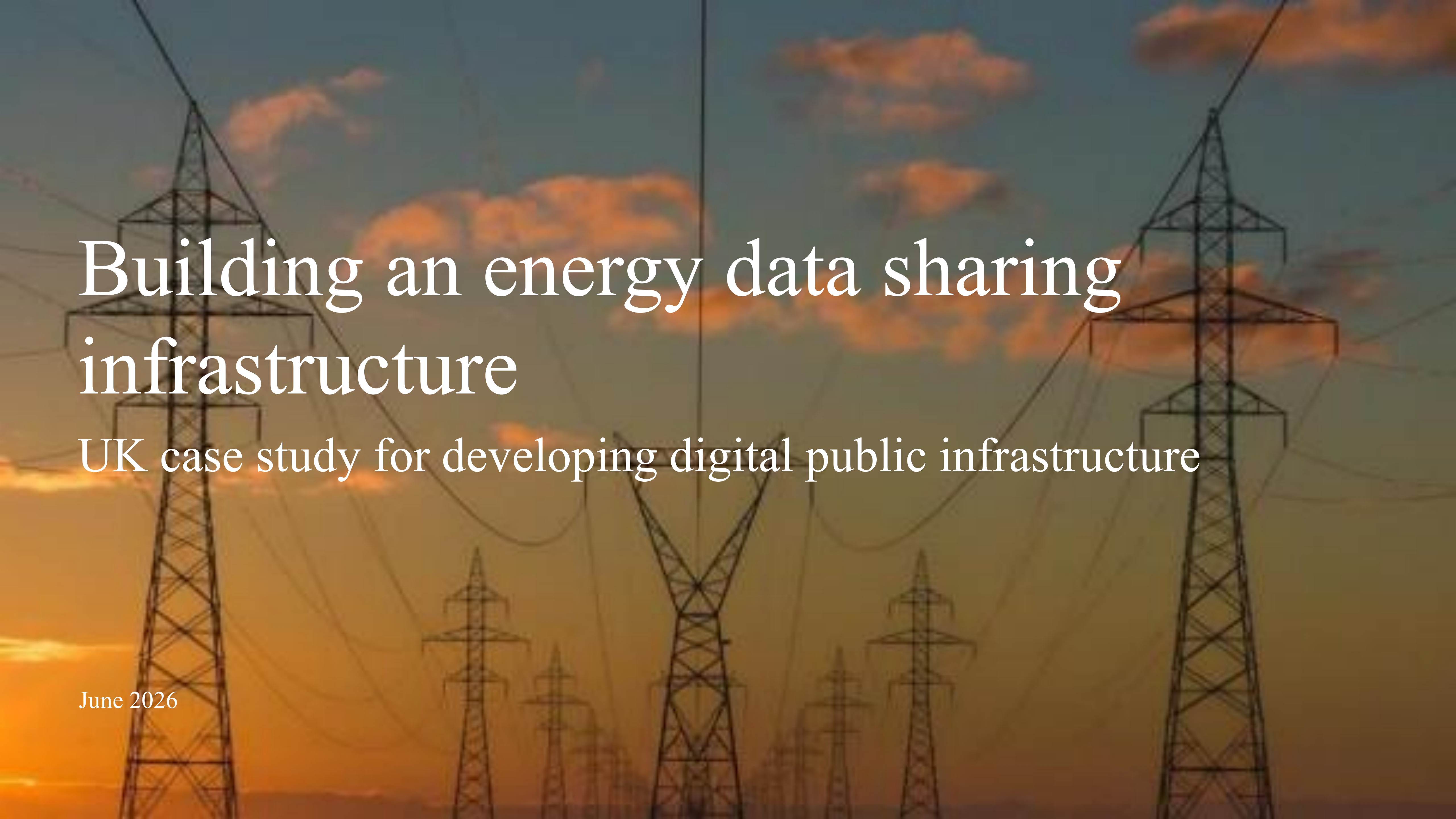

Building an energy data sharing infrastructure

UK case study for developing digital public infrastructure

June 2026

ARUP

Our firm

We guide, plan and design the future of the built environment. We are a global consultancy with extensive technical and advisory expertise.

AboitizPower Cayanga Hillside Solar Project

Shaping resilient cities in Asia Pacific

1963
First office opened

6,400+
People

31
Offices

150+
Disciplines

ARUP

Challenges in energy systems worldwide

Transition

Resilience, Security & Sovereignty

System Complexity

New Tech Workloads

ARUP

Achieving **net zero**

requires an

integrated energy system

ARUP

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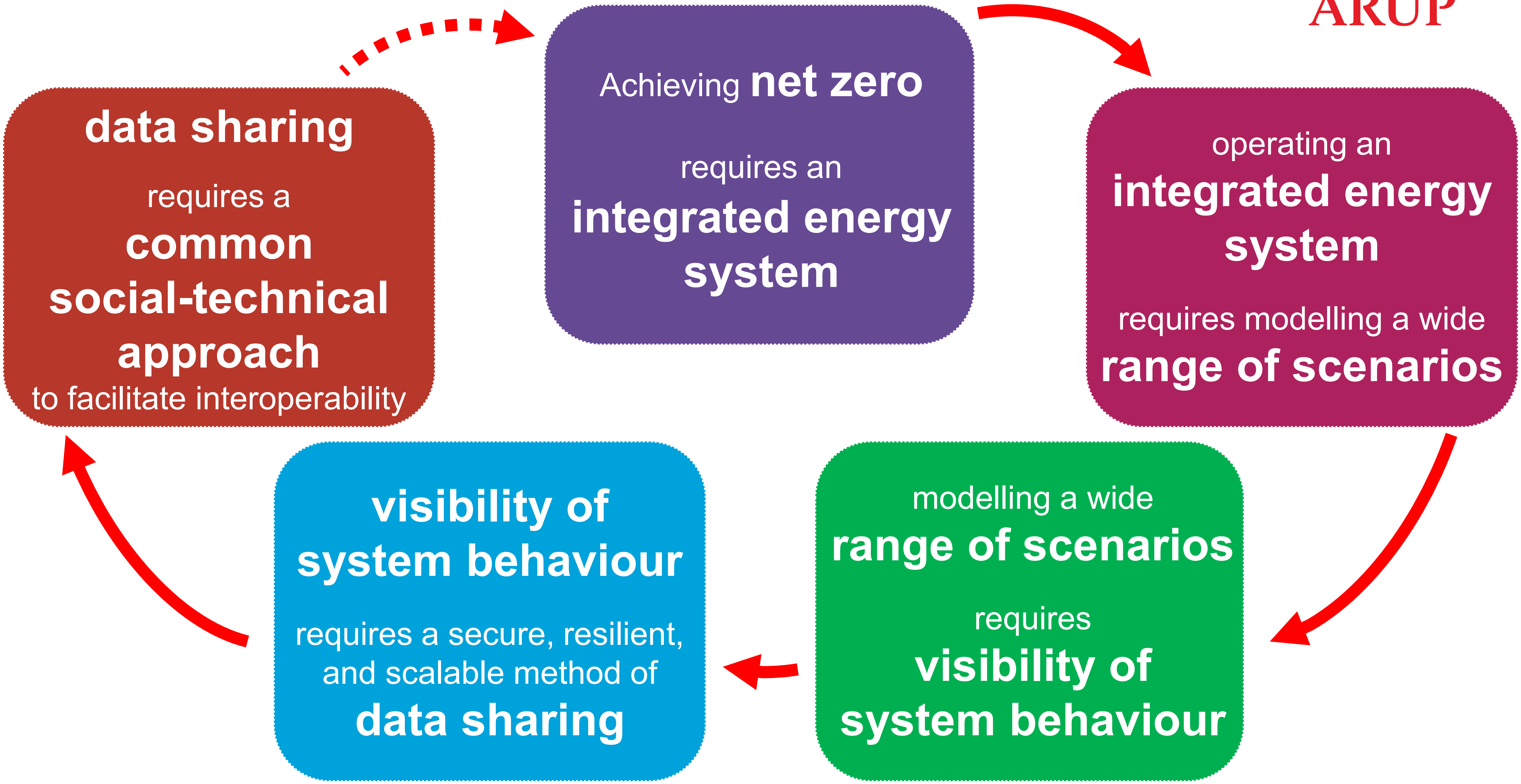
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requires a secure, resilient, and scalable method of
data sharing
data sharing
requires a
common social-technical approach
to facilitate interoperability

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Publications asking for better data sharing

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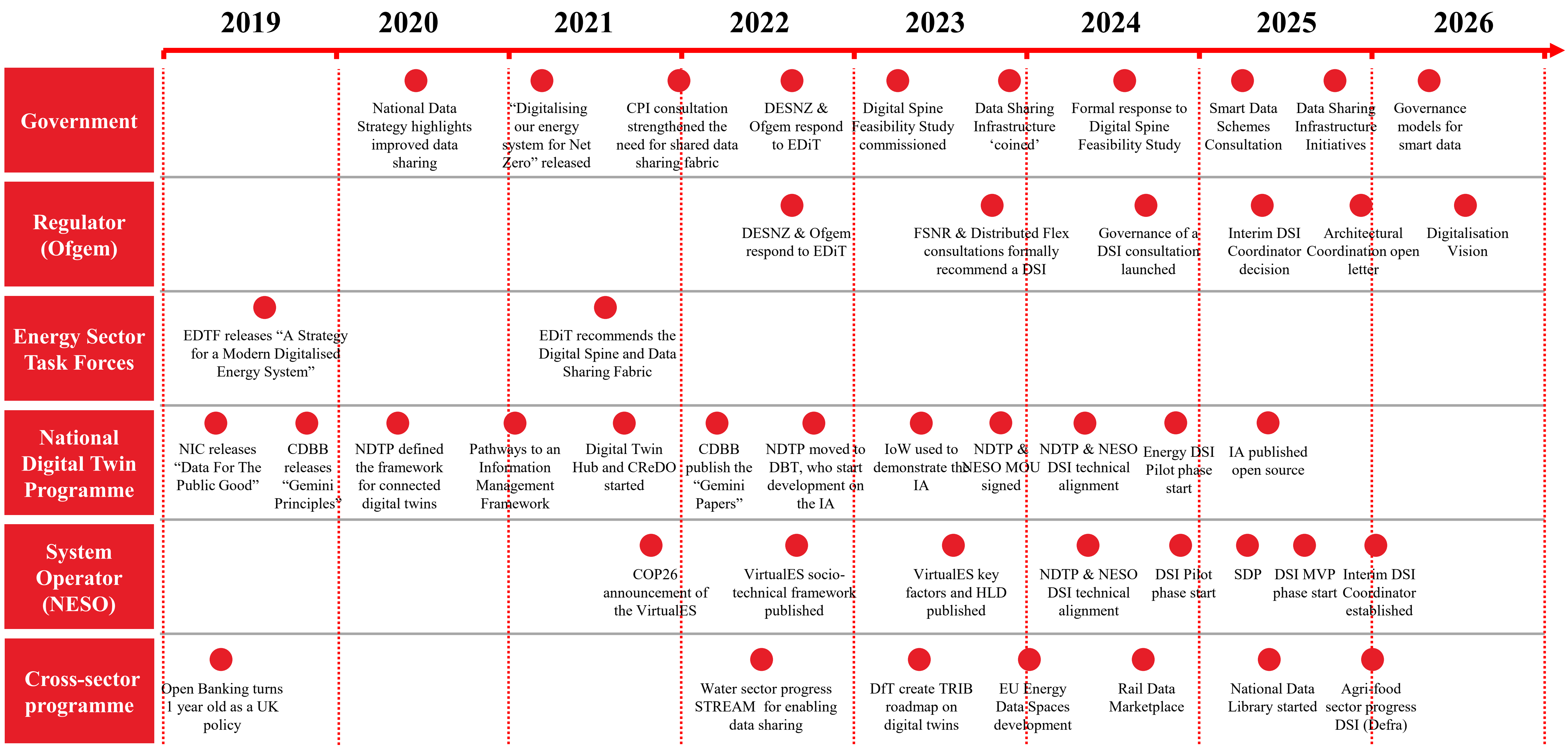

Image credits NESO

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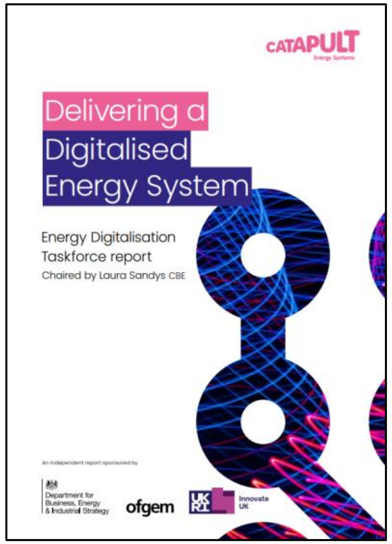
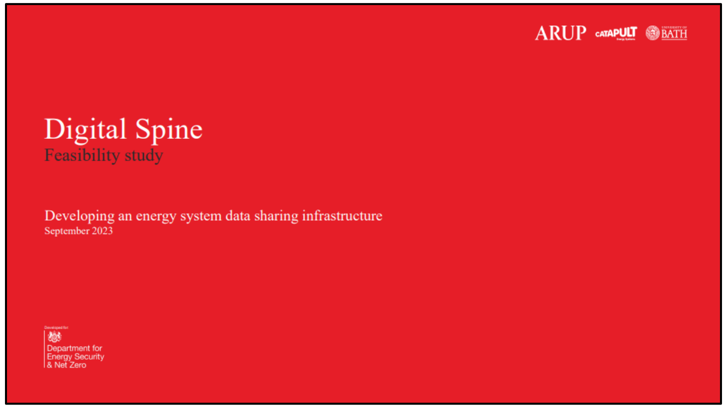
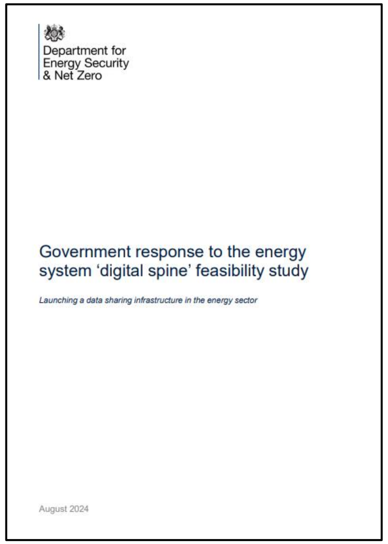
Roadmap to Data Sharing Infrastructure







NESO
National Energy System Operator

2022
Outlined the vision

2023
Defined the concept and roadmap

2024
Provided the policy mandate

2025+
Developed the Pilot and MVP

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Prioritised use cases

15 potential use cases identified through extensive research
and stakeholder engagement

5 use cases prioritised:

- Day 1 use cases:
  provide immediate value

- Strategic use cases:
  provide future strategic potential

Used to determine the "problem space" of functional requirements for the DSI

UK: "long list" use cases

1. Heat network planning / identification
2. Smart Tariff transparency
3. Development and operation of Markets for Flexibility services
4. Digital Licensing & Reporting
5. Carbon Emission Accounting
6. City Decarbonisation
7. Transport electrification enablement
8. Vulnerable Consumer/Households Identification
9. Electricity Market reforms
10. Sector Coupling for carbon neutral power systems
11. Policy carbon impact measurement
12. Local Area Energy Planning
13. Electricity Flexibility
14. Whole-system operation
15. Dynamic network management

Energy data can be…

- Hard to find
- Challenging to access
- In non-standard formats
- From legacy systems
- Using bespoke technical interfaces
- Variety of bilateral legal agreements
- Commercially sensitive

Data Sharing Infrastructure (DSI)

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Prepare

Data preparation node (DPN)

- Common containerised application
- Deployed at organisation boundary

Trust

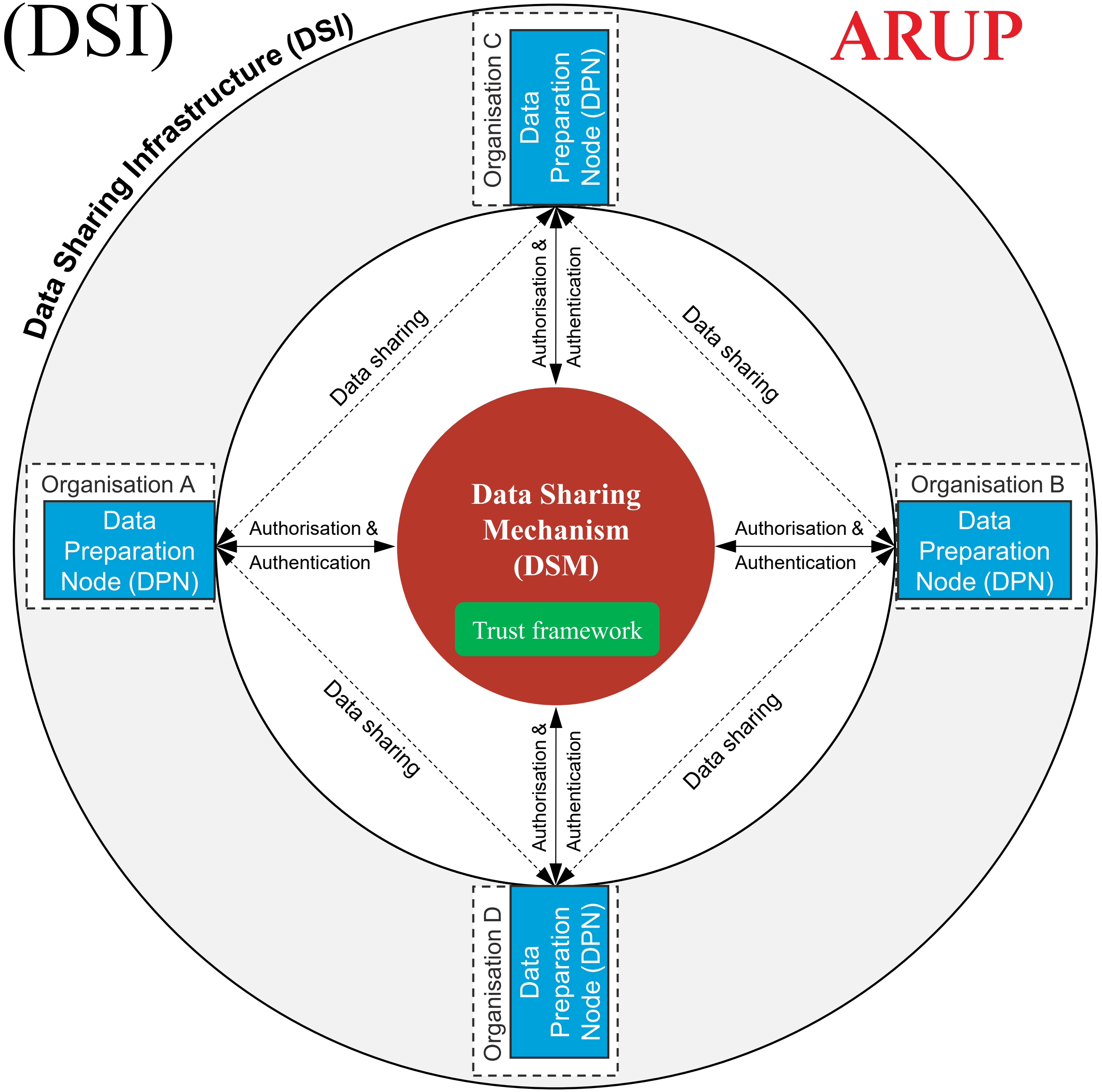
Trust framework

- Scalable legal & identity framework
- Address the "*handshake problem*"

Share

Data sharing mechanism (DSM)

- Control plane or broker
- Authorisation & authentication



Data Sharing Interactions

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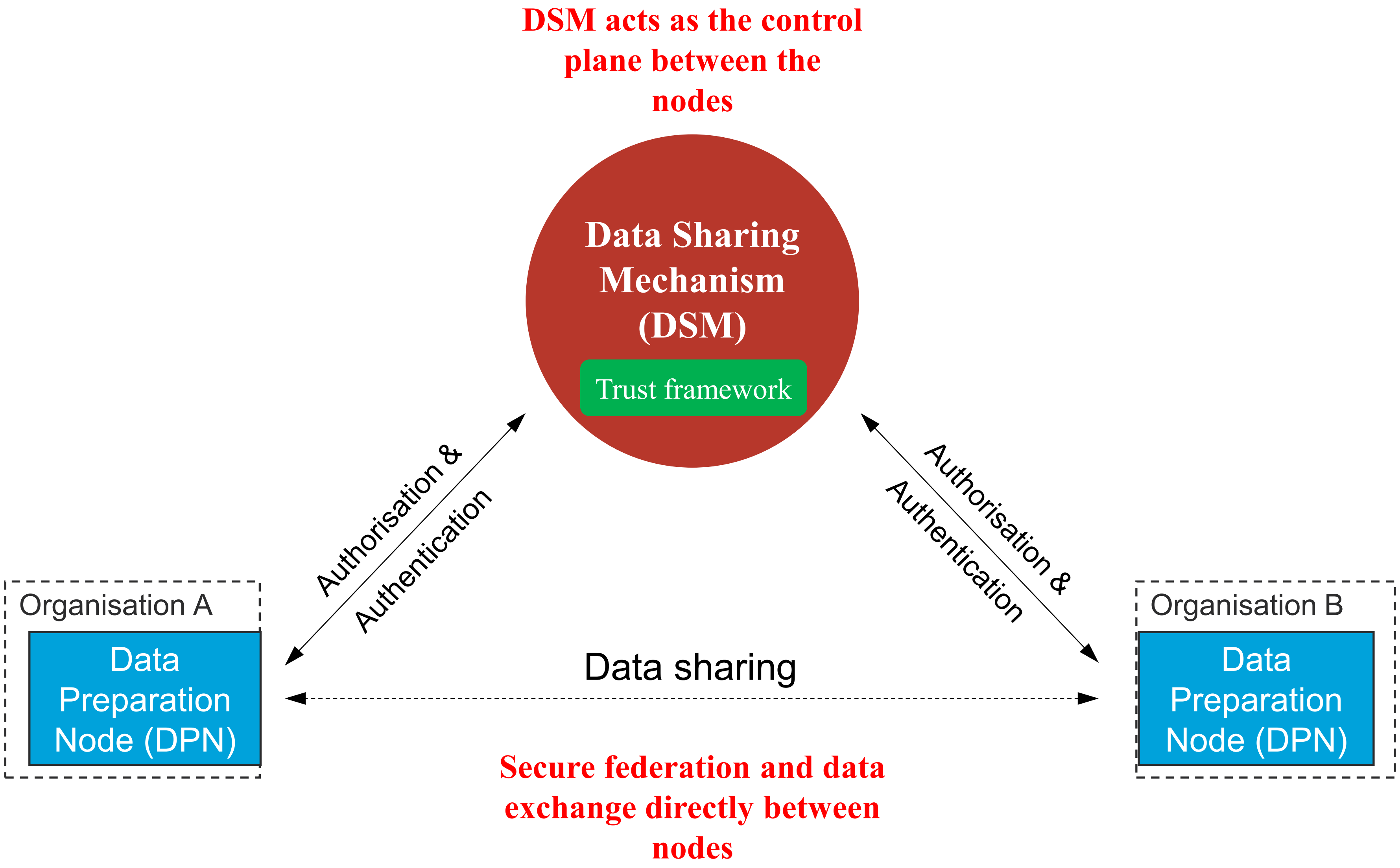

Roadmap: UK’s energy data sharing infrastructure

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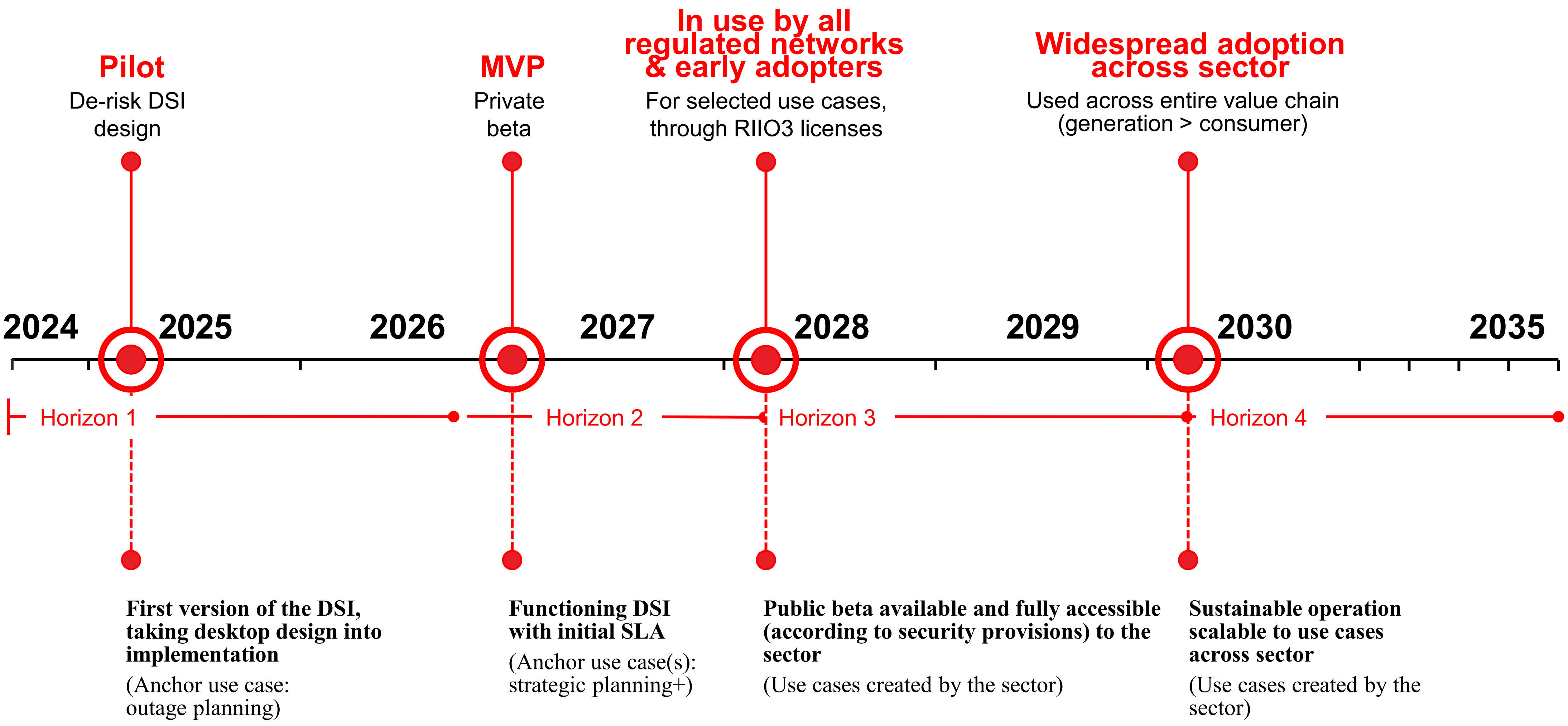

Image credits: Adapted from NESO

Materials taken from NESO public webinars

Outputs on developing data sharing infrastructure

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- **Full report** (411 pages)
- **Summary report** (52 pages)
- **Executive brief** (16 pages)
- **Summary presentation** (32 slides)

How might this apply in Southeast Asia?

Open & Shared Data: Philippines Energy Infrastructure

NETWORK MAP · PHILIPPINES

NGCP, gencos & the digital tier

The Philippine grid as it stands today: NGCP's 230/138/69 kV transmission network across the three asynchronous grids (Luzon · Visayas · Mindanao), the major gencos by installed MW and fuel, distribution utilities and electric cooperatives, and PeeringDB-listed data-centre facilities.

11 DUs/ECs modelled · 8 gencos · 20.6 GW installed

Layers

Transmission (≥69 kV)	2,861
Island interconnectors (HVDC/AC)	4
Lines · voltage unknown	510
Substations (all)	1,027
Backbone hpoints (≥230 kV)	92
Power plants (MW ∝ area)	276
Data centres (PeeringDB)	25

DATA PROVENANCE

transmission_lines · OpenInfraMap / OSM via Overpass (ODbL 1.0)

substations · OpenInfraMap / OSM via Overpass (ODbL 1.0)

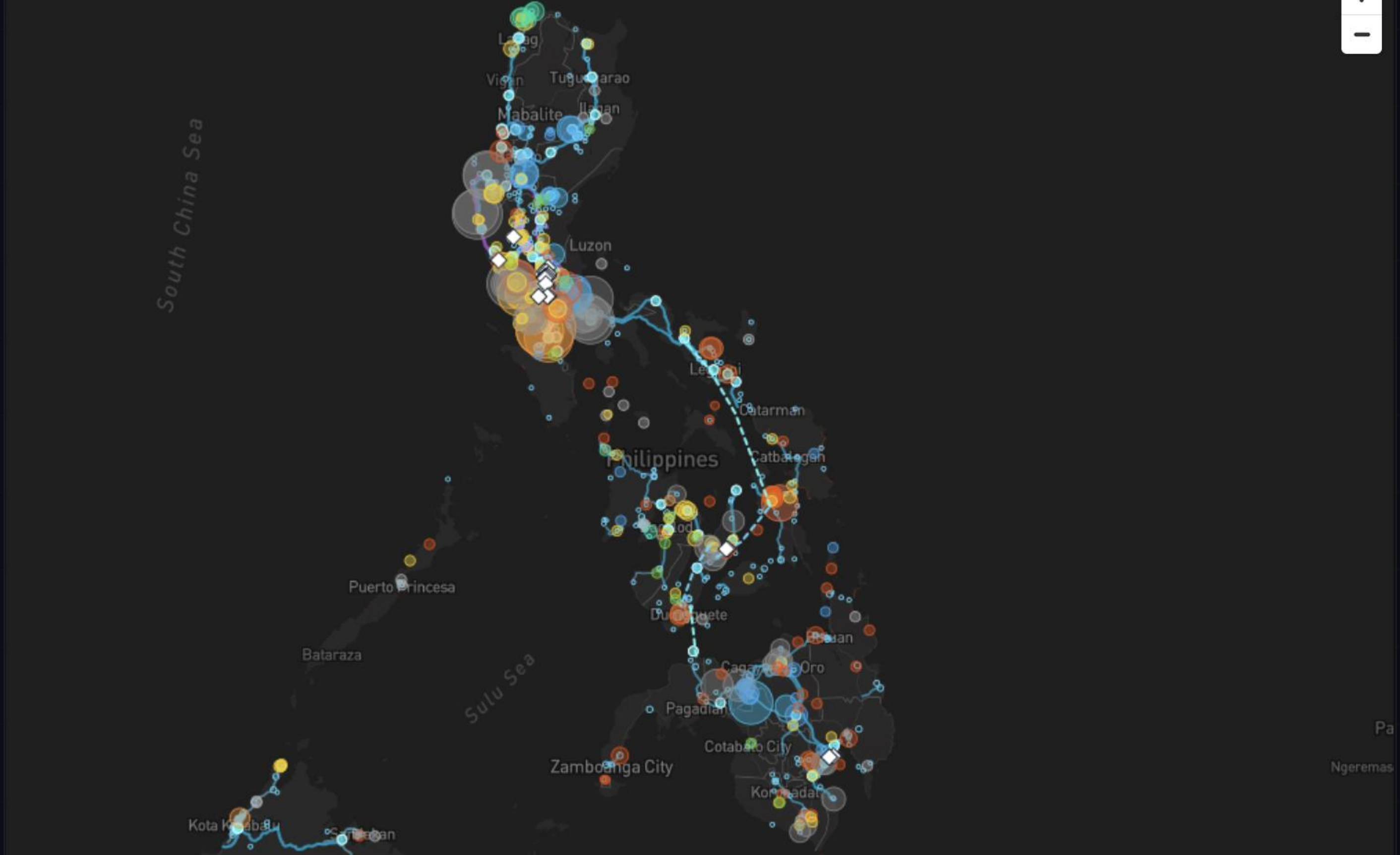
hpoints · OSM substations ≥ 230 kV (NGCP backbone subset)

plants · OpenInfraMap / OSM power=plant (ODbL 1.0)

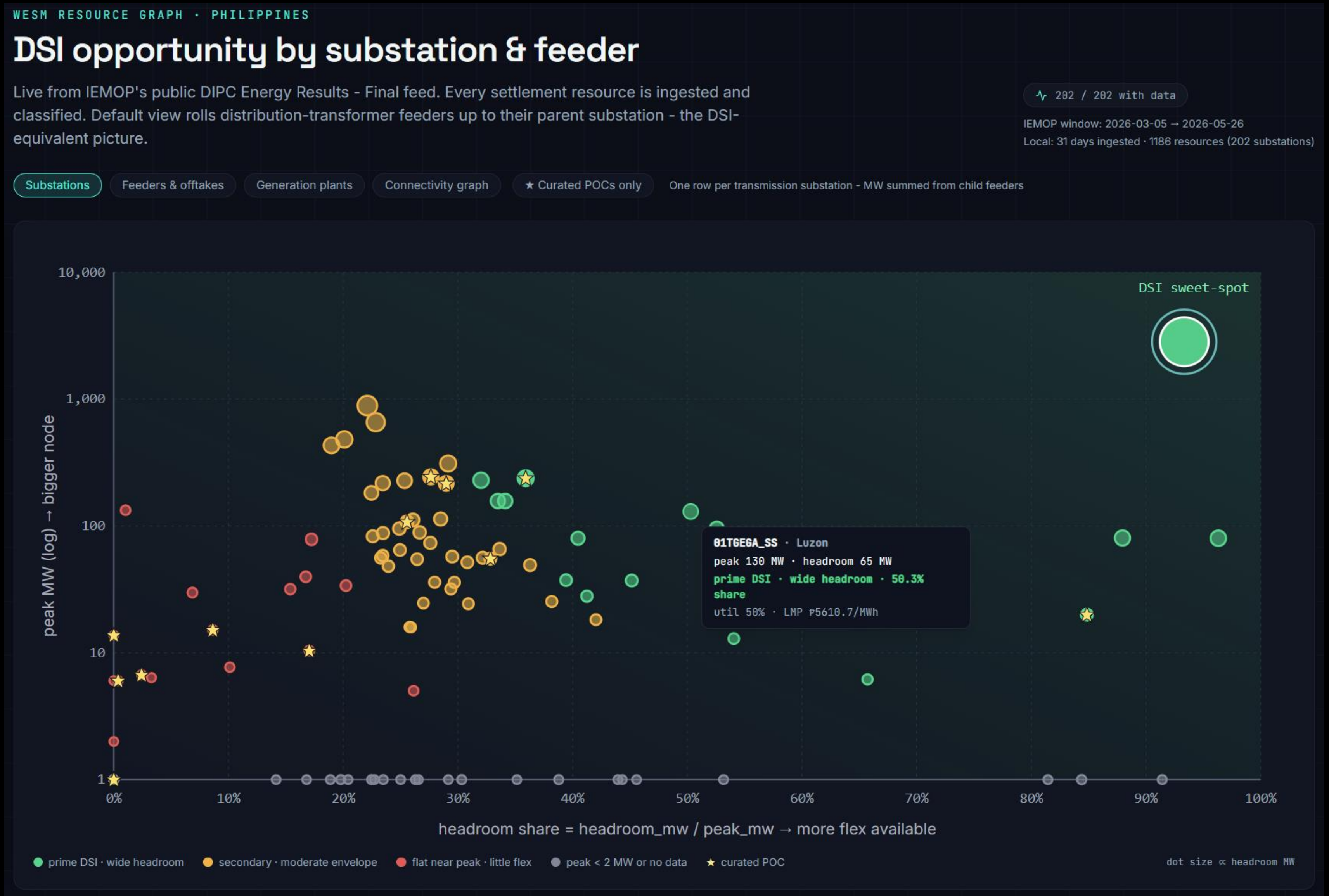
data_centres · PeeringDB public API

Snapshot 2026-05-26

PHILIPPINES · LIVE TILES



Open & Shared Data: Substation & Feeder Utilization



Open & Shared Data: Grid Utilization

NETWORK UTILISATION · PHILIPPINES

WESM dispatch & opportunity scoring

Hourly LMP (PHP/MWh) and dispatched MW from IEMOP's public DIPCEF feed, aggregated across 109 priority nodes on the Luzon grid. Opportunity score combines headroom MW with LMP volatility - the highest-scoring nodes are the most attractive sites for real-time demand response and energy buffering.

109 / 109 nodes with data

Luzon | Visayas | Mindanao — 24 hours | 7 days | 30 days

SYSTEM PEAK (SUM OF NODE PEAKS)	AVERAGE NODE UTILISATION	TOP OPPORTUNITY NODE
8.83 GW	33%	03BACMAN_SS 2643 MW headroom · ₱7943/MWh p95

DSI VALUE · GRID ROLLUP

What real-time data sharing buys before upgrade required

Pillar (2) flex share and (3) growth are modelled with published constants - see the assumptions strip for citations. Replace with a bottom-up ICP roster + observed-growth signal in Phase 3.

	LUZON (55 nodes)	VISAYAS (37 nodes)	MINDANAO (7 nodes)
TOTAL PEAK MW	8.83 GW	1.50 GW	39 MW
PEAK SHAVED MW	1.06 GW	180 MW	5 MW
AVG DEFERRAL	2.7 yr	2.9 yr	2.3 yr
NPV AVOIDED	₱5.55 B	₱1.00 B	₱21.2 M
RESIDUAL GAP MW	1.59 GW	269 MW	7 MW
SHAVE SHARE	12%	12%	12%

DSI vs siting - what real-time flex buys

Primary use case: prepare → trust → share telemetry lets 12% of node peak flex in real time. Residual gap is the backstop case - sites where new BESS or flexible data-centre load are warranted.

GROWTH: LUZON 4.3% · VIS 4.0% · MIN 5.1%

GRID	NODES	PEAK MW (SUM)	DSI PEAK SHAVED	AVG DEFERRAL	NPV CAPEX AVOIDED	RESIDUAL GAP → SITING
Luzon	55	8825	1059 MW	32.3 mo	₱5.55 B	1589 MW

Method: peak_shaved = peak × controllable_share; deferral = ln(1 + shaved/peak) / ln(1 + growth); NPV uses ERC WACC band 8%. See the DSI assumptions strip below for the full inputs and sources.

Potential avoided/deferred network capex

DSI benefit model - assumptions & sources

The per-node peak-shave, deferral-years and NPV figures are produced by a static benefit model whose inputs are published constants. Each constant is listed below with its source. Values are revised as better Philippine data becomes available.

Controllable share [IRENA-23] · 12.0%

Share of node peak that flexible load + behind-the-meter storage can shed in real time. IRENA Innovation Landscape (2023) gives 8–15%; we use the conservative mid-point.

Peak demand growth [DOE-PDP] · Luzon 4.3% · Visayas 4.0% · Mindanao 5.1%

Annual peak-demand growth rates from the Philippine Energy Plan 2023–2050. Used to compute how many years a given shave defers the next upgrade trigger.

Capex avoided per MW [NGCP-TDP] · ₱28.0 M / MW

Blended cost of a 230/115 kV substation bay plus a representative reconductor span, from the NGCP Transmission Development Plan 2024–2033 unit-cost schedule.

Discount rate [ERC WACC] · 8.0%

WACC band the Energy Regulatory Commission applies to transmission asset valuations. Used to NPV-discount the deferred capex.

Utilisation trigger [NGCP planning] · 70.0%

Conventional planning threshold above which a substation is queued for upgrade. Anything above this that DSI cannot absorb is the residual gap requiring siting (BESS, flexible load).

AVOIDED / DEFERRED NETWORK CAPEX

₱7.80 B – ₱10.80 B / yr

National envelope, low–high

SHOW WORKING →

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