



AESO Discussion Paper Transmission Constraints Management: Rule 9.4 AUC Re-Filing Proposal

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1. Executive Summary

As part of ongoing consultations related to Transmission Constraint Management (TCM), the AESO has prepared this discussion paper intended to advance dialogue and concepts related to TCM rules for real time constraint management. This new discussion paper contains a review of the Alberta Utilities Commission (Commission) Decision 2009-042¹ (“TCM Decision”) on the proposed TCM Rule 9.4 with a focus on the Commission directions to the AESO regarding the amendment and re-filing of the TCM Rule. The AESO would like to receive stakeholder comment on the discussion and proposals put forward in this paper to assist in finalizing a rule amendment consistent with the Commission directions.

In this paper, the AESO has included a review of the Commission findings in the TCM Decision related to objections on the grounds of public interest and FEOC (Fair, Efficient and Openly Competitive). In the AESO view, the ruling supported the recommended rule design related to TCM as a real time protocol, relying mainly on economic dispatch of the merit order following the dispatch of TMR, and did not see a requirement for compensation for constrained down generation under regulation. The ruling also supported the use of TMR and DDS in applicable but not all constraint events. A summary of key decision items is provided in this paper together with the AESO’s interpretation of the noted rulings.

The AESO is considering changes to the TCM Rule in response to the Commission directions put forth in the TCM Decision and is seeking stakeholder input on the AESO proposals.

Specifically, this discussion paper addresses the following key areas for rule amendment:

- The Scope of the TCM Rule:
 - The AESO will revise rule language to clarify that the TCM rule applies to congestion that occurs in real time.
- The TMR/TCM Rule relationship
 - The AESO will continue its current practice of TMR procurement and usage which is described section 6.2.
- The Pay as Bid Approach
 - The AESO does not recommend using any pay as bid protocol within the TCM Rule. The AESO continues to advocate the use of the EMMO to dispatch up downstream generation during a congestion event.
 - Severe market distortions are not constraint management issues and should be dealt with using other appropriate actions.

¹ Alberta Electric System Operator Objections to ISO Rule 9.4 Transmission Constraints Management April 9, 2009 (TCM Decision)

- TCM Rule Terms
 - The AESO will define and use the following terms in the manner described herein:
 - “transmission constraint” – no change to ISO rule anticipated
 - “real-time” – adopt dictionary meaning but not include in ISO rule
 - Replace terms foreseen and unforeseen with foreseeable and unforeseeable and adopt language that consistent with current TMR practices if required.
 - “local load pocket” – include defined term in rule language. Provide examples of “somewhat isolated load” and the impacted reliability criteria.
 - “effective factor” means a ratio, calculated by load flow studies, of the change in the flow on the constrained path corresponding to a change in an energy production, an energy consumption or energy flow on an interconnection
- TCM Rule Process Steps
 - The AESO will continue its current practice of TMR procurement and usage. See section 6.2 for further discussion.
 - The AESO does not see a need to modify the TCM rule with respect to DDS dispatch.
 - The AESO will modify 9.4.4 b) rule language to provide additional clarity surrounding the conditions under which the SC will exercise its discretion in deviating from the protocol in an area.

2. Introduction

As part of ongoing consultations related to Transmission Constraint Management (TCM), the AESO has prepared this discussion paper to advance dialogue and concepts related to TCM rules for real time constraint management. This material should be viewed keeping in mind the AESO Discussion Paper Transmission Constraints Management: RAS in the Planning Stage which was published on July 3, 2009.

This new discussion paper contains a review of the Alberta Utilities Commission (Commission) Decision 2009-042² (“TCM Decision”) on the proposed TCM Rule 9.4 with a focus on the Commission directions to the AESO regarding the amendment and re-filing of the TCM Rule. This paper is intended to facilitate stakeholder input related to constraints management and in particular solicit comment on the AESO response to the Commission directions.

² Alberta Electric System Operator Objections to ISO Rule 9.4 Transmission Constraints Management April 9, 2009 (TCM Decision)

3. Purpose

The AESO is considering changes to the TCM Rule in response to the Commission directions put forth in the TCM Decision. Specifically, this discussion paper addresses the following key areas for rule amendment:

- The Scope of the TCM Rule
- The TMR/TCM Rule relationship
- The Pay as Bid Approach
- TCM Rule Terms
- TCM Rule Process Steps

The AESO agrees with the Commission that the revisions the AESO has been directed to make would benefit from consultation with market participants. The AESO would like to receive stakeholder comment on the discussion and proposals put forward in this paper to assist in finalizing a rule amendment consistent with the Commission directions.

4. Background

TCM Rule 9.4 is intended to guide the development of system controller procedures³ to be used to manage constraints that arise in real time. The TCM protocol can be found in the TCM rule section 9.4.4(a) which contains the generic sequential steps that the AESO would take to manage a constraint. The TCM Rule was filed with the Alberta Utilities Commission (Commission) in April 2008. The Commission Proceeding 41 hearing was held in October 2008 to consider market participant objections to the proposed TCM Rule. On April 9, 2009, the Commission released Decision 2009-042 (“TCM Decision”) on the matter.

In the TCM Decision, the Commission directed the AESO to change the TCM Rule and provided concepts and principals for the AESO to include in its amended TCM Rule to be filed. A summary of the key items to be clarified or amended is outlined in the Purpose above.

The AESO will file the TCM Rule revision with the Commission upon completion. When the Commission is satisfied that the AESO has incorporated the Commission’s directions in the Decision, the revised TCM Rule will come into effect at a date specified by the Commission. The Commission noted that a hearing on the TCM Rule had already been held and the direction of the Commission was made based on the evidence and submission of the parties.

5. Recap of Commission Findings in the TCM Decision

While this discussion paper is primarily focused on the Commission directions which all arise from the technical deficiency findings of the TCM Decision, the AESO believes that it would be useful to review the Commission findings related

³ Procedures are currently specified through the development of AESO Operating Policies and Procedures (OPPs) on a regional basis.

to objections on the grounds of public interest and FEOC (Fair, Efficient and Openly Competitive) to put the discussion of the Commission directions in context. In the AESO view, the ruling supported the recommended rule design related to TCM as a real time protocol, relying mainly on economic dispatch of the merit order following the dispatch of TMR, and did not see a requirement for compensation for constrained down generation under regulation. The ruling also supported the use of TMR and DDS in applicable but not all constraint events. A summary of key decision items is provided below for reference together with the AESO's interpretation of the noted rulings.

5.1 Fair, Efficient and Openly Competitive (FEOC) Market Findings

The Commission ruled that the Market Participant Objectors have failed to demonstrate that the TCM Rule does not support a FEOC market. The Commission made the following statements on specific topic areas:

- 1) Economic Dispatch – use of merit order for dispatch instructions aligned with regulations
 - “The requirement for the AESO to determine the order of dispatch by economic merit under subsection 17(c) of the EUA is not absolute. ... Moving up and down the merit order in order to curtail certain generators or skipping generators in merit upstream of the constraint and dispatching other higher price generators downstream of the constraint to meet demand incorporates the concept of economic dispatch and satisfies the requirements of this subsection.” (para 113)
 - The Commission ruling on this item clearly permits the use of reverse merit order to dispatch upstream generation as consistent with and permitted under regulation.
- 2) Pool Price Impact – recognition of transmission constraint impact on market.
 - “While the Commission recognizes that it may be impractical or even impossible to resolve transmission constraints without impacting the pool price, it expects the AESO to strive to minimize disruption of market prices as much as possible.” (para 116)
 - The AESO notes the Commission recognizes that the TCM Rule use of the energy market merit order to constrain downstream generation impacts the market price and such impact is expected and is acceptable so long as the AESO strives to minimize the price impact.
 - “Provided that the EMMO/RMO approach is used infrequently and for periods of congestion of short-duration, the Commission finds that the price impact of the TCM Rule does not, in and of itself, offend the FEOC operation of the market. The price impact would include the price of any market response such as increased imports, which the AESO submitted could limit the severity and duration of a congestion event.” (para 117)

- The AESO interprets the Commission findings to mean that the price impact of the TCM Rule is reasonable under current and anticipated market conditions.
- 3) Compensation – Constrained Down payments inconsistent with regulation.
- “There is no legislative requirement for the AESO to pay compensation to generators who are constrained down.” (para 130)
 - “... the Commission has not been persuaded by the evidence that there is an implied requirement for the TCM Rule to provide for compensation to constrain down generators ensure a FEOC market.” (para 138)
 - “... the Commission is not persuaded that the payment of compensation is similar to an ancillary service because unlike an ancillary service, the generators who are constrained down cannot physically be dispatched up to provide support to the AIES.” (para 139)
 - The AESO interprets the above compensation statements to mean that constrained down payments are not required or even contemplated under regulation.
- 4) Transmission “rights” – Regulations provide for reasonable system access.
- “... There is no explicit legislative provision found in the EUA or the Transmission Regulation that references a generator’s “right” to access the AIES.” (para 150)
 - “Access to the AIES, for all generators, is a reasonable opportunity and not a “right.” (para 154)
 - “The Commission is not persuaded by NaturEner’s submission that curtailing new entrants is discriminatory. ... The Commission has determined that there are no explicit or implicit transmission “rights” but that the obligation imposed on the AESO is to provide market participants with a reasonable opportunity to access the AIES. There is nothing inconsistent with the requirement of a RAS scheme and the provision of a reasonable opportunity to access the AIES where there may be insufficient transmission available.” (para 158)
 - The AESO interprets the above transmission “rights” statements to be supportive of its approach to constrain down generators without paying constrained down payments as well as allowing under regulation the assignment of RAS to generators and load where appropriate.
- 5) Use of TMR/DDS – not required in all situations.
- “With respect to the issue that the overall cost impact of a TMR/DDS only approach to manage transmission constraints would be less than the costs associated with the TCM Rule, the Commission is not persuaded that such a conclusion can be reached on the evidence submitted in this proceeding. The Commission notes the AESO evidence that contracting for TMR can be problematic outside contestable markets and that extensive direction of TMR could be costly given the escalation clauses under Article 11 of the ISO Tariff. Given the AESO’s past experience using TMR, the AESO’s evidence

would suggest that the overall cost impact of a TMR/DDS only approach may not be less than the costs associated with the TCM Rule.” (para 175)

- “As well, the Commission considers that the approach provided in the TCM Rule recognizes the need for flexibility in order for the AESO to manage constraints. A TMR/DDS only approach does not provide the same degree of flexibility.” (para 176)
- “Further, the Commission expects that if the frequency and duration of congestion events increases in specific locations, the TCM Rule will, in effect, converge to the TMR/DDS only alternative.” (para 177)
 - The AESO notes that the Commission ruled that the use of TMR/DDS may be applicable in certain situations but that “the TCM Rule does not offend the FEOC operation of the market because it does not use a TMR/DDS only approach.” (para 178)

5.2 Public Interest Findings

- 1) Long term investment impact – no long term impact expected.
 - “With respect to the submissions that pool price distortions would adversely affect the long term investment climate, the Commission understands that the use of EMMO/RMO within the TCM Rule is expected to be infrequent and of short duration. As such, the Commission is not convinced that there would be an adverse affect on the long term investment climate to the detriment of the public interest.” (para 187).
 - The short term nature of the TCM rule is not an impediment to long term investment.
- 2) Use of business practices- not contrary to public interest.
 - “As section 17 of the Transmission Regulation specifically directs the AESO to make rules and establish practices respecting the management of transmission constraints, the Commission does not find the use of business practices to be contrary to the public interest.” (para 188)
 - This part of the ruling provides AESO some discretion on the use of business practices to meet its duties under the EUA.

6. Discussion of Commission Directions in the TCM Decision

The Decision included a number of directions for the AESO to clarify or consider in revising and refileing the TCM rule. Each of these items is outlined below:

- Clarify the Scope of the TCM Rule
- Clarify the TMR/TCM Rule relationship
- Consider ENMAX Pay as Bid Approach
- Define Key TCM Rule Terms
- Clarify TCM Rule Process Steps

The AESO has provided a brief discussion on and a proposal for each related item for industry feedback. The AESO is interested in feedback both on the interpretation of the issues as noted as well as on the proposal to address the identified issue.

6.1 Clarify the Scope of the TCM Rule

Direction:

- “TCM Rule should either be limited to real time congestion or be expanded to include the planning stage elements related to congestion;” (para 205 c) If the scope of the TCM Rule ... is expanded..., provide a description in the TCM Rule of how RAS will be administered;” (para 205 d)

Issue:

- Some stakeholders were looking for a comprehensive set of rules on constraints management both in real time and in the planning stage.
- The TCM Rule included references to planning stage developments in the notification section of the rule (section 9.4.3a).

Discussion:

- The Commission confirmed in the TCM Decision that “the TCM Rule does not need to address all forms of congestion.” (para 74) “The AESO can choose the scope it wishes to apply to the TCM Rule but once it does the scope should be clear.” (para 75)
- Given the above findings, the AESO is of the view that the Commission does not see a need to expand the scope of the TCM Rule beyond real time or to specifically include constraint management practices that occur in the planning domain such as RAS.
- In addition, the AESO agrees with the Commission that the TCM Rule should be “evaluated on its own merits as a generic rule. A generic rule should provide guidance to OPPs made in relation to it. However, it is unnecessary for the AESO to outline every detail for an OPP within the rule that informs it. “ (para 85)
- The proposed rule submitted to the Commission included a notification section, 9.4.3a)ii), that required the AESO to notify market participants of any RAS requirements. This led to a interpretation by some that the rule was intended to deal with constraints management in the planning stage through the use of RAS.
- All constraints ultimately occur in real time and need to be managed by the system controller (SC). The SC needs to have a procedure to follow when an unforeseeable event occurs. OPPs are area specific procedures intended to provide guidance for managing any constraint on the existing system and contain procedures for unforeseeable but possible events (contingencies) that are studied by the AESO following established

reliability criteria. The SC manages congestion in real time following the OPP procedures and uses the TCM Rule as guidance when there is no applicable procedure for an unforeseeable event.

- In the planning stage, system planners may run studies and foresee constraints that may or may not be contingency related and may be caused by changes to the existing system such as a new interconnection. The AESO plans the system and prepares for changing circumstances and will consider different potential options such as TMR in the planning stage.

Proposal:

- Revise rule language to clarify that the TCM rule applies to congestion that occurs in real time.
- Remove notification section to market participants from the TCM Rule. Use Interconnection and RAS ID documentation to provide notification information.
- Discuss management of constraints in the planning phase as part of the RAS stakeholder consultation and formulate separate RAS Rules and guidelines. Create an information document or flowchart that outlines the AESO's comprehensive approach to TCM both in the planning stage and in real time.

6.2 Clarify the TMR/TCM Rule relationship

Direction:

- "Clarify at a high level when, in real time, the AESO would move from the use of the TCM Rule to the use of TMR." (para 205 e)

Issue:

- Clarity related to the advanced contracting of TMR for TCM is required.
- Clarity related to when a directive for TMR would be used is required.

Discussion:

- TMR is an integral part of the proposed TCM protocol. Section 9.4.4 vi) specifically refers to the conditions when TMR would be used.
- The proposed TCM protocol is intended to be generic and is intended to be applied consistently in all circumstances where congestion occurs.
- Contracted TMR is used when it is available and effective in managing the constraint. That is, there must be a contract in place that allows the use of the TMR unit under the constraint circumstances and using the TMR unit must actually be effective in relieving the constraint.
- Use of TMR is either foreseeable or unforeseeable and is based on the application of reliability criteria, including the avoidance of cascading and the size and sensitivity to outage of the affected load.
- Use of directed TMR is unforeseeable. That is, it is not planned for in the planning horizon. Directed TMR is used only after a risk assessment is

undertaken, either in the near term or in real time, and it is determined that there is a unacceptable risk to load or a risk of cascading.

- The AESO considers foreseeable TMR to be TMR that is required to meet forecast reliability criteria under expected operating conditions and planned transmission outages in an area. The need for this TMR must be forecast typically one to two years in advance so that TMR contracts can be reasonably procured.
- The use of TMR within the TCM protocol is particularly well suited to deal with local load pocket situations. A local load pocket refers to a load that is somewhat isolated from the rest the system in that it is better served by local generation. To serve this load from the rest of the system would likely put the load at risk and violate reliability criteria.

Proposal:

- The AESO will continue its current practice of TMR procurement and usage. The AESO identifies a need for TMR on a system basis having given consideration to the current or anticipated system conditions and applying reliability criterion. The price impact of the constraint is not a consideration in TMR procurement.
- Foreseeable TMR, TMR that can be forecast one to two years in advance, will be contracted for.
- Unforeseeable TMR will be directed following a risk assessment of an actual or anticipated near term constraint event.

6.3 Consider ENMAX Pay as Bid Approach

Direction:

- The ENMAX proposal is “ ... to base the pool price on the unconstrained merit order that would have occurred without the constraint, and pay dispatched generators with bids greater than the unconstrained SMP on an as-bid basis. ... The Commission considers that there may be merit in further exploring the this alternative in order to determine an approach that best reflects the market design objectives ...” (para 207)

Issue:

- Determine whether the “ENMAX proposal” can be integrated into the TCM rule to constrain on generation and set the pool price in a manner that best reflects the market design objectives.

Discussion:

- ENMAX suggests that the SMP should be set based on the unconstrained merit order so that it equals the value that would have occurred but for the constraint. Constrained on generation would be paid their offer price through a settlement separate and distinct from the energy market settlement. The separate settlement would be passed through to load as a transmission charge.

- The energy market design depends upon a single clearing price which reflects market conditions including supply and demand on the entire system, supply scarcity and congestion.
- The Transmission Development Policy recognizes that a congestion free transmission system is a necessary part of the current market design. However, it also recognizes that congestion will occur and that a congestion management plan is necessary. Under regulation⁴, some congestion is anticipated to be part of a normally functioning “unconstrained” electricity market.
- Congestion, by definition results in otherwise in-merit energy being constrained and the potential for price impacts.
- The TCM protocol should be robust enough to manage any constraint regardless of duration or size and allow the normal functioning of market fundamentals to occur in a manner consistent with market design. The TCM protocol is not intended to deal with situations where the constrained event leads to market distortions which prevent the market price from reflecting underlying market fundamentals. As in any case where this unlikely event might occur, other mitigating out of market actions would be taken to manage the event such as using OPP 801 Supply Shortfall, market suspension or in the case where non-competitive behavior is suspected, discussing the event with the MSA.

Case for the proposed TCM protocol:

- The proposed TCM protocol provides a practical, effective in-market solution to a market issue and causes a minimal amount of market price impact.
- The proposed TCM protocol manages constraints seamlessly within the current market framework. Any solution must work within the current framework of a single clearing price for the market and common transmission price for the province. While no method being considered is perfect, this method is effective because it:
 - causes the least market distortion
 - encourages the proper market responses in most cases, e.g., encourages action by imports and price responsive load and discourages exports through the market price signal
 - discourages generation in the constrained area through volumetric curtailments, and
 - minimizes the AESO’s direct involvement in the market while allowing participants to respond to the price signal.
- The proposed TCM protocol provides the best price signal. The use of EMMO provides the most appropriate directional price signal to market participants in all existing congestion circumstances. The price will be set by dispatching the merit order and, where competition exists, the highest priced dispatched offer or bid will set the price. It is possible that lower

⁴ Transmission Regulation 15(1)(e)(ii): The AESO must plan a transmission system that...is adequate so that, on an annual basis, and at least 95% of the time, transmission of all anticipated in-merit electric energy ... can occur when operating under abnormal operating conditions.

priced imports will displace higher priced Alberta generation and this is an appropriate outcome. The AESO does not view the pool price as being artificially elevated. It is appropriate for the pool price to rise since less supply is available to the market during congestion. Participants that can relieve the congestion will respond to the price signal and participants that cannot are constrained.

- The proposed TCM protocol is aligned with policy. The AESO notes that the Transmission Policy stipulates that real time congestion shall not alter or distort prices. The AESO believes that the proposed TCM protocol will result in the least amount of price distortion and the most practical application given the alternatives and is most in line with policy intent.
- The proposed TCM protocol is practical and effective. The TCM protocol makes practical, effective use of the energy market merit order and participant offers to the market. Effective upstream generation is dispatched off in reverse merit order and effective downstream generation is dispatched on according to relative economic merit. This establishes the real time market clearing price in a transparent manner. Downstream dispatch is undertaken in a manner which is consistent with the anticipated price impact of congestion events on demand and imports.
- The proposed TCM protocol is an in-market solution. The market can provide for a price that reflects the “scarcity” created by transmission congestion – there is no need to go out of market. Scarcity pricing also leads to loads facing the full price of transmission congestion since the cost of congestion is reflected in prices.

Issues with TCM protocol:

- The AESO notes that if planned transmission upgrades are delayed, the TCM protocol could result in higher pool prices when applied in some known congested areas. In most circumstances, managing a constraint using the TCM protocol will result in a pool price that will encourage the appropriate competitive market responses. As long as market fundamentals remain intact, the price that is reflected will be the appropriate price. In the unlikely event that a market distortion occurs such that the price is not reflective of the market fundamentals such a distortion is not a constraint management issue and will need to be dealt with appropriately through other means.

Case for the Pay as bid protocol:

- The pay as bid protocol removes the impact of a constraint from the pool price and, in ENMAX’s view, is consistent with government policy that congestion arrangements should not set or distort market prices.
- The pay as bid protocol removes the impact of constraints from economic signals within the market. In ENMAX’s view, this aligns with government policy that markets should not be adjusted or unduly distorted with transmission costs. The methodology entails creating a price based upon an “unconstrained” merit order which is created using a different energy market merit order from the “constrained” energy market merit order actually used to dispatch generators. The loss of supply or demand due to

transmission constraints would not affect the supply, demand or price in the “unconstrained” merit order.

- The price impact of a constraint is estimated through offer prices and collected as a separate charge. Dispatched generators with offer prices above the “unconstrained” price are paid their offer price times the volume of energy produced and those costs are recovered after the fact during settlement through a transmission charge.
- The pay as bid protocol sets the SMP without reference to the transmission constraint. Dispatched generators with offer prices at or below the “unconstrained” price are paid the unconstrained price.

Issues with the Pay as Bid protocol

- The AESO would prefer to use “in market” solutions first before going to “out of market” solutions. As an example, the AESO considers dispatching the merit order and using it to set SMP to be an “in market” solution.
- The pay as bid protocol is an administrative, non-transparent, “out of market” solution. This is at odds with the current market design which centers on a single pool price. A form of this pay as bid approach was implemented in a the previous version of OPP 521 and during a May 2007 constraint event resulted in setting posted prices which failed to signal the need for economic imports and downstream demand response despite the fact that the SC was close to initiating supply shortfall procedures under OPP 801. The final settlement prices were not transparent to the market in real time as the directed TMR costs stemming from the event were recovered through an Ancillary Service (AS) payment months later. The AS payment is a form of side payment similar in nature to that proposed under the pay as bid protocol which is inconsistent with the market design (single priced market). The AESO has used similar side payments in the past to pay for out of merit imports under a previous set of market rules and found the payments to be administratively burdensome, unpopular with stakeholders and was subsequently discontinued⁵.
- The pay as bid protocol will result in an inappropriate price signal to the market. The May 2007 SOK event is a good illustration of what happens when the pay as bid model is put in place. During this actual two day event, the SOK cut-plane was restricted to a north-south flow of 1450 MW, decreased from the normal 2050 MW level. Following the protocol at the time, on May 15 for HE20 the AESO constrained 490 MW of upstream generation down and directed 800 MW of downstream generation on for TMR. As there was no price reconstitution at the time the market price for the hour was set at \$5.25 /MWh. An analysis of the static merit order for the hour indicated that an hourly price of \$17.06 / MWh would have been the unconstrained price absent the congestion. Imports did not respond given the Mid C price at the time of \$55 /MWh, probably would not have responded to the “unconstrained” price either.

⁵ From December 2000 to December 2001, the ISO rules required the payment of uplift charges to importers when the pool price settled below their offer price.

In addition, no price responsive load came off as prices were very low. During settlement, loads were subsequently charged for the cost of TMR directives that they were unaware of beforehand. The total cost of TMR directives over the two day event was estimated to be \$5.2 million. The AESO does not view the outcomes produced by this pay as bid model as desirable.

- If the TCM protocol had been used during the May 2007 SOK event, the incremental cost might have been significant relative to using the pay as bid protocol. Under the TCM protocol, the AESO would have dispatched up the energy market merit order and the resultant hourly price would have been \$91.11 /MWh. The incremental cost of the TCM protocol over the “unconstrained” price would have been some \$565,000 ($(\$91.11 - \$17.06) * 7626$ of Alberta load). Applying the same methodology to all ten constrained hours that occurred during the event the total price impact of using the TCM protocol is estimated to be in the order of \$2.3 million dollars. This is significantly less than the estimated \$5.2 million cost of using directed TMR. Assuming the same static merit order and using the pay as bid protocol during the event, the estimated cost might have been as low as \$0.1 million.
- The AESO would note however that our analysis of more recent SOK events indicate that the payments to “constrained on” generators under a pay as bid model would result in similar hourly payments as the TCM protocol in all but the highest priced hours. In those higher priced hours, the actual price impact in the TCM protocol case compared to the static analysis would likely have been lower due to market response. In the May 2007 example, imports may have responded to the higher price signal because the mid-C price at the time was \$55 /MWh. Using a \$10 /MWh transportation cost for delivery to Alberta, the delivery price of \$65 may have been attractive enough for imports to be scheduled placing downward pressure on market price.
- The pay as bid protocol could lead to further out of market responses or market suspension. The proposed unconstrained pool price does not send the appropriate real time price signal to market participants to reflect changed market conditions. As the system is constrained, prices should reflect available supply and demand. If price is set at the “unconstrained price” the impact of transmission availability is not fully reflected and the AESO may need to go “out of market” to address the imbalance (directing imports, curtailing DOS load or other steps). The price could be extremely low, as demonstrated above, yet the supply shortfall procedures would still be required. The pay as bid protocol effectively results in a market distortion where the price is not at the appropriate level to incent the appropriate action. The price could be extremely low, as demonstrated above, yet supply shortfall procedures would be required. The AESO would rather let the market respond to a proper price signal that results in load response, import response, generation location decisions, and other market response mechanisms.
- The pay as bid protocol is unfair and may encourage a race to the top. Consider a situation where two identical and adjacent downstream

generators are both dispatched to full. Generator A offered its energy below the unconstrained price and therefore receives the unconstrained price while Generator B offers above the unconstrained price and receives its offer price. The two generators receive different payments for their energy, and Generator A is encouraged to offer its energy at a higher price above the unconstrained price. The result is that the price increases with the potential for perverse offer behavior in addition to the side payments. To avoid a race to the top, additional rules mitigating this perverse offer behavior may be needed, such as locking down offers at the end of the T-2 period. This may result in other potential undesirable market impacts.

- The pay as bid protocol is not appropriate for all types of constraint situations and may create perverse incentives:
 - Transmission constraints may occur when new generation is added to the system, until new transmission facilities are built. Under the pay as bid protocol, the unconstrained merit order produces a lower market price since it assumes that all new generation is unconstrained and available to be dispatched. The same situation would occur in a supply area like KEG when transmission lines are down for planned maintenance. In both these cases there is less incentive for load to accelerate transmission build or to minimize planned outages. Load already receives the benefit of unconstrained transmission through the lower market price under the pay as bid protocol.
 - Transmission constraints may occur during outages at cogeneration facilities even though the transmission system was not designed nor intended to handle these facilities at full output. Constrained cogeneration supply would lower the market price generated from the unconstrained merit order even though a transmission solution was not warranted or appropriate. There are cases where cogeneration facilities built to primarily serve local load will offer their full electrical output to the AIES during unplanned periods of reduced onsite oil production. This increase in availability may result in a constraint. In this case, the market price would be impacted under the pay as bid proposal.
 - In order to avoid such situations under the pay as bid protocol, criteria would have to be developed to distinguish these temporary or permanent situations from more “normal” constraints so that the market price is not unduly impacted. The more exceptions that there are to a protocol, the more difficult it is to understand and implement.
- Pay as bid has operational implementation issues:
 - Requires multiple merit orders (new systems) which distinguish different types of dispatch (energy, pay as bid, TMR, DDS)
 - Incompatible with the current dispatch tool
 - Need to determine whether downstream demand opportunity service (DOS) gets curtailed before you begin to dispatch downstream generation on a pay as bid basis.
 - Multiple constraints may not be easily or accurately handled.

- Potential for an artificial price cap below \$1000 being created during a supply shortfall if transmission constraints are also present.
- Incompatible with current TMR and DDS systems and procedures
- Separation of dispatch from SMP could cause transparency issues for market participants.
- Imports are significant portion of peak supply and can be scheduled hourly to address extended constraint events. AESO is not a participant in the market and therefore does not have a mechanism to procure imports for the market in the absence of the proper price signal. Most market participants including loads can procure and schedule imports if there is an appropriate price signal in the market.

AESO Conclusions

- The AESO believes the price signal is the appropriate method of attracting supply to the market and encouraging fair, efficient, and openly competitive behaviors. Out-of-market actions should be avoided whenever possible and their impacts minimized when they are necessary. The pay as bid protocol creates out of market payments and may lead to perverse offer behavior.
- The AESO believes that the adopted protocol should be effective, practical and work within the current market framework. The TCM Rule is compatible with OPP 801 Supply Shortfall in that the pool price rises as undispatched and available supply diminishes and the top of the energy market merit order is reached. Once this happens out of market actions are used as set out in OPP 801. OPP 801 has provision for acquiring imports and other supply along with various steps to mitigate supply shortfall. All transmission limits and requirements are respected to ensure the transmission system is not placed at risk. The pay as bid proposal fails to signal scarcity conditions during supply shortfall events which could lead to further out of market actions.
- The AESO believes that a single protocol to deal with congestion is appropriate. Congestion may occur for many reasons such as planned maintenance or forced outages of transmission facilities or critical generation units' or inadequate transmission. The pay as bid protocol is not appropriate in all instances of transmission constraints and has implementation issues.
- It is the AESO view that the TCM protocol minimizes the price impact and the level of market distortion:
 - Prices are allowed to reflect market economics for other system congestion cases wherein a market response is appropriate.
 - While allowing prices to rise may in some instances be more costly than the pay as bid model, the resulting price is a result of market economics and sends correct signals. The AESO has looked in detail at a past SOK event and determined that the cost to load of using the TCM protocol would actually have comparable to using the pay as bid approach.

- Pay as bid mechanisms create out of market payments to specific generators which has the effect of unnecessarily distorting the price signal which is contrary to government policy.
- The AESO notes that any TCM protocol should be robust enough to manage any constraint regardless of duration or size and allow the normal functioning of market fundamentals to occur in a manner consistent with market design. The TCM protocol is not intended to deal with situations where the constrained event leads to market distortions which prevent the market price from reflecting underlying market fundamentals. These situations, should they arise, will be dealt with appropriately through other means.

Proposal:

- The AESO does not recommend using any pay as bid protocol within the TCM Rule. The AESO continues to advocate the use of the EMMO to dispatch up downstream generation during a congestion event.
- Severe market distortions are not constraints management issues and should there be a need these situations will be dealt with appropriately through other means.

6.4 Define Key TCM Rule Terms

Direction:

- “Identify, use and fully define fundamental concepts and terms ...;” (para 205 a) “The Commission has considered terms such as transmission constraint, foreseen, unforeseen, real-time, planned, local load pocket and effective...” (para 55)

Issue:

- Stakeholders and the AUC wish to have more clarity around key terms.

Discussion:

- Need to discuss definitions and use to draft rule language on the terms that follow.
- Transmission constraint:
 - Transmission constraint is currently defined as a limitation imposed by one or more transmission elements to normal economic merit operation of generation, load and interchange transactions or to the flow of electrical energy from one part of the AIES to the other. The AESO believes the current definition is workable in the context of the TCM Rule and does not see a need to change the definition at this time.
- Real-time:
 - The NERC Glossary of Terms defines real time to be “present time as opposed to future time”.
 - The AESO notes that the common dictionary meaning of the term is “the actual time during which a process or event occurs” (Cdn Oxford)

- The AESO considers real time is the timeframe that is within the SC's immediate control. The time frame is usually measured in minutes or at most several hours.
- Foreseen and unforeseen:
 - The AESO believes it is more appropriate to use the terms foreseeable and unforeseeable rather than foreseen and unforeseen. As noted in section 6.2, the AESO uses these terms primarily in the context of TMR procurement.
 - The AESO considers foreseeable TMR to be TMR that is required to meet forecast reliability criteria two years in the future under expected operating conditions and planned transmission outages in an area.
 - The AESO uses directed TMR in unforeseeable circumstances, that is, the need for TMR is not planned for within the two year planning horizon.
 - If the terms foreseeable and unforeseeable are incorporated in the TCM Rule to clarify the intended use of TMR, the definitions should be consistent with the above stated practice.
- Local load pocket and TMR use:
 - The AESO considers that a local load pocket refers to a load that is somewhat isolated from the rest the system in that it is better served by local generation. To serve this load from the rest of the system would likely put the load at risk and violate reliability criteria.
 - The AESO would point to the Rainbow area as an example of a local load pocket. On the other hand, in the SOK example where there is a substantial market downstream of a constraint together with substantial load, the AESO would consider that the load is not pocketed.
- Use of the term "effective":
 - The TCM Rule contains a generic protocol with specific sequential steps. Not all steps are required because they do not remedy the constraint set out in the OPPs and therefore are not "effective". In addition, some steps may not have any impact or may not have the desired impact on relieving the constraint and are therefore not appropriate or effective. Another consideration is whether the step efficiently addresses the concern either because the step creates other unintended, unhelpful consequences or has much less impact than other actions (see "effective factor" discussion).
 - The AESO uses the term effective with respect to the first step of the protocol which refers to using the "effective factor" as applied to assets. The AESO uses load flow studies to calculate effective factors for each asset in a constrained area and the numeric value represents the relationship between a change in the assets MWs and the corresponding MW change in the constraint condition. For example, a generator effective factor of 0.9 implies that a one MW reduction in the asset output would result in a 0.9 MW reduction in the overload (constraint).
 - Effective must be considered in relative terms. For example all generators may contribute to a constraint however only a few would be

considered effective because they contribute significantly more to the constraint.

Proposal:

- The AESO will use the terms as defined herein.
- Key terms:
 - “transmission constraint” – no change to ISO rule anticipated
 - “real-time” – adopt dictionary meaning but not include in ISO rule
 - Replace terms foreseen and unforeseen with foreseeable and unforeseeable and adopt language that consistent with current TMR practices if required.
 - “local load pocket” – include defined term in rule language. Provide examples of “somewhat isolated load” and the impacted reliability criteria.
 - “effective factor” means a ratio, calculated by load flow studies, of the change in the flow on the constrained path corresponding to a change in an energy production, an energy consumption or energy flow on an interconnection

6.5 Clarify TCM Rule Process Steps

Direction:

- “Clarify the process steps that will be followed to manage congestion:”
 - i) “through the use of TMR.”
 - ii) “by addressing what appears to be a missing step under subsection 9.4.4(a) with respect to re-dispatching DDS to protect the price signal after removing a DDS dispatch under subsection 9.4.4 (a) (iii)”
 - iii) “by adding clarity to when the system controller’s discretion is exercised under subsection 9.4.4(b)” (para 205 b)

Issue:

- The Commission is seeking further clarity as to how specific steps in the protocol would work in practice and under what circumstances would the system controller deviate from those steps.

Discussion:

Use of TMR

- The TCM protocol outlined in 9.4.4 a) contains a sequential ordering of steps. Steps vii) and viii) of the generic TCM protocol are key steps in managing most constraints on the system. In step vii) generators are constrained down upstream of the constraint to prevent an overload. Step viii) replaces the constrained down energy by dispatching up generation using the merit order. Most constraint events will be managed using these steps.
- TMR is an integral part of the proposed TCM protocol. Section 9.4.4 vi) specifically refers to the conditions when TMR would be used.

- Contracted TMR is used in step vi) when it is available and effective in managing the constraint. That is, there must be a contract in place that allows the use of the TMR unit under the constraint circumstances and using the TMR unit must actually be effective in relieving the constraint.
- Use of directed TMR is unforeseeable. That is, it is not planned for in the planning horizon. Directed TMR is used in step vi) only after a risk assessment is undertaken, either in the near term or in real time, and it is determined that there is a unacceptable risk to load or a risk of cascading.
- The use of TMR within the TCM protocol is particularly well suited to deal with local load pocket situations. To serve this load from the rest of the system would likely put this load at risk and violate reliability criteria.
- If the AESO determines, in advance, that an area is a local load pocket (such as the Rainbow area) or has determined that specific generation is required to provide special services such as voltage support and has established TMR contracts then step vi) would apply. That is, the system controller would dispatch on effective TMR units to meet the local area requirements. If the SC has sufficient contracted TMR to manage the constraint then no further steps may be necessary other than to dispatch DDS under the current rules for price reconstitution purposes.
- On rare occasions, predefined local load pocket areas may not have enough contracted TMR to totally relieve the constraint or the constraint event may create an unforeseeable load pocket which has no contracted TMR. In those special load pocket circumstances, step vi) anticipates that the SC will make an assessment to determine if there is an unacceptable risk to load or a risk of cascading and, if so, issue directives to non-contracted generation downstream of the constraint to manage the constraint. In the extreme, after all available generation downstream of the constraint is dispatched or directed on, the SC would move to step ix) and begin curtailing downstream load.

Missing DDS Step

- While there may appear to be a missing step in the protocol, the required DDS rebalancing actions are prescribed in the DDS sections of the AESO rules. In step iii) of the TCM protocol, DDS providers that are downstream of the transmission constraint will receive a DDS dispatch on. This step is consistent with AESO rule 6.3.6.1 b) which states that a source asset is not eligible to be dispatched off in the energy market merit order for DDS when ...”ii) such dispatch would cause transmission must run to be required”.
- When the SC implements step iii) and reduces the amount of total DDS on the system, the SC, acting under rule 6.6.6.2 and utilizing the automatic tools that have been developed to assist with DDS dispatch requirements, will dispatch off eligible DDS. Given that rule 6.3.6.2 already provides the SC with the appropriate action direction, the AESO does not believe it is necessary or advisable to duplicate the 6.3.6.2 rule within the TCM Rule.

System Controller Discretion

- 9.4.4 b) of the TCM Rule outlines three exceptions to following the sequential protocol steps in 9.4.4 a). Although the SC may take alternative action in the exceptional circumstances listed, once the AIES is operating in a safe and reliable mode, the SC must follow the TCM protocol steps. The exceptions are:
 - Minimum stable generation - during a short duration constraint event the SC may exclude an asset from RMO and / or pro-rata curtailment if doing so would bring the asset below its minimum stable generation. In taking this action, the SC is attempting to avoid operational problems on the system. Keeping the maximum number of units available on line at reduced output also insures that a full recovery of the electrical system can be attained more quickly after a congestion event. Completely shutting off units unnecessarily delays system recovery while waiting for long start up processes to complete. The AESO recognizes that other generation will have to be curtailed an additional amount during this period, however the AESO expects that this step would be used very infrequently and for short durations.
 - Abnormal operating or market conditions- The AESO considers it impractical to have protocols for every possible situation that may occur and it may be required to take steps not listed in TCM protocol to address unusual circumstances. In particular, the AESO may not be able to follow the TCM protocol:
 - When voltage/reactive power effects of following the protocols would cause reliability concerns;
 - When risks to the system (severe weather, fire, etc.) require more conservative or otherwise unusual operation in a constrained area; or
 - When real time system configuration would result in an action being ineffective even though, under the protocol, such action would be deemed adequately effective.
 - Contravention of a reliability standard- In accordance with the requirements of the Alberta (WECC) reliability standards, the SC must bring the system to within its operating limits in no more than 20 minutes if a stability limit is exceeded, or 30 minutes if a thermal limit is exceeded. If the SC, by following the TCM protocol, deems that the system cannot be brought back to within the operating limits within the required time, the SC must take immediate actions that will bring the system back within the operating limits. The AESO expects to take such action very infrequently as the need would be caused by unexpected events or a combination of events not normally planned for.

Proposal:

- The AESO will continue its current practice of TMR procurement and usage. See section 6.2 for further discussion.
- The AESO does not see a need to modify the TCM rule with respect to DDS dispatch; however, it will review TMR/DDS procedures with stakeholders to ensure that the overall approach in the rules is

understood. If required, the AESO will seek input on clarifying TCM rule language regarding the process steps and the use of TMR directives.

- The AESO will modify 9.4.4 b) rule language to provide additional clarity surrounding the conditions under which the SC will exercise its discretion in deviating from the protocol in an area.

7. Next Steps

The AESO welcomes feedback on the TCM Rule 9.4 proposals. A comment matrix has been prepared to make it easier for stakeholders to submit their comments. The TCM Decision included a number of directions for the AESO to clarify or consider in revising and refilling the TCM rule. The AESO would appreciate receiving comment on the topics outlined below:

- Clarify the Scope of the TCM Rule
- Clarify the TMR/TCM Rule relationship
- Consider ENMAX Pay as Bid Approach
- Define Key TCM Rule Terms
- Clarify TCM Rule Process Steps

The AESO is interested in feedback both on the interpretation of the issues as noted as well as on the proposal to address the identified issue. When providing comment on the AESO approach to the TCM Rule 9.4, the AESO would appreciate receiving feedback on specific practices or policy in terms of their alignment with the AESO's intention to:

- Provide reasonable transmission access
- Allow generation and load to compete for transmission access
- Balance safe, reliable and economic system operation with market solutions that support a fair, efficient and competitive market

After receiving feedback from stakeholders, the AESO will review the feedback and communicate how it wishes to proceed on re-filing of TCM Rule 9.4.

Please use the comment matrix on the AESO website to submit your feedback to Gordon Nadeau at gordon.nadeau@aeso.ca by January 15, 2010.