



05 December 2016

James Lindley
Manager Systems Performance and Commercial
Australian Energy Market Operator

Submitted Electronically:

Dear Mr. Lindley,

Infigen Energy Limited
Level 22, 56 Pitt Street
Sydney NSW 2000
Australia
T +61 2 8031 9900
F +61 2 9247 6086
T +1 214 515 1124
www.infigenenergy.com

Infigen Energy Limited makes this submission in response to the *Causer Pays Procedure – Factors for Asynchronous Operation: Issues Paper* (October 2016) (**Issues Paper**).

The related bodies corporate of Infigen Energy Limited that are registered market participants in the NEM are Renewable Power Ventures Pty Ltd, Woodlawn Wind Pty Ltd and Lake Bonney Wind Power Pty Ltd, but for convenience we will simply refer to “Infigen Energy” in this submission.

This submission has been jointly developed by Infigen Energy, Pacific Hydro Clements Gap Pty Ltd, Tilt Renewable Australia Pty Ltd and Waterloo Wind Farm Pty Ltd (**Coalition**). The Coalition members operate wind farms in South Australia.

Of the options presented by AEMO for consultation, Option 2 is the most appropriate for a causer pays procedure for periods of asynchronous operation. The basis of the Coalition's view is set out below.

Each of the factors set out in clause 3.15.6A(k) are relevant

AEMO is required by clause 3.15.6A(j) of the National Electricity Rules (**NER**) to take into account the principles in clause 3.15.6A(k) in preparing a procedure for the purposes of clause 3.15.6A(j)(2).

The Issues Paper singles out clause 3.15.6A(k)(3) as being the only principle specifically relevant to determining a causer pays procedure for the purposes of clause 3.15.6A(j)(2). The Coalition's position is that all relevant factors in clause 3.15.6A(k) must be taken into account by AEMO and that the relevant factors extend beyond the factor in paragraph (k)(3).

While paragraphs (k)(3) and (k)(6) are the only paragraphs which specifically mention asynchronous operation, each of the factors in clause 3.15.6A(k) must be considered for its relevance to preparing a causer pays procedure for periods of asynchronous operation.

Clause 3.15.6A(k)(1)

Fundamentally a causer pays procedure must 'reflect the extent to which the Market Participant contributed to the need for the regulation services'. The conduct of Market Participants may vary between periods of synchronous and asynchronous operation.

For example, particular conduct during an asynchronous period, motivated by high dispatch prices, can impact on frequency.¹

Currently, the causer pays factors for synchronous periods are derived from historic data indicating the contribution of a Market Generator to frequency deviation. This historic data has no relevance to the issue of the extent to which a Market Participant contributed to the need for regulation services during a period of asynchronous operation. Consequently, the principle in clause 3.15.6A(k)(1) will not be accounted for in a methodology which derives causer pays factors applicable to periods of asynchronous operation from historic data reflecting the contribution to the need for regulation services in a synchronous period.

In order to take into account the principle in clause 3.15.6A(k)(1), a methodology based on actual performance during the particular asynchronous period is required.

Clause 3.15.6A(k)(3)

In preparing a causer pays procedure AEMO must take into account:

- (3) for the purpose of paragraph (j)(2), the contribution factor determined for a group of *regions* for all *Market Customers* that do not have *metering* to allow the individual contribution of that *Market Customer* to the aggregate need for *regulation services* to be assessed, must be divided between *regions* in proportion to the total *customer energy* for the *regions*.

In respect of clause 3.15.6A(k)(3), the Coalition agrees with AEMO's interpretation that the residual contribution factor for Market Customers, as between the regions on either side of a synchronous separation is to be proportionate to the total customer energy in each group of regions.

Clause 3.15.6A(k)(4)

AEMO is provided with a discretion to determine the relevant timeframe over which an individual Market Participant's contribution to the aggregate need for regulation services will be determined. In exercising this discretion AEMO must act reasonably in the context of its responsibility to prepare a causer pays procedure. In respect of a causer pays procedure for periods of asynchronous operation within the mainland NEM, the appropriate period of time (considered in the context of the other principles set out in clause 3.15.6A(k)) would be the period of asynchronous operation. There is no other timeframe which can accommodate the principles in paragraphs (k)(1) and (k)(6).

Clause 3.15.6A(k)(6)

In preparing a causer pays procedure AEMO must take into account:

- (6) where contributions are aggregated for *regions* that are operating asynchronously during the calculation period under paragraph (i), the contribution factors should be normalised so that the total contributions from any non-synchronised *region* or *regions* is in the same proportion as the total *customer energy* for that *region* or *regions*.

¹ For example, the conduct of non-scheduled generators at Lonsdale and Port Stanvac, South Australia on 1 November 2015: AER, *Report into market ancillary service prices above \$5000* (11 February 2016), 9.

In respect of clause 3.15.6A(k)(6), the Coalition disagrees with AEMO's interpretation. AEMO interprets paragraph (k)(6) as applying only to global requirement costs. The text of the paragraph does not support this interpretation as no mention is made of global market ancillary services requirements.

The Coalition interprets paragraph (k)(6) as recognising that once a mainland region is operating asynchronously, the mainland region or regions on each side of the network separation are operating asynchronously. For instance, if the SA region is operating asynchronously with the rest of the mainland NEM then it follows that the remainder of the mainland NEM is also operating asynchronously with the SA region. In this circumstance, the regions comprising the rest of the mainland NEM may be operating synchronously with each other, but they are nevertheless asynchronous in relation to the SA region.

In circumstances such as these, the causer pays procedure for the asynchronous period will need to provide for the aggregation of contributions:

- in an asynchronous region; and
- in regions which are asynchronous from another part of the mainland NEM but synchronous with one another.

The causer pays procedure will then need to normalise the aggregated contribution factors so that the total contributions from the asynchronous region or regions is in the same proportion as the total customer energy for that region or regions.

Unlike clause 3.15.6A(k)(3) which refers to Market Customers and, therefore, appears directed at the formula in clause 3.15.6A(i)(2), clause 3.15.6A(k)(6) is focused on asynchronous operation of regions generally (ie is relevant to both Market Generators and Market Customers). Consequently, the normalisation required by clause 3.15.6A(k)(6) will affect the calculation of the 'MPF' and 'AMPF' factors in the formulae under clauses 3.15.6A(i)(1) and 3.15.6A(i)(2) of the NER.

AEMO refers to sections 5.9 and 5.10 of the *Causer Pays: Procedure for Determining Contribution Factors "Causer Pays Procedure"* (15 December 2013) (CPP) in respect of the normalisation and aggregation process undertaken in compliance with clause 3.15.6A(k)(6). Section 5.9 of the CPP provides for a process for determining a single set of causer pays factors for the mainland and Tasmanian region by normalising the figures for regional demand. This is required by clause 3.15.6A(k)(6) as Tasmania is always operating asynchronously with the mainland NEM.

As the asynchronicity between the mainland NEM and Tasmania is a constant physical reality of the NEM, the MPF for both the mainland NEM (in synchronous operation) and Tasmania are able to be calculated on the basis of historic data. In contrast, the asynchronous operation of a region of the mainland NEM is not a constant. Compliance with clause 3.15.6A(k)(6) could only, therefore, be undertaken through normalisation on the basis of total customer energy during the asynchronous period of operation.

Clause 3.15.6A(k)(7)

Clause 3.15.6A(k)(7) indicates that the causer pays procedure must take into account that semi-scheduled generators will not be assessed as contributing to the deviation in the frequency of the power system if the semi-scheduled generating unit meets one of

three criteria in the relevant dispatch interval. One of these criteria is that the semi-scheduled generating unit achieves its dispatch level at a uniform rate.

The Australian Wind Energy Forecasting System (**AWEFS**) is used for the purpose of, among other things, determining an Unconstrained Intermittent Generation Forecast (UIGF) for semi-scheduled generators and, combined with other technical and market inputs, calculates a dispatch target for a semi-scheduled generator. However, there are significant flaws in the capacity of AWEFS to accurately calculate the dispatch levels of a semi-scheduled generating unit. These include:

- failure to recognise variation in the operating state of a wind turbine so that a turbine restarting or shutting down or undertaking an auto reset process will be included in an assessment of whether the generating unit is achieving its dispatch level at a uniform rate;
- assessment of uniform dispatch is on the basis of a single wind signal for a wind farm, which fails to recognise varied wind conditions across a wind farm site;
- AEMO assessing wind farm performance against dispatch targets which do not properly take into account local technical limitations of the generating unit;
- changes in capability of the wind farm notified to AEMO in the projected assessment of system adequacy (PASA) data are not inputted into the AWEFS;
- the time delay between AEMO issuing the Generator Dispatch Limit (**GDL**) (against which the performance of the generating unit is assessed) and the GDL being received by the wind farm operator means that there is only a fraction of the five-minute dispatch interval available to the wind farm operator to attempt to meet the GDL.

Aside from these flaws in the AWEFS, it is an oxymoronic regulatory requirement for a semi-scheduled generating unit to achieve dispatch levels at a uniform rate. A generating unit can only be classified as semi-scheduled where the output from the generating unit is intermittent.²

The dispatch instruction issued to a wind farm sets a maximum level of power to be supplied by a generating unit over a specified period.³ Provided that the maximum level is not exceeded during a constraint period, a wind farm will be operating in accordance with dispatch levels.⁴ Despite complying with the dispatch instruction, a wind farm which generates below the maximum specified in the dispatch instruction will be subject to FCAS costs as the principle in clause 3.15.6A(k)(7) requires dispatch levels to be achieved at a uniform rate (rather than in conformance with dispatch instructions).

The Coalition considers that the operation of the NEM should be based on good power system control practice reflecting the physics of the electricity system. Processes and systems based on actual performance data will enable these anomalies to be identified and addressed to ensure that the operation of the NEM is technology neutral.

² Clause 2.2.7(a), NER.

³ Clause 4.9.2(a)(3), NER; see also, AEMO, *Participant categories in the National Electricity Market*, 2.

⁴ Clause 3.8.23(b), NER.

The AWEFS' flaws should be addressed from both a technical and regulatory perspective to ameliorate harsh treatment of wind farms under the NER. While these technical and legislative changes are outside the scope of the current review, the Coalition considers that the methodology chosen by AEMO for the causer pays procedures should not exacerbate these system flaws. A methodology based upon actual performance data is more reasonable with respect to the actual frequency performance in the islanded region/s and more transparent and accountable.

Option 2 should be adopted

Of the options presented in the Issues Paper, the Coalition considers that Option 2 should be adopted as the causer pays procedure for asynchronous operation of mainland regions. This option would base the causer pays factors for periods of asynchronous operation on the frequency indicators for the islanded region by measuring and aggregating:

- the performance of appropriately metered generating units in the region or regions; and
- demand in the region or regions during the asynchronous dispatch intervals.

Once a separation event occurs between mainland NEM regions, the mainland NEM is asynchronous on each side of the separation. For this reason, the Coalition considers that it is appropriate for new contribution factors to be determined for each asynchronous region or group of regions.

AEMO suggests that adopting Option 2 will create an unjustified divergence between the treatment of local market ancillary service (**LMAS**) constraints and asynchronous operation of the mainland NEM. The Coalition's position is that the clear physical distinction between synchronous and asynchronous operation of the mainland NEM justifies this distinction. Contribution factors should be determined (and frequency control ancillary services (**FCAS**) costs settled) on the basis of the physics of the NEM. Adopting this approach means that contribution factors for asynchronous periods would be determined on the basis of actual performance.

This approach is wholly consistent with clause 3.15.6A(k)(1) of the NER which requires the causer pays procedure to take into account the principle that the contribution factor for a Market Participant should reflect the extent to which the Market Participant contributed to the need for regulation services. The conduct of Market Participants alters between synchronous and asynchronous market operation. The only way to account for this difference in behaviour consistently with the principle in clause 3.15.6A(k)(1) is to determine contribution factors ex post based on performance during the asynchronous period.

The Coalition considers that this approach could also be adopted more broadly (through amendments to the NER) so that contribution factors would also be determined on the basis of actual performance during periods of synchronous operation and FCAS costs would be settled against synchronised regions (even where a LMAS constraint has been applied).

Any separation event in the NEM should activate a thorough investigation into the performance of the generators to ensure that appropriate control action and frequency response is provided. The calculation of an ex post contribution factor would ensure that detailed examination of performance is undertaken.

Other options proposed by AEMO are based on historical data

Option 1: Use existing process for local requirements

AEMO's preferred option is to utilise a process substantially the same as that used to recover the costs of local ancillary services requirements. This process is set out in clause 4.2.2.4 of the *Efficient Dispatch and Localised Recovery of Regulation Services Business Specification* (1 July 2010) (**Business Specification**) and utilises the pre-calculated MPF values as an input.

The Coalition's position is that Option 1 is not an appropriate approach to determining contribution factors in a period of asynchronous operation. Local ancillary service requirements are fundamentally different from asynchronous operation. Local ancillary service requirements are created by AEMO; whereas, asynchronous operation is a physical reality.

Local ancillary service requirements result from the imposition by AEMO of a LMAS requirement on a region. An imposition of such a constraint on a region which is operating synchronously with the rest of the mainland NEM has the effect of artificially isolating that region in respect of the provision of FCAS.

AEMO's isolating of a region through the imposition of a LMAS requirement which is otherwise operating synchronously, places the region subject to the constraint at a competitive disadvantage in the NEM. While the constraint is in place, FCAS may only be sourced from Market Generators registered to provide FCAS in the constrained region. The constraint acts as a distortion of the physical operation of the mainland NEM: while the physical mainland NEM is operating according to the laws of physics and consequently enables the provision of FCAS across the mainland NEM, AEMO isolates the constrained region with the consequence of price distortion through an imposed limitation on FCAS supply.

The separate automatic generator control (**AGC**) used to manage a region while synchronised to the mainland NEM has to be physically referenced to the same frequency as the rest of the NEM. This means that the LMAS is an arbitrary economic construct which is physically providing global services while being labelled 'local'. There is no local frequency reference that can be used, until a region is physically separated from the rest of the mainland NEM (using a local frequency when synchronised would cause hunting between regions). Once regions are separated the local frequency reference is the frequency available to the AGC located in the separated region. Consequently, the local frequency should be the basis for calculating the contribution of a Market Participant to the need or regulation services during a period of asynchronous operation.

Processes which distort the physical and economic operation of the NEM should be avoided. The Coalition's view is that basing processes on actual performance is less likely to have a distorting impact.

Option 3: Recalculate historical CMPFs using only facilities within the asynchronous region

Option 3 proposes that causer pays factors would be determined for asynchronous dispatch intervals using historical performance data, but excluding the performance of appropriately metered facilities outside of the asynchronous region.



As with Option 1, this methodology would rely on the historical contribution factors determined by AEMO, rather than reflecting actual performance during a period of asynchronous operation. Option 3 also does not recognise that an asynchronous state will exist in the mainland NEM on both sides of a separation event.

Should you have any queries regarding this submission, please do not hesitate to contact me directly by telephone (02) 8031 9971 or email niva.lima@infigenenergy.com.

Yours sincerely,

Niva Lima
Manager Operations Control Centre