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Sydney

20April 2007

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Dear John

Submission on the Congestion Management Review Directions Paper

Thank you for giving NEMMCO the opportunity to comment on the Congestion Management Review Directions Paper. The Directions Paper has been valuable in conveying how the Commission is setting out to define the Congestion Management Review, the interpretation of the Ministerial Council on Energy's Terms of Reference, and the alignment with regulatory development in transmission areas that has been occurring outside this Review.

The following comments are made on the Directions Paper:

- The suggestion to recognise NEMMCO's interpretation of fully co-optimised constraints in Chapter 3 of the Rules is endorsed. However, adding a new type of constraint that gives priority to interconnector flows over generation could raise some issues;
- The reasoning and logic behind localised granular pricing arrangements given in the Directions Paper is appreciated, however a case is yet to be made for further implementation to the NEM. NEMMCO sees the Commission's work program on whether mis-pricing is driven by outages, rather than occurring during system normal conditions as having a major bearing on the feasibility of these mechanisms. If the conclusion from the mis-pricing work program is that congestion is outage driven, then a granular pricing mechanism that targets a small number of material constraints in a defined location may not be relevant when outage related congestion can be dispersed throughout the NEM;
- There was a suggestion for NEMMCO to publish additional information on mis-pricing. A clearer description on the form of information required would assist NEMMCO in identifying implementation issues.

Detailed comments are provided in the attachment. NEMMCO appreciates the timeliness of this Directions Paper and looks forward to the publication of the draft Final Congestion Management Review.

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NEMMCO notes that the Directions Paper does not comment on the future of the NCAS review that the Rules [clause 3.1.4(a1)(4)] require NEMMCO to conduct. The AEMC has previously advised NEMMCO that it would be undesirable to run the AEMC's CMR and NEMMCO's NCAS review in parallel and, as such, it would be prudent for NEMMCO to commence the NCAS review after the release of the CMR draft report. Given COAG's recent response to the ERIG final report, it is apparent that the MCE will be asking the AEMC to specifically address some of the matters that the Rules obligation asks NEMMCO to address. NEMMCO would therefore appreciate further clarification from the AEMC on the future of the NCAS review.

Yours faithfully,

Brian Spalding.

Brian Spalding
Chief Operating Officer

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ATTACHMENT: Comments on the Congestion Management Review Directions Paper

The following points relate to highlighted comments from the Directions Paper.

the Commission suggests that the Rules could be amended to confirm NEMMCO's interpretation of Part 8 and insert clauses (a) and (b) in Chapter 3 of the Rules, which contains the bulk of the Rules for spot market operation. The Commission seeks stakeholder views on the appropriateness of such an amendment.

Directions Paper pg 55

NEMMCO endorses the Congestion Management Review Directions Paper ("**Directions Paper**") suggestion to confirm NEMMCO's general rule for constraint formulation. NEMMCO's general rule[1] has been developed on the basis of NEMMCO's interpretation of the existing Rules and the Statement on NEM Electricity Transmission issued by the Ministerial Council on Energy on 20 May 2005. NEMMCO's general rule is:

> *All relevant scheduled generating unit energy terms, regulated interconnector and scheduled network service and scheduled load terms should be on the left hand side of the network constraint equation.*

NEMMCO's plan to convert existing system normal equations to fully co-optimised formulations which commenced on 4 July 2005 was completed in December 2006 in accordance with its published work program[2]. We confirm that the fully co-optimised approach to constraint formulation has:

- improved management of system security and reliability; and
- been implemented using a comprehensive consultation process.

removing intervention could heighten the incentives of constrained off generators to bid -$1,000/MWh. The Commission therefore welcomes comments on this option.

Directions Paper pg 75

Clamping or giving interconnector flows priority over generation, may limit negative IRSR but will not remove the incentive for constrained-off generators bidding -$1,000/MWh in all cases. If remote generators were submitting negative bids to secure volume at the regional reference price, clamping or giving interconnector flows priority over generation, may only reduce their dispatch by denying the remote generators access to the adjacent region. The incentive however, for the remote generators to bid -$1,000/MWh may not be reduced by clamping or giving interconnector flows priority over generation.

[1] NEMMCO, Network and FCAS constraint formulation, July 2005
[2] NEMMCO Communication No. 1824 - Revised Network Constraint Formulation Rules, 01/07/2005

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where constraints are affected by both inter-regional flows and local generation output, inter-regional flows could be given priority to the available transmission capacity...The Commission seeks stakeholder views on the relative merits of this approach compared to simply retaining or eliminating clamping.

Directions Paper pg 75

Clamping introduces additional complexity and uncertainty at times when interconnector constraints are binding and high prices are more likely to be occurring. With this in mind, NEMMCO can see merit in exploring alternatives to clamping which will prevent negative residues.

The implications of adding a new type of constraint that gives priority to interconnector flows over generation to reduce negative residues raises a number of issues. Based on the Directions Paper commentary the new constraint would restrict the control that NEMMCO has over the interconnector term which is in conflict with the MCE's statement that allows NEMMCO to control all variables. The 20 May 2005 MCE statement is re-produced below:

> *All constraints should be developed in a consistent form. A form of constraint equation that allows NEMMCO to control all the variables (ie a fully co-optimised direct physical representation) should be adopted by NEMMCO.*

While the new constraints may firm the IRSR, the new constraints could increase the economic cost of dispatch. If a simple co-optimised constraint is represented as:

Local Generation + Interconnector Flow <= Limit

the dispatch optimisation process (NEMDE) is able to choose the least cost combination of Local Generation and Interconnector flow to conform to the limit. If the new constraint can be represented as:

Local Generation <= Limit

then NEMDE is confined to forcing the Local Generation to conform to the limit, without any reference to the Interconnector Flow. Extensive testing or analysis would be needed to demonstrate that firming IRSR but denying NEMDE the choice of choosing between Local Generation and Interconnector Flow, will result in the least cost outcome compared to the status quo.

Practical issues also arise. Consider where the present fully co-optimised constraint and the new constraint would be binding. NEMMCO's interpretation of the Directions Paper commentary is that the binding fully co-optimised constraint would ensure system security and the new constraint would ensure that the interconnector flow be given priority.

How much priority should the interconnector be granted? If it was an absolute priority, what would the ramifications be for generating units being given targets below their technical minimum? If absolute priority is not given then how will the share be given between the interconnector flow and local generation, and how would the sharing be implemented in the new constraint?

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In this context, a number of more fundamental changes could be made to the IRSR instrument.

The first is changing the definition of IRSR units so that they are effective in the presence of looped (rather than radial) regions and loop flows.

Directions Paper pg 70

Funding negative IRSR should be considered as part of the CMR. Exploring some of the Firm Transmission Right approaches used in North America may identify applications for the NEM. One approach used by PJM (Pennsylvania-New Jersey – Maryland Interconnection) is to define the economic value of the Firm Transmission Right as either the benefit or a liability to the holder depending on the congestion activity on the transmission path.

Following the Southern Generator's Rule Determination where it was recognised that negative IRSR can arise from efficient dispatch of generation located on a loop that crosses regional boundaries, there is merit in considering the definition of IRSR in the presence of loop flows. However given that looped region structures are not expected in the foreseeable future[3], short-term costs from such an exercise may not be matched by benefits in the same time frame.

It also should be pointed out that the likely evolvement of the network to become more highly meshed will not by itself create greater instances of negative IRSR:

- Loops would need to cross region boundaries to impact the firmness of IRSR. The Direction Paper's link with firmness of IRSR and loops contained within regions is not apparent. It is not expected that development of loops contained within regions will have a direct impact on firmness of IRSR;
- Even where loops cross region boundaries, a single point of injection on the loop will not cause negative IRSR. Negative IRSR will only arise if there are multiple points of injection on the loop to trigger the "spring washer"[4] affect.

[3] NEMMCO, SOO/ANTS, Chapter 8.2

[4] AEMC, Final Rule Determination, Management of Negative Residues in the Snowy Region, 14 September 2006, Pg A4

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There may be scope to make changes to the information available to market participants through NEMMCO's Market Management Systems. NEMMCO could publish information on mis-pricing. .... The Commission also welcomes comments from stakeholders on other similar options.

Directions Paper pg 60

The Direction's Paper suggests there could be scope to publish information on mis-pricing in the form of nodal prices, or differences between the RRP and nodal prices.

NEMMCO's view is that mis-pricing is simpler to calculate than nodal pricing information. Nodal pricing could be defined as the "marginal cost of suppy at that location" or taking the process used to calculated the Regional Reference Price and applying this to every node in the NEM. Nodal pricing would need to reflect additional issues to mis-pricing such as losses, islanded operations or (potentially) local ancillary service effects. The mis-pricing information is also simpler in that it does not apply to those nodes without scheduled generation.

Mis-pricing similar to the type that Dr Biggar has been using for his analysis, involves information that NEMMCO currently publishes such as:

- the binding constraint name;
- the constraint marginal value;
- limits applying to the interconnector;
- the corresponding mathematical equation using LHS terms, coefficients, operator and RHS terms.

Nevertheless we would suggest that the conclusions on congestion from determining and publishing mis-pricing data compared to nodal pricing data are likely to be similar. Section 5 of the Directions Paper contains some broad points on how additional information could assist participants to manage and reduce the trading risks of congestion. Since commercial drivers for participants will still be based around a regional market, and NEMMCO already publishes significant constraint related information, there would be merit in explaining further how this mis-pricing information is expected to improve participant responses to congestion. Such an exercise may also narrow the type of practical detail that is required to fulfil the expected outcomes, particularly whether nodal prices are really needed.

Perhaps stakeholder submissions on this point will also identify users and the use that this information could be put to. A better understanding of how and who will use this information could lead to determining the timing of the publication and cost effective delivery mechanisms. Providing historical mis-pricing data, using existing Market System inputs say once a year and delivering via DVD has far less cost implications than:

- building into the Market Management Systems and publishing in the dispatch timeframe; or
- consolidating, interpreting and publishing via the SOO/ANTS.

The ramifications of publishing nodal pricing would need to be carefully considered. It would represent the equivalent of running a nodal dispatch system in parallel with the existing dispatch system. It would require a very substantial ongoing commitment to resources.

In addition to publishing information to assist participants to manage the trading risks associated with congestion, there may also be scope for NEMMCO to publish more information (as against data) in relation to historical congestion..... For example, NEMMCO could expand the SOO to include the tracking of trends in mis-pricing for connection points, or tracking of trends in the frequency and duration of mis-pricing across connection points.

Directions Paper pg 62

NEMMCO currently publishes considerable information on congestion in the ANTS. This information includes:

- maximum interconnector power transfer capabilities (Chapter 10);
- average interconnector capabilities at times of high scheduled demand (Chapter 10);
- interconnector utilisation (Chapter 13);
- hours of binding system normal constraints (historical trend information) (Chapter 13); and
- Appendix F information on:
    - historical trend information comprising hours of binding system normal constraints;
    - Historical Flow Path Utilisations (based on ANTS zones)
    - Approximate maximum NTFP capabilities and hours of constrained flow
    - Intra-regional and Inter-regional total duration of constrained flow
    - Significant flow path constraints (including binding hours)
    - inter-regional transfer capability at times of high demand (and constrained flow).

Formulation of constraints (based on the predispatch formulation in NEMDE) is also contained in the SOO CD.

Similar information to mis-pricing could also be determined from historical information regarding the frequency and duration of binding network constraints and the knowledge of which generators were constrained (ie generators that appear on the LHS of binding constraint equations). Aggregate information regarding intra and inter regional binding network constraints is already published in the ANTS.

additional information in the APRs could assist in this process. For example information could be provided on:

- **existing network transfer capability under "system normal" conditions – this would ideally be done against a metric that is common across the TNSPs;**
- **annual network capability duration curves for transmission cut-sets between ANTS zones. Such a metric could show the proportion of time that the network capability was close to its design capacity and also reflect incremental changes over time in the network capability arising for TNSP operations that increase the transfer capability of the existing network (e.g. through an increased use of Network Support and Control Services (NSCS); and**
- **the potential increase in network capacity when NSCS are enabled/dispatched both for reliability and market benefit reasons.**

The Commission also considers that APRs could potentially be enhanced to include information on connection point to load centre transfer capability.

Directions Paper pg 62

NEMMCO supports the principle of exploring approaches to establishing accountability for network capability that is funded via network charges, but recognises that measures for network capability are yet to be defined in any consistent and comprehensive manner.

As network transfer capability for any given flow path depends on dispatch (network loading, generation and sometimes demand) conditions that cannot be adequately described by a single number. However, network capability could at least partly be described as a plot of (say): level of flow when binding; against the number of hours binding at each level of flow[5]. Historical information of this type and flow duration curves for each interconnector are already reported in the ANTS. Information of this type for each ANTS flow path other than interconnectors could be constructed with some additional analytical tools and resources. Presentation of the above information in a targeted form would be useful addition to the process of developing more effective regulatory mechanisms.

Correlating:

- historical information on network capability;

with an understanding of:

- network loading patterns; and
- the deployment of network support & control services (NSCS).

[5] The capability of a flow path may not be able to be accurately calculated for a particular cut-set unless the relevant constraints are binding, which occurs typically only for a small number of hours in a year. The sparsity of the data suggests that constrained flow-duration curves alone may not be sufficient to describe capability.

may provide some useful clues as to the effectiveness of NSCS in influencing the network capability. Such correlations may also provide some clues as to existing headroom on network loading before congestion reaches "serious" levels. However, caution would need to be exercised before attempting to develop targets of network capability given the often complex nature of the constraint equations that underlie flow paths.

In responding to a request for information on locations that could accept further generation injection without exacerbating congestion, NEMMCO would appreciate some guidance on whether this means congestion under, for example:

- average conditions (such as average demand diversity and average weather; no transmission outages); or
- under extreme weather conditions with the critical circuit out of service.

Depending on the extent of locational information required, additional resources may need to be devoted to the task. It may be possible to provide limited information of this type for a small number of connection points across the NEM. Practical difficulties may arise to extend this form of information to multiple connection points within each ANTS zone because it is likely to require more extensive power system analysis than is currently performed as part of the annual planning processes.

The CMR provides an opportunity for the ambiguities arising from clause 3.11.4(b)(2) to be resolved, with a range of options being presented to the MCE. These options could be presented in the context of a fully integrated Congestion Management Regime that builds on the significant progress made by the Commission and AER in progressing the transmission regulatory regime. The MCE could then provide a clear policy direction on governance arrangements for NSCS and, as part of its response to the CMR Final Report, provide Draft Rules to the AEMC that would be subject to further consultation.

Directions Paper pg 78

NEMMCO is pleased to note the AEMC's observation that the CMR is an opportunity to resolve the ambiguities arising from clause 3.11.4(b)(2) – a clause that requires NEMMCO to procure and deploy network control ancillary services (NCAS) to enhance the value of spot market trading.

If the requirements of clause 3.11.4(b)(2) were to remain in the Rules in their current form – that is, NEMMCO was to continue to be required to play a role in affecting network capability for the benefit of the market – there is the distinct possibility that NEMMCO would have to be second guessing the behaviour of NSPs who have a formal financial incentive to affect network capability (through application of the Regulatory Test) for the benefit of the market. The intent of clause 3.11.4(b)(2) does not seem to sit well with NEMMCO's role as independent market and system operator, and the clause itself is highly qualified and challenging to apply.

NEMMCO would appreciate further clarity as to the AEMC's intentions in regard to the nature of the ambiguity the AEMC has in mind to address, as resolving the ambiguities arising from clause 3.11.4(b)(2) could mean:

- retaining (for the time being) an obligation on NEMMCO to use NSCS to enhance the benefits of trade from the spot market, but clarifying the language in clause 3.11.4(b)(2) to make it more practicable to apply?

or

- removing the obligation on NEMMCO to use NSCS to enhance the benefits of trade from the spot market by deleting clause 3.11.4(b)(2)?

General comment on granular pricing and firmer risk management instruments

The emphasis placed by the Directions Paper on establishing the reasoning behind granular pricing and corresponding risk management instruments ("**mechanism**") is appreciated. However the dependency of these mechanisms on the outcomes of the mis-pricing work program was not clearly drawn. NEMMCO sees the Commission's work program on whether mis-pricing is being driven by outages, rather than occurring during system normal conditions as having a major bearing on the feasibility of these mechanisms.

NEMMCO agrees with the Commission that the appropriate policy response to congestion during system normal conditions and those during periods of outage events may well be different. In its earlier submission to the Issues Paper, NEMMCO expressed that congestion arising from outages could be infrequent, unpredictable in their location and could have a severe affect on spot prices. NEMMCO's submission went on to say that:

> *One limitation of CSP/CSC is that they can only be introduced when there is some foresight on where the congestion will arise. The lead time required to set up a CSP/CSC arrangement means that it is not practical for the arrangement to alleviate congestion that arise from outages.*

The AER's study on the Total Cost of Constraints referenced by the Directions Paper indicated that an increasingly significant proportion of the costs are related to transmission outages and the majority of the costs occurred on a few days per year. If the conclusion from the mis-pricing work program is that congestion is outage driven, then a mechanism that targets a small number of material constraints in a defined location may not be relevant when outages can be dispersed throughout the NEM.

Even if a location is identified through the mis-pricing exercise, steps taken to implement the mechanism could have a significant impact on its effectiveness.

Significant preparation work is likely to be required to adapt the principles of the mechanism to the designated location. This preparation could start with an examination of the characteristics of that network limitation or "pinch point". Identifying constraint equations used to manage the congestion will provide information on:

- which generators/interconnectors contribute to or relieve the congestion;
- coefficients that will indicate the extent to which each generator/interconnector will contribute or relieve the constraint.

An understanding of the expected performance could be addressed by using various scenarios of binding constraints to model:

- which generators might be expected to respond to modified congestion signals;
- the level of response of each generator; and
- impact on IRSR.

Consultation could identify that the mechanism may result in commercial or physical reasons for stakeholders not to respond (ie through bidding behaviour, or investment decisions) in a manner that may relieve congestion.

The CSP component of the Snowy Trial is an example of the type of localised granular pricing discussed by the Directions Paper. Significant preparation work[6] was required to apply the CSP/CSC mechanism to the Snowy Region location even though the Trial was simplified through:

- directly involving one generator that contributed to the constraint; and
- not having a CSC for Northerly flows.

There are many aspects of the Snowy Trial that lead NEMMCO to believe that a wider application of the CSP/CSC mechanism, or similar granular pricing mechanisms is far from straight forward. For instance conflicting price signals may occur if a single generating unit is involved in concurrent mechanisms. There is considerable learning to be done on granular pricing mechanisms, its transparency, its implementation issues, and its performance in practice.

The Commission's evaluation of the broader impacts of the Trial is a suitable starting point. One interesting exercise could be to assess the affect of alignment between dispatched offer and settlement when compared to what could have occurred if Tumut was settled at the nodal price.

Implementation timing and resourcing will have to be determined on a case by case basis

NEMMCO's general practice is that incremental changes require a lead time of between 3 to 9 months from when the necessary regulatory approval is given, and that IT development work will be undertaken within a 6 monthly Market Management System("**MMS**") upgrade cycle. This approach has worked effectively where changes are incremental in nature and are confined to a small number of business processes.

The project evaluation work undertaken on the abolition of the Snowy region identified that, where changes are required to many business processes, and where projects of that nature have not been previously undertaken, extra time must be provisioned to recognise the extensive required co-ordination and testing. Implementation of the abolition of the Snowy region has been determined at fifteen months. Multiple trials involving Participants are required for projects of this scale

[6] the Snowy Hydro proposal was for application of the CSP/CSC mechanism to apply only to Tumut generation and the Snowy-NSW interconnector flows (both directions) – whereas the 78 relevant constraint equations also include terms involving Murray generation, Guthega generation and Snowy-Victoria interconnector flows (both directions);

that go beyond the general MMS upgrade cycle. This was also the case for the introduction of Tasmania to the NEM.

Given the early stage of the Directions Paper discussion it could be premature to say that the implementation of the publication of nodal pricing, or localised granular pricing will require a similar level of resourcing and timing as the abolition of the Snowy region. However it should be stressed that the timing of the implementation of any CMR initiative involving NEMMCO and/or Participant processes will have to be determined on a case by case basis and could be on a similar or greater scale to the abolition of the Snowy region.

NEMMCO requests that discussion and sufficient lead times be incorporated into major NEM developments to ensure that resource requirements can be obtained and committed. The timing of other NEM developments may also have to be accommodated. If there is a requirement by the reform agenda for regular large scale Market System implementations it may be necessary for NEMMCO to consider the adequacy of its resourcing and the funding implications that go along with this.

Clarification of a number of SOO/ANTS related statements contained in the Directions Paper

The ANTS uses a market simulation .....Market benefits are assessed assuming short run marginal cost (SRMC) bidding for generators. (Directions Paper pg 29)

Section 8.13.3 of Chapter 8 of the 2006 SOO provides a description of the actual bidding modelled in the ANTS. The ANTS simulations are based on Market benefits which are constructed on the assumption of a number of key inputs rather than a pure SRMC model. While the SRMC is a key input to this hybrid modelling, the assumed bidding behaviour for generators is based on a combination of the:

- level of contracted supply;
- overall plant capacity;
- short-run marginal cost (SRMC); and

minimum generator output level, which refers to the minimum level at which a generator must operate for technical reasons (for example, water hammer, furnace stability, etc).

NEMMCO estimated the value of all congestion[7] in the NEM (from 2009/10) onwards at $2.2bn. The Commission understands that this does not account for any network investment beyond October 2010, even though such additional investment is likely to occur. (Directions Paper pg 30)

The ANTS takes account of all known committed investment and routine investment (which TNSPs believe likely to occur) and provides an upper bound estimate on congestion costs. Some of this investment is expected to occur beyond 2010.

[7] It may be worth noting that the modelling assumptions used in the AER's Total Cost of Constraints study are not comparable to the modelling assumptions underlying the SOO / ANTS estimates of future congestion costs.

The significant increase from 2010/11 to 2011/12 is assumed to be the first year that benefits from deferring generation projects can be realised. (Footnote 45 Directions Paper pg 30)

Rather than assuming 2011/12 is the first year that benefits arise from the deferral of generation capital, the ANTS recognises 2011/12 as the first year that this capital deferral has significant benefits. These benefits usually do not accumulate earlier because the generation entering the NEM between now and 2011 has already been committed and cannot be deferred by new transmission investment. As this committed generation captures the markets potential revenues crowding out other new investment in either transmission or generation.

For example, the Commission understands that load flow data sets (transmission line static data) and constraint sets are already available. (Directions Paper pg 30)

The constraint set information used in the ANTS is publicly available. However following the Commission's recent decision on information provision, under the Technical Standards for Wind and other Generation Rule, load flow snapshots are no longer available to Registered Participants.

Connection point demand data is understood to not be publicly available, leaving modellers to estimate this for themselves. (Directions Paper pg 30)

Connection point demand data is published in the APRs.