ELECTRICITY INDUSTRY ACT 2004

ELECTRICITY INDUSTRY (WHOLESALE ELECTRICITY MARKET) REGULATIONS 2004

WHOLESALE ELECTRICITY MARKET RULES

Market Procedure for: Determination of the Maximum Reserve Capacity Price

Version 1.1

Commencement: This Market Procedure is to have effect from 8:00am (WST) on 13 October 2008

Version history

13 October 2008	New Market Procedure for Determination of the Maximum Reserve Capacity Price resulting from PC_2008_06
4 December 2008	Amended Market Procedure for Determination of the Maximum Reserve Capacity Price resulting from PC_2008_14
20 November 2009	Proposed amendments to the Market Procedure for Determination of the Maximum Reserve Capacity Price under PC_2009_12

1. Procedure for Determining the Maximum Reserve Capacity Price

This Procedure for determining the Maximum Reserve Capacity Price sets out the principles to be applied and steps to be taken by the IMO in order to develop and propose the Maximum Reserve Capacity Price as required under the Market Rules. Under the Market Rules, the Maximum Reserve Capacity Price is used as the price cap for the Reserve Capacity Auction in the event that one is held. It is also used as the basis of determining the price of uncontracted Capacity Credits in the case where the Reserve Capacity Auction is cancelled.

This procedure is made in accordance with Market Rule 4.16.3.

1.1. Interpretation

1 In this procedure, unless the contrary intention is expressed:

(a) terms used in this procedure have the same meaning as those given in the Wholesale Electricity *Market Amending Rules* (made pursuant to Electricity Industry (Wholesale Electricity Market) Regulations 2004);

(b) to the extent that this procedure is contrary or inconsistent with the Market Rules, the Market Rules shall prevail to the extent of the inconsistency;

(c) a reference to the Market Rules or Market Procedures includes any associated forms required or contemplated by the Market Rules or Market Procedures; and

(d) words expressed in the singular include the plural or vice versa.

1.2. Purpose

The purpose of this procedure is to describe the steps that the IMO must undertake in determining the Maximum Reserve Capacity Price in each Reserve Capacity Cycle.

1.3. Application

1 This procedure applies to:

- The IMO in determining the Maximum Reserve Capacity Price; and
- Western Power in developing estimates of the costs associated with connecting a notional Power Station to the 330 kV transmission system.

1.4. Overview of the Maximum Reserve Capacity Price

The Maximum Reserve Capacity Price sets the maximum offer price that can be submitted in a Reserve Capacity Auction and is used as the basis to determine an administered Reserve Capacity Price if no auction is required. Each year the IMO is required to conduct a review of the appropriateness of a number of the components that are used to determine the Maximum Reserve Capacity Price**.**

1.5. Definition of Power Station

1 The Power Station upon which the Maximum Reserve Capacity Price shall be based will :

(a) Be representative of an industry standard liquid-fuelled Open Cycle Gas Turbine (OCGT) power station.

(b) Have a nominal nameplate capacity of 160 MW.

(c) Operate on distillate as its fuel source.

(d) Have a capacity factor of 2%.

(e) Include low Nitrous Oxide (NOx) burners or associated technologies as would be required to demonstrate good practice in power station development.

1.6. Scope of the Factors to Maximum Reserve Capacity Price

1 The Maximum Reserve Capacity Price is to include all reasonable costs expected to be incurred in the development of the Power Station, which will include estimation and determination of:

(a) Power Station balance of plant costs, which are those other ancillary and infrastructure costs that would normally be experienced when developing a project of this nature.

(b) Land costs.

(c) Costs associated with the development of liquid fuel storage and handling facilities.

(d) Costs associated with the connection of the Power Station to the bulk transmission system.

(e) Allowances for legal costs, insurance costs, financing costs and environmental approval costs.

(f) Reasonable allowance for a contingency margin.

(g) Estimates of fixed operating and maintenance costs for the Power Station, fuel handling facilities and the transmission connection components.

1.7. Development of Costs for the Power Station

1 The IMO shall engage a consultant to provide advice, including an estimate of the costs associated with designing, purchasing and constructing the Power Station. The Power Station costs shall be determined with specific reference to the use of actual project-related data and shall take into account the specific development conditions under which the power station will be developed. This may include direct reference to:

(a) Existing power stations, or power station projects under development, in Australia and more particularly Western Australia;

(b) Worldwide demand for gas turbine engines for power stations;

(c) The engineering, design and construction, environment and cost factors in Western Australia;

(d) The level of economic activity at the state, national and international level.

2 Development of the Power Station costs shall include components for the gas turbine engines, and all Balance of Plant costs that would normally be applicable to such a Power Station. This must include, but will not be limited to the following items:

(a) Civil Works.

(b) Mechanical Works.

(c) Electrical Works.

(d) Buildings and Structures.

(e) Engineering and Plant Setup.

(f) Miscellaneous and other costs.

(g) Communications and Control equipment.

(h) Commissioning Costs.

1.8. Transmission Connection Works

1 Western Power shall provide Transmission Connection Cost Estimates on the basis defined in Step 1.8.2.

2 The Transmission Connection Cost Estimate shall be developed on the following basis:

(a) The capital cost (procurement, installation and commissioning, excluding land cost) of a generic, industry standard 330kV substation that facilitates the connection of the Power Station will be estimated.

(b) The estimate will include all the components and costs associated with a standard substation.

(c) The estimated cost will be based on a generic three breaker mesh substation configured in a breaker and a half arrangement.

(d) The substation will be located adjacent to an existing transmission line and include an allowance for 2km of 330kV overhead single circuit line to the power station that will have one road crossing.

(e) It shall be assumed that the transmission connection to the Power Station will be located on 50% flat - 50% undulating land, 50% rural - 50% urban location and there will be no unforeseen environmental or civil costs associated with the development.

(f) The connection of the substation into the existing transmission line will be turn-in, turn-out and will be based on the most economical (i.e. least cost) solution. It is assumed that the existing transmission line will not require modification to allow the connection with the exception of one new tower located at the substation to allow a point of connection.

(g) Costs associated with any staging works will not be considered.

(h) Shallow connection easement costs will be considered.

(i) An estimate of deep connection costs shall be included.

1.9. Liquid Fuel Storage and Handling Facilities

1 The IMO must determine appropriate and reasonable costs for the Liquid Fuel storage and handling facilities. Costs associated with the following items should be developed:

(a) A fuel tank of 1,000 t (nominal) capacity including foundations and spillage bund.

(b) Facilities to receive fuel from road tankers.

(c) All associated pipework, pumping and control equipment.

2 The estimate should be based on the following assumptions:

(a) Land is available for use and all appropriate permits and approvals for both the power station and the use of liquid fuel have been received.

(b) The capacity of the storage tank should be sufficient to allow for 24 hours of continuous operation for a 160 MW open cycle gas turbine power station.

(c) Any costing components that may be time-varying in nature must be disclosed as part of the modelling. Such components might be the cost of the liquid fuel, which will vary over time and as a function of exchange rates etc.

3 The costing should only reflect fixed costs associated with the Fixed Fuel Cost (FFC) component and should include an allowance for keeping the tank half-full at all times.

4 The IMO may engage a consultant to assist the IMO in reviewing and estimating the costs associated with liquid fuel storage and handling facilities.

1.10. Fixed Operating and Maintenance Costs

1 The IMO must determine Fixed Operating and Maintenance (O&M) costs for the Power Station and the associated transmission connection works.

2 The Fixed O&M costs may be separated into those costs associated with the Power Station, those costs associated with the transmission connection infrastructure and any other major components that are considered likely to be of sufficient magnitude so as to require separate determination.

3 Fixed O&M costs shall also include fixed network access and/or ongoing charges.

4 To assist in the computation of annualised Fixed O&M costs, the costs associated with each major component shall be presented in 5 year periods covering 1 to 5 years; 6 to 10 years; 11 to 15 years; 16 to 20 years; 21 to 25 years; 26 to 30 years; 31 to 35 years; 36 to 40 years; 41 to 50 years; 51 to 55 years; and 56 to 60 years as required respectively.

5 The Fixed O&M costs associated with each major component shall be converted into an annualised Fixed O&M as required in the determination methodology section (1.14).

6 The IMO may engage a consultant to assist the IMO in reviewing and estimating the Fixed O&M costs.

1.11. Land Costs

1 The IMO shall retain Landgate under a consultancy agreement each year to provide valuations on parcels of industrial land. The regions in which the analysis would be conducted are:

(a) Collie Region

(b) Kemerton Industrial Park Region

(c) Pinjar Region

(d) Kwinana Region

(e) North Country Region

(f) Kalgoorlie Region

These areas represent the regions within the SWIS where generation projects are most likely to be proposed and should provide a broad cross-section of options.

2 The IMO will contract with Landgate to conduct the valuations on the same land parcel size, so as to provide a consistent method of valuing the cost of purchase of the land. The IMO will provide an indication as to the size of land required, which should be limited to the following options:

(a) One parcel of land in an industrial area which does not require a significant buffer zone due to its classification. Eg. 3 ha.

(b) The summation of multiple smaller parcels of land as appropriate to meet the requirements above.

(c) One larger parcel of land which includes the requirement of a buffer zone. Eg. 30 ha.

1.12. Legal, Financing, Insurance, Approvals and Other Costs

1 The IMO shall determine an estimate for the following costs associated with the development of the Power Station project:

(a) Legal costs associated with the design, construction and of the power station.

(b) Financing costs such as debt and equity raising costs not directly covered in the application of the cost of finance the Maximum Reserve Capacity Price.

(c) Insurance costs required to insure the replacement of capital equipment and infrastructure. This component shall be computed as part of the determination of the Weighted Average Cost of Capital (WACC).

(d) Approval cost including environmental consultancies and approvals, and local, state and federal licensing, planning and approval costs;

(e) Other fixed costs associated with operating and maintaining the Power Station.

(f) Contingency costs, where this shall be equal to a factor of 0.15.

2 The IMO may engage a consultant or consultants to directly estimate costs associated with the provision of legal costs, financing, Insurance and Environmental approval costs.

1.13. Weighted Average Cost of Capital

1 The IMO shall determine the cost of capital to be applied to various costing components of the Maximum Reserve Capacity Price. This cost of capital shall be an appropriate Weighted Average Cost of Capital (WACC) for the generic Power Station project considered, where that project is assumed to receive Capacity Credits through the Reserve Capacity Auction and be eligible to receive a Long-Term Special Price Arrangement through the Reserve Capacity Mechanism.

2 The WACC will be applied directly:

(a) In the annualisation process used to convert the Power Station project Capital Cost into an annualised capital cost; and

(b) To account for the cost of capital in the time period between when the Reserve Capacity Auction is held (i.e. when capital is raised), and when the payment stream is expected to be realised. To maintain computational simplicity, the nominal time for this period is two years.

3 The methodology adopted by the IMO to determine the WACC may involve a number of components that require review. These components will normally be classed as those which require review annually (called Minor components) and those structural components of the WACC which require review less frequently (called Major components). If the IMO determines that the Major components do not require review the same values shall be used as were used in the calculation of the MRCP in the previous year.

4 The IMO shall determine the WACC for the purposes of calculating the Maximum Reserve Capacity Price and shall review the minor components that contribute to that determination.

5 The review of the Minor components shall be the subject of the public consultation processes.

6 The IMO may engage a consultant to assist the IMO in reviewing the minor components.

7 The IMO shall compute the WACC on the following basis:

(a) The WACC shall use the Capital Asset Pricing Model (CAPM) as the basis for calculating the return to equity.

(b) The WACC shall be computed on a Pre-Tax basis.

(c) The WACC shall use the standard Officer WACC method as the basis of calculation.

8 The pre-tax real Officer WACC shall be calculated using the following formulae

$$WACC_{real} = \left(\frac{\left(1 + WACC_{no\min al}\right)}{\left(1 + i\right)} \right) - 1 \text{ and}$$

$$WACC_{no\min al} = \frac{1}{\left(1 - t\left(1 - \gamma\right)\right)} R_e \frac{E}{V} + R_d \frac{D}{V}$$

Where:

(a) R_e is the nominal return on equity (determined using the Capital Asset Pricing Model) and is calculated as:

$$R_e = R_f + \beta_e \times MRP$$

Where:

R_f is the nominal risk free rate for the Capacity Year;

β_e is the equity beta; and

MRP is the market risk premium.

(b) R_d is the nominal return on debt and is calculated as:

$$R_d = R_f + DRP$$

Where:

R_f is the nominal risk free rate for the Capacity Year;

DRP is the debt risk premium for the Capacity Year;

(c) *t* is the benchmark rate of corporate income taxation, established at either an estimate effective rate or a value of the statutory taxation rate;

(d) γ is the value of franking credits;

(e) *E/V* is the market value of equity as a proportion of the market value of total assets;

(f) *D/V* is the market value of debt as a proportion of the market value of total assets; and

(g) The nominal risk free rate, R_f, for a Capacity Year is the rate determined for that Capacity Year by the IMO on a moving average basis from the annualised yield on Commonwealth Government bonds with a maturity of 10 years:

– using the indicative mid rates published by the Reserve Bank of Australia;

and

– averaged over a 20-trading day period.

(h) The debt risk premium, *DRP*, for a Capacity Year is the premium determined for that Capacity Year by the IMO as the margin between the observed annualised Australian benchmark corporate bond rate for corporate bonds which have a BBB+ (or equivalent) credit rating from Standard and Poors and a maturity of 10 years and the nominal risk free rate:

– using the predicted yields for corporate bonds published by Bloomberg; and the nominal risk free rate calculated as directed above; and

– the nominal risk free rate and Bloomberg yields averaged over the same 20-trading day period.

(i) If there are no bonds with a maturity of 10 years on any day in the period referred to in Steps 1.13.8(g) and 1.13.8(h), the IMO must determine the nominal risk free rate and the *DRP* by interpolating on a straight line basis from the two bonds closest to the 10 year term and which also straddle the 10 year expiry date.

(j) If the methodology used in Steps 1.13.8(i) cannot be applied due to suitable bond terms being unavailable, the IMO may determine the nominal risk free rate and the DRP by means of an appropriate approximation.

(k) *i* is the forecast rate of inflation. In establishing a forecast of inflation, the IMO is to have regard to the forecasts of the Reserve Bank of Australia, the Western Australian Department of Treasury and Finance, and financial market participants.

9 The CAPM shall use the following parameters as fixed variables each year.

CAPM Parameter	Notation/Determination	Component	~~Value~~
Nominal risk free rate of return (%)	R_f	Minor	~~TBD~~
Expected inflation (%)	π_e	Minor	~~TBD~~
Real risk free rate of return (%)	R_{fr}	Minor	~~TBD~~
Market risk premium (%)	*MRP*	Major	~~6.00~~
Asset beta	β_a	Major	~~0.5~~
Equity beta	B_e	Major	~~0.83~~
Debt margin (%)	*DM*	Minor	~~TBD~~
Debt issuance costs (%)	d	Minor	~~TBD~~
Corporate tax rate (%)	*t*	Major	~~30~~

Franking credit value	γ	Major	~~0.5~~
Debt to total assets ratio (%)	*D/V*	Major	~~40~~
Equity to total assets ratio (%)	*E/V*	Major	~~60~~

1.14. Determination of the Maximum Reserve Capacity Price

1 The IMO shall use the following formulae to determine the Maximum Reserve Capacity Price:

The Maximum Reserve Capacity Price to apply for a Reserve Capacity Auction held in calendar year t is PRICECAP[t] where this is to be calculated as:

PRICECAP[t] = (ANNUALISED_FIXED_O&M[t] + ANNUALISED_CAPCOST[t] / (CAP / SDF))

Where:

PRICECAP[t] is the Maximum Reserve Capacity Price to apply in a Reserve Capacity Auction held in calendar year t;

ANNUALISED_CAPCOST[t] is the CAPCOST[t], expressed in Australian dollars in year t, annualised over a 15 year period, using a using a Weighted Average Cost of Capital (WACC) as determined as part of the Maximum Reserve Capacity Price Market Procedure and updated as required;

CAP is the capacity of an open cycle gas turbine, expressed in MW, and equals 160MW;

SDF is the summer derating factor of a new open cycle gas turbine, and equals 1.18;

CAPCOST[t] is the total capital cost, expressed in million Australian dollars in year t, estimated for an open cycle gas turbine power station of capacity CAP; and

ANNUALISED_FIXED_O&M[t] is the annualised fixed operating and maintenance costs for a typical open cycle gas turbine power station and any associated electricity transmission facilities, expressed in Australian dollars in year t, per MW per year.

The value of CAPCOST[t] is to be calculated as:

CAPCOST[t] = (PC[t] x (1 + M) x CAP + TC[t] + FFC[t] + LC[t]) x (1+ WACC)^2

Where:

PC[t] is the capital cost of an open cycle gas turbine power station in year t, expressed in Australian dollars in year t per MW;

M is a margin to cover legal, approval, and financing costs and contingencies;

TC[t] is the cost of electricity transmission assets required to connect an open cycle gas turbine power station to the SWIS, plus an estimate of the costs of augmenting the shared network to facilitate the connection of the open cycle gas turbine power station, expressed in Australian million dollars in year t;

FFC[t] is the fixed fuel costs and must represent the fixed costs associated with an on-site liquid storage tank with sufficient capacity for 24 hours of Liquid Fuel including the cost of keeping this tank half full at all times expressed in Australian million dollars in year t;

LC[t] is the cost of land purchased in year [t]; and

WACC is the Weighted Average Cost of Capital.

1.15. Major Review

1 In accordance with Market Rule 4.16.9, the IMO must conduct a review of the methodology used to determine the Maximum Reserve Capacity Price at least once every five years. This process will review the basis for determining the Maximum Reserve Capacity Price, the structural methodology by which the Maximum Reserve Capacity Price is computed each year and the method the IMO uses to estimate each of the constituent components of the Maximum Reserve Capacity Price.

Maximum Reserve Capacity Price Basis

2 The basis of determining the Maximum Reserve Capacity Price shall be reviewed by the IMO with particular reference to the following factors:

(a) The type of power station

(b) The size of the power station

(c) The expected load factor of the power station

(d) Primary and secondary fuel types of the power station.

3 The above review must give consideration to the Wholesale Electricity Market Objectives.

Power Station

4 In accordance with Market Rule 4.16.9, the IMO must conduct a review of the definition of the Power Station and its associated components. The IMO is required to take into consideration the following factors:

(a) The method used to determine the Power Station price

(b) The summer derating factor applied to the Power Station

(c) The capacity factor of the Power Station.

Transmission Connection

5 In accordance with Market Rule 4.16.9, the IMO must conduct a review of the type of connection used to connect the Power Station to the bulk transmission network. The IMO is required to take into consideration the following factors:

(a) Which part of the bulk transmission system the Power Station will be connected to (eg 330kV / 220 kV/ 132 kV).

(b) Land use type assumptions (rural/urban options).

(c) The switchyard configuration.

(d) The number of road crossings.

Fixed Fuel Costs

6 In accordance with Market Rule 4.16.9 the IMO must conduct a review of the fixed fuel costs with direct reference to the outcome of the review of the Maximum Reserve Capacity Price in Step 1.15.2 above.