Background to the Central London Plan

Introduction to the Central London network and our plans for it over the coming years.

PAGE 4

Increasing capacity

Our plans to increase the capacity of the network to support the growth of the capital city.

PAGE 6

Improving operational response

Building dedicated teams to provide a 24/7 response in the heart of London.

PAGE 8

Investing in network resilience

An update on the investments we are making to reduce the number of power-cuts.

PAGE 10

London Highlights

News of the work we are doing with stakeholders to support London’s priorities.

PAGE 12

Welcome

I am delighted to present the first annual summary of our progress against our Central London strategy.

The Central London area has a significant commercial and political impact on the UK economy. Customers served by UK Power Networks include the many internationally significant businesses in the City of London, the West End and Canary Wharf, and the many strategic government and royal sites around Parliament Square, Whitehall and Green Park.

Delivering power to these customers carries a great responsibility and for this reason, we engaged with key London stakeholders while delivering our RIIO-ED1 business plan. This engagement made it clear there were two main priorities for our customers in London:

• Increase the capacity of the network to support the growth of London
• Improve and maintain the reliability of the network to minimise disruption caused by power-cuts.

To reflect this, our business plan included proposals for four large substations that will increase capacity in high-growth areas by a total of 300MVA, which is the equivalent of 150,000 new domestic electricity consumers. Additionally, it included proposals to both invest in the resilience of the network to reduce the number of power-cuts and to provide an enhanced 24-hour response to minimise the impact when they do occur. This update details our progress against these plans and the improvements that have been seen to date.

We have continued to engage with our stakeholders since developing our business plan and we recognise that London has ambitious plans to become a leading “low carbon” city and to improve air quality. UK Power Networks is helping to facilitate these plans by enabling both the connection of electric vehicles and low carbon generation. For example, we worked with Transport for London (TfL) and Go-Ahead to establish the first fully electric bus garage in London. This went live in September 2016 and we are working with TfL on their plans to electrify more bus routes.

I hope you will find this update interesting and informative. We would welcome your feedback on it and how we can develop it for future years.

Basil Scarsella
Chief Executive Officer
BACKGROUND TO THE CENTRAL LONDON PLAN

The Central London Area (CLA) contains the political, financial and entertainment districts of one of the greatest cities in the world. It is the economic engine of the UK and a number of blue chip companies have their headquarters in the CLA.

The CLA comprises approximately 160,000 electricity consumers in the heart of London. The following diagrams show the geographic area covered by CLA and an overview of the main substations in the wider London network supplying these customers.

The CLA is comprised of commissioned assets in substations with a post code of, EC1, EC2, EC3, EC4, E1, SE1, SW1, WC1 and WC2. The following figures show the Central London network area in terms of both postcode and primary substation.

The CLA is unique in the sense that it is predominantly an interconnected network. In Central London the concept of LV interconnected networks was first developed in the 1930s to deal with increasing demand.

The Central London Plan is comprised of three distinct elements. These are:

- Provision of increased capacity to meet future electricity demand;
- Improved operational response; and
- Improved resilience of the interconnected network.

* Only part of the E1 and SE1 postcodes are part of the Central London Area
Supporting growth

BY INCREASING CAPACITY

As London continues to develop and grow, we are delivering the electrical infrastructure to support this progress.

In our RIIO-ED1 business plan we included proposals for four major schemes in the capital to provide a combined 300MVA of additional capacity. This is enough to power the equivalent of 150,000 average homes. Along with many other schemes to increase capacity, these projects are providing the infrastructure for many of the key developments which ensure London continues to be a major economic centre and culturally vibrant capital city. Below is an update on the progress of each of these four major schemes.

**PROGRESS UPDATE**

In line with regulatory reporting guidelines, the forecast costs shown here are only the direct costs of delivering the project. They do not include indirect costs such as administration and project planning.

**Calshot Street (now Grafton Way)**

- 86MVA
- Mar 2018
- £8.2m

**BACKGROUND:**

The establishment of Calshot Street is part of the City Road – City of London Regional Development Plan. The purpose of the project is to build a new substation in the Kings Cross area providing an increase in capacity of 86 MVA. This increase in capacity will allow load to be transferred from the adjacent Back Hill substation to help keep load within the capacity of that site.

**PROGRESS UPDATE: IN DELIVERY**

Due to the substation being constructed on third party land in close proximity to residential and commercial premises, careful consideration had to be given to the impact of the construction and final substation building on the surrounding community. Once all agreements were in place, construction started in May 2016. All equipment required for the substation has been ordered and despite progress to date being more complex than originally anticipated, completion of the substation is forecast for March 2018 in line with the requirements of nearby developments.

**Vauxhall Nine Elms Battersea (VNEB)**

- 86MVA
- Dec 2019
- £28.7m

**BACKGROUND:**

The VNEB area is a Greater London Authority (GLA) designated opportunity area located along the south bank of the Thames between Vauxhall and Chelsea Bridges. The planning framework contained proposals for:

- 16,000 new homes;
- An extension to the Northern Line; and
- Regeneration of Battersea Power station.

To facilitate this development UK Power Networks proposed to build a new substation in the VNEB area providing an increase in capacity of 86 MVA.

**PROGRESS UPDATE: IN DELIVERY**

This project involves both the construction of a new substation and a tunnel to route the power cables to the site. The existing building on the site has been modified to provide sound attenuation allowing the substation construction to begin. An access shaft has been completed to allow the tunnel boring machine to be lowered and tunnel boring to begin. The site will be energised in a phased manner to reflect requirements of large developments in the area and is scheduled for completion by December 2019.

**White City (Wood Lane)**

- 43MVA
- Dec 2018
- £12.1m

**BACKGROUND:**

The London Borough of Hammersmith and Fulham and the GLA have agreed a planning framework for a White City Development Area, proposing mixed office, residential and community use. The 41-acre site is close to the BBC Television Centre and Westfield Shopping Centre. The forecast increase in demand could not be accommodated at the Bullwer Street substation and hence a new substation in the White City area was proposed. This substation will provide an increase in capacity of 43 MVA.

**PROGRESS UPDATE: IN DELIVERY**

To date, a site has been secured for the construction of the substation in Wood Lane, under the A40 flyover. The design of the substation is substantially complete and contractors have been engaged to start construction in March 2017. The route for the incoming 132kV cables has been assessed and been deemed viable. The scope of installation and capacity added to the network remains unchanged. Due to space limitations, the original plan to allow for the future installation of a third transformer, were one required, is no longer feasible.

**West End**

- 86MVA
- 2022
- £36.5m

**BACKGROUND:**

London’s West End encompasses the entertainment districts of Leicester Square and Covent Garden as well as the shopping districts centred on Oxford Street, Regent Street and Bond Street. It is one of the most highly sensitive and economically important areas of London. Three substations which supply the West End were predicted to exceed their firm capacity in the coming years due to demand growth within the West End area. To alleviate this issue, a new substation will be constructed which will provide an increase in capacity of 86 MVA.

**PROGRESS UPDATE: IN PLANNING**

This project requires a new tunnel to be built to allow installation of the incoming cables and construction of the substations itself. This creates an interdependency between the route of the tunnel and the location of the substation. An assessment of possible tunnel routes has been carried out with two possible options being identified and a land search has been commissioned to find a suitable site for the construction of the new substation.
A reliable power supply is vital for a capital city which operates on a 24-hour basis.

To reflect this our RIIO-ED1 business plan proposed the establishment of an operational depot providing response to any issues on the network by teams based centrally 24 hours a day, 7 days a week. This complements the existing depot serving the Central London area and has improved response times dramatically, by halving the time is takes to arrive at the location of LV network faults. Forming this dedicated team for Central London has also led to an enhanced inspection routine for the key assets involved in distributing electricity to customers.

To improve performance, we have moved from a 4-year inspection cycle to inspecting the 3,456 linkboxes in Central London on an annual basis. In addition to this, we have fitted a fire suppression blanket to each of these linkboxes which reduces the impact of any faults that occur. This has led to a reduction in disruptive failures with none in Central London in 2016.

We are building teams to increase inspections of the equipment that delivers power to London.

Improving Operational Response

Improvements in Central London CIs and CMLs in 2015/16 INCLUDING Kingsway event

<table>
<thead>
<tr>
<th></th>
<th>2014/15</th>
<th>2015/16</th>
<th>Improvement</th>
<th>Improvement %</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI</td>
<td>1.61</td>
<td>1.60</td>
<td>0.01</td>
<td>0.1%</td>
</tr>
<tr>
<td>CML</td>
<td>2.62</td>
<td>2.51</td>
<td>0.11</td>
<td>4.1%</td>
</tr>
</tbody>
</table>

Improvements in Central London CIs and CMLs in 2015/16 EXCLUDING Kingsway event

<table>
<thead>
<tr>
<th></th>
<th>2014/15 (May to March)</th>
<th>2015/16 (May to March)</th>
<th>Improvement</th>
<th>Improvement %</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI</td>
<td>1.53</td>
<td>1.33</td>
<td>0.20</td>
<td>13.2%</td>
</tr>
<tr>
<td>CML</td>
<td>2.46</td>
<td>1.40</td>
<td>1.06</td>
<td>43.1%</td>
</tr>
</tbody>
</table>

These values are presented as the contribution of Central London to the overall London CI/CML values. These changes we proposed are expected to contribute to an improvement in Central London’s network performance of 0.2 Customer Interruptions (CI) and 0.3 Customer Minutes Lost (CML). This represents an improvement of about £300 in the average time that customers are without supply. These performance improvements have been embedded by Ofgem within the overall RIIO-ED1 CI and CML targets for the whole London Power Networks (LPN) network.

As we have continued to focus on improving reliability across our networks, power-cuts have continued to decrease. The chart above shows how both the number of power-cuts and the length of time customers are without supply has fallen across London, with the average length of power cuts reducing by more than 50% since 2009/10.

As can be seen from the table above, due to a significant event in the Kingsway area in 2015/16, improvements in performance were not as good as anticipated. However, underlying performance improvement was ahead of target with a 43% reduction in CML.

Customer Interruptions (CI) are the number of customers interrupted for 3 minutes or longer per 100 customers on our network. Customer Minutes Lost (CML) are the average time customers are without power, for power-cuts lasting 3 minutes or longer.
INVESTING IN Network Resilience

The network design of the CLA has resulted in a relatively high resilience when compared with other UK cities, but does increase the complexity of operating the network. Building on this high level of reliability, we are investing in state-of-the-art control systems and new network designs to further improve the performance of the network.

**UK Power Networks proposed to improve network reliability and resilience over the ED1 period by:**

- Increased automation on the HV network;
- The conversion of four interconnected loads groups to unit protection; and
- Enhanced maintenance of the interconnected networks.

**Self-healing networks**

The London network historically has a large amount of remote control capability due to a programme that started in the late 1990s to install remote control capable secondary switchgear.

Since commencing the Central London Strategy we have implemented an Automatic Power Restoration System (APRS) which utilises this remote control capability.

The system will automatically take account of network status following a fault to determine which switching operations will restore power to the largest amount of customers. These switching operations are then completed automatically by the system ensuring the impact of outages is minimised for customers.

**Increasing resilience of interconnected groups**

The Central London network is unique in the UK in that it operates Low Voltage (LV) interconnected networks, which supply power to “groups” of demand. The advantage of this design is that it better supports large amounts of concentrated demand and is able to continue to provide power to customers if a fault occurs. The design of these networks has evolved over time to provide better safety and reduce the complexity of operation.

To further improve the safety of these networks and simplify their operation, UK Power Networks is converting some of these groups to a new design. This new design, using HV Unit Protection, will reduce the complexity of operating the LV network which will both improve safety and allow supplies to be restored more quickly.

To upgrade these networks, we have worked with our suppliers to develop the necessary equipment that will suit the confined constraints presented in the London network area. Once this new equipment has been thoroughly tested, conversion of a group in the Leicester Square area will be piloted. The experience gained from this initial pilot conversion will be used to inform the conversion of the remaining three groups identified for HV Unit Protection, as presented in our RIIO-ED1 business plan.

**Enhanced maintenance of interconnected networks**

There are five teams in the Central London area dedicated to performing “network sweeps” in interconnected areas to identify any masked issues on the LV network and proactively fix any identified. This has contributed towards a reduction of 38% in the average number of customers experiencing a loss of supply when an HV fault occurs between 2015 and 2016.
London Highlights

We understand the priorities of our stakeholders develop over time and we continue to engage with them to make sure we are supporting them in the right way. The updates below are some examples of exciting developments that will help the country achieve a reduction in carbon emissions and also improve the air quality in the capital.

**Electric buses are breath of fresh air for London**

A fleet of environmentally friendly buses has taken to the streets of London with help from UK Power Networks. 51 single decker buses which run on electricity and charge up at Waterloo bus garage in central London are now on London’s streets. We contributed to the high-tech, low carbon joint project by laying 400 metres of power cable under the ground and installing new equipment to manage the power supply at the site in Cornwall Road.

Smart charging at Waterloo bus garage offers us the opportunity to explore how to bring electric vehicles within closer reach of more people. It also offers the potential to control when electric vehicles receive their charge for the customers’ benefit as well as the electricity system as a whole. Less carbon in the air is good news for everybody’s health, while the chance to explore how timed connections can help make electric vehicles more affordable for all is an exciting prospect.

**Innovating for a Low-Carbon future**

UK Power Networks has been awarded funding for a cutting edge project that could pave the way for hundreds of megawatts of low-carbon energy to enter London’s power supply.

Across London, many major offices and housing developments have their own Combined Heat and Power (CHP) units, which capture the heat created as a by-product of electricity generation and circulate it round a building instead of having a separate boiler. Less carbon in the air is good news for everybody’s health, while the chance to explore how timed connections can help make electric vehicles more affordable for all is an exciting prospect.

**Powering the transition to electric vehicles**

Electric Vehicles will be one of the biggest contributors to reaching our carbon reduction targets and help improve the air quality in major cities such as London.

As the organisation responsible for making sure the electricity network is ready to supply the power needed to charge these vehicles, we are aware that we have a big role to play in facilitating the charging infrastructure required as more electric vehicles are being driven and recharged in the capital.

For this reason, we have been proactively engaging with the key people involved in delivering this infrastructure, for example:

- Working with Transport for London (TfL) and the bus operating companies to understand their requirements for the electrification of four specific bus routes.
- Producing an online guide to help London Councils and other developers who are looking to install public charging points for electric vehicles. Making the process as transparent and simple as possible will support the installation of the charging points needed to keep electric vehicles running.

In addition to this we are working to understand how “smart charging” of electric vehicles will help to keep the cost of charging electric vehicles as low as possible.

Electric buses are breath of fresh air for London

A fleet of environmentally friendly buses has taken to the streets of London with help from UK Power Networks. 51 single decker buses which run on electricity and charge up at Waterloo bus garage in central London are now on London’s streets.

We contributed to the high-tech, low carbon joint project by laying 400 metres of power cable under the ground and installing new equipment to manage the power supply at the site in Cornwall Road.

Smart charging at Waterloo bus garage offers us the opportunity to explore how to bring electric vehicles within closer reach of more people. It also offers the potential to control when electric vehicles receive their charge for the customers’ benefit as well as the electricity system as a whole. Less carbon in the air is good news for everybody’s health, while the chance to explore how timed connections can help make electric vehicles more affordable for all is an exciting prospect.

Powering the transition to electric vehicles

Electric Vehicles will be one of the biggest contributors to reaching our carbon reduction targets and help improve the air quality in major cities such as London.

As the organisation responsible for making sure the electricity network is ready to supply the power needed to charge these vehicles, we are aware that we have a big role to play in facilitating the charging infrastructure required as more electric vehicles are being driven and recharged in the capital.

For this reason, we have been proactively engaging with the key people involved in delivering this infrastructure, for example:

- Working with Transport for London (TfL) and the bus operating companies to understand their requirements for the electrification of four specific bus routes.
- Producing an online guide to help London Councils and other developers who are looking to install public charging points for electric vehicles. Making the process as transparent and simple as possible will support the installation of the charging points needed to keep electric vehicles running.

In addition to this we are working to understand how “smart charging” of electric vehicles will help to keep the cost of charging electric vehicles as low as possible.
Key Contacts

General enquiries
0800 029 4285

Connections services
0800 029 4280

Emergencies or power cuts
(24 hours a day)
New 3 digit number: 105
or 0800 31 63 105
Please note this number is free to call from mobile phones

Text message updates
during a power cut
To keep you updated if you have a power cut in your area, text:
‘Power’ followed by your ‘postcode’
(e.g. Power IP3 6QX)
to 80876

Media enquiries
0330 159 1712

A full list of our contact details can be found at:
www.ukpowernetworks.co.uk