Australian Energy Market Commission

THE DETERMINATION OF COMPENSATION FOLLOWING THE APPLICATION OF THE ADMINISTERED PRICE CAP, MARKET PRICE CAP, MARKET FLOOR PRICE OR ADMINISTERED FLOOR PRICE

Guidelines

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30 June 2009

GUIDELINES

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Citation

AEMC 2009, *The Determination of Compensation Following the Application of the Administered Price Cap, Market Price Cap, Market Floor Price or Administered Floor Price, Guidelines*, 30 June 2009, Sydney

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.

Contents

Abbreviations

AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
AGC	Automatic Generation Control
APC	Administered Price Cap
APP	Administered Price Period
Commission	see AEMC
CPT	Cumulative Price Threshold
DC	Direct Costs (for formula)
FCAS	Frequency Control Ancillary Services
MCR	Maximum Continuous Rating
MPC	Market Price Cap
MW	Megawatt
MWh	Megawatt hour
NEL	National Electricity Law
NEM	National Electricity Market
NEMMCO	National Electricity Market Management Company
NSP	Network Service Provider
OC	Opportunity Costs (for formula)
P	Estimate of bid price (for formula)
PF	Administrative floor price (for formula)
Q	Cleared load in MWs (for formula)
REV	Spot market revenue (for formula)
Rules	National Electricity Rules
SRMC	Short Run Marginal Cost
TCA	Total Claimable Amount (for formula)
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 the administered price cap (APC), Market Price Cap (MPC)[1], market floor price or administered 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 Australian Energy Market Operator[2] (AEMO) and the claimant must provide.

The purpose of these guidelines is to:

- be applied by a three member panel in its role required under clause 3.14.6(l) of the Rules 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 AEMO on the information to be provided in support of a claim for compensation.

1 Formerly known as Value of Lost Load (VoLL).

2 Prior to 1 July 2009, these responsibilities applied to the National Electricity Market Management Company (NEMMCO).

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1 Purpose and scope of the 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 the APC, MPC, market floor price or administered 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[3] (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 AEMO 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 AEMO electricity 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.

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3 Established under clause 3.14.6 of the Rules.

In accordance with clause 3.14.6(f) of the Rules, the Commission may amend or replace the compensation guidelines, from time to time, in accordance with the transmission consultation procedures. In practice, the Commission intends to review these guidelines every three years, or at an earlier time in light of market circumstances.

4 Confidentiality

This section sets out the Commission's considerations when determining whether to publish confidential information from:

(a) a claimant who provides information which it considers is confidential to the Commission in order to make a claim under clause 3.14.6 of the Rules; or

(b) a person who provides information which it considers is confidential to the Commission when it makes a written submission to the Commission on a report or decision under clause 3.14.6 of the Rules.

If a claimant/person provides information which it considers is confidential to the Commission, the claimant/person must identify the sections in the document which it considers is confidential and provide reasons for its claim of confidentiality.

The Commission will determine whether it considers this information is confidential.

If the Commission determines that this information is not confidential, it will notify the claimant/person of its decision and provide the claimant/person with an opportunity to withdraw the document (in whole or in part).

If the Commission determines that this information is confidential, it may:

(a) omit the sections which are confidential and make a note to that effect in those sections of the document when it publishes the document; and

(b) exclude the confidential information from the reports and decisions under clause 3.14.6 of the Rules; or

(c) in the case of the claimant, notify the claimant of its intention to publish the documents with the confidential information to give stakeholders an opportunity to make submissions on the claimant's claim; or

(d) in the case of a person making a submission, notify the person of its intention to publish the documents with the confidential information to give the claimant an opportunity to respond to that submission and stakeholders an opportunity to make submissions on the submission.

If the Commission intends to publish the documents with the confidential information, it will first provide the claimant/person with an opportunity to withdraw the document (in whole or in part).

If the claimant/person withdraws a document (in whole or in part) which it claims is confidential, the Commission will not consider the sections of the document which has been withdrawn in its decisions under clause 3.14.6 of the Rules.

For the avoidance of doubt, if the Commission provides the panel established under clause 3.14.6 of the Rules with confidential information, that information will be provided to the panel under the terms of a confidentiality deed.

If the information that a claimant/person wishes to submit is confidential under the terms of an agreement with a third party, it is the claimant's/person's responsibility to negotiate with the third party as to the terms on which that information may be disclosed to the Commission.

5 Objectives of paying compensation

The objectives of the payment of compensation following the application of an APC, MPC, market floor price or administered 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"[4]

(b) "Market Participants to supply energy and other services during an administered price period".[5]

This compensation regime is just one component of the market's broader MPC-Cumulative Price Threshold (CPT)- APC mechanism, which, as a whole, provides a comprehensive framework to provide investment signals and manage risks faced by retailers and other market participants.

Following a number of hours in which sustained high spot market prices (up to the MPC) breach the CPT and result in an administered price period in a region, compensation may be payable. These high spot market prices, together with the levels at which the CPT and APC have been set, are intended to provide investment signals to participants.

The payment of compensation recognises this regulatory risk that participants may face in the market. It also ensures that participants are not disadvantaged by continuing to participate in the market during high stress periods, such as an administered price period or other event. The payment of compensation contributes to these investment signals, as part of this broader mechanism when operated together.

4 Clause 3.14.6(c)(1)(i) of the Rules.

5 Clause 3.14.6(c)(1)(ii) of the Rules.

6 Principles of the guidelines

Clause 3.14.6(c)(2) of the Rules governs the amount of compensation payable in respect of a claim under clause 3.14.6 of the Rules. Taking this into account, in practice, this is to be based on:

(a) the costs directly incurred by the claimant, as a consequence of the application of the APC, MPC, market floor price or administered floor price (as the case may be); and

(b) the value of any opportunities foregone by the claimant as a consequence of the application of the APC, MPC, market floor price or the administered floor price (as the case may be).

These guidelines seek to provide guidance to interested parties, including potential claimants, on how these principles might be given practical effect.

7 How to apply for compensation

In order to make a claim for compensation, a claimant must have lodged its notification of an intent to make a claim for compensation under clause 3.14.6 of the Rules to AEMO and the Commission within five business days of the event, in accordance with clause 3.14.6(b) of the Rules.

The claimant's intent to claim compensation becomes a claim for compensation once the claimant has provided the information necessary to enable its claim to be assessed to the Commission and panel. The information to be provided should be sufficiently detailed and, in accordance with the requirements in the compensation guidelines, address all relevant sections that apply to the claim.

To enable a claim for compensation to be assessed, the claimant must provide information in the following areas:

1. eligibility to make a claim – see section 8 of these guidelines;

2. the costs for which it is claiming, and provide the necessary evidence to support its claim:

   (a) direct costs – see section 10.2 of these guidelines;

   (b) opportunity costs, if applicable – see section 10.3 of these guidelines;

   (c) for scheduled load – see section 10.4 of these guidelines;

   (d) for scheduled network service providers – see section 10.5 of these guidelines;

3. spot market revenue received – see section 10.6 of these guidelines;

4. other revenue it has, or will, or is expected to, receive in relation to this claim – see section 9.1.1 of these guidelines; and

5. additional information required to support the claim not specifically listed above – see section 9.1.1 of these guidelines.

The claimant must include a statement in the documents provided to the Commission stating that "the claimant acknowledges that the Commission is able to provide all information given to it by the claimant to the panel and such consultants as the Commission considers appropriate."

The burden of proof regarding costs incurred, and the provision of information, analysis and/or models, rests with the claimant. All information provided by a claimant in support of its claim for compensation must be verifiable. The Commission may take appropriate measures to verify any information provided, to ensure the transparency and robustness of this process. See section 4 of these guidelines for more details.

All information submitted by a claimant in support of a claim for compensation must be authorised by the signature of a person or persons with authority to sign on behalf of that claimant.

Claimants should also note that the Rules provide that the "AEMC may recover from a claimant for compensation… any costs that are incurred by the AEMC and the panel in carrying out their functions under this clause [3.14.6 of the Rules] in respect of the claim. For this purpose the AEMC may require the claimant to pay all or a proportion of those costs to the AEMC prior to the claim being considered or determined."[6] The Commission will assess any costs to be recovered from the claimant on a case-by-case basis.

The Rules also provide the process for the Commission, and the panel, to assess a claim for compensation (clauses 3.14.6(g) to 3.14.6(p) of the Rules). Claimants should be mindful of this process, and the public consultation phase on the panel's draft report and the Commission's draft decision, when compiling the information to be provided in support of its claim.

To lodge the information to enable a claim for compensation to be assessed, please send it:

electronically to: applications@aemc.gov.au

Or in hardcopy to:

Australian Energy Market Commission

AEMC Applications

PO Box A2449

Sydney South NSW 1235

Applications sent via e-mail/mail should reference the following: Company/Organisation name and "claim for compensation".

6 Clause 3.14.6(q) of the Rules.

8 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 AEMO 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 AEMO in respect of a scheduled network service if, due to the application of an administered price cap, MPC, 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 AEMO 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 AEMO 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.

9 Information requirements

9.1 Information to be provided to the Commission and Panel

The claimant and AEMO are required to provide the following information in support of any claim for compensation as a consequence of the application of the APC, MPC, market floor price or administered floor price (as the case may be).

9.1.1 From the claimant

1. Clearly identify the claimant's eligibility to claim compensation i.e. in what category (or categories) of registered participant is the claimant applying for compensation, and the event giving rise to the claim for compensation.

2. Provide the total value of the compensation being sought (in accordance with section 10 of these guidelines), at a specified date in time. (The default date would be the date that the intent to claim compensation becomes a claim 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 relevant trading interval for which compensation is being claimed.

4. Provide a narrative of the circumstances that resulted in the identified costs being incurred that were coincident with market prices affected by the event.

5. Provide an itemised quantitative breakdown of the direct costs that are being claimed for, in relation to the categories of costs identified in the methodology for calculating compensation in this guideline.

6. If applicable, identify the method chosen for calculating opportunity costs and provide an itemised quantitative breakdown of the opportunity costs that are being claimed for.

7. Provide details of any other compensation claim that the claimant has been paid, that it has made or that it is considering making under any other clauses of the Rules e.g. clause 3.15.7 as a directed participant, during the time periods for which this claim for compensation relates.

9.1.2 From AEMO

1. Provide a verification of the facts identified in the claimant's narrative, for the specified trading intervals, including confirming whether the events being cited by the claimant are coincident with market prices for energy and/or frequency control ancillary services (FCAS) affected by the application of the APC, MPC, market floor price or administered floor price (as the case may be).

2. Provide details of the spot market income the claimant has received, or will receive, in respect of each relevant trading interval.

3. Provide details of the metered energy data used for the purposes of calculating the spot market income referred to above.

4. Provide any other data relevant to the calculation of the spot market income i.e. the marginal loss factor.

5. Provide details of any directions given to the claimant during the time periods for which the claim for compensation relates, and any compensation paid, to be paid, or under consideration to be paid as part of the directions compensation process.

9.2 Information to be provided to AEMO from the Commission

If compensation is determined to be payable, the Commission will advise AEMO of the total amount of compensation payable for each relevant trading interval.

10 Methodology to calculate compensation

This section sets out the framework for calculating the total level of compensation to be claimed. To calculate the inputs to this formula, claimants need to consider:

- the categories of direct costs relevant to their claim, including the provision of ancillary services – section 10.2;
- the most appropriate method of calculating their opportunity costs, if applicable, and its value – section 10.3; and
- the value of any spot market income received – section 10.6.

For the treatment of scheduled load, see section 10.4; for the treatment of scheduled network service providers, see section 10.5. In addition, the Commission may make other adjustments to the value of any compensation payable – see section 10.7.

10.1 Basic calculation

The total level of compensation, Total Claimable Amount (TCA), is to be based on the following calculation:

$$TCA = \sum_{t} (DC_t + OC_t - REV_t)$$

where:

$TCA = Total\ Claimable\ Amount$

$DC_t = Direct\ Costs\ Incurred\ in\ Trading\ Interval\ t$

$OC_t = Opportunity\ Costs\ Incurred\ in\ Trading\ Interval\ t$

$REV_t = Spot\ market\ income\ received\ in\ respect\ of\ Trading\ Interval\ t$

$t = Trading\ Interval\ for\ which\ the\ claim\ is\ being\ made$

Any other adjustments to the amount of compensation payable (see section 10.7) is taken into consideration by the Commission, rather than the panel.

10.2 Calculation of direct costs

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

10.2.1 Fuel costs

Fuel costs incurred during the relevant trading intervals. Higher than normal fuel costs[7] may also be included, with supporting reasoning to explain why they were incurred, such as:

- 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 administered price period (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.

10.2.2 Operation and maintenance

Operation and maintenance expenses directly attributable to the pattern of operation during the relevant trading intervals, including charges for:

- consumables such as water and chemicals; and
- predictable expenses not yet incurred such as the advancement of future maintenance requirements.

10.2.3 Wear and tear

General wear and tear directly attributable to the pattern of operation during the relevant trading intervals. Higher than normal wear and tear that may be attributed to specific circumstances related to the generator's operation during the relevant trading intervals, with supporting reasoning, 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), with potential consequences of:
  - additional maintenance and overhaul capital expenditures;
  - increased likelihood of forced outages (post APP) and associated lost revenue;

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

– long term efficiency losses, i.e. heat rate increases that cannot be reversed; and

– reduced technical life.

10.2.4 Ancillary services

The direct costs related to the provision of all ancillary services (i.e. 6 second, 60 second, 5 minute and regulation services) incurred by an ancillary service generating unit or load during the relevant trading intervals.

10.2.5 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:

- repair costs in the event of physical plant/equipment failure; and
- all other direct costs that cannot be attributed to the operation of the unit during the event, including start-up costs outside the event.

10.3 Calculation of opportunity costs

10.3.1 Definition of opportunity cost

The opportunity cost of a particular choice refers to the value of the next best alternative or opportunity.[8]

For the purpose of the guidelines, the definition of opportunity cost focuses on the timeframe for the event. Furthermore, opportunity costs will generally be most relevant to generating plants that are energy-constrained. Any costs directly associated with generation during an event such as an APP is regarded as direct costs, whereas costs/benefits associated with potential generation alternatives in another period constitutes opportunity costs.

For a more detailed discussion of the definition of opportunity cost, see Appendix A.

10.3.2 Valuing opportunity costs

Determining opportunity costs is essentially concerned with the expected future value of electricity in a particular region of the NEM over a particular time period.

Before valuing any opportunity costs, a claimant must first determine whether opportunity costs are a relevant consideration for it. If opportunity costs are

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

relevant, then the principles for selecting the most appropriate method for valuation of opportunity costs for that claimant need to be applied.

10.3.2.1 Determining whether opportunity cost is a relevant consideration

As mentioned previously, for these guidelines, opportunity cost will generally be most relevant to plant which is energy-constrained. Opportunity costs, therefore, capture those components that involve foreclosing opportunities to use scarce resources more profitably at another point in time.

To determine whether opportunity costs are a relevant consideration, the claimant first needs to identify whether its plant has either of the following limitations:

1. Technical limitation to replenishing the energy used during the relevant trading intervals – 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).

2. Commercial limitations to replenishing the energy used during the relevant trading intervals at the original costs – there may also be commercial incentive/disincentive to using the energy in a particular period.

   For more discussion on these limitations, please see Appendix A.

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.

If the physical and commercial limitations of a plant suggest a valid case for opportunity costs, it should be recognised that valuing the opportunity cost will depend on the range of future opportunities foreclosed. In determining these, 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.

10.3.2.2 Principles for selecting a method for valuation of opportunity cost

The choice of method (or methods) for calculating opportunity cost should follow the hierarchy of principles stated below:

- A market based valuation of opportunity cost is preferred because it is unambiguous and simple to verify.
- A market based valuation of opportunity cost should reasonably closely reflect the characteristics of the relevant energy limited facility being its location, the time period over which opportunity cost is assessed and its cost structure.
- If an appropriate market based valuation is not available then the use of market values over a similar past period should be considered.[9]
- If the use of market values over a similar past period is not available then opportunity cost valuation should be based on processes and models used by the claimant for determining their dispatch offers and managing their trading risks.
- It may be necessary to use a number of methods, undertake a comparison of the advantages and disadvantages of each method, to arrive at a conclusion on an appropriate opportunity cost.

Claimants will need to determine the most suitable method for calculating their opportunity costs, taking into account the total value of the compensation being sought against the evidence needed to support its claim. Illustrative examples of how to apply the principles is provided in Appendix A.

The burden of proof regarding the value of the opportunity costs incurred, and the provision of information, analysis and/or models to support the claim, rests with the claimant.

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[9] In exceptional circumstances, where a claimant does not consider that any future value appropriately reflects the cost of the opportunity foregone, the claimant can propose that a past value be applied. The claimant would need to explain, in detail, the exceptional nature of the circumstances, and why the specific past value is appropriate.

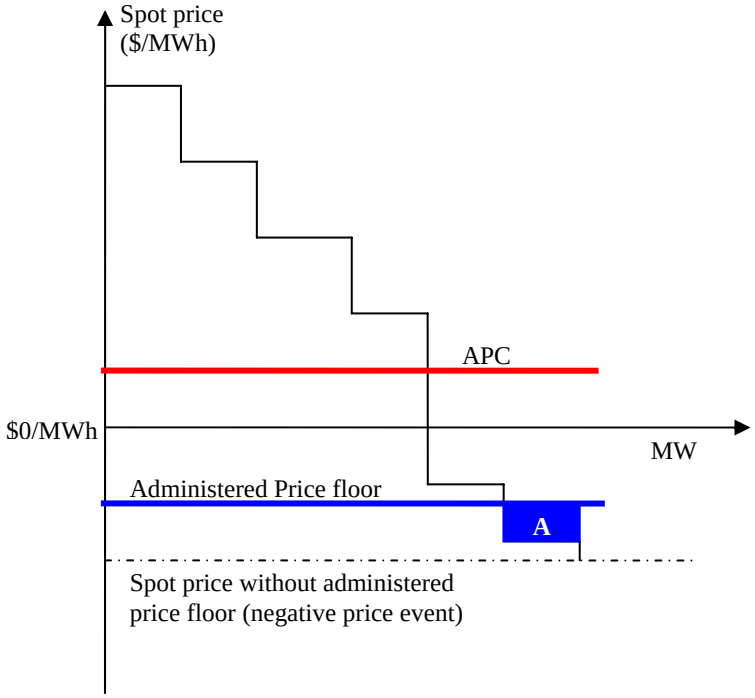
10.4 Treatment of scheduled load

The calculation of compensation for scheduled load differs to that of generating units, as it relates to the application of an administered floor price[10]. The methodology which follows is restricted to the application of the Rules.

Figure 1 shows the costs faced by a scheduled load under an administered price floor event.

Note: It is assumed that the underlying dispatch does not change as a result of application of the administered floor price. It is, therefore, the incidental costs associated with replacing the actual spot price with the administered floor price.

Figure 1 Opportunity cost of scheduled load under administered floor price event



10 Clause 3.14.6(a2) of the Rules.

Under an administered floor price, the costs incurred by the scheduled load is the additional payments that it has to make for consuming electricity at a higher price (i.e. the administered floor price) than its bid price. This is referred to as Component A (shown as the blue shaded area in Figure 1) calculated as:

$$A = \sum_{b=1}^{C} Q_b \cdot (PF - P_b)$$

where:

PF is the administered floor price

Q_b is the cleared load in MWs, 1… C, for the relevant trading interval

P_b is an estimate of the bid price

b is the relevant trading interval from 1 to C.

Evidence that the load could produce in support of its claim with respect to P_b may comprise, either:

- bid price for its standing bid data; or
- past load profile and spot prices to establish that its estimate of load consistent with their normal consumption pattern (as in a standing bid), and/or historic load/price patterns under negative price events. The key issue is to establish that the price point (or points) at which the dispatchable load increases/decreases to a higher/lower level of consumption is consistent with a typical operating profile of the load.

10.5 Treatment of scheduled network service providers

The calculation of compensation for scheduled network service providers (NSPs) is restricted to direct costs, incurred as a consequence of the application of an administered price cap, market price cap, market floor price or administered floor price (as the case may be). The direct costs relate to the direct loss of revenue as a consequence of the event, and may include counter-price flows.

To calculate the compensation costs, the scheduled NSP needs to determine the revenue it would have received if the event did not occur, less the actual revenue received.

Evidence that the scheduled NSP could produce in support of its claim, for the relevant trading intervals, includes AEMO data on uncapped spot prices in the relevant regions, energy flows between regions, energy losses on the interconnector over the relevant time period, and the adjusted prices taking into account price scaling effects[11] in the relevant regions.

[11] Clause 3.14.2(e)(2) of the Rules.

10.6 Calculation of spot market revenue

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

10.7 Other adjustments

10.7.1 Financing costs

In determining the total level of compensation, it may be appropriate for the Commission to recognise reasonable financing costs in respect of the passage of time between the event occurring to which the compensation claim relates and any 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.

In determining such costs, the Commission would also take into account any unreasonable delays from the claimant in providing the necessary information to commence assessment of the claim for compensation, or responding to requests for clarification or additional information from the panel or Commission.

The Commission will assess any financing costs on a case-by-case basis.

10.7.2 Other sources of compensation

In determining the amount of compensation payable, the Commission may take into account the value of any other sources of compensation paid, to be paid, or under consideration to be paid, to the claimant where that compensation arises out of the same events and covers the same costs and opportunities foregone, if applicable, that are the subject of this compensation claim.

Appendix A Opportunity Costs

In the event of any perceived differences between interpretations provided in this Appendix and the main body of the compensation guidelines, the main body of the guidelines prevails.

A.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. 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.

In the context of the electricity industry, the question of what constitutes a particular participant's opportunity cost can generally only be answered with reference to the specific context in which the participant 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.[12] 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 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 in another period constitutes an opportunity cost.

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12 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.

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

- 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.

A.2 Determining whether opportunity cost is a relevant consideration

As discussed in section 10.3.2.1 of these guidelines, opportunity costs capture those components that involve foreclosing opportunities to use scarce resources more profitably at another point in time.

In determining whether opportunity costs are relevant for a claimant, any estimation of opportunity costs needs to give due consideration to the following two issues, namely:

1. Technical limitation to replenishing the energy used during the relevant trading intervals – 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 may not be eligible for claiming any opportunity costs.

2. Commercial limitations to replenishing the energy used during the relevant trading intervals 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.[13] 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

[13] 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.

future opportunities foreclosed, as discussed in section 10.3.2.1 of these guidelines. 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, all other things being equal, the opportunity imposed by using energy unprofitably during an APP event will be higher for the latter. The factors which need to be considered in determining the range of opportunities foreclosed are discussed in section 10.3.2.1 of the guidelines.

In considering these factors, an illustrative example of the impact of the range of opportunities foreclosed may be: 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 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.[14] These uncertainties may cause the opportunity cost to be both very high and volatile under extreme conditions.

A.3 Illustrative examples of applying the principles to value opportunity cost

For the following illustrative examples, a discussion of two types of plants may be useful. Then we apply two principles for selecting a method for valuation of opportunity costs. In particular, the following discussion may be relevant to how limited energy plants may apply the hierarchy of principles to meet their specific circumstances.

In considering the technical or commercial limitations on a plant, for illustrative purposes it may be useful to consider claimants in two broad categories, based on their flexibility:

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.

[14] For further clarification on these issues, see Concept Economics report, *Risk Assessment of Alternative Compensation Options*, July, 2008, pp.33-35.

Opportunity cost 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 may represent a reasonable proxy for opportunity cost i.e. the first principle of a market based valuation applies here. 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.

Opportunity cost for plant in category (b) above

For plant in category (b), opportunity costs could 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 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 should be calculated as the difference between administrative pricing at the time of generation and the later hour when it might otherwise have been used.

This is an example of applying the second principle of using a market based valuation which closely reflects the characteristics of the plant.

More specifically, under this approach, compensation for hydroelectric facilities may 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.