ofgem Promoting choice and value
for all gas and electricity customers

Cost Assessment Working Group (CAWG)

Meeting 4

26 June 2012

Today's agenda

Morning session

- Totex – Bob & Barry (WPD), Julian (UKPN), Keith (NPG), Mark (Ofgem)

Afternoon session

- Responses to DR5 cost assessment approach - Sara (Ofgem),
- Network Investment – Tom (Ofgem), Iain (NPG), Lawrence (Ofgem), Sarah (ENWL)
- Real Price Effects – Mark (Ofgem)
- Pension Costs – Sarah (ENWL)
- Uncertainty Mechanism – James (Ofgem)

Purpose of Today

- Develop further thinking in five areas:
  1. Totex
  2. Network Investment
  3. Real price effects
  4. Pension costs
  5. Uncertainty mechanisms
- What is fit for purpose? What requires tweaks/better way of doing it? What needs wholesale change?
- Actions given to answer these questions
- Licensees to make full use of the group and bring own propositions at and between meetings to inform all of the above

RIIO-GD1 Totex Model

- RIIO is not mechanistic
  - Regressions are used to inform discussions between Ofgem and the DNO
  - Baselines are not set on totex alone (WJBP, unit cost, etc)
- Three approaches have been used to inform
  - Model with single aggregated cost
  - Middle Up Model – 3 separate models
  - Bottom-up Model – Combining 7 separate models
- 3 years historical and 2 years forecast modelled (8yr model cross check)
- Adjustments
- Selection of cost drivers – using engineering knowledge
- Transparency – Excel used

RIIO-GD1 Models

- 3yrs actual historical costs (2009-2011) panel model
  - 2011 costant – best of current performance
- 2 yrs forcasts (2014-15) panel model
  - 2014 costant – most robust performance
- 8 yrs forecasts (2014-21) panel model (crosscheck)
- Costs models
  - Topdown – single aggregate totex costs
  - Middle-up – aggregation of capex, opex and repex costs
  - Bottom up – 7 activity level costs
    - Repex Tier 1
    - Capex – Mains reinforcement
    - Capex – Connections
    - Opex – work management
    - Opex – emergency
    - Opex – reports
    - Opex - maintenance

RIIO-GD1 Totex Middle Up Model

- The middle up model combines the totals of Capex, Opex and Repex
- This model is to provide a second view of totex
  - Based on the upper quartile of the aggregate of opex, capex and repex modelled costs
- The efficiency score is based on

$$\text{Efficiency Score} = \frac{\text{Capex + Opex + Repex Actual Cost}}{\text{Capex + Opex + Repex Modelled Costs}}$$

- The sum should be equal to topdown totex model

GD1 Totex Third Approach – Bottom-up 1

- The Bottom-up approach contains two groups
  - Those cost activities with identified cost drivers - Regressions
  - Those cost activities were it was not possible to allocate cost drivers – Non-regression
- An aggregate of:
    - The upper quartile allowance of the sum of regression activities modelled costs, and,
    - Each non-regression cost activities allowance
- Advantages of this Model
  - For each activity there is a cost driver that is more aligned to each activity
  - Each non-regression has been subject to specialist technical assessment

GD1 Totex Third Approach – Bottom-up 2

- Activities with identified cost drivers
  - Efficiency Score = Sum of 7 activities actuals / Sum of 7 activities modelled
  - The upper quartile is then taken based on the aggregate
  - Then a benchmark is made of the efficient cost
- Activities where no cost driver was allocated:
  - A benchmark for each activity is calculated with use of technical consultants
  - This is then added to the areas were cost drivers were identified
- Reverse adjustments are then applied along with RPEs and productivity assumptions

Potential use for RIIO-ED1

- Using more than one totex model to help inform or support preferred model (aggregate, middle-up, bottom-up)
  - Middle-up – possibly expand the groups used in DPCR5
  - Bottom-up – possible breakdown of areas on C1 for a disaggregated approach
- Use of technical expertise
  - Identify areas without assigned cost drivers early
- Transparency
  - data sharing with DNOs
  - Excel
- Ensure that whatever approach undertaken is compatible with other analysis ie. Business Support
- Ensure that specific DNO view on scenarios are the same
- In total there are 33 regressions run in GD1 – fewer than DPCR5

DR5 Approach: review of responses

- Level of work – green (limited/none), amber (medium), red (significant)
  - limited = strong consensus limited work required, no red in applicability and no more than one red in materiality
  - significant = strong consensus work required, red in materiality
  - medium = in between
- Level of consensus – strong (green), medium (amber), weak (red)
  - criteria: applies only to applicability,
  - strong = all/all except 1 in same category
  - medium = 2 or more across two categories (one must be amber)
  - weak = across all three or green and red

Areas of consensus

Limited Work
Diversions
ESQCR
Legal & Safety (asbestos, safe climbing)
Major systems risk (flooding)
Environmental
Visual amenity
NOCs other (dismantlement, remote location generation)

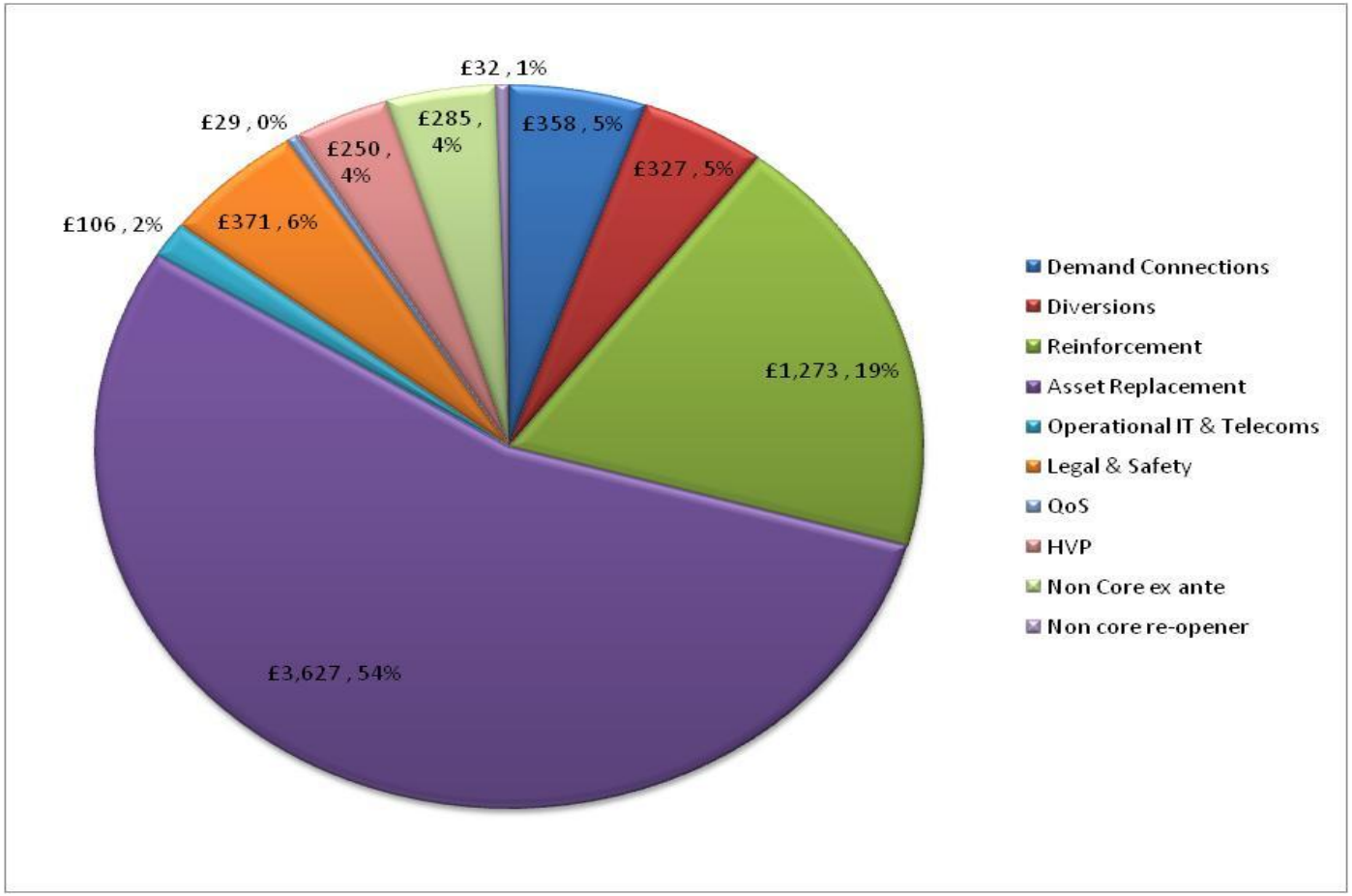
Significant Work
Asset Replacement (modelled costs, non-modelled costs, unit cost adjustment)
Inspection & Maintenance (I&M)
Non-op capex (V&T)

Areas of disagreement

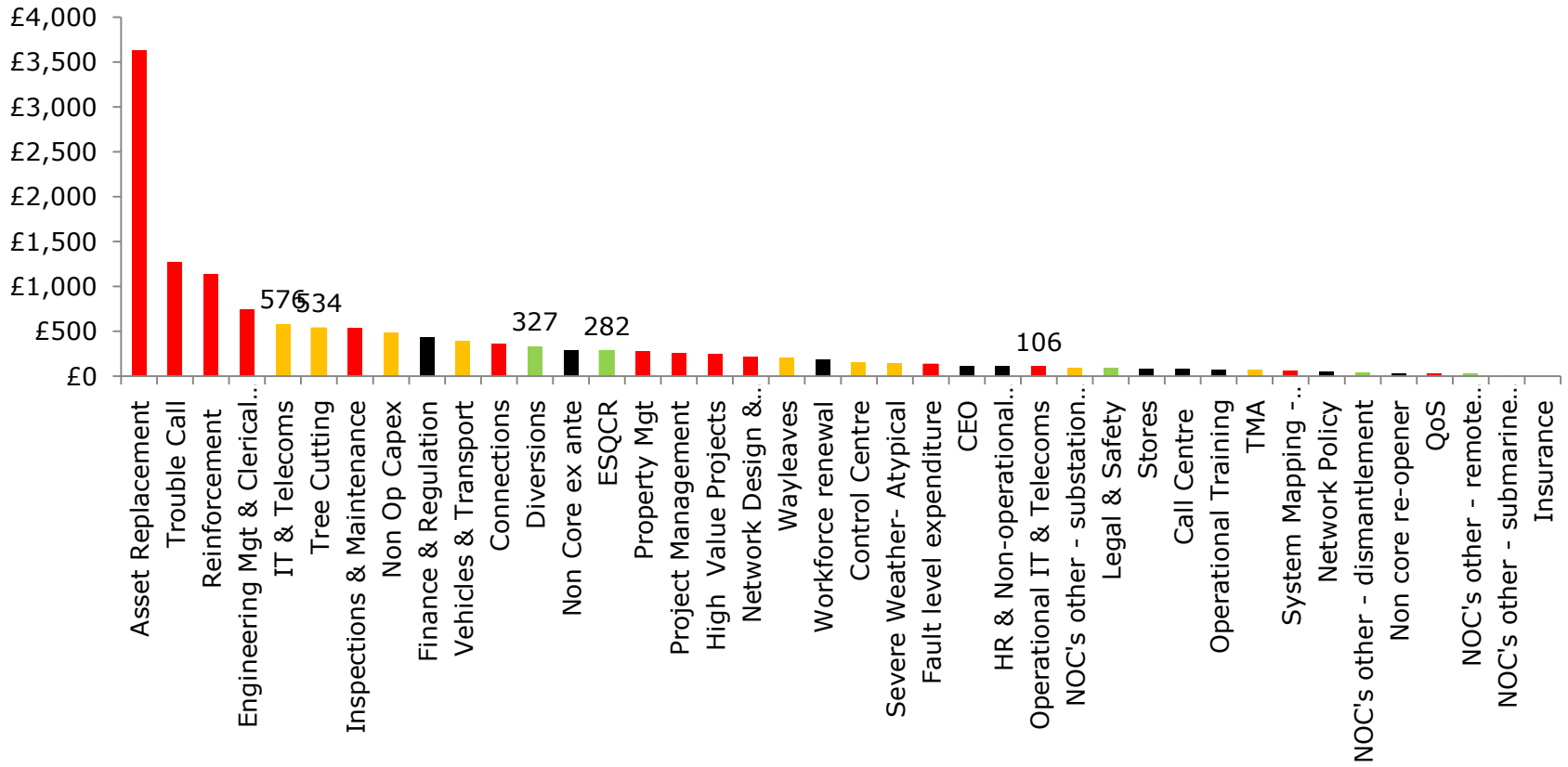
Medium Work
Operational IT (substation RTUs, marshalling kiosks, receivers)
Major systems risk (HILP, Black Start, CNI)
Losses
I&M (Pressure assisted cables, submarine cable, Urban specific)
Non-op capex (plant & equipment)

Significant Work
General Reinforcements
Asset Replacement (wood pole overhead lines)
High value projects (specific)
Connections (low volume high cost connections)
Faults (LV HV OH faults, EHV & 132kV faults, non QoS faults, pressure assisted cables, submarine cables, third party cable damage recovery)
Tree cutting
NOCs other (unmetered electricity)
CAIs (Group 1 and 2)
BSCs (Group 3 indirects, property, IT&T, property rents)

Makeup of DR5 Network Investment (1)



Makeup of DR5 Network Investment (2)



Further DNO views/comments

- Uncertainty mechanisms
  - Secondary network reinforcement
  - Fault levels
  - Real price effects
- Expert review
  - Suitable for property, IT and Totex
  - But only if there are no obvious cost drivers and any benchmarking must be appropriate
- Regional adjustment
  - Limited and onus on individual licensee in WJBP but...
  - submarine cable
  - remote location generation
  - modelled separately from Totex

ofgem Promoting choice and value for all gas and electricity customers

Load-related expenditure baseline setting

26 June 2012

Load-related expenditure - Overview of categories

- General reinforcement modelling
  - General reinforcement: primary network (N-2 & London)
  - General reinforcement: primary network (132kV – EHV excl. N-2 & London)
  - General reinforcement: secondary network (HV – LV)

- Customer specific (ie: connections)
  - High Volume Low Cost
  - Low Volume High Cost

- Fault level reinforcement

General Approach

1. Understand approach at DPCR5
2. Is it fit for purpose for RIIO-ED1 and beyond?
3. Areas requiring development/ improvement
4. Specific areas that need to be considered/ accounted for
5. How allowances might interact with outputs/ secondary deliverables

= Ofgem's September doc view of how load-related expenditure modelling might work

Load-related expenditure - Overview of DPCR5 approach to expenditure benchmarking

	Analysis undertaken			Outputs	Uncertainty mechanism	
	Modelled / benchmarked	Scheme review / expert	Trend/ runrate analysis	Tied to secondary deliverable	Eligible for volume driver	Expenditure eligible for Load related reopener
General reinforcement modelling						
Primary network (N-2 & London)		√		LI		net efficient expenditure above/ below Ofgem baseline, subject to materiality criteria
Primary network (132kV – EHV excl. N-2 & London)	√			LI		net efficient expenditure above/ below Ofgem baseline, subject to materiality criteria
Secondary network (HV – LV)			√			net efficient expenditure above/ below Ofgem baseline, subject to materiality criteria
Customer specific (ie: connections)						
High Volume Low Cost	√				√	
Low Volume High Cost		√				net efficient expenditure above/ below Ofgem baseline, subject to materiality criteria
Fault level reinforcement		√				

Load Related Expenditure Reopener:

- Materiality threshold: Standard 1% of base revenue plus additional hurdle of 20% above/ below DPCR5 baselines for expenditure areas eligible for reopener
- Efficient expenditure above thresholds eligible after IQI factor is applied. Opposite on downside if activated by Ofgem for RIIO-ED1

Modelling framework

Primary network model approach for DPCR5 as a starting point

In terms of setting allowances for RIIO-ED1, the existing model assesses the relevant points:

1. Relative to demand growth, how much capacity is a DNO proposing to install?
2. How does this ratio compare to previous years?
3. How does this ratio compare to other DNOs (forecast & historic)?
4. How does the cost of installing this capacity compare to the DNO's previous MEAV p/MVA?
5. How does the cost of installing this capacity compare to other DNO's (forecast & historic)?
6. How do the costs of the individual elements of the work proposed compare with the equivalent unit cost modelling

Modelling framework

Primary network model for DPCR5 as a starting point

In terms of setting allowances for RIIO-ED1, there are some developments to the analysis that are likely to be required:

- Clarify exact nature of interaction with secondary deliverable
- Capturing the impact of generation growth on substations (RSWG)
- A modelled approach to the secondary network (RSWG & FCWG)
- Ensure that specific DNO views on scenarios do not pollute the modelled comparison of data
- Ensure that whatever approach undertaken is compatible with Totex analysis

All of this work is underway to some degree within the ED1 process through relevant working groups – CAWG probably best placed to pull this all together for September paper and modelling

General reinforcement: N-2 schemes & London

DPCR5 APPROACH:

- Scheme-by-scheme review – bottom up consultant review

DEVELOPMENT FOR RIIO-ED1:

- Same basic approach
- Potential use of scenario-based scheme lists
- Will need sensible thresholds for what is/ isn't modelled

RATIONALE:

- Schemes are likely to have specific detailed design that do not lend themselves well to comparison through modelling
- This was the approach taken at both DPCR5 and is being undertaken at RIIO-T1
- Use of scenarios as trigger point for investment to manage some of the uncertainty and allow for a flexible secondary deliverable

General reinforcement: primary network (excluding specialist schemes)

DPCR5 APPROACH:

- Modelling of the ratio of capacity installed vs. max. demand (across DNOs and historic vs. forecast)
- Cost per MVA of installed capacity (across DNOs and historic vs. forecast)
- Construction costs of schemes identified vs. replacement unit costs

DEVELOPMENT FOR RIIO-ED1:

- Capturing growth in generation at substations, rather than just netting this off from demand peak (WIP – RSWG)
- Potential use of scenario-based scheme lists

RATIONALE:

- key questions still appropriate – although answers in ED1 may differ to those in DPCR5
- Comparison to DNO historic as a means of accounting for inherent network differences
- Use of scenarios as trigger point for investment to manage some of the uncertainty and allow for a flexible secondary deliverable
- Potential increase in DG likely to impact on the capacity installed vs. max demand ratio

General reinforcement: secondary network (HV – LV)

DPCR5 APPROACH:

- Trend analysis/ run-rate analysis used
- Material rises from DPCR4 levels requiring strong evidence

DEVELOPMENT FOR RIIO-ED1:

- Secondary network modelled in same manner as primary network
- Movement towards more modelled inputs rather than scheme specifics
  - E.g. Can the modelling work under WS3 provide DNOs with inputs for the Ofgem model (volumes, demand changes, installed capacity)
- Model run for different "scenarios"
- If/ where possible, incorporate fault-level scheme into modelling

RATIONALE:

- Within the wider context of the government's low-carbon obligations, reinforcement at LV in order to allow for the accommodation/ connection of LCTs is likely to become a bigger issue in ED1 than it was in DPCR5.
- Greater uncertainty across the 8/9-year period. Different scenarios can be modelled based on different assumptions on uptake and clustering.

Customer-specific load-related expenditure - Connections

DPCR5 APPROACH:

High Volume Low Cost connections:

- Small-scale LV and other LV only: DNO forecast volumes x lowest of industry median/ DNO own gross unit cost of each subset
- LV w/ HV: DNO forecast volumes x lowest of industry UQ/ DNO own gross unit cost
- Net to gross ratio set based lowest of industry UQ/ DNO own ratio
- Baseline based on DNO volumes: volume driver true-up will amend DNO revenue
- Ex-post assessment of net to gross ratio could amend baselines

Low volume High Cost connections

- All connection expenditure forecast at EHV+: ex-ante allowance set based on projects in progress/ projects in planning stage for DPCR5 and projects forecast to be carried out by ICPs/ IDNOs
- Net to gross ratio set based lowest of industry UQ/ DNO own ratio

Customer-specific load-related expenditure - Connections

DEVELOPMENT FOR RIIO-ED1:

- Where possible, the intention is to carry out analysis and set baselines from volume of projects delivered per market segment, rather than per MPAN
- Include DUoS-funded work carried out by third parties within volume driver/ uncertainty mechanism

FURTHER WORK REQUIRED BEFORE APPROACH TO ANALYSIS IS DEVELOPED:

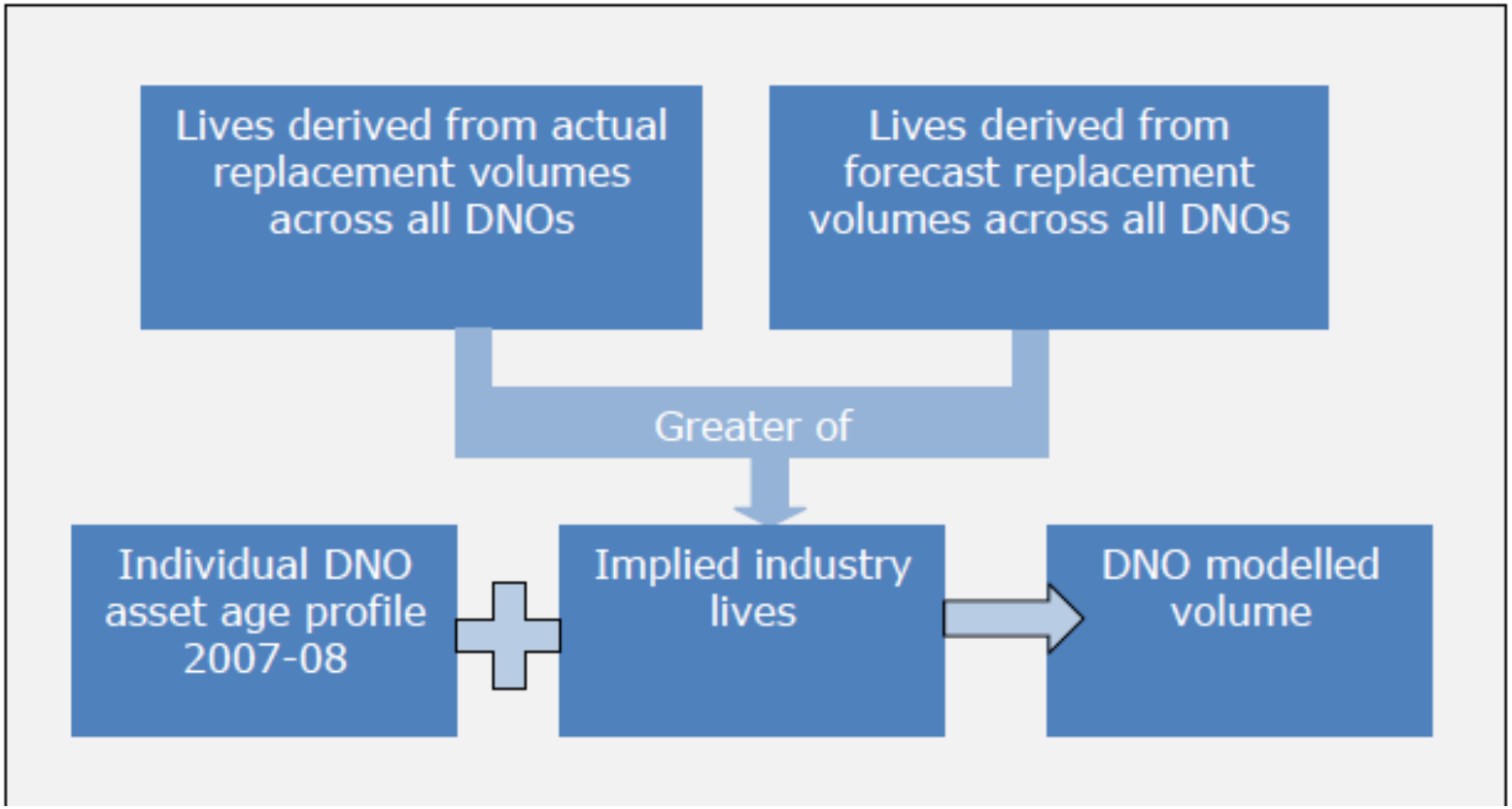
- Clarification of CAF rules
- Details of incentive for quicker connection times
- Policy details on anticipated reinforcement investment
- Policy details on any further movement in the contestable/ non-contestable boundaries

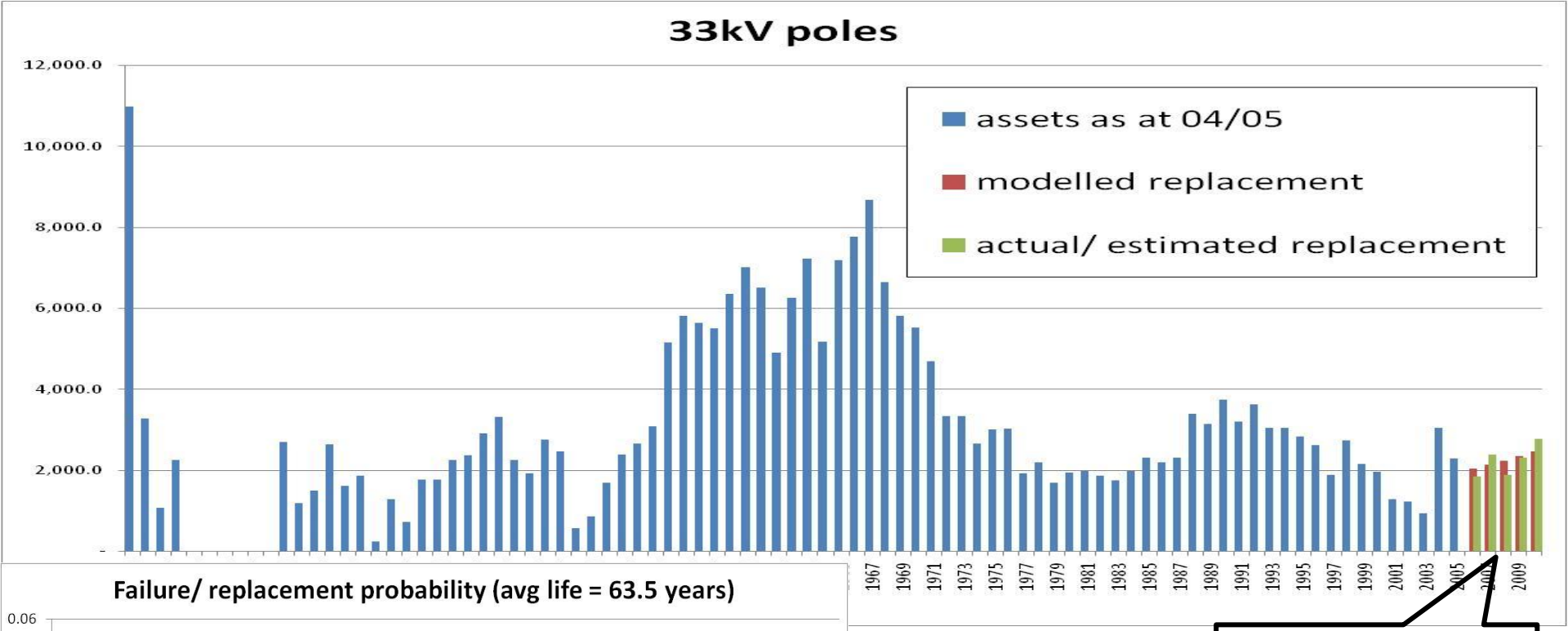
Non Load Related Investment

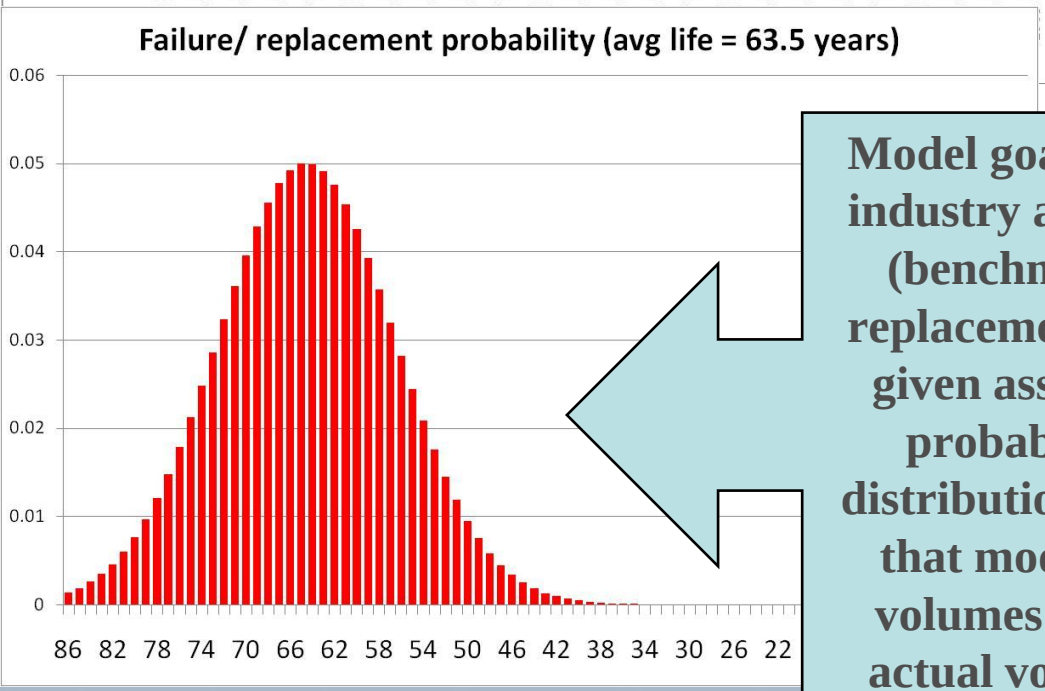
What are we attempting to do?

- The ultimate aim is to help inform the level of investment required for the DNOs in ED1.
- An age based asset replacement model based on survivor modelling principles will be used (as per DPCR4 & 5).
- The volume of assets forecast to be replaced by each DNO will be benchmarked against model output:
  - Avoids need for detailed asset condition information but is still sufficiently robust to determine baseline expenditure
  - also useful under RIIO fast tracking assessments
  - onus on DNOs to justify departures from model generated volumes and expenditures
- Ideally model would capture all relevant factors and be acceptable to all parties – just a matter of "cranking the handle"

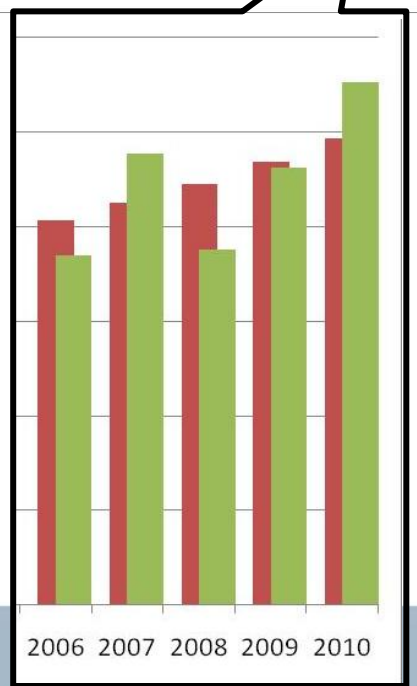
Starting point: the DPCR5 model







Model goal seeks industry average (benchmark) replacement age, given assumed probability distribution, such that modelled volumes equal actual volumes



DPCR5 model assumptions

- Each unit replaced is homogenous –
  - Replacement is like-for-like
  - volumes can be multiplied by a single asset value to derive replacement expenditure for that asset type
- Use of industry average life rather than frontier, quartile etc
- asset is replaced at end of life, rather than refurbished, and in its entirety (not specific components)
- Variation in lives of individual assets for any reason captured by assumed probability density function

Potential areas to revisit/ improve

- Conceptual
  - Use of Poisson probability distribution ($\sigma^2 = \mu$). Are others suitable eg Weibull?
  - does the benchmark life reflect appropriate management of risk and HI targets?
  - Should benchmark be industry average or is it feasible/ desirable to establish a frontier?
  - real life complications (eg programs not individual replacements, scope efficiencies, refurbishment not replacement, uncertainties associated with smarter grids, multiple investment drivers)
- Scope of model application
  - Still only appropriate for primary network assets? (61% of NLRE)
  - Specific asset type issues in DPCR5
    - OH lines affected by refurb, costs not comparable (23%)
    - Cost/ scope boundary issues with non modelled volumes - secondary assets (7%), substation "other" (7%)

Potential areas to revisit/ improve (2)

- Data/ implementation
  - Change in reporting of volumes in DPCR5 – solved some issues, created others? Are historic data being recut for other reasons anyway?
  - How many years historic data is required? (longer the better)
  - Derivation of unit costs and potential overlap/ gaps between asset types?
  - Other potential data issues?
- Lessons from electricity transmission (not used in GD, GT)
  - More data in T1 - historic data spanning previous 2 price control periods
  - More of a basis for discussion than benchmarking tool (not many TNOs)
  - Consideration of variations in historic volumes and significance on model (not expected to be material in distribution)

Do we need a dry run to test these and unknown issues?

Real Price Effects 1

- RPEs: These measured the expected real input price inflation of the DNOs.
  - Avg RPEs of 1.1% per yr for Network Investment
  - Avg RPEs of 1.4% per yr for Operational activities
- These were based on assumptions made from
  - CEPAs April 2009 report
  - Mix of input from the DNOs FBPQs
- Element of risk with repect to RPEs - Conflicting evidence was received from the DNOs in DPCR5
- RPEs are to be submitted in the 2012 Forecast pack

What assumptions can be made taking account of uncertainty

Example - Transmission BP - RPE estimates by main cost category

RPE estimates provided by First Economics for SHETL, NG, SPTL

	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17 to 2020/21
Labour – general	(3.2)	(0.9)	0.6	0.8	0.7	1.05
Labour – specialist	(1.95)	0.35	1.85	2.05	1.95	2.3
Materials – general/civil	(0.7)	1.1	1	0.9	0.7	1.3
Materials – electrical	(0.2)	1.6	1.5	1.4	1.2	1.8
Materials – steel for pipelines	14.8	1.6	1.5	1.4	1.2	1.8
Plant and equipment	(1.2)	0.6	0.5	0.4	0.2	0.8

Real Price Effects

- RPEs are to be justified in WJBPs
- The fast track companies in T1 were allowed their requested RPEs
  - Non-fast tracked companies RPEs reviewed
- Problems with transparency in DPCR5
- Ensure consistent application across working groups
  - Eg. Ensure consistent application within WS3 model
- Productivity improvements
  - Assumptions were made by Frontier Economics for DPCR5
    - 1% per yr for both NI and operational activities
    - Limited challenge from DNOs on figures
    - Do smart grids and new technologies offer up scope for greater productivity gains in RIIO-ED1?

Do efficiency assumptions balance with RPEs

Uncertainty mechanisms

Uncertainty mechanisms fully-calibrated at price control review

- **Indexation (e.g. RPI)**
- **Volume driver** (calibrated at price control review)
- **Revenue trigger** (calibrated at price control review)
- **Use it or lose it mechanism**

Forward-looking revenue adjustment determined by Ofgem during price control

- **Revenue adjustment based on updated cost assessment if trigger event occurs (e.g. specific re-opener)**

Revenue allowance determined after company incurs relevant expenditure

- **Pass-through items**
- **Logging-up of actual expenditure subject to ex post efficiency review**
- **Backward-looking revenue adjustment based on benchmarking analysis of outturn costs**

Potential areas requiring uncertainty mechanisms

- DNOs have to date suggested the following areas that may require some form of uncertainty treatment:
  - TMA including lane rental
  - Blackstart/ CNI/ other centrally mandated spend
  - Smart meter roll-out costs
  - Reinforcement spend
  - Rising & lateral mains
  - High value projects

Approach for ED1

- Where possible we will endeavour to provide ex-ante allowances, rather than relying on uncertainty mechanisms
- Onus on DNOs to provide robust information as part of their WJBP
- DNOs will need to show how and why it is in customers' interest to adopt uncertainty mechanism ahead of ex-ante approach
- We believe that a number of the areas highlighted by DNOs on the previous slide could be settled via ex ante allowances


ofgem
Promoting choice and value
for all gas and electricity customers