IN THE DISPUTE RESOLUTION PANEL AT MELBOURNE

(Constituted for determinations as to compensation under clause 3.16.2 of the National Electricity Rules)

BETWEEN

AGL Hydro Partnership (ABN 86 076 691 481)	(**AGL Hydro**)
Woodlawn Wind Pty Limited (ABN 38 139 165 610)	(**Infigen**)
Lake Bonney Wind Power Pty Limited (ABN 48 104 654 837)	(**Infigen**)
Snowtown Wind Farm Pty Ltd (ABN 76 109 468 804)	(**Trustpower**)
Pacific Hydro Clements Gap Pty Ltd (ABN 87 109 911 097)	(**Pacific Hydro**)
EnergyAustralia Pty Ltd (ABN 99 086 014 968)	(**EA**)

and

Australian Energy Market Operator Limited (ABN 94 072 010 327)	(**AEMO**)

DETERMINATION

(National Electricity Rules, clause 3.16.2)

The Dispute Resolution Panel determines that:

1. Compensation is payable to each of AGL Hydro, Infigen, Trustpower, Pacific Hydro and EA in respect of the *scheduling error* declared by AEMO on 7 June 2012 in its Scheduling Error Report entitled "Incorrect Unconstrained Intermittent Generation Forecasts for Semi-Scheduled Generators" (**the UIGF scheduling error**).
2. The following amounts of compensation are payable in respect of revenue for sale of electricity on the *spot market* that was lost by reason of the UIGF scheduling error:
    (a) The amount of compensation payable from the *Participant compensation fund* to AGL Hydro is $78,585.00, to be paid by AEMO through Austraclear within 7 days.
    (b) The amount of compensation payable from the *Participant compensation fund* to Infigen is $1,178,290.00, to be paid by AEMO through Austraclear within 7 days.
    (c) The amount of compensation payable from the *Participant compensation fund* to Trustpower is $12,031.00, to be paid by AEMO through Austraclear within 7 days.
    (d) The amount of compensation payable from the *Participant compensation fund* to Pacific Hydro is $29,999.00, to be paid by AEMO through Austraclear within 7 days.
    (e) The amount of compensation payable from the *Participant compensation fund* to EA is $11,891.00, to be paid by AEMO through Austraclear within 7 days.

3. The costs of the dispute resolution process are to be allocated between the parties as has been agreed by the parties.

Date: 27 November 2012

Peter R D Gray SC

Liability limited by a scheme approved under professional standards legislation

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and

Australian Energy Market Operator Limited (ABN 94 072 010 327)	**(AEMO)**

REASONS FOR DETERMINATION

(National Electricity Rules, clause 3.16.2)

1. On 7 June 2012, AEMO declared in its Scheduling Error Report entitled "Incorrect Unconstrained Intermittent Generation Forecasts for Semi-Scheduled Generators" that it had failed to follow the *central dispatch* process set out in rule 3.8.[1] By reason of AEMO's declaration there is, for the purposes of the National Electricity Rules, a *scheduling error*: clause 3.8.24(a)(2) (**the UIGF scheduling error**).

2. At the time it was declared, the UIGF scheduling error was ongoing.

3. The UIGF scheduling error had its origins in the implementation of *National Electricity Amendment (Central Dispatch and Integration of Wind and Other Intermittent Generation) Rule 2008 No. 2* (**the 2008 Rule change**).

4. The 2008 Rule change required *generating units* that produce electricity intermittently, and that (either alone or in a group *connected* at a common *connection point*) have a *nameplate rating* of 30MW or over, to be classified under Chapter 2 of the Rules as *semi-scheduled generating units*.

5. Companies that own, operate or control *generating units* that are *connected* and supply electricity to a *transmission system* or a *distribution system* forming part of the *national grid* are registered as *Generators*.

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[1] Italicised expressions in these reasons have the meanings defined in Chapter 10 of the National Electricity Rules.

6. The owners, operators or controllers of *semi-scheduled generating units* are *Semi-Scheduled Generators* insofar as their activities relate to a *semi-scheduled generating unit.*

7. Under the 2008 Rule change, *Semi-Scheduled Generators* and *semi-scheduled generating units* became subject to the *central dispatch* process.

8. Under the *central dispatch* process, in certain *dispatch intervals* (known as *semi-dispatch intervals*) a *Semi-Scheduled Generator* is subject to electronic *dispatch instructions* from AEMO's system NEMDE, by which the *Semi-Scheduled Generator* is instructed to increase or reduce the quantity of electricity a *semi-scheduled generating unit* produces for the *semi-dispatch interval.*

9. During a *semi-dispatch interval* the output for a *semi-scheduled generating unit* must not exceed a *dispatch level* specified by NEMDE in the relevant *dispatch instruction.*

10. *Central dispatch* applies an input known as an *unconstrained intermittent generation forecast* (**UIGF**) as an upper limit on NEMDE's calculation of *dispatch level* for the relevant *semi-scheduled generating unit.*

11. The requirement for AEMO to develop a UIGF is established in rule 3.7B, which provides that AEMO must prepare a forecast of the *available capacity* of each *semi-scheduled generating unit* (to be known as the UIGF) for the purposes of, amongst other things, *dispatch.*

12. Clause 3.7B(c) relevantly provides:

> (c) When preparing an *unconstrained intermittent generation forecast* for the purposes referred to in paragraph (a), *AEMO* must take into account:
>
> (1) the maximum *generation* of the *semi-scheduled generating unit* provided by the *Semi-Scheduled Generator* as part of its *bid and offer validation data*;[2]
>
> (2) the *plant availability* of the *semi-scheduled generating unit* submitted by the *Semi-Scheduled Generator* under paragraph (b);
>
> (3) the information obtained for the *semi-scheduled generating unit* from the *remote monitoring equipment* specified in clause S5.2.6.1;
>
> (4) the forecasts of the energy available for input into the electrical power conversion process for each *semi-scheduled generating unit*;
>
> (5) the *energy conversion model* for each *semi-scheduled generating unit*;
>
> (6) the assumption that there are no *network constraints* otherwise affecting the *generation* from that *semi-scheduled generating unit*; and
>
> (7) the timeframes of: ... (ii) *dispatch, ...*

13. The *energy conversion model* (**ECM**) referred to above is in the form of a data template, with the data used as an input into a mathematical model that defines how an *intermittent* energy source, such as wind, is converted by a *semi-scheduled generating unit* into electrical output. Thus, in the case of a wind turbine, the ECM forecasts the electrical power output from the wind turbine based on the forecast of wind speed.

14. The UIGF *scheduling error* is constituted by AEMO having incorrectly determined UIGFs for *Semi-Scheduled Generators* during certain *dispatch intervals.*

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[2] This provision originally read "the total registered capacity provided by the *Semi-Scheduled Generator* as part of its *registered bid and offer data*", until amended with effect from 16 December 2010 by items [1] and [2] of Schedule 1 to *National Electricity Amendment (Bid and Offer Validation) Rule 2009 No 21.*

15. The Joint Submission prepared by the parties describes the UIGF scheduling error, and identifies what gave rise to it, as follows (including footnotes):

> 49. A UIGF should ... forecast the total electrical *power* output from available *semi-scheduled generating unit*s, based solely on the forecast *power* input to its *intermittent* energy conversion process and ignoring any *constraints* on its electrical *power* output, such as *network* limitations.
>
> 50. The data that is used to produce *dispatch instructions* for *semi-scheduled generation* is processed by a number of systems. The UIGF data for wind generators is determined by the Australian Wind Energy Forecasting System (**AWEFS**).
>
> 51. The manner in which AEMO *dispatches semi-scheduled generating units,* and its use of AWEFS in preparing a UIGF, is set out in the 'Power System Operating Procedure – Dispatch', version 74, dated 1 July 2012, made for the purposes of Rule 4.10 (**Dispatch Procedure**).[3]
>
> 52. The Dispatch Procedure provides that specified SCADA inputs are to be used by AWEFS in preparing a UIGF, including MW output, wind speed, wind direction, number of turbines in service, and the 'control system set-point' (the latter of which is stated to be 'desirable but not mandatory' for a *Semi-Scheduled Generator* to provide).[4] This SCADA data is the 'primary input' for preparing a UIGF, but the Dispatch Procedure also provides that where these inputs fail, AWEFS will not use this data, and will revert to using forecast weather and turbine availability information to produce a five minute ahead dispatch forecast. The forecast information specified in the Dispatch Procedure for this purpose is the 'number of turbines available' and the 'upper MW limit'.[5]
>
> 53. AEMO is required under Rule 2.2.7(d) to develop and *publish* guidelines setting out the information to be contained in ECMs. AEMO *published* the ECM initial guidelines (which remain current) on 28 April 2009. During the consultation on these guidelines as part of the implementation process for the *Semi-Scheduled Generator* arrangements, and in response to submissions by potential *Semi-Scheduled Generators*, AEMO made the provision of the 'control set-point' information as part of the ECM optional (as is now reflected in the Dispatch Procedure). In hindsight, this decision appears to be the cause of an unintended impact on the manner in which *semi-scheduled generating units* are *dispatched.*
>
> 54. AWEFS uses the control set-point sent in real-time to AEMO to determine whether actual output has been reduced by a *constraint* equation.[6] Where that control set point data is provided, AWEFS will revert to using forecast weather and turbine availability information to determine the UIGF where a output has been effected by a *constraint* equation. However, in the absence of a control set-point, AWEFS effectively assumes the output reduction is due to a reduction in wind, and fails to revert to using forecast weather and turbine availability information in determining the UIGF. As noted, AEMO is required under Rule 3.7B(c)(6) to create a UIGF for each *semi-scheduled generating unit* on the assumption that there are no *network constraints* otherwise affecting *generation.*
>
> 55. The lack of a control set-point has resulted in AWEFS ignoring this assumption.[7]

16. On 23 July 2012, AGL Hydro served an *Adviser referral notice* pursuant to clause 8.2.5, the purpose of which was stated to be:

> ... to request a DRP award compensation from the Participant Compensation Fund in circumstances where AEMO has declared a scheduling error and there is agreement between the applicant and AEMO on the methodology for calculation of loss.

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3 Dispatch Procedure, section 25 (Attachment 3). This section was added to version 70 of the Dispatch Procedure on 6 October 2011 and there have been no material amendments since that date.

4 Dispatch Procedure, section 25.1 (Attachment 3).

5 Dispatch Procedure, section 25.1.

6 Limitations on the *power system* are represented in NEMDE as a series of mathematical constraint equations.

7 Had the Wind Farm control set-point been provided, this would allow AWEFS to ignore the Wind Farm's output in the previous *dispatch interval* (if approximately equal to the control set-point value) and provide an UIGF based on actual wind speed and the number of turbines available.

17. Clause 3.16.2(a), (b), (d), (h) and (i) relevantly provide:

> (a) Where a *scheduling error* occurs, a *Market Participant* may apply to the *dispute resolution panel* for a determination as to compensation under this clause 3.16.2.
>
> (b) Where a *scheduling error* occurs, the *dispute resolution panel* may determine that compensation is payable to *Market Participants* and the amount of any such compensation payable from the *Participant compensation fund*.
>
> ...
>
> (d) A *Scheduled Generator* or *Semi-Scheduled Generator* who receives an instruction in respect of a *scheduled generating unit* or *semi-scheduled generating unit* (as the case may be) to operate at a lower level than the level at which it would have been instructed to operate had the *scheduling error* not occurred, will be entitled to receive in compensation an amount determined by the *dispute resolution panel*.
>
> ...
>
> (h) In determining the level of compensation to which *Market Participants* are entitled in relation to a *scheduling error*, the *dispute resolution panel* must:
>
> ...
>
> (3) Use the *spot price* as determined under rule 3.9, ...;
>
> (4) Take into account the current balance of the *Participant compensation fund* and the potential for further liabilities to arise during the year;
>
> (5) Recognise that the aggregate liability in any year in respect of *scheduling errors* cannot exceed the balance of the *Participant compensation fund* that would have been available at the end of that year if no compensation payments for *scheduling errors* had been made during that year.
>
> (i) The manner and timing of payments from the *Participant compensation fund* are to be determined by the *dispute resolution panel*.

18. Between about 23 July 2012 and 30 October 2012, principles of compensation were agreed between (at least) AGL Hydro and AEMO for the purposes of assessment of the amount or level of compensation in the nature of lost revenue which would, but for the UIGF scheduling error, have been earned for the sale of additional electricity on the *spot market*.

19. On 30 October 2012 the presently constituted *dispute resolution panel* was appointed to determine compensation in respect of the UIGF scheduling error on the agreed principles, and on 30 and 31 October 2012 the further *Semi-Scheduled Generators* which are now parties to this dispute opted in to that dispute resolution process pursuant to clause 8.2.6B(c).

20. All of the *Semi-Scheduled Generators* which are parties to this matter are also *Market Participants*.

21. My function under clause 3.16.2 is to determine:

> (a) whether compensation is payable to the *Market Participants* which are parties to this dispute;
>
> (b) if so, the amount (clause 3.16.2(b) refers) or level (clause 3.16.2(h) refers) of compensation; and
>
> (c) the manner and timing of any payments to them from the *Participant compensation fund*.

22. By reason of the manner in which the matter has come before me described in paragraphs 18 and 19 above, I regard my function referred to in paragraph 21(b) above in this particular dispute as being limited to determining the amount or level of compensation in the nature of lost revenue which would, but for the UIGF scheduling error, have been earned for the sale of additional electricity on the *spot market*.

23. Infigen, in addition to seeking compensation in the nature of lost *spot market* revenue, is pursuing a claim for compensation for renewable energy certificates that it would, but for the UIGF scheduling error, have been entitled to create under the *Renewable Energy (Electricity) Act 2000* (Cth). A differently constituted *dispute resolution panel* is to determine that claim.

24. An informal, non-transcribed, hearing was held in the present matter on 14 November 2012.

25. As a result of the UIGF scheduling error, it is clear that in various *dispatch intervals* since each relevant *semi-scheduled generating unit* first became semi-scheduled, the level at which the unit had been *dispatched* by the *central dispatch* process has been lower than dictated by a proper application of rule 3.8.

26. More than 28,000 *dispatch intervals* have been affected by the UIGF scheduling error.

27. But for the UIGF scheduling error, the affected *Semi-Scheduled Generators* would have operated at a higher level of *generation* and would have been entitled to earn revenue for the sale of additional electricity at the applicable *spot price*.

28. I have been provided with information in respect of each *Semi-Scheduled Generator* in this dispute, which has been agreed between that *Semi-Scheduled Generator* and AEMO, that identifies how many *dispatch intervals* have been affected in respect of each relevant wind farm, and the lost or "under-forecast" energy attributable to each wind farm.

29. I am satisfied that the information referred to in paragraph 28 above is confidential. It could be used to infer matters that are commercial-in-confidence. I have made a direction to preserve its confidentiality. It is not necessary to set that information out in order to explain my determination in this matter.

30. The UIGF scheduling error affected each of AGL Hydro, Infigen, Trustpower, Pacific Hydro and EA from the dates at which each was semi-scheduled in respect of the wind farms specified below, to the end dates set out below:

Affected Generator	**Wind Farm**	**Semi-Scheduled from**	**End date**
AGL Hydro	Bluff	5 July 2011	8 March 2012
	Hallett 1	9 April 2009	20 March 2012
	Hallett 2	11 May 2009	8 March 2012
	North Brown Hill	19 July 2010	8 March 2012
	Oaklands Hill	5 August 2011	14 April 2012
Infigen	Lake Bonney 2	9 September 2010	19 March 2012

	Lake Bonney 3	2 July 2010	22 September 2012
	Woodlawn	3 May 2011	25 October 2012
Trustpower	Snowtown	26 July 2010	14 November 2012
Pacific Hydro	Clements Gap	17 April 2009	1 August 2012
EA	Waterloo	20 August 2010	20 March 2012

31. I am satisfied that each of the *Semi-Scheduled Generators* in this dispute has been affected by the UIGF scheduling error in the manner outlined in clause 3.16.2(d) of the Rules in respect of numerous *dispatch intervals*, in the above date ranges.

32. I am therefore satisfied that compensation is payable to each of AGL Hydro, Infigen, Trustpower, Pacific Hydro and EA in respect of the UIGF scheduling error.

33. It remains to determine the amount or level of compensation to which each *Semi-Scheduled Generator* is entitled.

34. The parties have agreed on the principles by which this calculation should occur. The agreed principles are described by the parties in the Joint Submission as follows (including footnotes):

> 67. In order to determine the amount of this compensation payable to each Affected Generator, it is necessary to establish the following values for each affected *semi-dispatch interval*:
>
> (a) the actual output of the Wind Farm;
>
> (b) the UIGF that would have applied if *network constraints* had not been taken into account – referred to as the **"what-if" UIGF**;
>
> (c) the level at which the Wind Farm would have been *dispatched* if the "what-if" UIGF had been applied in *central dispatch*, with all conditions not impacted by the *scheduling error* remaining unchanged – referred to as the **"what-if" *dispatch level***;
>
> (d) the applicable *intra-regional loss factor* for the Wind Farm; and
>
> (e) the applicable *spot price*.[8]
>
> ...
>
> 69. The following compensation principles have been agreed by the parties for the purposes of quantifying an Affected Generator's spot market losses for this particular *scheduling error*:
>
> (a) The calculation of the "what-if" UIGF must be based on the data actually available for each 5-minute *semi-dispatch interval*, using:
>
> (i) SCADA inputs actually received for the purposes of determining wind speed and wind turbine availability (subject to paragraph (b)); and
>
> (ii) AWEFS standing data actually used, which includes information from the ECM.[9]
>
> (b) If SCADA data for turbines available (as required under the ECM) was not provided for a Wind Farm, the SCADA data for turbines in operation will be used instead. For the

[8] Rule 3.16.2(h)(3) requires the *dispute resolution panel* to use the *spot price* determined under Rule 3.9 in determining compensation.

[9] The data used by AWEFS in the *dispatch* process for *semi-scheduled generating units* is discussed ... at paragraph 52 [of the Joint Submission].

Lake Bonney 2 and 3 Wind Farms, the calculation of turbines available will be based on the sum of turbines in operation and additional 'turbines paused' SCADA data actually provided to AEMO, which can be aggregated to derive turbine availability.

(c) The "what-if" UIGF for a Wind Farm cannot exceed its actual capacity (assuming unlimited wind) based on the number of wind turbines available[10] for *dispatch* during the relevant *semi-dispatch intervals*.

(d) For reasons of practicality, the impact of the *scheduling error* on a Wind Farm's output during a period after a *constraint* has been lifted will not be included for the purpose of calculating an Affected Generator's loss.

(e) The "what-if" dispatch level is taken to equal the "what-if" UIGF unless the Wind Farm would not have achieved the "what-if" UIGF due to the relative economics of the Wind Farm compared to other generators within the network constraint. Other *Generators* competing for access to the *constrained* transmission line may have displaced the output of the Wind Farm because they were cheaper within the constraint. However, it is not possible to re-create with certainty the exact conditions that would have occurred absent the *scheduling error*, nor is it practical to attempt this for many thousands of affected *dispatch intervals* over 3 years. The parties have therefore agreed for the purposes of this claim to assume that the "what-if" dispatch level is:

(i) for each affected *semi-dispatch interval* in which the *regional spot price* was $300/MWh or more, the maximum *dispatch level* of the Wind Farm resulting from a re-run of the original NEMDE *dispatch* calculation with only the following changes:

(A) substitute the UIGF with the "what-if" UIGF for each affected Wind Farm; and

(B) substitute the initial MW with the "what-if" dispatch level calculated by the NEMDE re-run for the previous *dispatch interval*, for the Wind Farm and for all other *scheduled generating units*, *semi-scheduled generating units* and *interconnectors* within the *network constraint* which caused the *semi-dispatch interval* to be set; and

(ii) for all other affected *semi-dispatch intervals*, the same as the "what-if" UIGF (determined in accordance with the principles in paragraph 69(a) to (c).

(f) Compensation is payable based on the difference between the "what-if" dispatch level determined under paragraph (e) and the actual UIGF that applied to the Wind Farm in the affected *semi-dispatch interval*.

(g) The quantity calculated under paragraph (f) is multiplied by the *intra-regional loss factor* to give the compensable quantity (in MWh).

(h) The spot market loss for each Wind Farm for each affected *semi-dispatch interval* is the compensable quantity calculated under paragraph (g) multiplied by the *spot price*.

(i) If the *spot price* for an affected *semi-dispatch interval* is negative, the calculation under paragraph (h) will result in a payment to the market (that is, a credit in the overall compensation calculation).

35. I am satisfied that the agreed principles are logical and appropriately adapted to applying the principles in clause 3.16.2(d) and (h) to the circumstances of this case in light of the UIGF scheduling error. The principles described in subparagraphs (d) and (e)(ii) above were adopted for reasons of practicality. I am satisfied that the

[10] Or turbines in operation where turbines available SCADA data is either not provided or cannot be derived from data provided to AEMO (see paragraphs (a) and (b)).

exclusion of the matters mentioned in them has, at most, only a marginal effect on the calculations, and it would not have been an efficient use of resources to go further. Had the parties not adopted these principles, many days of additional work would have been required in order to attempt to carry out the relevant calculations, and this wasteful use of resources has been avoided.

36. AEMO has, with the concurrence of each *Semi-Scheduled Generator*, provided to me calculations of the compensation for the respective *Semi-Scheduled Generators* carried out by AEMO in accordance with the agreed principles. The agreed figures resulting from the application of the agreed principles are as follows:

(a) AGL Hydro:	$78,585.00
(b) Infigen:	$1,178,290.00
(c) Trustpower:	$12,031.00
(d) Pacific Hydro:	$29,999.00
(e) EA:	$11,891.00

37. The parties' Joint Submission specifies the current balance of the *Participant compensation fund*: $5,450,565.

38. The Joint Submission identifies no reason under clause 3.16.2(h)(2) and (3) not to order full payment to be made of the amounts of compensation that have been calculated. Further, the Adviser has informed me that, aside from Infigen's claim referred to in paragraph 23 above, there is no other application for compensation to be paid from the *Participant compensation fund* currently pending.

39. After payment of the compensation determined in this matter, there will be a positive balance in excess of $4.1 million in the *Participant compensation fund*.

40. I calculate the maximum quantum of compensation available to Infigen in its claim referred to in paragraph 23 above as being such that, after payment of that maximum quantum (should that be ordered), a substantial portion of the amount referred to in paragraph 39 would remain.

41. I am satisfied that there is no reason under clause 3.16.2(h)(2) and (3) not to order full payment to be made of the amounts of compensation that have been calculated in this matter.

42. The amounts of compensation referred to in paragraph 36 above exclude any GST. If those payments are in consideration for taxable supplies, AEMO must also pay an additional amount equal to the consideration multiplied by the applicable GST rate: clause 3.15.10A(b)(1).

43. The allocation of the costs of the dispute resolution process have been agreed by the parties.

Date: 27 November 2012

Peter R D Gray SC
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