



AESO Discussion Paper Transmission Constraints Management: RAS in the Planning Stage

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1. Introduction

This paper is part of a series of discussion papers on the topic of Transmission Constraints Management (TCM). A previous discussion paper entitled AESO Recommendation Paper Congestion Management Plan dated August 30 2007 outlined the approach to TCM during real time operations and those recommendations resulted in changes to TCM Rule 9.4. This discussion paper addresses TCM that may be identified during the interconnection process or through system and interconnection studies. This paper contains a review of the AESO's use of Remedial Action Schemes ("RAS") and the business practices that are applied in determining the assignment and operation of those schemes.

This discussion paper is premised on the AESO obligations to provide system access while recognizing the congestion that may occur from time to time. The AESO's role is to ensure that there are adequate transmission facilities available so that the system can operate in a safe, reliable and efficient manner and to promote a fair, efficient and openly competitive market for electricity.

To provide system access, the AESO plans transmission expansions and enhancements so that 100% of a generator's in merit energy can be accommodated under normal system conditions. That is, transmission development plans must accommodate all anticipated in-merit generation and must ensure reliable operation including acceptable system performance during credible contingency events as defined in established reliability criteria and standards.

When the transmission system is not capable of handling the full output from a generator until system enhancements are completed and when this congestion cannot be handled through real time operator action, RAS may be employed to facilitate market participation while maintaining system reliability and protecting system facilities. Market participants seeking to interconnect to the system may be assigned a RAS on a temporary basis prior to system reinforcements. RAS requirements may be identified in the planning stage of system development or when system studies are undertaken.

RAS may also be used as a permanent non-wires solution to address issues that arise on a regional or system wide basis. System RAS is a distinct and separate concept from interconnection RAS and has its own set of business practices.

This paper reviews the AESO's current internal planning and operating practices regarding the use of RAS and identifies how the AESO proposes to move forward with rule language and practices for RAS.. The AESO believes that the discussion and documentation of RAS business practices will provide clarity to stakeholders regarding the constraint management principles used in the planning domain and facilitate consistency in the application of RAS.

2. Purpose

Existing RAS business practices have evolved over time and the current AESO approach to RAS is outlined in this paper. RAS business practices are intended to guide the AESO in assessing the need for RAS on a case by case basis. This discussion paper will help frame a RAS business practise discussion and facilitate stakeholder input into final policy positions on RAS interconnection matters including examining rule language to provide greater clarity to the accompanying business practices.

3. Background

The *Transmission Regulation*, created in 2004 and amended in 2007, among other matters directs the AESO in Section 17 to “make rules and adopt practices respecting the operation of the transmission system and the management of transmission constraints that may occur from time to time”¹.

The AESO consulted on and created TCM Rule 9.4 which was intended to guide the development of system controller procedures to be used to manage constraints that arise in real time. TCM Rule 9.4 is designed to ensure reliable system operation and allow generation to compete for market access in a fair, efficient and openly competitive manner. TCM Rule 9.4 was filed with the Alberta Utilities Commission (Commission) in April 2008. While TCM Rule 9.4 provided for public notices with respect to RAS changes, the Rule did not include specific rules regarding the use of RAS. RAS is used to manage technical or system issues that cannot be managed by the system controller in real time and were not specifically a part of TCM Rule 9.4’s generic real time protocol. The Commission Proceeding 41 hearing was held in October 2008 to consider market participant objections to the proposed TCM rules and on April 9, 2009, the Commission released Decision 2009-042² (“TCM Decision”) on the matter.

The TCM Decision directed the AESO, among other things, to clarify the scope of the TCM Rule 9.4 stating that the TCM rules should either be limited to real time congestion or be expanded to include the planning stage elements related to congestion³. If the TCM rule scope was expanded to include the planning stage, the AESO is directed to provide a description in the TCM rule of how RAS will be administered. As noted in the AESO May 21, 2009 letter to the AUC on the ATCO Power Objection to Amendment to OPP 501, the AESO is proceeding on the basis that the revised TCM Rule 9.4 will not be expanded to include the planning stage.

As the AESO stated at the TCM hearing, the TCM Rule 9.4 is intended to deal with real time congestion that can be managed by system operator action. Policies and procedures that the AESO employs in the planning stage to ensure reliable system operation are not intended to form part of TCM Rule 9.4 and the AESO will be revising the TCM rules to clarify the scope of the Rules in that regard.

Reliable system operation also requires that the AESO utilize criteria which are designed to ensure that there are adequate transmission resources available to the system operator so they are able to maintain system reliability through a wide variety of load levels, generation dispatches, interchange levels, adverse weather conditions and system outages.

Given the specific nature and uniqueness of RAS in the planning domain and its impact on generator system access, the AESO intends to review the internal AESO business practices related to RAS and seek industry input on those practices. The AESO will use the same consultation process for finalizing those business practices as employed for an ISO rule.

¹ Transmission Regulation section 17

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

³ TCM Decision paragraph 205 page 41.

4. RAS Usage in Alberta

4.1 Normal and contingency conditions

Transmission systems are subject to a wide variety of conditions and events. Load, generation and interchanges are constantly changing in response to customer needs and the need for load and generation to be balanced instantaneously. The system extends over a wide geographic area and must operate through a wide variety of market, weather, maintenance and equipment outage conditions. RAS may be required to ensure reliable system operations and some specific criterion used when considering a RAS application is discussed below.

The AESO has adopted the NERC/WECC's Transmission Planning Standards which provide a framework for a reliable system. The transmission planning standards include categories of system events and define acceptable response to these events. These categories are included in the AESO's Transmission Reliability Criteria and represent increasing levels of system contingencies. For convenience a summary of the four categories of events which may prompt the use of a RAS is provided below.

Category A represents a normal system with no contingencies and all facilities in service. This is often referred to as the N-0 condition. The system must be able to supply all firm load and firm transfers to other areas. All equipment must operate within its applicable rating, voltages must be within their applicable ratings and the system must be stable with no cascading outages.

Category B events result in the loss of any single specified system element under specified fault conditions and normal clearing. The specified elements are a generator, a transmission circuit, a transformer or a single pole of a DC transmission line. This is often referred to as an N-1 event or with the most critical generator out of service, an N-G-1 event. The loss of opportunity load, opportunity interchanges, or radial customers is allowed.

Category C events result in the loss of one or more specified system elements under specified fault conditions and include both normal and delayed fault clearing events. When any two specified system elements are lost simultaneously, this is referred to as an N-2 event. All of the system limits for Category A and B events apply with the exception that planned, controlled loss of either firm load, firm transfers and/or certain generation is acceptable provided there is no cascading.

Category D represents a wide variety of extreme, rare and unpredictable events, which may result in the loss of customer demand (firm load) and generation in widespread areas. The system may not be able to reach a new stable state. These events need to be evaluated for risk and consequences. The WECC is currently drafting the "Extreme Contingency Guide" to provide additional guidance around this class of event.

These criterion apply to the system or path at its maximum load or loading condition based on the average MW flow over the highest load or path loading hour. Planned or controlled interruption of electric supply to radial customers or some local network customers connected to or supplied by the faulted element or by the affected area, may occur in certain areas without impacting the overall security of the interconnected transmission system.

4.2 RAS Definition

System protection schemes are used throughout the WECC region though different definitions exist for such schemes. The ISO rules currently define a RAS to mean protection schemes

designed to perform pre-planned corrective measures following a disturbance to provide for acceptable AIES performance or equipment protection⁴. In general terms, RAS, also known as special protection schemes, are control systems that make automatic adjustments to electrical system elements (i.e. generation, load and transmission lines) in order to meet system performance criteria without operator intervention. RAS are designed for specific foreseen events and may include shedding load or generation triggered automatically in response to system limits designed to preserve system integrity.⁵

4.3 Existing RAS in Alberta

At present, there are over seventy RAS in place on the Alberta system. These RAS are often in place to protect transmission and generation facilities for certain events (i.e. contingencies). The RAS are designed to ensure the AIES meets performance criteria following contingencies by:

- protecting transmission facilities against severe thermal overloads
- tripping of the intertie to avoid severe voltage depression or instability
- providing generator stability protection
- preventing excessive generator overspeed
- stabilizing system frequency following disturbances

OPP 704 Remedial Action Schemes is confidential and contains a list of RAS on the AIES and identifies specific TFOs', GFOs' and Interconnected Members (IMs') who have roles and responsibilities with respect to the various RAS on the system. OPP 704 has gone through 4 revisions in the last 2 years as the number and function of RAS on the system is changing with system conditions and constraints. Many RAS are also documented in the OPPs specific to the area in which the RAS operates.

4.4 AESO use of RAS

The AESO has duties to plan adequate transmission, expedite timely construction of system facilities as well as to proactively provide system access to new load and generation. To ensure adequacy and reliability, technical studies must also be carried out at various stages of project

⁴ The NERC definition of RAS is "an automatic protection system designed to detect abnormal or predetermined system conditions, and take corrective actions other than and/or in addition to the isolation of faulted components to maintain system reliability. Such action may include changes in demand, generation (MW and Mvar), or system configuration to maintain system stability, acceptable voltage, or power flows. An RAS does not include (a) underfrequency or undervoltage load shedding and/or in addition to the isolation of faulted components to maintain system reliability. Such action may include changes in demand, generation (MW and Mvar), or system configuration to maintain system stability, acceptable voltage, or power flows. An RAS does not include (a) underfrequency or undervoltage load shedding or (b) fault conditions that must be isolated or (c) out-of-step relaying (not designed as an integral part of an RAS)."

⁵ A special group of system protection and controls are safety nets. Safety nets systems are used to protect the system from events that are more critical than Category B. Safety nets and RAS may have similar objectives but are different. Safety nets protect the system from many different events by sacrificing some firm load to protect the system from uncontrolled outages over wider areas and they promote faster restoration of the system. It is recognized that safety nets will not effectively protect the system from all Category D events. Safety nets may well protect the system in the event of a Category B or greater event under abnormal or emergency conditions. Underfrequency and undervoltage load shedding schemes are examples of safety nets. Safety nets are in place for more severe unplanned events and are used to minimize cascading. System transfer capability may be supported by RAS but not by safety nets.

development to ensure system performance meets reliability criteria. The AESO planning and operational activities are performed in stages over time to align with customer interconnection projects and regulated planning requirements.

RAS is used primarily on a temporary basis when new market participants are being added to the system in advance of the transmission system's capability to manage such loads or supplies. In considering the use of a RAS, the AESO will consider its duty to ensure reliable system operation while at the same time allowing customers market access in a fair, efficient and openly competitive manner. The primary purpose of a RAS in Alberta is to immediately detect abnormal or predetermined system conditions and take instantaneous corrective actions to maintain system performance where operator action cannot be relied upon. RAS can be used, for example, to trip generation after a loss of a transmission facility to prevent loading from exceeding performance criteria (Category B event). RAS is applied as opposed to operator dispatch⁶ if: (1) necessary actions must occur in time frames beyond the operator's and/or customer's ability to respond, or (2) the AESO determines that operating complexity is beyond the ability to reliably operate through operator actions.

RAS is often used to maintain or increase the transmission system capabilities because it mitigates the transmission performance violations after a contingency occurs, by automatically and expeditiously tripping generation, load or system facilities. The contingency can be a single or credible multiple contingency. Without the RAS, the transmission capability would have to be reduced as the system must be operated to prepare for the next contingency.

Another use for RAS is as a long term mitigation for certain low probability /high consequence system events such as mitigating system impacts resulting from Category C or D disturbances, thereby avoiding the need for significantly more expensive transmission facilities.

RAS may also be used to address issues that arise on a regional or system wide basis. Such system conditions are thought to be relatively unique, are not necessarily caused by any single event or market participant action and would have to be dealt with on a case by case basis.

On occasion, circumstances surrounding the customer interconnection may change in such a way that the AESO must take action to address an immediate or imminent reliability or transmission access issue. The reliability issue may arise for a number of reasons some of which impact the need for and nature of RAS such as:

- Delays in transmission facilities may trigger the need for a RAS which was not contemplated at the time that the interconnection agreement was signed.
- Customers may wish to advance their in service date and be willing to accept limited transmission access until planned facilities are in place.
- Over time as the project develops, system conditions may change or new studies may be undertaken utilizing new data or analyzing a new system configuration any of which may reveal reliability issues that need to be dealt with correctly and promptly to meet reliability criteria.

In these circumstances, the AESO intends to apply the same RAS policies and practices as would apply otherwise, however, each situation is somewhat unique and other factors need to

⁶ Operator dispatch for congestion may occur pre-contingency (system normal, RAS event has not yet occurred) and post contingency (after the RAS has operated, including when the generator that was tripped comes back on line).

be considered. In proposing and implementing a solution that requires prompt action possibly through rules (OPP's) on an expedited basis, the AESO would consider a number of factors including:

- the temporary nature of the issue and time frame for final transmission facility solution
- the complexity of changes to system tools required in the interim period
- the impact on the ability for existing load and generation to compete for access
- the complexity of the required SC procedures and resources available in the interim period
- the potential for staged solutions
- the impact on customer project costs

Given the likely predominance of customer interconnection RAS and the potential benefit to customers from interconnection RAS documentation, section 5 of this discussion paper mainly addresses the interconnection RAS topic while section 6 contains more information on system RAS.

5. RAS and AESO Interconnection Business Practices

The need for RAS is most often determined during the planning phase of the customer interconnection process. Existing RAS business practices have evolved over time and the current AESO approach to interconnection RAS is outlined below. While the ISO is proposing a overarching rule for the use of RAS for system constraints that cannot be handled by operator action, the industry would benefit from further clarity that would be provided from business practices designed to provide more information on the criteria for the case by case evaluation.

5.1 RAS and the Interconnection In Service Date

The AESO proactively plans the system to anticipate generator and load interconnection requirements. When the AESO receives a preliminary assessment application from a customer to connect to the transmission system or receive additional system access, the AESO makes an assessment identifying the required facilities for and timing of the requested interconnection.

Transmission usage has strained transmission system capabilities in many parts of the AIES and the addition of transmission facilities required for interconnection may not be possible before the requested customer in service date. The AESO may need to determine if the requested interconnection date is appropriate. In deciding whether or not to approve the requested interconnection date, the AESO would consider a number of balancing objectives.

When assessing a customer interconnection application, the AESO may allow an interconnection to proceed if specific reliability issues in the area are addressed. The AESO may determine that a RAS can be offered to allow load or generation to interconnect to the system before the transmission system has been reinforced to provide unconstrained access. If a temporary RAS is a viable option and is feasible, the AESO may proceed to interconnect the customer. The customer has the choice of delaying their interconnection until needed facilities are built or accepting a temporary RAS as a condition of interconnection. The AESO believes that conditional access to transmission through the use of a RAS is consistent with its duty to provide reasonable access.

In some cases, a RAS may be a permanent solution as an effective alternative to providing a long term transmission solution. The AESO may propose a non-wires solution as allowed under

regulation⁷ and, in those few cases, may consider a different treatment of the RAS assignment and cost allocation. This is discussed under system RAS below.

When a RAS is a reasonable alternative to otherwise denying system access, the current AESO policy is to require the last load or generator connecting to the system in a congested area to use a RAS on a temporary basis. This is a practical solution to a temporary issue, and would allow the market participant some access to compete. The order of connection is determined by the AESO's interconnection queue management process in effect at the time.

5.2 Considerations in proposing an Interconnection RAS

The AESO takes into account the following matters when considering the use of RAS:

- technical requirements
- operational requirements

These design specifications are reflected in the interconnection agreement.

Each of the above topics is discussed further below.

5.2.1 Interconnection RAS technical requirements

The following are the current AESO technical considerations, in order for a RAS to be considered a viable option:

- The RAS must provide the same level of reliability as other protection systems.
- A RAS will not compromise the reliability or restrict the operation of the electric system. RAS must meet applicable NERC/WECC and AESO reliability criteria and Alberta reliability standards.
- The use of RAS will not impose safety hazards to customers, the public, or operating personnel.

5.2.2 Interconnection RAS operational requirements

The following additional operational factors are considered by the AESO in assessing whether a RAS is feasible.

- The probability of more than one operating procedure being applied at the same time (e.g. coincident use of transmission constraint procedures and supply shortfall procedures).
- The complexity of the operating procedure (e.g. number of steps in a procedure)
- The operating tools that can be designed and prudently implemented to handle the number of inputs required to determine a recommended action including consideration of comprehensive programming logic. The design will consider failure of the operating tool itself and the ability of the system controller to apply manual procedures.
- The available system controller resources in position to implement procedures. In practical terms, a reasonable number of employees must be ready to respond to a reasonable number of events.

If a RAS is out-of-service for maintenance work or unavailable or fails to operate, system controller actions to manage the situation will be outlined in the appropriate OPP. System controller actions may occur in real time in response to an event or the actions may occur prior to a potential event in a manner which ensures that system reliability is maintained.

⁷ Transmission Regulation Section 15(3)

5.2.3 Interconnection RAS and the interconnection agreement

As noted in section 5.2 above, if a constraint is identified at the time a system access customer request is being assessed and the AESO determines that it can achieve the requested interconnection date by offering a RAS, the AESO policy is to allow the customer to choose to accept the RAS , or decline service until the system is reinforced.

If the customer chooses to proceed with the application, the AESO follows the current customer interconnection procedure which includes the following relevant RAS components:

- To the extent feasible, the AESO will identify the necessary transmission reinforcements (and an estimate of the timing) that will remove the need for a RAS. The period of time under which a RAS may be used is temporary and may span a few months or several years.
- To the extent feasible, the AESO will identify to the customer all conditions under which the RAS may operate and all existing operating procedures in a constrained area together with the need for any changes to operating procedures.
- Notification to market participants of impending transmission congestion involving application of the RAS will be handled through the development and filing for approval of Needs Identification Documents (“NID”). Any RAS would also be subsequently incorporated and consulted upon in a new or revised Rule (OPP) for the area.
- Market participants will not be provided notice prior to the NID filing for RAS directly related to a particular interconnection, as:
 - The customer may or may not choose to move forward with the interconnection proposal;
 - The customer is the one who is affected by the RAS operation, so advance notice to other market participants is not necessary; and
 - Earlier notice may be in conflict with the customer’s right to confidentiality⁸ while the interconnection agreement is at the earlier stages of development. For RAS requirements developed from an emerging system requirement, the notification may be provided earlier than in the development of the OPP, if a public process is used to identify potential RAS market participants.

5.3 Potential alternatives when RAS is not appropriate

On occasion, system conditions are such that the use of RAS is not an appropriate method of dealing with a potential system issue. In those cases, system facilities can be protected by reducing or derating existing transmission system transfer capabilities. Reducing a path rating is a pre-contingency measure and similar to RAS does not require system controller action. The reduced transfer limit ensures that the system will meet required performance criteria and/or standards. All generators using the path in question are potentially impacted by the reduced transfer capability, not just the customer requesting the interconnection change.

6 System RAS

As noted in section 4.4, RAS will likely be needed in the future on either a permanent or temporary basis to address issues that arise on a regional or system wide basis. System RAS can be considered as any RAS that is

⁸ The AESO respects customer requests for confidentiality including customer information and development of interconnection proposal detail, until it is necessary to engage in public consultation prior to filing a Needs Identification Document for approval.

- Material to the transmission system reliability (e.g. if RAS fails to operate when requested, or operates incorrectly, could cause cascading or equipment damage or, the RAS supports a system operating limit), and
- Is required to meet performance requirements in a Transmission Planning standard.

The system RAS concept used here is intended to be distinct and separate from any local protection system, including a RAS that only impacts a local area. The AESO recognizes that the term “local” is undefined but notes that it is common practise that such designations are left to the discretion of the reliability entity. In Alberta, many of the existing RAS are considered local protection systems associated with a customer interconnection and only a few are considered to be system RAS.

The AESO Transmission Planning Standards (TPL) set out performance requirements for category A, B, C and D contingencies.⁹ The mitigation of category C and D events are often candidates for system RAS. Category C and D performance requirements provide that load and generation loss are acceptable actions to prevent cascading, equipment damage or both.

There are often a variety of solutions that may be considered to meet both the planning and operating criteria. The decisions must be made with due regard for the costs to meet the Reliability Criteria, impact on stakeholders and the risks associated with not meeting the Reliability Criteria.

A system RAS may be proposed to meet the performance requirements of Category C or D events if the risk is low and acceptable when compared to the cost of a wires solution (e.g. more transmission lines and equipment). The risk may be described as the probability of the event occurring times the consequential cost to load and/or generation.

For example, the cost of mitigating a common tower failure (a Category C type event) may require separating lines planned for a common tower onto separate towers. This may come at a high cost. Alternatively a RAS could be applied to trip generation and load for the Category C event for a lower cost in terms of transmission infrastructure. The RAS design would be such that it would be able to sense the simultaneous loss of lines on a common tower and directly trip load and or generation. If the cost of separate towers is significantly more than the cost of implementing a RAS, and the consequence of load / generation loss is acceptable then the RAS may be proposed as an acceptable solution.

System RAS costs would be considered to be costs incurred as an alternative to a wires solution and would therefore be appropriately paid for by load as load is responsible for all system costs under regulation. However, the implementation of a system RAS may result in specific load or generation having a more limited access to transmission under abnormal operating conditions. The Transmission Regulation Section 15(1) e requires the AESO to plan transmission access to be available for up to 95% of the time on an annual basis during abnormal conditions for the system as a whole. As long as the total system RAS impact does not cause the performance standard to be violated, the AESO considers that the application of system RAS is appropriate and consistent with government policy. The AESO is also permitted under Section 15(2) to provide for specific and limited exceptions to the transmission access requirements of Section 15(1) if the exceptions are filed with the AUC for approval and the period of time to which the exceptions apply is identified. The AESO expects in those cases that

⁹ See section 4.1 for definitions of Categories A, B, C and D.

AUC approval would take into account the cost of the system RAS solution including the cost of restricting transmission access relative to the cost of alternative solutions.

When considering a system RAS as an alternative to a wires solution, the AESO may determine that more than one load or generator may be effective in providing the service. The AESO would then determine how to assign the RAS among the potential providers. The approach used for system RAS would be consulted upon and determined on a case by case basis. Where practical and feasible the AESO would seek market based solutions such as using a Request for Proposal approach for procuring the service. As a wires alternative, the cost of such system RAS would be paid for by load.

Interconnection RAS are often a temporary measure to meet performance requirements for Category B events. However, on occasion, transmission system performance requirements may be such that the interconnecting customer may also need to be connected to a system RAS. In those cases, a temporary interconnection RAS may contain elements of system RAS, in which case the system portion of the RAS may remain in service beyond any transmission upgrades designed to ensure Category B performance requirements are met. In those cases, the AESO policy is that all costs that need to be incurred to implement the system RAS aspect of the interconnection are paid for by load and not the interconnecting customer. Since the activation of a system RAS is a low frequency and low probability occurrence and reasonable market based alternatives are not generally available, the AESO believes that the interconnecting customer is being provided reasonable transmission access. If the interconnecting customer disagrees with the AESO position, they can delay their project until the system RAS requirement is otherwise resolved or investigate an alternative unconstrained location for interconnection.

7. Consistency with Market Policy and Transmission Regulations

7.1 Regulatory Authority

AESO has duties originating in Alberta legislation, regulation and as the operator of a balancing area within WECC. A summary of the relevant AESO authorities and obligations for the management and use of RAS on the system is provided in this section.

The *Electric Utilities Act* (“EUA”) sets out the powers and duties of the AESO. The legislative authority as it applies to RAS is found Section 17 of the EUA which requires the ISO:

- to provide system access service on the transmission system and prepare an ISO tariff;
- to direct the safe, reliable and economic operation of the interconnected electric system;
- to make arrangements for the expansion and enhancement of the transmission system.

Additionally Alberta’s *Transmission Regulation* Section 15 (1) (e) requires the AESO to plan a transmission system that will ensure that the system:

- is sufficiently robust so that 100% of the time, transmission of all anticipated in-merit electric energy can occur when all transmission facilities are in service, and
- 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.

The *Transmission Regulation* Section 15 (3) (b) also permits the AESO to propose non-wires solutions (such as RAS) if the non-wires solution is required to ensure reliable service due to the shorter lead time of the non-wires solution, for a specified limited period of time.

7.2 Reliability Criteria

The *Transmission Regulation* Section 19 identifies the reliability standards, agreements and criteria that apply in Alberta and outlines how new Electric Reliability Organization reliability standards or any other standard deemed appropriate by the AESO may be adopted by the AESO to replace the existing standards.

The AESO is a member of WECC and has signed a WECC Reliability Management System Agreement which means that the AESO has agreed to follow the NERC and WECC Reliability Criteria and Standards for planning and operating the Alberta system and its interties.

Adherence to these NERC and WECC reliability criteria and standards is described in the AESO Reliability Criterion. To ensure the adequacy and reliability of the AIES, technical studies are carried out to measure system performance against these criteria. The AESO Reliability Criteria is central to the AESO fulfilling its duties to direct the safe, reliable and economic operation of the transmission system. With an adequate system and prudent operating criteria, the AESO is able to operate the transmission system securely and at the same time facilitate an open and competitive electricity market.

The intent of the Reliability Criteria document is to create clarity around the Reliability Criteria that apply to Alberta and interpretations particular to Alberta. The Reliability Criteria document has three sections. In Part II, the System Planning Section 4.4 refers to the use of RAS as part of system protection and control design. Planners use the Reliability Criteria to ensure the system can withstand reliability events (Category B, C and D) under a specific adverse generation scenario and peak loading conditions. The planner's role is to provide adequate transmission resources so the operator will be able to operate the system reliably in real time. The Reliability Criteria also serves as a foundation for needs documents, functional specifications and operating policies and procedures.

The Part III Operating Criteria section describes the operating policies and standards that guide the development of AESO operating procedures to ensure that the system can withstand the next contingency events, in accordance with the WECC Minimum Operating Reliability Criteria. Operating Policies and Procedures based on the operating criteria can be found in the ISO Rules on the AESO web page. The Operating Criteria section contains references to the operation of automatic RAS which have been incorporated into the relevant sections of this discussion paper.

The AESO notes that it is leading the mandatory reliability standards initiative which could replace or revise the existing AESO Reliability Criteria. To the extent that RAS associated NERC or WECC reliability standards are adopted as Alberta reliability standards, they may duplicate or modify the criteria included in the existing AESO Reliability Criteria. Subsequently the AESO Reliability Criteria may need to be updated. The AESO anticipates that the RAS related NERC or WECC reliability standards will be evaluated and adopted as Alberta reliability standards in the next year or so and such evaluation will benefit from the RAS policy discussion.

7.3 DOE Policy Alignment

The Department of Energy ("DOE") recognized the importance of eliminating congestion given Alberta's single pool price market design and directed the ISO to plan a robust transmission

system.¹⁰ Targets were established in regulation because the DOE recognized that congestion may occur even after the next phase of planned transmission development. The DOE expected that during abnormal conditions, real time congestion would be resolved by merit order re-dispatch, followed, if necessary by pro rata curtailment of parties with equivalent offers¹¹.

The AESO manages the customer interconnection process to accommodate requested customer interconnection dates. The AESO identifies the required facilities needed to provide the customer system access 100% of the time during normal operating conditions and has a process to arrange for the needed facilities to be built. Once the needed facilities are in place, the AESO expects that the system will be sufficiently robust to accommodate the management of congestion through merit order re-dispatch.

7.4 Policy Application and Rule Development

The AESO has considered the policy direction outlined in the sections above and determined a set of practices for the application of RAS that is consistent with the stated direction and intent as noted above. The AESO is seeking input on these policy interpretations as well as on our recommendation to document this direction in a rule and associated business practices.

Use of interconnection RAS for new customers: If a constraint is identified at the time a system access customer request is being assessed and the AESO determines that it can achieve the requested interconnection date by offering a RAS, the AESO policy is to allow the customer to choose to accept the RAS, or decline service until the system is reinforced. While the AESO considers that the Transmission Development Policy (“TDP”) and associated regulations preclude the use of trigger participants in dealing with real time congestion, the TDP does not prohibit the assignment of a RAS to a market participant as a temporary non-wires solution. Assigning RAS requirements to an interconnecting market participant allows the AESO to add new assets to the system while meeting the intent of DOE policy.

RAS as non-wires solution: The AESO notes that a temporary RAS is an acceptable non-wires solution contemplated under regulation. Further the AESO notes that on occasion RAS may be a permanent non-wires solution to specific system issues.

Denying system access: The AESO also considers that it can deny system access without a RAS given its duties to provide for the safe, reliable and economic operation of the system. Denying system access under these conditions is not contrary to the AESO’s duty to provide reasonable system access.¹²

RAS and congestion management: A RAS would not be used to manage congestion when a real time operational approach could be used consistent with the intent of the DOE policy. After a RAS has activated and the system controller determines that the constraint situation is manageable, the AESO will apply the TCM Rule 9.4 protocol to restore system access by applying reverse merit order and pro rata dispatch where technically and operationally viable.

Multiple RAS: Implementing a multiple RAS solution to constraints increases the operational complexity and requires the AESO to impose RAS costs and more limited system access on existing generators or load. The AESO has adopted a policy of not applying multiple RAS or creating a pro-rata application of a RAS to multiple generators as a solution to constraints

¹⁰ Alberta Regulation 86/2007, Transmission Regulation Section 15(1)(e)

¹¹ Alberta Transmission Development Policy; December 2003; page 8

¹² Electric Utilities Act Section 29

caused by a customer interconnection. In determining the policy, the AESO has given consideration to the complexity and cost of a multiple RAS approach as well as the temporary nature of the installation.

Ineffective RAS or other exceptions: While the AESO intends to consistently apply its multiple RAS policy, unique situations can occur where exceptions are deemed appropriate. In some cases, the need for a RAS may arise after an interconnection agreement is signed. Further, while RAS is an effective non-wires option, its use is not always appropriate. The application of RAS needs to be considered on a case by case basis, utilizing the reliability criteria for guidance.

RAS and the ISO Rules: The AESO is recommending the creation of ISO rules specifically outlining its authorities and obligations with respect to the use of RAS in the context of interconnections. Creating AESO RAS rules provides a formal linkage to the appropriate sections of regulation applicable to RAS. The AESO would need to ensure that any new RAS rules provide the appropriate flexibility of interpretation to deal with the unique reliability issues that arise and that the RAS rules are consistent with the regulations and legislation. As such, the “rule” would be necessarily global and overarching, with specific practices to be found in information documents.

Documented criteria for RAS: The AESO also considers that the approach to RAS is not suited to the application of a standardized business practice although some common principles for using RAS could be outlined in rule language or more likely a business practice or information document. The practices would provide clarity regarding criteria and consideration as noted in the paper. While a system related RAS business practice is not being contemplated, the AESO expects that it will be held accountable to perform its duties under legislation including the requirement to use good engineering judgment when considering the benefits and risks of a system related RAS.

Alternatively, the AESO could create a RAS informational document which is not a rule but provides stakeholders with a review of the appropriate regulation and policy referenced by the AESO in its practices and procedures. An information document is generally more descriptive and can provide examples to aid interpretation. Information documents can be updated more frequently and in a timelier manner than a rule. However, rules create formal obligations and a formal process must be followed to change an obligation under a rule which provides more certainty and external transparency for stakeholders.

8. Summary

Transmission constraints may be identified during the customer interconnection process or through ongoing system evaluations. When the transmission system is not capable of providing unrestricted transmission access until system enhancements are completed, Remedial Action Schemes (“RAS”) are employed by the AESO to provide a reduced level of service while maintaining system reliability and protecting system facilities. Market participants seeking to interconnect to the system may be assigned a temporary RAS as a condition of interconnection until needed transmission facilities are built to resolve reliability issues.

The AESO may offer a temporary RAS to an interconnecting customer on a case by case basis if the RAS is technically feasible, viable from an operational perspective and agreed upon through the interconnection agreement. The AESO will need to ensure that the RAS permits reliable operation of the system while providing market participants a reasonable opportunity to

compete for market access. When a RAS is a permanent non-wires solution to a system issue, the RAS assignment and cost allocation principles will be reviewed on a case by case basis.

When considering the use of RAS on the system, the AESO relies on the RAS business practices outlined in this paper as well as its duties under regulation and the need to apply good engineering practice and business judgment on a case by case basis.

9. Next Steps

The AESO welcomes feedback on the RAS discussion paper. A comment matrix has been prepared to make it easier for stakeholders to submit their comments. The AESO would appreciate receiving comment on:

- the interconnection and system RAS distinction
- technical and operational RAS policies
- interconnection RAS issues, policies and principles
 - use of RAS on new customers
 - factors considered when moving an interconnection date
 - customer and market notice on interconnection & system RAS use
 - use of reduced path rating where RAS is not appropriate
- RAS as non-wires solution
- approach to exceptions to the stated policy
- use of expedited rules process to facilitate early participant access
- the AESO's recommendation for rule language and criteria in business practices.

When providing comment on the AESO approach to RAS, the AESO would appreciate receiving feedback on specific practices or policy in terms 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 the issues raised.

Please use the comment matrix on the AESO website to submit your feedback to Gordon Nadeau at gordon.nadeau@aeso.ca by July 24, 2009.