any discernible impacts on customers*

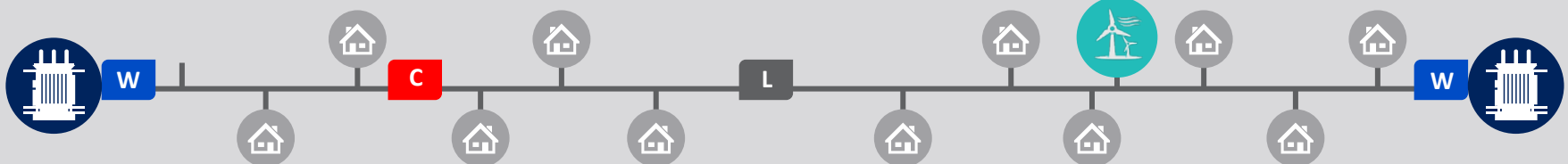




New controllable switching devices stabilise voltage

Allows us to lower voltage levels

Enables networks and appliances to work in harmony

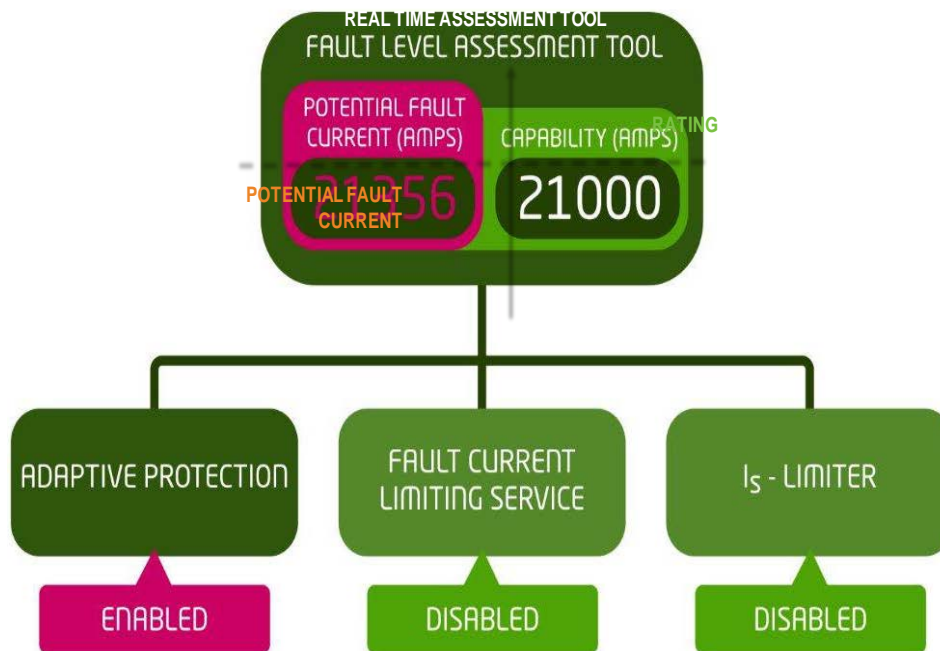


- Low cost
- Quick fit
- Minimal disruption
- Low carbon
- Low loss
- Invisible to customers
- Faster connection of low carbon technologies





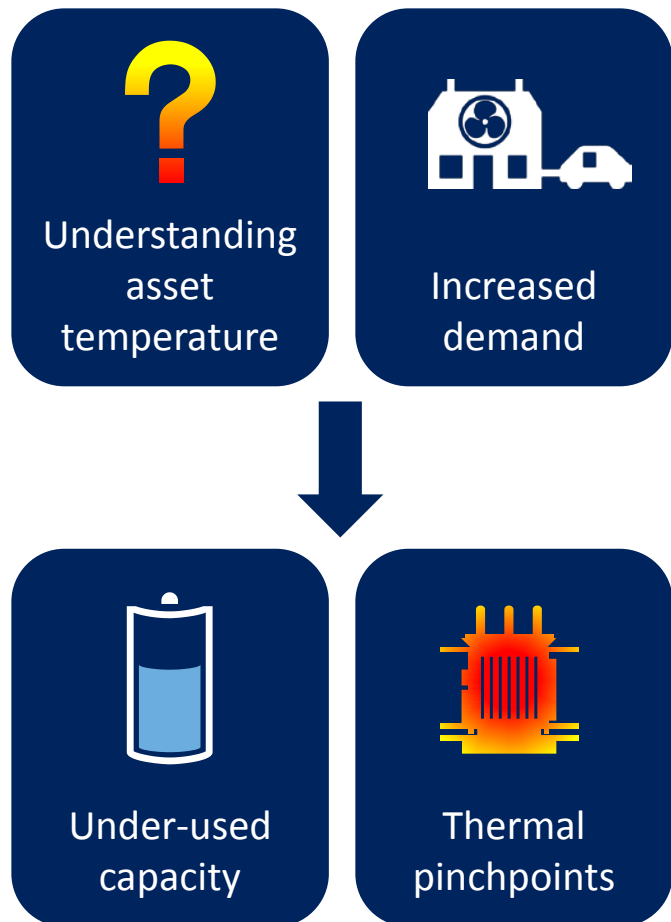
Respond is the first UK demonstration of an active fault level management solution that avoids traditional network reinforcement



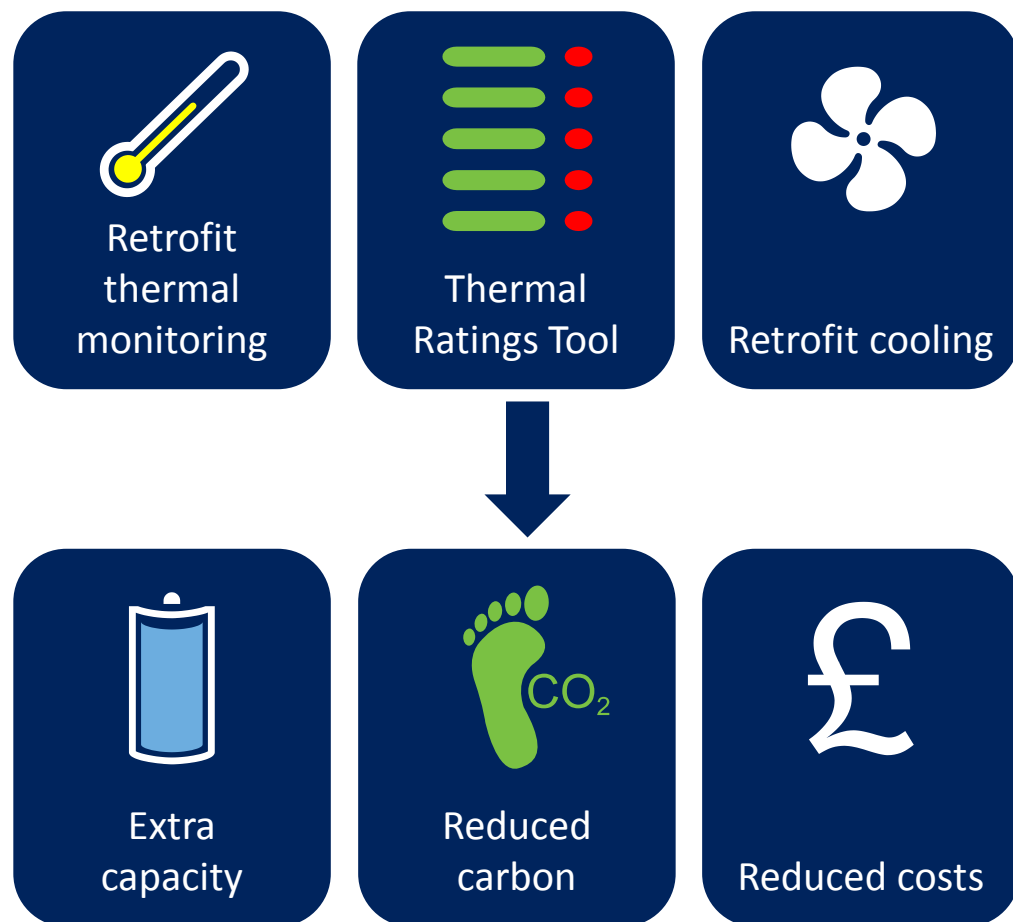
World first in commercial fault level management services



## Problem



## Celsius Solution





## Seven smaller scale projects – £6 million invested



Low voltage network solutions

Voltage management on low voltage busbars

The 'Bidoyng' smart fuse

Low voltage integrated automation

Low voltage protection and communications

Fault current active management

Combined online transformer monitoring



## Leading or supporting £16 million of NIA projects so far



Asset risk optimisation

Combined on-line transformer monitoring

Demand scenarios / ATLAS

Distribution asset thermal modelling

Sentinel

Avatar

VOLL

Smart Grid Forum work stream 7

Overhead line ratings



Bidoyng smart fuse - single-shot auto-recloser



KELVATEK



WEEZAP - world leading LV vacuum circuit breaker



When is C<sub>2</sub>C cost effective ...?



... or when should we reinforce?

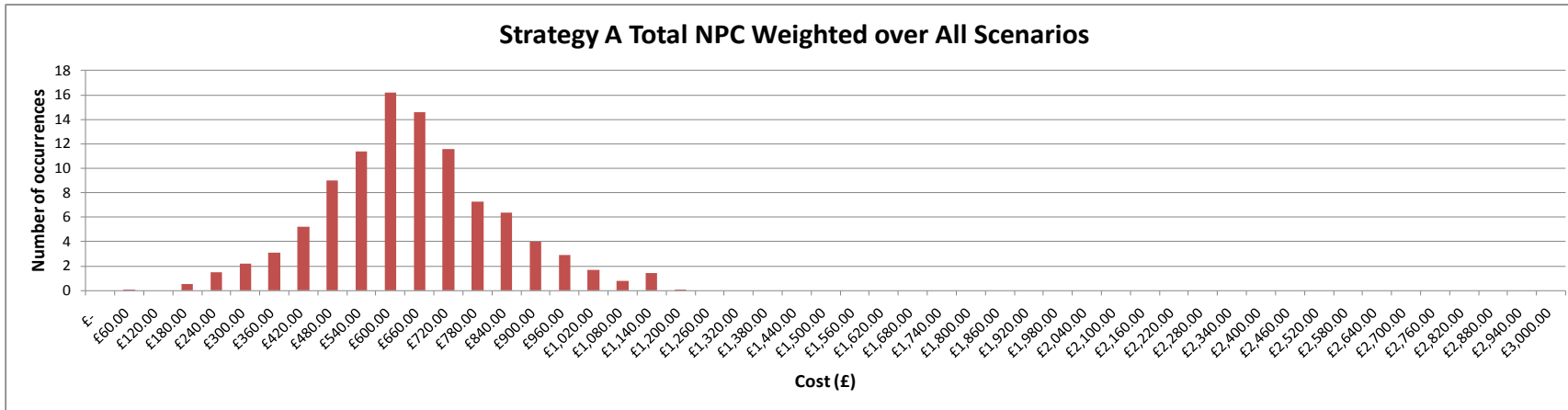


Working with University of Manchester to develop economic methodology

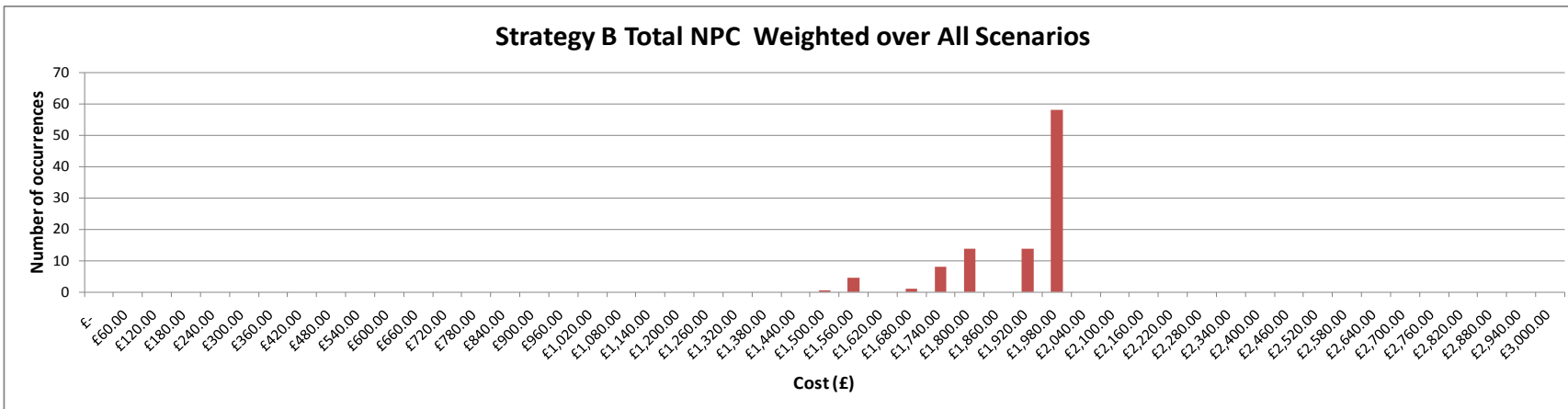


## Net present cost (x-axis is cost, y-axis is probability)

DSR



Reinforcement



DSR is always cheaper, but with greater uncertainty in total cost (width of distribution)

Want to know more?



**futurenetworks@enwl.co.uk**



**www.enwl.co.uk/innovation**



**0800 195 4141**



**@ElecNW\_News**



**linkedin.com/company/electricity-north-west**



**facebook.com/ElectricityNorthWest**



**youtube.com/ElectricityNorthWest**

Thank you for your time and attention