Whole-life costing

Cost Assessment Working Group

10 July 2012

Agenda

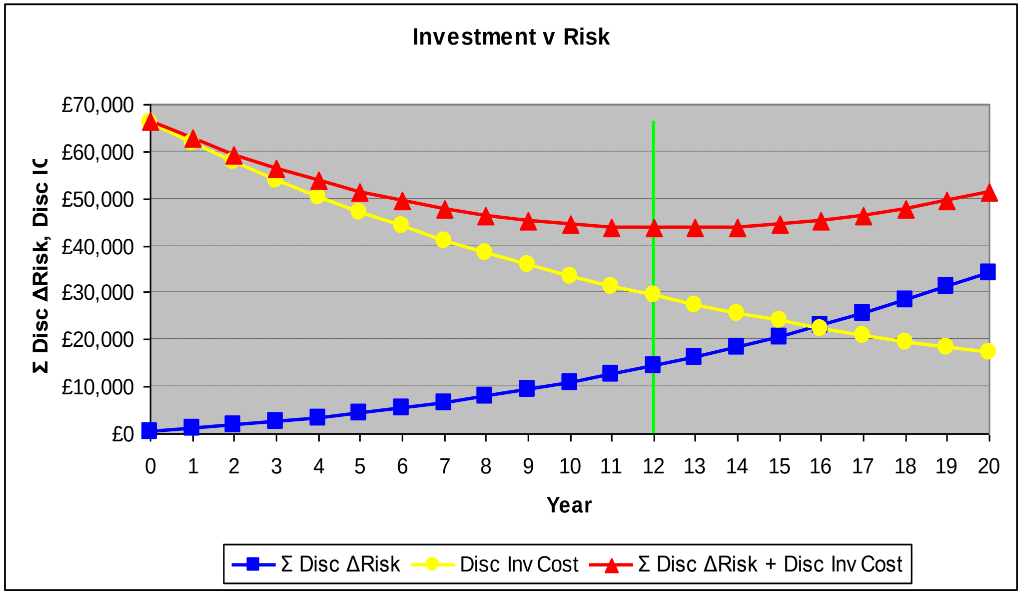
- How companies make decisions about whole life costs
- How uncertainty affects decision making
- Modelling parameters
- How different assessment approaches could distort DNO behaviours
- Key questions for CAWG

Company decision making - Tensions

- Short-term cost minimisation
  - How do I do the minimum possible to reduce near-term investment requirements?
    - At what detriment to longer-term costs?
    - At what cost to risk, service or performance?
- Whole-life cost minimisation
  - How do I minimise the overall outlay on an asset when considered over its whole lifecycle?
    - At what cost to risk, service or performance?
- Whole-life value optimisation
  - How do I ensure I get the best return from an asset for the money I spend on it over its lifetime?
    - At what near-term cost to customers?

Whole life value optimisation

- Looking at whole-life value needs to consider both the costs of the asset and the value that the asset generates
  - Asset risk increases as assets age
  - The earlier assets are replaced, the more potential value is voided
- Combining these two allows an optimum intervention point to be determined



Solution pricing (1)

- Companies need to assess conditions under which refurbishment techniques can extend lives – and then assess whether they represent good value relative to alternative techniques
- Such techniques not available for all asset types
- Refurbishment may affect asset components not included in all DNO HI calculations of hosting assets
- Refurbishment options may only be applicable at certain points in the asset lifecycle
- Will therefore need to agree HI movements associated with refurbishment solutions and may need to adjust deterioration models to recognise that refurbishment addresses only some failure modes

Solution pricing (2)

- Where disparate assets co-exist (eg substations), whole-life cost considerations can be applied at the site or asset level
- Lowest whole-life cost may differ depending on whether site or asset being considered
- Incremental cost decision based on;
  - Net cost saving of combined solution compared to separate interventions
  - Net value voided by early replacement of associated assets
- New techniques allow reduction of cost saving (eg through new jointing techniques allowing old assets to be connected to new), and
- Measures to quantify voided value (eg sub-optimal HI/£) – requires condition data by individual asset rather than extrapolated from sample of wider population

How uncertainty affects decision making

- Sometimes the modelled ‘optimum’ solution will flex when there is uncertainty as to what will be needed in the future
  - Sometimes a different solution will prove most valuable because it is able to operate in a number of different future scenarios (ie reducing risk of future early replacement under some circumstances)
  - Sometimes there is value in delaying investment until it is clear what is needed
- Examples
  - ‘No regrets’ upsizing of assets when intervening for other drivers
  - Demand side response to delay/ avoid reinforcement investment
  - Pro-actively making investment now that will only be needed at a future date

‘No Regrets’ upsizing

- Consider the marginal cost of installing additional capacity on assets replaced in ED1
- This capacity is not required in the short-term but could prevent a repeat visit to upsize equipment in the future
- The marginal cost decision depends on;
  - The unit cost of the additional capacity, and
  - The likelihood and timing of when that capacity would be required
- Marginal costs of upsizing relatively small compared to overall cost
  - Marginal cost of installing 90MVA unit instead of 60MVA unit ~ +12%
  - Marginal cost of installing 16/32MVA unit instead of 11.5/23MVA unit ~ +8%
  - Marginal cost of installing 3150A switchboard unit instead of 2000A switchboard (per CB) ~ +6%
- In vast majority of load growth scenarios, increased capacity will be needed well within the life of new asset
- If reported as asset replacement, this will increase the unit costs

Demand Side Response

- Demand side response (DSR) techniques can be useful to avoid and/ or delay reinforcement expenditure
- Different types of DSR techniques (eg peak lopping, fault conditions) have different advantages and disadvantages and different unit costs (one-off and ongoing)
- DSR decisions need to be made on a network location specific basis
- Business cases for DSR are sensitive to future load growth assumptions
  - Strong business case (high option value) when there is chance that increased capacity may not actually be needed eg sites where demand comprises small number of big loads
  - (ironically) weaker business case in times of high load growth – not enough time to payback on DSR investment

Investment in advance of need

- Some circumstances where companies may plan to make investment ahead of need
- A number of potential drivers eg
  - Resource smoothing – bringing forward some investment to reduce unit cost increase where future resources expected to be scarce
  - Extreme size of programme may make overall timely deliverability impossible without starting early
  - Early targeted investment to prevent future bottlenecks on DNO network causing constraints to customer service or wider societal aims
  - Practical constraints such as outage windows – including with NG
- Hard to estimate the cost assumptions needed to develop NPV models for many of these

What would a decision model need to consider?

- Key components:
  - Input options
    - Cashflows: Requires consistent data sets at appropriate levels of disaggregation. For shorter life solutions may require modelling of cashflows for subsequent interventions
    - Risk: Requires common and comparable outputs
  - Model components
    - Time – What length of time should the model apply to a scenario?
      - In theory, this should be assessed over a period longer than the solution life of the longest lived solution but with maximum horizon varied depending on expected economic life of the solutions being compared
    - Discount rate
      - A number of options available: Bank of England base rate, Treasury green book social discount factor, DNO weighted average cost of capital
    - Uncertainty – how do we factor future uncertainty into models?
      - Suggest we investigate evolution of gas “real options” approach – a number of adaptations will be required to enable application for ED decisions
    - These factors can have big impact on modelling results – may need to agree common assumptions, or at least state what inputs companies have used
- Important to know all components when comparing DNO decisions

How DNO behaviour may be influenced by regulatory framework

- If companies compare using inconsistent cost definitions we risk not ‘comparing apples with apples’ and drawing incorrect conclusions on solution efficiency
- Without quantification of risks, whole-life costing becomes whole-life cost minimisation, potentially leading to a fix-on-fail approach with unquantified impact on service, risk or performance
- Assessment over short time horizons leads to short term decisions being rewarded over lowest whole life costs
- Use of different discount rates changes impact of short and long term cash flows on NPV calculation and hence changes which decisions are shown as most efficient
- Failure to recognise future uncertainty and associated option value leads to efficient ‘no regrets’ upsizing looking expensive and hence discourages long term thinking
- If put more emphasis on one more than another may distort DNO behaviour

Key questions for CAWG

- Do we need common models to assess decisions?
  - Common model or just common key inputs
- How should DNOs describe their decision making process and, in particular, their chosen model inputs
- What does this mean for required templates/ WJBP criteria? eg
  - Do we need separate submissions to (a) outline why company has chosen the asset management strategy for each asset class and (b) to show the implementation of that strategy in terms of outputs, volumes and costs over period
  - Time horizons required – what tables will we need populated for ED2
  - New reporting rules eg where to report 'no regrets' upsizing
- How do different options need to be reflected in outputs?