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MSA REPORT

Spinning Reserve Market Event Report

23 January, 2004

MARKET SURVEILLANCE ADMINISTRATOR

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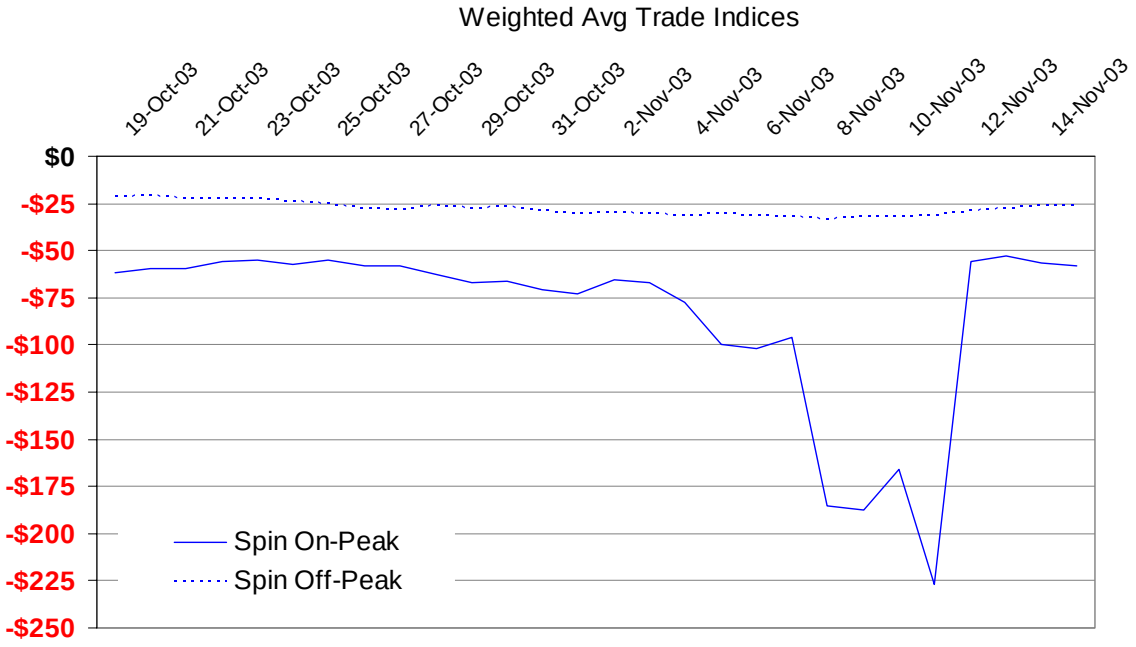
1. MARKET EVENT

The daily equilibrium prices in the active On-Peak spinning reserve market on the Alberta Watt Exchange (Watt-Ex) beginning October 29, 2003 for November 4 delivery, took a noticeable turn to the negative (**Figure 1**) from the index range in the prior weeks and months. Spinning reserve contracts, like all other active ancillary service contracts traded on Watt-Ex, are priced at a negative differential to the prevailing Pool price on the date of delivery of the contract (e.g. -$50.00). A seller with a contract price of -$50 is paid [Pool price - $50] times the delivered volume for each hour of the contract. When Pool price is less than the discount (e.g. Pool price less than $50) the seller receives nothing.

Figure 1 – Watt-Ex Active Spinning Reserve Index Prices



The MSA had noted that trading activity in recent weeks had been increasingly competitive in the spinning reserve market as demonstrated by a gradual trend to more negative differentials. This trend seemed to be a gradual change involving many market participants – the expected outcome of increased competition. The trend to more negative differentials naturally results in lower costs to the AESO. However, a significant change in this trend was observed for delivery dates from November 3 - 11 and was related to offers for hydro reserves from TransAlta Utilities (TAU). The trend in average costs to the AESOover the same period is less obvious as the day to day variations in pool prices are significant.

2. BACKGROUND

On Watt-Ex, active ancillary service contracts are traded over multiple days prior to the date of delivery of the reserve service – for standard contracts, typically the five business days prior to delivery. As an example, the Nov 25 active On-Peak spinning reserve contract refers to active on-peak spinning reserve for delivery on November 25. This contract could be traded on any and all days from Nov. 18-24. The general process for trading on Watt-Ex is described below.

Suppose that the AESO needs to buy 200 MW of On-Peak Spinning reserve for delivery on November 1. The buying is carried out over the 5 previous business days. On some days no volumes are bought but the AESO will need to buy its requirement over the five days. Each day with one or more trades has its own settlement price and all sellers will be paid that price – much the same as the AESO's energy market that clears at a single price for all sellers. The daily settlement price is called the 'Equilibrium price' and each seller has a 'contract' for the delivery day (November 1) specifying volume and the price is the Equilibrium price for the day of the trade. On the delivery day, not all sellers will be paid the same price because it depends on the day that they sold to the AESO.

On the first trading day, suppose the AESO posts that it is willing to buy up to 100 MW of On-Peak Spinning reserve for delivery on November 1 if the price is better than - $50. Here, 'better than -$50' means prices offered at discounts greater than -$50 such as -$70. The AESO pays the seller less because the discount to Pool price is higher. For a discount of $X, the AESO pays out [Pool price - $X] times volume for every hour in the On-Peak period that the Pool price is greater than $X.

So, AESO bids 100 MW @-$50

Say, the offers are:

Company AAA offers 50 MW @-$70
Company BBB offers 30 MW @ -$60
Company CCC offers 20 MW @ - $45
Company DDD offers 20 MW @ -$30

The above offers have been ranked by cost. Given these offers, the AESO would buy 50 MW from AAA and 30 MW from BBB. Companies CCC and DDD are too expensive relative to the AESO's bid and will not trade. Note that the AESO buys only 80 MW (50 MW from AAA and 30 MW from BBB) against the total of 100 MW it was willing to buy this day. The settlement price for these trades is called the Equilibrium price and lies half way between the most expensive bid that is met and offer that is taken. In this example we have only one bid price, -$50, and the most expensive offer that is taken is -$60. Hence, the Equilibrium price for this day's trades is -$55 and is the price that applies to both trades despite their differing offer prices.

Suppose that the AESO procures the remainder of the 200 MW that it needs on the second trading day. That day it buys 120 MW (200 MW it needs in total less the 80 MW bought on the first day) at an Equilibrium price of -$60 from AAA (60 MW) and DDD (60 MW).

Overall then, on November 1, the AESO takes delivery of its 200 MW of On-Peak spin as follows:

Company AAA 50 MW @-$55 and 60 MW @-$60
Company BBB 30 MW @-$55
Company DDD 60 MW @-$60

It can be seen that not all sellers get the same price. Indeed, Company AAA has two contracts with different prices. Since there are different prices involved in these four contracts, even though all sellers on a given trade day receive the same price, Watt-Ex calculates and posts a market index for the day of delivery of the product and it is the volume-weighted trade Index.

In our example, the trade Index is:

(80 MW X -$55 + 120 MW X -$60) / (200 MW) = -$58

Note that this trade Index does not affect the contract prices between the AESO and the sellers. It is simply the Index of the market as a whole, the 'volume-weighted average' of the market prices. The trade Index allows the market prices to be described by a single value, rather than several equilibrium prices due to the multiple day procurement window.

The trade Index is of significance to the market since it is a general reference price for the market. Further, and perhaps more significantly, it is the reference price in the Notional Reserve Quantities Agreement between TAU and the Balancing Pool[1], and thus it has an influence on the trading behaviour of TAU in the ancillary services market, as discussed below.

[1] The Notional Reserve Quantities Agreement sets out additional terms and conditions in respect of certain sections of the PPA including the apportionment of the total notional ancillary services obligation among regulating, spinning and supplemental reserves, and the reserve price mechanism.

3. HYDRO GENERATION, THE HYDRO PPA AND THE AS MARKET

Hydro facilities have different characteristics from thermal plants. Although TransAlta Utilities' hydro plants provide only modest amounts of energy (less than 5% of Alberta's demand), many of the facilities were specifically designed to be able to provide significant reserves to support the reliable operation of the system. Historically, the hydro units provided a large portion of the operating reserves needed in Alberta. Generally, the hydro projects are sized to utilize most of the river flow even in high flow years. Consequently, much of the time there is more generating capacity at the plants than there is water to run through them and this makes them a natural source of ancillary services (reserves). Providing reserves from hydro facilities generally does not consume any of the water stored in the facilities reservoir and so the marginal cost of providing the reserves is low or non-existent.

TransAlta Utilities hydro resources were operated under the previously regulated environment in Alberta and became subject to the Hydro PPA in 2001, a power purchase arrangement between TAU and the Balancing Pool. The Hydro PPA is a financial contract extending to December 2020 which prescribes that in exchange for control of the formerly regulated hydro assets in the new deregulated market, TAU maintains a notional obligation to provide given levels of energy and ancillary services to the Alberta market. By comparison, in the thermal PPAs, the plant owners became the plant operators with control (in terms of market participation) handed to the PPA buyers.

The term 'notional obligation' indicates that TAU has a financial obligation to the Balancing Pool. The PPA specifies notional quantities by hour of energy and total AS. The Notional Reserve Quantities Agreement apportions the total AS obligation into the three active AS products and also stipulates that the price basis of any financial payment is to be the trade Index of the product which is published by Watt-Ex.

TAU is free to decide upon its level of participation in the energy and AS markets with its hydro facilities. This is an extremely important point. It makes sense to have the company that has owned and operated the plants for many years responsible for the participation of the plants in the deregulated market. The notional obligations provide a mechanism to return to consumers the value of these plants as they existed under regulation, as well as mitigating market power.

The cash flows with respect to TAU for each of the three active AS products covered under the terms of the PPA are as follows:

- From TAU to the Balancing Pool : (the notional quantity) x (Pool price – trade Index)
- From the AESO to TAU : (the volume provided) x (Pool price - Contract price)

The 'Contract price' is the Equilibrium price applicable on the day that the trade took place between the seller and the AESO. This applies for each of the three active AS products.

The spirit of this arrangement is such that TAU would be approximately cash flow neutral if actual reserve volumes provided matched the notional quantities and assuming that the trade Index in the agreement with the Balancing Pool matches the Contract price. To the extent that TAU was to exceed the notional quantities, the surplus revenue would accrue to TAU. Similarly, any shortfalls relative to the notional quantities would lead to TAU being financially negatively impacted in a similar way. This is not unlike the availability incentive payment structure embedded within the thermal PPAs. Hydro energy quantities are also similar.

The Hydro PPA allocates 400 MW to be the notional quantity of AS in most hours of the year. It did not establish the distribution of the MW among the three active products – regulating, spinning and supplementary reserves. This was done in the agreement between the Balancing Pool and TAU. The details of the process leading to the selection of the specific allocations to each of the three markets are unknown to the MSA. However, we observe the rather strange situation where TransAlta has a notional obligation in the supplemental market that is often in excess of the volumes that the AESO purchases.

Any seller with contract cover will generally be motivated to offer the contract volume at variable cost. The theory behind this is that the seller can shut in its own production and buy from a cheaper source to meet its contracted obligation should such less expensive alternatives be offered. In the case of hydro and ancillary services, the variable cost is low, often zero. Then one might expect TAU to sell up to the notional obligation volumes at close to zero, and any excess volumes at market prices. A key difference in the relationship here is that the price applied to the notional quantities is the trade Index and this is influenced by the daily Equilibrium prices.

It can be contemplated that should TAU be in a physically short position with respect to providing the notional volumes, TAU has an incentive to have a negative impact on the trade Index in the market in which it is short. This incentive is clear if TAU deems that the amount it would receive in the market for the volumes it is capable of providing, is less than the anticipated payment it would make to the Balancing Pool. In fact, this is precisely what began to occur in the supplemental reserve market beginning in August 2002. TAU found that it was unable to meet its notional obligation and began to implement a trading behaviour whereby TAU would offer sufficient volumes at a discount of -$999 in order to minimize the payment that was due to the Balancing Pool. As a result of this circumstance, and TAU's offer behaviour in the supplemental market, TAU routinely receives $0 for providing supplemental reserves to the AESO and passes on $0 to the Balancing Pool under the terms of its agreement. This behaviour is rooted in the existence of the notional quantities and the pricing agreement between TAU and the Balancing Pool.

In general, the above behaviour has been limited to the active supplementary reserve market. The notional quantities for both the active regulating and spinning reserves are substantially less than the market and TAU frequently sells more than the notional volume. Isolated cases of the offer behaviour by TAU were observed and reviewed by the MSA in November 2002 in the active regulating market, as well as in January 2003 in both the active regulating and

active spinning reserve markets. Upon investigation, the MSA was advised by TAU that these events were caused by TAU trading errors. The errors meant that TAU was unable to sell the full notional quantity to the AESO and elected to follow the same offer strategy as used in the supplemental market. At that time, TAU made it quite clear that they might follow the same strategy in the future should they again find themselves in a short position.

The behaviour that has been observed recently and is the subject of this price report in the active on-peak spinning reserve market bears a striking resemblance in nature to what has been occurring in the supplemental reserve market for the last 14 months and was observed briefly in the regulating and spinning reserve markets in late 2002 and early 2003.

It is instructive to provide some examples of how the offer strategy works. It should be noted that TAU is the only participant we are aware of with a financial forward position settled against the trade Index and, accordingly, we have not attempted to disguise their name in these illustrative examples.

Assume that TAU was short and had only 50 MW to sell against a 70 MW notional obligation amount. Suppose that TAU tries to influence the market by selling very cheaply. As with the previous example, on the first trade day, the AESO posts that it will buy up to 100 MW @-$50:

AESO bids 100 MW @-$50

Say, the offers are:

TAU offers 50 MW @-$999
Company BBB offers 30 MW @ -$60
Company CCC offers 20 MW @ - $45
Company DDD offers 20 MW @ -$30

Here we see that TAU is offering at a very high discount (-$999) that is the lowest it can be (arguably equivalent to offering at a variable cost of zero). However, the results of that day's trading activity will not change. The Equilibrium price for the day for all sellers will still be -$55, half way between the most expensive bid that is met and offer that is taken. As a means of influencing the trade Index, this strategy has failed since it has not affected the daily Equilibrium price.

We can see that for TAU's offer strategy to affect the trade Index, its sales must first influence the Equilibrium price on some of the trading days. In fact, for the strategy to work, TAU must be the only seller on the days that it sells to the AESO.

In our example, with only 50 MW to sell, TAU must wait for a trade day that the AESO posts to buy 50 MW or less. Then TAU can sell the AESO's full posted requirement for that day at a very low price, say -$999. This will have the maximum leverage on the Equilibrium price which will be half way between the AESO's bid and TAU's offer.

On trade day 1 of the example, the AESO posted 100 MW @ -$50 and TAU can not offer to sell that day because it cannot meet the whole volume. Say that on trade day 2 the AESO posts 40 MW @-$50. As the volume to be bought (40

MW) is less than what TAU can deliver (50 MW), TAU can meet all the AESO's stated needs on that trading day and have a resulting low Equilibrium price:

AESO bids 40 MW @-$50

Say, the offers are:

TAU offers 50 MW @-$999
Company BBB offers 30 MW @ -$60
Company CCC offers 20 MW @ - $45
Company DDD offers 20 MW @ -$30

The Equilibrium price will be -$524.5 and will apply to the 40 MW that TAU sells to the AESO. Note there are no other sellers on that day and the deeply discounted Equilibrium price affects only TAU and the AESO. Under such a contract, the chances of TAU receiving revenue are quite small – only in any hours where Pool price exceeds $524.5 will the AESO be paying out to TAU for this product. This seems like a good deal for the AESO.

Where TAU's strategy comes into play is the influence that the daily Equilibrium prices have on the trade Index. Assume that over the various trading days 160 MW are bought by the AESO for an average price of -$60 and 40 MW are bought from TAU at -$524.5. This totals to 200 MW for delivery on November 1.

Then the trade Index for November 1 will be:

(40 MW X -$524.5 + 160 MW X -$60) / (200 MW) = -$152.9

It is apparent how the offer by TAU caused a low daily equilibrium price of -$524.5 and this in turn lowered the trade Index price to -$152.9.

TAU will receive income from the AESO on 40 MW @ -$524.5 and pay to the Balancing Pool for 70 MW @ -$152.9. By selling its 40 MW at a deep discount, TAU has managed to lever down the trade index to a low value. Overall, TAU expects to come out ahead with this strategy when it is unable to physically deliver the notional quantity of a given AS product.

4. CHRONOLOGY AND ANALYSIS

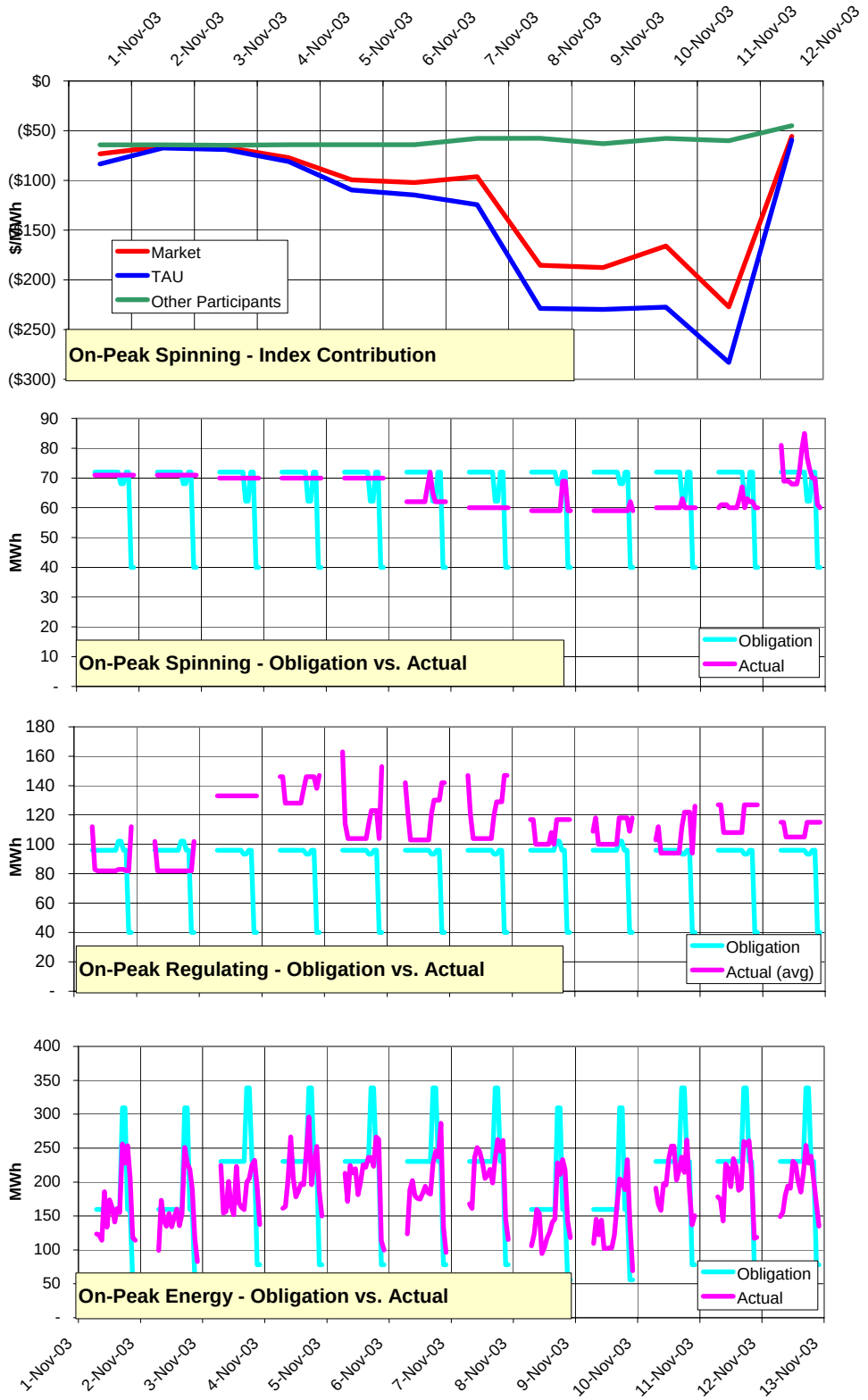
For the week of October 26 – November 1, the MSA observed that TAU delivered approximately 92% of notional volumes in spinning reserve. This was the first week the MSA observed a shortfall to notional quantities in spinning reserve by TAU since June 2003 when regular monitoring of this metric by the MSA was undertaken.

Beginning on October 29 in the Nov 4 on-peak spinning reserve product, TAU offers into the spinning market were significantly more negative than average levels observed in the market and different from their usual pattern. TAU trading activity in On-Peak spinning reserve for the subsequent delivery days of Nov 5-11 resulted in Equilibrium prices as low as -$283, implying that TAU offers had been in the range of -$500. The top chart in **Figure 2** shows the volume weighted contribution to the trade Index for on-peak spinning reserve by TAU and by all other participants. The figure shows that the change in the trade Index of active on-peak spinning reserve in the period shown is clearly attributed to the trading activity of TAU.

TransAlta's Brazeau plant had been running at a reduced level due to planned maintenance that began in early September and this plant typically is a provider of active spinning reserve. The Bow River plants, also an active spinning reserve supplier, provided about half the volume of spinning reserve it typically provides in the week of November 2 - 8 and in the week of October 26 - November 1, which would have been another significant factor in creating exposure or shortness compared to their PPA obligations over these two weeks, in addition to the maintenance at Brazeau.

On November 4, the MSA received a telephone call from TAU in which we were informed that TAU was in a physically short position with respect to spinning reserves. The MSA was also informed that TAU would undertake measures to manage this exposure and that the exposure would persist until the end of November. Based on the MSA's previous experience, it was anticipated that TAU would be 'managing' their short position in a similar manner to the way they handle their short position in the supplemental reserve market (In reality, TAU are not 'managing' their short position; rather they are managing their offers to lower the trade Index against which their position is settled).

Figure 2 – TAU Spinning Reserve Activity, Nov. 1 – 12, 2003



In order to ascertain the magnitude of TAU's short position in spinning reserves relative to notional PPA volumes, the MSA conducted a detailed analysis. The results of this analysis indicate that from November 1-5, TAU was short only 1 – 2 MW in spinning reserve in on-peak hours. From November 6 – 12, TAU was short 10-13 MW in on-peak hours. As shown in the middle two charts of **Figure 2**, the analysis also indicates that in several hours, TAU was concurrently providing greater than the notional level of regulating reserves while providing less than notional volume of spinning reserves. This would suggest that TAU chose to allocate reserve volumes that could have enabled TAU to cover its short spinning position, into the higher value regulating reserve market. The bottom chart in **Figure 2** shows that TAU was also short of notional volumes on energy the majority of the time in on-peak hours in the period from November 1 -12.

Figures 3, 4, and **5** show how the capacity of the three TAU hydro systems was distributed in terms of energy and ancillary services for the period from November 1 – 12. These three figures show that the capacity for Bighorn and Brazeau (taking into account the current outage) was essentially all accounted for while capacity in the Bow system appears to be significantly below MCR in the period shown. Current water storage data from Alberta Environment (not shown here) indicates that several reservoirs on the Bow system are below normal levels. This suggests that operational constraints in the Bow system appear to have been contributing to TAU's short position with respect to energy, which in turn, would likely affect TAU's provision of ancillary services.

Another aspect of the analysis undertaken by the MSA in this matter was to review the historical impact to TAU from the Hydro PPA. The results of this analysis indicated that for January through October, 2003, TAU has experienced a cumulative loss of approximately $9 million on the energy component of the Hydro PPA. This is a result of the energy shortfall brought about by dry conditions through the summer and fall of 2003. The vagaries of nature will yield high and low water years with the corresponding effect on TAU.

The low water year that reduces energy generation contributes to an improved capability in providing AS. The AS component of the Hydro PPA however has been profitable for TAU in 2003 and over the January through October period more than offset the loss position on hydro energy. This underscores the significance to TAU of maximizing ancillary services revenue in 2003.

The last transactions by TAU in the active spinning reserve market which resulted in a heavily negative Equilibrium price occurred on November 4 and involved the November 11 On-Peak contract. Subsequent to November 4, the MSA has observed that daily Equilibrium prices for On-Peak Spinning Reserve have returned to prior levels (-$55.00 to -$60.00). TAU has continued to transact in the On-Peak spinning market, however at prevailing market price levels. It appeared that TAU was still short relative to their notional PPA volumes and it is thus surprising to the MSA based on the previous practice that they were selling at prevailing market prices.

Figure 3 – Bighorn Offer Profile, Nov. 1 - 12, 2003

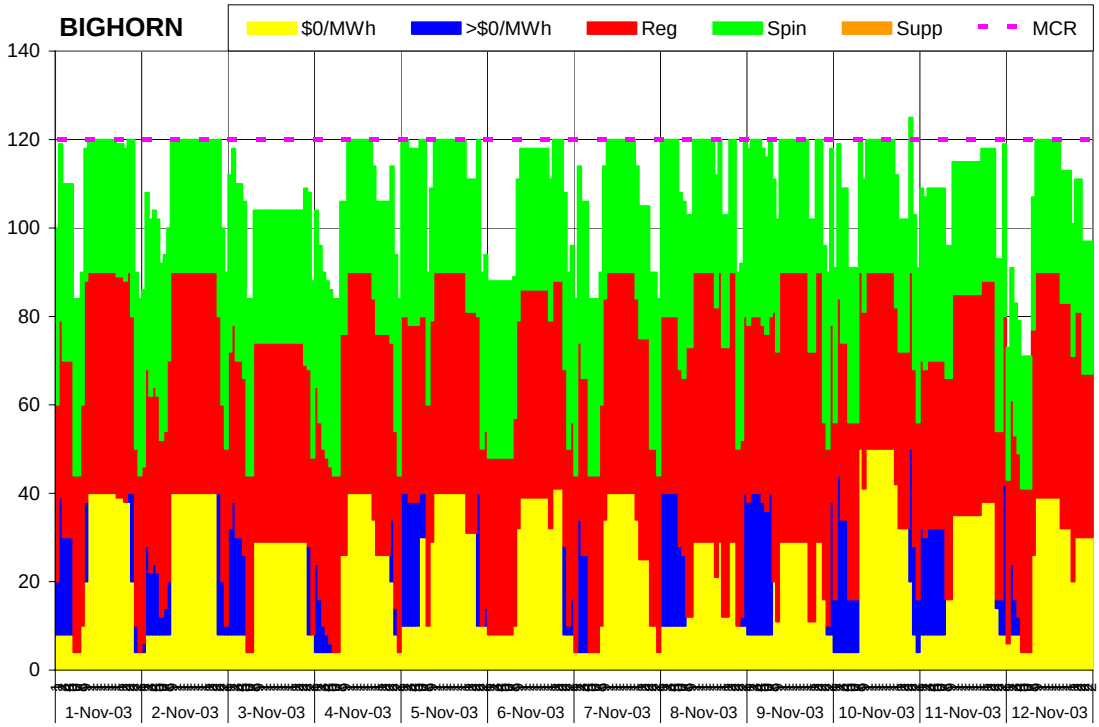


Figure 4 – BOW System Offer Profile, Nov. 1 – 12, 2003

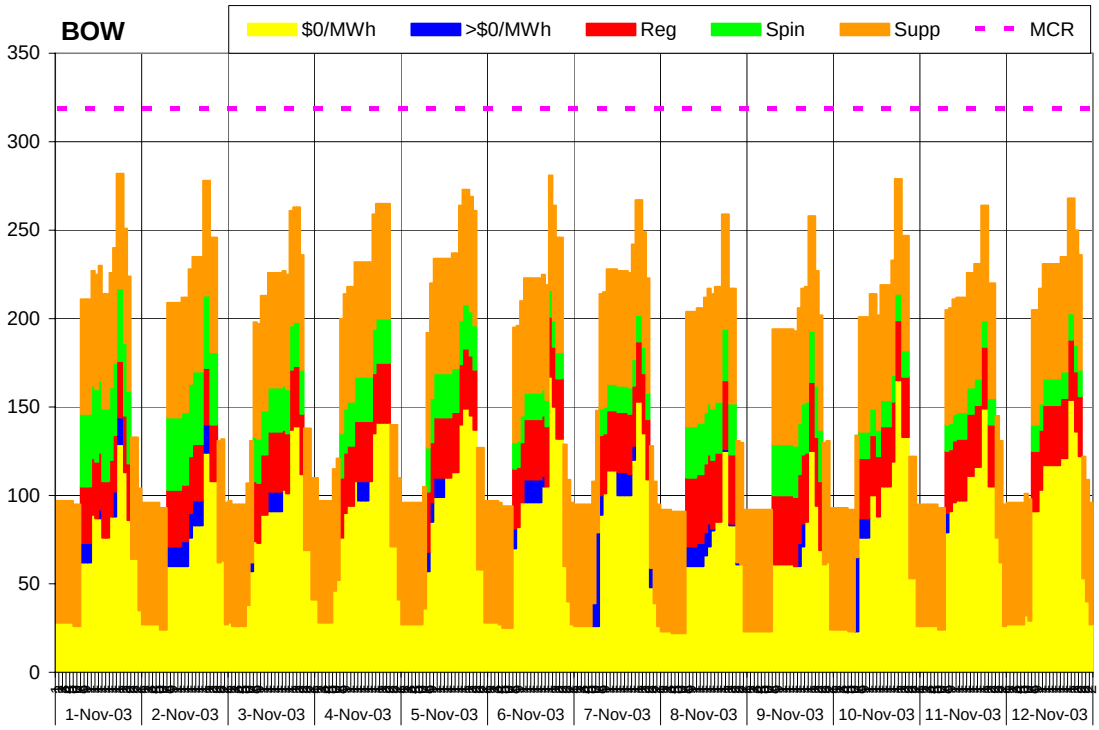
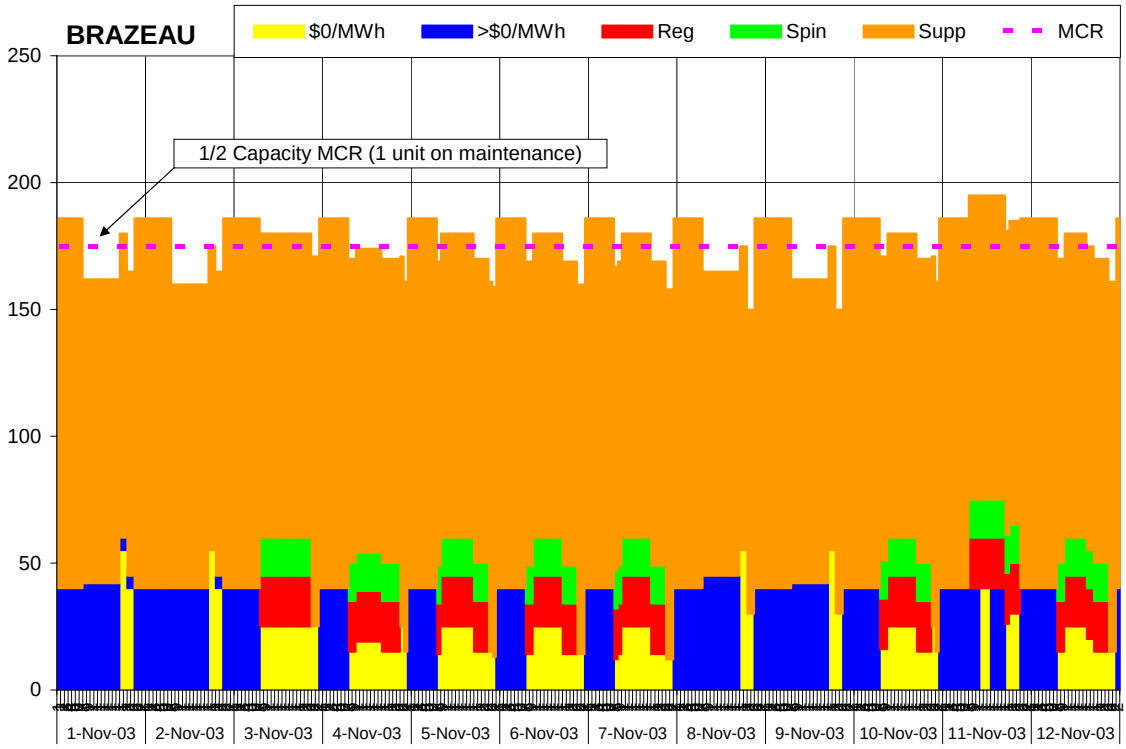


Figure 5 – Brazeau Offer Profile, Nov. 1 – 12, 2003



5. ASSESSMENT OF HARM

As with other market anomalies, the issue of harm is obviously an important one to consider. In this case, harm as a result of the behaviour in question could be characterized as follows:

- ***Market Participants:*** The spinning reserve market has experienced anomalous market outcomes for reasons that do not appear consistent with a fair, efficient and openly competitive market. A key concern for the MSA in this matter is the impact that such anomalous outcomes may have on the confidence of market participants that the ancillary services market is a properly functioning market. For example, the standard market response to a shortage of supply is a rise in the market price which signals scarcity. In this case, the price signal is counter-intuitive.

- ***All Stakeholders*:** Current and potential market participants as well as market operators and others will have a reduced level of confidence that the ancillary services market is a properly functioning market. When market outcomes cannot be tied to market fundamentals, confidence in that market is eroded.

- ***Other Sellers in the Market*:** On days when TAU implements the trading strategy in question, other sellers are completely displaced from the market since TAU must garner the entire volume of spinning reserve that is transacted in order to have the desired effect on the Equilibrium price. Other sellers are however, able to compete in the market on subsequent trading days within the procurement window for the remaining volumes the AESO requires for that delivery day.

- ***AESO:*** The AESO finds itself in a position where a portion of its Spinning reserve purchases are deeply discounted, essentially free. With reduced overall costs, the AESO on behalf of customers appears to come out ahead from this process and is not directly harmed.

- ***The Balancing Pool*:** Since the trade Index is the reference price for the notional reserve payment from TAU to the Balancing Pool, the payment is forced close to zero due to the effect of the highly negative trade Index. Thus, the Balancing Pool is receiving significantly less from TAU than would be expected from 'the average market price' times the notional quantity. The MSA is concerned that the spirit of the Hydro PPA might not be preserved through this process.

6. SUMMARY AND CONCLUSIONS

- The MSA has observed that since the November 4 trading day, no further trading activity of this nature has been observed to date. The behaviour in question did not affect active On-Peak spinning reserve trade Index beyond November 11.
- It is clear that the hydro system is experiencing a low year with respect to water levels, causing TAU to be short relative to notional PPA energy volumes. In any given hour, TAU is faced with optimizing its asset portfolio between energy and ancillary services. Optimizing the return of an asset portfolio is normal business practice. However, such optimization, when it results in anomalous or counterintuitive market outcomes (i.e., the effects on the trade Index), is a concern to the MSA and is not acceptable.
- The potential and incentive for TAU to repeat such behaviour as a result of the Hydro PPA, remains in any future period in which TAU is (or deems itself to be) physically short of meeting the notional reserve volumes. Given the remaining 17 year life of the PPA, the probability of such behaviour reoccurring, would appear to be almost certain.
- While the MSA views the trading activity by TAU as being rational profit maximizing behaviour and within the rules of the AS market, the MSA views the resulting market outcomes to be aberrant in that no other profit maximizing participant in the ancillary services market is likely to have an incentive to trade in a similar way.
- This behaviour should be viewed as harmful in that market prices cannot be tied to fundamentals (negatively impacting the participants' confidence). As well, there remains a concern that the spirit of the Hydro PPA is not being preserved.
- The option of changing the fundamental arrangements involved in this issue, the Hydro PPA and the agreement between TAU and the Balancing Pool, is beyond the MSA's mandate. However, the MSA remains concerned that this behaviour has a negative effect on the market. Consequently, the MSA is publishing this information to help participants to better understand these anomalous market outcomes. By shedding a light on some of the structural aspects of the AS market it is hoped to add confidence to the market.
- The market would be well served by the publication of the notional quantities and the index pricing within the agreement between TAU and the Balancing Pool. This would be consistent with the whole PPA process that was undertaken prior to 2001 and consistent with the MSA's own belief that markets work better with more information.
- The MSA expects TAU and the Balancing Pool will address the MSA's concern over this matter and collectively develop and implement solutions so as to prevent this type of behaviour in the future.
- The MSA will have discussions with Watt-Ex around the appropriateness of them continuing to publish indices which can be influenced by the behaviour of an individual party. The MSA will work with Watt-Ex to have them either

remove all existing indices or replace them with ones where the algorithms are less subject to influence by a single participant.