BONNEVILLE POWER ADMINISTRATION

Transmission Services

Connecting Variable Generating Resources to the Federal Columbia River Transmission System (FCRTS)

Posted July 2, 2010

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March 5, 2009

1. Background

The Bonneville Power Administration (BPA) has about 1,700 megawatts of wind power operating on its system today. Wind power in BPA's system is set to reach 3,000 MW by the end of 2009 and grow by yet another 1,300 MW in 2010. Several thousand megawatts of new wind plants are seeking interconnection to the federal system.

Much of the wind on the BPA system has been developed in the Lower Columbia region. Wind projects located in the same general area tend to move up and down simultaneously, frequently resulting in large, unscheduled swings in wind generation. This causes BPA to increase or back off generation in like amounts in real time to maintain the constant balance of loads and generation needed to keep the lights on. Today, BPA provides these balancing services from federal dams. But the hydro system's limits are being reached. Excessive wind generation imbalance is beginning to impose real consequences on power system operation that could affect system reliability.

Several Large Generator Interconnection Agreements (LGIA) equaling 2,200 MW are pending with wind developers that have projects in varying stages of development. These agreements define the wind developers' and BPA's responsibilities and will remain in effect for the life of each generator.

BPA can only make commitments to new generators that it is confident can be fulfilled without compromising the reliability of the system. Our challenge has been to define an immediate solution that maintains system reliability while continuing to encourage the development and interconnection of variable resources to the transmission grid. We also are working on other medium-to-long-term wind integration strategies.

This paper describes an operational approach that will allow us to move forward. The Federal Energy Regulatory Commission defines an intermittent or variable generator as "an electric generator that is not dispatchable and cannot store its fuel source and therefore cannot respond to changes in system demand or respond to transmission security constraints." Our approach will apply equally to wind and all other forms of variable generation that may be added to the BPA system, such as wave or solar power plants.

Under this approach, BPA will establish the amount of balancing reserves that BPA will provide, consistent with the approach assumed to set rates in the 2010-2011 rate case. Changes to the approach in the future would also affect future rate assumptions. BPA will send dispatch signals to project operators or directly to variable generators to limit output so that BPA does not exhaust its balancing reserves.

BPA first included the balancing reserves needed for wind in its Wind Integration Rate for 2009. For the 2010-2011 rate period, BPA expects to forecast a larger amount of balancing reserves for all balancing needs, including amounts to address generation imbalance. The balancing reserves calculated for variable generation in the Wind Integration Rate for 2009 did not include generation imbalance. As a result, the amount of balancing reserve forecast for wind for the 2009 rate period is lower than the amount forecast for the 2010-2011 rate period. BPA will continue to establish the amount of balancing reserves BPA will provide, consistent with the amounts of installed variable generation, but the amounts may vary over time as system needs change and as alternate system and variable generation management techniques emerge.

The operating practice BPA is memorializing in Dispatch Standing Order (DSO) 216 is designed to assure that BPA has sufficient operational tools at its disposal to ensure the reliability of the federal system.

In general, the approach is as follows:

BPA will calculate the total amount of reserves needed for its Balancing Authority Area for both loads and resources. BPA will implement the practices described in this paper when it has deployed 90 percent of all reserves held for balancing.

A) **Over-generation: Reduce variable generator output:** BPA will require variable generators to reduce generation. Via electronic signal from the BPA Automatic Generation Control system, BPA dispatchers will inform each variable generator operator of the generation limit it is allowed for the remainder of the hour. This limit will consist of the generator's originally scheduled output plus its proportional allocation of balancing reserve for variable generation (discussed in Attachment B).

   Each generator operator will be required to reduce its generation to its limit for the balance of the hour. Each generator operator must adjust generation output to or below its limit within 10 minutes of receiving a dispatch order from BPA. This will ensure that reserve requirements are not violated. Failure to comply may result in BPA taking action to disconnect the generation from the grid. Any variable generator that fails to comply with these dispatcher's orders three times within 24 months will be required to install Automatic Generation Control (AGC) equipment that will accept electronic signals from the BPA energy management system that will automatically set generation limits for the variable generation project.

B) **Under-generation: Curtail transmission schedule (E-tag):** Because variable generators cannot increase power output on demand, a different approach is needed for under-generation. When actual variable generation is significantly less than scheduled and BPA has consumed 90 percent of its balancing reserves, the transmission schedule (E-tag) for each variable generator will be curtailed for the balance of the hour to the amount of the power actually being generated plus its proportional allocation of balancing reserve for variable generation. The holder of the transmission schedule may be the variable generator, the entity receiving the variable generation or a third party. In all cases, curtailing the transmission schedule to actual variable generation output plus its proportional allocation of balancing reserve shifts the responsibility for balancing the under-generation to the wind power customer and its balancing authority.

This approach will be applied to all new and existing variable generators interconnected to the federal system. An example of this approach is included in Attachment A.

Over time, BPA expects other system management techniques to emerge that will both increase the amount of balancing reserves available to the BPA Balancing Authority Area and reduce the amount of reserves needed by variable generators. Some solutions may be easily obtainable through more accurate scheduling practices.

Some solutions, such as acquiring additional balancing reserves from other parties, are complex and may be costly. Through BPA's Wind Integration Team and other regional venues, including the Joint Initiative sponsored by ColumbiaGrid, the Northern Tier Transmission Group and WestConnect, BPA and the wind power development community are actively working to define new solutions to the increasing demand for balancing reserves. These new solutions will be implemented over time, and are in addition to the procedures for limiting wind and curtailing E-tags.

2. Amount of Balancing Reserves Supplied from the Federal Columbia River Power System (FCRPS)

The amount of FCRPS balancing reserves available from the existing federal system to support variable generators is limited. This amount also is likely to change over time with increased load service obligations and changes to non-power constraints. This statement is true for both the upward reserves (when variable generation is less than scheduled and reserve generation must be increased) and downward reserves (when generation is more than scheduled and reserve generation must be decreased).

In low-flow seasons (e.g. September and October), the combination of natural streamflow, available reservoir storage, and non-power constraints could result in the FCRPS operating at very low generation levels. To preserve reliability, BPA cannot operate the FCRPS below a certain minimum level. In this circumstance, the difference between actual and minimum generation levels could be small, leaving a very small margin for downward reserve (which could also be limited by storage constraints).

Conversely, under high-flow seasons (e.g. May and June), carrying reserves to compensate for possible under-generation by variable generators may limit the FCRPS's ability to generate. This may, in turn, inhibit the FCRPS's ability to move the necessary volumes of water through the turbines (through increased generation) consistent with legal requirements such as Total Dissolved Gas (TDG) limits. The upward reserves that the system could carry would be limited to the amount of capacity that could be made available without violating the TDG limits.

As more of the flexibility of the FCRPS is tied up to supply balancing reserves, the cost of these reserves will increase. Wind integration studies show that scheduling errors are the biggest driver in the amount of reserves that BPA must hold. If there are no improvements to scheduling practices, balancing reserve requirements during the 2010 and 2011 rate period could be up to 1,700 MW for 4,330 MW of wind projects connected to the federal system. The final amount of balancing reserves for the 2010 and 2011 rate period will be determined in accordance with Western Electricity Coordinating Council and North American Electric Reliability Corporation control standards.

BPA has received feedback from customers and the wind development community that BPA's forecasted balancing reserve levels are greater than they would like BPA to carry. The wind community has proposed that BPA forecast the amount of balancing reserves for generation imbalance assuming 30-minute persistence scheduling accuracy. Under a 30-minute persistence method, the level of generation at 30 minutes before the hour is used as the schedule for the next hour for calculating reserves. Using a 30-minute persistence schedule would reduce reserve levels significantly. With these new operating requirements in place, BPA will be better positioned to carry a smaller quantity of balancing reserves, which would lower costs to wind generation owner/operators while still maintaining system reliability.

3. Overview of Technical Requirements

Dispatch and Communication System

The BPA Automatic Generation Control (AGC) system will be modified to calculate the amount of balancing reserves deployed at any given time. The software changes required for BPA's AGC system will be specified in a BPA requirements document under development by an internal BPA team. This team will also work with variable generator owner/operators to ensure their systems are compatible with the resulting AGC software. The updated AGC performance criteria will be reflected in Dispatch Standing Order (DSO) 216.

Two primary components of the AGC system will need modification:

1) the basepoint adjustment term, and

2) the regulation term.

The *basepoint adjustment term* is the difference in megawatts between the scheduled generation for the hour – the basepoint – and actual generation at any time during that hour by FCRPS facilities being directly controlled by BPA's AGC system (on AGC response). Whenever the load in BPA's Balancing Authority Area changes during an hour, this term changes by the amount of the change in load. Also, when any generator in BPA's Balancing Authority Area that is not on AGC response changes its output during an hour, the difference between that generator's schedule (basepoint) and actual output is added to the basepoint adjustment term. The basepoint adjustment term has other inputs that do not relate to reserve deployment and these inputs will need to be removed in order to accurately calculate the amount of regulation and load following deployed in-hour.

The *regulation term* in AGC is the amount the FCRPS facilities on AGC response are being moved up or down due to the Area Control Error (ACE). ACE is the amount BPA's Balancing Authority Area is out of load/generation balance on a second-to-second basis. ACE also has multiple inputs that will need to be removed in order to see how much of the ACE is due to load and/or generation movement as opposed to interconnection frequency deviation, schedule changes and automatic time error correction.

Once AGC has deployed 85 percent of balancing reserves, an alarm will notify BPA Dispatchers and variable project operators that BPA is nearing full deployment of reserves and the potential for limits on generation is near. Once AGC has deployed 90 percent of balancing reserves, BPA will require variable generator operators to reduce generation levels (if generation output exceeds the scheduled amount) or transmission E-tags will be curtailed (if generation output is below the scheduled amount). BPA Dispatch will receive an alarm from AGC. A subsequent alarm will show BPA Dispatch when a facility is not responding. This will give the dispatcher the information needed to decide whether or not to open the breaker and take the facility offline.

The amount of variable generation reduction or transmission E-tag curtailment deployed for each facility will be based on the algorithms outlined in Attachment B.

Communications between BPA and the variable generators will take place through standard communication protocols such as Inter-Control Center Communication Protocol (ICCP) or SCADA Remote Terminal Unit (RTU), depending on which method each variable generator has available. In all cases, the minimum data set will include a flag indicating that limitations are in effect and the megawatt limit to which each entity must lower its output. Additional data will be available that may be useful to variable generator operators, such as advance notice that BPA has deployed enough balancing reserves so that there is a risk that limitations or curtailments will be implemented.

Owners of variable generators may elect to have their facilities receive generation limits directly from BPA's energy management system, or owners may elect to have BPA's energy management system sending a signal to the generator operator, provided the facility fully responds as outlined below.

Dispatch Standing Order

A Dispatch Standing Order (DSO) defines the actions dispatchers will initiate and the responsive actions generators must implement to modify plant output to maintain reliable operation of the transmission system. The operational protocols described in this document will be included in a new Dispatch Standing Order, DSO 216. BPA will release DSO 216 to operational entities that sign a non-disclosure agreement with BPA. Over time, BPA may find it necessary to make changes to DSO 216. BPA will make changes in a public process when possible. There will be times that responses to real-time issues necessitate a change to the DSO without a public process. At Joint Operating Committee meetings, BPA will inform affected parties of any changes to the DSO.

Facility and Netting of Facilities

Facility refers to an individual variable generation project. Some owners of variable generators have expressed interest in netting their generation and adding dispatchable generators to the net so that they can choose which generator or generators to adjust to meet the limitation requirement. BPA is willing to explore the development of a netting approach. The following sections describe our initial thinking on the topic. However, the formal rules, practices and procedures for netting will be developed through BPA Transmission Services' standard business practice development process.

Project and Fleet Response Requirement for Over-generation

In an over-generation condition, AGC will send a signal to the facilities or to the operator of any entity that nets facilities. This signal will be the maximum generation limit to which each entity needs to reduce its output so as to stay at or below its limit. Any entity that fails to fully respond in 10 minutes will be assessed a violation. BPA dispatchers also will have the right to take any facility offline by opening the breakers of any facility that fails to fully respond. The BPA dispatcher will open breakers on facilities that are in violation if, 10 minutes after the dispatcher issued the order to reduce output, the amount of reserves still deployed exceeds 80 percent of the balancing reserve. With respect to netted facilities, our initial thinking is that if the net amount continues to exceed the limited megawatt quantity and opening breakers is required, the BPA dispatcher will open the breakers on those facilities that have the largest error until the total megawatts of the netted facilities is equal to or less than the megawatt quantity to which the facilities have been limited by the order.

Schedule Curtailments for Under-generation

In an under-generation condition, AGC will calculate the amount of curtailment needed. For individual facilities, AGC will send the amount of curtailment, and the transmission E-tags will be curtailed in BPA's software. With respect to potentially netted facilities, BPA's initial thinking is that it will curtail E-tags or allow the entities the option of increasing the output of dispatchable generation that is included among the netted facilities instead of curtailing their E-tags. If the dispatchable generation does not fully respond in five minutes, BPA will curtail the E-tags on the wind facilities on a facility-by-facility basis, without netting facilities, to ensure that the curtailed E-tags are implemented within the 10-minute window.

Testing and Acceptance Procedure

BPA will test these automatic scheduling and operational practices before relying on them to assure federal system reliability and compliance with non-power operating requirements. For facilities that receive generation limits directly from BPA's energy management system, the testing will consist of sending a limiting value to the facility and ensuring that it fully responds within 10 minutes. If the facility does not fully respond, the operator will need to modify the facility's control system until the facility has the required response. If this does not occur, BPA will always trip that facility's breaker when limiting variable generation output if the facility is over-generating.

For facilities that elect not to receive generation limits directly from BPA's energy management system, the testing will consist of sending a signal to the generator operator and ensuring that the facility or netted facilities fully respond within 10 minutes. If the facility or netted facilities do not fully respond, modifications to their procedures must be made until full response is achieved. After BPA has accepted the operations of these facilities, random tests will occur to ensure compliance with the requirement. If the facility or group of netted facilities fails to fully respond during these random tests, the failure will count against its three violations, but penalties as specified in BPA transmission rates will not be applied during testing and certification.

The random testing approach will be developed in cooperation with wind project owner operators in a way that minimizes economic impact on the generator owners.

Violations

Variable generator operators that do not elect to have their facilities receive generation limits directly from BPA's energy management system must ensure that they fully respond to the limitation within 10 minutes. If a generator fails to fully respond three times within a 24-month period, the generator will be required to receive generation limits for the facility or facilities directly from BPA's energy management system. With respect to netted facilities, our initial thinking is that if an entity is netting facilities and fails to respond three times within a 24-month period, the entity will be required to receive generation limits for the variable generating facilities being netted directly from BPA's energy management system.

The entity must install all necessary equipment so that the facility or facilities are able to receive generation limits directly from BPA's energy management system within six months of notification of the third violation. During this time period, the entity must fully comply with BPA directives to reduce generation within nine minutes of receiving the order. If necessary equipment is not installed within six months of the notification, BPA has the right to take the generator offline until the equipment is installed and operational. In order to be removed from receiving generation limits directly from BPA's energy management system, the variable generator operator must prove to BPA that the necessary corrections have been made to the variable generator's operation, and that it is able to fully respond to the limitation orders within 10 minutes. This demonstration can be made no less than two years from the date on which the facility started to receive generation limits directly from BPA's energy management system.

In addition, generator operators that fail to respond will be assessed a failure-to-comply penalty, and BPA may take the facility or facilities offline by opening the breaker when full response does not occur within 10 minutes.

With respect to potentially netted facilities, BPA's initial thinking for the case of under-generation is that, if netted facilities ramp generation up to meet the amount of curtailment required, the generation must be fully deployed within five minutes of the order. Because tag curtailments take five minutes to be implemented, the curtailments must occur at the five-minute mark in order to insure they are implemented inside the 10-minute window. If the generation is not fully deployed within five minutes, BPA will curtail tags on the wind facilities on a facility-by-facility basis, without netting facilities, to ensure that the curtailed tag is implemented within the 10-minute window. If any netted facilities fail to fully respond three times in a 24-month period, BPA will not allow the facilities the option to ramp up generation to meet the curtailment, but instead will curtail tags on the wind facilities using the same process as is used on the non-netted facilities.

4. Reliability Requirements

Because of the significance of this issue, BPA will include a provision in the DSO 216. In Attachment C to this paper for LGIA language, BPA has included language regarding the customer's possible move to another control area.

5. Implementation Schedule

The primary modifications needed for implementation will be to the AGC system. BPA will need to change AGC to calculate the amount of reserves deployed each hour and to provide automated signals to the variable generators to 1) notify them when BPA is nearing full deployment of reserves, and 2) limit the output.

Communications will need to be put in place at each variable generator and in the BPA dispatch centers that allow an analog signal to be sent to the control system of the variable generator electronically. BPA will work with the variable generator owners and operators to develop specifications and to install necessary equipment and software changes.

When curtailing E-tags, BPA will use a similar methodology to that employed in the development of the curtailment calculators for transmission system constraints currently in use by the dispatchers. These tools allow the dispatchers to calculate the amount of curtailment needed by any generator. The curtailment calculator automatically curtails the associated transmission schedule E-tags.

Time-Line:

By February 13, 2009, BPA will develop a requirements document for modifications to AGC and scheduling software.

By October 1, 2009, BPA will complete changes to AGC and scheduling software. Changes will begin as soon as the requirements document is complete. BPA will work with the variable generator operators to complete retrofits and new installations so that all operating wind projects connected to the federal system are capable of receiving and responding to an automated signal by October 1, 2009.

6. Evaluation and Assessment

This approach, together with enhanced operational tools, will allow BPA to continue to interconnect variable generators to the grid and sign LGIAs while maintaining system reliability. BPA will continue to evaluate the ability of the federal system to absorb additional variable generation as we gain experience with larger wind penetration levels.

The agency's primary objective is to operate the transmission grid and FCRPS reliably and cost effectively while complying with our statutory and legal responsibilities. At the same time, supporting the development of renewable energy in the Northwest is an important objective for the agency. Because the agency and the wind community are entering uncharted territory, a number of issues may arise in overall implementation that could require BPA to revisit the assumptions behind this plan of action. If issues do arise, further changes to requirements, DSOs or possibly the LGIAs may be necessary. BPA's Wind Integration Team and Transmission Services' Account Executives will keep interested parties apprised of such developments.

Attachment A
Example Procedure

Step 1:
Estimate the total amount of balancing reserves (TR) to be supplied:

- **a)** Balancing reserves associated with Load = LR (can vary from hour to hour based on forecast of load).
- **b)** Balancing reserves associated with variable generation = WR (total reserve level carried in the BAA for variable generation).
- **c)** TR = LR + WR (Note ESA may limit the TR).

Step 2:
The AGC system will be modified so that BPA can monitor the usage of balancing reserves.

Step 3:
Variable generators will schedule their generation for the next hour.

Step 4:
When the AGC system determines that BPA has deployed 85 percent of the TR, then an alarm will inform dispatchers and variable generator operators that deployment of reserves is nearing full deployment.

When the AGC system determines that BPA has deployed 90 percent of the TR, then:

- **a)** Alarms will inform dispatchers that balancing reserves have been depleted, and
- **b)** AGC will trigger.

Over-generation case:

- **a)** AGC allocates to each individual facility its allocated share of balancing reserves.
  - a. Each facility's allocated share of balancing reserves plus its schedule sets the maximum generation allowed at that facility for the balance of that hour.
- **b)** AGC sends automatic signal to each facility or the operator of entities netting facilities, setting the generation limit each is allowed.
- **c)** The operator of each variable generator or group of netted facilities reduces generation to the limit within 10 minutes.
- **d)** AGC will monitor compliance.
  - i. If full compliance is reached, no further steps are needed.
  - ii. If a project does not fully comply:
    1. Assess violation (if this is the **third** violation, the project will be required to install the ability to receive generation limits directly from BPA's energy management system).
    2. Check reserve levels in system:
       - a. If balancing reserves available have not increased by approximately 20 percent or more, alarm BPA dispatch to trip breaker on non-conforming facilities.

Under-generation case:

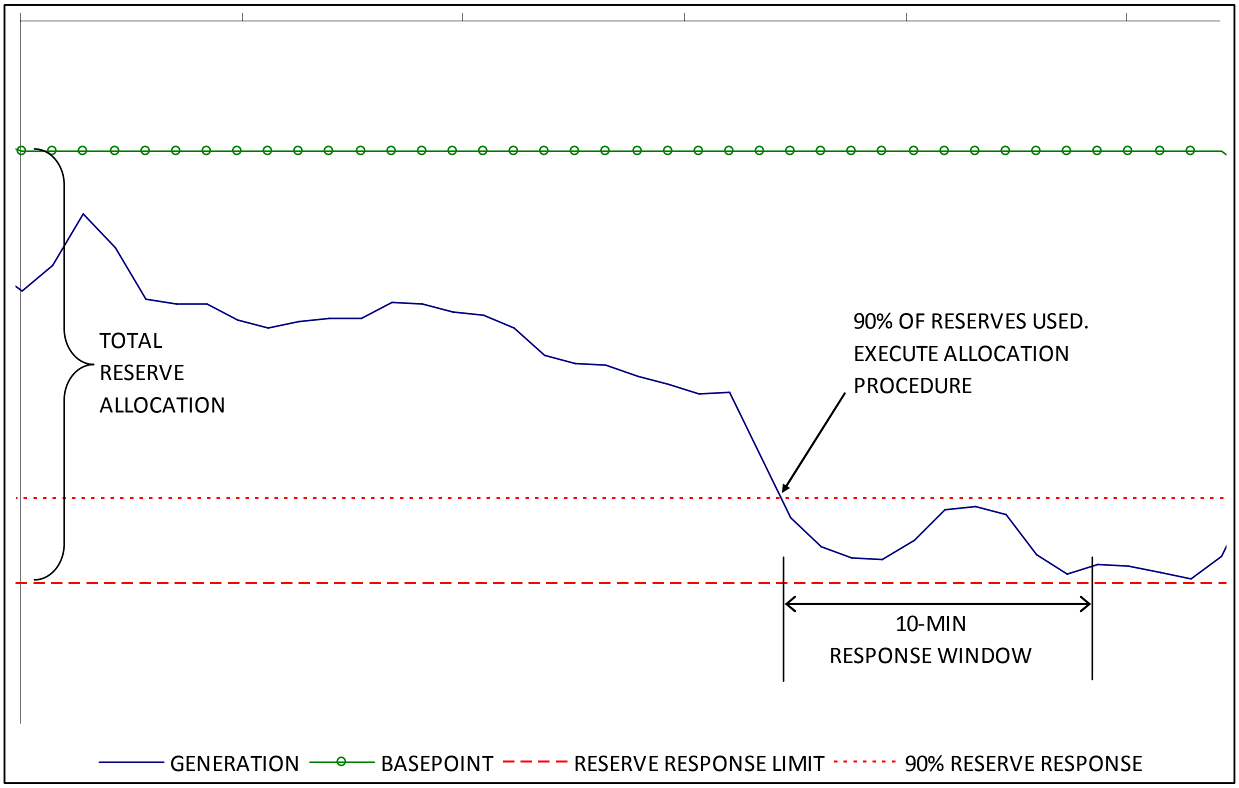
a) AGC allocates to each transmission schedule E-tag associated with an individual generator its share of balancing reserves based on its mean absolute error.
   a. Each facility's schedule less its allocated share of balancing reserves sets the minimum generation limit.

b) AGC will calculate the amount of curtailment and allocate curtailment to associated E-tags for facilities generating less than their minimum generation:
   a. For individual facilities, AGC will send the amount of curtailment and the E-tag will be curtailed in BPA's software.
   b. Schedules will be curtailed to equal actual generation plus the facility's proportional allocation of balancing reserve for variable generation.
   c. For netted facilities, BPA may curtail E-tags or give the entities the option of increasing other generation.
   d. In this case, the entity must offset the error in five minutes or curtailment of E-tags will take place.

Note: Should wind conditions or other system conditions change dramatically within the balance of the hour after over-generation or under-generation controls have been effected, BPA could, if necessary, issue a subsequent control order to continue to maintain reliability for the balance of the hour.

Example of Deployment

The figure below illustrates the timeline in which actions under the proposed language would take place given a set amount of balancing reserves. For simplicity, consumption of the reserves, measured by the responding generators, is illustrated as a single trace. At the beginning of the hour, generation targets must be set such that there is adequate capability to provide for upward and downward movement.



This example shows only the case where wind is over-generating, causing the balancing resources to decrease generation. When the balancing resources have been 90 percent deployed, the procedure is invoked. Because this is an over-generation case, projects are sent a generation limit. All projects must be at or below their limited generation value within 10 minutes after the generation limit signal is transmitted. Those projects outside of their limits must reduce generation. This provides some immediate relief of the problem and allows other generators below their limited generation to generate up to that amount to the extent that it does not require more than the total balancing reserves set aside for the hour.

Attachment B
Reserve Allocation Methodology Proposal

The amount of reserves allocated to an individual facility is proposed to be the facility's nameplate capacity normalized against the nameplate capacity of the generation fleet within the Balancing Authority Area (BAA).

$$A_j = \frac{C_j}{\sum C} \times R \qquad \text{(Equation 1)}$$

C is the nameplate capacity for facility *j*, *A* is the facility reserve allocation, and *R* is the total reserve level carried in the BAA for variable generation. It should be noted that the total reserve level may differ between the upward and downward directions. This allocation method is consistent with the allocation of reserve costs in WI-09 and will remain consistent if such allocation of reserves is used again in the FY10-11 rate case. Alternatives do exist to Equation 1, but the intent is to make it such that the allocation of reserves to the individual facilities is consistent with the allocation of the reserve costs adopted in FY10-11.

In theory, all projects could operate at their schedule plus A_j and reserves would be adequate. Aggregating the wind fleet activity allows some facilities to be above or below their individual limits without causing a system problem. Individual facilities may operate without limitation to their schedule plus allocated reserves under normal circumstances when adequate system-wide reserves are available, subject to imbalance charges. When the BAA has deployed 90 percent of its reserves, it becomes necessary to use the individual reserve allocation as a benchmark for corrective action. Figure 1 illustrates an example of the condition individual projects may be in at a given point in time.

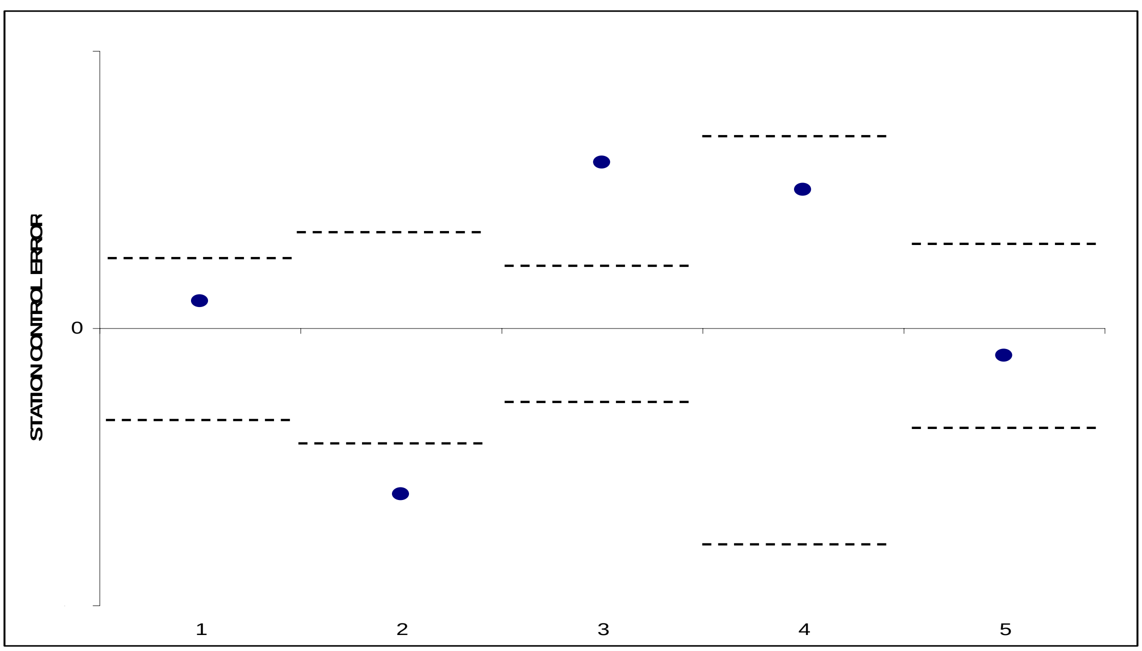


Figure 1 – Example distribution of errors relative to schedule for a hypothetical five-project wind fleet.

When the system reserves are approaching exhaustion in the downward direction (e.g. generators are over-performing relative to schedule), instructions would be issued to limit output to a specified level. It is proposed that the limit for any given variable generation facility be equal to the scheduled generation plus the reserve allocation.

$$\left(G_j\right)_{\max} = \left(G_{j,t}\right)_{sched} + A_j \qquad \text{(Equation 2)}$$

G is the generation for project *j* at time *t*.

This provides immediate relief because those projects outside of limits and in the contributing direction (e.g. Project 3 in Figure 1) must reduce generation to be within their allocated amount. Those projects already within bounds or in the non-contributing direction retain the ability to move up to and within their allocated amount.

When the system reserves are approaching exhaustion in the upward direction (e.g. generators are under-generating), schedules must be reduced within the hour to correct the issue. The following equation calculates the schedule curtailments for facilities contributing to the exhaustion of reserves.

$$\Delta\left(G_{j,t}\right)_{sched} = \begin{cases} A_j + SCE_j, & SCE < 0 \\ 0, & SCE \geq 0 \end{cases} \qquad \text{(Equation 3)}$$

where *G* is the generation for facility *j* at time *t*, and *SCE* is the Station Control Error equal to the actual generation minus the scheduled generation at time *t*.

ATTACHMENT C: LGIA:

APPENDIX C (from LGIA)
INTERCONNECTION DETAILS

3. CONTROL AREA OBLIGATIONS FOR THE INTERCONNECTION CUSTOMER

(a) As specified in Article 9.4, the Interconnection Customer is responsible for compliance with Control Area requirements. This includes the WECC Reliability Criteria referenced in Article 4.3.1.1. The Joint Operating Committee described in Article 29 will address past performance issues and future compliance requirements.

(b) Supplemental information to comply with the Control Area requirements is detailed in this Appendix C below:

(i) Transmission Provider's Control Area requirements include compliance with operating instructions issued in accordance with Transmission Provider's dispatch standing orders, including dispatch standing order 216 concerning the curtailment of wind generation, as such dispatch standing orders may be amended from time to time.

C. The following language will go in Appendix C of the LGIA following the list of required Control Area services.

Upon one-year's written notice to Transmission Provider, and with Transmission Provider's consent, which shall not be unreasonably withheld, Interconnection Customer may self supply, or acquire from a third party, the Control Area Services that Transmission Provider is providing under this LGIA at the time of the notice, if such Control Area Services are (1) comparable to the Control Area Services Transmission Provider is providing, and (2) consistent with the Tariff and Transmission Provider's associated business practices. No later than the date on which Interconnection Customer begins self-supplying such Control Area Services or taking such Control Area Services from a third party, Interconnection Customer must compensate Transmission Provider for

(i) any costs to modify the Transmission System that Transmission Provider incurs because of such self-supply or third-party supply, and

(ii) a percentage of costs that Transmission Provider has incurred, if any, to acquire energy or capacity to supply such Control Area Services to wind generators in Transmission Provider's Control Area, and that Transmission Provider has not yet recovered from such generators, according to the following formula:

(MW amount of Interconnection Customer's installed wind generation capacity in Control Area as of the date of the notice/total MW amount of installed wind generation in Control Area as of such date) X Transmission Provider's unrecovered costs;

except that Interconnection Customer does not have to pay such costs if Transmission Provider determines that it has an alternative market for such energy or capacity.