Our transition to Distribution System Operator
Future Smart
Tim Manandhar, Lead ICT Engineer
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Welcome Future Smart
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Changing Energy Landscape
Future Smart
### About UK Power Networks

Three distribution networks:
- London
- East of England
- South East of England

<table>
<thead>
<tr>
<th>Measure</th>
<th>Data</th>
<th>% of industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>End customers</td>
<td>8.2m</td>
<td>28%</td>
</tr>
<tr>
<td>Population served</td>
<td>c.18m</td>
<td>-</td>
</tr>
<tr>
<td>New metered connections*</td>
<td>46,000</td>
<td>32%</td>
</tr>
<tr>
<td>Distributed generation connected</td>
<td>8.5GW</td>
<td>31%</td>
</tr>
<tr>
<td>Energy distributed</td>
<td>84.8TWh</td>
<td>28%</td>
</tr>
<tr>
<td>Peak demand</td>
<td>16GW</td>
<td>N/A</td>
</tr>
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* Average per annum 2010/11-2014/15

The largest electricity distributor in the UK delivering electricity to 18 million people, representing 28% of the UK population
The energy system is going through a fundamental change

<table>
<thead>
<tr>
<th>Old world</th>
<th>New world</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centralised</td>
<td>Decentralised</td>
</tr>
<tr>
<td>(Few, large generators)</td>
<td>(Thousands of distributed generators)</td>
</tr>
<tr>
<td>Predominantly fossil fuel based</td>
<td>Hybrid - much more renewables</td>
</tr>
<tr>
<td>One way power flows</td>
<td>Bi-directional power and information flows</td>
</tr>
<tr>
<td>Predictable - Planned</td>
<td>Intermittent - Managed</td>
</tr>
<tr>
<td>Customers consume</td>
<td>Customer self-produce and consume</td>
</tr>
<tr>
<td>Flexibility from generators</td>
<td>Flexibility from Demand, Storage and generation</td>
</tr>
</tbody>
</table>
What is driving change?

Transition to a low carbon economy
- Mandated carbon budgets
- Air quality regulations
- Vehicle emission standards

Changing regulatory environment
- Outputs focused
- Promoting innovation and competition
- Facilitate low carbon transition

Technology revolution
- Rapid cost reduction in renewable tech
- Digitisation
- Connected homes
- Smart meters
- Block chain technology

Societal changes
- Population growth/urbanisation
- ‘Local is best’
- Affordability
- Increasing expectations - choice, transparency, value
The future is already here

**Growth in Electric Vehicles**
- Over 300 electric buses in London by 2020
- 100k Plug-in vehicles sold in the UK (56% YoY growth)
- 12k charge points

**Storage Market Boom**
- Almost 1GW of accepted storage offers
- Nearly 16GW of enquiries

**Growth in DG**
- 8.5GW of DG connected, doubled in the last 5 years
- First Solar / Storage schemes with no subsidy Support

Pace and scale of change is increasing
The distributed energy world in 2030
Distribution networks acting as a facilitator for a wide range of energy resources and market models

UK Power Networks Distribution System Operator (DSO)

- Local energy markets
  - I+C
  - CHP
  - Electric vehicle fleet
  - Mobile battery
- Connected living
  - Micro storage
  - Electric vehicle
  - Smart meters
  - Smart appliances
- Other Electricity DSO
- DSO substation interconnection
- Transmission network
- Large scale Renewable generation
- Base Load Generation
- Interconnectors
- Gas DSO

- CHP
  - Combined Heat and Power
- I+C
  - Industrial and Commercial
- DSO
  - Distribution System Operator
- Connected Living
- Community Energy Scheme
Collaboration is key
The Role of the DSO

Future Smart
Transitioning to a Distribution System Operator

**Emergent DSO**

**Enhanced roles**
- Keeping the lights on
- Providing great customer service
- Lowering our costs

Secure and reliable supplies taking into account two way flows and greater intermittency
Facilitating cheaper and quicker connections using proven innovation
Optimising network investment decisions using alternative flexible solutions

**Full DSO**

**New roles**
- Support whole system optimisation
- Enabling markets

Collaborating with the GB SO to deliver ‘whole system’ outcomes that are best for customers
Enabling market solutions for DER to provide flexibility to local and wider system
Our DSO Strategy – 5 key areas for 2017 - 2018

1. Facilitate cheaper and quicker connections using proven innovation
   Continue rollout of Flexible DG that uses Active Network Management

2. Use customer flexibility as an alternative to network upgrades
   Run market tenders for flexibility services such as Demand Side Response

3. Develop enhanced System Operator capabilities
   Develop TSO – DSO Commercial Framework, DER Dispatch capability and readiness for smart meters

4. Collaborate with industry to enable GB wide benefits
   Actively participate in industry forums to make this transition a reality

5. Prepare and facilitate the uptake of Electric Vehicles
   Enable connections using smart solutions and ensure business readiness
Launched in January 2017, the Open Networks Project will lay the foundations of a smart energy grid in the UK.

**Open Networks Project Advisory Group**

**Open Networks Project Steering Group**

**ENA Board**

**ENFG**

**Workstream 1:** T-D Process

**Workstream 2:** Customer Experience

**Workstream 3:** DNO to DSO Transition

**Workstream 4:** Charging

**Workstream 5:** Comms

**ERG**

**COG**
Definition of a DSO

“A Distribution Operator (DSO) securely operates and develops an active distribution system comprising networks, demand, generation and other flexible distributed energy resources (DER).

“As a neutral facilitator of an open and accessible market, it will enable competitive access to markets and the optimal use of DER on distribution networks to deliver security, sustainability and affordability in the support of whole system optimisation.

“A DSO enable customers to be both producers and consumers; enabling customer access, customer choice and great customer service.”

• As a cross-industry effort, the Open Networks Project is mindful of the fact there is more to learn and that this is a fast moving picture.
• The definition provides a starting point for the development of the DSO with a range of potential paths.
• It is not an exhaustive, or closed definition, but will evolve over time as the knowledge of the networks increases and the industry develops.
SGAM – Smart Grid Architecture Model
A tool to simplify complexities of smart grid

EU SGAM framework

• 5 Interoperability Layers
• A tool to map actors, relationships and interfaces.
Telecoms and ICT – Key enabler

ICT sector accounts for 2% of global emissions
(*EC report*)

Industry needs to invest in ICT and telecoms to support smart grid

ICT enabled smart solution is estimated to curb 15% global emission
(*smart 2020 study*)

ICT identified as a key enabler to smart
(*UKPN business plan – RIIO-ED1*)
Help us Shape ‘A Smart Grid for all’

We have published our FutureSmart Paper that describes UK Power Networks’ transition to a Distribution System Operator to deliver ‘a smart grid for all’.

Your opinion matters to us
Our consultation will run until 15 September 2017, and we would like to invite you to take part

Please visit us at FutureSmart.ukpowernetworks.co.uk  Or get in touch at FutureSmart@ukpowernetworks.co.uk
Thank You

Help us shape a smart grid for all
Visit FutureSmart.ukpowernetworks.co.uk and respond by the 15th September