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MSA Report

Dispatch Compliance

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Market Surveillance Administrator

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1 INTRODUCTION

This report presents a recent history of the issues and rule making surrounding dispatch compliance and risk in the Alberta market. It goes on to review the AESO's audit of dispatch compliance during three months: August 2002, January 2003 and August 2003. The intention of the review is to determine if the dispatch compliance rule, introduced in December 2000, has achieved the goal of creating more orderly dispatch and price clarity in the Alberta spot market. The review also intends to determine whether the AESO needs to consider imposing the financial non-payment penalty for over-generation, as contemplated in the AESO rules.

The work was undertaken in late 2003 and the MSA is grateful for the assistance and cooperation provided by the AESO's Market Development team.

2 BACKGROUND

The Alberta real-time electricity market is based on a single clearing price model which uses an ascending price-based supply stack (merit order) to dispatch energy to serve system demand. The merit order is notionally a combined stack of bids by load and offers by suppliers. However, very little load actually bids, and most is deemed to have a bid of $999. With the exception of energy flowing in or out of the province as imports or exports, which is dispatched on an hourly basis, energy dispatches to intra-Alberta producers are given on a minute-by-minute basis. Payment for energy produced is then settled using a time weighted hourly average price for the entire system. Key to orderly dispatch and efficient price discovery in this market design is that some form of dispatch compliance is maintained. Those generators who have energy priced at or below the system marginal price (SMP) should be generating at the correct output, while those generators who have energy priced higher than the system marginal price should not be generating the out-of-merit energy, as they have accepted the risk of non-dispatch through their pricing strategy.

Prior to the December 15, 2000 approval of a rule pertaining to dispatch compliance (Rule 6.6 in the current AESO Rules Document), there were few constraints with respect to generators who chose to 'self-dispatch' or produce energy out-of-merit (OOM). The two relevant rules about dispatch compliance were as follows:

- Pool Rule 5.3.5, Unit Owner Discretion on Dispatch Instructions stated: "The final decision whether or not to comply with a dispatch instruction remains at the sole discretion of the Participant, but if a Participant does not comply that Participant must immediately inform the System Controller."
- Pool Rule 3.4.3 *Compulsory Restatement of Available MW or Operating Constraints* [must be submitted]: "…if a Participant reasonably expects: a) that the MW capacity of a Unit will be changed by more than 10% than the stated highest MW block Offer or Bid submitted."

Under this rule structure, there were no financial penalties if a producer chose to generate out of merit. The producer would simply inform System Control that they were a 'price-

taker', and then continue to generate. The only consequence of this strategy was the block of energy would not be eligible to set the SMP. In reality it was a form of out-of-merit generation.

Such out of merit generation was common prior to the rule change, and created significant issues for both System Control, in terms of balancing the system, and the market at large, in terms of its influence on efficient price discovery.

Market Development issued a discussion paper in October 2000[1] outlining the issues that had developed around dispatch compliance. In it they provide the following example:

The ability to deliver energy out-of-merit creates significant price spiking and the "chasing the price" effect while displacing "next in merit" suppliers. For example, a Participant offers 100MW at a price of $999.00. If the participant believes they will not be dispatched and wants to deliver the energy regardless they can tell the System Controller that their energy will be provided as a price taker. Their original offer is flagged as out-of-merit and cannot set Pool price, yet they will receive the derived Pool Price for the delivered MWs.

> This example provides an example of "irrational" bidding behavior in that energy is priced at a level higher than they are willing to accept a dispatch at…. In doing so they may also displace an existing price/quantity pair from being dispatched conceivably forcing the derived Pool price down. Delivering energy out-of-merit equates to an absence of any dispatch risk for Participants while potentially creating false price fluctuations.

In effect, participants were insulated from dispatch risk by the ability to opt to be a price taker. The rule structure allowed Participants to speculate with a high price offer knowing that they could physically deliver the energy at a lower price, albeit one they seemed willing to accept.

To summarize, the high degree of dispatch flexibility created issues for the market including:

- Impairment of price discovery mechanism via the merit order
- Irrational bidding behaviour (offering at prices higher than willing to accept for dispatch)
- Unfair bumping out of merit of producers who had rational, good faith offers by producers who were 'self-dispatching'
- Impairment of System Control's ability to coordinate supply and load in the AIES because of 'self-dispatching', with potential negative impacts on system reliability

The objectives of market design to achieve orderly dispatch and to create efficiency of the price discovery mechanism were being undermined by the absence of adequate rules around dispatch compliance, which failed to properly assign dispatch risk to generators.

[1] Market Development, *Proposed Market Rule Changes Discussion Paper*, Power Pool of Alberta, October 17, 2000. http://www.aeso.ca/files/market_rules_17-oct-2000.doc

3 CURRENT DISPATCH RISK RULE

Given the concerns surrounding dispatch compliance, a rule change was introduced in December 2000. The objectives of the rule change were to:

- Properly align generator offers with the dispatch risks that are inherent in a given offer strategy
- Create a more orderly dispatch in the system
- Promote greater price clarity and efficiency in the real-time market
- Better coordinate the supply/demand balance by eliminating self-dispatching

In the current AESO Rules Document, the rule reads as follows:

Rule 6.6. *Pool Participant Non-Compliance on Energy Market Dispatch and Ancillary Service Directives*. – Pool participants may only supply energy that has received either an energy market dispatch or ancillary service directive. Energy supplied that has not received an energy market dispatch or ancillary service directive may be at risk of non-payment.

In any circumstance where an energy market dispatch can or will not be followed, the pool participant shall advise the system controller as soon as practical that the energy market dispatch will not be complied with and the pool participant will as soon as practical submit a new offer or bid restating the status of the asset to reflect the non-acceptance of the energy market dispatch.

The pool participant is in non-compliance when it is producing the greater of 10MW or +10% energy variance more than the highest energy market dispatch MW amount and or the ancillary service MW amount.

A pool participant may be considered non-compliant with an energy market dispatch even though they are responding to an ancillary service dispatch. The pool participant is responsible for coordinating their energy and ancillary service submissions.

Any non-compliance on an energy market dispatch or ancillary service is subject to review by the ISO and if warranted, will result in non-payment for energy delivered that is considered non-compliant.

> As an exception, energy delivered to the AIES while a pool participant is testing and/or commissioning, a generating unit will receive payment if the pool participant has complied with the ISO Operating Policies and Procedures and has received approval from the System Controller.

The current rule is asymmetrical, providing the AESO with the opportunity to withhold payment for over generation, but there is no limit or penalty for under generation. The current rule is also relatively generous with the allowance of the greater of 10MW or 10% of the dispatch level. For large coal and gas generators, the 10% provision allows for over generation of almost 50MW for the largest assets, such as Sundance 6 (399MW) or Joffre (474MW). For smaller turbines such as the 45MW GE LM6000, a common unit in the Alberta system, the 10MW tolerance represents almost 25% of capacity. For generating units that are 10MW or smaller, the 10MW tolerance means they can zero offer the unit at all times and self dispatch.

The current rule structure is also non-firm in its commitment to the non-payment penalty, stating that non-compliant generation *may be at risk of non-payment*, which allows the AESO significant discretion. To date, the non-payment option has never been exercised.

4 DISPATCH COMPLIANCE: MONITORING PROCESS

With the introduction of a rule pertaining to over-generation and the risk of a non-payment penalty, the AESO undertook work to develop a tool that can monitor dispatch compliance. The current dispatch compliance monitoring process uses an ORACLE query. The query identifies hours in which generating units have exceeded dispatch above the 10% or 10MW tolerance, and calculates the potential non-payment. The ORACLE report produces the following information:

- Owner name, unit, date and hour ending
- Dispatched Energy – the hourly weighted average of all dispatch instructions given for a unit in a given hour
- Metered Volume – the hourly MW output that is used for settlement
- % Deviation – percentage that metered volume is greater than dispatched generation
- Pool Price – hourly time weighted average SMP
- MWh Difference – metered volume minus dispatched energy
- 10% of Dispatched Energy
- Allowable Deviation – the greater of 10MW or 10% of dispatched energy
- Non-Payment Volume – MWh difference minus allowable deviation
- Non-Payment – pool price times MW volume that exceeds allowed dispatch variance
- Bill Cycle – settlement billing cycle
- Ramp Rate – obtained form the Dispatchable Asset Characteristics (DACs) submitted by the participant or half of the Maximum Claimed Capability (Ramp Rate) of the asset if there was a zero / null ramp rate in the DACs.

4.1 Data Filters and Exclusions

The AESO recognizes that there are several legitimate reasons that may cause a generator to appear to be out of compliance and that relief should be granted in such cases. In other cases, the quality of 'evidence' of non-compliance was deemed suspect and not suitable to enforce the rule.

4.1.1 Unit Ramping and Ramp Rates

First, the ORACLE query filters out hours where the unit in question is ramping. Although generators are encouraged to provide accurate ramp rates in their DACs submission, this data is often inaccurate in terms of units' real-time ramping

capability. The provision of ramp rates in the DACs is not a technical requirement compared, for example, to when units are required to provide ramp rates for the provision of ancillary services. Unless ramp rates are provided such that they reflect actual real-time capability, and not theoretical or optimal operational capability, the inclusion of hours where units are ramping will lead to biased non-compliance energy calculations. If the AESO were to take this forward to settlement, it could potentially lead to a great deal of controversy regarding the settlement results.

4.1.2 Unit Testing, Commissioning and Returning from Outages

Units that are commissioning, ramping to or from outages or performing unit testing also need to be filtered out of the data. During periods of unit testing, commissioning or returning from outages, producers are required to offer their energy at $0.00, and use energy restatements to manage changes to output levels. However, output levels can change unexpectedly, leaving producers out of dispatch compliance. In order to provide the necessary operational flexibility during testing, commissioning or returning from outages, these hours are omitted from the dispatch compliance analysis. However, the AESO's Operating Policies and Procedures (OPPs) do require any unit that is commissioning, testing or experiencing a change in operational characteristics to inform System Control. The ORACLE data base does not contain sufficient information to automate this filter. Therefore, this exclusion must be performed manually.

4.1.3 Metering Issues

There are a number of data issues that have to be handled manually. There are producers at industrial sites who are dispatched as net site generation, but metered as gross. In some cases this can lead to industrial sites appearing to over-generate compared to their dispatch levels. Another metering issue arises when there is multi-meter settlement versus a single dispatch level. In the audit provided below, we did not encounter these issues.

4.1.4 Dispatch Timing Issues

A generator can fall out of compliance due to dispatch timing. Although the ADAMs system has improved dispatch efficiency, a timing issue does exist. For example, a generator can be issued a dispatch up (D1), and then shortly thereafter another dispatch down (D2), before it has responded to D1. The generator can then find itself out of compliance with D2, because it moved the unit to the D1 level. This non-compliance is expected to be relatively transitory, lasting only short periods until the unit can come into compliance. Therefore, this type of non-compliance is not viewed as a major problem.

Because of the filters and exclusions that are required, dispatch compliance monitoring is a labour intensive process that struggles to produce settlement quality results. To date, the AESO has used moral suasion and the threat of non-payment rather than actually withholding payment from producers that are found to be out of compliance.

5 DISPATCH COMPLIANCE MONITORING REVIEW

The MSA reviewed the dispatch compliance audit process to determine to what extent generators appear to be violating the dispatch compliance rule, and whether the AESO needs to take dispatch compliance monitoring results to financial settlement (non-payment). As mentioned, the AESO has expressed reluctance to impose the non-payment penalty largely because the monitoring and calculation of non-compliance is not sufficiently accurate to stand behind at the settlement level. AESO staff have also expressed concern that imposing non-payment would be costly, inherently contestable, and would provide only marginal benefit to System Control above the level of dispatch compliance that has been reached through moral suasion and the threat of non-payment.

Table 1 summarizes dispatched energy and non-compliant output for the 3 audit months. As the table shows, non-compliant energy represents a small percentage of total energy, ranging from 0.021% in January 2003 to 0.37% August 2002. As percentages, these are clearly very small numbers – clearly no-one is seriously abusing the rule. Although the potential non-payment dollar amounts may appear to be significant, they must be viewed in the context of a market with a throughput of $150 to $500 million per month. Also, it is interesting to note that the average cost per MWh of non-compliant energy is not far out of line with the average monthly Pool price. This suggests that generators are not routinely 'cherry picking' by over generating at high Pool prices.

Table 1. Summary of Dispatch Energy and Non-Compliant Energy

	August 2002	January 2003	August 2003
Total System Energy Dispatched (GWh)	5,079	5,494	5,336
Non-Compliant Energy (GWh)	19	1	10
Non-Compliant Energy (%)	0.37	0.021	0.18
Total Non-Payment	$570,000	$65,500	$526,000
Average Non-Payment/MWh	$30.48	$56.84	$54.59
Average Monthly Pool Price/MWh	$32.03	$80.52	$55.63

Table 2 breaks down non-compliant output by generation type. The majority of non-compliant energy is produced by hydro or industrial site co-generation. This is not surprising given some of the hydro and co-generation plants are the least dispatchable types of generation. Hydro can be dispatch constrained because of environmental constraints on water releases. In some cases, such as Taylor Hydro, control of the water is driven by irrigation requirements. In the case of the Oldman River Dam, water releases are controlled by Alberta Environment. Because of environmental constraints and third party control over water releases, the generating unit owner has less control over unit

output and can therefore be inadvertently out of dispatch compliance because of unanticipated water releases.

In the case of industrial site cogeneration, these units are supplying energy to both on-site loads and are also exporting energy to the grid. At many industrial sites, large swings in on-site load can cause the generators' export-to-grid offers to shift out of compliance. This occurs if an on-site load trips or if there is an unanticipated reduction in on-site load. If the level of generation is not reduced quickly enough, or an energy restatement reflecting the decline in on-site load is not submitted to System Control, the increased exports to the grid may breach the 10MW or 10% over-generation allowance, leaving the generator in non-compliance.

In general, the smallest contributors to non-compliant energy are coal and gas generators. This is encouraging because they are the most dispatchable assets, and potentially the most likely to be used to 'cherry pick' high prices with non-compliant energy because they have fewer operating and dispatch constraints.

Table 2. Breakdown of Non-Compliance by Generation Type

	Non-Compliant Output (MWh)	Non Compliant Output (%)	Total Potential Non-Payment ($)
		August 2002	
Hydro	5688	30.41%	155,346
Industrial Site Co-gen	12555	67.13%	388,527
Gas	225	1.21%	5,726
Coal	234	1.25%	20,561
Total	18703	100.00%	570,160
		January 2003	
Hydro	0	0.00%	0
Industrial Site Co-gen	424	36.78%	20,505
Gas	299	25.94%	14,337
Coal	429	37.28%	30,640
Total	1152	100.00%	65,484
		August 2003	
Hydro	8412	87.3%	463,043
Industrial Site Co-gen	925	9.6%	48,213
Gas	102	1.1%	3,758
Coal	192	2.0%	10,780
Total	9631	100%	525,794

6 SUMMARY

The ORACLE query developed by the AESO is adequate for monitoring dispatch compliance. However, it does not appear well suited for enforcement of the non-payment penalty, as it does not produce settlement quality data.

As the detailed reviews of August 2002, January 2003 and August 2003 have shown, non-compliant energy represents a very small portion of total dispatched energy. Much of the non-compliant energy produced arises from dispatch constrained hydro and industrial site co-generation. In general, non-compliance does not appear a major problem with the more highly dispatchable coal- and gas-fired units.

It is of some concern that there appear to be ‘repeat offenders’ among the more highly dispatchable units, albeit the energy amounts are generally small. Some of the industrial site cogeneration projects also appear in more than one report.

Atco’s Oldman River Hydro and Canadian Hydro Developer’s Taylor Chute were the largest contributors to non-compliant hydro generation. The Oldman Plant was recently

commissioned. At this point Atco is unsure how it will manage dispatching the unit, given they do not control the water releases. The Taylor plant is located on an irrigation canal, and also does not have control over the water.

Given the small amounts of over-generation, in general it appears that the introduction of the dispatch risk rule has produced the intended result of promoting orderly dispatch and preventing the muting of an efficient price signal via the merit order. The hydro and industrial site cogeneration plants remain a challenge in terms of managing their constrained dispatchability.

7 RECOMMENDATIONS

The dispatch compliance rule has served the AESO quite well since December 2000. This is likely the result of the cooperation of most participants who will observe the sign that says, 'please do not walk on the grass.'

However, it is now time to revisit the rule with a view to making it more appropriate to the current market circumstances. There are generators who routinely generate very close to the limit of compliance – if they can control the output that closely, they should be encouraged to be closer to the actual dispatch level. One of the effects of over generation (but usually within tolerance) is that there are many small blocks of 'phantom' energy in the upper reaches of the merit order that are simply not there for the SC to call on when needed. They are already being generated. The rule needs to be symmetrical – that is both under and over generation needs to be discouraged. The revised rule should have penalties associated with it greater than the simple withholding of payment – the penalty should be there to discourage the behaviour rather than becoming a line item on the AESO's invoice with the generators. Enforcement of the revised rule should not be held up due to lack of settlement quality data. This should be treated as a behaviour rule rather than a settlement matter.

Pending the development of the new rule, the AESO needs to work with some of the repeat offenders to bring them into line. If the development of a new rule is not likely to occur in the near future, it may be necessary for the AESO to actually withhold some energy payments for the cases that are quite clear cut. The MSA believes that the word would get around fairly quickly that the AESO is serious about this matter, although it is acknowledged that there would be some push back. Enforcement of the rule is also needed to assure generators that they are all being treated in an equitable manner by the AESO. The lack of enforcement can only lead to a long-term degradation of compliance.