Quick Hits
A Six Month Review

July 3, 2009

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1.0 Introduction

In December 2007, The AESO implemented an integrated package of market design changes which were identified as the "Quick Hits". The market design changes were created in response to the recommendations contained in an Alberta Department of Energy policy paper[1] following an extensive period of industry consultation. During the industry consultation process, AESO agreed to assess whether the rule changes achieved the intended results and to make recommendations on further improvements if warranted. In June, 2008, the AESO requested industry feedback specifically on the Quick Hits rules. This AESO report contains an assessment of the market during January to June 2008 period while operating under the new rules. The report includes a summary of the "Quick Hits" metrics that have been analyzed and industry comments on the rules, provides some observations on whether the "Quick Hits" design elements are operating as intended and makes recommendations for improvements where appropriate.

2.0 Background

2.1 Quick Hits Rule development

Following extensive stakeholder consultations regarding Alberta's competitive electricity market, the Alberta Department of Energy ("DOE") released a June 2005 electricity policy framework paper (the policy paper).[2] In the Policy Paper, the DOE recommended that the energy only market be maintained with modifications and improvements.[3]

With respect to short term adequacy, the policy paper contained a number of recommendations regarding market design improvement. After extensive industry consultation, the AESO recommended a package of design changes and introduced new ISO rules to implement those changes effective December 3, 2007. Early on in the process, the package of market design changes were given the name "Quick Hits" as it was anticipated that these were minor changes that could result in significant improvements to the market structure by having an immediate effect on the visibility of available supply and the credibility, stability, or undue volatility of the pool price.

The Quick Hits rule changes that were implemented addressed the following policy recommendation areas:

- Merit Order Stabilizers:
  -Must Offer and Must Comply
  -Restatements
  -Dispatch of Long Lead Time Energy

[1] Alberta's Electricity Policy Framework: Competitive – Reliable – Sustainable June 6, 2005 Alberta Department of Energy, the "Policy Paper"
[2] Policy Paper
[3] Policy Paper, page 22

-Short Term Adequacy Assessment

- Reconstitution of Pool Price for TMR Energy
- Payments to Suppliers on the Margin
- Treatment of Imports and Exports
- Price forecasting

2.2 Reason for Quick Hits Report

The Quick Hits rules implemented some important and significant changes to Alberta's electricity market design. The AESO has a regulatory duty to ensure that the Quick Hits rules promote the fair, efficient and openly competitive operation of the electricity market and during the industry consultation process, the AESO agreed to report on the market after six months of operating under the "Quick Hits" rules. Each category of rule change was designed to achieve specific objectives and in this report, rule performance is measured against these objectives.

The AESO monitors the market on an ongoing basis and has prepared this report to provide information to the market consistent with its duties and commitments. The report contains a summary of the "Quick Hits" metrics in each area of the rules that have been analyzed along with some observations on whether the "Quick Hits" design elements are operating as intended. Recommendations for improvements are also discussed where appropriate.

While the report is mainly for information, the AESO welcomes feedback on the assessment especially related to any next steps and it should be noted that this report reflects a summary of data intended to provide feedback on particular items. Should further discussion be required, the AESO will consider this in the next steps determination.

2.3 Quick Hits Metrics Discussion Paper

To assist in the preparation of the Quick Hits Review, the AESO issued a discussion paper[4] on May 29, 2008 which outlined the proposed metrics and analysis that the AESO would use for the review. Stakeholder feedback on the Quick Hits metrics recommendations put forward in the discussion paper was solicited. In addition, the AESO issued a letter on June 12, 2008 asking for stakeholder feedback specifically on the Quick Hits rules. The AESO was particularly interested in receiving comments on any problems created by specific rules or by the lack of a specific rule. To assist the AESO in understanding of any stakeholder issue, the AESO requested that the comments identify the problem created by the Quick Hits rule(s) and identify suggestions for an effective solution.

[4] "Quick Hits Discussion Paper Performance Metrics For The Six Month Review", May 29, 2008.

The AESO reviewed the stakeholder feedback provided and has considered the specific, relevant issues put forward when preparing the data and analysis for this report. The discussion of specific stakeholder issues can be found in the appropriate sections of the report. The AESO also conducted an internal review of the operational impacts of the Quick Hits rules. The Quick Hits Review utilizes the insights obtained from the metric analysis, the stakeholder feedback and the operational assessment to make recommendations for rule changes as required.

3.0 Analysis, Findings and Recommendations

3.1 Key Terms

The Quick Hits review contains repeated references to the following key ISO terms:

MC: "**maximum capability**"[5]
AC: "**available capability**"
TDE: Total Declared Energy
MER: Mandatory Energy Restatement
MER-A: Mandatory Energy Restatement Type A
MER-B: Mandatory Energy Restatement Type B
AOR: "**acceptable operational reason**"
VPR: Voluntary Price restatement
EMMO: "**energy market merit order**"
SMP: "**system marginal price**"
TMR: "**transmission must-run**"
DDS: "**dispatch down service**"
PSM: Payments to Suppliers on the Margin
ATC: "**available transfer capability**"
GC: Gate Close is noon the day before the next trading day
T: T is the start of a settlement interval
T-x: T-x is the time x hours before the start of a settlement interval
HE: Hour Ending is the time at the end of the settlement interval.

3.2 Analysis Framework and Overview

This AESO report contains an assessment of the market during January to June 2008 period while operating under the new rules with some comparisons to appropriate historical periods in 2007. The time period from the December 03, 2007 effective date of the rules to the end of the year has not been included in the analysis primarily to provide for easier monthly comparison but also to avoid potential data issues that typically occur at the beginning of a new procedure as participants go from the training phase to the actual input phase.

[5] Terms highlighted in bold are defined in the definitions section G1 of the ISO rules.

The metrics in each rule area section reflect information at several different levels of aggregation, outline comparisons over different time periods and provide trends over time. Some metrics reflect information by asset type, by fuel type, by owner and / or in total for all assets. Others reflect data pre and post Quick Hits implementation, at relevant time periods. In some cases, hourly, daily, weekly and monthly time trends are also provided.

The AESO notes that some metrics show line graphs with a large amount of data and the graphics are much easier to read if viewed in color.

The AESO requested industry feedback specifically on the Quick Hits rules and received stakeholder comment on market issues that are, in the AESO's view, beyond the scope of this report. Some stakeholders proposed making rule changes that would allow Ancillary Services (AS) asset substitution within the T-2 period. The AESO will be discussing such potential AS rule changes within the context of the Operating Reserves redesign discussions which are underway. Other stakeholders commented on the issue of allowing imports to set the pool price as discussed in the Policy Paper and suggested that exports should be treated the same as load with no T-2 restrictions. The AESO is aware of industry concerns in these areas and has issued the Market Roadmap to discuss the priorities for addressing these and other major initiatives.

3.3 Merit Order Stabilizers

The merit order stabilizers (must offer, must comply and limitations on restatements) are intended to create offer stability in the merit order resulting in a more efficient dispatch of the system that eliminates the unnecessary volatility that is caused by last minute restatements to price and volume.

3.3.1 Maximum Capability (MC)

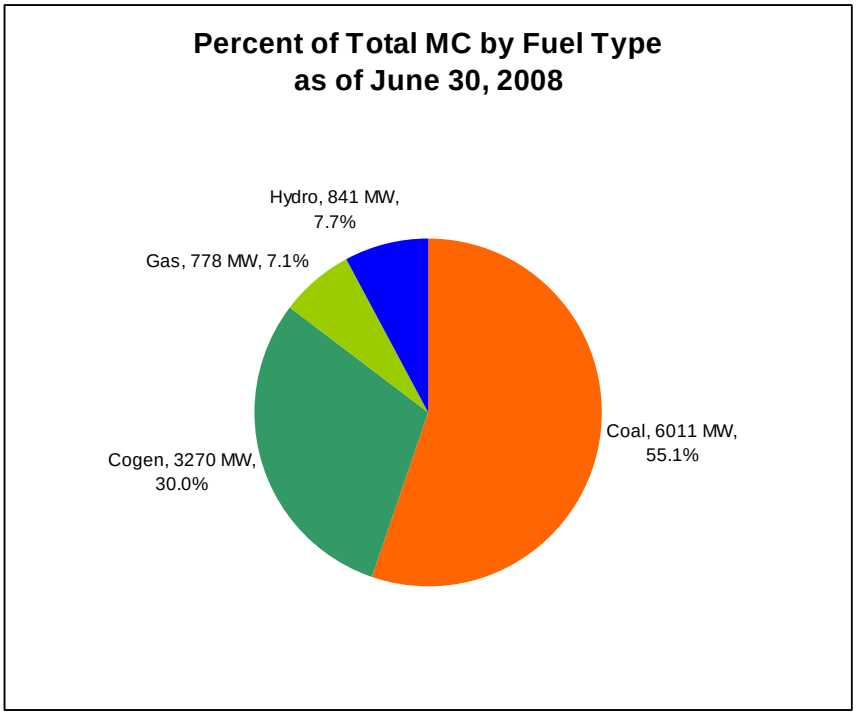
One of the goals of the Quick Hits rule changes was to improve the AESO's visibility of supply. The MC rules replaced the TDE rules and both were intended to establish a baseline of all potential supply available to the market. The new combination of MC, AC and AOR rules were to provide further assurance that generators were responsive to dispatch instructions and that there was limited the ability of generators to self dispatch for economic reasons within the delivery hour.

Under the new rules, generating assets and imports are assigned a MC and must offer their MC to the market. MC for generating assets means the maximum quantity (MW) that the generating asset is physically capable of providing under optimal operating conditions for that asset while complying with all applicable ISO rules and terms and conditions of the ISO tariff. The MC for each asset is approved by the AESO and is fixed unless or until the asset owner requests a change. The AESO must agree upon all MC change requests.

MC Conclusions:
MC levels have been relatively unchanged since the inception of Quick Hits. Only eight assets have requested MC level changes and all changes have been approved as requested. All but one of the requested changes were for less than 10 MW. One participant had a significant MC change which was greater than 10 MW reflecting a desire to report on a gross MW basis rather that a net basis. Total MC by fuel type is provided in Figure 1.

MC levels are generally representative of the assets on the system as most assets have produced at their assigned MC level at least once during the six month period. The AESO would point out that an assets MC value are confidential and may differ from the assets Maximum Continuous Rating (MCR) value which is listed on the AESO Current Supply and Demand (CSD) report on our website.

Figure 1



3.3.2 Available Capability (AC)
One of the goals of the Quick Hits rule changes was to improve the AESO's visibility of supply. The AC rules were intended to establish on an hour by hour basis the actual supply available to the market.

Under the new rules, all generating assets have their AC set to the MC of the asset as per the value in the AESO Energy Trading System. All generating assets must offer their MC unless they have an AOR. The AOR must be provided with the restatement which reduces the AC below the MC.

Offers must be submitted for each hour of the next trading day before noon of the day before. Participants can only change an assets AC if they have an acceptable operational reason.

The AESO has documented the status of asset AC initially and tracked the changes to AC over the period. The AESO has also made comparisons of AC to historical TDE submissions. TDE was the previously used mechanism requiring generators to submit supply availability. The use of TDE was discontinued when the Quick Hits rules were put in place, however, TDE and AC can be compared to identify similarities or differences in information provided in similar time periods pre and post Quick Hits.

AC Conclusions:
The AESO notes that on a comparable assets basis total AC values are lower than total TDE values used prior to Quick Hits. Since the potential aggregate AC values did not change between the periods, the difference is primarily the result of lower coal AC during the period due to an increased level of outages. The AC values for other fuel types are also lower compared to their TDE values although the difference is small. Total AC is higher than total TDE if all assets are included due to the additional generation capacity brought on in 2008 which increased the maximum AC in 2008 compared to 2007.

Looking at AC and TDE levels on an individual asset basis, a statistical analysis has indicated that of the 56 assets with comparable data in the January to June time frames pre and post Quick Hits, 33 assets have exhibited a statistically significant decrease in the average AC compared to TDE, 12 assets show an increase and 11 assets had no significant change.

AC and TDE comparisons have determined that the frequency and accuracy of outage and derate submissions have been consistent under the two sets of rules, however the overall visibility of supply has improved post Quick Hits.

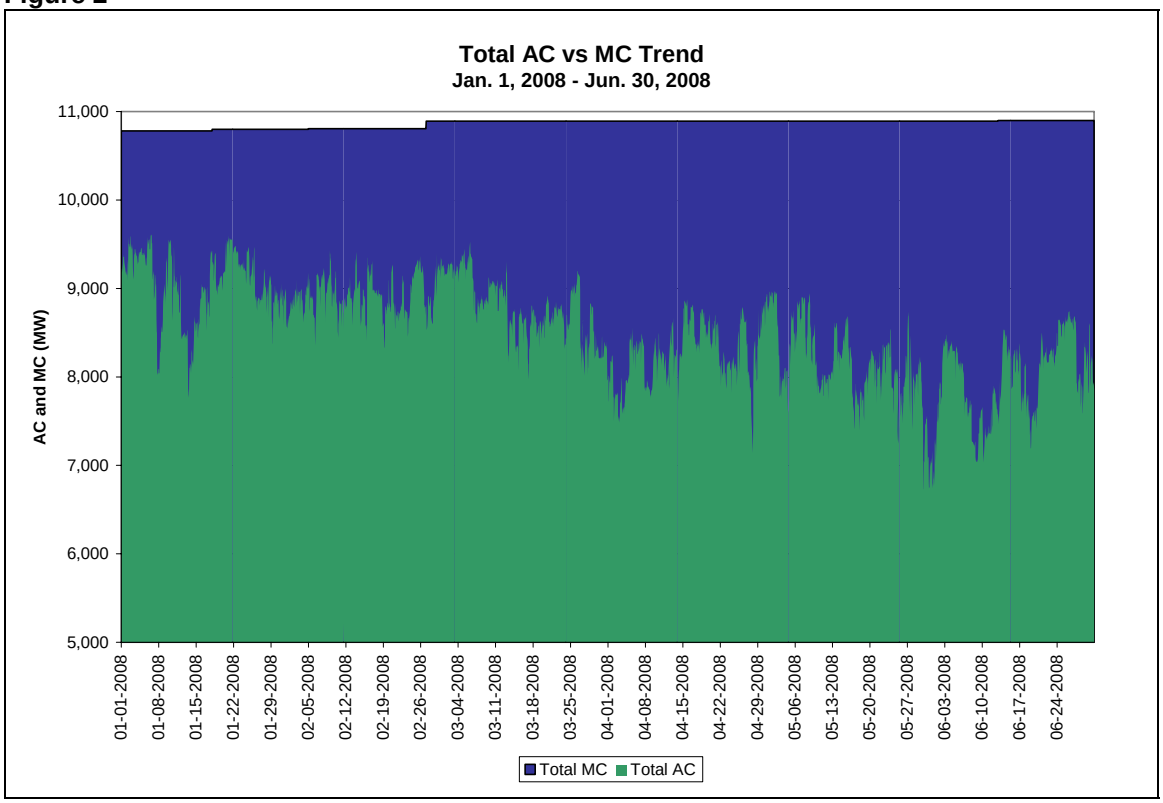
To analyze the magnitude of the changes from one period to the next the difference between the AC (TDE) at GC to T-2 and from T-2 to the hour was studied. The analysis shows that most AC changes during the GC to T-2 period signaled a decrease in supply; however, the magnitude of the decrease was significantly less than was experienced in the pre Quick Hits period with respect to TDE changes. The results for this time period suggest that the AESO has better visibility of supply under Quick Hits than before.

Total AC levels have trended lower over the period as expected being higher in the winter months and lower in the spring and summer due to planned outages. AC values do fluctuate with planned and unplanned outages, however AC values have been more or less stable over review period. Cogeneration AC values have been the source of most of the variability which is consistent with the nature of

the onsite processes and their historical behavior. The Total AC trend over the six month period is illustrated in Figure 2.

Further analysis of the average hourly AC by fuel type for each month illustrates the significant impact of coal outages on total AC and points to a small increase in hydro AC during the spring due to normal spring runoff.

Figure 2



Stakeholder comments

EPCOR and TransCanada submitted comments on the Quick Hits rules which included suggestions for changes to the definition of AC. The current AC definition requires assets to identify the maximum quantity (MW) that they are physically capable of providing and TransAlta notes that additional generation capability may at times be available if a secondary fuel source is used. TransAlta suggests changing the AC definition to specifically refer to primary fuel source generation capability. EPCOR also noted that current AC values do not provide information on what a unit is capable of producing under dire AESO needs. The AESO believes that the MC and AC definitions sufficiently accommodate these concerns for most reasonable operating conditions having regard for the technical requirements for generation interconnection. The AESO may consider enhancements to the definitions in the future as priorities permit. Special circumstances allowing the AESO to direct additional generation actions are adequately covered in regulation and the existing Operating Practices and Procedures (OPP's).

TransAlta suggested that accurate input of AC values would be facilitated if the AESO systems had outage data upload capability. The AESO agrees and has since provided an upload module to accommodate that request.

TransAlta and TransCanada both commented on issues with long lead time energy dispatch rules and procedures. The TransAlta suggestion to modify the rules to exclude base load coal assets from becoming designated as long lead time assets has been incorporated within the current rules after the Quick Hits review period. The AESO has determined that while the SC and participants have adapted to the long lead time rules and procedures, those rules and procedures are not achieving the intended or expected efficiencies. In particular, the procedures cannot easily handle cases where some of the assets generation is already online and there is no mechanism to advise the AESO of a time to start for additional generation units for that asset. The AESO notes that while there could be improvements to the current rules regarding long lead time assets, the potential solutions are technically complicated and would require significant internal changes. Given other market design priorities, the AESO does not anticipate pursuing long lead time rule changes at this time.

EPCOR submitted a concern that under the Quick Hits rules, the Historical Trading Report no longer shows the amount of active reserves associated with AC values offered into the market which, in their view, can be misleading and can create information asymmetry in the market. The AESO notes that in the previous reporting practice AS offers and total offered energy were combined and published to give the market visibility of the total available supply. At that time, TDE values did not have to equal total offered supply. Under the Quick Hits rules, AC values represent all available energy and the new report achieves the same objective of providing visibility of available supply.

3.3.3 Mandatory Energy Restatements (MER)

To ensure the AESO is continually updated on the available supply to the market, restatement rules were created to facilitate ongoing supply updates. Another goal was to improve pool price stability and reduce undue price volatility so the revised restatement rules included restrictions at T-2 and provided participants with enhanced restatement capability and flexibility prior to the T-2 period.

The new restatement rules combined with the new Must Offer requirement was intended to improve the AESO's visibility of supply and to stabilize the EMMO starting two hours before real time dispatch began and during the delivery hour. A MER-A is required if participants need to change an asset's AC without changing an asset's offer prices. A MER-B is required if participants need to change the AC and the existing offers because the offers no longer represents the operating state of the asset.

To analyze the restatements the following three time periods are dealt with separately:

- GC to two hours before the start of a settlement interval (T-2)
- T-2 to the start of a settlement interval (T)
- T to the time at the end of a settlement interval (HE)

MER Conclusions:
Total MER-A type restatements having been occurring a little less frequently post Quick Hits although the overall MER-A restatement pattern pre and post Quick Hits is similar. MER-B type restatements have decreased significantly after Quick Hits. The Quick Hits rule changes appear to have had the most impact on the MER-B type of restatement activity.

Looking at the data by fuel type and time period, the results varied. For some time periods and fuel types, there was not a significant change in restatement activity. In other time periods where there was a significant change it was mostly a reduction of submissions which would have been expected. The only increases occurred in the T to HE period for cogeneration and gas assets although the absolute numbers were small compared to other time periods. The total number of restatements in the period by fuel type and time period is provided in Table 1 below.

Table 1: Total Number of Restatements January to June for both 2007 and 2008

	MER-A/Energy Restatements						MER-B/Locking Restatements			
	2007			2008			2007		2008	
	Gate Close to T-2	T-2 to T	T to HE	Gate Close to T-2	T-2 to T	T to HE	T-2 to T	T to HE	T-2 to T	T to HE
Coal	39,631	8,603	4,196	30,191	8,691	4,967	2,161	1,698	208	91
Cogen	96,211	12,916	5,548	94,471	14,649	6,897	2,078	2,657	1,409	498
Gas	18,429	1,556	522	8,081	893	641	603	995	97	67
Hydro	9,955	347	139	1,090	209	98	123	71	132	53
Total	164,226	23,422	10,405	133,833	24,442	12,603	4,965	5,421	1,846	709

Legend

	2008 Results decreased > 20%		2008 Results increased > 20%

Upon examining the monthly pattern for total MER-A submissions for each time range pre and post Quick Hits, the AESO notes that MER-A submissions declined in most months post Quick Hits in all time frames. There was also a noticeable increase in MER A submissions in May and June during the T to HE period

Figures 3 and 4 show the monthly pattern for total MER-B submissions for the relevant time ranges pre and post Quick Hits. MER-B submissions have declined significantly in all months post Quick Hits in both the T-2 to T period and the T to HE time frame.

Figure 3

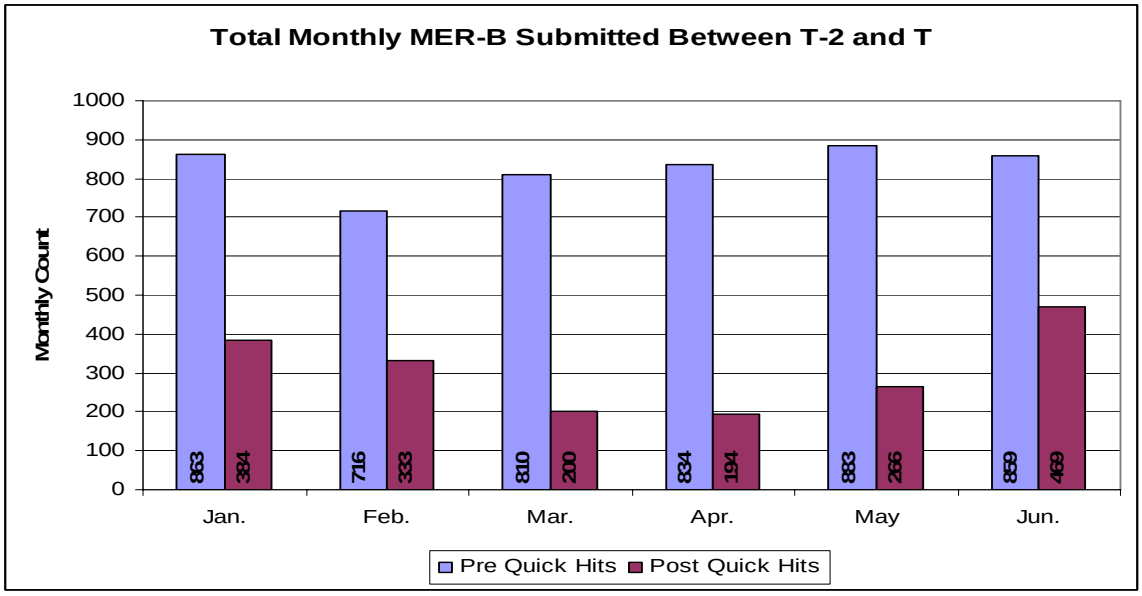
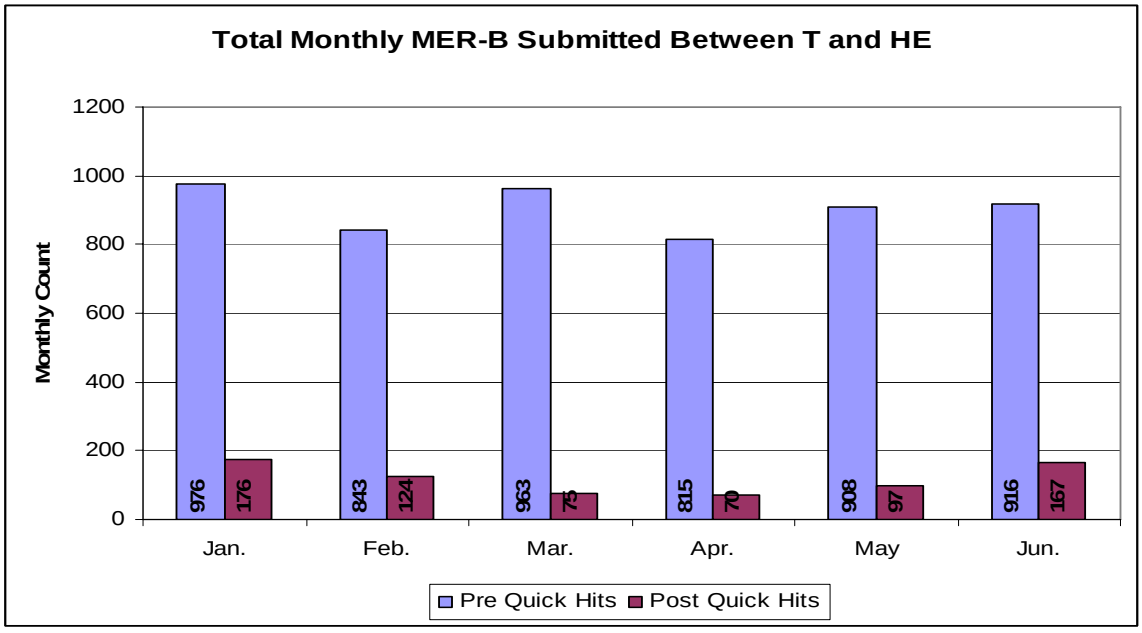


Figure 4



An examination of the change in MER submissions by fuel type determined that MER-A submissions by fuel type have not changed significantly with the new Quick Hits rules. One exception to the general finding relates to hydro MER-A submissions which have decreased in absolute and relative terms primarily due

to the fact that restatements for Ancillary Service purposes have been eliminated. Coal MER-B submissions have declined significantly both in absolute and relative terms and cogeneration MER-B submissions have remained relative constant in absolute terms although they represent a higher percentage of the total submissions post Quick Hits.

The quantity (MW) change of MER-As has been analyzed in total and by fuel type to determine if the nature of MER-A submissions has changed. Only comparable unit's pre and post quick hits are considered. The results indicate that overall the change to the AC has been similar in the pre and post Quick Hits period. Hydro unit availability is more stable now than in the pre Quick Hits period, though this is also due to changes in how offers are made. There has been a slight increase in the size of the changes to the AC for gas units post Quick Hits.

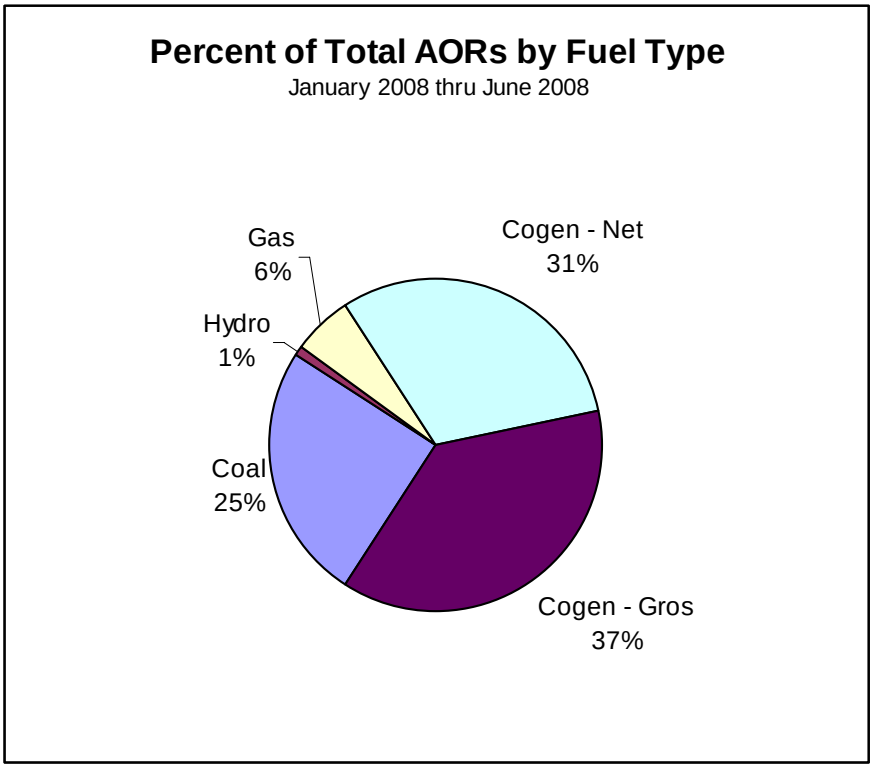
Upon examining the restatement data over time during the post Quick Hits period on either a monthly or daily basis, the MER-B submission pattern appears to be relatively stable while the MER-A submissions have trended upward during the last three months. The Quick Hits rules do not appear to have created any unintended consequences since their inception to this point in time.

Acceptable Operating Reason (AOR) Analysis:
Participants submitting an MER must provide an AOR. The AOR analysis indicates that the nature of AOR events has not changed significantly under the Quick Hits rules and as a result supply visibility has not have been impacted in an unintended way.

From January thru June, 2008 there have been a total of 177,490 AOR entries for MER-A and MER-B restatements from generation assets. Like the MER analysis, the AOR count is measured on an asset hour basis.

AOR Conclusions:
The AESO determined the AOR percentage occurrence by each fuel type and the analysis highlights that a high percentage of the AOR submissions are attributed to the cogeneration assets as illustrated in Figure 5 below. The cogeneration net category is a subset of the main cogeneration category and is unique because the MC and AC levels reflect their net to grid generation potential. All other cogeneration assets report AC levels on a gross generation basis with no required adjustments for onsite load levels. The cogeneration net category submits has a very large AOR count considering the fact that it only has four assets in its categorization.

Figure 5



An analysis of AOR categories in the pre and post Quick Hits periods for comparable assets was also undertaken. The analysis determined that the post Quick Hits categories were more descriptive of the assets condition. Post Quick Hits there was less use of the "other" category and the new rules elimination the "Economic" and "Ancillary Service" categories. The total number of AOR submissions decreased in the post Quick Hits period which is consistent with the fact that the total number of energy restatements decreased.

Stakeholder comments

TransCanada submitted comments on the Quick Hits rules which included suggestions for changes to the definition of an AOR. TransCanada sought further clarification as to why part iii of the AOR definition allowed constant or ongoing physical or operational constraints to be an AOR and suggested that the AESO include "unanticipated" in the AOR definition. The AESO notes that an AOR is required whenever there is a restatement of an assets AC and it is expected that AC levels will change with physical or operating constraints whether they are unanticipated or not. It is expected, though, that any anticipated physical or operational constraints would be properly submitted in the participant's offer as per rule 3.5.3.1 c) and a restatement would not be required.

3.3.4 Voluntary Price Restatements (VPR)

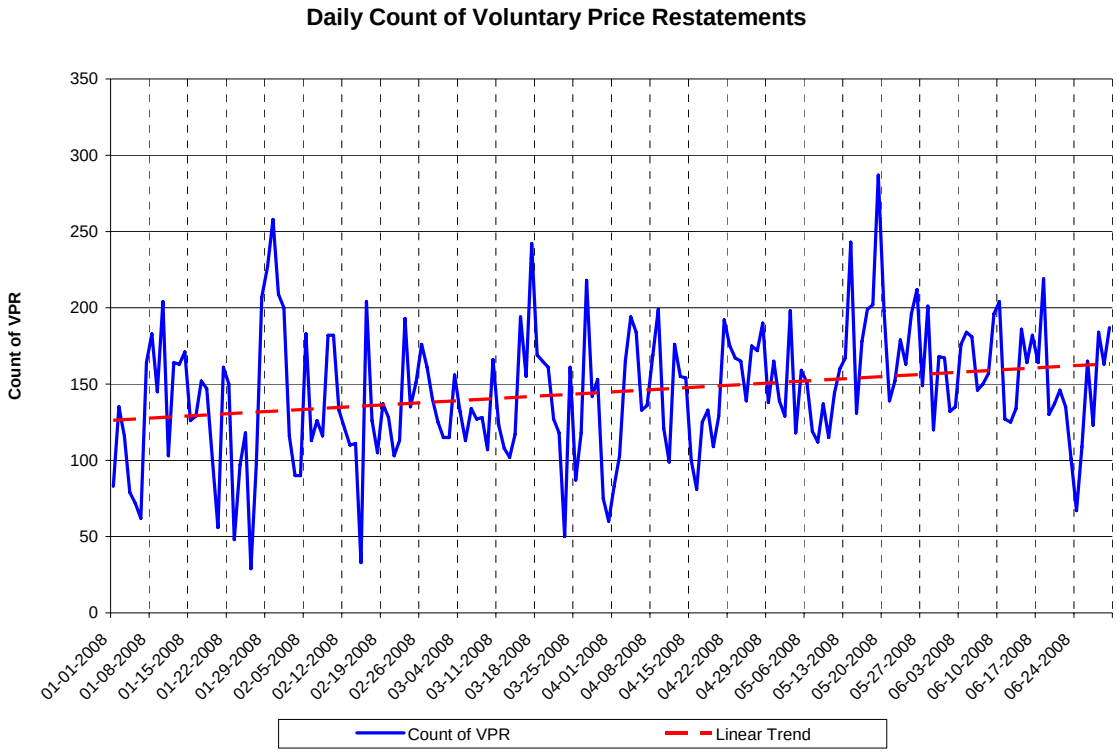
Under the Quick Hits rules, a VPR was not allowed after the T-2 lockdown period. This VPR restriction is a key component of the rules changes intended to enhance merit order stability and to reduce intra-hour volatility, the frequency of short duration dispatches and price-chasing.

VPR Conclusions:

VPR's have been relatively modest in numbers and are stabilizing over time with a slight upward trend over the period as illustrated in Figure 6 below. VPR's are new so there is no direct historical comparisons that can be made. The number of VPR's has been modest and has averaged 6380 per month with a high of just under 8000 per month and a low of just over 5000 per month during the period.

As expected, VPR's are fairly evenly distributed among fuel types. Hydro generation units have relatively fewer VPR's as they tend to generally have less restatement activity overall compared to other fuel types.

Figure 6

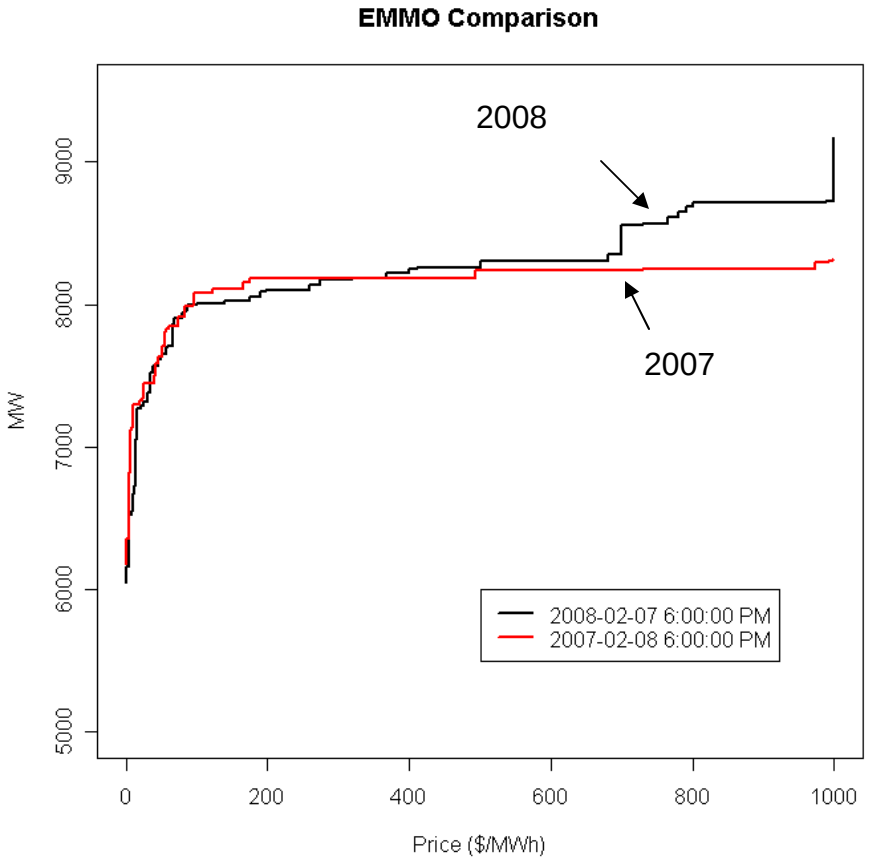


3.3.5 Offer Behavior and Pool Prices

The AESO monitored the EMMO to determine if offer behavior has changed compared to historical behavior and whether the resultant merit order appears more or less stable.

EMMO Conclusions:
The EMMO analysis indicates that there is a more robust EMMO post Quick Hits compared to the pre Quick Hits period. EMMO analysis indicates that the Quick Hits rule changes have impacted the merit order in a way that would reduce intra-hour volatility. The shape of the EMMO indicates that there are more distinct offers at all supply levels in the post Quick Hits period. The AESO would point out, however, that the EMMO analysis is indicative only as the market is dynamic and many factors other than the Quick Hits rule changes may have had an impact on the competitive offers in the merit order. A specific example of the EMMO which has resulted under the QH rules is provided in Figure 7 below.

Figure 7
EMMO example: Winter Peak – Normal Supply



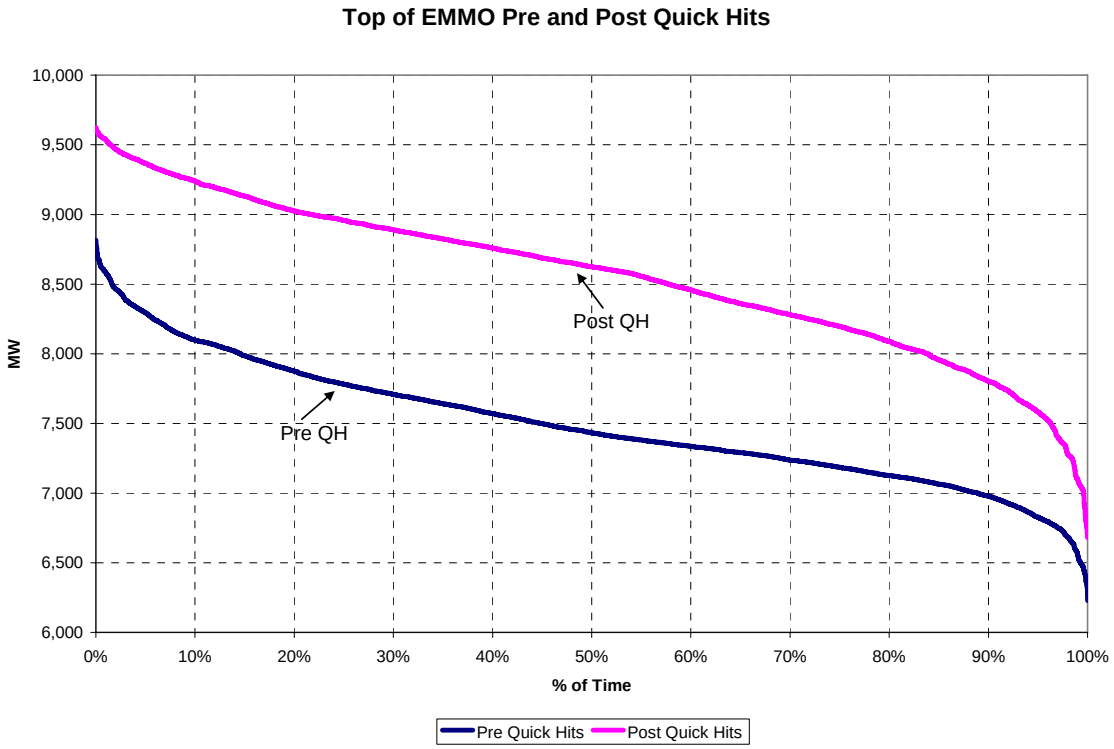
Further analysis was performed on the offer blocks which make up the EMMO. Tests indicate that, as expected, there was a significant increase in the use of the number of offer blocks in the post Quick Hits period. The greater use of offer blocks supports the conclusion that the EMMO is more robust.

Smoothed EMMO figures were created for each of the six months in the pre and post Quick Hits periods and the results show that there has been an overall increase in the MWs available in the EMMO in all months and an improvement in

the distribution of the MW throughout the price range The improvement in the distribution can be seen in Figure 7 as well if you look the prices greater than $200/MWh.

A duration curve analysis was performed showing the total MWs in the EMMO at time T for all hours during comparable pre and post quick hits periods. The duration curve analysis presented in Figure 8 below confirms that there has been an overall increase in the MWs in the EMMO for all hours. The increase in total MWs is partially due to an increase in the number of generation assets in the post Quick Hits period. The EMMO duration curves reveal that the shape of the duration curve is very similar between the two periods.

Figure 8



The EMMO was also examined on an HE basis comparing the top of the EMMO by HE for the pre and post quick hits periods. The analysis indicates that there is a more stable hour over hour amount of offers in the merit order in the post Quick Hits period.

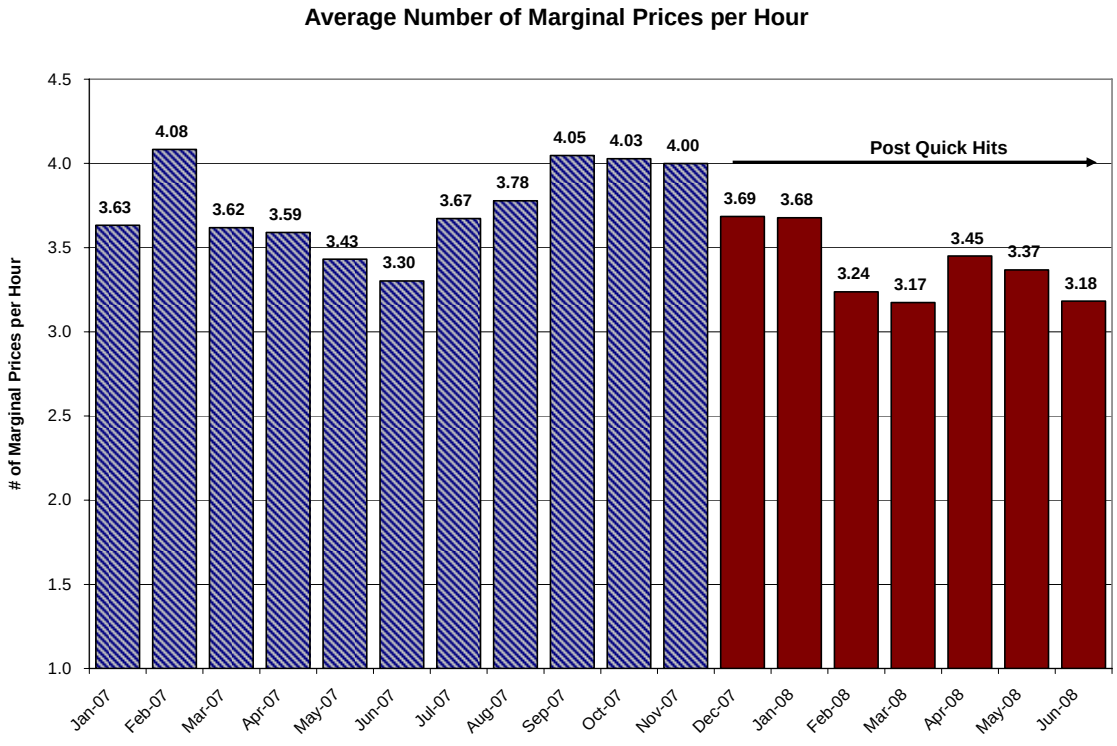
Analysis of changes in the EMMO also indicate that merit order stability has improved in that there are significantly fewer hours where the change in the EMMO distribution between time periods is significantly large post Quick Hits compared to the pre Quick Hits period. The data implies that there is more EMMO stability from hour to hour.

SMP Analysis:
The AESO monitored SMP activity to determine, on a relative basis, whether the frequency and duration of SMP changes points to a more efficient market dispatch and lower price volatility since the implementation of Quick Hits.

SMP Conclusions:
The SMP analysis indicates that SMP changes have decreased over the period since Quick Hits implementation as illustrated in Figure 9 below. However, the analysis indicates that there is still a wide range in the SMP count from day to day.

Actual dispatch counts have also been studied and the data analysis determined that after adjusting for the impact of DDS dispatching[6], the energy dispatch frequency is about the same in the post Quick Hits period as expected.

Figure 9



Pool Price Analysis:
The AESO monitored pool price trends to determine, on a relative basis, whether the Quick Hits rules have positively contributed to the credibility, stability, or reduced the undue volatility of the pool price.

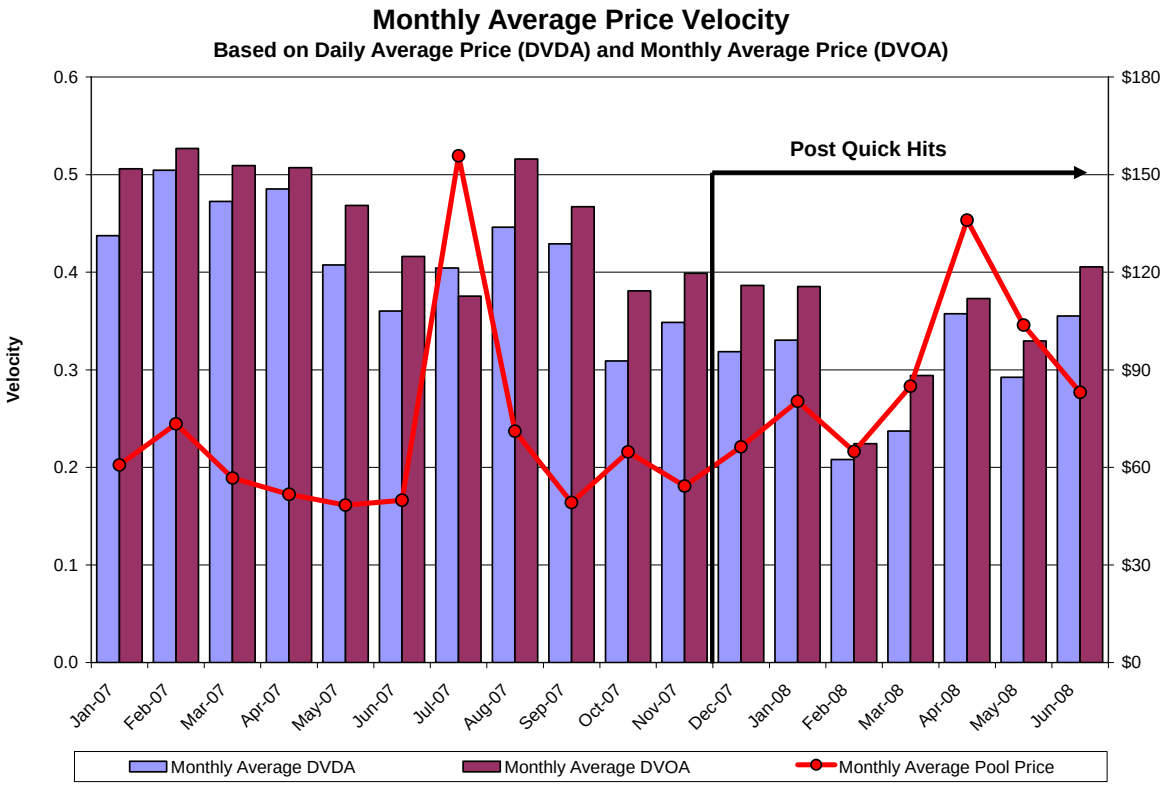
[6] Dispatch Down Service is a pool price reconstitution mechanism and is defined in Section 3.4.

Pool Price Conclusions:
The pool price analysis indicates that price volatility has been lower in the post Quick Hits period. The volatility decrease may be attributable to the Quick Hits rule changes although that is difficult to determine definitively.

Comparative price analysis was performed on the monthly range in the marginal price on and off peak pre and post quick hits as well as the monthly standard deviation and coefficient of variation of the on and off peak prices. The analysis did not reveal a measurable change in volatility in the monthly trend post Quick Hits, however the average hourly range post quick hits was lower at $45.04/MWh compared to the pre quick hits the range in SMP of $56.38/MWh.

Price velocity is a measure of the hour over hour rate of change in the pool price. Two price velocity measures were analyzed and both measures indicate a reduction in the post Quick Hits price velocities when compared to the pre Quick Hits period. The price velocity results shown in Figure 10 below definitively support the overall conclusion that price volatility has been lower in the post Quick Hits period. The AESO points out, however, that the market is dynamic and many factors other than the Quick Hits rules may have had a positive or negative impact on price volatility making the interpretation of results less definitive.

Figure 10



3.4 Transmission Must Run (TMR) and Dispatch Down Service (DDS)

The Quick Hits rule changes created DDS which is intended to improve pool price fidelity. Dispatching TMR displaces in-market energy and could have an impact on pool price. If the price is artificially depressed by constraining on TMR energy, then the correct price signal is not being sent to the market.

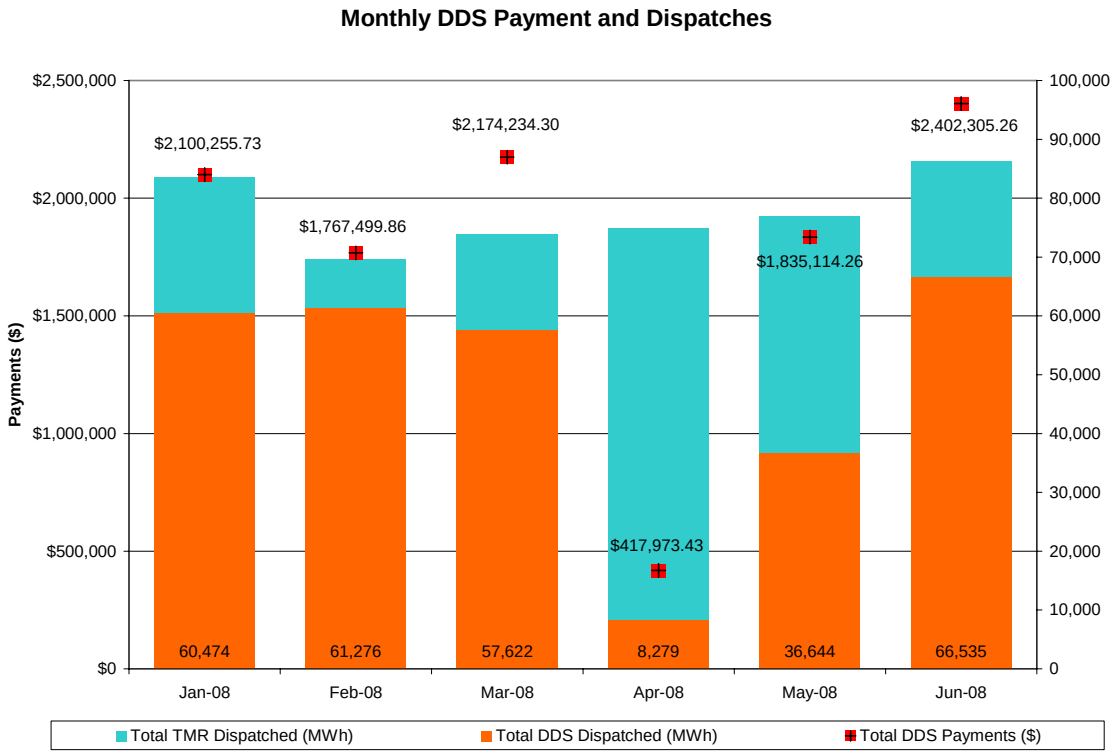
DDS is a pool price reconstitution mechanism created to address the unintended consequences of TMR on the pool price. DDS provides a procedure where in merit generation is dispatched down to offset the TMR energy constrained on and in doing so leaves the pool price at the same level as before the TMR dispatch occurred. To accomplish the intended price reconstitution, a DDS market was created to allow generators to offer a price to voluntarily dispatch down and offset the impact of TMR.

The costs of providing the DDS service are allocated to suppliers (generators & imports) by metered volumes in a manner which is effectively a “financial pro rata” among suppliers who generated during a settlement interval.

DDS has been used extensively to offset the impact of TMR dispatches on pool price. Available DDS offers have been sufficient to provide DDS for almost all hours.

DDS Conclusions:
DDS price reconstitution results in payments to generators who agree to reduce output from the generators who remain dispatched in the merit order. This cost allocation between generators has been less than $1.00/MWh for most hours. The total DDS payment between generators during the entire period was around $10 million or some $0.50/ MWh in hours when DDS was utilized. Total DDS payments between generators on a monthly basis are provided in Figure 8 together with the associated monthly TMR and DDS dispatch volumes.

Figure 11



The AESO also notes that DDS has been effective in reconstituting pool price when TMR is running. The AESO has estimated that the impact of DDS on pool price which is shown in Table 2 below on a monthly basis for the hours in which DDS is active. The AESO notes that the DDS pool price reconstitution impact may have been in the order of around $5.00/ MWh over all hours in the analysis period.

Table 2: Impact of DDS on Pool Price

	Average Pool Price ($/MWh)	Average "Un-reconstituted" Pool Price ($/MWh)	Average Hourly Impact When DDS Runs ($/MWh)	Average Hourly Cost when DDS Runs ($/MWh)
Jan-08[7]	$83.82	$77.42	$7.37	$0.44
Feb-08	$62.23	$56.46	$5.98	$0.38
Mar-08	$90.41	$84.65	$6.88	$0.55
Apr-08	$134.07	$133.15	$3.70	$0.36
May-08	$103.30	$98.49	$7.60	$0.61
Jun-08	$81.51	$73.10	$9.39	$0.58

Stakeholder comments

Stakeholders have suggested that the design of the DDS market does not accurately reconstitute the price and that the DDS reference price creates 'stickiness' in the price.

[7] From January 13th, 2008 to February 3rd, 2008

The stakeholder concern is that DDS encourages generators to alter their energy market offers in order to be in merit and therefore able to make DDS offers. In effect, this does not allow the price to be fully reconstituted because incremental energy enters the market at a lower price than would occur absent the DDS payments.

A second concern, price stickiness, is associated with the DDS Reference Price, which is set monthly at 12.5 GJ/MWh. Stakeholders highlighted the MSA's analysis that power prices settle very near the reference price in more hours than would be expected. Stakeholders suggest that this stickiness interferes with the market and reduces price fidelity.

The AESO recognizes that the market response to the DDS product has changed offer behavior for some market participants, an issue that was contemplated before the implementation of DDS, and that these actions may have reduced the impact of price reconstitution. Given the apparent interest in the topic expressed by stakeholders, the AESO will further consider whether a review of DDS design and usage is appropriate aligned with other market design priorities at this time.

EPCOR, TransAlta and TransCanada submitted comments on the Quick Hits rules on other DDS issues and suggested changes to the DDS rules. EPCOR noted that DDS dispatches were being issued for less than 5 MW and that for a large coal unit that level of dispatch was hard to respond to. The AESO notes that the purpose of DDS dispatching is to offset the impact of TMR on the pool price which will sometimes require the use of smaller DDS dispatches. However, over 97% of the DDS dispatches in the study period were 5 MW or greater. The AESO recognizes that coal units experience small variances in output even in steady state operation and takes that into account when dispatching DDS.

TransCanada suggested that DDS offers should be allowed to be greater than the pool price to encourage greater DDS participation at lower pool prices. The AESO analysis of the DDS market suggests that there were sufficient DDS offers available in all hours of the study period and while the AESO would consider any suggestions to improve DDS market participation, the AESO believes that the DDS price cap supports a FEOC market.

TransAlta submits that DDS market participation could be improved if participants were allowed to adjust an assets minimum stable generation (MSG) value on a daily or hourly basis if needed Cogeneration facilities have operational constraints that can vary on a hourly basis so having a single MSG makes it difficult to offer all excess capacity potentially available for DDS. TransAlta suggested creating two types of MSG, a daily or hourly MSG input by participants for DDS offer purposes and a secondary operating level for energy market purposes. The AESO is willing to consider rule changes that would result in increased DDS market participation. The AESO is also required to operate a FEOC market and we are concerned that allowing an asset to restate their DDS

offers without some verifiable reason provides too much DDS offer flexibility to specific participants at the potential expense of other participants. The AESO would like to further industry input on the proposal and requests that stakeholder to provide comment on this issue along with their comments on the conclusions and recommendations put forward in this review.

3.5 Payments to Suppliers on the Margin (PSM)

The new PSM rules were intended to address the discrepancy between the dispatch and settlement intervals giving generators a greater opportunity to receive payments based on their actual offer price instead of the settled pool price which may be lower than their offer.

The PSM rules allow for payment of the offer price for the energy produced during a settlement interval if the dispatch is followed and the offer is greater than pool price. Settlement will be in the form of an uplift payment to the supplier. Settlement charges for payments to suppliers on the margin will be applied to all load as an energy charge based on their proportion of total load within the settlement interval.

PSM Conclusions:
The PSM analysis indicates that the majority of payments made under the PSM rules is small and are distributed evenly over time likely due to the improved EMMO stability brought about by the other Quick Hits rule changes. The PSM cost is relatively insignificant in comparison to total market revenues. Total payments were $1.5 million over the six month period and the average hourly charge being around $0.05/ MWh. Table 3 provides a monthly summary of PSM volumes, revenues and average hourly charges.

The AESO notes that over all 6 months the financial significance of uplift is relatively low (under 1% of total market revenue), and concludes that PSM have had an insignificant financial impact on both suppliers and on load. Given the limited benefit to suppliers on the margin in term of revenue relative to total market revenue, the implementation cost and the administrative complexity of determining PSM payments, the AESO would like stakeholder feedback on the value of retaining the PSM mechanism in the future.

The AESO notes that a parallel program for payments to loads (bids) on the margin may be warranted, so no decision regarding PSM will be made until that design option is explored.

Table 3: Payments to Suppliers on the Margin Summary

	Total Energy Production (GWh)	Uplift Payment ($)	Market Value ($1,000)	Financial Significance	Average Hourly Uplift Charge ($/MWh)
January	5,087	$268,888	$419,966	0.06%	$0.05
February	4,661	$89,021	$307,638	0.03%	$0.02
March	4,769	$259,827	$407,475	0.06%	$0.05
April	4,527	$424,744	$623,681	0.07%	$0.09
May	4,435	$216,694	$472,444	0.05%	$0.05
June	4,340	$238,305	$381,095	0.06%	$0.05
Total	27,818	$1,497,479	$2,612,299	0.06%	$0.05

Stakeholder comments

Direct Energy and EPCOR submitted comments on the Quick Hits rules which noted that PSM uplift charges could not be passed through to load under the current Regulated Rate Option (RRO) regulation. The Department of Energy (DOE) investigated the matter and determined that given the options considered the best approach was leave the rule unchanged. The DOE also suggested that market participants approach the AUC to have all uplift costs recognized under RRO regulation.

3.6 Imports and Exports

The Alberta electricity market design needs to facilitate the import and export of electricity in a fair, efficient and openly competitive manner.

Importers and exporters are subject to the T-2 requirement. Import and exporters must also submit electronic tags (e-tags) for each interchange transaction and must make reasonable efforts to procure transmission service for the offered AC. Importers and exporters must submit an MER-B and provide an AOR if the sum of the e-tag quantities is less than AC. If the total import offer quantity in the EMMO is greater than import ATC, imports with transmission would flow and the interchange would be fully utilized.

Import and Export Conclusions:

The import and export analysis indicates that there have been no significant unintended consequences of the Quick Hits rules on the market. Import and export AC values are not fluctuating inappropriately between the relevant time periods and import and export AC values have been comparable to previous time periods. The analysis also suggests that imports and exports are not encountering significant restrictions to market participation. Quite frequently as the pool price rises, so does the difference between import AC levels confirming that import competition is still occurring post Quick Hits. The AESO can conclude that there are no price fidelity issues created by the Quick Hits rules with respect to imports at present.

Stakeholder comments
ENMAX, EPCOR and Powerex submitted comments on the Quick Hits rules related to imports and exports. ENMAX and EPCOR suggested that changes be made to the AOR definition specifically for imports which would allow importers to restate their import offers after T-2 if they were unable to commercially obtain supply. The AESO recognizes that there are seams issues between the Alberta market and other jurisdictions including differences in contracting procedures and notification deadlines. The AESO must achieve a balance within the import rules such that intra Alberta generators receive fair and equitable treatment and the rules support a FEOC market. As outlined in the Market Roadmap, the AESO is planning to consult with stakeholders on a broad range of intertie topics to determine the best way to proceed on such issues.

Powerex had a concern regarding the treatment of wheel-through transactions in the AESO procedures when one side of a wheel-through was cut. The AESO has noted the issue and has addressed the concern through changes to its rules.

3.7 Adequacy and Price forecasting

3.7.1 Adequacy Price forecasting
A new adequacy assessment report was created to provide daily and weekly assessments which indicate the amount by which supply exceeds demand on an hourly basis.

Adequacy Conclusions:
The AESO believes that the published adequacy assessments provide a good indication of market conditions. Adequacy assessments use the best forecast information available at any particular time period. The adequacy assessments are more accurate within T-2 to T time periods because both the supply and demand forecasts used in the assessments are close to actual supply and demand on the system and can only be restated for physical reasons in that time period.

3.7.2 Price forecasting
The AESO also provides a new two hour pool price forecast. During the preceding two settlement intervals for each settlement interval of the trading day's operation the forecast dispatch price in $/MWh is published. The forecast is updated before the delivery hour as required to reflect known supply changes.

Price Forecast Conclusions:
The AESO found that the pool price forecast has improved relative to the previously published format and can be considered accurate the majority of the time. The pool price forecast is still not a reliable predictor of price as small changes in supply and demand over a two hour period can have a large impact on the final price; the AESO will continue to monitor the price forecasts to

determine if improvements to the forecast methodology are possible or warranted.

4.0 Government Policy Alignment

The Quick Hits rules changes were designed to directly address some of the short term adequacy (STA) issues and recommendations identified in the Alberta Department of Energy policy paper.[8] In the paper, the DOE stated that "the issue of STA can be defined as having two components. The first is referred to as Offer Shortfall, in which the system operator does not always know if there will be enough generation available in the supply stack to meet the load".[9] The AESO notes that the Merit Order Stabilizer components of the Quick Hits implementation directly addresses the Offer Shortfall issue and the analysis has verified that there has been an improvement of supply information available to the system operator creating alignment with government policy.

The DOE paper also referred to a second issue which is that "there is significant volatility / instability of the merit order. This volatility arises from two sources: dispatch signals which do not recognize physical plant parameters and corresponding market flexibility which allows last minute restatements and does not require adequate dispatch compliance."[10] Since 2005, the AESO has instituted rule changes and compliance processes which helped to address the DOE merit order issue. The rule changes related to must offer and must comply (MC, AC, restatements, T-2) and the payments to suppliers on the margin that are part of the Quick Hits are specifically intended to reduce undue volatility of the merit order. The analysis presented in this paper indicates that Quick Hits rule changes have had a positive impact on merit order volatility and stability providing alignment with government policy.

The impact on pool price of TMR was also discussed in the DOE paper and the AESO was required to create processes, practices and rules to address the TMR impact on pool price and appropriate methodology for reconstitution. The new DDS rule changes instituted with the Quick Hits rules have been operating as intended and have improved the "energy price signal fidelity" as required by DOE policy

The AESO believes that the Quick Hits rules are technically sound. The analysis presented in this paper indicated that the rules are clear, complete and providing the benefits that were generally intended.

The Quick Hits rules are supportive of a fair, efficient and openly competitive market. The merit order stabilizer rules (must offer, must comply and limitations on restatements) have been shown to be operating properly in that the rules

[8] Alberta's Electricity Policy Framework: Competitive – Reliable – Sustainable June 6, 2005 Alberta Department of Energy the "Policy Paper"
[9] Section 4.2 page 20
[10] Section 4.2 page 20

have applied equally to all assets, allowed assets to easily communication their generation capabilities to the AESO and provided a level playing field for competition at the T-2 submission time frame.

The Quick Hits rules have been shown to be in the public interest. The AESO has been provided with better visibility of available supply which has improved system reliability. The electricity market in general has also benefited from improved access to information (adequacy assessments and price forecasts) and a more robust, stable EMMO which has had positive impacts on pool price discovery and may have impacted pool price volatility.

5.0 Summary of Findings and Recommendations

The following section provides a high level summary of the main findings and recommendations of the review:

- The Quick Hits rules have provided the AESO with an improved view of available supply.
- The Quick Hits rules have created a more robust, stable EMMO and reduced pool price volatility.
- The DDS market appears to be operating as designed, noting that stickiness of offers at a price level may occur. Further industry discussions on the DDS rules will be considered.
- The PSM rules are functioning as planned but the benefit to producers on the margin in terms of revenue is relatively insignificant in comparison to total market revenues, the implementation cost and the administrative complexity of the program. Further industry discussions on the program may be warranted.
- The AESO adequacy assessments provide a good indication of market conditions and are relatively accurate.
- While the AESO two hour pool price forecast was good, improvements could be made.

Based on these key findings the AESO concludes that the Quick Hits rules have been operating as designed, have not created any unintended consequences and are sustainable. Market participants appear to be utilizing the increased flexibility provided under the new rules.

6.0 Next Steps

The AESO welcomes feedback on the Quick Hits six month review conclusions and recommendations put forward in this paper. A comment matrix has been prepared to make it easier for stakeholders to submit their comments. After receiving feedback from stakeholders, the AESO will review the feedback and communicate how it wishes to proceed on the issues raised. The AESO will also use the feedback to improve its ongoing monitoring of the market.
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.