6 December 2013

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Marc Tutaan
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Lodged on-line: www.aemc.gov.au

Dear Mr Tutaan

Comments on Draft Report: Management of negative inter-regional settlements residues

The Australian Energy Market Operator (AEMO) operates the National Electricity Market (NEM), the Victorian Declared Wholesale Gas Market (DWGM) in Victoria and the Short Term Trading Markets (STTM) for gas at hubs in Adelaide, Sydney and Brisbane. AEMO is also responsible for the procurement and planning of the shared network and for connections to the electricity transmission network in Victoria, and has a range of national planning functions for electricity and gas transmission.

Thank you for this opportunity to contribute to the Review of the management of negative inter-regional settlements residues.

Managing negatives residues is an inherently difficult task for the market operator. It relies on tracking, and to some extent predicting, dispatch outcomes in real-time. It then requires AEMO intervening against what would appear to be efficient dispatch according the bids presented. We thank the AEMC for taking the time to investigate this in detail.

We support the recommendations of the report with respect to the processes of managing negative residues when they arise. Nevertheless, the discussion is a useful reminder of the need to address the underlying market design issues that allow negative residues to accumulate.

AEMO has assisted the preparation of the draft report by providing data, procedures and demonstrations.

Please find attached our submission. If you would like to further discuss any matters raised in this submission, please contact Ben Skinner on 03 9609 8769.

Yours sincerely

David Swift

Executive General Manager, Corporate Development

Attachments: AEMO submission

AEMO Submission to Draft Report: Management of negative inter-regional settlements residues

1. Scope and assessment framework

In limiting the scope to AEMO's management of negative residues since the adoption of the $100,000 threshold, the AEMC has complied with clause 3.8.10(g) but missed an opportunity to investigate:

- The reasons why negative residues continue to arise, which represent some form of market failure.
- Incidents prior to 1 July 2010, particularly April 2010, where $18 million accrued in one day.

The review's discussion, and recommendations, nevertheless reinforce AEMO's view that an improved market design would not create negative residues.

Within the scope investigated, the draft recommendations found the right balance between AEMC's role as a rule maker and AEMO's role as market operator. The review investigated the details of AEMO's Negative Residue Management (NRM) procedure and found some opportunities for improvement. AEMO agrees that these opportunities should be pursued through an AEMO procedural consultation.

The assessment framework seems consistent with AEMC approaches and is supported.

2. A difficult role for AEMO

Managing negative residues is an inherently difficult task. Negative residues are a function of regional prices, which are an outcome of the dispatch process rather than a dispatchable variable that can be constrained. They can be managed only by tracking historical, and where possible predicting, negative residues and then intervening by constraining physical dispatch. Any NRM mechanism will be imperfect, as evidenced by AEMO's partial success in limiting events to $100,000.

The design itself requires difficult judgements. In turn, this design when implemented affects market outcomes, creating winners and losers. This places the market operator in an uncomfortable position.

3. Interest in the Review

It is disappointing that no submissions were received from the groups that pay for negative residues, which is Transmission Network Service Providers (TNSPs) in the first instance, and ultimately customers through Transmission Use of System (TUOS) charges. The topic may be seen as obscure and of concern only to generator dispatch, yet the cost to customers is significant with some $26 million accruing in the period under review. It would be worth eliciting views from these groups, if necessary through direct engagement.

Nevertheless the review received much sophisticated interest from market facing participants, expressing strong views that AEMO should intervene either more or less frequently. It is worth considering the motivations of such views. Most likely it is the impact of the NRM upon incumbent trading positions. The effects upon price and dispatch outcomes seem to be of more interest than the NRM's intended aim: to limit customer cost.

This demonstrates the contentious role that AEMO is in, and why directly resolving the causes of this settlement shortfall at its source would be far preferable to clamping.

4. Why the clamp is frequently ineffective

Figure 2.1 uses a benign cost-reflective bidding example to demonstrate negative residues. However in all significant negative residue events bidding well away from cost is present. Were bidding always consistent with cost as per this example, it is probable that the $100,000 threshold would not have been reached in the period under review.

Discussion in the text[1] implies that the only reason that the clamp, once applied, would be ineffective would be due to "system security" reasons: e.g. "It should be noted that a number of the events included in both totals would not be clamped for system security reasons"[2].

Whilst strictly true, it is a misleading description giving an impression that AEMO is manually choosing not to apply the clamp during certain system conditions. In fact, this has not occurred in the last two years.

A better explanation is that where generators bid low rates of change, or fail to follow dispatch targets, then controllable variables that could be used to reduce interconnector flow are removed from the dispatch process. At that point the clamp is designed to fail as it has a lower constraint violation penalty than other constraints which, if violated, are presumed to lead to an insecure system.

Of course, options such as moving generators at their technical rates of change could quickly reduce counter-price flow without insecurity. However the dispatch process must operate within the limits described by the bids as presented to it.

A significant contributor to the clamp's ineffectiveness is generator non-conformance. AEMO provided AEMC analysis of NRM events on Qld-NSW southwards flow (QNI south) between April 2012 and September 2013. Where AEMO dispatched the interconnector to reduce flow by 100MW, the metered actual flow averaged a reduction of 43MW for that dispatch interval. The data showed that aggregated non-conformance[3] of scheduled generation in the exporting region caused the shortfall, i.e. it was not caused by fluctuations in demand or non-scheduled generation.

Furthermore, the level of non-conformance showed a statistically significant correlation to the Queensland trading price, i.e. the higher the regional price the slower scheduled units responded to targets to reduce output. Thus the higher priced events accumulated residue for a longer period.

5. Clamping Threshold

AEMO concurs with the analysis in this section and recommendation for no change.

6. Cycling

As AEMO noted in its submission to the issues paper, serious cycling was evident in QNI south NRM events during early 2013[4]. AEMO considers that prior to this time cycling was not a major concern.

These events appear to derive from a bidding strategy optimised around the clamp itself. An unusual bidding pattern created a point of congestion affecting most Queensland generators,

[1] Draft report page 8 (in reference to April 2010 event), 9, 12, 13, 14, 17
[2] Page 14
[3] "Non-conformance" refers to scheduled entities operating at a different level than their dispatch targets as measured at the end of the relevant dispatch interval.
[4] In the 32 hours leading up to 6AM on 18 January 2013, this interconnector was clamped seven times.

and driving QNI south counter-price flows. After exceeding the threshold QNI south was clamped and the residues gradually reduced. The generator bids were then returned to a more typical pattern such that the congestion was relieved and the clamp released. The bids were reset and the process repeated.

AEMO agrees that the 2013 cycling events were problematic, but they did not arise from a physical cause. An anti-cycling mechanism is therefore being contemplated in order to combat a bidding tactic: a regulatory response to certain market behaviours.

A cycling mechanism will require careful design: there are many ways it could be done. AEMO agrees it is best placed to propose such designs through a procedural consultation. However it should be recognised that AEMO will have no more data on the benefits of addressing cycling than the AEMC has revealed in this review, and AEMO is not well placed to consider the appropriateness of behavioural controls.

A procedural consultation is sure to be hotly contested between those who have previously won and lost from cycling events, placing AEMO in a difficult position. The draft recommendation requires only that AEMO "investigate and consult" on anti-cycling mechanisms. AEMO requests a clearer instruction in the final report as to whether the AEMC considers a behavioural control should be introduced. If it does, then AEMO can go forward to design the most practical implementation.

7. Clamp Increments and Decrements

AEMO concurs with this analysis and agrees that a misconception about the intent of the clamp target change asymmetry has arisen. AEMO accepts the recommendation to better articulate this in its procedures.

8. Publication of NRM quantity

AEMO thanks the AEMC for its advice in this regard. AEMO intends to publish the NRM cumulative figure, but the task is non-trivial. In the current design, the field is determined but not captured within the MMS systems until an event is active. This can be rectified through the construction of new MMS logic. AEMO is targeting the late 2014 release.

The draft report is correct in stating that the figure can be calculated from existing public quantities and several participants are doing this. AEMO intends to show how this is done in its procedures.

9. Metered versus target MW

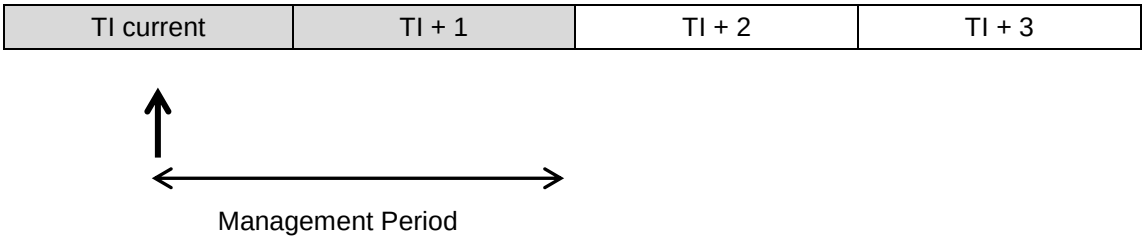
AEMO agrees with the draft recommendation. Launching the dispatch engine with inputs from metered quantities rather than the previous interval's cleared (target) quantities is the dispatch process' standard design, applying, for example, to generator ramping. Otherwise the dispatch solution would deviate from the real power system. In the case of NRM, the level of non-conformance (discussed above) means this deviation would quickly become severe and possibly insecure.

10. NRM procedural clarifications

Sections 2.4 and 4.2.2 of the draft report described the current NRM. This included some inadvertent ambiguities or misunderstandings. To assist the AEMC and other readers, we have re-described the automated NRM procedure below, in particular the start and end of the management period, and the concepts of temporarily activating and de-activating the constraint within the management period.

10.1. Start of the management period

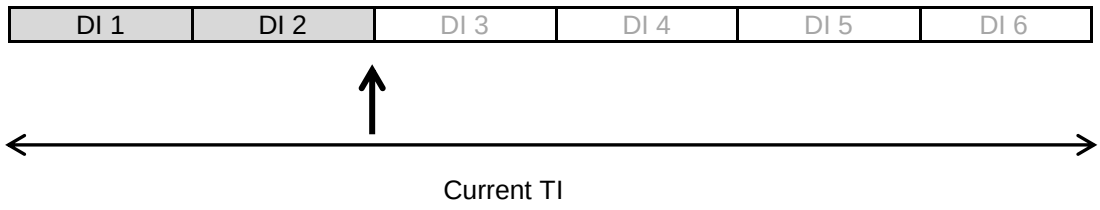
NRM is initiated when the accumulation of negative residues from past consecutive 30-minute trading intervals (TI) including the current TI exceeds $100,000. Automatically the current TI and the next TI will be marked as the “management period” and the relevant NRM constraint will be activated (“un-swamped”). Within this management period, NRM constraints can be temporarily de-activated and re-activated when certain conditions are met.



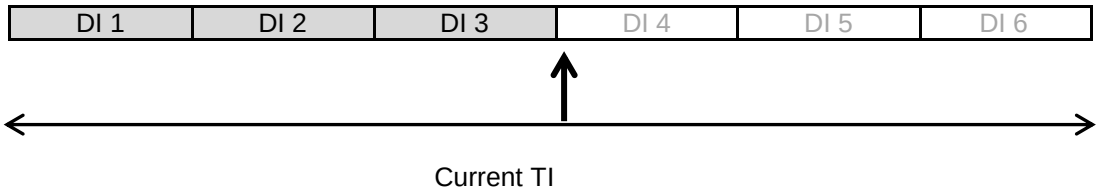
10.2. Calculation of the residues

Within a TI, the average prices, flows and losses from all available 5-minute dispatch intervals (DI) are used to provide an estimated residue for the current TI.

The estimated residues for the current TI are updated every DI, for example at the start of the third DI into the TI the estimate is based on data from DI’s 1-2.



Similarly at the start of the fourth DI the estimate is based on data from DI’s 1-3.



When no dispatch values are available (i.e. at the start of the first DI), the latest 30-minute pre-dispatch value may be used.

10.3. Action within the management period

Within the management period the counter-price inter-regional flow is progressively reduced to halt the accrual of negative residues. It is done more aggressively for higher rates of

negative residue accrual. Table 2 from AEMO's "Brief on Automation of Negative Residue Management"[5] details the interconnector offset sizes applied to reduce counter-price flow.

> **Example**: If from Table 2 an offset of -100 MW is required the new interconnector target will be given by:
>
> $$InterconnectorTarget \leq InterconnectorInitial + Offset$$
>
> Or,
>
> $$InterconnectorTarget \leq InterconnectorInitial - 100$$

Within the management period if the negative residue accrual has been halted (latest estimate of negative or positive residues for current TI<$1000), the interconnector flow will be held constant by applying an offset of zero MW.
$InterconnectorTarget \leq InterconnectorInitial$).

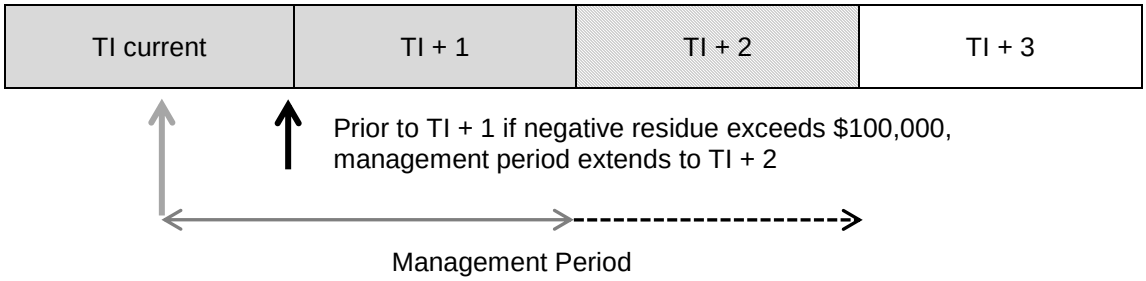
If the latest estimate of residues for the current TI shifts to a large positive value (>$1000), the NRM constraint is relaxed in accordance with the table.

10.3.1. Temporary suspension of negative residue management within the management period

If the residues for the current TI have been estimated as positive for the past three DIs and the NRM constraint is violating or not binding, the flow management is temporarily suspended (NRM constraint is de-activated or "swamped"). If within the management period, negative residues for the current TI are again estimated to exceed $1000, the inter-regional flow will again be managed (the NRM constraint is reactivated or "un-swamped").

10.4. Extension of the management period

The accumulated amount is regularly assessed prior to the start of a new TI. If the accumulated negative residue amount remains above $100,000, the management period would be extended for another TI (ie. until the end of the next two TI's).



10.5. End of the management period

The management of negative residues cease at the end of a management period when the accumulation of negative residues is below the threshold and there are no further extension to the management period.

[5] http://www.aemo.com.au/Electricity/Policies-and-Procedures/~/media/Files/Other/Dispatch/Brief_on_Automation_of_Negative_Residue_Management.ashx

10.6. Impact of Price Revision

The management of negative residues will not be initiated during any interval when a price revision event is triggered and the prices are unresolved. However, if a price revision is triggered within a management period, the process described above will continue.