

The background features a large, stylized white arrow pointing right, overlaid on a blurred image of a modern building with a glass facade and a large, glowing, multi-tiered light fixture. The overall color palette is dominated by blues, oranges, and whites.

# Reliability & Safety Working Group

12 July 2012

## Today's agenda

- **Action log update**
  - Capturing the impact of Generation on LI ratings
  - Potential use for LIs regarding LV reinforcement
  - Anticipatory investment interactions with LI
- **Ofgem-developed Load-related questionnaire**
- **Work that needs doing**
  - Ahead of September paper
  - Cost visits and up to February
  - Business plan development

## Action log update

### Actions follow-up discussion today

1. DNOs to develop appropriate definitions to allow collation of DNO views on treatment of DSR and increasing levels of generation at substations within the existing LI mechanism (ie: primary network)
2. ENWL to develop thoughts on how delivery against the loading at LV model could be assessed on an ongoing basis
3. SP & SSE to develop models that show exactly how strong a "time to connect" incentive would have to be to lead to them "gold plating" their networks

### Actions requiring further work

1. Ofgem development of Load-related questionnaire – to inform position for September paper (will be discussed today)
2. DNO feedback on UKPN's Load Priority Index proposal (WPD/ ENWL/ SSE yet to respond – UKPN to provide further explanation?)
3. Ofgem to determine standardised LI1-LI5 criteria
4. Ofgem to check whether Demand/ generation boundary has or is likely to change

# Capturing the impact of generation in LI framework

- Our intentions – why we asked the questions
  1. Understand how connected generation will impact on the level of maximum demand that sets the LI at a demand-driven sub-station – potential impact on the cost assessment process (growth in max demand vs. capacity installed)
  2. Understand whether the Load Index as currently set out is appropriate as a proxy indicator of whether reinforcement to cater for growth in generation has being delivered within RIIO-ED1. If not, can we/ should we develop something similar to address this

**DNO-specific responses suggest that this may not have been completely clear or there has been a divergence of understanding/ focus**

# Capturing the impact of generation / DSR in LI framework (1)

Questions addressed in consolidated DNO response:

1. The treatment of DG in considering whether a substation can support demand
2. The treatment of whether a substation can support DG

## Capturing the impact of generation / DSR in LI framework (2)

### 1. The treatment of DG in considering whether a substation can support demand

#### **Points to consider**

- Only likely to impact on LI4/ LI5 sites
- Difficult/ time consuming to understand how much and when demand is offset by generation
- Generation growth more unpredictable with a profile that isn't as smooth as demand growth
- Present DG penetration levels mean that very few locations currently impacted
- Contractual arrangements encouraged by ETR130 where generation output is not predictable

## Capturing the impact of generation / DSR in LI framework (3)

1. The treatment of DG in considering whether a substation can support demand (DG impact on existing Load Index)

### Conclusions

- DG impact on LI1- LI3 sites not significant enough to impact on max demand
- LI4 & LI5 sites would require planning & design studies in order to accommodate demand regardless of DG impact
- The DG present at a substation should be factored into this planning and design work and solution once it is determined that intervention is required
- DG-dominated substations – where the generation growth would drive the need for any reinforcement would be an exception – although currently there are very few of these

# Capturing the impact of generation / DSR in LI framework (4)

## 1. The treatment of whether a substation can support DG (“DG Index”)

### Points to consider

- Penetration rates of generation will determine whether generation growth becomes more predictable and therefore appropriate to capture in index-type measure
- Some DNOs currently unable to assess capacity of transformers

### Conclusions

- Growth rates currently too “lumpy” and unpredictable
- Not currently required due to low penetration levels of generation
- Suitable measure would need to be separate, similar and complimentary to the Load Index
- Should be developed by RSWG with a view to implementation if appropriate at mid-period review

**Does this summarise DNO views on these points?  
– Are there any further points to raise?**





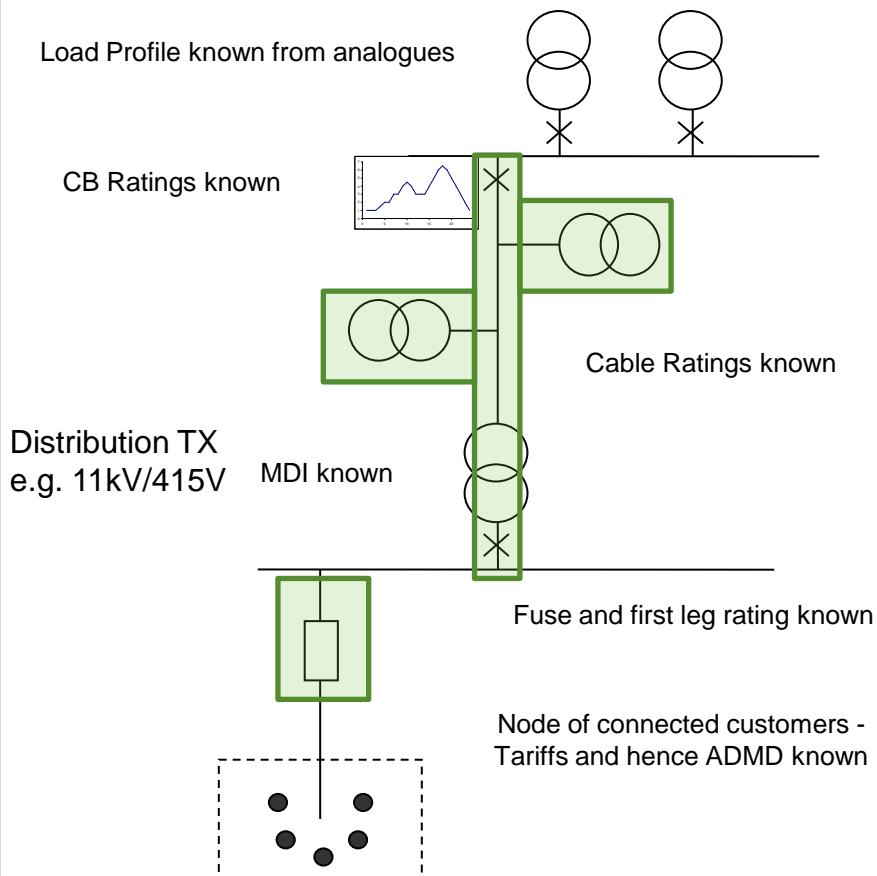
# Secondary Networks LI outputs

Reliability & Safety WG

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## Primary TX e.g. 33/11kV



### Other interventions

- Penetration thresholds set for voltage and harmonic interventions
- Thresholds can be set by LCT type e.g. 20 kW on an asset, or % of rating
- Uses same spatial distribution of EV, HP and PV in the thermal model
- $LI_h$  &  $LI_v$  ~ % WS3 penetration level

### Outputs

- Count HV feeder sections, Dist TX and LV feeders which exceed thresholds
- $LI_h$  &  $LI_v$   $LI_t$  – volume of likely interventions
- Output can be contrasted against vanilla WS3 model
- Caters for DNO specific preloading and stakeholder plans versus WS3 vanilla assumptions

- WS3 modelling provides a common set of thresholds that allow definition of a 'problem'.
- LI model provides a planning assumption for volumes by asset type that are likely to require an intervention.
- WS3 model provides two alternate methods of intervening
  - Traditional Solution Set
  - Smart Solution Set
  - Both have associated costs.
- Subject to agreeing the solution valuation assessment criteria these predict a 'benchmark' solution cost.
- Benchmark cost x volume ~ allowance for a given set of assumptions

- Objective would be to invest just ahead or in response to need
  
- How can we measure actual problems ?
  - Data availability
    - HP connections via MCS web site notifications of Mpans for RHI
    - Smart Meter data flows evidence of actual ADMD changes
    - EV connection notifications
  - Annual re runs of models updated with actual penetration levels and locations.
  - Sites / circuits requiring intervention marked as LI outputs against investment driver –  $Li_h$   $Li_v$   $Li_t$  as per HI tracking.
  - Intervention forecast updated annually with residual balance to attain latest GB Gov forecast makes up balance
  
- Data on actual traditional and smart costs informs benchmark as technologies become mature.

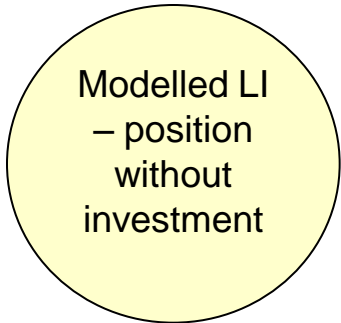
# How can we compare Allowances & Problems Solved ?

- └ Scenarios and intervention bandwidths
- └ Dead-band options
- └ Volume driver options
- └ Hybrid

# Potential Role for LI at LV

## 1. Forecasting ex ante allowance for business plans

DNO makes forecast load assumptions for RIIO ED1

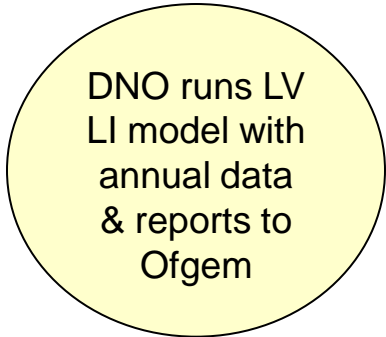


DNO uses model to forecast ex ante allowance based on the number of “LV reinforcement problems” it forecasts it will need to resolve in RIIO ED1  
**“LI5” equals “LV reinforcement problem”**

and/or

## 2. Potential use as uncertainty mechanism

DNO takes annual actual data from network



Potential to fund DNO on £ per problem solved **and** use data to monitor whether number of ‘problems’ solved fall within pre set ‘dead band’ agreed within ex ante allowance

## 3. Secondary deliverable

Ofgem collects annual data on “LV reinforcement problems” solved to compare to original number forecast  
**Only capturing “LI” change where there has been an intervention**

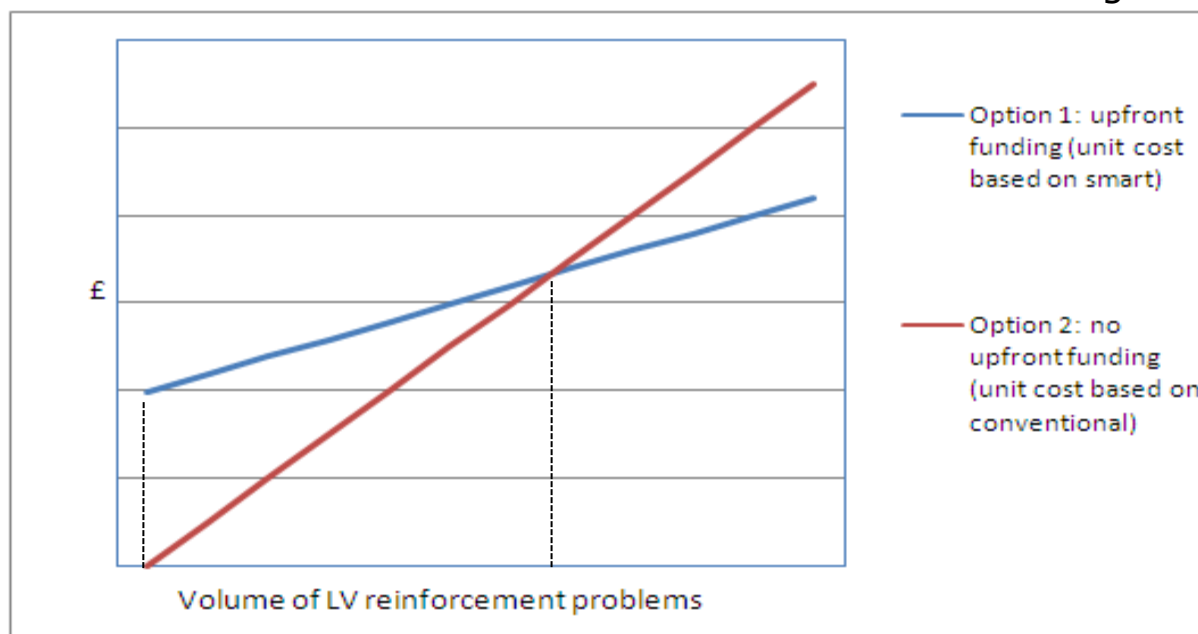
## Ongoing reporting against LV reinforcement problems

- Against a consistent definition of an “LV reinforcement problem” as something requiring an intervention
  - DNOs use WS3/ equivalent model to identify number of interventions likely to be required on secondary network in ED1 period
  - £ p/ intervention sets DNO baseline (Covered on next slide)
  - On an annual basis DNOs report volume of interventions by intervention types and re-run model – similar to HI tracker
  - Funding adjusted for problems that don’t arise or increase in number of “LV reinforcement problems”
  - DNOs are only funded for the problems they solve
  - Assessment and reporting based only on “LV reinforcement problems” addressed (ie: the movement of these from LI5 is the only movement measured)

**LI USED TO IDENTIFY LIKELY PROBLEMS. BASELINES SET AND ADJUSTED BASED ON SOLVING THESE PROBLEMS, NOT LI DELIVERABLE**

## Setting unit cost of solving an “LV reinforcement problem”

- Options with regards to Smart Grid enabling technologies
  - Upfront funding for infrastructure – unit cost then set based on a “smart” solution
  - No upfront funding – unit cost set based on traditional approach, relevant volumes will drive investment decision on smart enabling investment





## Setting unit cost of solving an “LV reinforcement problem”

- Unit cost could be based on a composite cost of solution-types for interventions on following:
  - HV feeders
  - Distribution transformers
  - LV feeders
- Examples of solutions
  - Replace asset with a larger asset
  - Civil work to increase cooling
  - Monitoring equipment installation
- Unit cost based on DNO view of how problems are likely to be solved to develop a composite unit cost, which could be adjusted

	Forecast	Actual
Smart solution 1	10%	5%
Smart solution 2	5%	35%
DSR	10%	20%
Conventional solution 1	60%	30%
Conventional solution 2	15%	10%

## Alternative approach

- Work that needs to be done metric; not set by LI-based “problems to solve”, but LCT uptake volumes
  - For each relevant technology an average MW of capacity required to accommodate is set based on mix of solutions forecast to be undertaken and modelled view on clustering vs. wider scattering

### Heat pump e.g.:

	Forecast	Actual
No action required	50%	50%
DSR	20%	35%
full reinforcement	30%	15%

- Benchmarked cost of providing the relevant MW of capacity sets allowance, potentially as a volume driver
- Modelled view of MW required per LCT type rather than modelled view of solution costs

## SP/SSE work on interactions between “LIs” and connections incentive

Assumptions on incentive:

1. Average time for connections with/ without reinforcement;
  - LV: 97% **6 weeks** (without), 3% **6 months** (with)
  - HV: 80% **6 months** (without), 20% **12-18 months** (with)
2. LV reinforcement cost: £75k, HV reinforcement cost: £2,000k
3. DNO aims to not incur any penalty

Conclusions:

1. Would result in 40%-50% increase in DUoS funded reinforcement
2. Strength of incentive would need to be significantly increased to encourage extra investment ahead of need – penalty would potentially need to be higher than the costs of the project
  - LV: £100k
  - HV: £6,000k

Do you all agree with SP/SSE broad conclusions?

## Load-related questionnaire

### Intention:

- Understand exactly how the issues around load in ED1 are expected to manifest themselves across the 14 licencees, both in terms of DNO expenditure and the experience of customers:
  - Identify common issues that we need to address now within Price Control framework
  - Understand where any expenditure shifts are likely to feature in business plans
  - Identify ongoing developments that we will need to take account of in assessing ongoing performance against ED1
  - Understand which issues that are more likely to develop in ED2

## LI & LRE – Developments in RSWG Interactions with CAWG/FCWG

### RSWG/ CAWG

- Identified the materiality of Load-related expenditure in terms of wider price control
- Identified the role of Load Index within the wider RIIO framework – ie: Secondary deliverable
- Emphasis on development of existing DPCR5 framework rather than restarting from principals
- In this context looking to put in place:  
An LI framework that tracks load-related work relevant to funding DNO, does not discourage/ advocate specific solutions and can react to any substantial uncertainty (+/- in volume of issues faced)

### FCWG

- Within the context of the relevant incentives/ output arrangements on reliability and connections – what role do LIs cover and where are its limitations

## September paper (1)

### PRIMARY NETWORK

#### ➤ OUTLINE OF FRAMEWORK

- LI operating as a secondary deliverable for reinforcement expenditure justified against primary outputs
- Consistent approach to LI1-LI5 scoring
- Cost Assessment approach based on DPCR5 approach

#### ➤ AREAS OF ONGOING WORK

- Accounting for DSR
- Potential developments for DG
- Approach for fast-tracking process vs. detailed assessment

#### ➤ POTENTIAL OPTIONS

- Approach to uncertainty
- Use of scenarios

#### ➤ LIKELY INTERACTIONS

- Asset replacement (wrt. Whole-life costs & asset upsizing)

**IS ANYTHING MISSING?**

## September paper (2)

### SECONDARY NETWORK

#### ➤ OUTLINE OF FRAMEWORK

- Volume indicator of number of Load-related interventions required in period
- Cost Assessment approach based on p/problem-solved unit cost

#### ➤ AREAS OF ONGOING WORK

- Capturing when a problem arises/ is solved
- Interaction with any Flexibility & Capacity output
- Approach for fast-tracking process vs. detailed assessment

#### ➤ POTENTIAL OPTIONS

- Use of LI or LCTs as indicator of volume of work/ funding required
- Approach to uncertainty
- Use of scenarios

#### ➤ LIKELY INTERACTIONS

- Flexibility & Capacity work & WS3
- Asset replacement (wrt. Whole-life costs & asset upsizing)

**IS ANYTHING MISSING?**

## Ongoing work

### **1. Again, is there anything missing for September?**

- Any further suggestions/proposals

### **2. Cost Visits**

- Looking to use visits to understand the processes taken to identifying likely schemes and the robustness of systems and decision-making process on reinforcement
- Review of likely N-2 schemes
- Evaluate approaches to upsizing assets

### **3. Clear view of assessment process for February document**

- Requirements for Business plan
- Approach to Fast-tracking vs. detailed



The background of the slide is a composite image. On the left, there are rows of solar panels under a bright sun. On the right, a hand is shown holding a white document. In the bottom left corner, a blue gas burner is visible. The overall theme is energy and customer service.

*ofgem*

Promoting choice and value  
for all gas and electricity customers