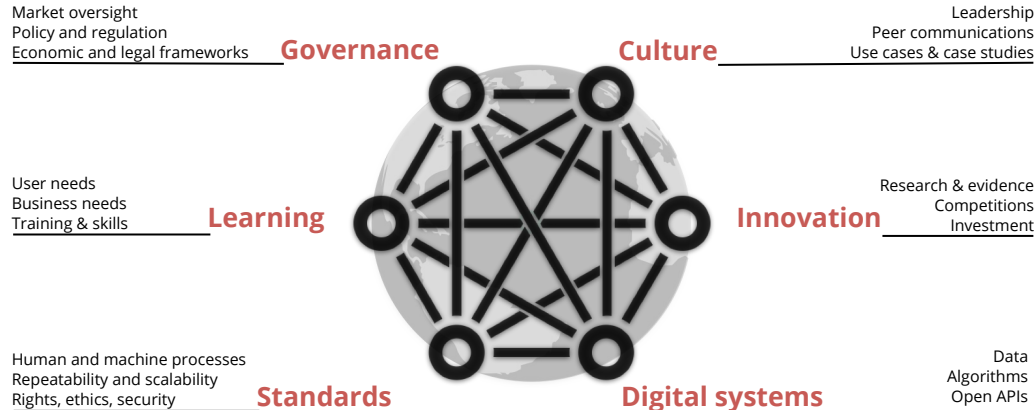# Open Energy
Building the web of energy data

1. **Develop an open standard that enables open marketplaces for data-sharing to flourish**

2. **Lay the foundations for interoperable and cohesive energy data infrastructure**

3. **Build on existing work and investments in existing initiatives to enable <u>discovery</u> and <u>use</u>**
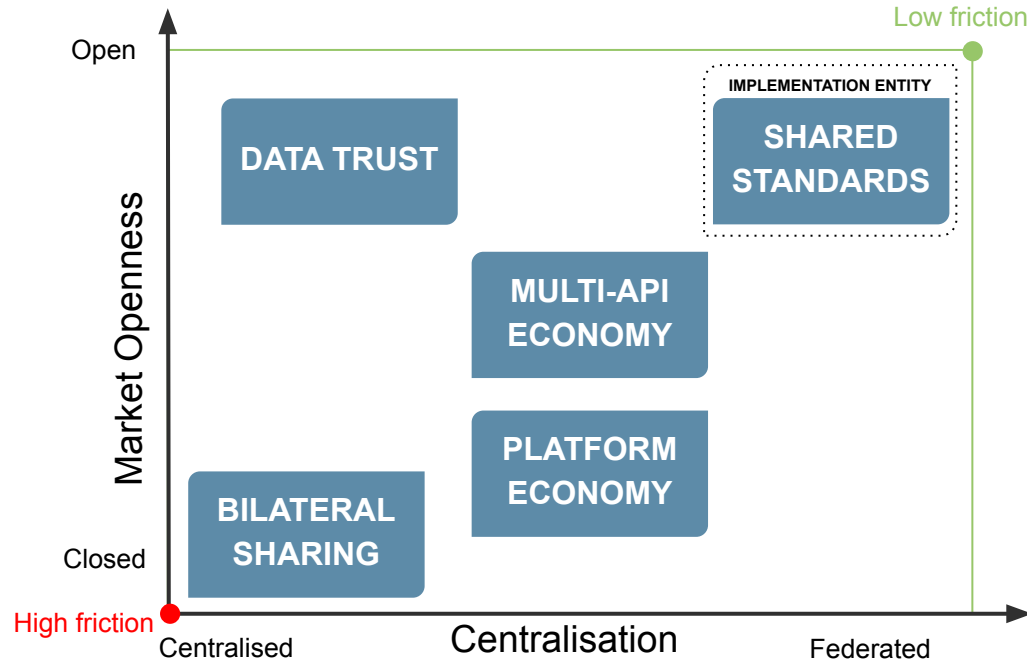
IcebreakerOne.org

To enable sharing our **data infrastructure** must address (at least)

- Rights
- Liability models
- Dispute resolution and redress
- Consent & consent management
- Security & privacy

- Legal frameworks
- Usability
- Logistics
- Technology architecture
- Operating principles

Market oversight
Policy and regulation
Economic and legal frameworks

Governance

Leadership
Peer communications
Use cases & case studies

Culture

User needs
Business needs
Training & skills

Learning

Research & evidence
Competitions
Investment

Innovation

Human and machine processes
Repeatability and scalability
Rights, ethics, security

Standards

Data
Algorithms
Open APIs

Digital systems

Similar approaches are being undertaken across sectors including banking, insurance, pensions, transport and health
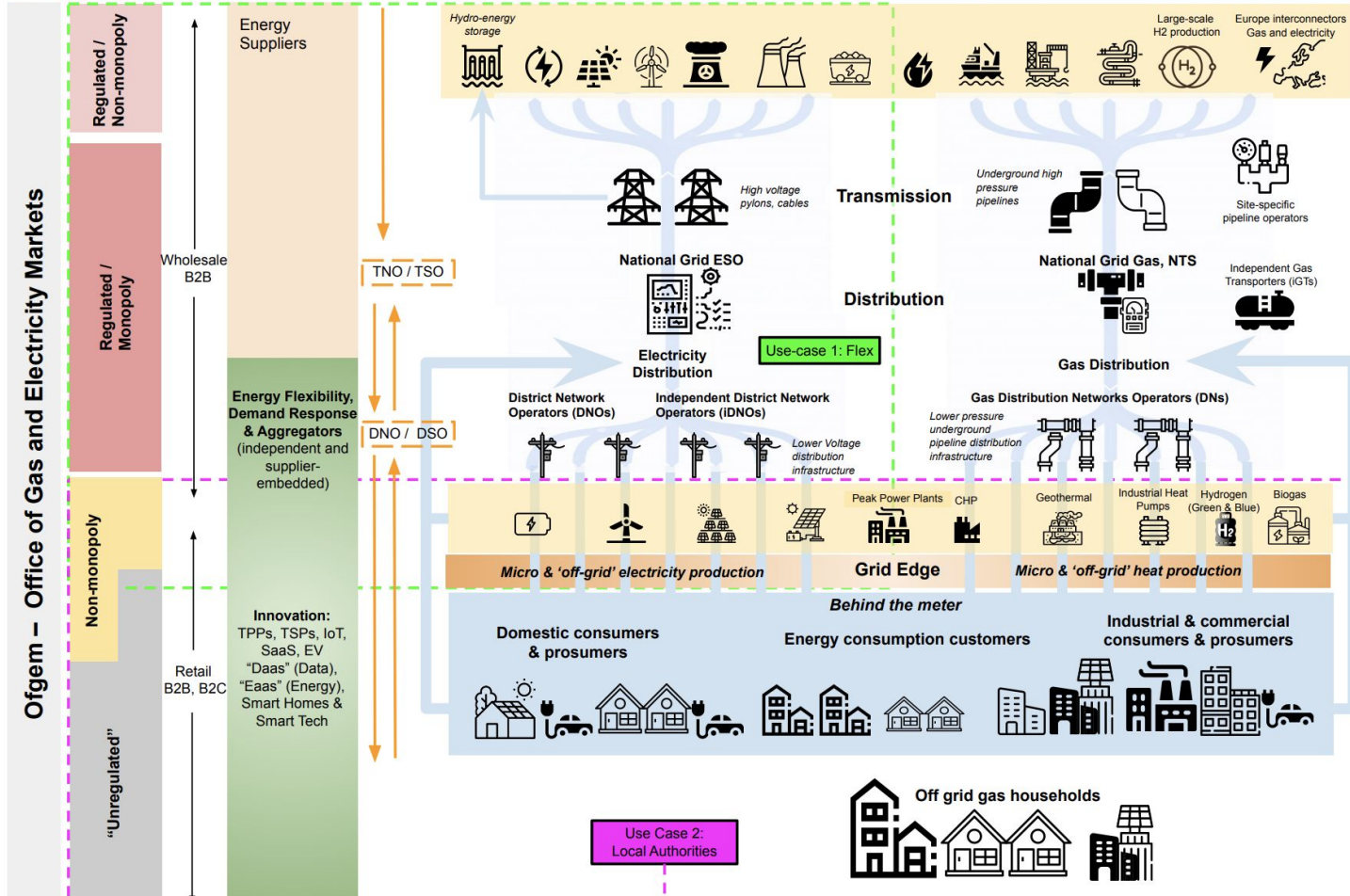
Market design — comparing data ecosystem models

Market Openness (vertical axis, from Closed to Open)
Centralisation (horizontal axis, from Centralised to Federated)

- DATA TRUST (Open, Centralised)
- SHARED STANDARDS — IMPLEMENTATION ENTITY (Open, Federated)
- MULTI-API ECONOMY (middle)
- PLATFORM ECONOMY (middle-low)
- BILATERAL SHARING (Closed, Centralised)

High friction (bottom-left)
Low friction (top-right)

Pros / Cons

Shared standards

Pros
- Open marketplace
- Shared integration / interoperability framework
- Close regulatory linkage & feedback loops
- Enables market-participants to self-organise
- Low transaction cost (common approach)
- Makes clear what should be 'competition'
- Multi-point, whole-system value creation
- Fast to integrate once in-place (adherence to standards and processes)
- Builds on architecture of the web

Cons
- Higher initial effort to reach consensus
- Requires cultural alignment
- Requires cohesion between regulation and market actors

Data trusts

Pros
- Centralised administration
- Governance a key focus
- Single integration point
- Single contracting point

Cons
- Lack of willingness to share into it
- Hard to address diversity of needs
- May struggle to meet diverse user needs
- Difficult to adapt in an agile manner/brittle

Multi-API

Pros
- Market-driven
- Quick-to-market
- Competitive at all levels

Cons
- Multiple rules & integrations
- Complex
- High cost to enter
- Monopoly-gating points emerge easily

Platform economy

Pros
- High single-point value creation
- Centralises control
- Faster-to-market
- Structurally attractive to reflect existing bureaucracies

Cons
- Lack of willingness to share into it
- Value flows easy to skew to monopolies
- Doesn't scale long-term
- Commercial friction on data value
- Not a 'web-first' strategy (reflects legacy thinking not 4th industrial revolution)

Bilateral contracts

Pros
- High single-point value creation
- Centralises control
- Faster-to-market
- Structurally attractive to reflect existing bureaucracies

Cons
- High friction process (repeat for each relationship)
- Low/no reuse (unique to each use)
- Market inhibiting
- High cost
- Slow (3-9 month contract cycle)

Energy ecosystem map

Governance, policy and regulation

Energy into the system (generation, production & transportation)

Ofgem – Office of Gas and Electricity Markets

Regulated / Non-monopoly

Regulated / Monopoly

Non-monopoly

"Unregulated"

Wholesale B2B

Retail B2B, B2C

Energy Suppliers

Energy Flexibility, Demand Response & Aggregators (independent and supplier-embedded)

Innovation: TPPs, TSPs, IoT, SaaS, EV "Daas" (Data), "Eaas" (Energy), Smart Homes & Smart Tech

TNO / TSO

DNO / DSO

Hydro-energy storage

Large-scale H2 production

Europe interconnectors Gas and electricity

High voltage pylons, cables

Transmission

Underground high pressure pipelines

Site-specific pipeline operators

National Grid ESO

National Grid Gas, NTS

Independent Gas Transporters (iGTs)

Distribution

Electricity Distribution

Use-case 1: Flex

Gas Distribution

District Network Operators (DNOs)

Independent District Network Operators (iDNOs)

Gas Distribution Networks Operators (DNs)

Lower Voltage distribution infrastructure

Lower pressure underground pipeline distribution infrastructure

Peak Power Plants

CHP

Geothermal

Industrial Heat Pumps

Hydrogen (Green & Blue)

Biogas

Micro & 'off-grid' electricity production

Grid Edge

Micro & 'off-grid' heat production

Behind the meter

Domestic consumers & prosumers

Energy consumption customers

Industrial & commercial consumers & prosumers

Off grid gas households

Use Case 2: Local Authorities

Investment community
(including government, private equity, venture capital, development banks, asset managers, pension funds and so on)

Stakeholder research covered ~9,000 companies across the energy system

One-on-one interviews and webinars

- DNOs & TOs
- Energy suppliers
- Service providers
- Regulatory & policy
- Research, innovation & disrupters
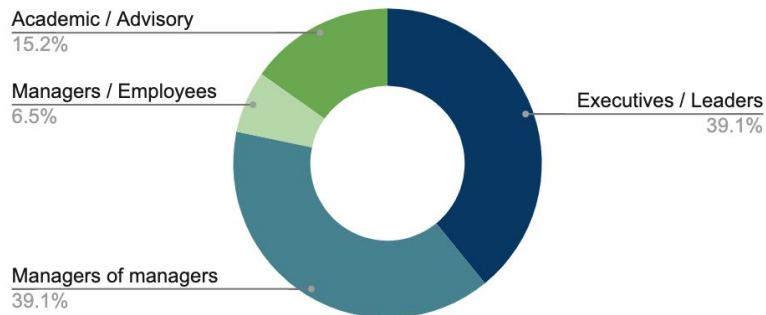- Local authorities
- Investors & other data users

Confirmed the need for a common data standard to underpin future energy trends

- Decentralisation
- Decarbonisation
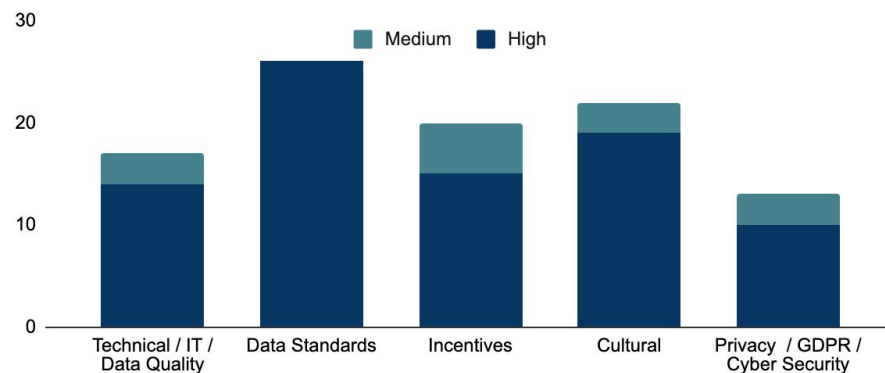- Digital transformation
- Democratisation

Stakeholders interviewed: breakdown

Interviewee roles

Academic / Advisory
15.2%

Managers / Employees
6.5%

Executives / Leaders
39.1%

Managers of managers
39.1%

Interview feedback: energy data blockers

Legend: Medium, High

Categories: Technical / IT / Data Quality, Data Standards, Incentives, Cultural, Privacy / GDPR / Cyber Security

2019 saw Climate Emergency Declarations by cities, towns, universities, communities, prompted by the CCC net-zero report & citizen climate change activism

Climate change plans have been adopted with ambitious targets for the 2020's and 2030's

- Unlocking access to core DNO capacity data to *proactively* **plan for Low Carbon Transport** and **migrate towards Low Carbon Heating Systems** was a consistent message from stakeholders

- **Removing manual intervention** will enable Local Authorities to take faster action to tackle Air Quality in cities and towns

- **Accelerating decarbonisation** of the UK's cities, towns and rural areas will create new skilled green jobs essential to post Covid -19 recovery

Accelerating the adoption of M2M interfaces rather than seeking to reverse engineer legacy IS systems will **save £M's and years of effort**

- Culture change is necessary within large organisations to progress towards a more open approach to making data accessible and usable
- Enabling a new trusted governance framework—agile enough to bring together energy, heat, transport and the built environment—will be a gamechanger for the Net Zero Economy

Governance will spur growth of an Open Energy ecosystem

Experience gained in Open Banking shows governance is key to the success of decentralised data sharing.

This approach can be repurposed for to provide an Open Governance Platform for Open Energy

- Common rules, controls and processes needed for security, commercial reasons, privacy & regulatory compliance.
- Automated, controllable access to distributed data as already successfully deployed in the Open Banking Directory.
  - Participant identity service; list of trusted participants; access control; signposting data (API endpoints).
- Standards designed around end-user and market needs, enabling a wide range of solutions.
- Future-ready, able to accommodate complex provisioning chains and support future regulatory developments.

Enables a highly innovative, dynamic ecosystem to evolve, where the market self-organises and applies resource efficiently.
- Unlocks interoperability with data from outside the energy sector.

Open Energy will unlock latent potential, just as Open Banking has done.

Two and a half years after launch, **hundreds** of companies authorised, almost **two million** consumers and growing fast.

Firmly positioned the UK as the **world's benchmark** for Open Banking, and consolidated our **leading position in FinTech**.

- Flexibility markets could save the UK up to £40B by 2050*

- In 2019, we spent £1bn balancing the electricity system.
  - Better data sharing could materially reduce this — even a 1% improvement would save £10M

- The UK energy data landscape is *really* complex...

Existing landscape: The ENA's landscape map

EDTF Recommendations

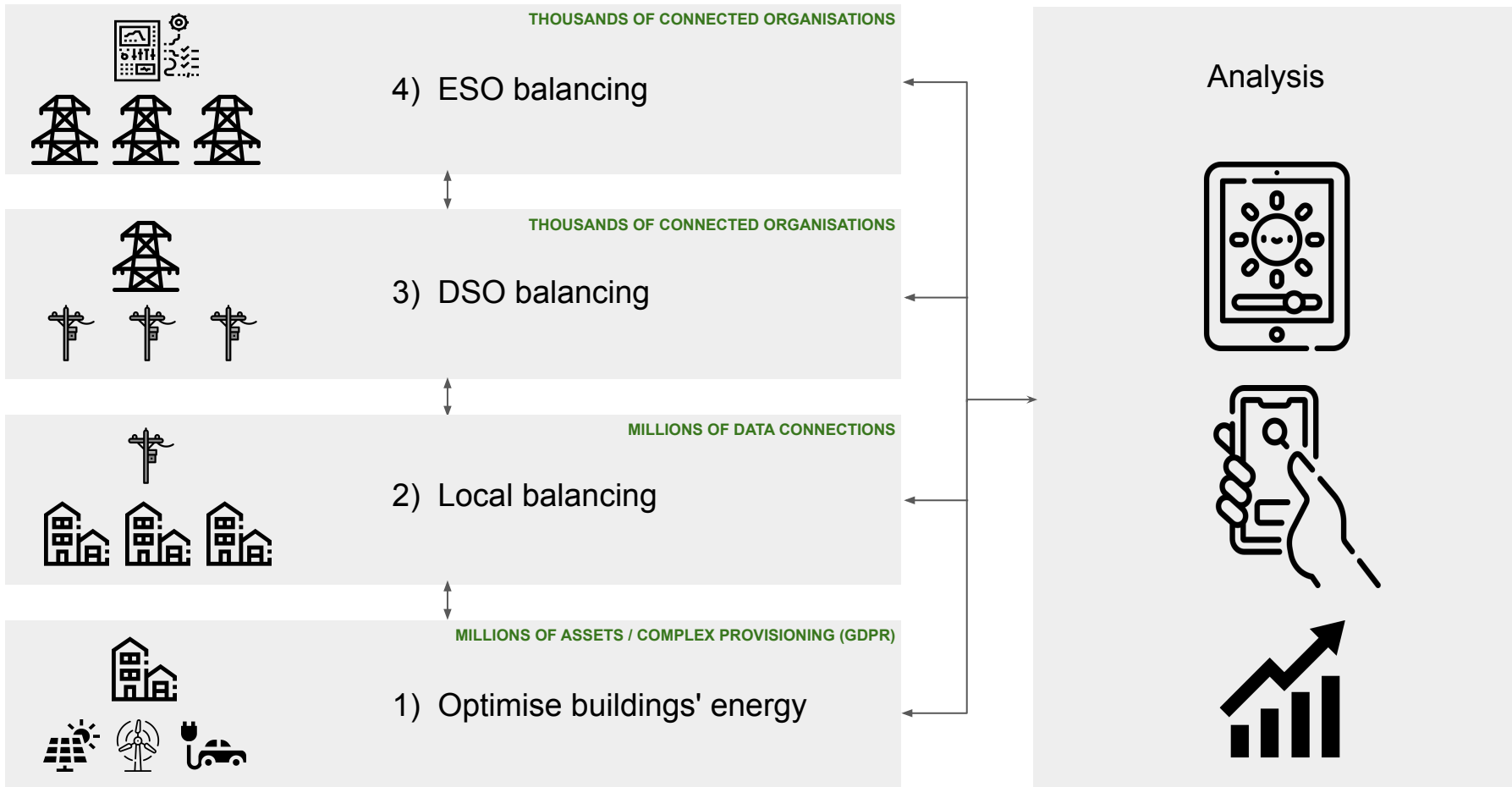**Digitalise the Energy System**

*Digitalisation Strategies
Continuous Improvement
Regulation & Standards*

Maximise the Value of Data

*Presumed Open
Discoverable & Searchable
Secure & Resilient
Interoperable*

Improve Visibility of Data

*Data Catalogue
Standardised Metadata*

Coordinate Asset Registration

*Coordination of Energy Assets
Improved Data Reliability
Efficiency of Data Collection*

Improve Visibility of Infrastructure & Assets

Unified Digital System Map

ENA DWG Enablers

Regulatory Framework

Regulatory Funding Mechanism(s)

Data Triage Process

Standard Legal Frameworks

Energy Data Standards
- Quality
- Metadata

Data Publication Formats (file types, APIs, etc.)

Standardised Energy Data Model(s)

Energy Systems Data Glossary

Standardised Energy System Metadata

Stakeholder Engagement & Use Case Development

MED Projects & Initiatives

37 projects!

Centre for Digital Built Britain- Digital Framework Task Group

Innovate UK – Modernising Energy Data Access (Small Business Research Initiative)

Your Online Digital Architecture (Siemens)

Electron

Ice Breaker

ENA

Network Innovation Collaboration Portal

Smarter Networks Portal

Open Networks Portal

ESO and DNO Data Portals (NPG, UKPN, WPD)

National Improvement Service Scotland

DAFNI – academic national platform for data analytics

CDBB - Reference Data Library

Support for Data Sharing

BEIS Industrial Decarbonisation Digital Service Discovery

Integrating RENewable energy and Ecosystem Services in environmental and energy policies (IRENES)

ELEXON - BSC Modification P398

Independent Gas Transporters' Uniform Network Code Mods 134 & 135

Visualisation of Distribution Future Energy Scenarios

National Energy Efficiency Data-Framework (NEED)

Electralink - FLEXR

WPD Energy Hub Innovation Project

Energy Data Visibility Discovery (ONS, Hippo)

Centre for Sustainable Energy Open Data Project

BEIS – Greater South Eastern Energy Hub

Energy Super-Hub Oxford

Flexibility Market – virtual platform to buy and sell energy

Bank Energi

Flexible Integrated Energy Systems (FLEXIS)

Greater London Authority (GLA) Infrastructure Advisory Panel

Corby Microgrid - Power Transition

LEMDEx - Local Energy Market in Devon and Exeter

Keele University - Smart Energy Network Demonstrator

ReFLEX Orkney

System-Wide Resource Register (SWRR)

Electric Vehicle Energy Task Force

Geospatial Commission - LUAR / NUAR

ENTSO-E Grid Map – digital map of 220Kv+ connections across Europe

Sheffield Solar

Vision of the future: Electricity balancing

THOUSANDS OF CONNECTED ORGANISATIONS

4) ESO balancing

THOUSANDS OF CONNECTED ORGANISATIONS

3) DSO balancing

MILLIONS OF DATA CONNECTIONS

2) Local balancing

MILLIONS OF ASSETS / COMPLEX PROVISIONING (GDPR)

1) Optimise buildings' energy

Analysis

Two components for Phase Two development

1) **Working groups**
   - User, market and societal needs
   - Policy & regulation (role of regulator, certification)
   - Legal (data rights, privacy, IP, liability)
   - Operational (access and consent management, redress, SLA)
   - Technical (authentication, security, tech)
   - Data (schemas, structures)

2) **Open Governance Platform (infrastructure already in place for proof of concept)**
   - Sandbox & production
   - Directory implementation
   - Automated, controllable access to distributed data
   - Machine-certification
   - Interoperability with data from outside the energy sector

We propose that these are done in parallel to data platform implementation(s) with other MEDA participants.

"Ensuring consistency and interoperability between the built environment and the energy sector with an Open Energy approach is essential to the development of our national data infrastructure", **Dame Wendy Hall**

"Open Energy will help support delivery of our legally binding net-zero targets and enable regulatory interventions across sectors", **Baroness Worthington, House of Lords**

"Building a digital ecosystem for the planet, to help us address our net-zero and SDG targets, will require groundbreaking initiatives such as Open Energy", **David Jensen, Digital Transformation Task Force, UNEP**

"Ensuring consistency and interoperability between Open Banking, Open Finance and the energy sector with an Open Energy approach would be a huge win for the UK",
Imran Gulamhuseinwala, Trustee, Open Banking Implementation Entity (OBIE)

"Building on Open Banking, Open Energy will help us deliver a robust data infrastructure. This will help the UK to improve efficiency, meet our net-zero targets as well as stimulate innovation to enable companies to scale up.", **Irene Graham OBE, CEO, Scale Up Institute**

"We recognise the benefits this could bring to the energy system, in enabling the transition to net zero, customer choice and operational effectiveness - and we support the further exploration of this approach.",
James Mulliner, Energy & Utilities Industries, IBM

"Open Energy should provide consumers (and their intermediaries) with more detail about their consumption habits, and this in turn should give people more confidence to choose the products and service options that might best suit them.",
Dhara Vyas, Head of Future Energy Services, Citizens Advice

"Prioritizing interoperability will allow open data ecosystems to gain more immediate traction whilst maintaining security standards...Raidiam strongly endorses any initiative that will broaden support from vendors, reduce costs of implementation and help to accelerate the digital future.", **Tim Johnson, Raidiam**

"I've sat in on several of these consultations about energy data now. There is simply no comparison. The Icebreaker One team really understands the complexity of the system they are looking to provide a solution for. I completely trust them to deliver a solution across the whole sector.", **Dr Alastair Buckley, Sheffield University**

"Icebreaker One is the most exciting thing to come out of MEDA",
Marc Bartlett, Head of DSO Transformation, Electralink

Open Energy
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IcebreakerOne.org