

# **Reliability & Safety Working Group**

## **Quality of Service**

17 May 2012

## Reliability and Safety Working Group

- Introduction to working group:
  - Arrangements and background
- The outputs framework
- DPCR5 arrangements as a starting points
- DNO/Ofgem thoughts on group's priorities for Quality of Service and Resilience
- Terms of reference, meeting dates & membership
- Initial thoughts on areas for development for RIIO-ED1.

## Working group arrangements

- This meeting will be minuted – views and actions
- The minutes will be published on Ofgem’s website, after having been circulated to attendees for comment
- We are proposing to attribute views and opinions expressed at the meeting
- If there are any objections this, please make this clear when commenting on minutes.

## The outputs-led framework

### OBJECTIVES

**Objective 1:** Play a full role in the delivery of a sustainable energy sector

**Objective 2:** Deliver value for money over the long term for existing/future consumers

### OUTPUT CATEGORIES

Environmental  
impact

Conditions for  
connections

Customer  
satisfaction

Safety

Reliability and  
availability

Social  
obligations

### PRIMARY OUTPUTS

Indicators to determine performance in the output categories during the price control

### SECONDARY DELIVERABLES

Intended to facilitate delivery of primary outputs in future price control periods

## Considerations in setting primary outputs

**Need to also consider the principles for setting primary outputs**

### **Principles guiding the development of primary outputs**

**Material**

**Controllable**

**Measurable**

**Comparable**

**Applicable**

**Compatible with the promotion of competition**

**Legally compliant**

## Primary Outputs & Secondary deliverables

- Primary Outputs:
  - Reflect the wants and needs of a network company's stakeholders
- Secondary Deliverables ("a means to an end"):
  - Managing network risk
  - Ability to deliver outputs in the future
  - Innovation

## Potential Outputs R&S outputs framework

- Safety
  - Primary Output : compliance with HSE requirements.
  - Secondary deliverable: comparable safety metric (possibly built around lost time accidents)
- Reliability
  - Primary Output : Interruptions performance
  - Secondary deliverables : health and load Indices, resilience measure

## RSWG priorities – DNO responses

### Quality of Service

- Target setting
  - Impact of metal theft and smart metering
- Pre-arranged allowances
- Short interruptions
- Incentive rates
- Worst-served customers
- GSoP SI 698 of 2010



## **RSWG priorities – DNO responses**

### Resilience

- Develop physical resilience metric
- Develop outputs for CNI, Black Start and HILP
- Review uncertainty mechanisms
- Clarity on government resilience aspirations

## Ofgem priorities

Arrangement	Proposed activity	Importance for Changes in ED1	Complexity of Changes
Health Index	Incorporation of asset criticality / consequence,	High	Medium
Load Index	Incorporation of criticality / consequence, DSM & investment ahead of need.	High	Medium
Safety	Develop and agree new primary output.	High	Low
Interruption Incentive Scheme (IIS)	Incentive rates, confirm unplanned target setting methodology, pre-arranged interruptions, short interruptions?	Medium	Medium
Resilience	Review need for measure of network resilience	Medium	Medium
Guaranteed Standards (SI 698)	Review thresholds and payment levels – including 18hr standard	Medium	Low
Worst Served Customers	Review allowance per customer and definition of WSC	Low	Low

## Terms of reference / meeting arrangements

- ToR have been circulated and are being updated
- Group membership : Environment Agency, HSE, DECC, Inexus and London First have expressed an interest in joining the group.
- Proposed meeting dates circulated:

Date	Indicative principal area for discussion	Location	Main Ofgem contact
Thursday, 17 May	QoS	Ofgem, Millbank	Karl Hurley
Thursday, 31 May	Health Indices	Ofgem, Millbank	Tom Wood
Thursday, 14 June	Load Indices	UKPN, Elephant & Castle	Thomas Johns
Thursday, 28 June	QoS	Ofgem, Millbank	Karl Hurley
Thursday, 12 July	Load Indices	Ofgem, Millbank	Thomas Johns
Tuesday, 24 July	Health Indices	Ofgem, Millbank	Tom Wood

## Outline of topics for today

- Target Setting
  - Unplanned
  - Planned
  - Short interruptions
    - UKPN presentation – Short interruptions
  - Incentive rates
- SSE presentation – Managing network risks and compensation
- Worst served customers
- Guaranteed standards
- Overall resilience
  - ENWL presentation - Potential measures of resilience in RIIO-ED1
- Any other business

## Target Setting

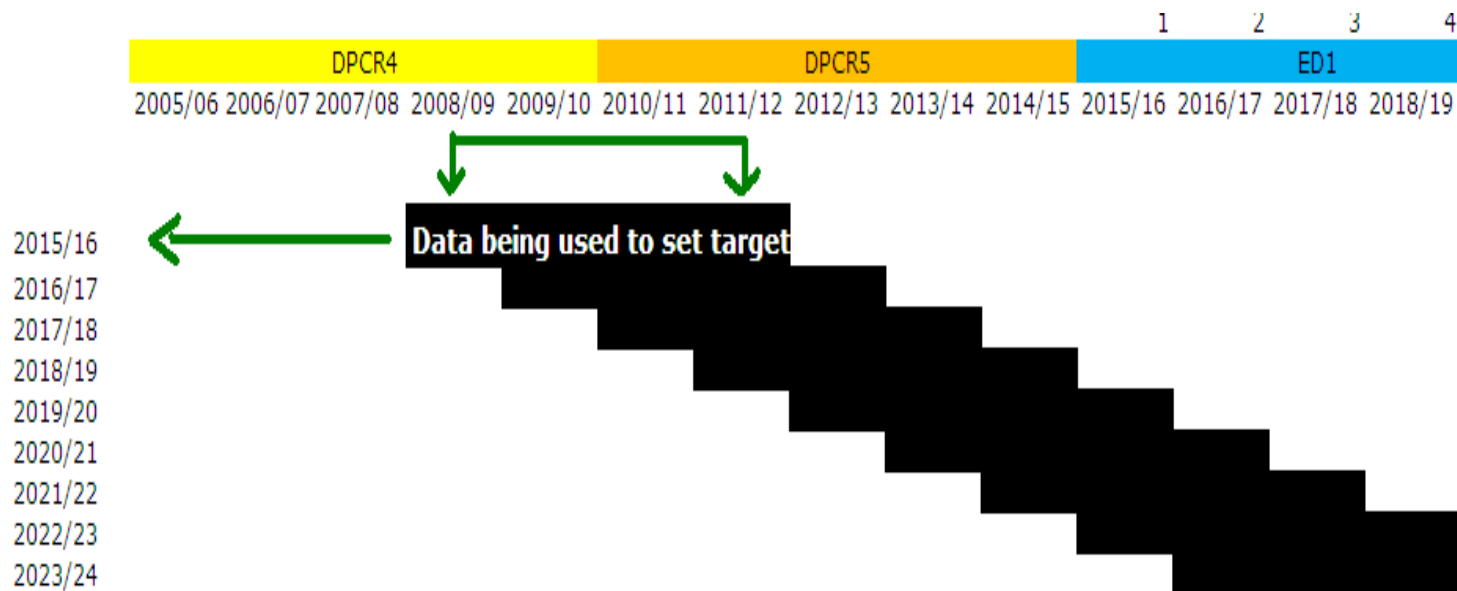
- Target Setting
  - Unplanned
    - Smart Meters
  - Planned
  - Short interruptions
    - UKPN presentation – Short interruptions
  - Incentive rates

## Unplanned Target Setting

- Updated all data used in DR5 target setting for recent years performance (09/10 and 10/11)
- Generally proposing to use broadly the same approach as per DR5 targets, but with a rolling targets approach, currently looking at a three year lag
- Will update this with 11/12 data, once:
  - Exceptional events are finalised; and
  - HV disagg is incorporated into model with 11/12 data
- Proposed method that follows to provide the 15/16 targets
- Consideration of customer research by DNOs, and Ofgem research

# Unplanned Target Setting for RII0-ED1

## Rolling Targets Approach



## Unplanned Target Setting for RIIO-ED1

Target Setting	CI	CML
132kV and EHV	10 years data from 2002/03 to 2011/12	10 years data from 2002/03 to 2011/12 (the minimum of own performance or industry average)
HV	4 years data from 2008/09 to 2011/12	4 years data from 2008/09 to 2011/12
LV	4 years data from 2008/09 to 2011/12	4 years data from 2008/09 to 2011/12
<b>2015/16 Target</b>	Derived from lower of: DNO's own 14/15 target; or average performance, split by the proportion of actual interruptions at each voltage.	Derived from lower of: DNO's own 14/15 target; DNO's own current average CML performance; DNO's own 4 year actual average CI performance multiplied by benchmarked CML/CI; or for better performers benchmarked CI multiplied by benchmarked CML/CI.



## Unplanned Target Setting for RIIIO ED1

### CIIs

Minimum of (1) or (2)

1. DNO's 14/15 target; or
2. Own four year moving average

## Unplanned Target Setting for RIIIO ED1

### CMLs

	<b>Frontier CI DNO</b>	<b>Other DNO</b>
	Minimum of:	Minimum of:
1	Benchmark CI multiplied by Benchmarked CML/CI	Own CI multiplied by Benchmarked CML/CI
2	2014/15 CML Target	2014/15 CML Target
3	Current average CML performance	Current average CML performance

## Use of benchmarking

	CI Target			CML Target
	Actual	Benchmark CI		
<b>DNO A</b>	100	80	T CML BM	Own CI target * BM CML/CI
<b>DNO B</b>	30	50	T CML BM	BM CI * BM CML/CI

- DNO A has an actual CI target of 100, and a benchmark CI of 80, we propose to use DNO A's CI target of 100 for the CML/CI calculation.
- DNO B (Frontier) has an actual CI target of 30, and a benchmark CI of 50, we propose to use DNO B's benchmark CI target of 50 for the CML/CI calculation.

## Prearranged Allowance/ target

### DPCR5 approach

- Prearranged element of IIS targets (Prearranged allowance) set based upon comparative analysis of forecast £ per interruption/ minute lost across a number of areas of expenditure that impact on the number and length of planned outages:
  - Load related expenditure (Demand And Generation growth, diversions and general reinforcement)
  - Non-load related expenditure (condition based replacement, ESQCR and visual amenity)
  - Tree cutting
  - Inspections and Maintenance

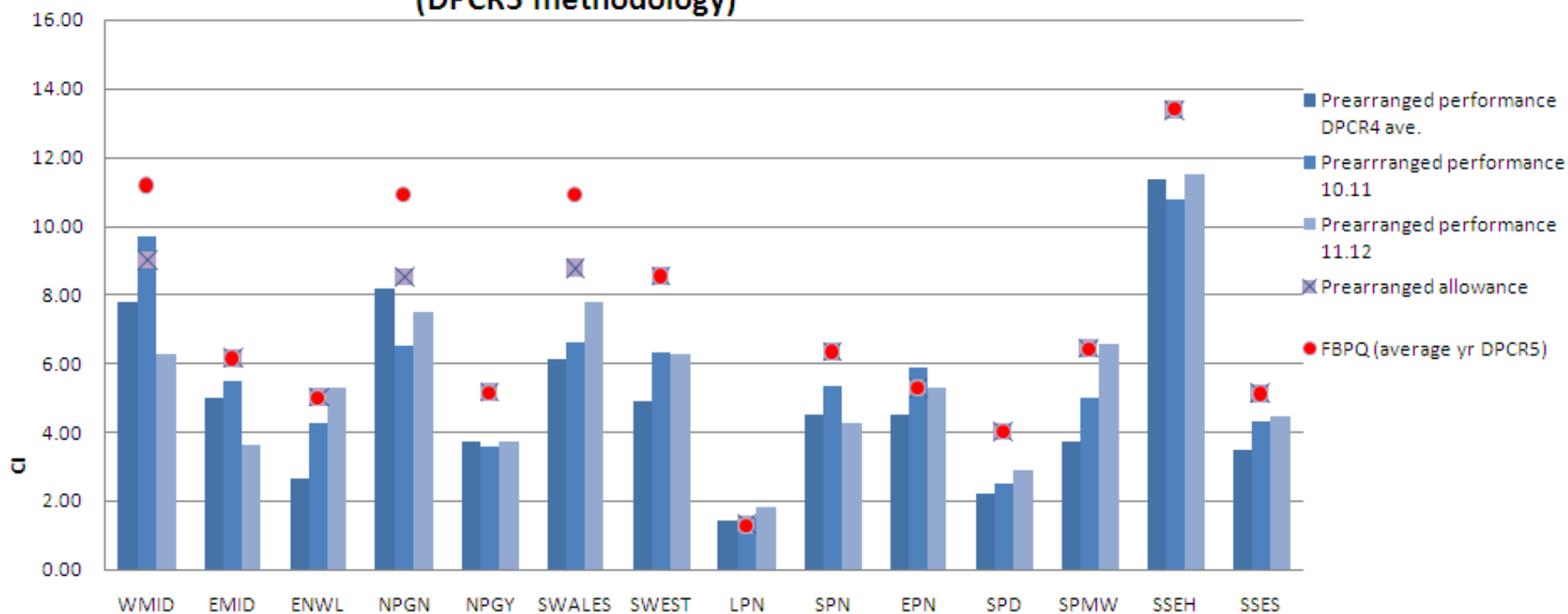
Potential over-reliance on DNO forecast prearranged CI/CML - Concerns regarding potential for over-forecasting – no apparent advantage in accurately forecasting impact on customers

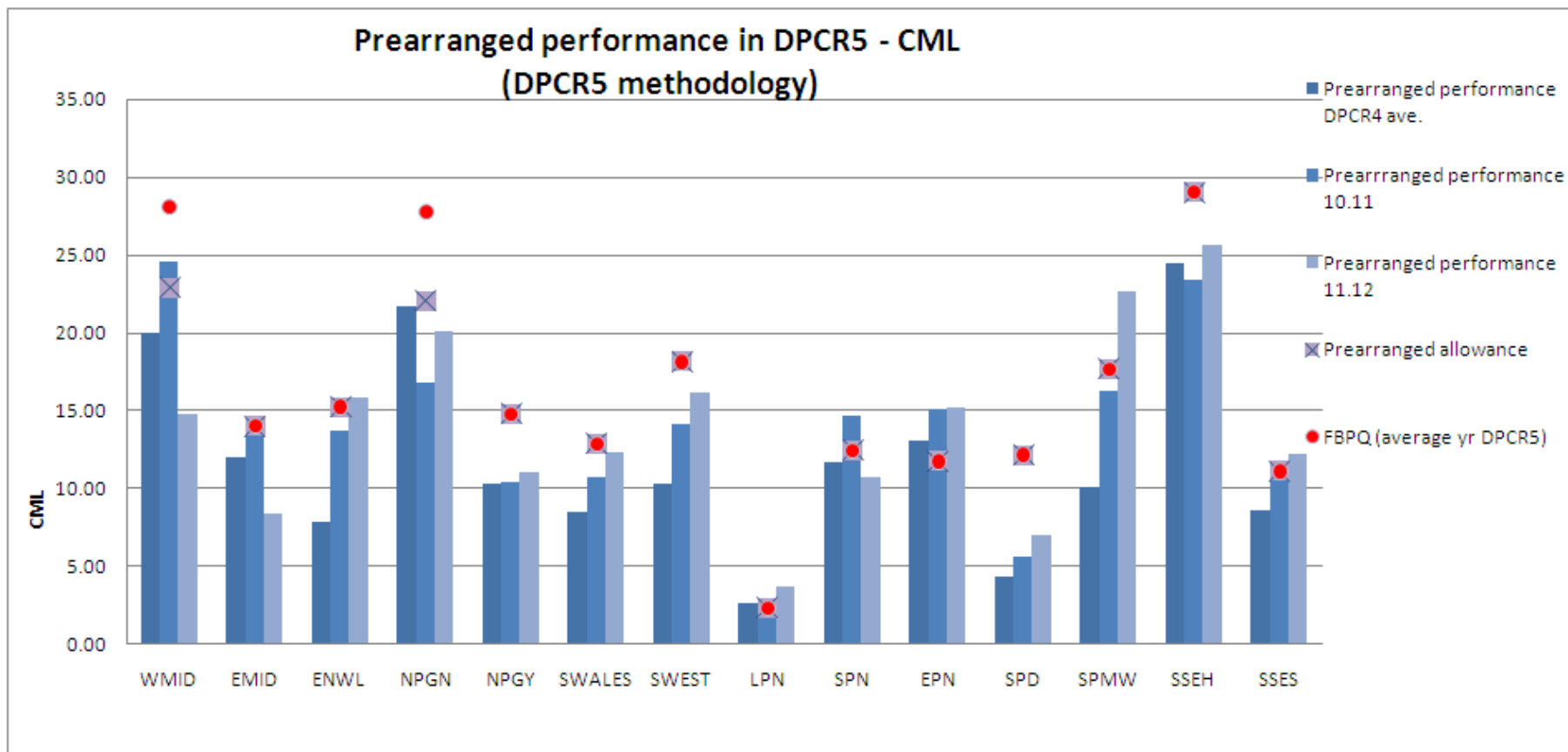
## Issues with and limitations of the DPCR5 approach

- Clearly, expenditure on and around a DNO's network will be a driver for planned outages, but should it be the main driver?
  - Assumption that more money = more interruptions is overly simplistic
  - Where a DNO spends extra money to reduce IIS impact, it shouldn't get an extra reward through a higher prearranged allowance
- Do interactions between different drivers and incentives encourage the right behaviour
  - Network Investment
  - IIS performance
  - Proactive measures to limit frequency and duration of prearranged interruptions
  - LCNF T2 interruptions exempt from IIS

Simplifying and separating the pre-arranged target-setting process might clarify the picture and allow the incentive rate to drive economic decision making by DNOs

**Prearranged performance in DPCR5 - CI  
(DPCR5 methodology)**





## Options explored for RIIO-ED1

1. **Prearranged allowance completely removed from target-setting methodology**
  - Planned CI/CML to count at 50% in performance against unplanned target
  - Option to incorporate prearranged actuals into performance from which targets are derived in future years
  - Account for the impact on IIS within the overall capex review either through an implementation allowance or amended unit cost
2. **Reviewed and refined version of expenditure driven methodology used to set allowances in DPCR5**
  - Further review of expenditure categories
  - Develop a more robust methodology for DNO forecasts of planned CI/CML
3. **Include a view of current average prearranged performance in target-setting methodology**
  - Set an assumed level of Prearranged interruption based on historic performance which mechanistically fits within the IIS target setting

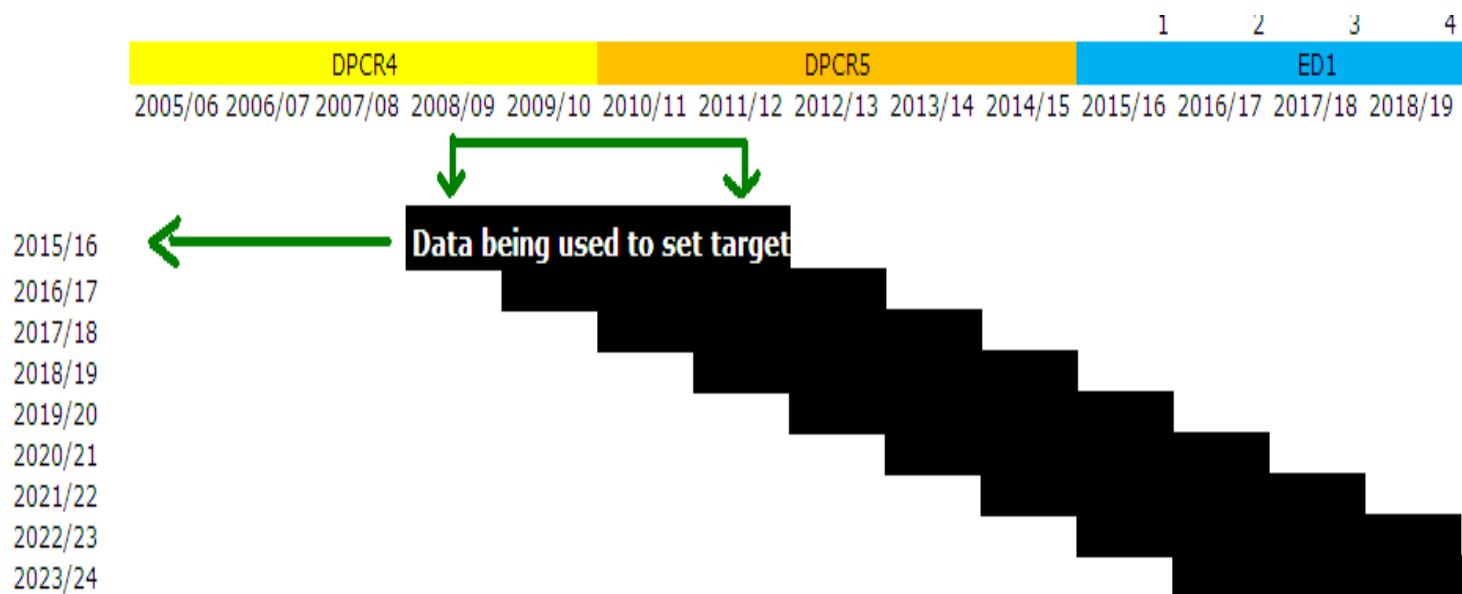


## Options explored for RIIO-ED1

1. Prearranged allowance completely removed from target-setting methodology
  - Previously raised at QoS working group July 2012
  - Fails to account for inherent levels of necessary planned outage unique to each DNO
2. Reviewed and refined version of expenditure driven methodology used to set allowances in DPCR5
  - Without large & potentially disproportionate amount of work, likely to retain same limitations as DPCR5 approach
  - Encourages DNOs to over-forecast?
3. Use a 4-year rolling average of actual prearranged performance to set a separate prearranged target and incentivise the reduction of planned outages
  - Over time will account for inherent levels of necessary planned outage performance
  - Does not require a DNO forecast

# Prearranged Target Setting for RII0-ED1

## Rolling Targets Approach

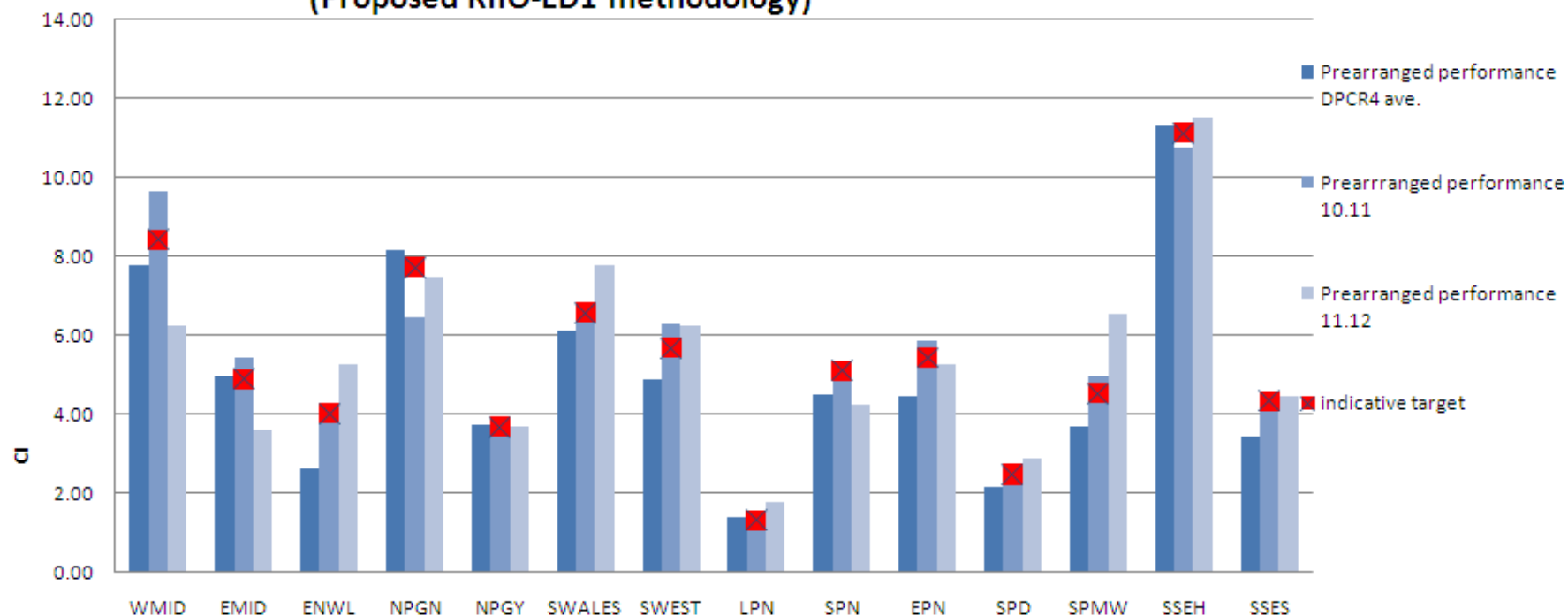


## Mechanics of incentive on Prearranged

- Target set at 4-year rolling average
- Target can get higher or lower
- If 4-year rolling average rises by more than 20% one year to the next, only 75% of CI/CML above this threshold are included the corresponding target

CI	2008.09	2009.10	2010.11	2011.12	2012.13	2013.14	2014.15	2015.16	2016.17	2017.18
Actual	10.00	10.00	10.00	10.00	35.00	25.00				
Rolling 4-year average								10.00	16.25	20.00
Upper target limit									12.00	19.50
Target									15.19	19.88

### Prearranged performance in DPCR5 - CI (Proposed RIIO-ED1 methodology)



**Prearranged performance in DPCR5 - CML  
(Proposed RIIO-ED1 methodology)**




RSWG 17.05.12  
Short Interruptions

# Short Interruptions

- Driver has been to reduce the duration of interruptions to supply
  - New technology has created more short duration interruptions
- Customer expectations are changing
  - Stakeholder feedback indicates impact of even short duration interruptions can be significant
  - 4 out of 6 groups highlighted <3min exclusion
  - energy ‘dips’ highlighted as having impact on business operations
  - In London we already do not close on to suspect faults to minimise disruption
- What incentive is best to address
  - CI incentivises overall interruptions performance – less than 3 min interruptions not in scope
  - CML incentivised longer duration
  - WSC addresses sustained repeat HV interruptions – mainly on overhead / mixed networks

# Short Interruptions - options

- Address repeat interruptions
    - Incentive similar to WSC incentive
    - Recognises shorter interruptions are probably better than long ones
    - Will need to be calibrated by willingness to pay research
    - Can it be made strong enough?
  - Address average short interruption performance (CI equivalent measure)
    - Future technologies may create more short interruptions by reducing longer duration incidents
    - CI type incentive difficult to calibrate
    - Must retain incentive to reduce durations as far as possible
- 



## Short Interruption Target Setting

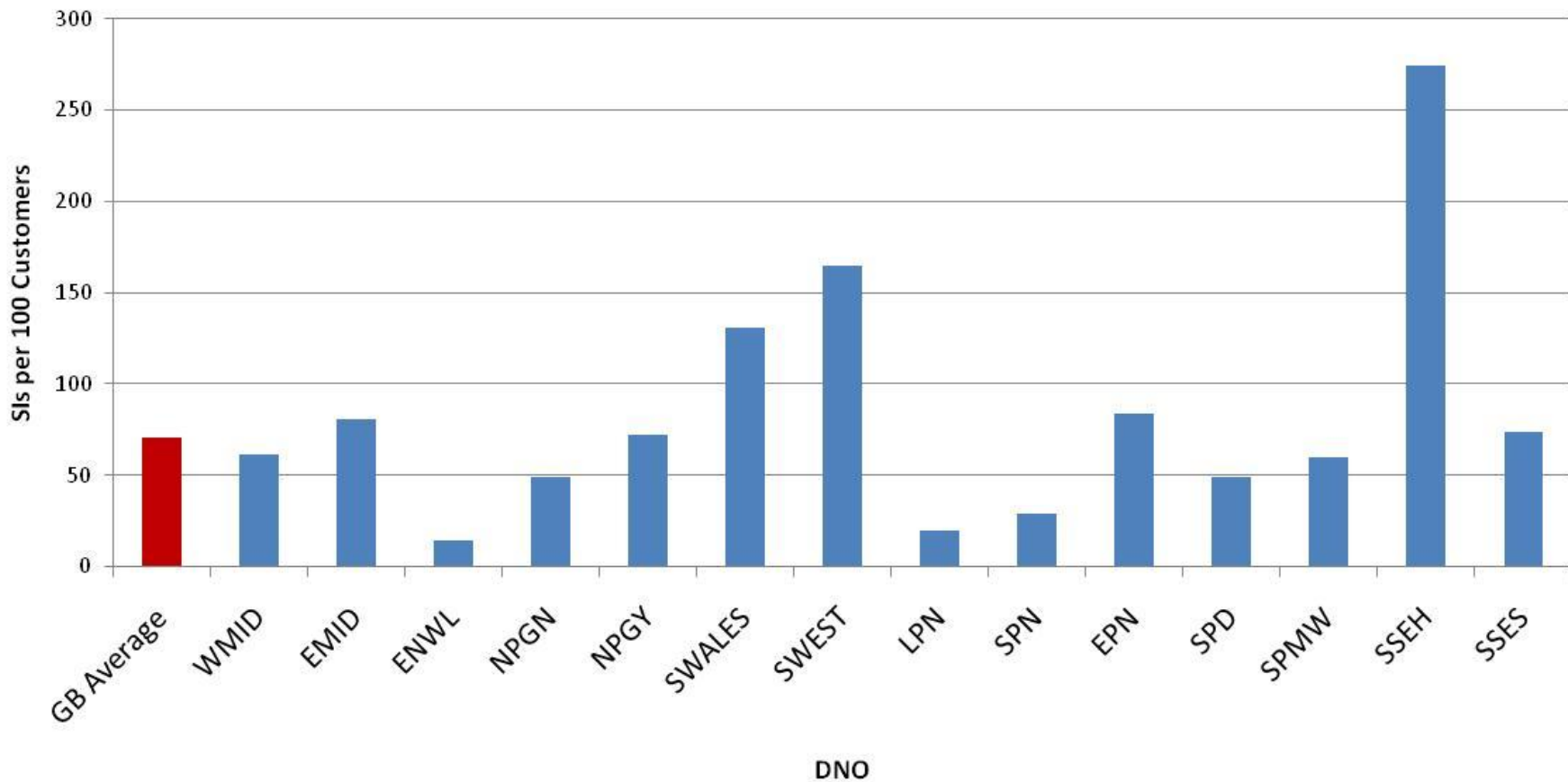
### Questions to be resolved:

- Is there a desire to incentivise Short Interruptions?
- Is it appropriate to create an incentive?
  - Can a comparable measure be applied across DNOs
- What would be the mechanism of an incentive?
- How would targets be set? How to deal with interaction with the main QoS incentive scheme?

## Short Interruption Target Setting

- Short interruptions brought about by operations of the network designed to reduce the length of interruptions.
- Majority of short interruptions are associated with automatic restoration schemes, such as:
  - Pole mounted auto-reclosers;
  - Ground mounted auto-reclosers;
  - Rural automation schemes; and
  - Load transfer schemes
- A DNO's short interruptions performance is significantly influenced by the density of above schemes on its network.

### Short Interruptions per 100 Customers - 2010/11



## Short Interruption Target Setting

### Other Issues:

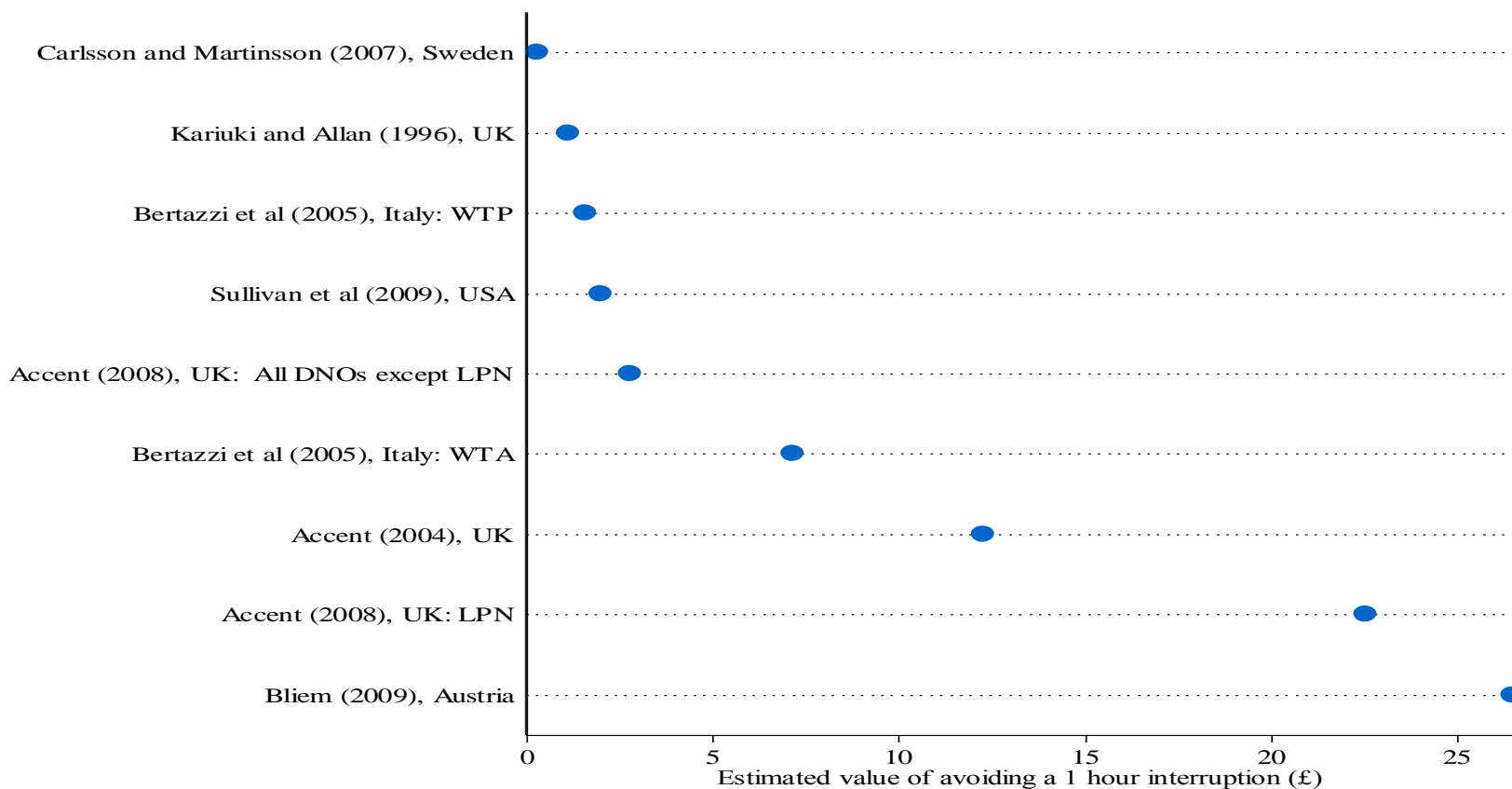
- How accurate is past reporting data? Are data sets sufficiently robust and comparable across DNOs for fair comparisons to be made?
- Would not want to incentive improvements in SIs at the expense of CIs.
  - No evidence to date that customers value SIs the same (or more) than CIs
- Any incentive could therefore be contingent on overall improvement in performance on CIs as well SIs in year.

## Incentive Rates

- Ofgem conducted extensive Willingness to Pay (WTP) research for both DPCR4 and DPCR5
- More recently we have employed Reckon to do a literature review of WTP studies both within the UK and internationally
- General points coming out of this:
  - Current DR5 incentive rates in the range of the studies reviewed
  - No clear signal that rates should be higher/lower than currently
  - Guarantee that redoing the full WTP research would yield different results – question is whether these would be any more/less accurate than now?

# Incentive Rates

**Domestic customers: estimated value of a 1 hour interruption (£)**



## Incentive Rates

- Up rate existing DR5 incentive rates for inflation
- Short interruptions using a scaled back level of revised ED1 incentive rates
  - What scalar to apply?
- Cap and collar on performance?



# RSWG – QoS Meeting 17 May 2012

## Managing Network Risks and Compensation





# Background

- **IIS recognised as powerful incentive for DNOs**
  - Drives customer restoration first, then repair
  - Drives innovation in automation and wider network design
  - Drives hot glove and mobile generation
  - Drives innovation in staffing and response
- **Clear DNO performance driver**
  - IIS and Guaranteed Standards
- **Important for DNOs to consider and manage network risk**
- **Planned and unplanned events and WSC**
- **It's what we do !**
- **Exceptional events recognised and excluded**

# Looking Forward – SSEPD View

- **Supports continuing long term improvements in IIS and GS**
- **Achieving 18 hour standard generally achievable**
- **Moving towards 12 hour standard likely to often not be achievable within DNO control**
  - Travel time
  - Locate, excavate, secure access, repair, restore
  - Recognising normal standards of network design and security
- **Recognises that customers may have increasing expectations of compensation**
- **View change in emphasis**
  - Still strong DNO performance incentive through IIS
  - Main new driver will be customer compensation for inconvenience
- **View this as acceptable but need to be mindful of compensation funding**

# Proposed Changes – Considered View

- **Uneconomic to design out all existing network outage risks**
  - Customers not willing to pay huge additional cost
- **IIS will continue to drive performance**
- **GS payments will become a normal compensation feature**
  - Estimated to increase by over 6 fold
  - Related to risks that DNOs cannot manage
  - Paid to those that suffer set outage criteria (say, 12 hours)
- **Big impact during bad weather events**
  - Need to retain exceptional events exclusion in IIS

# Summary

- **IIS will continue to drive DNO performance**
- **DNOs responsible for failures that are within their control**
- **DNOs should not be at risk of failures which they cannot reasonably manage**
  - GS and EX Gratia Payments for more difficult faults
  - Exceptional events and severe weather
  - Highlands and Islands, subsea cable failures etc
- **These costs should be socialised across all customers**

## Worst served customers

- Definition
  - Customer experiencing on average at least 5 HV interruptions per year over a 3 year period (with a minimum of 3 HV interruptions in each year)
- Required Performance Improvement
  - 25% reduction in average number of HV interruptions measured over 3 years
- Currently capped at £1,000 per WSC
- Costs are logged up and funding is provided ex-post
- We propose to keep this scheme, but what changes can/should be made?

## Worst served customers

- Ofgem are open to amendments –
  - Adjust the definition
  - Relax the £1,000 per customer cap
  - DNOs need to evidence this in their plans
- DNO stakeholder engagement research

## Guaranteed standards (SI 698)

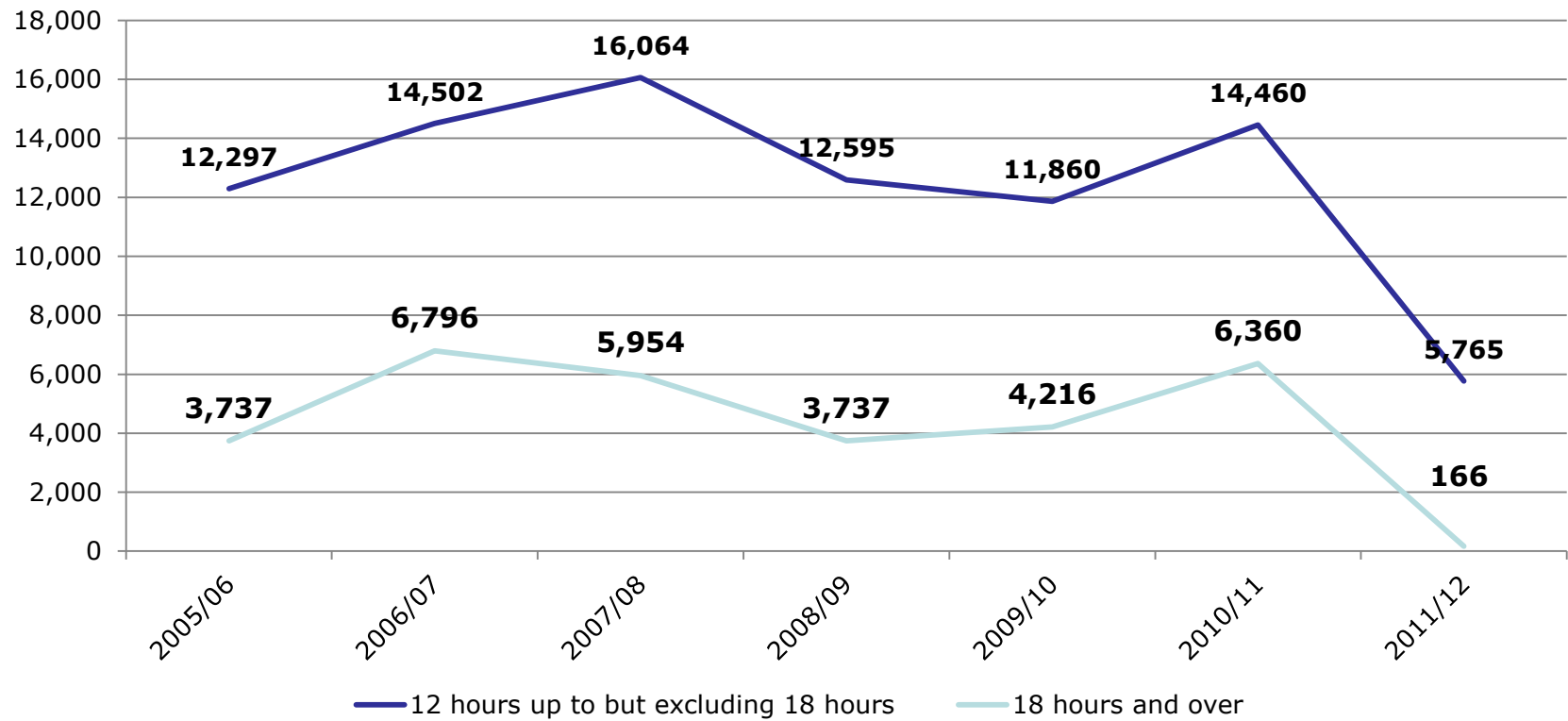
- Adjust compensation levels for inflation
- Hydro – Highlands and Islands customers carve out
- Normal weather standard move from 18 to 12 hours
- Severe weather time periods
- Inclusion of business customers
- Caps on payments
- Severe weather thresholds
- Automatic compensation
- Impact of smart meter rollout

## Normal weather standard move from 18 to 12 hours

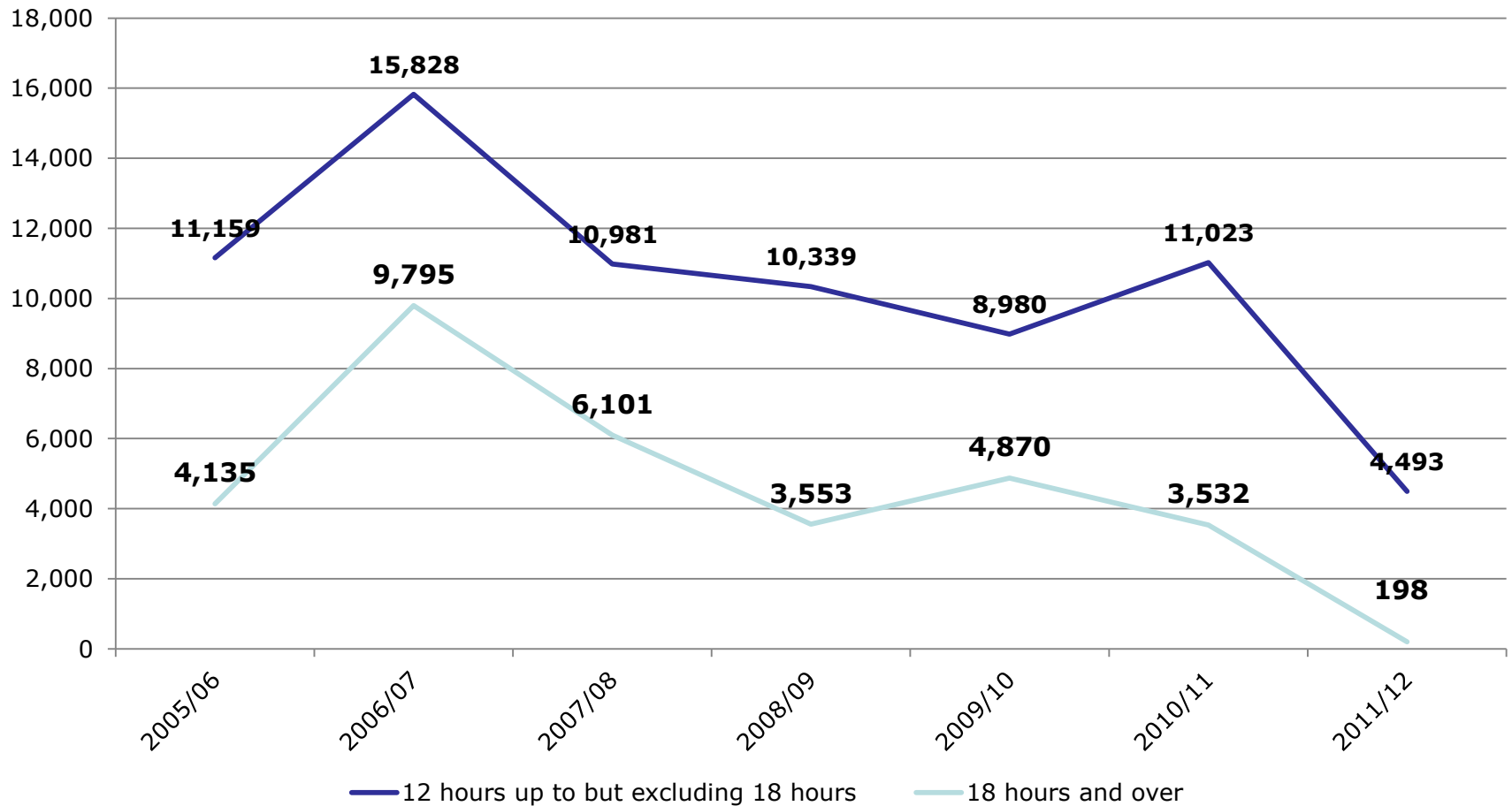
- Ofgem believe the movement from 18 to 12 hours is:
  - Achievable
  - Not costly
  - In customers interests
- Recent evidence supports this



### WPD WMID Performance



## WPD EMID Performance



## Restoration of Customers

<b>WMID</b>	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12
3 mins up to but excluding 12 hours	99.4%	99.3%	99.2%	99.3%	99.4%	99.2%	99.7%
% Not restored by 12 hours	0.6%	0.7%	0.8%	0.7%	0.6%	0.8%	0.3%

<b>EMID</b>	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12
3 mins up to but excluding 12 hours	99.2%	99.0%	99.2%	99.3%	99.2%	99.1%	99.7%
% Not restored by 12 hours	0.8%	1.0%	0.8%	0.7%	0.8%	0.9%	0.3%

## Severe Weather Claims

Claimed	2007-08	2008-09	2009-10	2010-11	2011-12
CI	38	23	37	13	83
CML	83	41	102	33	347
Category 1	12	9	9	5	11
	4 were less than 5 HV incidents over the threshold	2 were less than 5 HV incidents over the threshold	6 were less than 3 HV incidents over the threshold	2 were less than 5 HV incidents over the threshold	4 were less than 1 HV incidents over the threshold
Category 2	4	1	7	3	6
			1 was less than 1 HV incidents over the threshold		1 was less than 5 HV incidents over the threshold
Category 3	-	-	-	-	1
Number of events	16	10	16	8*	22

\* Overlap of one severe weather event

## **Overall resilience**



# Potential measures of Resilience in RIIO-ED1

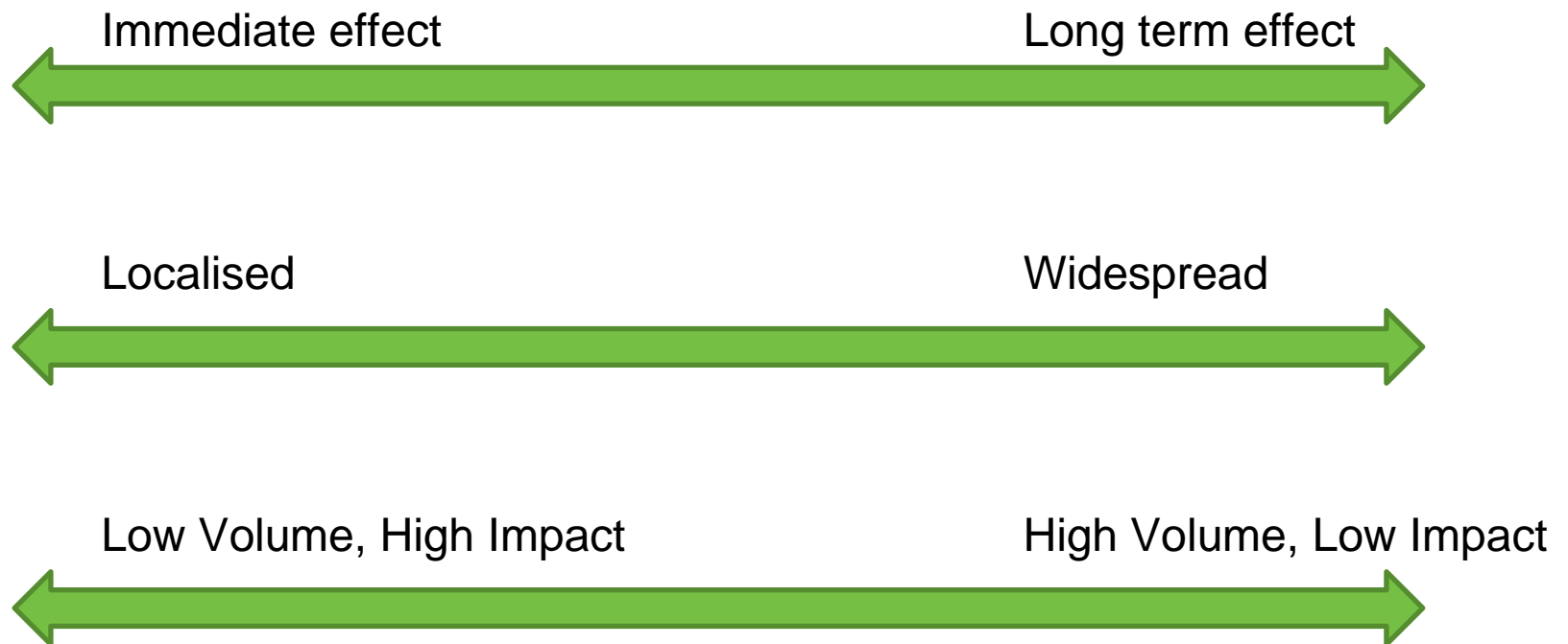
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17 May 2012



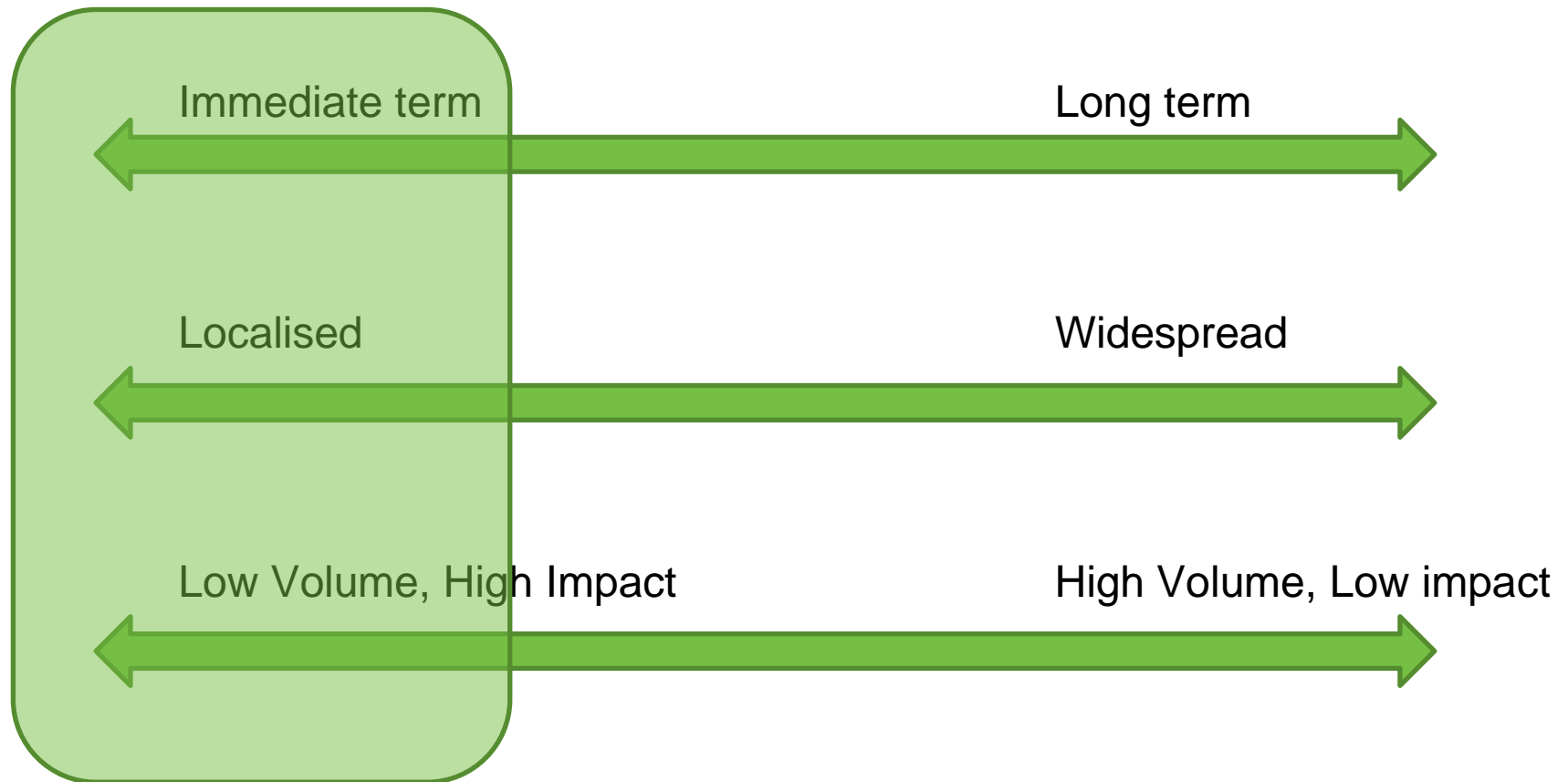
- Distribution networks are designed and built to operate within a wide operating envelope
- Most assets have significant tolerance to variations in loading, temperature, weather, operating regime etc.
- Networks are designed to offer a significant degree of redundancy that makes them resilient to many types of events
- The performance of networks under these conditions is monitored & incentivised by schemes such as IIS, Outputs regime etc.
- These are based on performance under 'average' conditions
- However, there are occasions when external events or circumstances render the assets unable to perform their usual function
- The tolerance of networks to these more extreme events is difficult to measure due to the exceptional nature of such events
- The preparedness of organisations to respond to extreme events also has a significant impact on the ability to restore service

- ▶ 'Resilience' covers a wide range of potential network impacts





- ▶ DPCR5 debate was largely around the effects of single, large but unlikely events, eg CNI, HILP



- RIIO-ED1 will need to re-consider all aspects of Resilience
  - Continuation (or not) of DPCR5 mechanisms
  - Climate Change adaptation requirements
  - Resilience to storms, floods and other extreme weather
  - Resilience to terrorism or other malicious attack
  
- Key to this will be determining what is an appropriate and affordable level of resilience that networks should exhibit (& how should we measure it?)

## ▣ Network preparedness

- Robustness of the Network assets
- Redundancy of the Network infrastructure

## ▣ Organisational preparedness

- Response capability of the organisation
- Risk appetite of the network operator

▣ Previous work of the Network Resilience Working Group considered the possibility of developing a multi-dimensional measure of network resilience

▣ Examples were based on storm events in response to the impacts of storms in September 2002

## Robustness of the Network assets

- The degree to which an atypical event disturbs the network from its usual operating regime, eg No. overhead line faults on an average day / No. overhead line faults on a 'storm' day.
- At unity, the network doesn't notice the storm so is completely resilient
- Would require a weather-related rather than network-related definition of a storm

## Redundancy of the Network infrastructure

- The amount of 'spare' capacity within the system that can be used to maintain or restore supplies when a component fails
  - Identifying sections containing customers with no same voltage alternate feed allows calculation of the ratio of 'secure' customers (more than one feed circuit ) to 'insecure' (only one feed circuit).
- = Number of secure customers on exposed network

Total customers in network

## Response capability of the organisation

- Response to extreme events relative to the normal response rate for overhead networks can be defined in average response times, eg 
$$= \frac{\text{Normal Overhead Network ASID}}{\text{Overhead Network Storm Day ASID}}$$
- As supplies are restored more quickly the Response index increases to a maximum of unity

## Risk appetite of the network operator

- The level of risk carried on the network arises from several sources;
  - The number of customers per protection zone – this is the number of customers who will suffer a supply interruption in the event of a fault.
  - The extent to which customers are connected to radial feeders as opposed to mesh feeders or automated radial feeders
  - The length of time taken to effect permanent repairs to earlier faults, ie the number of holes in the network at the time of the event

- ▣ If measures were combined in a metric, it would allow different mitigation measures to be tested against each other
  - Reduce probability of event/s
  - Reduce potential impact of event/s
  - Improve ability of network to recover from event/s
  - Improve the organisation's ability to deal with event/s

- ▶ A number of potential ways of incentivising resilience;
  - Publishing in Annual report
    - Reputational incentive and the basis for discussion with stakeholders
  - Linking to delivery of pre-determined Outputs
    - More formally linked to the achievement of certain prescribed states (would need to be defined)
  - Linking to delivery of pre-determined investment programmes
    - Associated with the delivery of prescribed programmes of work that can be measured in volumes
  - Incentivised through amendments to existing incentive regimes, eg remove exemptions from IIS

# A potential 'Broad Measure'?

- It is unlikely that we will be able to develop, test and implement a measure of overall resilience in time for the RIIO-ED1 process; however this area is of increasing importance to stakeholders as reliance on a secure electricity supply increases.
- It may be possible to measure a number of resilience indicators based on current network performance and investment. These could be included in the Annual report, or perhaps combined into a Broad Measure that would allow DNOs to demonstrate the resilience of their networks. It is unlikely to be appropriate to directly incentivise such a measure, but it could be used as a metric against which DNOs could demonstrate the robustness and appropriateness of their associated investment plans



# A potential 'Broad Measure'?

- Such measures could be derived from existing reporting requirements and include;
  - Proportion of network compliant to ETR132
  - Proportion of overhead lines built to enhanced design spec
  - Number of customers fed from EHV & 132kV substations not protected to 1/100 flood level
  - Proportion of customers fed on HV radials
  - Proportion of substations compliant with Black Start requirements
  - Number of sites with outstanding CNI requirements
  - 'Pinch point' measure?
  - Etc.

## **Any other business**

- Open letter exceptional event Post Dartford, etc.

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