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IMO Deep Connection Cost Calculation - Methodology Review

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Scope / Context

- Assumptions and methodology behind the calculation of the Deep Connection Costs (DCC).
- In the Context of a broader review of the MRCP being undertaken by the IMO.
- Regulatory Context is at the intersection of the WEM Market Rules and Western Power’s Access Arrangement under the ENAC (particularly Capital Contribution Policy).

Basis of Analysis

Basis of analysis is a set of criteria established to assess the extent to which the existing methodology or any proposed changes meet the Market Objectives

- **Criteria 1: Accuracy**
  - *The extent to which the DCC calculation methodology drives the correct level of new capacity investment and supports the correct mix of generation technologies in the market. This can best be achieved by the DCC reflecting the actual cost likely to be borne by an efficient new entrant capacity provider.*
- **Criteria 2: Simplicity (Repeatable, Transparent and Cost Effective)**
  - *The calculation methodology represents an overhead burden ultimately borne by customers on the SWIS. Further, more complicated methodologies may introduce uncertainty or modelling difficulty amongst potential investors. For these reasons it is preferable that any methodology be simple to understand, implement and manage. To the extent feasible, participants other than Western Power should be able to independently apply the methodology, therefore supporting their own investment modelling capability, and also assisting the independent verification of DCC estimations by the market.*

Basis of Analysis

cont

- **Criteria 3: Certainty**
  - *The methodology is stable over time, therefore promoting regulatory certainty, and as a consequence, reduced investment risk.*
- **Criteria 4: Flexibility**
  - *The methodology can accommodate variations in the character of connection costs, and in the scenarios that may be used to establish the benchmark*
- **Criteria 5: Resilience to changes in other regulatory contexts**
  - *The methodology is expected to continue to deliver the intent of the Market Rules given anticipated scenarios of industry change, development and reform.*

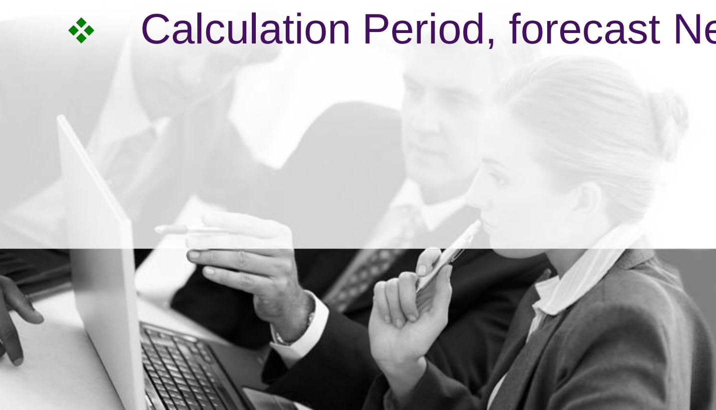
Basis of Analysis

Factor	Weighting
Accuracy	50%
Certainty	20%
Simplicity	20%
Resilience	5%
Flexibility	5%

Focus of Review

The existing DCC calculation methodology includes calculating a connection cost for a model 160 MW generator connect at 330 kV at 7 model locations. This calculation is undertaken in a manner that seeks to be consistent with Western Power's Capital Contribution Policy. The most cost effective of these locations is then selected. Within this methodology the review focussed on major components of the Capital Contribution Policy.

- Determining Minimum Practical Works.
- Estimating the cost of the Minimum Practical Works.
- Level of contribution to the connection costs from current and future third parties.
- Extent to which Costs are an Acceleration of Investment that would have met the NFIT.
- Calculation Period, forecast Network Access Charges and Other Costs.



Outcome of Review

The review identified the following issues

- **Accuracy**
  - The existing estimating methodology represents an opportunity for significant inaccuracy in the order of +/- 30-50% of the actual completed cost of the connection asset on the basis of comparison with AAEi estimating categories.
  - The lack of integration with Western Power's 10 Year Planning introduces significant inaccuracies.
  - The lack of dedicated options analysis has the opportunity to introduce significant inaccuracies.
  - Is 160 MW and a 330 kV connection the correct scale for least cost capacity provider given the cost impact of an increasing DCC?

Outcome of Review

The review identified the following issues (cont)

- **Simplicity (repeatable / transparent)**
  - The existing methodology is a simplification of the process that is undertaken for a real applicant and relies heavily on the experience of Western Power technical staff and on historic analysis. This reliance means that the process cannot be completed by non Western Power staff and undermines the repeatability of the process.
  - Modelling the Actual Connection Costs for 7 sites represents a significant administrative burden.
- **Certainty**
  - The DCC is becoming an increasing portion of the MRCP over time and under the currently assumptions may change dramatically year to year due to network constraints for generators connected at a fixed model size.

Outcome of Review

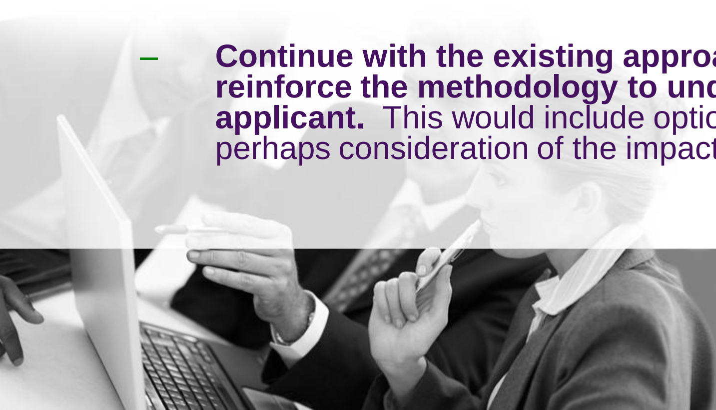
The review identified the following issues (cont)

- **Flexibility**
  - Fixing the connection size and voltage undermines the ability of the methodology to respond to changes in the position of the technical nature of the efficient new entrant generator within the market.
- **Resilience**
  - The current approach to calculating the DCC requires an implementation of Western Power’s Capital Contribution Policy. Thus any methodology and associated assumptions must be framed with reference to this Policy and is therefore sensitive to changes to Western Power’s Access Arrangement . This arrangement is reviewed regularly under the ENAC.

Options Considered

Options considered in terms of decreasing simplicity:

- **Option 1**
  - **Calculate an “average cost” based on average cost per MW of network capacity installed and adjust this annually to capture market changes.**
- **Option 2**
  - **Use historic connection cost data to forecast likely future DCC on a per MW basis.** This approach may place bounds around the historic connection cost data to only include connection costs for technologies consistent with a efficient new entrant capacity provider. The approach to forecasting may take into account trends over time or other market data.
- **Option 3**
  - **Continue with the existing methodology and revisit and adjust the main assumptions to attempt to address some issues. (stats quo)**
- **Option 4**
  - **Continue with the existing approach of the modelling of the connection of a model generator and reinforce the methodology to undertake analysis more consistent with that undertaken for an access applicant.** This would include options analysis, integration with Western Power long term planning and perhaps consideration of the impact of the Applications and Queuing Policy



Options Analysis

Criteria	Average Cost	Forecast on Historic Connection Costs	Reinforced Existing Approach
Accuracy	✗	✓	✓
Simplicity	✓	✓	✗
Certainty	✓	✗	✗
Flexibility	✗	✓	✗
Resilience	✓	✓	✗

Preferred Option

Option 2 – Forecasting Connection Costs from Historic Data - is the preferred Option as it:

- Will be more accurate than the existing methodology.
- Will be simpler (although only Western Power will be able to update the simple model due to confidentiality).
- Depending on forecasting assumptions, will smooth changes in connection costs whilst always approaching the actual long run cost borne by generators.
- Will continue independent of changes in Western Power’s access arrangement.
- Will reflect changes in the technology of the efficient new entrant capacity provider (depending on bounds placed on input data).
- However, this approach requires a robust data set of connection costs.

Issues Addressed in Model

- Historic connection costs cover all network connection investment required by MRCP calculation (not just the DCC) – By agreement with the Working Group, this changed the scope to the calculation of Total Connection Cost from DCC

- Balance between reflecting long run and short run marginal costs - Ability to respond to rapid changes in actual connection costs due to network limitations. To address this Access Offers have been included in the model and heavily weighted in the development of the Total Connection Cost

- Confidentiality of actual connection cost data. Western Power to run calculation with process to be confirmed by an auditor

- Selection of generation connections to be included in the model – exclude cost s associated with locating generators next to fuel sources or loads.

Issues Addressed in Model

- Scope of connection costs – Defined in the model
- Basis of escalation of historic costs
- Years with no relevant connection costs. Proxy of Clause 1.8 a-h of the Market Procedure for: Determination of the Maximum Reserve Capacity Price.
- Establishing a conservative forecasting error margin in the calculation – set at 15%

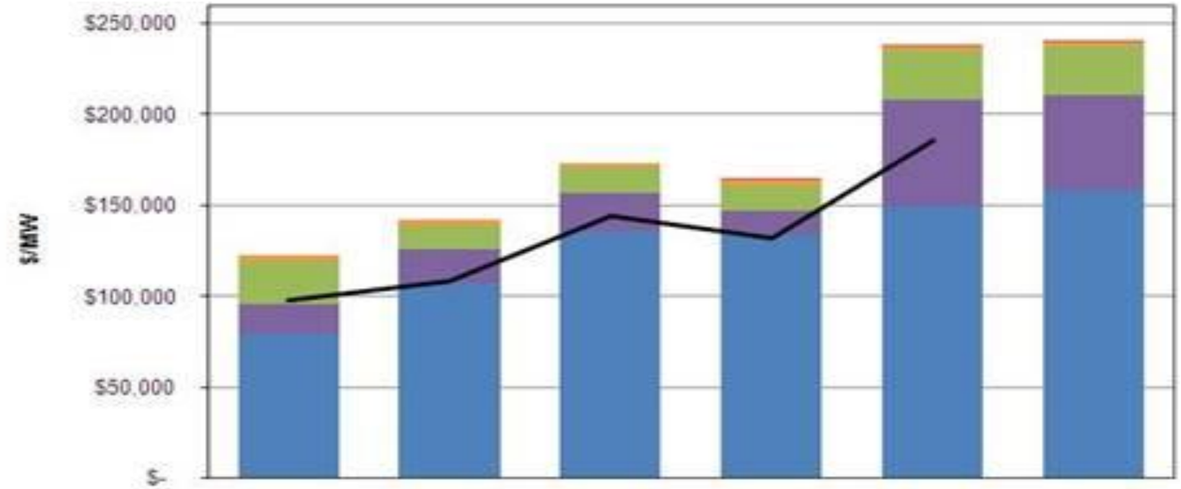
Impact of New Methodology

- In the 2011 Reserve Capacity Cycle the estimate for TC was $A48.798Million or $304,875 per MW Capacity Credit. This compares to a figure calculated through the recommended methodology of $127,953 per MW.

- This represents a 58% reduction.

- This does however bring the calculation more into line with the pre 2009 MRCP calculations.

Impact of New Methodology



Capacity Year	08/09	09/10	10/11	11/12	12/13	13/14
Power Station Cost	$ 79,110	$ 107,404	$ 135,701	$ 134,091	$ 149,306	$ 158,710
Transmission Costs	$ 16,558	$ 18,017	$ 20,672	$ 13,151	$ 58,493	$ 51,621
Fixed O& M	$ 23,900	$ 13,363	$ 14,392	$ 13,431	$ 27,335	$ 26,649
Fuel Costs	$ 2,907	$ 3,456	$ 2,631	$ 3,151	$ 2,615	$ 2,825
Land Costs	$ -	$ -	$ -	$ 293	$ 769	$ 818
MRCP (nearest $100)	$ 122,500	$ 142,200	$ 173,400	$ 164,100	$ 238,500	$ 240,600
Excess Capacity	6.43%	11.44%	2.19%	5.83%	8.99%	NA
Reserve Capacity Price (per yr) —	$ 97,837	$ 108,459	$ 144,235	$ 131,805	$ 186,001	NA

Impact of New Methodology