

**WESTERN POWER**   
**DISTRIBUTION**

*Serving the Midlands, South West and Wales*

**Losses Strategy**

January 2015

# Losses Strategy - Background

- Standard Licence Condition 49 applicable from April 2015 requires licencees ‘to ensure that Distribution Losses from its Distribution System are as low as reasonably practicable, and to maintain and act in accordance with its Distribution Losses Strategy’
- EU Ecodesign Regulation provide minimum standards for transformers
- EU Energy Efficiency Directive requires Ofgem to report on ‘*concrete measures and a timetable for their implementation*’ to Government by June 2015
- As part of the RIIO ED1 process, all DNOs were required to submit a Losses Strategy as part of their Well Justified Business Plan Submissions in accordance with guidance from and a value of losses provided by Ofgem
- We held a workshop on developing our Losses Strategy in November 2014
- All DNOs are currently reviewing their Losses Strategies

# Western Power Distribution's Losses Strategy

- Western Power Distribution's strategy is to ensure that losses from our Distribution System are as low as reasonably practicable, having regard to the following:
  - the Distribution Losses characteristics of new assets to be installed on our Distribution System;
  - whether and when assets that form part of our Distribution System should be replaced or repaired;
  - the way that our Distribution System is operated under normal operating conditions; and
  - any relevant legislation that may impact on our investment decisions

# Objectives of our strategy

- The objective of the strategy is to manage losses such that by 2023:
  - our networks become increasingly “energy efficient”. That is, system losses are generally at a defined level of economic efficiency based on the valuation of avoided energy loss including carbon abatement;
  - Future investments take losses into account to ensure that the best balance is achieved between higher cost network investments today to provide lower costs of energy supplied to customers in the future;
  - The overall level of loss managed by us is measurable and reportable with a predicted level of confidence in order for (a) us to manage losses and demonstrate the effectiveness (b) for Ofgem to incentivise continued performance in loss management and (c) for other stakeholders to understand how we are performing; and
  - The risk of losses increasing due to potential but uncertain greater demands of increasing generation and consumption is avoided, but without undue costs to today’s customers.

# Losses

- Losses are difficult to measure as small errors in the measurement of either the input or output lead to large errors in the loss percentage
- Losses are currently estimated to be between 5.8% and 6.6% of electricity generated
- Losses are mainly made up of:
  - Technical losses – iron losses, copper losses, imbalance, poor power factor
  - Theft in conveyance – locations with no supplier
- We estimate that 25% of losses occur on service cable and low voltage networks, distribution transformers accounting for 22%, the HV network 25% and higher voltages 28%. But it varies between rural and urban networks
- We plan to use data from two of our Low Carbon Network Projects to seek to establish a better estimate of losses

# Changes Since the last submission as part of our Business Plan

- We have taken the Ofgem comments on board (concerns over the quantification of benefits from work programs)
- We have added CBAs for items which do not provide an economic return, rather than just those that do
- The IFI project “An Overview of the Management of Electricity Distribution Losses” has reported allowing us to consider the recommendations in that report
- The Energy Efficiency (Encouragement, Assessment and Information) Regulations 2014 have come into force
- We have focused on transformers and cables as the two asset types which contribute the most to losses
- The benefits of reducing losses are included, referencing the Ofgem figure for the societal cost of losses
- We aim to save over 54,000 MWh of losses in RIIO-ED1

# Our Revised Losses Strategy - Transformers

- Our 33kV and above transformers already have lower losses than the targets set by the Ecodesign regulations
- Interventions to our transformer policies at these higher voltages did not produce favourable CBAs
- At 11kV the Ecodesign regulations do improve losses and there is a CBA benefit in changing policies at this level
- We will oversize transformers where we can forecast a likelihood of Low Carbon Technology up-take
- We will undertake the early replacement of pre-1958 ground mounted units
- We plan to discontinue our smallest sizes of pole mounted and ground mounted distribution transformers

# Our Revised Losses Strategy - Cables

- Cables produce the most losses when they are operated at or near their peak ratings. Network configurations mean that this occurs mostly on the low voltage network
- At 33kV and above there is no CBA benefit in changing our cable policies. At 11kV favourable CBAs are produced for the smaller cross sectional sizes. At LV there is a benefit for all cables resulting in:
  - We plan to discontinue our smallest size service cable
  - We plan to install “next size up” for our low voltage cables
  - We plan to discontinue our smallest size of 11,000 volt cable
  - We have harmonised our sizes of 33,000 volt cable
- There is no benefit in the early replacement of underground cables



# Our Revised Losses Strategy

- **Design Rules**

- We will stop tapering cables on our new low voltage network designs
- We will investigate the potential for reducing low voltage feeder lengths
- We will investigate the benefits of designing our new or uprated networks to operate at a maximum of 90% of rated transformer capacity

- **Power Quality and Voltage Regulation**

- We have started a voltage reduction trial in Wales and will consider a more widescale adoption once we have assessed the results
- We will develop a project to assess the methods of addressing network imbalance, and measure them against the losses reductions seen
- Working with a solar developer we are investigating ways of using the customer's inverter to improve network phase angle

- **Revenue Protection**

- We will develop methods of identifying unregistered MPANs using both map based office analysis and physical on-site analysis

# Our Revised Losses Strategy – Beyond 2023

- Our strategy also looks beyond RII0-ED1, and sets out the items we expect to see being developed in the future
- Superconductors, Heat Recovery Systems, Energy Storage and Active Network Management for Losses all feature in this section
- We will develop it as each of those applications matures and as other applications are created

# Summary of Proposed Investment

Proposal	Interventions per Annum	Savings per Annum (kWh)	Interventions through RIIO – ED1	Savings through RIIO – ED1 (MWh)
<b>Transformers</b>				
Replace pre 1958 transformers	250	2,694,543	1,996	21,556
Discontinue small size pole mounted transformers	575	68,072	4,600	545
Discontinue small size ground mounted transformers	448	1,140	3,584	9
<b>Cables</b>				
Discontinue small size service cables	343 km	412,629	2,744	3,301
Next size up LV cables	694 km	3,049,799	5,552	24,398
Discontinue small size 11kV cables	448 km	951,421	3,584	7,611
<b>Imbalance</b>				
Correct Imbalance at LV substations	Per substation	1,014	Per substation	