electricity north west

Bringing energy to your door

Exploring the barriers and opportunities presented by storage

Paul Bircham

Commercial Strategy & Support Director

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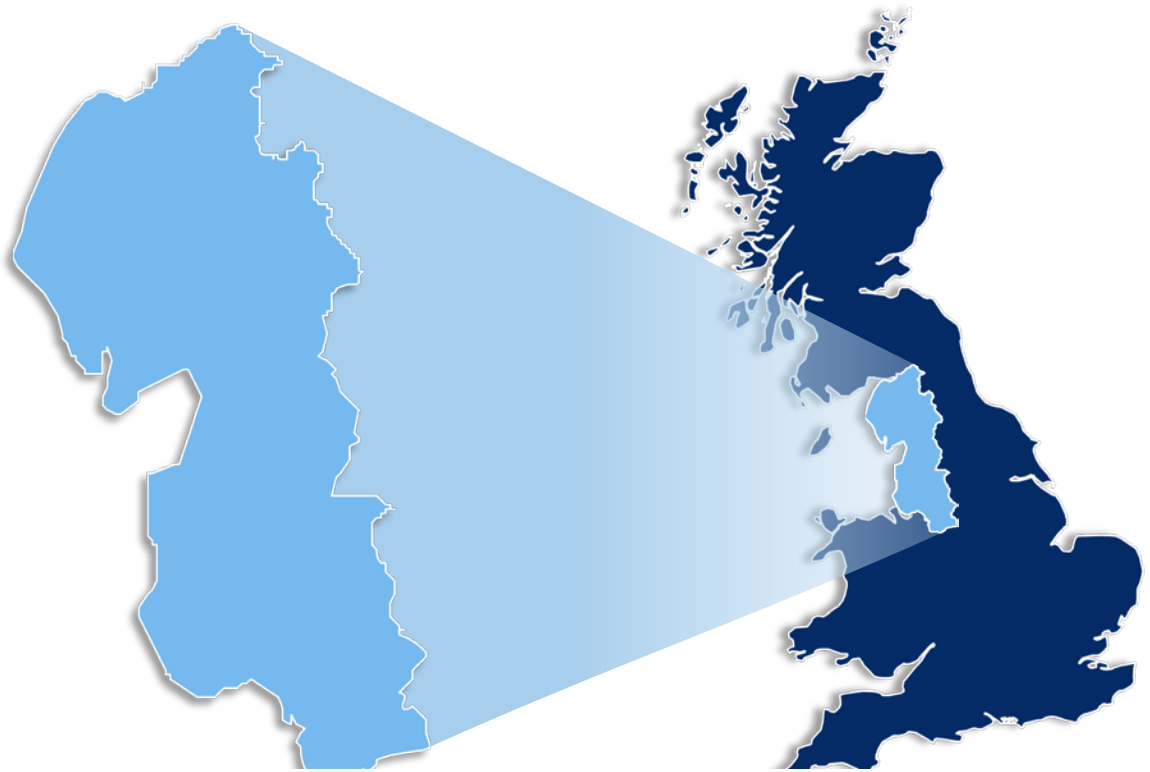
Introducing Electricity North West

5 million

2.4 million
(45% of demand)

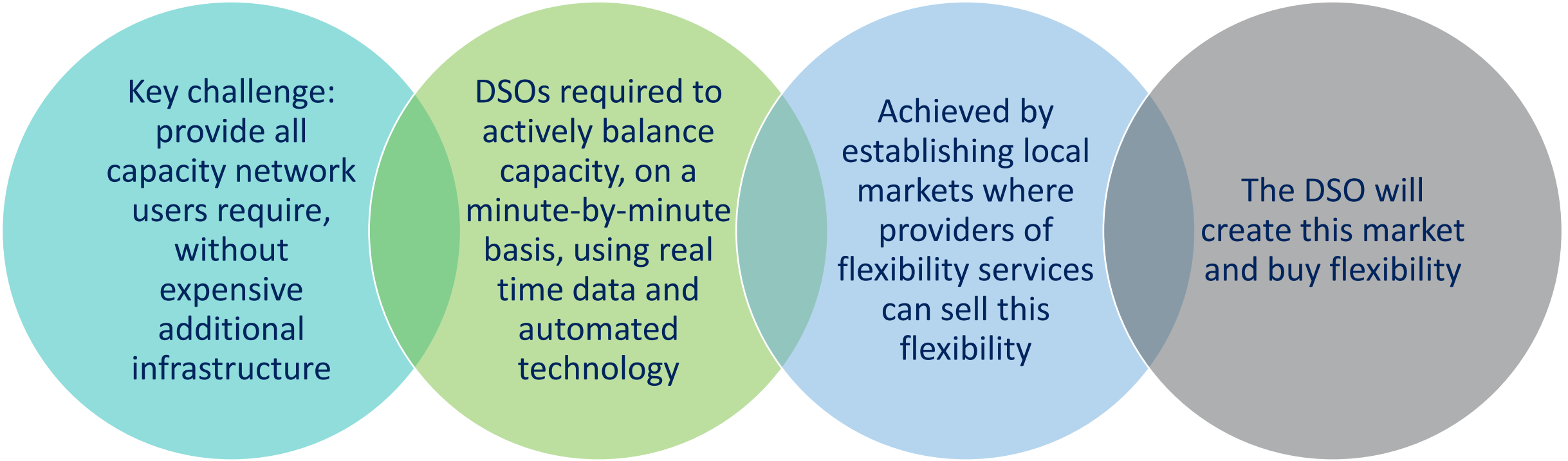
20,000 I&C
(55% of demand)



- 25 terawatt hours
- £12 billion of network assets
- 56 000 km of network
- 19 grid supply points
- 66 bulk supply substations
- 363 primary substations
- 33 000 transformers

From DNO to DSO: Our Road Map

Fundamental role remains unchanged: The provision of Network Capacity



To enable this transition DSO must become trusted facilitator and advisor

What DSO Can Deliver

Connections

- Enable rapid DG & storage growth

Network Stability

- Manage this growth through dynamic control

Low Cost Solutions – Minimise Infrastructure Spend

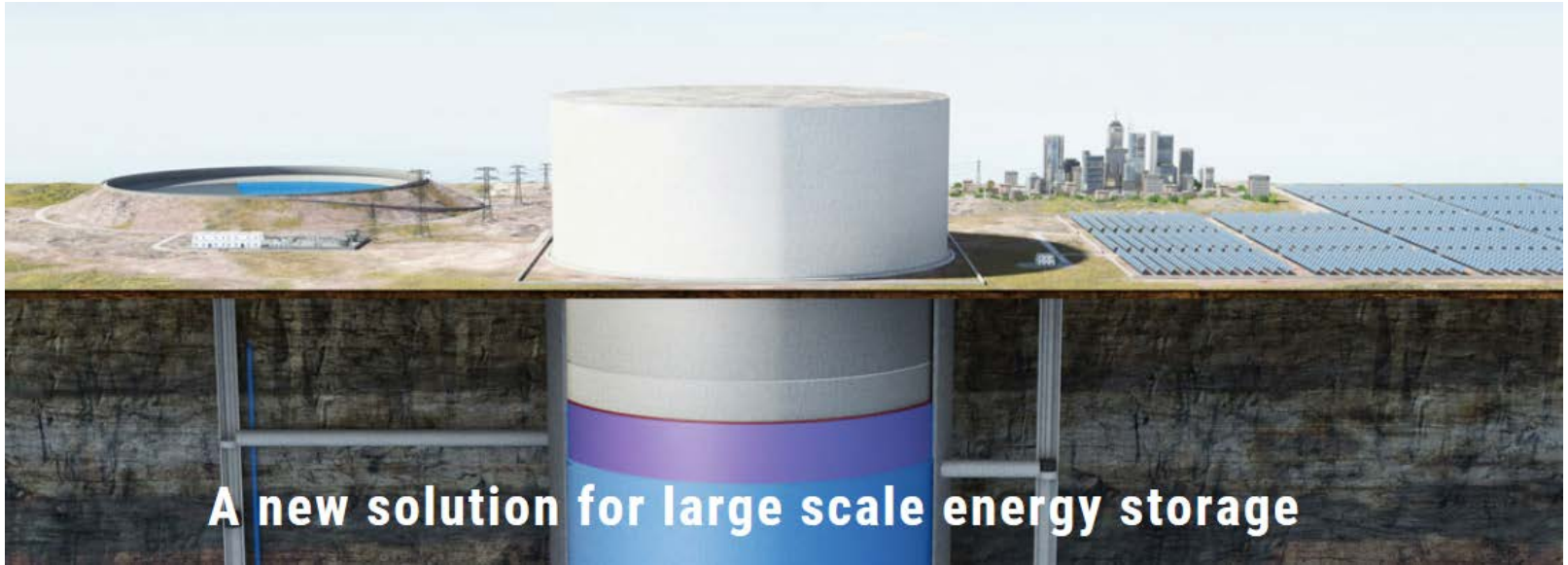
- Creates new markets
- Enables new services
- Collaboration with transmission through open markets to provide wider system stability

Provides a resilient service during low carbon transition at lowest cost

We are storage technology agnostic

- We understand the importance of storage in the energy mix
- We value the vital contribution, flexible technologies, such as storage play in balancing the future smart grid

- Many different technologies are emerging from Graphene to Gravity Storage



Making it easier for storage to line up the value chain

Our responsibility: **To enable customers connected to our networks the freedom to buy and sell their energy safely, securely and at lowest cost**

Requires new service model
Provision of flexible network capacity through local and regional balancing

Only when network capacity starts to unacceptably limit our customers' freedom, will we identify where additional capacity is required

Example:
Recent call for flexible capacity in 7 locations across North West

Seven target areas for flexible services

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Establishing local markets for providers of flexibility

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Uncertainties for DSOs: where storage can help

Penetration of DG and storage ahead of forecast

Set to increase as innovation lowers cost to connect and panel/ turbine prices fall

ENWL >1GW/month

Flexible LCTs – electric cars and heat pumps will increase demand and flexibility

Tesla hot spot

20 x 120kW chargers equivalent to 4 super stores

Pace of market formation and activity growth

Roll out of commercial based capacity solutions such as C_2C, ANM

CLASS crossing market boundaries

Stakeholders challenge DNOs to accelerate environmental improvements and deliver benefits for all

Concern for those who are getting left behind

DSO – Critical Enabler of a Low Carbon Future

Peter Emery

Chief Executive

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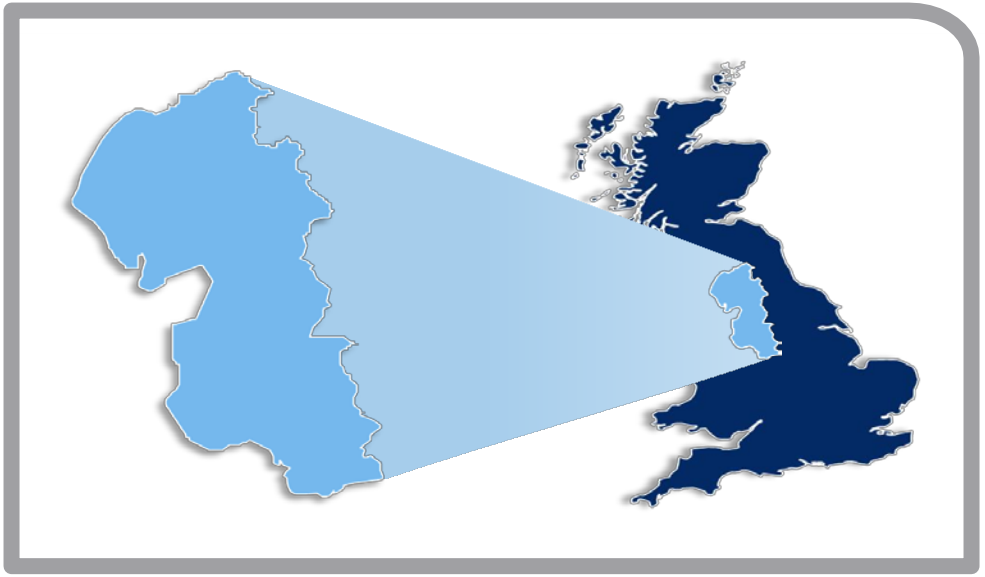


£12 billion of network assets

56 000 km of network ● 96 bulk supply substations

363 primary substations ● 33 000 transformers

Electricity North West

Five consecutive successful second tier LCNF/NIC bids			Only DNO to spend all it's innovation allowances
Leading our industry to a low carbon future			Stimulating supply chain development

Collaborative partnerships with SMEs, universities and National Grid

Critical Enabler Of A Low Carbon Future

Strategic Context

- 5th Carbon Budget commits UK to 57% reduction from 2027 to 2032
  - Great progress decarbonising power.....but substantial gas fleet remains
  - Limited progress in decarbonising vehicles or homes

Emerging Consensus

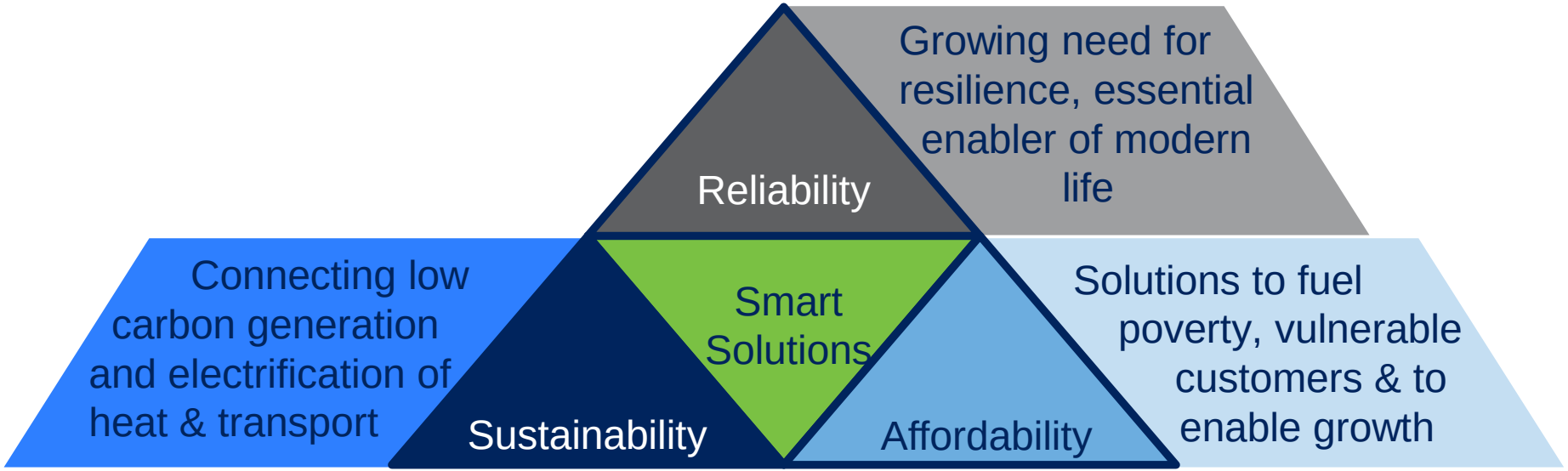
- DG in combination with storage is capable of providing a fundamental and substantial building block in constructing the low carbon framework

- Without DSO this cannot happen

- This alone would be justification enough for the move to DSO

The Broader Network Challenge

● The network operator ‘Trilemma’ ●



● Smart solutions are the key to unlocking this puzzle ●

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DSO Innovation Focus

Avoid participation in service provision (storage / DG)

- Conflict with regulated monopoly role

Innovation focus

- **Customer Service** - expertise, ease of connection, market access
- **Dynamic Network Control** - Active Network Management (ANM)
- **Commercial**
  - Contract terms to attract wide participation in network services
  - Structures to enable market based collaboration with TSO
  - Market testing underway

DSO: Essential Components

- Network Capacity Provision
- Flexible Network Capacity Market Facilitation
- Network Access Management and Forecasting
- Capacity-based Charging
- Market driven collaboration with Transmission System Operator to provide Whole System participation

DSO – Focussed on Network Capacity Management

Maximising utilisation of all existing network capacity ensures efficiency

Provision of capacity **for** customers **from** other customers is often lowest cost, first option

DSOs must facilitate local markets for flexible capacity

- Direct customer access
- Access through aggregators

Exchange of information and enhanced transparency necessary to avoid inefficient network over-stress and maintain security of supply

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Innovation - Other Areas

Demand Management through Voltage Control

- Ideal Opportunity for service provision

High Voltage – CLASS

- HV control to increase or reduce demand
- CLASS is now live providing grid services

Low Voltage - Smart Street

- Active LV management could significantly reduce customer demand and allows greater DG output
- Benefits accruing to customers are largely beyond the meter

CLASS
Customer Load Active System Services

SMART STREET

Energy Efficiency – Injection of Pace

- Committee on Climate Change - progress towards carbon budgets is slowing
  - New policies needed to drive building energy efficiency
  - Government has consulted on new approach to energy efficiency

- DNOs well placed to respond
  - Trusted to provide advice to overcome lack of information / misinformation
  - Use local contacts to build skills / share experience / expertise
  - RAV-based funding “beyond the meter” could provide access to lower cost of capital than ECO
  - Local strategic deployment to secure early benefits

- Intrinsically aligned to reduce energy consumption – Not Conflicted

Summary

- Climate change imperative drives increasing urgency
- Energy trilemma constrains acceptable solutions
- Multi-sector innovation is demonstrating what can be done
  - Ease of deployment and market access must not constrain growth
- Further thinking & innovation still needed on the shape and scope of network activities to make this happen
  - Development of new RIIO Outputs needed eg capacity incentive?
  - DNOs to DSOs facilitating wide participation in new markets
  - DSOs could play increased role in energy efficiency roll-out

Powering the North West's Future: From DNO to DSO

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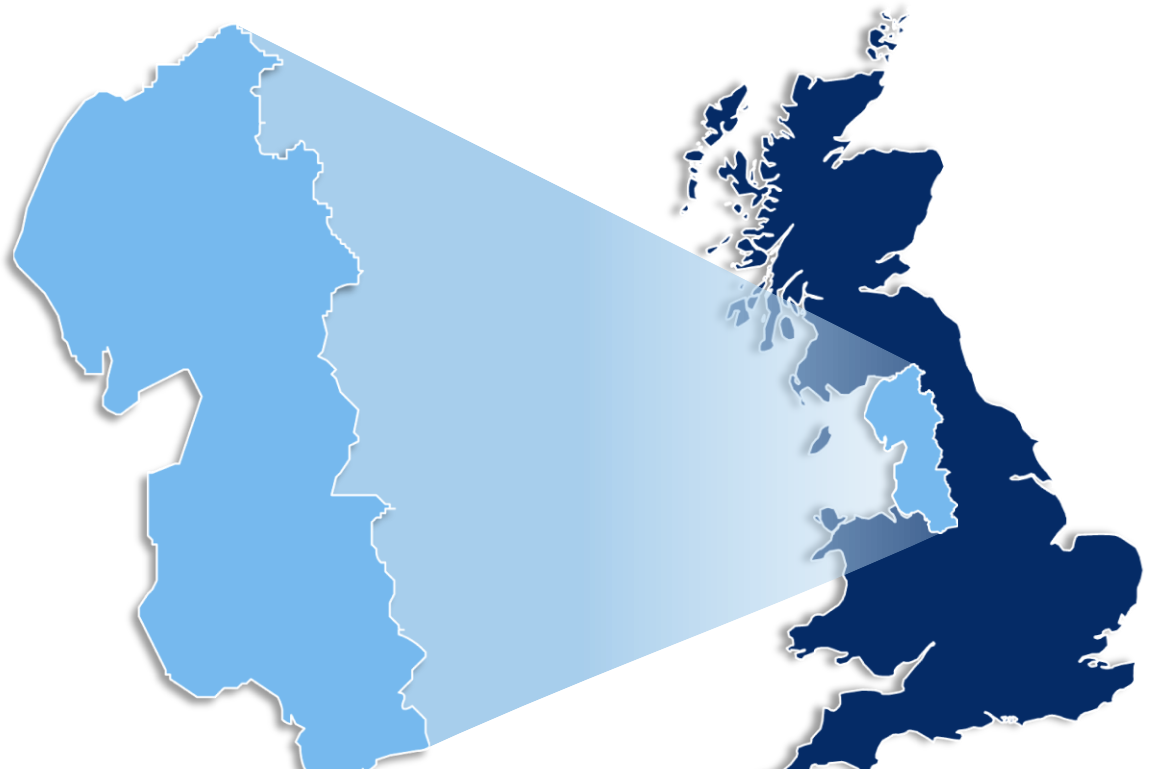

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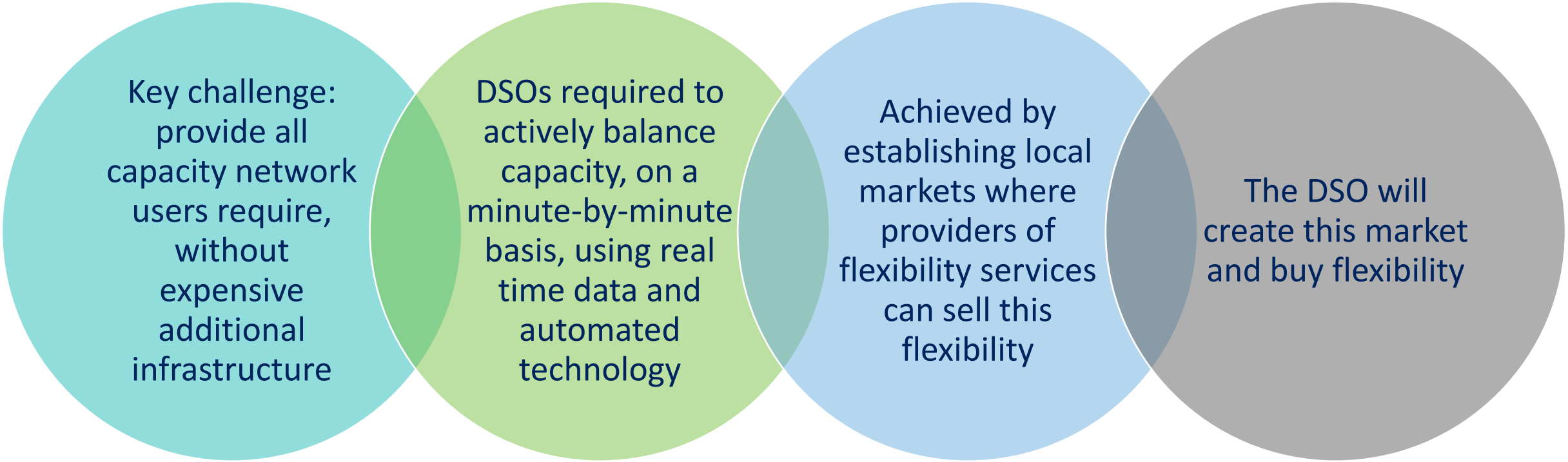

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DSO: The continuing provision of Network Capacity...

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...for a growing list of network users...

Consumers and exporters

- Domestic customers (230V)
- Small & medium-sized enterprises (230V)
- Commercial customers (11kV)
- Industrial customers (33kv & 132kV)

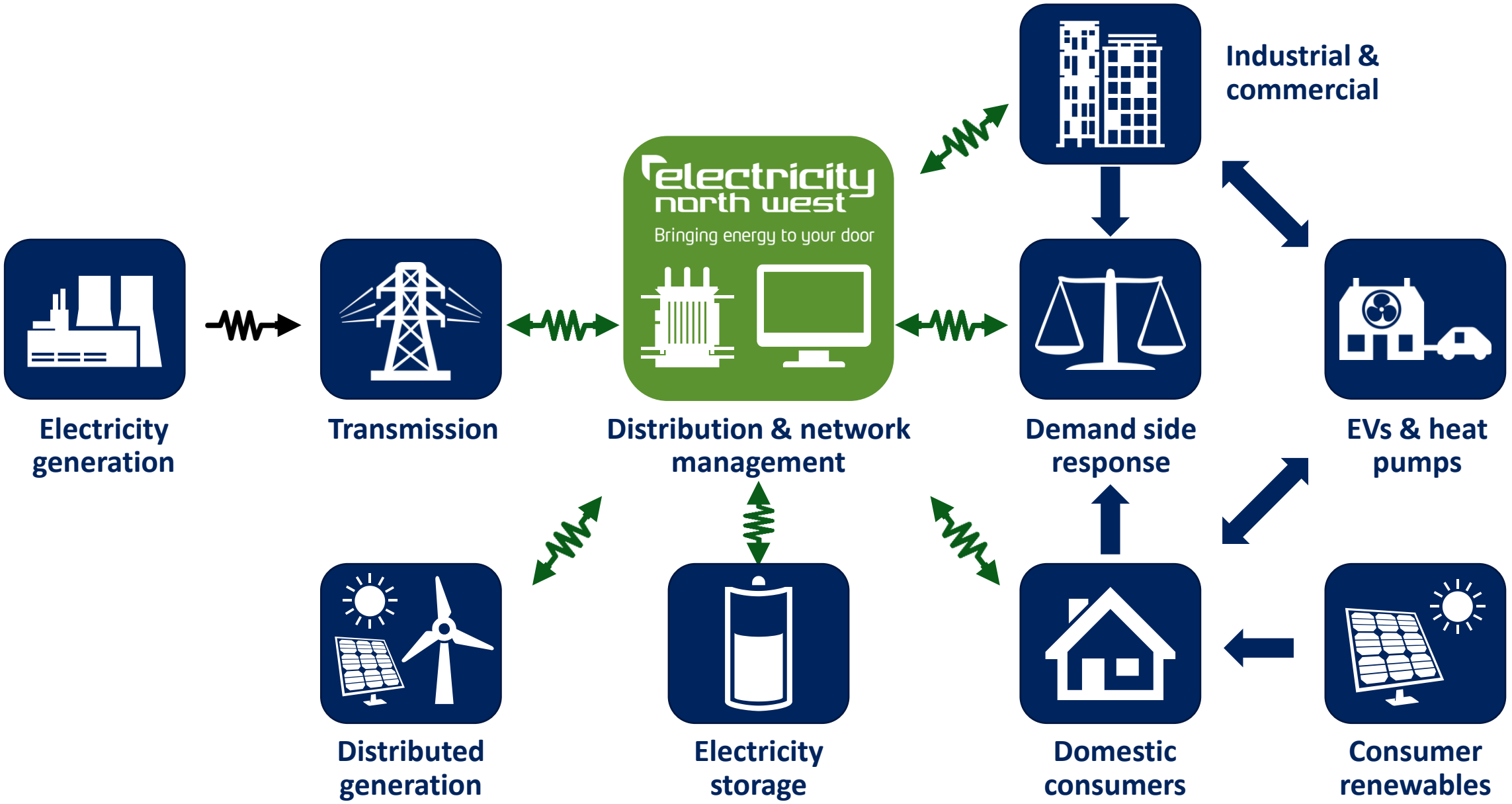
Energy generators

- 11kV (eg small solar farms)
- 33kV (eg combined heat & power plant)
- 132kV (eg offshore wind farms)

Storage operators

- Various connection voltages

...and a more complex and multi-directional network



Providing capacity without expensive additional infrastructure

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Actively balancing capacity, on a minute-by-minute basis

2014 – 2019 Network Management System replacement

- New SCADA live from **October 2017**
- CLASS dashboard live from **December 2017**
- Self-healing network (FLISR) **May 2018**
- Advanced Demand Management System, with real-time load monitoring and platform for DERMS
  Summer 2019

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Facilitating new markets with new information

Curtailment index

Provides an indication of the potential constraint of the generator	Based on fault data and planned maintenance data	Two types of index values: A forecast value based on 6 years data An actual value for the last 12 months	Will be provided as part of quotation

Generation index

Approximate indication of the available additional thermal capacity for generation in MVA	Provided for every primary and bulk supply point (BSP)	Future development will include fault level indicator	Will be published on website

Enabling all customers to participate and benefit

Network requirements of domestic customers are significant design feature

Harnessing flexibility of domestic customers achieved in multiple ways

Through aggregators, including existing energy suppliers	Through unseen demand-side response utilising techniques such as CLASS	Through direct engagement by the DSO, such as Power Saver Challenge

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Customer Load Active System Services

POWER SAVER challenge

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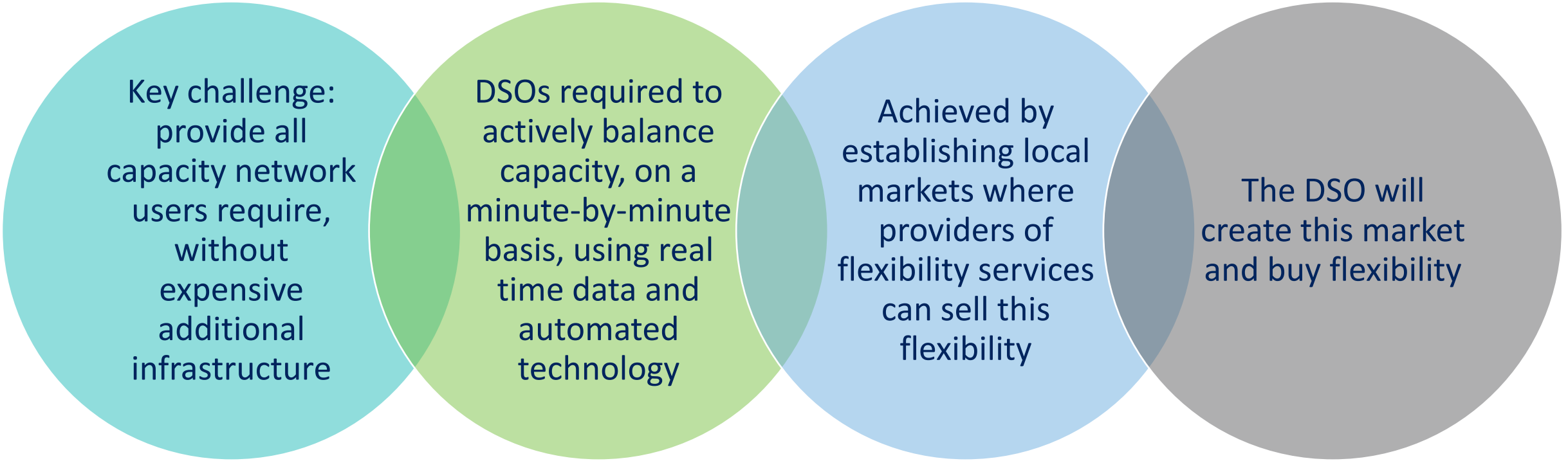

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