

# **WESTERN POWER** **DISTRIBUTION**

*Serving the Midlands, South West and Wales*

## **Energy Network Innovation for Communities**

Yiango Mavrocostanti

Innovation and Low Carbon Networks Engineer

13<sup>th</sup> of February 2018

Democratic, Decentralised and Decarbonised Energy Systems with  
WPD

University of Nottingham

# Outline

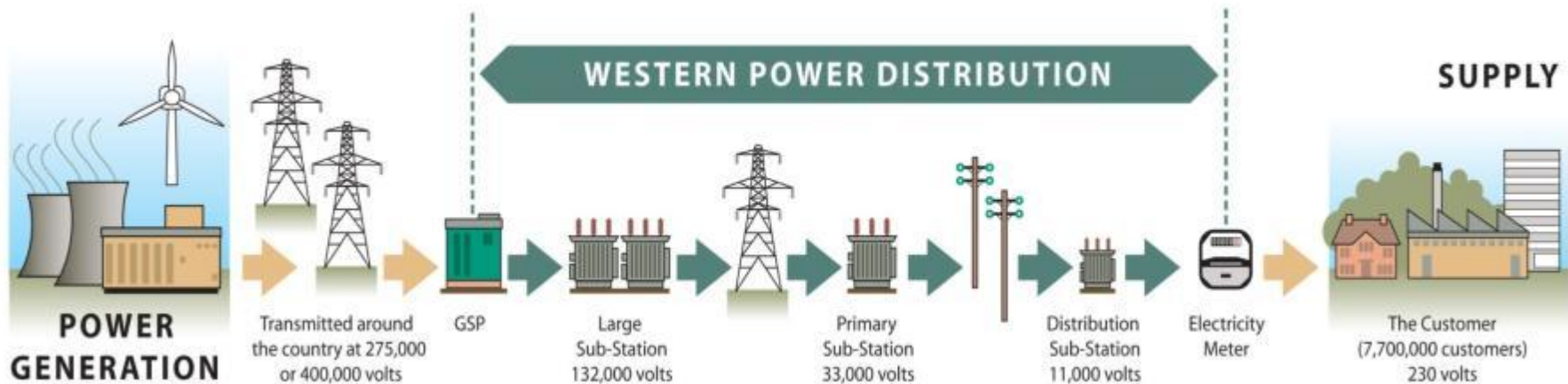
- Western Power Distribution – Who we are
- Traditional role of Distribution Network Operators
- Future role of DNO – Drivers for change and the challenges
- WPD's Innovation Strategy
- Innovation for communities projects
- Support for Community Energy

# 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



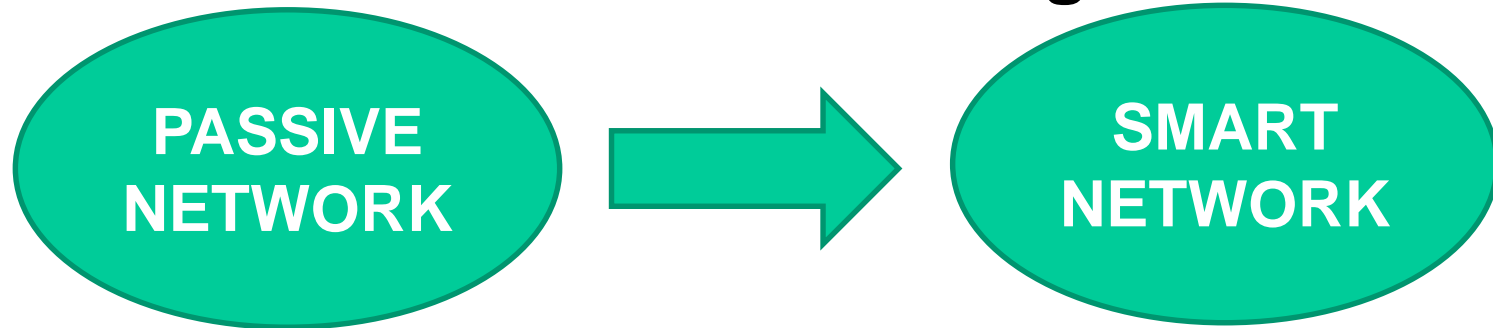
## Key Activities

- 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

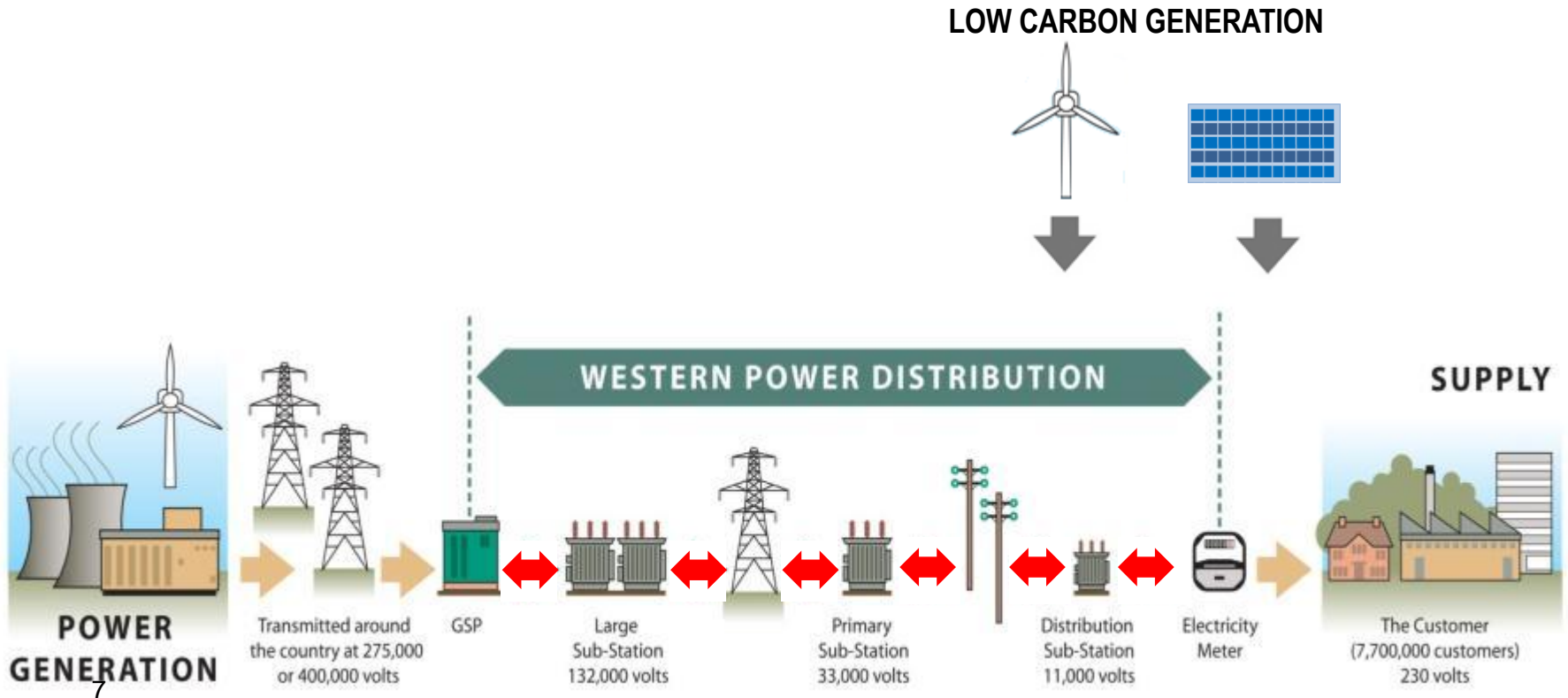
# What needs to change?



- 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

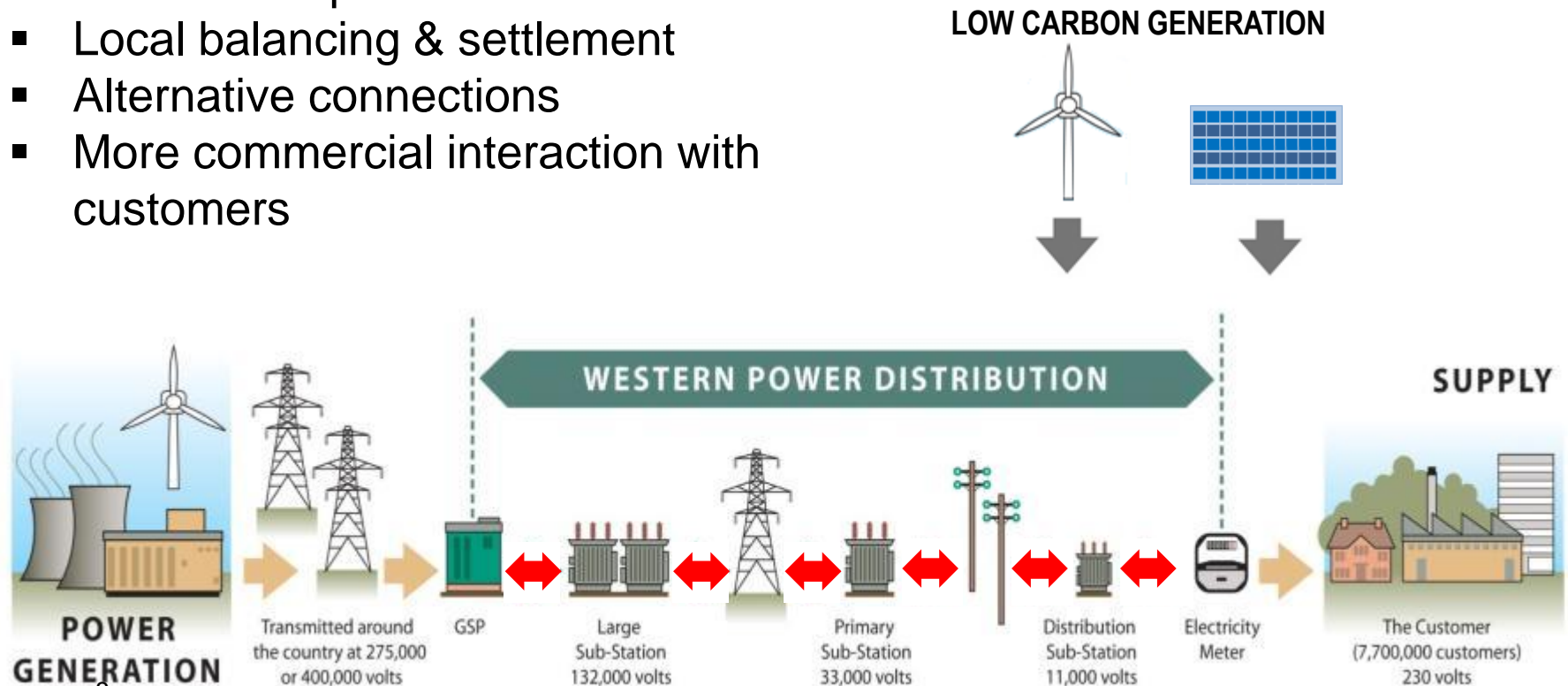
- Localised generation causes reverse power flows, voltage level changes, rapid variations in export / import
- Additional impact upstream on National Grid



# 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



**DISTRIBUTION**

*Serving the Midlands, South West and Wales*



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



WESTERN POWER DISTRIBUTION  
NETWORK EQUILIBRIUM

WESTERN POWER DISTRIBUTION  
SMART ENERGY ISLES



WESTERN POWER DISTRIBUTION  
NETWORK TEMPLATES

WESTERN POWER DISTRIBUTION  
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
- AIRSTART<sup>1</sup>
- 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 Heat<sup>2</sup>

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

# WPD Innovation Project Learning

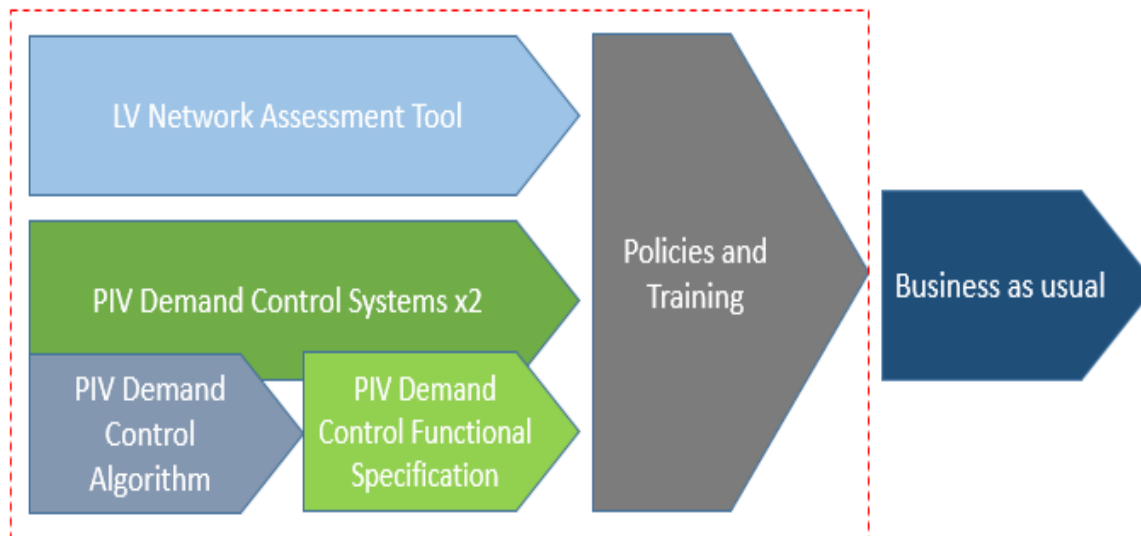
- LV Templates – Energy profiling
- Low Carbon Hub – development of Alternative Connections/ ANM
- Low Carbon Hub – development of DG constraint panels
- FALCON – I&C DSR (with DG and Active Demand)
- FALCON – Energy Forecasting
- SoLa BRISTOL – domestic DSR and DSM (with batteries)
- Community Energy 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

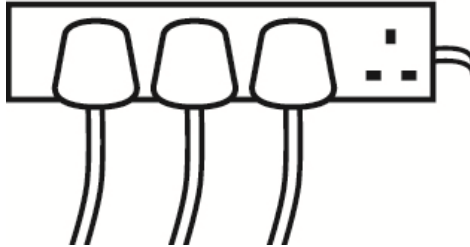


# WPD Innovation for Communities

## 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**

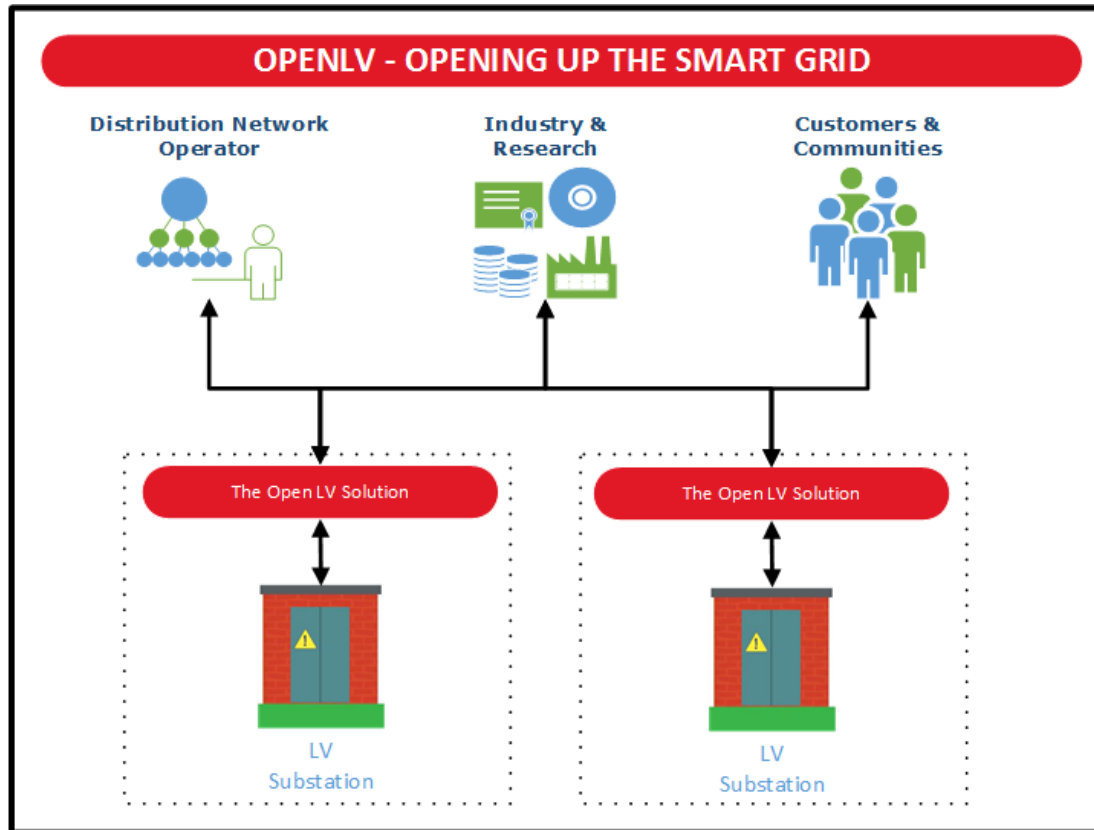
UNIVERSITY OF  
**EXETER**

**WESTERN POWER  
DISTRIBUTION**

*Serving the Midlands, South West and Wales*

# 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

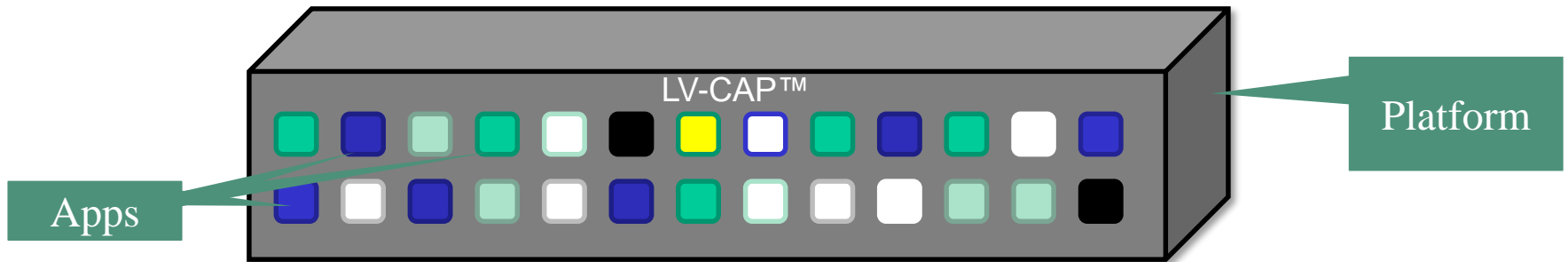
## OpenLV



- 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

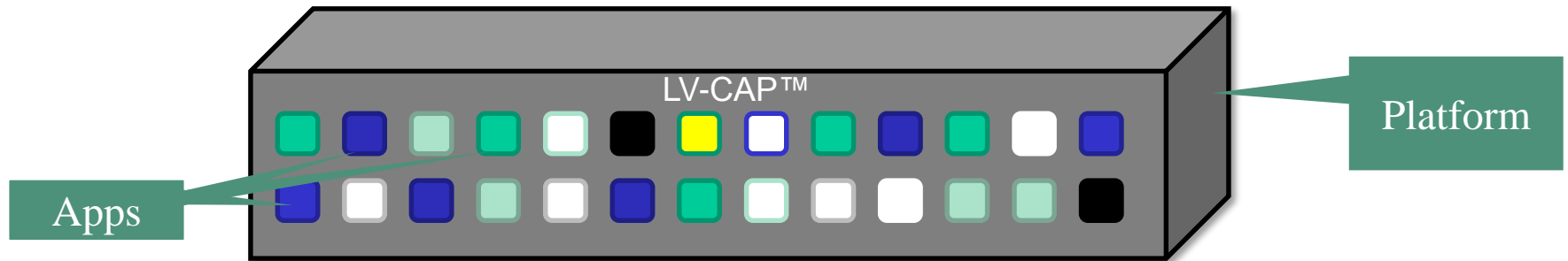


### Example Apps:

- 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](mailto: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?