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MSA REPORT

‘Quick Hits’ Review: Dispatch Down Service

10 July, 2008

MARKET SURVEILLANCE ADMINISTRATOR

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1 INTRODUCTION

On December 3, 2007 the AESO implemented the 'Quick Hits' rules package. This package represented perhaps the most significant change in ISO rules since market opening. The 'Quick Hits' were comprised of four main areas:

- Merit Order Stabilizers
- Payments to Suppliers on the Margin
- Treatment of Imports/Exports
- Reconstitution of Pool price for Transmission Must Run (TMR) Energy

The MSA closely monitors the market to ensure that it operates in a fair, efficient and openly competitive manner. With the advent of new rules the MSA is keenly interested in whether the rules have had any unanticipated consequences. In addition to our regular Quarterly Reports the MSA is undertaking some more detailed analysis with respect to particular rule changes. In this report we present a summary of our findings relating to the reconstitution of Pool price for TMR energy using the Dispatch Down Service (DDS). In this summary we have presented an aggregated analysis to respect participant confidentiality but in some areas we have relied upon a more detailed participant or unit level analysis in reaching our conclusions.

Section 2 of this report provides a brief summary of the policy direction to reconstitute Pool price for TMR energy, the alternatives considered by the AESO and a summary of the ISO rules and implementation. In Section 3 we provide a review and analysis of some unanticipated consequences of the DDS market based on the MSA's monitoring activities over the last six months. In Section 4 we provide some conclusions based on our observations to date.

2 BACKGROUND

2.1 Government Policy

In mid 2005, the Alberta Department of Energy released a paper entitled, 'Alberta's Policy Framework: Competitive - Reliable – Sustainable'. This paper followed extensive consultation with Stakeholders and noted that TMR had a significant impact on Pool price fidelity:

> The Department acknowledges that the current treatment of TMR in calculating Pool price is problematic and has significant impact on Pool price fidelity. Under the energy-only market design, the Department supports the concept of reconstituting the clearing price for all instances where TMR is employed on an interim or temporary basis. The Department considers that transmission development should eliminate the need for most TMR contracts and remove most congestion areas in the long-run. Where TMR has taken on the role as a cost effective and appropriate long-term alternative to building transmission, the Department does not support reconstitution of Pool price for that quantum of TMR. (p.38)

Based on this direction, the AESO identified Pool price reconstitution as one area that would be tackled as part of the 'Quick Hits' package of rules (also referred to as Phase I of the Market Policy Implementation). Beginning in the summer of 2005 the AESO engaged stakeholders in discussions around the appropriate mechanism through which to reconstitute Pool price for TMR energy.

2.2 Alternatives considered by the AESO

A number of alternatives were considered to reconstitute Pool price. Some features emerged early in the design, including a 'virtual TMR operating block' being inserted back into the merit order at a 'TMR reference price' with Pool price being set by the highest priced block that would have been needed absent the need for TMR.[1] The purpose of the TMR reference price was to 'essentially "re-insert" this block of energy into the energy market merit order at a level that more appropriately represents the units providing the TMR energy.'[2] While the proposed mechanism 'reconstituted' Pool price, the TMR still displaced some generators on the margin who would have run absent the TMR. It was also not clear the mechanism was consistent with legislation (whereby the last dispatched unit should set the system marginal price) and may have led to a 'race to zero' (generators forced off at the margin may have offered lower to capture the 'reconstituted' Pool price).

In late 2006 the AESO considered two other options for reconstituting price that would be both consistent with legislation and would avoid a race to zero.[3] One very simple option was to insert a 'TMR Price Modifier' consisting of a virtual TMR offer block just above the last dispatched unit. However, such an option would have only resulted in a partial reconstitution. The other option considered a 'Transmission Limiter Dispatch'. This option included a reference price but left generators close to the margin still running (and setting price) and instead proposed limiting in-merit generators by creation of a 'dispatch down service' (DDS) market. The DDS market was seen as appealing since it allows generators to exhibit their willingness to be dispatched down. Of all the mechanisms considered, creation of DDS represented the most market friendly, but also the most complicated, option considered.

2.3 ISO Rules of December 3, 2007

The DDS concept was further developed during 2007 leading to final ISO rules being introduced on December 3, 2007. The key features of the DDS market are:

DDS offers are not eligible for a dispatch if:

i) such dispatch would cause transmission must-run to be required.

[1] See http://www.aeso.ca/downloads/Quick_Hits_Term_Sheets_Aug5_Final.pdf and http://www.aeso.ca/downloads/Jan30_Draft_Rule_Changes_short.pdf.

[2] The AESO proposed that units currently providing TMR typically had operating costs in 'the range of 10-15 times the value of natural gas on a typical day' but as of early 2006 had not settled on whether this would be static multiple of daily gas price or a dynamic number varying within the 10-15 range on a daily or hourly basis. See http://www.aeso.ca/downloads/Mar29_TMR_Reconstitution_ltr.pdf

[3] http://www.aeso.ca/downloads/Workarounds_Cover_Letter_Nov_29_06.pdf

ii) such dispatch would be in an area where one or more source assets are constrained down.
iii) such dispatch would impair the source asset's ability to comply with an ancillary service dispatch or directive.
iv) the pool participant is unable to respond to such dispatch.[4]

Assuming there are eligible DDS offers, DDS service will be dispatched if:

i) the system marginal price is less than or equal to the reference price, and

ii) a source asset has been issued a transmission must-run dispatch or directive, and
iii) the transmission must-run quantity (MW) is greater than constrained down directive quantity (MW) as calculated by the system controller.[5]

Although not explicit in the ISO rules, DDS is also not dispatched during some IT maintenance/ upgrades when the System Controller relies upon manual dispatch.

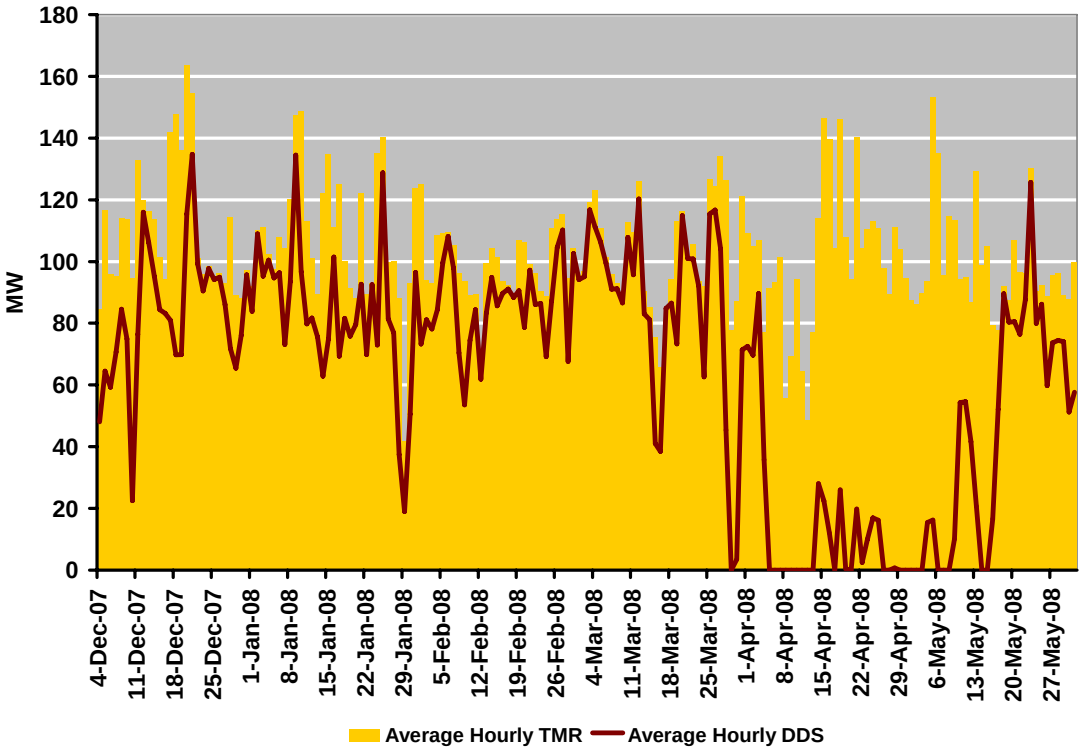
A reference price for DDS is determined monthly at a 12.5 heat rate.[6] The reference price is not used to set system marginal price but acts as the trigger for whether DDS is dispatched or not.

2.4 DDS Implementation

The DDS market was activated on December 4, 2007, with market participants able to enter DDS offers the previous day. In Figure 2.1 we show average daily TMR and DDS dispatches. The low levels of DDS dispatch from early April to mid May are largely due to the number of MW already 'constrained down' due to KEG transmission upgrade.[7]

[4] ISO Rule 6.3.6.1
[5] ISO Rule 6.3.6.2. As per ISO Rule 6.3.6.3 DDS is only dispatched up to the TMR quantity less the Constrained down quantity.
[6] See ISO Rule 3.10. The gas price is the monthly Canadian natural gas price for the month in $/GigaJoule at AECO C and Nova Inventory Transfer, the Alberta Bidweek Spot Price, as published on www.ngx.com.
[7] Work connected to the KEG transmission upgrade occurred between March and June 2008, but had limited impact outside the April to mid-May period.

Figure 2.1: Average Hourly TMR and DDS Dispatches



The cost of payments to DDS providers is borne entirely by the generators in the market and is distributed evenly to all participants generating in hours where DDS was dispatched. Thus far, the average cost of DDS has been approximately $0.35 per MW/h. The cost for DDS is considerably lower in April reflecting the small amount of DDS dispatched.

Table 2.1: Estimated DDS Charge

Month	Estimated DDS charge ($/MWh)
December	$0.41
January	$0.39
February	$0.36
March	$0.46
April	$0.09
May	$0.38

In Table 2.2 we provide some basic summary statistics for TMR and DDS. On average approximately 100MW of TMR is required in each hour and at least some TMR is required in almost every hour.[8] We note from the other statistics DDS dispatches are more variable. In the first four months some DDS is

[8] Units supplying TMR also offer into the energy market. At very high Pool prices all TMR units will have been dispatched back to energy even though the 'need' for the TMR unit to run may have not been removed.

dispatched between 86% and 93% of hours, with on average DDS being approximately equal to the TMR required in a little over half of those hours. April and May see considerably lower levels of DDS dispatch due to the KEG transmission upgrade.

Table 2.2: Summary Statistics

	December	January	February	March	April	May
Hours in Month	672	744	696	743	720	744
% Hours TMR Dispatched	100%	100%	100%	100%	99%	100%
Average Hourly TMR Dispatched (MW)	111	108	99	103	101	99
% Hours DDS Dispatched	93%	89%	95%	86%	27%	59%
Average Hourly DDS Dispatched (MW)	83	83	86	85	14	45
% Hours DDS approx = TMR	44%	49%	58%	45%	4%	10%

Over the next few years the DDS market is forecast to contract as the need for TMR declines. Table 2.3 contains the AESO's estimates of the current need for TMR and the need in the next three years. These estimates indicate that those areas currently not requiring TMR will continue not to do so. In other areas the need for TMR varies significantly both in maximum need and frequency. For example, in the Rainbow region TMR is needed in most hours, whereas in the South region it is expected to be needed only infrequently. The requirement for TMR is expected to be eliminated in the NW and Rainbow region in the next few years assuming new transmission is built on schedule. TMR need in the South region is expected to continue and may increase if transmission is delayed.

Table 2.3: Estimated Max. TMR Need by Region[9]

	Region					
Year	NW	Rainbow	South	Central	Edmonton & Fort Sask.	Fort McMurray
2008	140	150	125	0	0	0
2009	140	160	125	0	0	0
2010	0	160	125	0	0	0
2011	0	0	125	0	0	0

[9] See http://www.aeso.ca/downloads/2007-10-12_-_TMR_Estimate.pdf

3 UNANTICIPATED CONSEQUENCES

Since the implementation of the rules for the reconstitution of Pool price for TMR energy and the DDS market the MSA has observed a number of market outcomes that to a greater or lesser extent were unanticipated at the time the rules were developed. These are:

- Price 'Stickiness' at the Reference Price
- Gas fired generation dominating the provision of DDS
- Competition between DDS and other market mechanisms
- Impact of information provision on DDS pricing
- Diminished accuracy of the Pool price forecast during hours with DDS

The following points need to be borne in mind whilst reading this report:

- Although we have attempted to isolate the effects attributable to DDS, the market is dynamic and the effects of one change are never truly completely separable from another, unless only one change occurs at a time
- The dynamic nature of the market may well mean that we have not yet reached a new steady state condition. Hence, the full effects of DDS or any of the other Quick Hits changes may not yet be evident.

3.1 Price 'Stickiness' at the Reference Price

At the MSA's spring stakeholder meeting[10] we observed that the Pool price was being set very close to the Reference Price for a considerable period of time. For purposes of illustration Figure 3.1 below shows a portion of the SMP duration curve for each month between January and March 2008, along with the Reference Price in the corresponding period (shown in the figure by the coloured dotted lines).[11] The flat portion of the price duration curve indicates that price has been 'sticky' for a considerable time within a very narrow band around the Reference Price in that month. Figure 3.2 shows the corresponding data for the first three months of 2007, where instead of a Reference Price we have plotted 12.5 times the gas price at AECO-C on first of each month. In 2007 we do not see the same 'stickiness' at or close to a price consistent with a 12.5 heat rate.[12]

[10] http://www.albertamsa.ca/files/Stakeholder_Meeting_-_March_2008.pdf

[11] A new reference price is declared on the second business day of each month; consequently Jan 2008 corresponds to the period Jan 4 – Feb 3, Feb 2008 to Feb 4 – Mar 3 and Mar 2008 to Mar 4-April 1. For 2007 we have simply used calendar months. Reference prices are shown in the Figure as dotted lines.

[12] During Jan 2007 gas prices varied from $5.62 - $7.68 / GJ, in Feb 2007 from $7.20-$7.90 /GJ and in March from $6.77- $7.37/GJ.

Figure 3.1: SMP Duration Curve (Jan – Mar 2008)

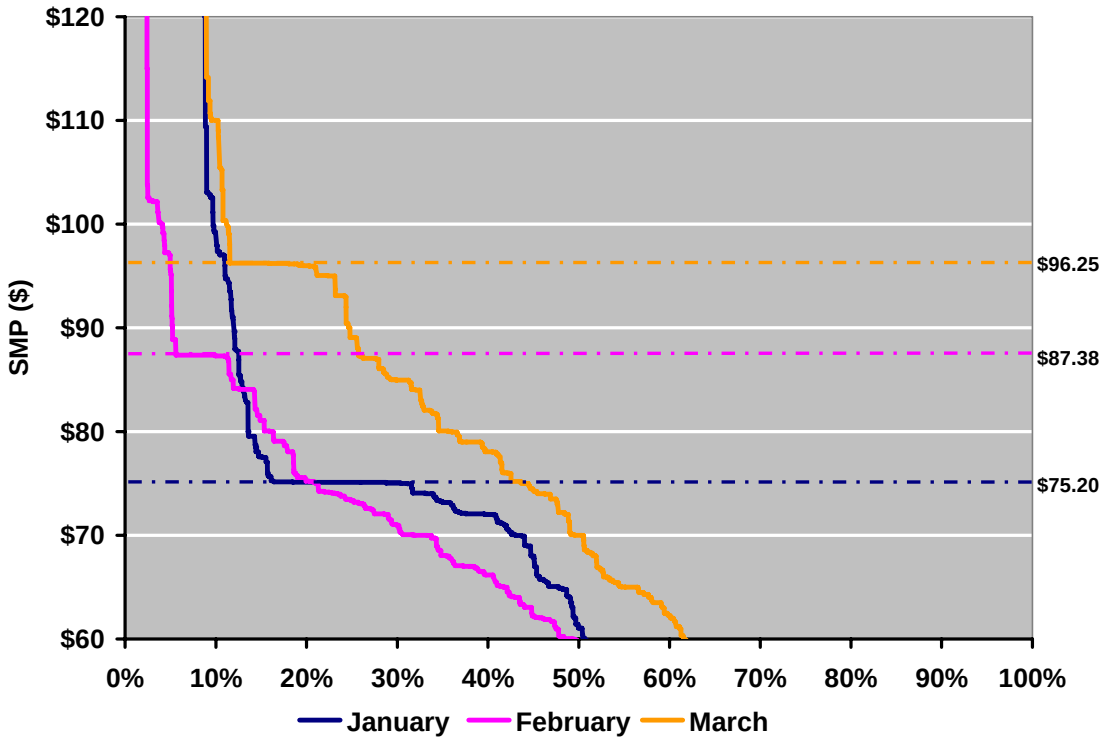
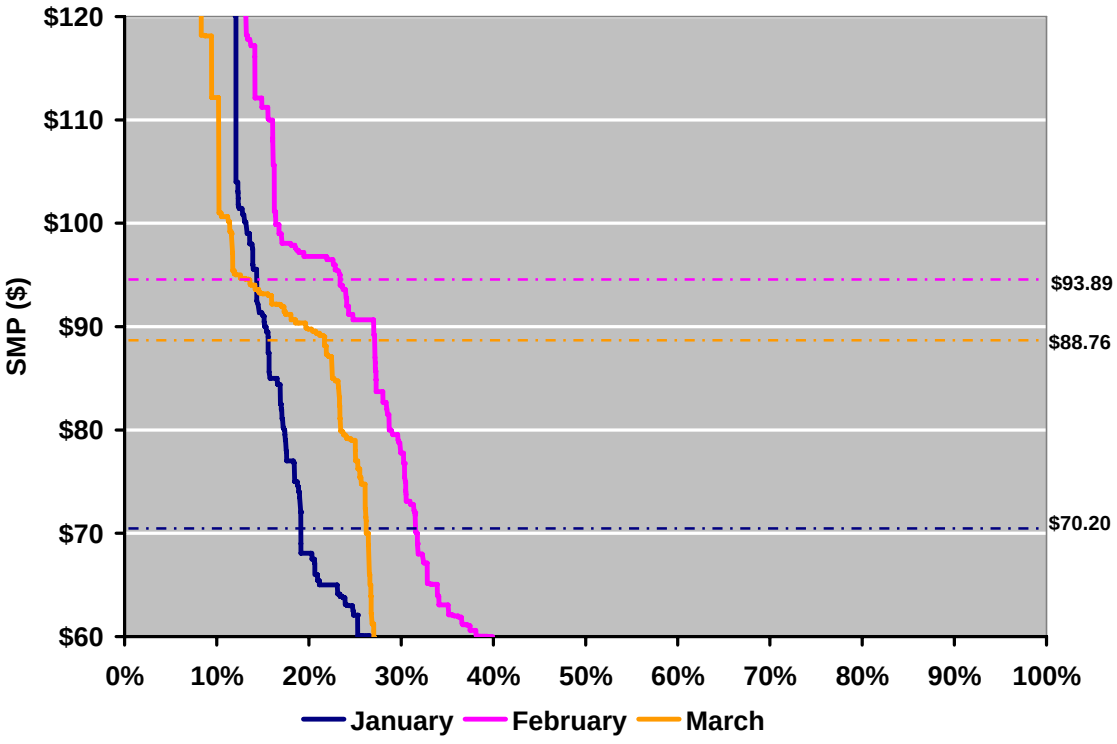


Figure 3.2: SMP Duration Curve (Jan – Mar 2007)



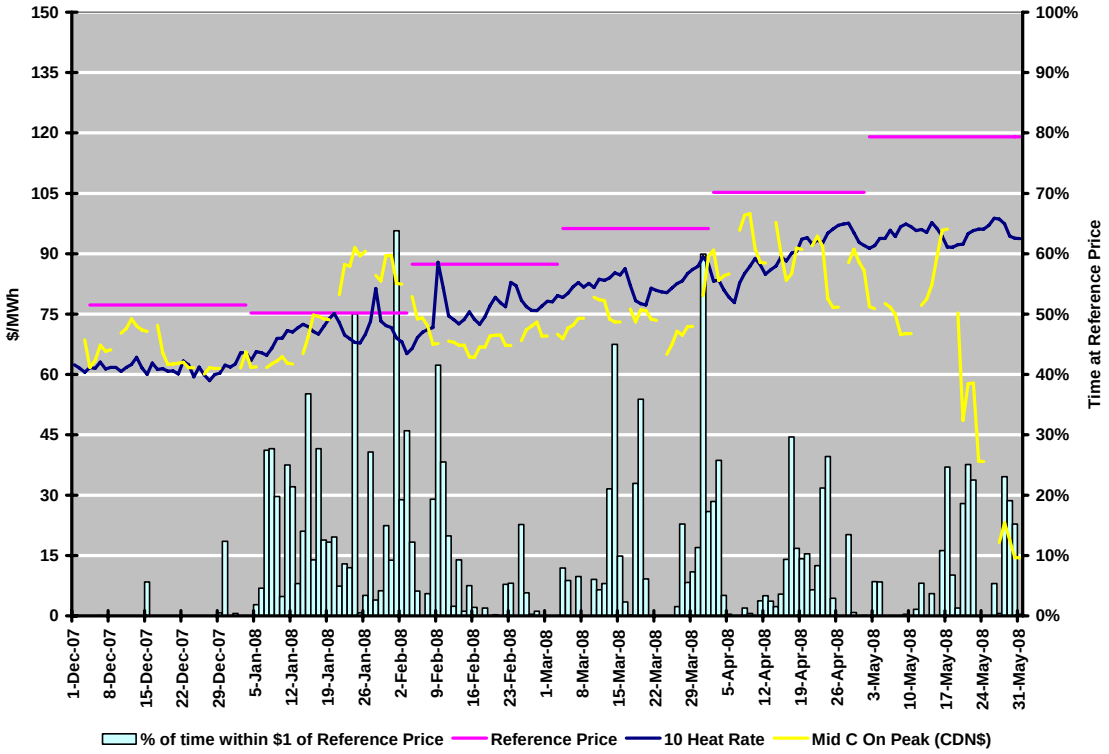
The Reference Price represents the trigger point for when units dispatched down for DDS are dispatched back to energy as the System Controller moves up the energy merit order. This effectively creates a disjoint in probability of dispatch (i.e. offering one penny below the Reference Price the dispatch probability is considerably higher than one penny above the reference price).[13] Such a disjoint may prompt participants who would have offered just above the Reference Price to offer just under the Reference Price – the unintended consequence being a 'hollowing out' of the merit order just above the Reference Price. In the view of the MSA the fact that an administratively determined Reference Price is influencing market outcomes leads us to be concerned about harm to price fidelity.

Some 'stickiness' around the Reference Price was expected from the market design. Although the Reference Price itself cannot determine SMP, market participants are frequently offering a single MW just below the Reference Price. 'Stickiness' might be expected to increase if the number of MW's required for TMR increases. 'Stickiness' may also be exacerbated since the Reference Price is known with certainty[14] and is set for a relatively long time period. To understand some of the drivers of 'stickiness' we consider in Figure 3.3 the period from December 4, 2007 through May 31, 2008.

[13] The Reference Price essentially acts a known 'shelf' of energy. The MSA has previously made its views known about the undesirable nature of 'shelf' strategies and the possibility that these represent a 'soft cap' (and floor) on the market both diminishing the quality of the contest between market participants and the quality of the price signal . See, for example, http://www.albertamsa.ca/files/MSAFEOC110405.pdf, p.4.

[14] The alternate designs considered by the AESO did consider a 'dynamic' Reference Price.

Figure 3.3: Drivers of 'Stickiness'



We observe little 'stickiness' in December a period when both the DDS market was new and the Reference Price was not posted on the AESO website. Low levels of 'stickiness' in April and early May correspond to a period with little DDS dispatch due to the KEG transmission upgrade. In the figure we show that as ten times the daily gas price at AECO-C (a '10 Heat Rate') approaches the Reference Price (12.5 times the gas price at the beginning of the month) we seem to observe an increase in 'stickiness'.[15] The choice of a '10 Heat Rate' is significant only in that it may represent a proxy for recovery of variable costs for a typical gas peaker. Our observation is that daily fundamentals may combine with the monthly Reference Price to increase the number of hours within a tight band around the reference price. In the figure we also show the Mid-C on peak price although evidence that this has any impact of stickiness appears weaker.

In conclusion, based on the information reviewed the MSA is concerned that the administratively set Reference Price is having an impact on price fidelity. As shown in Figure 3.1 we have observed some days where price has been set over 50% of the time within a very narrow band around the Reference Price. Since the reconstitution mechanism itself is intended to contribute to price fidelity, the real question is whether the net effect of the mechanism helps or hinders fair, efficient and open competition. We consider this broader question in examining other aspects of the reconstitution mechanism in the following sections. A narrower

[15] Other factors are also in play – for example, on a given day tight supply conditions may cause prices to remain in excess of the Reference Price resulting in no 'sticky' hours.

question is whether changes to the determination of the Reference Price may offer a solution. We have noted above that there is some evidence that 'stickiness' increases where gas prices are increasing within a month. If such a conclusion could be validated it might suggest 'resetting' the Reference Price more frequently (e.g. Daily). Other possibilities considered during the design of the reconstitution mechanism included a dynamic or random selection of Reference Price between a 10 and a 15 heat rate. The random nature would potentially make it more difficult for market participants to shadow the Reference Price. Such mechanisms, however, may not reduce 'stickiness'. For example, market participants may be able to quickly locate a dynamic Reference Price through offering very small blocks (e.g. 1MW) to quickly locate where the Reference Price was on any day.

3.2 Gas fired generation dominating the provision of DDS

In Figure 3.4 we show the weekly market shares by submitting participant of DDS providers. For a relatively small market, the number of participants receiving dispatch is encouraging. In Figure 3.5 we can see the Gas units have dominated the provision of DDS. While gas units are likely to be able to offer deeper discounts than coal units (since being dispatched down allows them to avoid a larger fuel cost) the relative dominance of gas and the participation of hydro are higher than expected. This a potential concern if the DDS market is proving attractive to participants who, absent the DDS market, would not have been running. If such is the case, the reconstitution of Pool price for TMR energy may be more apparent rather than real. Absent any real reconstitution, the only other impact would be a transfer from generators as a whole (those that pay for DDS) to generators providing DDS.

It is perhaps not so surprising that gas units are dominant providers of DDS. If one compares active spinning and supplemental reserves with DDS, they are quite similar in nature. Gas units and hydro are dominant providers of spinning and supplemental reserves. For spinning and supplemental, on occasion providers are required to move into the energy market for up to one hour in response to a contingency event and receive an unknown Pool price. For DDS, on occasion providers are required to move into the energy market as the Reference price is reached and most likely Pool price will be well above their fuel costs. One might expect more hydro participation in DDS for the same reasons. However, most of the significant hydro resources in Alberta have significant financial obligations (i.e. the Hydro PPA) in the active reserves market that limit their incentive to participate in DDS.

Figure 3.4: Average weekly DDS market share by submitting participant

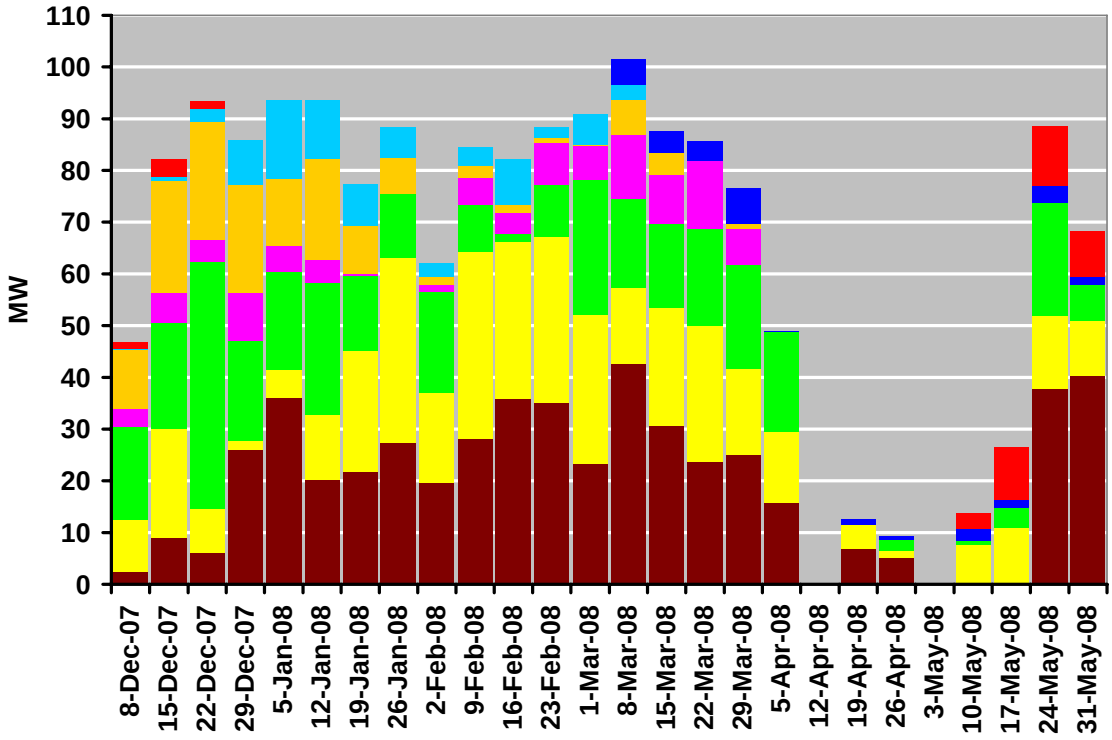
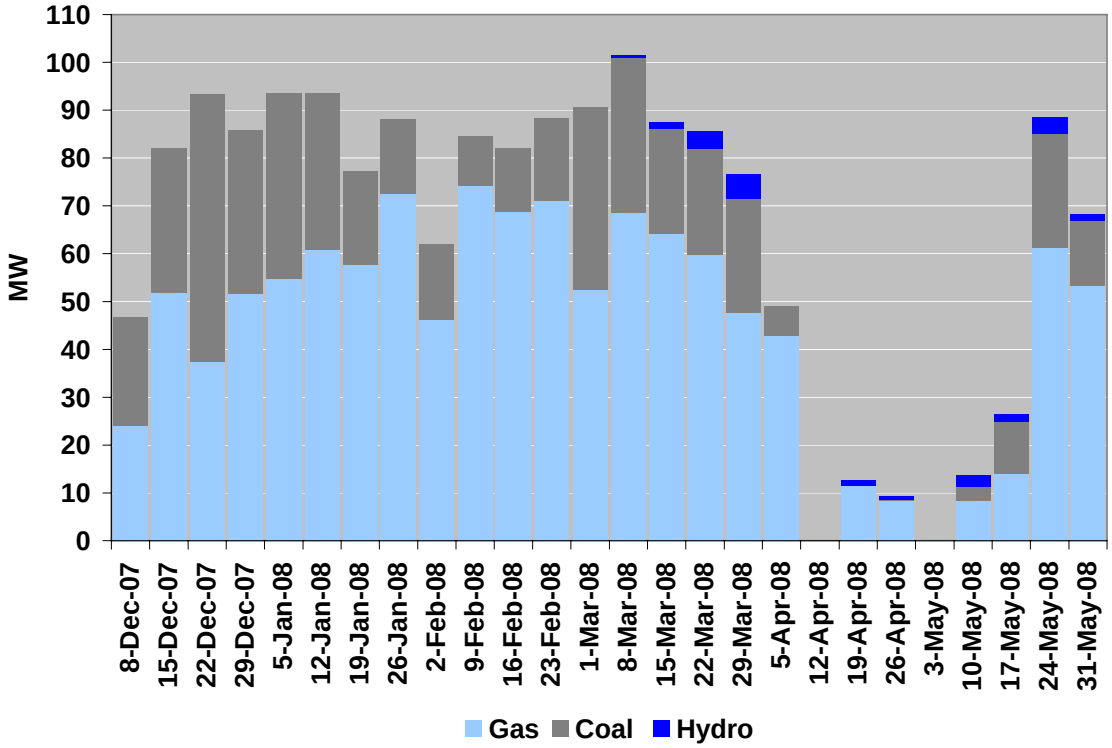
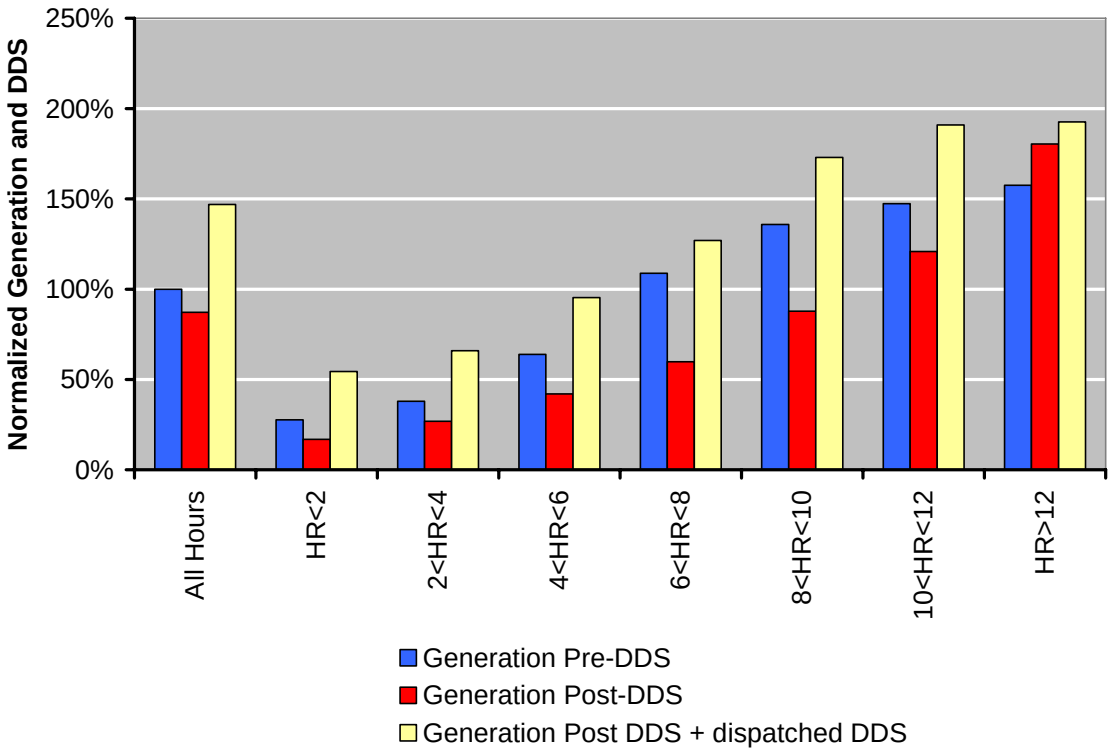


Figure 3.5: Average weekly DDS market share by fuel type



To examine the reconstitution of Pool price for TMR energy in more details we look more closely at the offers of a subset of gas fired units providing DDS.[16] The subset represents over half of the average DDS provided and the majority of that supplied by gas fired units. In Figure 3.5 we show the average generation for this subset of units for the period Jan-Mar 2007 ('Pre-DDS'), average generation for the period Jan-Mar 2008 ('Post-DDS') and the sum of average generation post DDS and the level of dispatched DDS. All values have been normalized by dividing by the average pre-DDS generation level in all hours (i.e. the far left blue bar = 100%).[17]

Figure 3.6: Generation pre and post DDS in all hours and at varying heat rates



If the figure showed that the actual generation in the pre-DDS period and the actual generation post DDS plus the actual DDS dispatched were equal we would conclude that there was some evidence that those MW's dispatched for DDS would otherwise have been generating energy by these gas units. This would mean that Pool price was truly being reconstituted for TMR energy. In fact, we interpret Figure 3.6 as showing the opposite – relatively few of the dispatched MW's would appear to have been running absent the existence of the DDS

[16] We have chosen a subset of generators that exercise a relatively large degree of control over their aggregate generation (i.e. not cogeneration).

[17] For example, if the pre DDS all hours column was 200MW (=100%), a column showing 25% would correspond to 50MW (200MWx25%). The MSA has chosen to presenting the data in normalized fashion, rather than simply as MW levels, to further respect the confidentially of the data relating to the subset of gas generators under consideration.

market. For example, over all hours the post-DDS generation and dispatched DDS is considerably higher (about 150%) than the pre-DDS generation level. Note that the actual generation in the post-DDS period is only slightly lower (about 90%) than in the pre-Quick hits period. This can be interpreted as some 'real' reconstitution of Pool price, but it is relatively small in comparison to the total DDS dispatched.

In the rest of Figure 3.6 we provide a more detailed analysis by breaking out the generation (pre and post –DDS) and generation and dispatched DDS at different implied heat rates (HR's). By examining the heat rate data we are able to isolate differences not due to difference in relative Pool and gas price between the pre- and post-DDS periods. The conclusion is similar, although there is some evidence that at higher heat rates a greater proportion of the dispatched DDS would have been running absent the DDS market (i.e. more of the reconstitution is 'real').[18]

It is important to recognize the above conclusions do not make allowance for the potential impact of other changes related to the 'Quick Hits' rules package or differences in fundamentals between the Pre and Post-DDS periods. Recognizing these limitations the MSA has completed a more detailed and unit specific analysis which continues to support a hypothesis that only a partial reconstitution for TMR energy is occurring.[19] To respect market participant confidentiality the MSA has not presented the more detailed analysis in this report. However, since all data relied upon is available to the AESO the MSA is intending share this more detailed analysis with the AESO for their further consideration.

The gas fired units offering in the manner described above are acting consistently with the incentives offered by the DDS market. The DDS market provides an attractive alternative for market participants who otherwise expect their units to be idle. It is worth reviewing that the DDS market was presented as an alternative to other reconstitution designs in order to prevent the 'race to zero' removing any real reconstitution of Pool price.[20] If the MSA's conclusions are correct, the 'race to zero' is still occurring just in a different form. It may indeed be the case that there is no market design that completely eliminates this problem. There are some reasons to believe that more vigorous competition in DDS market would result in more 'real' reconstitution. The MSA intends to continue monitoring the DDS market to ascertain the extent to which these competitive forces emerge over the coming months.

[18] Note that above a 12 heat rate includes many hours in which no DDS is dispatched (i.e. we are above the reference price). Above the reference price all DDS is dispatched back to energy which is consistent with the observation that post-DDS actual generation is higher than in the pre-DDS period.

[19] The MSA has not attempted to estimate the dollar amount of reconstitution occurring. Simulating market outcomes, in particularly estimating price impacts, are inherently problematic in the Alberta market. The very existence of the DDS market changes the incentives for market participants as do other changes to market rules introduced in the Quick Hits package.

[20] See Section 2.2

3.3 Competition between DDS and other market mechanisms

Prior to Quick Hits, imports and exports provided some 'reconstitution' for TMR energy. Prices 'suppressed' by TMR energy to some extent spurred additional exports (or discourage additional imports). The limit on this equilibrating mechanism would be the prices (and liquidity) in neighbouring markets. Consequently, the introduction of DDS may have impacted import and export flows. While the MSA monitors intertie flows very closely, it has not been able to isolate any impact from DDS. Other Quick Hits changes, such as the T-2 gate closure, would more likely impact on the usage and efficiency of the interties.

The MSA has also been monitoring for any impact the DDS market has had on the operating reserves markets. Market participants dispatched for DDS cannot coincidently use the same MW's to supply active reserves, although they can participate in standby markets. We see some evidence that DDS providers are moving away from active reserves to standby but have not been able to ascertain the impact, if any, on prices or premiums.

3.4 Impact of information provision on DDS pricing

Early in the introduction of the DDS market, the MSA was concerned that the absence of 'price' information for DDS offers might limit the efficiency of the market.

On March 18 the AESO introduced a DDS historical trading report (updated for the previous hour) to complement a DDS market report showing the available MW's (updated close to real time). The combination of the two reports should assist market participants in determining the prices associated with successful DDS offers in the previous hour. Although participants may only change DDS offers outside T-2[21], the MSA had expected to observe a convergence in DDS prices for units receiving dispatch once price information became available. In a pay-as-bid market like DDS, one would expect sellers to seek the 'best' price and a sign of efficiency would be a convergence of prices and consequent narrowing of spreads.

Figure 3.7 shows the hourly spread of DDS prices for units receiving dispatch and Figure 3.8 shows the daily average spreads. Thus far, we have not observed compelling evidence that the information disclosure has positively impacted efficiency (in terms of a reduced spread). The MSA will continue to monitor this aspect of the market noting that the KEG transmission upgrade reduced the requirement for DDS and there is relatively limited data since the posting of the historical trading report on March 18.

[21] Changes within T-2 are permissible with an acceptable operational reason.

Figure 3.7: Hourly spread of DDS prices for units receiving dispatch

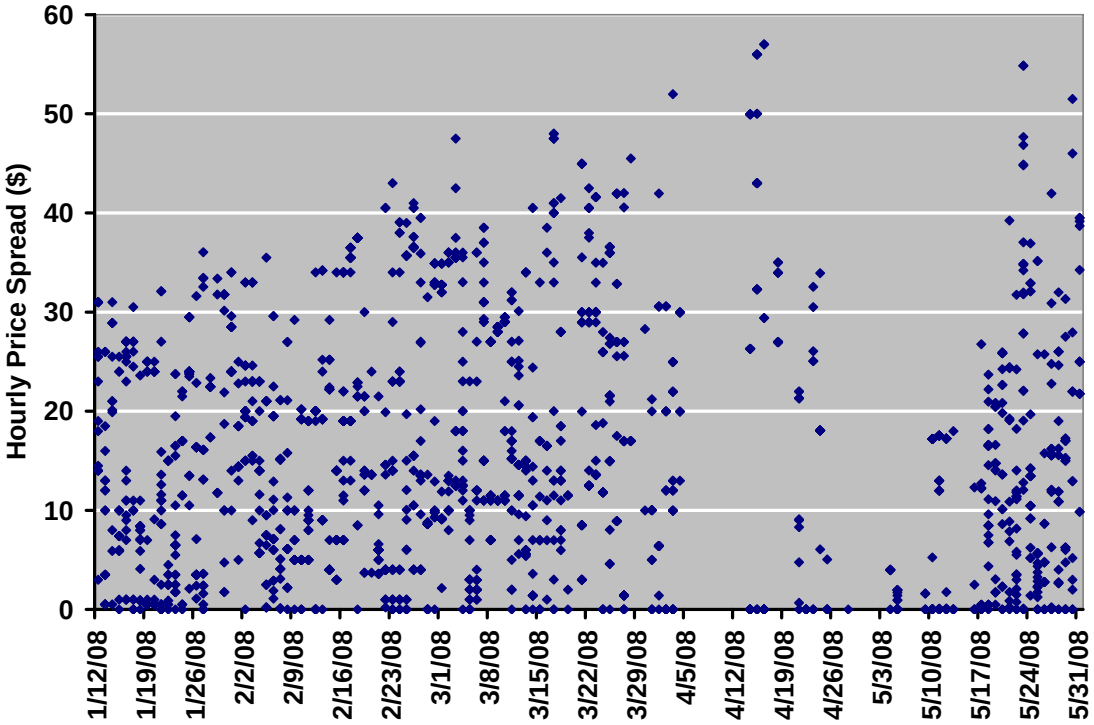
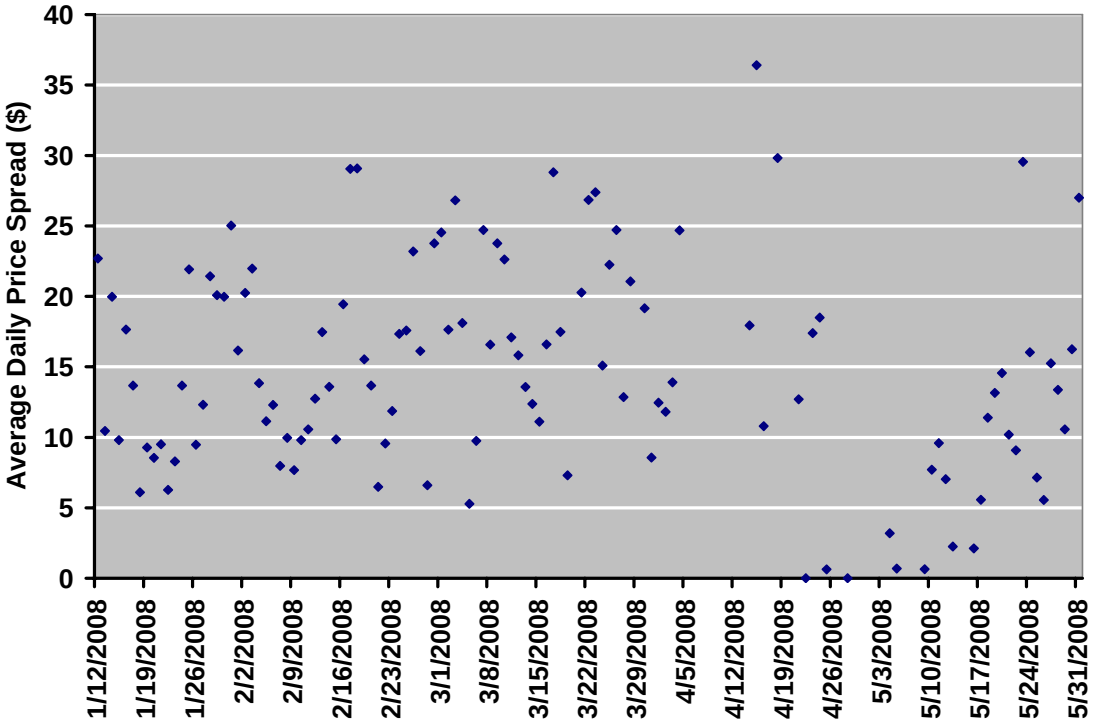


Figure 3.8: Average daily spread of DDS prices for units receiving dispatch



3.5 Diminished accuracy of the Pool price forecast during hours with DDS

In the Quick Hits package it was anticipated that the introduction of merit order stabilizers, in particular the lockdown of non-operational restatements at T-2, would greatly improve the AESO's ability to forecast Pool price.[22] Historically, the AESO had been restricted by:

- the ability of market participants to use locking and energy restatements close to real time for market reasons
- uncertain flows on the interties for even the next hour
- unplanned outages and derates
- unanticipated changes in load

With the advent of Quick Hits all the forecast uncertainty with respect to the first two factors has largely been eliminated. Improvements to the AESO's price forecast were not explicitly part of the 'Quick Hits' package but nonetheless the forecast was anticipated to improve.

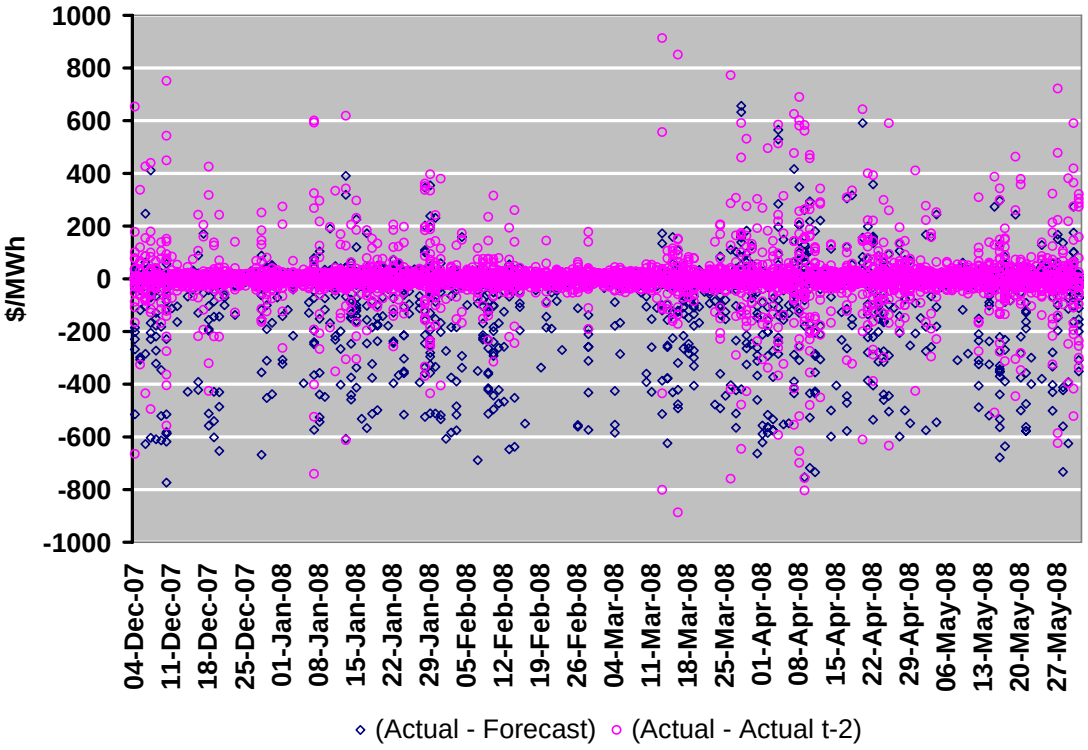
In Figure 3.9 we show the hourly price deviation between Pool price and AESO's forecast Pool price in each hour from December 4 to May 31. We also show the deviation between Pool price and Pool price two hours previously [i.e., PP(T) – PP(T-2)]. Both the AESO's forecast and the Pool price two hours previously predict the pool price accurately in many hours. However, on the basis of the mean square error of the deviations, the AESO's price forecast performs worse than the using the actual price two hours previously.[23]

The AESO Pool price forecast also appears to exhibit statistical bias (over predicting price more often than under predicting price). Both the accuracy and bias inherent in the forecast are of concern to the MSA. One contributory factor to both of these problems is the operation of the DDS market and TMR reference price.

[22] The 2005 Alberta Department of Energy paper entitled Alberta's Policy Framework: Competitive - Reliable – Sustainable reflects this expectation.

[23] The mean square error for 'Actual – Forecast' is approximately 15,500 and for 'Actual – Actual at T-2' is 10,342.

Figure 3.9: Deviation between Actual and Forecast Pool price



In Figure 3.10 and 3.11 we show a scatter plot of actual versus forecast Pool price along with the reference price in January and February respectively.[24] The 45 degree line shows where the actual and forecast values are equal (i.e. forecast is perfect). Below the 45 degree line shows where the forecast is over-predicting the actual. In both months shown we see the bias noted above, the forecast tends to over predict. The scatter plots also show the impact of the Reference price – since there is a clustering of actual values at Reference price that the price forecast often over predicts.

In conclusion the MSA notes that the DDS market and reference price appear to be the cause of the price forecast problems. The MSA understands the methodology of the price forecast is little changed from prior to Quick Hits and therefore it is unsurprising that it does not perform well in conjunction with the DDS market.

[24] January period corresponds Jan 4 – Feb 3 and the February period from Feb. 4 – March 3.

Figure 3.10: Scatter Plot of Actual v. Forecast Pool price and TMR Reference Price (January)

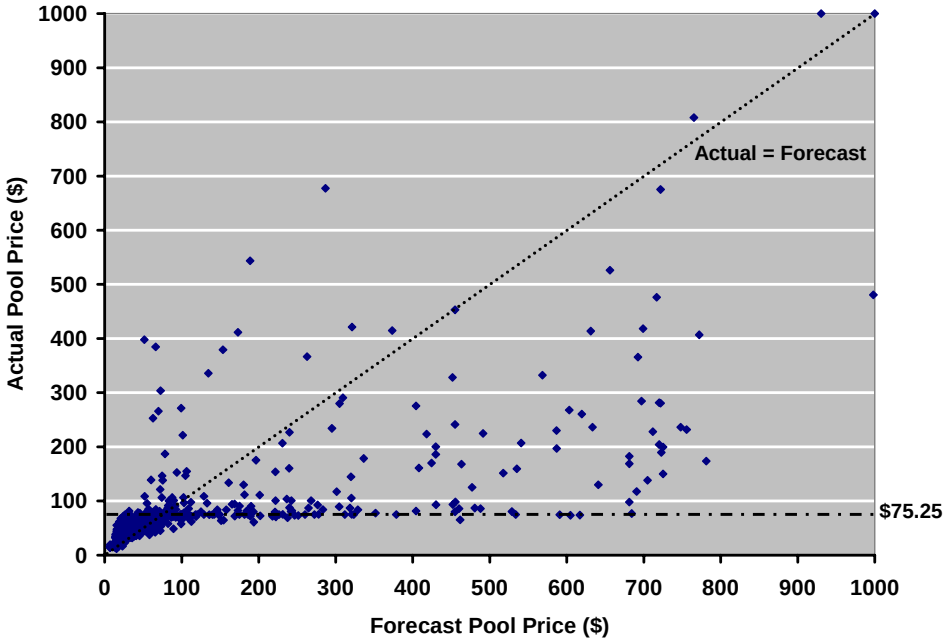
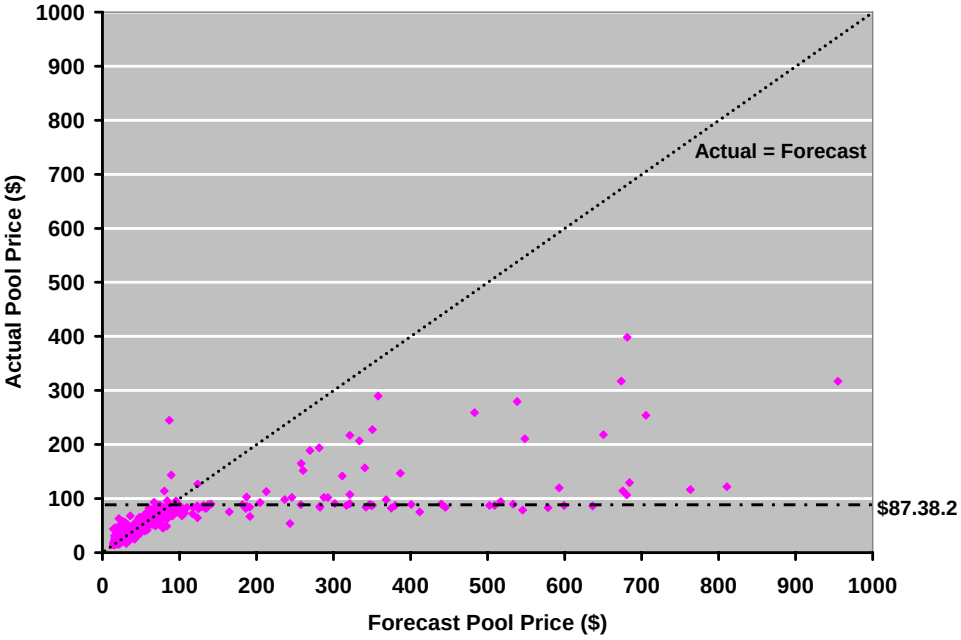


Figure 3.11: Scatter Plot of Actual v. Forecast Pool price and TMR Reference Price (February)



4. CONCLUSIONS

In this report we have examined a number of unanticipated consequences following from the introduction of the DDS market. Our main conclusions are:

- A high degree of Price 'stickiness' around the Reference Price may be resulting in harm to price fidelity
- Participation in the DDS market suggests that DDS payments are sufficiently attractive to some generators to influence their offer behaviour. There is evidence that absent the DDS market they would not offer at such low prices. The result is that a portion of the apparent reconstitution of Pool price for TMR energy is not occurring.
- The release of more information about the DDS market starting in March 2008 does not yet seem to have led to a noticeable improvement in market efficiency.
- The impact of DDS market and the Reference Price on the determination of Pool price are not well represented in the AESO's price forecast. The result is the Pool price forecast exhibits both bias and poor accuracy.

Although not a part of this report, the MSA also believes that the complexity of the DDS market design has been partly responsible for the IT issues experienced by the AESO and a contributory factor in the pricing errors that have been reported.

The MSA recognizes that the DDS market is continuing to evolve and it, along with other aspects of the market related to Quick Hits, will continue to be a focus of our monitoring activities. DDS metrics will be included in our Quarterly reports, beginning in third quarter of 2008. The MSA already publishes daily information on TMR and DDS in our Daily Snapshot and will examine whether we can supplement this with further metrics in our weekly Market Monitor.[25]

Achieving a true reconstitution of Pool price for TMR energy is much more challenging problem. The MSA notes that the DDS market represents a relatively complex mechanism to achieve reconstitution. One of its perceived advantages was avoiding the 'race to zero'. The 'race to zero' described where generators dispatched off in order to reconstitute price, even though SMP was higher than their offers, would simply offer lower to ensure dispatch resulting in little or no actual reconstitution. Based on our analysis the 'race to zero' is still occurring but in a different form. Currently DDS payments are sufficiently attractive that generators who absent DDS would have been unlikely to run are incented to offer low in the hope of providing DDS. The inherent problem is that a generator who does not want to run at the prevailing Pool price prefers receiving DDS payments to receiving nothing. The result is less reconstitution than might have been expected and a transfer from generators as a whole (those who pay for DDS) to generators providing DDS. The MSA is inclined to believe that the 'race to zero'

[25] All MSA reports are available on our website: http://www.albertamsa.ca

may be impossible to avoid no matter what reconstitution mechanism is introduced.

While the 'race to zero' may have eliminated some of the intended reconstitution for TMR energy, it does appear as if partial reconstitution is taking place. Assessing exactly how much is problematic given the dynamic nature of our market and the other market mechanisms that could have impacted price. Against any gains in price fidelity from reconstitution, the MSA also believes it is important to weigh the adverse impact on price fidelity of 'stickiness' around the Reference Price and the impact on the fidelity of the price forecast. In both of these areas improvements to the market design appear to be possible.

In conclusion, the MSA notes reconstitution mechanisms are inherently complex and are likely to have unanticipated consequences. Price fidelity in the Alberta market would be best served by elimination of the need for TMR energy. The MSA notes that in this regard the need for TMR is expected by the AESO to decline in coming years, but that this decline is subject to approval of new transmission.