

WESTERN POWER **DISTRIBUTION**

Serving the Midlands, South West and Wales

Energy Network Innovation for Communities

Yiango Mavrocostanti

Innovation and Low Carbon Networks Engineer

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Democratic, Decentralised and Decarbonised Energy Systems with
WPD

The Old Library, Cardiff

Outline

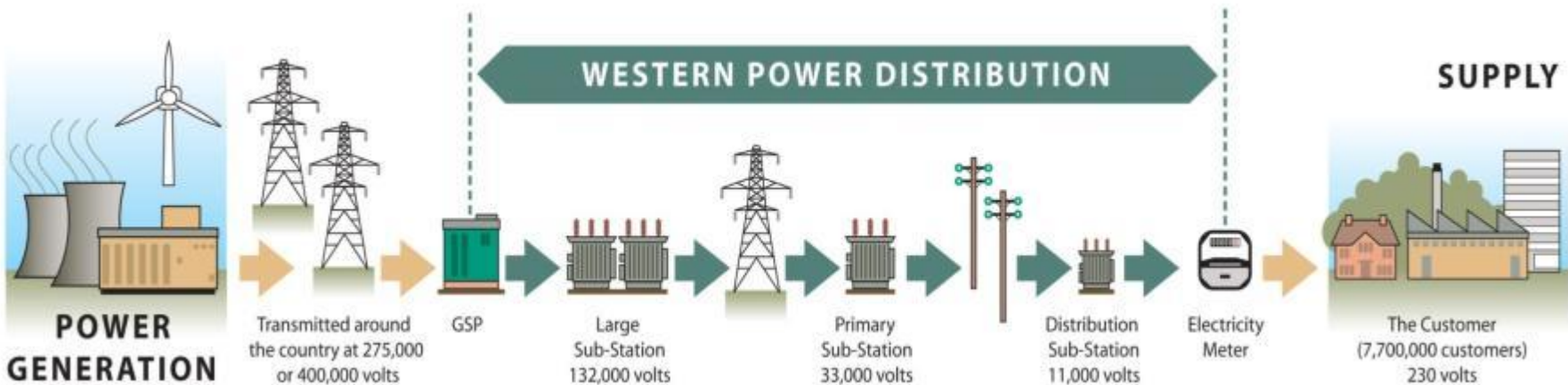
- Western Power Distribution – Who we are
- Traditional role of Distribution Network Operators
- Future role of DNO – Drivers for change and the challenges
- WPD's Innovation Strategy
- Innovation for communities projects
- Support for Community Energy

Our service territory and customer base

- WPD is a Distribution Network Operator (DNO)
- We distribute electricity to 7.8 million customers
- We operate 4 of 14 distribution licence areas in the UK



Traditional Role of the DNO



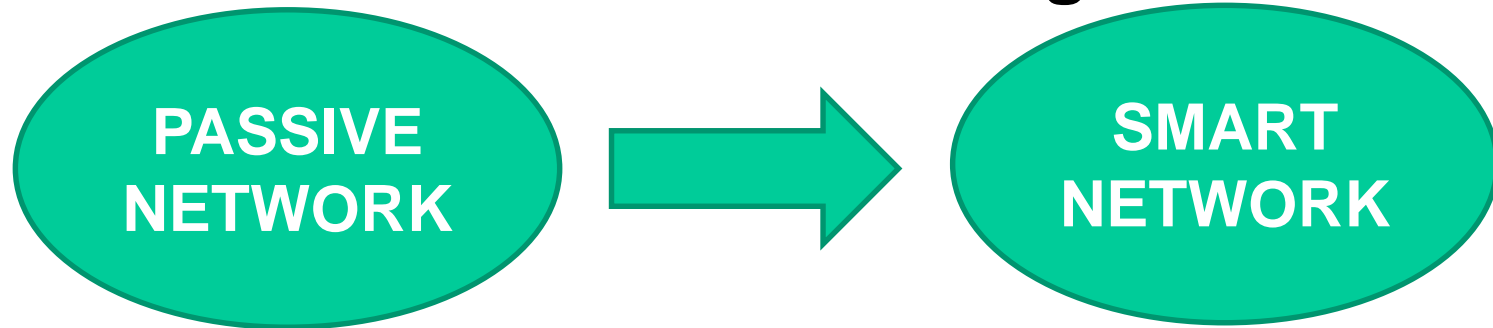
Key Activities

- Maintain the network
- Connect new customers
- Fix the network

Network Changes - Drivers

- Climate change and international agreements on reducing carbon emissions
- EU and UK binding targets
- Rapid changes in GB generation
- Significant uncertainty over the pace of change
- Long lead time to build conventional capacity

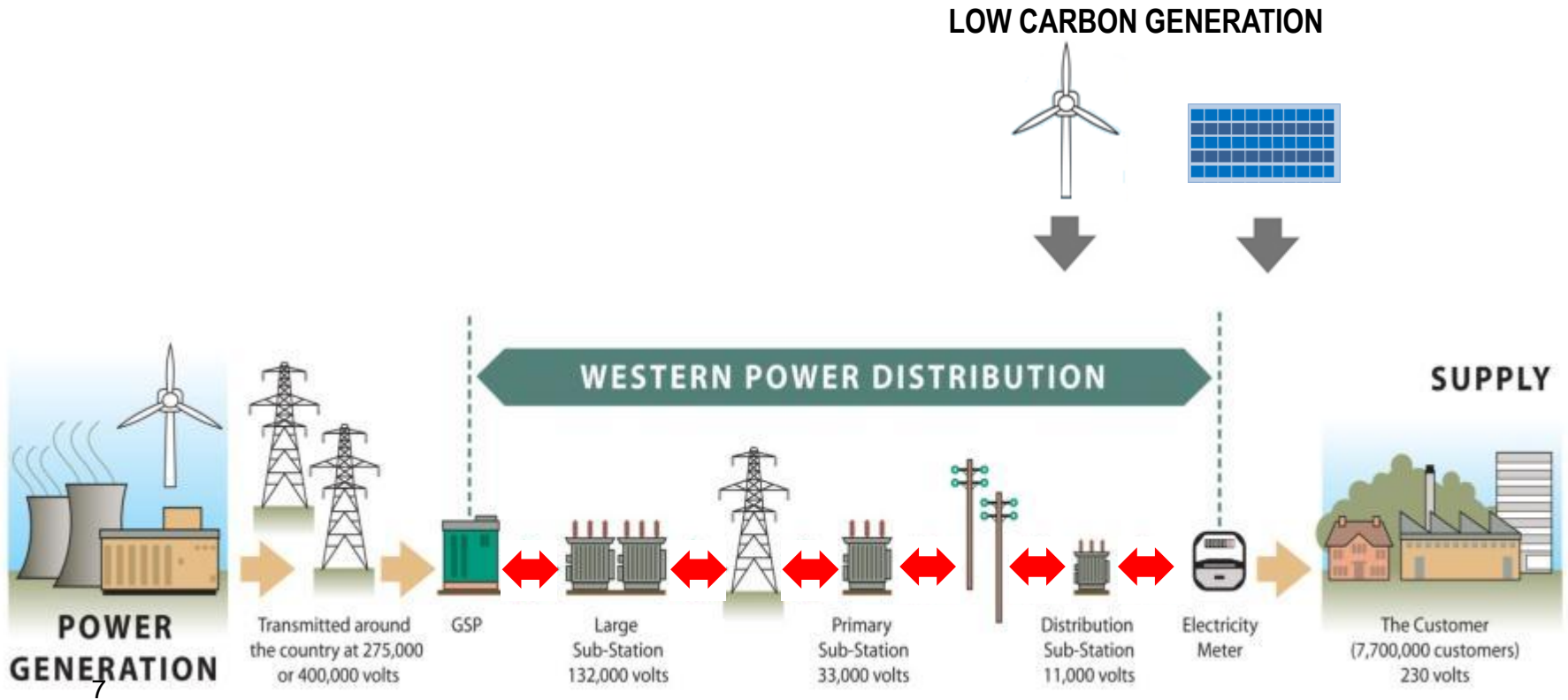
What needs to change?



- Historic and real time energy flows
- Forecasting future energy volumes across the network
- Active reconfiguring of the system as needed
- Commercial arrangements to contract DG, active demand and storage services
- National Grid Transmission System Operator (TSO) and DSO cooperation to reduce conflicts
- Simple platform for energy suppliers, generators/ storage, local community schemes and other market participants to trade in energy services

The challenge for our network

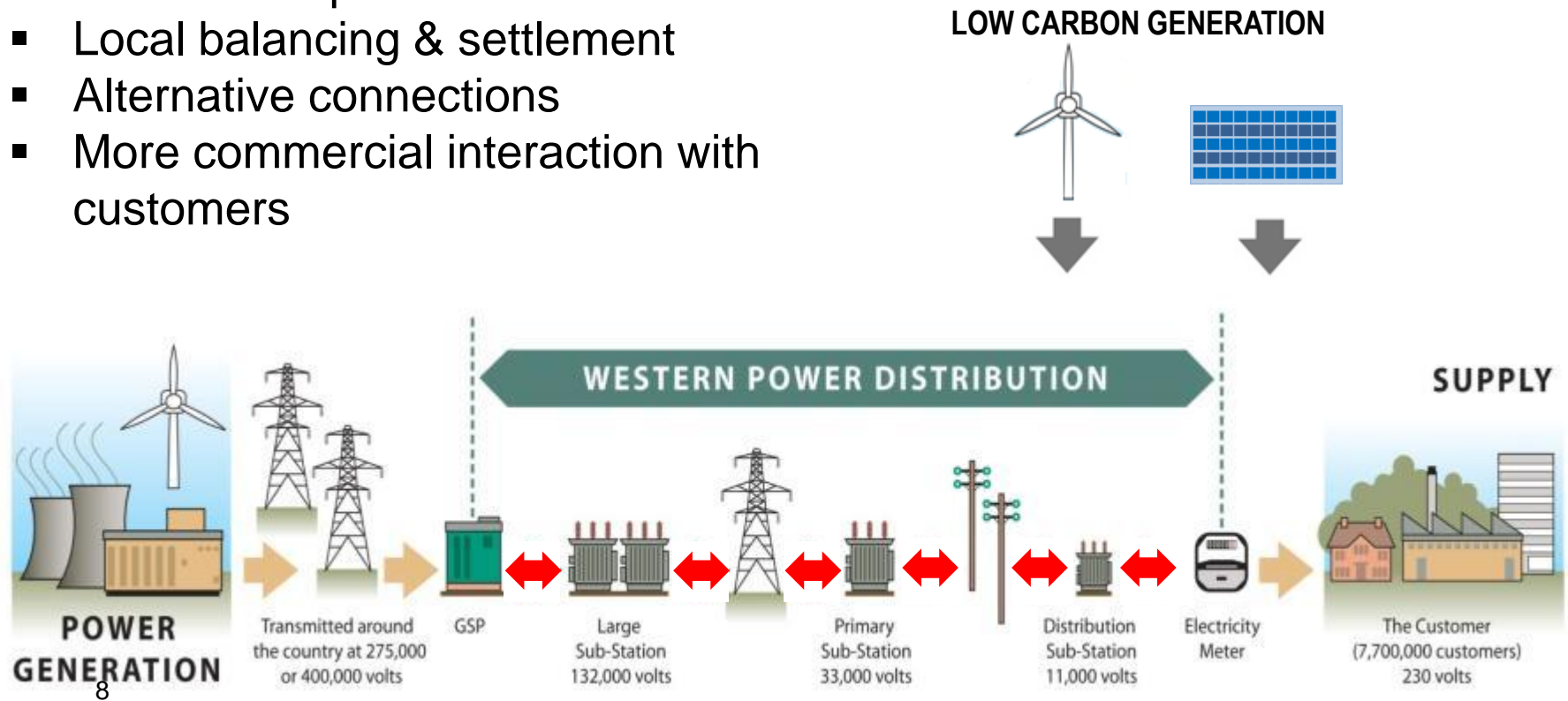
- Localised generation causes reverse power flows, voltage level changes, rapid variations in export / import
- Additional impact upstream on National Grid



The future role of the DNO

Key Activities


- Managing energy not power
- Demand response contracts
- Local balancing & settlement
- Alternative connections
- More commercial interaction with customers



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WESTERN POWER DISTRIBUTION
PROTEUS



WESTERN POWER DISTRIBUTION
FLEXDGRID

WESTERN POWER DISTRIBUTION
PLUGS AND SOCKETS



WESTERN POWER DISTRIBUTION
SOLA BRISTOL


WESTERN POWER DISTRIBUTION
LOW CARBON HUB

WESTERN POWER DISTRIBUTION
OPEN LV



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NETWORK EQUILIBRIUM

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SMART ENERGY ISLES



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NETWORK TEMPLATES

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FALCON

Future Networks Programme

Assets

- Telemetry
- Decision support
- Improved assets
- New assets
- Flexibility
- Automation
- Incident response



Customers

- New connections
- Upgrades
- Information
- Self Serve
- Products/Service
- Tariffs
- Communities



Operations

- Reliability
- Forecasting
- DSO
- DSR
- GBSO Interface
- Efficiency
- SHE and Security



Network and Customer Data

- Airborne Inspections
- AIRSTART¹
- Telecoms Templates
- Superconducting Cable
- SF6 Alternatives
- MVDC Test Lab
- Smart Energy Laboratory
- Statistical Ratings
- Primary Network Power Quality Analysis

- Hybrid Heat Pump Demonstration
- Hydrogen Heat & Fleet
- Carbon Tracing
- HV Voltage Control
- Solar Storage
- LV Connect and Manage
- Sunshine Tariff
- CarConnect
- Industrial & Commercial Storage

- DSO/SO Shared Services
- Project Sync
- Project Entire: Flexible Power
- Integrated Network Model
- Smart Meter Exploitation
- Distribution Operability Framework
- Data Analytics
- Voltage Level Assessment
- LV Connectivity
- Smart Systems and Heat²

Note: 1 – Funded by Aerospace Technology Institution; Note 2 – Funded by the Energy Systems Catapult

WPD Innovation Project Learning

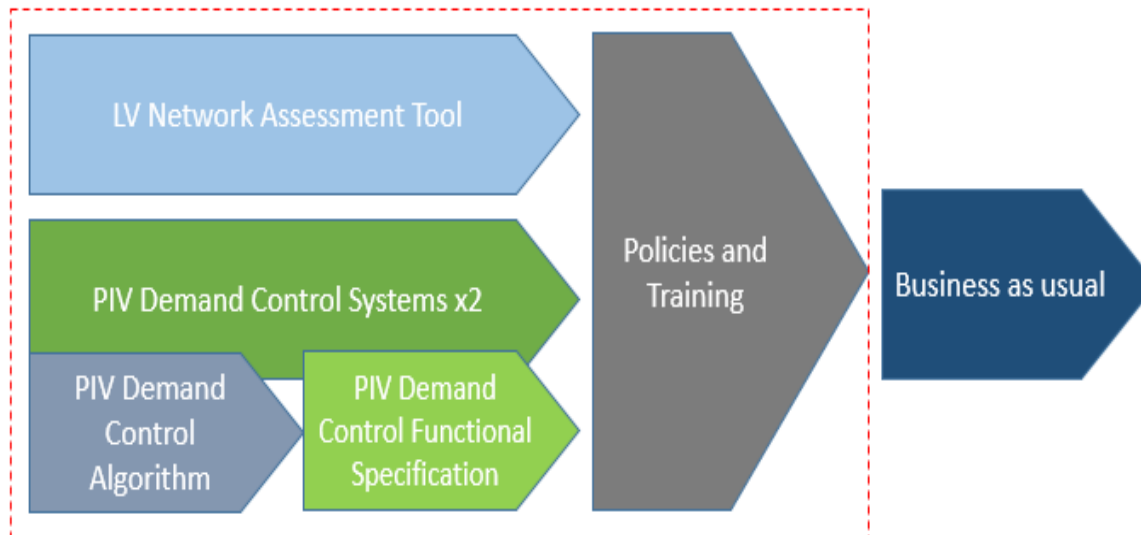
- LV Templates – Energy profiling
- Low Carbon Hub – development of Alternative Connections/ ANM
- Low Carbon Hub – development of DG constraint panels
- FALCON – I&C DSR (with DG and Active Demand)
- FALCON – Energy Forecasting
- SoLa BRISTOL – domestic DSR and DSM (with batteries)
- Community Energy Action – Community based DSR
- ECHO – domestic DSR (smart plugs)
- Car Connect – Smart EV charging
- SYNC – I&C DSR (demand shifting to summer DG peak)
- ENTIRE – Demand side response
- Solar Storage (DG output smoothing and ancillary services using battery storage)
- Plugs and Sockets – EU funded project



WPD Innovation for Communities

Electric Nation - CarConnect

- World's largest Plug-in Vehicle trial consisting of 500-700 vehicles
- Using a wide range of EV models and charging rates of up to 32A
- Developing all the tools required for Distribution Network Operators (DNOs) to manage EV uptake
- Modelling of EV network impacts and constraints
- Monitoring of real-time EV impact to defer reinforcement
- Mitigation of EV impact through Demand Side Response
- V2G test bed development

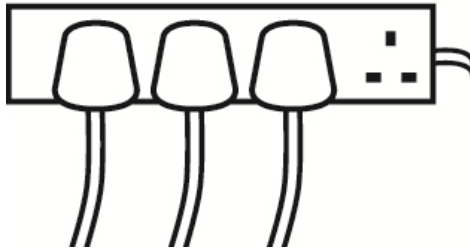


WPD Innovation for Communities

Plugs & Sockets / Cornwall Local Energy Market

Platform for trading
flexibility services

Customers will alter electricity
consumption or generation to benefit
a third party.



DNO, SO, TO, Aggregators, Suppliers, Generators connect
to the “Socket” via “Plugs”

- Notify flexibility services requirements
- Flexibility service trading
- Notify use of flexibility services
- More information at

<https://www.westernpower.co.uk/Connections/Generation/Community-Energy/Articles-and-case-studies.aspx>

centrica

nationalgrid

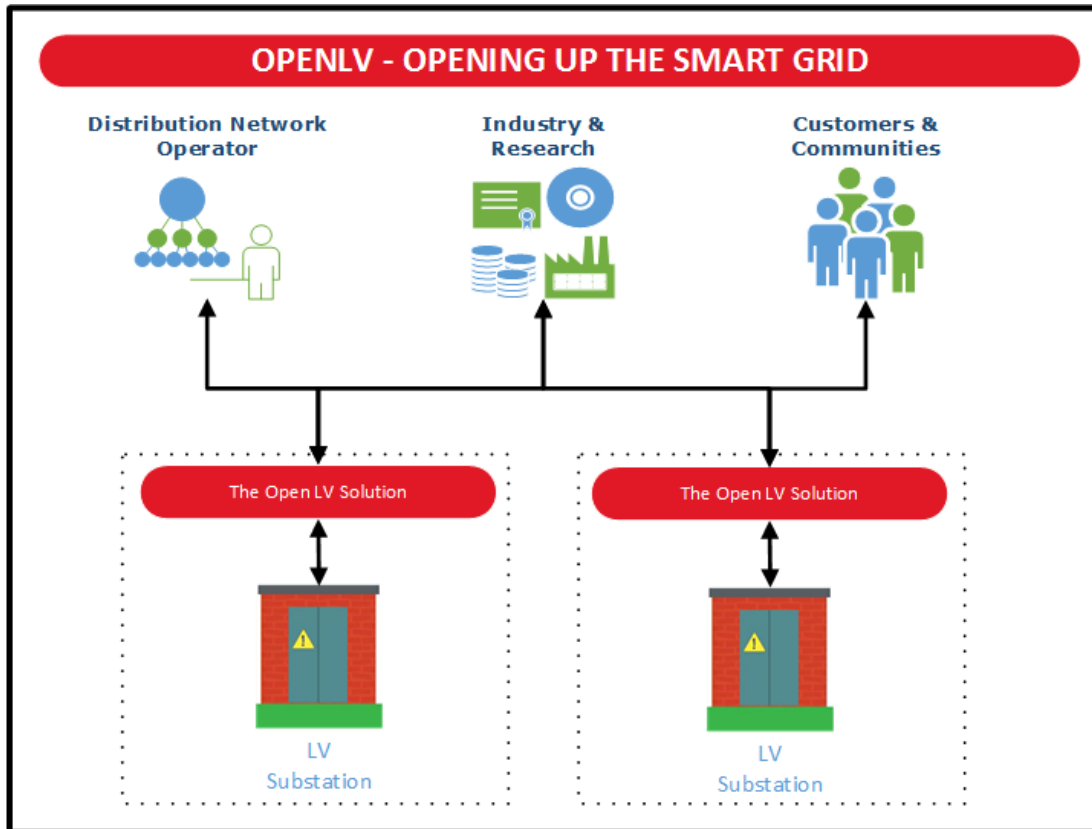
UNIVERSITY OF
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WPD Innovation for Communities

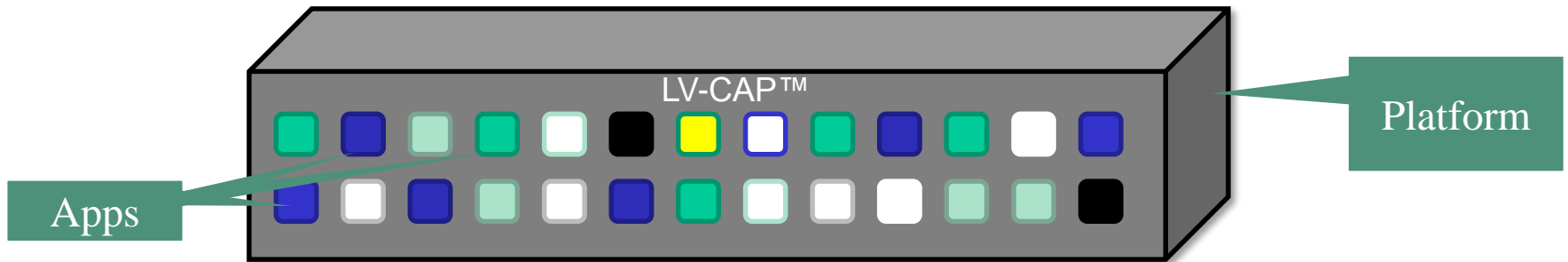
OpenLV



- OpenLV will deploy a workable open substation platform for both monitoring and control of the LV network.
- This platform will support the usage of a number of apps.

WPD Innovation for Communities

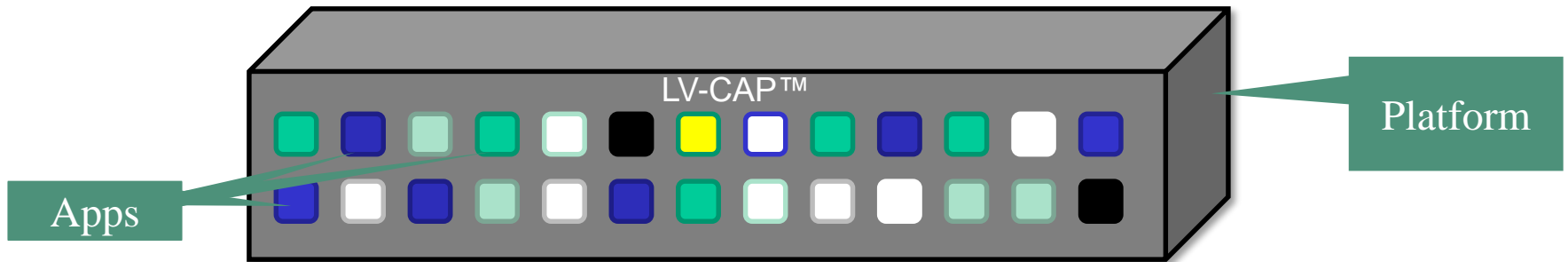
OpenLV



- Through the apps it will provide community energy groups access to LV network data.
- Stimulate the Market to facilitate a common platform with low cost entry for a range of new App developers.

WPD Innovation for Communities

OpenLV

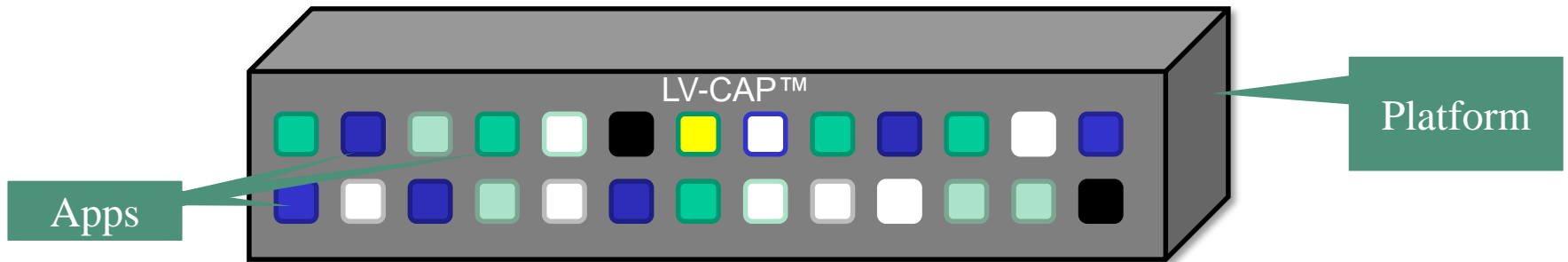


Example Apps:

- What's My Community Demand
- LCT take-up monitoring & prediction
- Real Time Thermal Rating – Transformers and Cables
- DSR for managed EV charging
- Automated Voltage Management
- Distributed generation control
- Community Alerts to request reduction or increase in load
- Automated energy storage control

WPD Innovation for Communities

OpenLV



- Can you think of any other ways in which you could use this data? The project team would love to hear from you.
- Call for more information on 0117 934 1400 and ask to speak to Rachel Coxcoon or Rachel Haycock, or email rachel.coxcoon@cse.org.uk
- <https://openlv.net/about/the-project/for-community-groups/>

Summary

- WPD – Traditional role of DNO and the industry changes
- WPD Innovation Team – Areas of focus
- Innovation for Communities
 - Electric Nation
 - Plugs and Sockets
 - OpenLV

Support for Community Energy

Connection Surgeries

- We have an annual schedule of Connection Surgeries
- Our Connection Surgeries allow customers to discuss face-to-face with one of our engineers, either the process of applying for a connection in general or specifics about a particular scheme



Connection surgeries



We operate the regional electricity network and provide new connections to homes, businesses and generation sites at voltages from 230 volts to 132,000 volts.

We understand that ahead of applying to us for a new connection and particularly for Generation Connections, our customers and Independent Connection Providers (ICPs) often have questions and want to understand more about the process, timescales, technical matters, consents/legal requirements and possible constraints of making a connection to the network in a particular area.

With this in mind we are running a series of Connection Surgeries where our engineers will be able to assist you.

The surgeries will run on the dates listed below and enable interested parties (like landowners, ICPs, developers and community groups) to make a 45 minute appointment with an engineer to discuss their requirements and the connection process, ahead of making an actual application for a connection to the network.

QUESTIONS?