



## **Inquiries**

The Australian Energy Market Commission  
PO Box A2449  
Sydney South NSW 1235

**E:** [aemc@aemc.gov.au](mailto:aemc@aemc.gov.au)

**T:** (02) 8296 7800

**F:** (02) 8296 7899

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## **About the AEMC**

The Council of Australian Governments, through its Ministerial Council on Energy, established the Australian Energy Market Commission (AEMC) in July 2005 to be the Rule maker for national energy markets. The AEMC is currently responsible for Rules and policy advice covering the National Electricity Market and elements of the natural gas markets. It is an independent, national body. Our key responsibilities are to consider Rule change proposals, conduct energy market reviews and provide policy advice to the Ministerial Council on Energy as requested, or on AEMC initiative.

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## Abbreviations

AEMC	Australian Energy Market Commission
AER	Australian Energy Regulator
AGC	Automatic Generation Control
APC	Administered Price Cap
APP	Administered Price Period
Commission	see AEMC
DC	Direct Costs
MCR	Maximum Continuous Rating
MWh	Megawatt hour
NEL	National Electricity Law
NEM	National Electricity Market
NEMMCO	National Electricity Market Management Company
OC	Opportunity Costs
REV	Spot market revenue
Rules	National Electricity Rules
SRMC	Short Run Marginal Cost
TCA	Total Claimable Amount
VoLL	Value of Lost Load

## Summary

These guidelines support the operation of clause 3.14.6 of the National Electricity Rules (Rules) which describes how compensation is to be determined by the Australian Energy Market Commission (Commission) if a claim is made by an eligible party following the application of an administered price, market suspension, Value of Lost Load (VoLL) or market floor price.

The Rules specify that the guidelines must:

- identify the objectives for the payment of compensation;
- require that the amount of compensation be based on costs directly incurred by the claimant and the value of any opportunities foregone;
- outline the methodology to be used to calculate the amount of any compensation payable; and
- set out the information requirements the National Electricity Market Management Company (NEMMCO) and the claimant must provide.

The purpose of these guidelines are to:

- be applied by a three member panel in its role in providing advice to the Commission on compensation;
- be applied by the Commission when determining whether compensation should be paid and the amount of compensation payable under the Rules, unless it is satisfied that there is a compelling reason not to do so;
- describe the methodology for calculating compensation, including what direct and opportunity costs will be considered in claims; and
- provide guidance to potential claimants and NEMMCO on the information to be provided in support of a claim for compensation.

In accordance with the transmission consultation procedures, the Commission is seeking views on these proposed guidelines. Interested parties are invited to make written submissions to the Commission on these proposed compensation guidelines.

Submissions may be lodged with the Commission electronically to: [submissions@aemc.gov.au](mailto:submissions@aemc.gov.au) or in hard copy to:

Australian Energy Market Commission  
AEMC Submissions  
PO Box A2449  
Sydney South NSW 1235

Submissions must be received by **21 April 2009**. Submissions sent via e-mail/mail are to reference the following: Company/Organisation name, Compensation guidelines, March 2009 - Reference EMO 0007.

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## **1 Purpose and scope of the proposed guidelines**

These guidelines support the operation of clause 3.14.6 of the Rules which describes how compensation is to be determined by the Commission if a claim is made by an eligible party following the application of an administered price, market suspension, VoLL or market floor price. The process provides for consideration of each claim by a three member panel, and consultation, before any compensation amount is determined by the Commission.

In accordance with the Rules, the Commission has prepared compensation guidelines to:

- be applied by a three member panel in its role in providing advice to the Commission on compensation;
- be applied by the Commission when determining whether compensation should be paid and the amount of compensation payable under the Rules, unless it is satisfied that there are compelling reasons not to do so;
- describe the methodology for calculating compensation, including what direct and opportunity costs will be considered in claims; and
- provide guidance to potential claimants and NEMMCO on the information to be provided in support of a claim for compensation.

These guidelines seek to provide potential claimants with greater certainty as to what costs will be considered for compensation, enabling them to make more informed decisions on whether they should apply for compensation. The guidelines will also enable other parties who might subsequently be required to fund compensation payments (via NEMMCO market fees) to understand better the potential value of such requirements.

## **2 Interpretation**

Any term used in the compensation guidelines that is defined in Chapter 10 of the Rules has the same meaning as it has in the Rules.

Where these compensation guidelines refer to words in the singular, it includes the plural, and words in the plural include the singular.

## **3 Commencement date**

The date of commencement of the compensation guidelines is [1 July 2009].

## 4 Confidentiality

Information provided to the Commission for the purposes of clause 3.14.6 of the Rules is confidential information if:

- (a) the person who provides it claims that it is confidential information; and
- (b) the Commission agrees that the information is confidential information.

If the Commission decides that information provided to it for the purposes of clause 3.14.6 of the Rules is confidential information, the Commission and three member panel may only make public a version of the reports to be provided under clauses 3.14.6(h), (i) and (n) of the Rules from which the information has been omitted.

If information is omitted from a published version of these reports as being confidential information, a note to that effect will be included in the reports at the place in the reports from which the information is omitted.

For any person wishing to claim confidentiality, the Commission would encourage that participant to also submit a version of their information suitable for publication, with the information for which they claim confidentiality to be omitted and insert a note showing where this information has been omitted for confidentiality reasons.

## 5 Parties eligible to apply for compensation

In accordance with clauses 3.14.6(a), (a1), (a2) and (a3) of the Rules, the following parties are eligible to apply for compensation in the following situations:

- scheduled generators may claim compensation from NEMMCO in respect of generating units if, due to the application of an administered price cap during either an administered price period or market suspension, the resultant spot price payable to dispatched generating units in any trading interval is less than the price specified in their dispatch offer for that trading interval;
- a scheduled network service provider may claim compensation from NEMMCO in respect of a scheduled network service if, due to the application of an administered price cap, VoLL, the market floor price or an administered floor price, the resultant revenue receivable in respect of dispatched network services in any trading interval is less than the minimum requirement specified by its network dispatch offer for that trading interval;
- a market participant which submitted a dispatch bid may claim compensation from NEMMCO in respect of a scheduled load if, due to the application of an administered floor price during either an administered price period or market suspension, the resultant spot price in any trading interval is greater than the price specified in the dispatch bid for that trading interval; or
- in respect of an ancillary service generating unit or an ancillary service load, a market participant may claim compensation from NEMMCO if, due to the application of an administered price cap, the resultant ancillary service price for

that ancillary service generating unit or ancillary service load in any dispatch interval is less than the price specified in the relevant market ancillary service offer.

## **6 Objective of the guidelines**

The objectives of the payment of compensation due to the application of an administered price, market suspension, VoLL or market floor price event under clause 3.14.6 of the Rules is to maintain the incentive for:

- (a) scheduled generators, scheduled network service providers and other market participants to invest in plant that provides services during peak periods; and
- (b) market participants to supply energy and other services during an administered price period.

## **7 Principles of the guidelines**

In accordance with clause 3.14.6(c)(2) of the Rules, the amount of compensation payable in respect of a claim under clause 3.14.6 of the Rules is to be based on:

- (a) the costs directly incurred by the claimant, due to the application of the administered price cap, market suspension, VoLL, the market floor price or the administered floor price (as the case may be); and
- (b) the value of any opportunities foregone by the claimant due to the application of the administered price cap, market suspension, VoLL, the market floor price or the administered floor price (as the case may be).

## **8 Information requirements**

The claimant and NEMMCO are required to provide the following information in support of any claim for compensation as a direct result of the application of the administered price cap, market suspension, VoLL, the market floor price or the administered floor price (as the case may be).

### **The claimant**

1. Clearly identify in what category (or categories) of registered participant the claimant is applying for compensation, and the event giving rise to the claim for compensation.
2. Provide the total value of the compensation being sought, at a specified date in time. (The default date would be the date of the application for compensation.)
3. Define the time periods (beginning and end) for which the claim for compensation relates, i.e. by the trading interval and date – and demonstrate that the requirements for a claim are met in each time period cited.
4. Provide a narrative of the circumstances that resulted in the identified costs being incurred that were directly attributable to the event.
5. Provide an itemised quantitative breakdown of the direct costs and opportunity costs that are being claimed for, in relation to the categories of costs identified in the methodology for calculating compensation.

### **NEMMCO**

1. Provide a verification of the facts identified in the claimant's narrative, for the specified timeframes.
2. Provide a commentary on whether the events being cited by the claimant are directly attributable to the application of the administered price cap, market suspension, VoLL, the market floor price or the administered floor price (as the case may be).

## 9 Methodology to calculate compensation

### 9.1 Basic calculation

The level of compensation is to be based on the following calculation:

$$TCA = \sum_t (DC_t + OC_t - REV_t)$$

where:

*TCA = Total Claimable Amount*

*DC<sub>t</sub> = Direct Costs Incurred in Trading Interval t*

*OC<sub>t</sub> = Opportunity Costs Incurred in Trading Interval t*

*REV<sub>t</sub> = Spot market income received in respect of Trading Interval t*

*t = Trading Interval in which conditions for a claim held*

### 9.2 Calculation of Direct costs

The following categories of direct costs are permissible to include in the calculation of Total Claimable Amount.

#### 9.2.1 Fuel costs

Fuel costs incurred during relevant trading intervals, including the potential reasons for abnormally high costs<sup>1</sup>:

- the provision of fuel for generation that may not be covered by the normal coal/gas supply arrangements in place;
- fuel costs incurred if the generator is started up to support (abnormally high) demand during an APP; and
- additional fuel costs driven by loading of generation plant being significantly different from the optimal level (which corresponds to the lowest heat rate) during the relevant trading intervals.

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<sup>1</sup> The report prepared (currently by ACIL Tasman) for NEMMCO on generation costs in the NEM, in the context of NEMMCO's National Transmission Statement, is a relevant reference source for the range of "normal" costs.

### **9.2.2 Operation and maintenance**

Operation and maintenance expenses directly attributable to the pattern of operation during the relevant period, including charges for consumables such as water and chemicals.

### **9.2.3 Abnormal wear and tear**

Abnormal wear and tear that may be attributed to specific circumstances related to the generator's operation during the relevant period, including (but not limited to):

- cycling of baseload thermal plants to rapidly start-up or shut-down units;
- sustained on-load cycling or high frequency MW changes in response to automatic generation control (AGC) during an APP, which can cause damage to equipment;
- ramping a unit beyond its design capability or temporarily overloading a unit beyond its Maximum Continuous Rating (MCR), which are known to cause significant costs including:
  - additional maintenance and overhaul capital expenditures;
  - increased likelihood of forced outages (post APP) and associated lost revenue;
  - long term efficiency losses, i.e. heat rate increases that cannot be reversed; and
  - reduced technical life.

### **9.2.4 Exclusions**

The following cost categories are not permissible to include in the calculation of Total Claimable Amount, unless the claimant can demonstrate a compelling case based on extraordinary circumstances:

- general wear and tear; and
- all other direct costs that cannot be attributed to the operation of the unit during the APP, including start-up costs outside the APP.

**The Commission would welcome views on:**

- **the specification of categories of direct cost to be included and excluded; and**
- **the need to provide more or less detail on how values of particular cost categories are to be calculated.**

## 9.3 Opportunity costs

### 9.3.1 Definition of opportunity cost

The concept of opportunity cost is a fundamental one in economics that is used to define the basic relationship between scarcity and choice. In a world where resources are scarce, choices must be made: the opportunity cost of a particular choice refers to the value of the next best alternative or opportunity.<sup>2</sup>

In the context of the electricity industry, the question of what constitutes a particular generator's opportunity cost can generally only be answered with reference to the specific context in which the generator operates. In particular, the rationale behind the distinction between direct and opportunity costs drawn for the purpose of this guideline, needs to be understood in light of the following comments:

- at a high level, if one adopts a broad definition of the short run marginal cost (SRMC) of generation, it in fact includes all opportunity costs, including those that refer to foregone production opportunities.<sup>3</sup> This definition blurs the distinction between direct and opportunity costs. For a thermal power station, the opportunity cost of beginning to generate power might include its start-up costs, its direct fuel costs, and any additional maintenance or other costs that it might incur as a result of its generation decision;
- however, the question of what constitutes the (opportunity) cost of fuel is often not straightforward. The opportunity cost of a fuel such as gas may be higher than what the generator may have paid for it under a contract (i.e. the generator's "cost"), if the gas can be sold to a third party at a higher price (rather than burning it). On the other hand, the opportunity cost of a fuel such as coal may be lower than its contractual price, if a failure to take an agreed quantity leads to penalty charges or storage costs. The timeframe over which these costs are assessed is then clearly important - the longer the timeframe, the more alternatives would likely be available to a particular generator; and
- accordingly, we have adopted a definition of opportunity cost for the purpose of this guideline that focuses on the timeframe. Any cost directly associated with generation during an event such as an APP is regarded as direct costs, whereas costs/benefits associated with potential generation alternatives at a future period constitutes an opportunity cost. For instance;
  - if a thermal plant needs to incur higher than normal fuel costs to support generation during an APP, it is treated as a direct cost component; and

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<sup>2</sup> Buchanan, James M., "opportunity cost", in *The New Palgrave Dictionary of Economics*, Eatwell, John, Murray Milgate, Peter Newman, Eds., Macmillan Press, 1987, pp.718ff.

<sup>3</sup> As Larry Ruff puts it: "SRMC is the incremental cost of fuel and raw materials, maintenance and wear-and-tear on equipment, including any opportunity costs if producing more for this market now increases the costs of producing for some other or later market." Larry Ruff, *Market Power Mitigation: Principles and Practice*, Charles River Associates, 2002, p.4.

- if a hydro plant uses up its limited quantum of hydro energy during an APP that could be utilised more profitably at a later period, the foregone (additional) profit constitutes an opportunity cost, as we discuss further below.

### **9.3.2 Calculation of opportunity costs**

The calculation of relevant opportunity costs under these guidelines is to be carried out in two stages. First, a determination of whether opportunity costs are a relevant consideration for the claimant. Second, if the first stage is satisfied, the application of one of two permissible methods to estimate an appropriate value of opportunity cost.

#### **9.3.2.1 Determining whether opportunity cost is a relevant consideration**

Opportunity cost will generally be most relevant to plant which is energy-constrained. For example, the use of stored water or a limited volume of gas used during an APP event, which results in a net reduction in the ability to generate (more profitably) in future periods. However, the concept might potentially include other circumstances – for instance, deferral of planned maintenance to another period at a higher cost (or lost revenue). Opportunity costs, therefore, capture those components that involve foreclosing opportunities to use scarce resources more profitably at another point in time.

Estimation of opportunity costs need to give due consideration to the following two issues, namely:

1. Technical limitation to replenishing the energy used during the relevant period – generators eligible for claiming opportunity costs will typically have some technical limitation such as limited water/gas that can enable them to produce a limited number of MWh in total over a time period (week, month, year). The physical ability to defer actions, such as using the same energy at a later point in time or defer maintenance etc, is the critical determining factor as to whether a claimant incurs an opportunity cost. A run-of-the-river hydro station, for instance, may not have any ability to defer generation and consequently is not eligible for claiming any opportunity costs.
2. Commercial limitations to replenishing the energy used during the relevant period at the original costs – there may also be commercial incentive/disincentive to using the energy in a particular period. For example, there may be a penalty for overdrawing gas over a stipulated limit or cost of storing and withdrawing gas, etc.

If there are no technical or commercial limitations, as may typically be the case for coal-fired power stations that do not have any energy limit, there may not be any

opportunity costs.<sup>4</sup> These two issues therefore form an initial assessment if opportunity cost is relevant for the claimant at all.

If the physical and commercial limitations suggest a valid case for opportunity costs, it should be recognised that the opportunity cost value will depend on the range of future opportunities foreclosed. To illustrate, an energy constraint that binds within-day but not across days will foreclose fewer opportunities than an energy constraint that binds across a week. Hence, other things being equal, the opportunity imposed by using energy unprofitably during an APP event will be higher for the latter. In determining the range of opportunities foreclosed, the following factors will need to be considered:

- how tight the energy limit is which, among other things, will depend on the starting level of energy, e.g. the initial storage level;
- location of storage;
- time of the year;
- available alternative resources, which in turn, are determined by the demand-supply balance in the region, as well as that of interconnectors. Opportunity costs ultimately reflect, in one form or another, the costs of deploying these alternatives;
- operational limits, such as how fast the storage may be depleted, minimum storage limits and the rate of inflows that replenishes storage;
- operational limits of the generator that may prevent generation from being increased above or decreased below certain limits. Relevant considerations in this respect include ramping and time required for start-up of the unit. Although these limits may typically not bind for hydro generators, they may in some cases be binding on other energy limited plants; and
- uncertain events that may affect supply, for instance;
  - the breakdown of a gas processing plant or gas pipeline;
  - outage of pumping capacity (for a pump-storage hydro unit) for the limited energy resources; or
  - demand outages of other generators and transmission interconnections.

For instance, if a region has a critical reliance on a particular gas processing plant or pipeline, or has several large baseload units that are prone to outages, the

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<sup>4</sup> It may be worthwhile to note the comment made by the Federal Energy Regulatory Commission (USA): "A requirement to bid at marginal operating cost does not take into account a generator's opportunity cost, which may exceed its marginal operating cost when other markets are transacting at higher prices. But while thermal generators may have opportunities to sell in multiple markets in advance of real time, those opportunities fade as real time approaches. By the time the real-time market is operating, a thermal generator has no opportunity to sell elsewhere if its bid is rejected, so it has no opportunity costs." (underline added). FERC, *Major Orders and Regulations: Section 6 – Policy Options*, RT-01-67-000, December 2005.

opportunity cost of limited energy in such a region will typically be high. This is because an outage of any one of these critical elements may have a major impact on the demand-supply balance, such that the value of stored water/gas would typically be high.<sup>5</sup> These uncertainties may cause the opportunity cost to be both very high and volatile under extreme conditions.

On the basis of consideration of these factors, claimants may be divided into two broad categories:

1. category (a): market participants who possess a high degree of flexibility and a wide range of choices over when to use their (constrained) energy. Illustrative examples of such market participants include large storage hydro generators who may have several weeks of storage capacity, or a large gas storage facility, who can choose to use their available MWh over a long period or for alternative purposes. A high degree of flexibility would typically imply a high value of opportunity cost since these market participants may use their resources to extract higher revenue associated with high spot price periods when they can flexibly deploy such resources; and
2. category (b): market participants who have a limited degree of flexibility and limited choices to use their resources and as such may typically have lower opportunity costs.

### **9.3.2.2 Estimating opportunity costs**

The Commission further recognises that the key to estimating opportunity costs is to properly reflect the inherent flexibility in using the energy in another period.

#### **For plant in category (a) above**

For plant which has a high degree of flexibility in its operation, then the traded value of a “cap” contract for a relevant time period and region would appear to represent a reasonable proxy for opportunity cost. The precise choice of time period and location might be influenced by the depth of traded volumes.

This value should be applied to the difference between actual scheduled output, and the level of output that could have reasonably been expected at prices consistent with the APC. This might be informed by historical data on actual output at similar time periods in previous years, where data is available.

#### **For plant in category (b) above**

For plant in category (b), opportunity costs should be estimated using the difference between the administered price and spot price for a designated period when the stored energy would otherwise be used. This depends, in part, on whether the

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<sup>5</sup> For further clarification on these issues, see Concept Economics report, *Risk Assessment of Alternative Compensation Options*, July, 2008, pp.33-35.

additional energy is likely to have been used at some future date, or whether this is energy that would have been used at a different time within the same day:

- if the opportunity cost of the energy used relates to its use at some future date, only the portion of generation that exceeds normal total daily generation levels would be paid its opportunity cost, based on the value of generation at some point in the future. That value is related to the storage horizon for the limited fuel or water, as well as expected or actual prices over that period; or
- alternatively, if it is the case that energy resources have been shifted from one hour to another within a 24 hour period, the opportunity cost is calculated as the difference between administrative pricing at the time of generation and the later hour when it might otherwise have been used.

More specifically, under this approach, compensation, for instance, for hydroelectric facilities would be calculated by:

- first, establishing the energy that would have been run on a daily basis through “normal” periods, referred to as “baseline” energy (with reference to actual inflows and representative days);
- second, using the actual MWh delivered to determine that portion of the energy output above the baseline that is eligible for opportunity cost payments; and
- finally, calculating payments for the energy supplied above the baseline assuming either the average energy price that day, or the average price paid that day for energy from the facility. In addition, if it is determined that water has been moved from a higher priced hour in order to generate in an hour where a lower administrative price has been applied, there may be compensation due for this difference.

### **Exceptional cases**

If the claimant has provided information in support of a view that the application of the guideline results in a level of compensation which is demonstrably insufficient, then the Commission may have regard to this information in determining any level of compensation.

Further, the three member panel may comment on the merits of this case in its report to the Commission. The three member panel may additionally comment on whether the application of the guideline results in demonstrably too much compensation. The Commission may also have regard to any such commentary in determining the level of compensation.

## **9.4 Calculation of spot market revenue**

The calculation of spot market revenue will be determined by actual payments between the claimant and NEMMCO for the relevant trading intervals.

## 9.5 Other adjustments

In determining the total level of compensation, it is appropriate to recognise reasonable financing costs in respect of the period between the event occurring to which the compensation claim relates and the compensation being awarded. In this context, it is also appropriate to have regard to the timing of relevant revenues had the compensation events not occurred.

The Commission would welcome views on:

- whether the broad approach of categorising claims into (a) and (b) based on flexibility of plant - and the degree to which future opportunities are foreclosed - is appropriate and workable;
- whether the choices of method for how opportunity cost should be valued for category (a) and (b) claims are appropriate, or can be improved upon; and
- whether claimants should have the ability to advocate alternative methods of valuing opportunity costs if they consider the methods specified in the guideline to be demonstrably inappropriate.