BEFORE THE
RHODE ISLAND PUBLIC UTILITY COMMISSION

DOCKET NO. 4149

DIRECT TESTIMONY

OF

RICHARD S. HAHN

IN THE MATTER OF NATIONAL GRID'S STANDARD
OFFER SUPPLY PROCUREMENT PLAN FOR 2011

ON BEHALF OF THE

RHODE ISLAND DIVISION OF PUBLIC UTILITIES AND CARRIERS

May 13, 2010

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INTRODUCTION

Q. Please identify yourself for the record.

A. My name is Richard S. Hahn. I am a Principal Consultant for La Capra Associates. My business address is One Washington Mall, Boston, Massachusetts 02108.

Q. Mr. Hahn, please summarize your experience and qualifications.

A. I have a BSEE and an MSEE in power systems engineering, and an MBA degree. I am a Registered Professional Engineer in Massachusetts. I have worked in the electric utility business for more than 35 years. From 1973 to 2003, I worked at NSTAR Electric & Gas (formerly Boston Edison Company). I have held many technical and managerial positions in both regulated and unregulated subsidiaries covering all aspects of utility planning, operations, regulatory activities, and finance. In 2004, I joined La Capra Associates. Since then, I have worked on projects related to resource planning, transmission, power procurement, generating asset valuations, analyzing market rules and prices, mergers, and litigation support. My resume is provided in Exhibit RSH-1.

Q. Have you previously prepared testimony before the Commission?

A. Yes. In Docket No. 4111, the Town of New Shoreham Renewable Energy Project, I filed direct and surrebuttal testimony. In Docket No. 4065, the National Grid's ("NGRID's" or the "Company's") proposed rate increase, I filed direct and surrebuttal testimony. I also filed direct and surrebuttal testimony in Docket No. 4041, NGRID's SOS procurement Plan for 2010. On April 23, 2009, I submitted comments on NGRID's accelerated procurement plan for Standard Offer Service ("SOS") power supplies, and appeared at the April 28, 2009 hearing in this proceeding. On April 8, 2009, I submitted direct testimony in Docket No. 4029 regarding the load forecast used in the justification of the Rhode Island Reliability Project. I have also testified before regulatory commissions in other states, as described in Exhibit RSH-1.

Q. What has been your experience relative to power supply procurement?

A. Most recently at La Capra Associates, as noted above, I have assisted the Division in reviewing NGRID's plans to procure SOS power supplies and comply with Rhode Island's Renewable Energy Portfolio Standards. I have also assisted the Pennsylvania Office of Consumer Advocate in reviewing the SOS procurement plans of several of Pennsylvania's Electric Distribution Companies, including PECO Energy, PPL Utilities, West Penn Power, Citizens Electric Company, and Wellsboro Electric Company. I was a leading member of La Capra Associates teams that served as the Independent Evaluator of a complex power contract between Consumers Energy and the Midland Cogeneration Venture, and have overseen the implementation of RFPs for long-term contracts between utilities and renewable energy facilities. During my career at NSTAR, I was responsible for integrated resource planning, energy supply planning, and wholesale power purchases and sales.

Q. What is the purpose of your testimony in this proceeding?

A. La Capra Associates, Inc. ("La Capra Associates") has been retained by the Division to review and comment on NGRID's plan to procure SOS power supplies for 2011 and to comply with Renewable Energy Standards ("RES") for 2011, including the Northbridge study that compared various procurement methodologies. This testimony presents the results of that review, and my conclusions and recommendations.

SUMMARY

Q. Can you summarize the results of your review and your conclusions and recommendations?

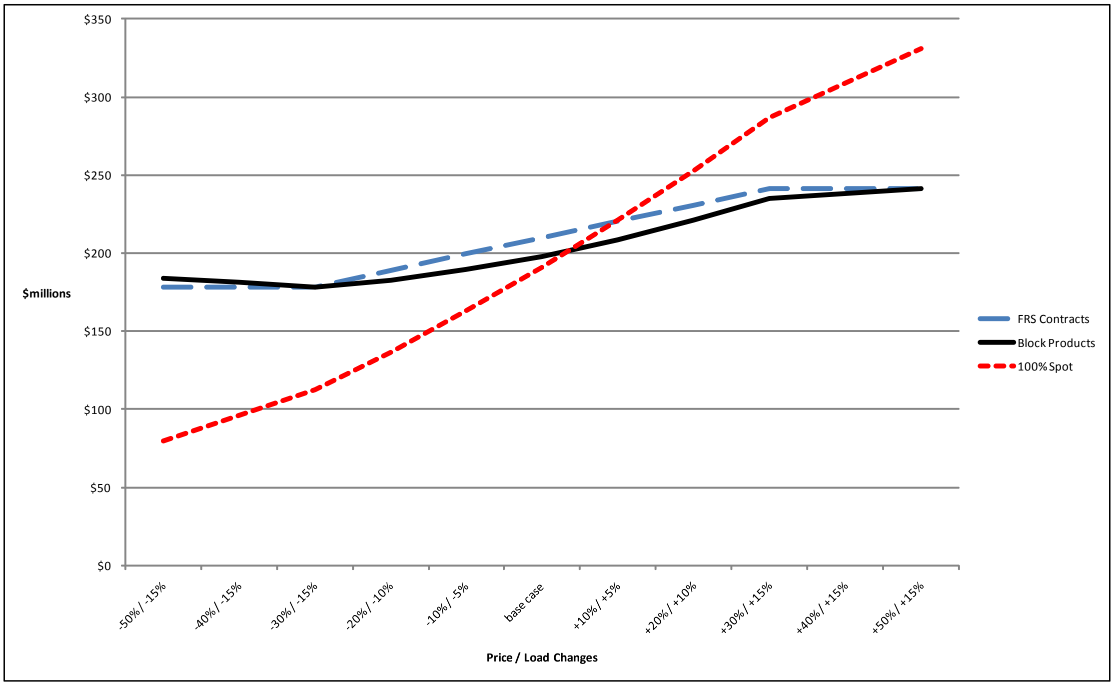
A. My recommendations on the proposed procurement plan can be summarized as follows.

- I recommend that the proposed redefinition of the procurement groups be approved.
- The proposed inclusion of spot market supplies for the Residential and Commercial Customer groups is reasonable and should be approved.
- For the Residential Customer group, the Company should utilize Block Products instead of the Full Requirements Service contracts proposed by NGRID. This procurement method will result in lower, more stable SOS rates on average over time. As shown in the following chart, Block Products are a very effective hedge against unanticipated increase or decreases in market prices and the level of SOS loads. Block Products are also effective in avoiding large over or under-recoveries under a wide range of outcomes, and they represent a reasonable, cost-effective hedge against price and load volatility.

TOTAL ANNUAL COST OF RESIDENTIAL CUSTOMER SOS POWER SUPPLIES

After Annual Reconciliation

Price / Load Change	-50% / -15%	-40% / -15%	-30% / -15%	-20% / -10%	-10% / -5%	base case	+10% / +5%	+20% / +10%	+30% / +15%	+40% / +15%	+50% / +15%
FRS Contracts	$178	$178	$178	$189	$199	$210	$220	$231	$241	$241	$241
Block Products	$184	$181	$178	$183	$189	$198	$208	$221	$235	$238	$241
100% Spot	$80	$96	$113	$137	$163	$191	$221	$253	$287	$309	$331



- For the Industrial Group, I recommend that the Company transition to an SOS supply plan based upon 100% spot purchases. This procurement method for this customer group will eliminate the cost of solicitations for Full Requirements Service contracts and avoid the high risk premiums due to potential customer switching.
- Commercial customers should be allowed to elect either the fixed or variable SOS rate option once every twelve months to be consistent with the Company's terms and conditions for its retail rates.
- The rate design aspects of the proposed plan, including reconciliations more than once per year, is reasonable and should be approved.

- With a minor revision described below, the Plan Documents are reasonable and should be approved.

OVERVIEW OF THE COMPANY'S MARCH 1, 2010 FILING

Q. Can you describe the Company's proposed plan to procure power supplies to meet its SOS obligations?

A. In its filing in this proceeding, the Company proposes to establish three groups of customers for the purposes of SOS power supply procurement. The Industrial Customer group would consist of rate classes G-32, G-62, B-32, B-62, and X-01. The Commercial Customer group consists of rate classes G-02, C-06, S-06, S-10, and S-14. The Residential Customer group consists of rate classes A-16 and A-60.

Q. Hoes does these customers groups compared to the Company's procurement groups for 2010?

A. In its approved procurement plan for 2010, NGRID utilized two customers groups. The Large Customer group consisted of rate classes G-02, G-32, G-62, B-32, B-62, and X-01. The Small Customer group consisted of rate classes A-16, A-60, C-06, S-10, and S-14. Because NGRID has proposed to change the definition of the customer groups, 2011 will be a year to transition to the new customer group definitions, with the transition to be fully implemented by 2013 according to the schedule proposed by the Company.

Q. How does the Company plan to procure SOS power supplies for the three customer groups in its March 1, 2010 filing?

A. For the newly-defined Industrial Customer group, NGRID proposes to use Full Requirements Service ("FRS") under short-term (i.e., three month) contracts with a fixed but different per KWH price for each month for 100% of the SOS supply obligation. This procurement plan is a continuation of the procurement plan for the Large Customer group for 2010. In January 2011, the load assets in this group will be limited to include only Industrial Customers. Requests for Proposals ("RFPs") for SOS power supplies for this customer group will be issued four times per year, with the first solicitation planned for the fourth quarter of 2010 for deliveries to be made in the first quarter of 2011. Each solicitation will be for 100% of the group load. The schedule for procurement activities for this customer group is provided in Schedule MMJ-3A in the Company's filing. Because the procurement method for the Industrial Customer Group is a continuation of the 2010 methodology for the Large Customer group, no transition period is required. The schedule for procurement activities for this customer group is provided in Schedule MMJ-3A in the Company's filing.

For the Commercial Customer group, the Company proposes a layering and laddering approach with FRS contracts to supply 90% of the load for this customer group with terms of six months and twelve months, and 10% of the load supplied by ISO-NE spot markets on a steady state basis. RFPs for SOS power supplies for this customer group will also be issued four times per year for 30% of the SOS load obligation. Two of the solicitations will be for staggered twelve month contracts and two will be for sequential six-month contracts. RFPs are issued during the calendar quarter immediately proceeding the effective date when deliveries commence. Because the definition of this customer group is changing from 2010, a transition period will be required. Procurements for approximately 87.5% of the load for the Small Customer group through

March 2011 have already been made. In mid-2010, the Company proposes to procure the remaining 12.5% through March 2011. Originally, it was contemplated that the 12.5% remaining tranche would be from FRS contracts. However, the Company is now proposing to procure 7.5% in FRS contracts and 5% via spot purchases. For the balance of 2011, three nine-month contracts for FRS totaling 95% of the load for the newly-defined Commercial Customer group will be executed, with 5% of this load being serviced by spot markets. These solicitations will be issued in the last two quarters of 2010 and the first quarter of 2011. Commencing in January 2012, SOS supplies for the Commercial Customer Group will come from three six-month contracts for 20% each of the group load, one twelve-month contract for 30% of the load, and 10% from the spot market. For deliveries commencing in July 2012, one six-month and one twelve-month contract will be executed. The steady state procurement activities for the Commercial Customer group will not be reached until 2013. The schedule for procurement activities for this customer group is provided in Schedule MMJ-3B in the Company's filing.

The Residential Customer group is part of the Small Customer group in 2010. As described above, procurements have already been made for 87.5% of this load through March 2011. For the remainder of 2011, the Company proposes to sign three nine-month contracts totaling 95% of the load for this group with 5% supplied from the spot market. Starting in 2012, the Company proposes to transition to a steady state supply mix similar to that proposed for the Commercial Customer group described above. The steady state supply mix for the Residential Customer group will be based on FRS contracts for 90% of the load with terms of six, twelve, eighteen, and 24 month terms, each for 15% or 20%

of the load. The steady state procurement activities for the Residential Customer group will not be reached until 2013. The schedule for procurement activities for this customer group is provided in Schedule MMJ-3C in the Company's filing.

Q. Why does the Company propose to rely upon FRS contracts and a small percentage supplied via spot market?

A. The Company bases it selection of FRS contracts on a study performed by Northbridge, which purports to establish that FRS contracts are a better hedge against price and volume volatility. The reason offered for reliance on spot purchases is that it allows the Company to remain active in bidding loads into ISO-NE markets. Should a FRS supplier default on its obligations, the Company asserts that it will be better able to replace those power supplies.

Q. How does the Company propose to establish SOS rates for each group of customers?

A. For the Large Customer group, there will be fixed but different rates each month, with the rates for a calendar quarter established one to two months in advance. For the Commercial and Residential Customer groups, the Company will develop rates based upon procurements made in advance and a forecast of the cost of spot market purchases. For the first three months of 2011, the rates will be based upon the 2010 procurement groups and procurements made in 2010. For the last nine months of 2011, there will be one rate set for each of the Commercial and Residential Customer groups. Beginning in 2012, the rates for the Commercial and Residential Customer groups will be set every six months, based upon procurements made in advance and a forecast of the cost of spot market purchases.

According to the Company's testimony, starting in April 2011, Commercial customers will have a one-time option to select fixed pricing or variable pricing. With the variable pricing option, the SOS rate will be different for each month, similar to the manner in which prices will be set for the Industrial Customer group. Under the fixed pricing option, the SOS rate is the same rate for each month in the billing period. The default option is the variable price that changes each month. Customers have a one-time opportunity to notify NGRID of their desire to be placed on the fixed pricing option. The variable pricing option requires that, when the Company solicits FRS bids for six to twelve month terms, individual prices be bid for each month.

Q. What is the Company's proposal for complying with Renewable Energy Standards ("RES")?

A. The solicitations of FRS conducted by NGRID will seek separate bids for compliance with Rhode Island's Renewable Energy Standard ("RES"), which requires that 5.5% of the 2011 power supplies come from renewable energy, with 2.0% coming from existing renewable energy facilities and the balance coming from new renewable energy facilities. This proposal is a continuation of the 2010 plan. By seeking separate bids, the Company asserts it can evaluate the cost-effectiveness of compliance by either combined or separate REC purchases.

THE PROPOSED PROCUREMENT GROUPS

Q. The Company has proposed changing the definition of its SOS customer procurement groups to Industrial, Commercial, and Residential from the Large and Small Customer definitions in the 2010 plan. Do you agree with that proposal?

A. Yes. In my testimony in Docket 4041, I recommended making such a change. Having three procurement groups, Industrial, Commercial, and Residential, is superior to the Large and Small Customer groups previously used by the Company. This change is appropriate and should result in better alignment of customer interest and the likelihood of switching.

THE INDUSTRIAL CUSTOMER GROUP

Q. Please comment on the design of the procurement process for the newly defined Industrial Customer Group.

A. NGRID proposes to continue the plan previously used for the formerly defined Large Customer group for this group of customers. This approach is based upon three-month FRS contracts with different but fixed prices each month. However, this group of customers is the most likely to switch to competitive suppliers, especially after the redefinition of procurement groups. The Company should consider the option of using 100% spot market prices for the Large C&I group, rather than FRS contracts with three-month terms. This will eliminate the solicitation activities for one of the three SOS procurement groups and costs of those activities. It will also avoid the high risk premium associated with the volumetric risk and the rate impact of the loss of several very large customers on the remaining customers in this group that stay on SOS supply. I made this recommendation in Docket No. 4041, and re-iterate it here.

Q. Has the Commission already ruled on that recommendation?

A. In Order 19839, the Commission approved NGRID's plan for the formerly defined Large Customer group through March 2011. However, the Order states that this decision does not foreclose the possibility of different procurement and pricing structures for a period commencing after March 31, 2011.[1] Therefore, it is appropriate to raise this issue in this proceeding.

Q. Logistically, how would such an approach work?

A. All Industrial Customer group SOS loads would be served by such spot purchases for energy, capacity, and ancillary services purchased from ISO-NE markets, and RES compliance would be met through separate REC purchases. NGRID would bid this load into these markets on behalf of these customers, but the customers would assume all of the price risk, which would be primarily limited to energy and REC prices, as capacity and ancillary services costs are well known one month in advance. If necessary, the Company could develop a month-ahead forecast of such rates, but the actual load would settle against actual, after-the-fact hourly energy prices, and the Company would charge customers based on those hourly rates. Since ISO-NE bills its participants at least weekly, the Company will have the information to bill these hourly priced customers promptly. The Company would amend its tariff to describe the process of setting these rates. Under this approach, the Company assumes no risk.

[1] See page 20 of Order 19839.

Q. Has 100% spot pricing for large customers been used in other jurisdictions?

A. Yes, this approach is being used by most of the large Electric Distribution Companies ("EDCs") in Pennsylvania after generation rate caps expire.

Q. Would this approach provide greater incentive for large customers to switch to competitive suppliers?

A. That is possible, but any increase in switching potential is likely to be small. Remember that these customers already have the greatest potential for and likelihood of switching. They have large loads and are experienced in procuring goods and services, so buying generation service from a competitive supplier is not much different from their normal business practices. Under both approaches, SOS prices will change monthly, so large customers will be incented to switch to competitive suppliers if they desire more stable, predictable prices.

Q. Assuming a procurement plan for the Industrial Customer group based upon 100% spot purchases is approved, how should the Company transition to this approach?

A. The Company should select a date in the near future, such as January 2012 or January 2013, when SOS procurements based upon 100% spot purchases would be effective. That will provide sufficient notice for customers in this group to prepare for the change.

THE COMMERCIAL CUSTOMER GROUP

Q. Please comment on the proposed procurement plan for the newly defined Commercial Customer Group?

A. Once the proposed plan reaches its steady state, SOS power supplies for the Commercial Customer group will be based upon layered and laddered FRS contracts for 90% of the load, with 10% being supplied by spot purchases. At a high level, the structure of this plan is acceptable. The layering and laddering approach results in four procurements per year, each with contract terms that range from six to twelve months. For this customer group at this time in Rhode Island, I believe that the use of FRS contracts is acceptable.

Q. Do you agree with the component of the plan to acquire 10% of the SOS power supplies for this group through spot purchases?

A. Yes. Including spot purchases at the 10% level is within the band of reasonableness.

Q. Do you have any concerns with the proposed plan for the Commercial Customer group?

A. Under the Company's proposed plan, it will take until January 2013, or more than two years, to reach steady state. One of the reasons for this lengthy transition period is the desire to have the plans coincident with the calendar year. Three procurements with nine-month contracts for 95% of the SOS load will be made for deliveries March through December 2011. For deliveries in the first six months of 2012, three additional procurements with six-month contracts for 60% of the SOS load will be made. The transition to the steady state procurement plan begins with a twelve month purchase for 30% of the SOS load. The basis for this lengthy transition plan is a competitive supplier survey undertaken by NGRID. According to this survey, competitive suppliers prefer FRS contracts on a calendar year basis. It is unclear why SOS procurement plans should be based upon supplier preferences. SOS plans should be designed and implemented based upon what is best for customers. If the Company's proposed plan is the best one, Rhode Island customers should not wait to more than two years to fully implement it. In discovery questions submitted to the Company, I have requested the results of the survey and supporting information. Responses to those discovery questions were received on May 12, 2010, providing insufficient time to reflect those responses in this testimony.

The other concern is the one-time option offered to Commercial Customers to choose between fixed and variable pricing. Once a Commercial Customer makes this election, it is bound by the election to perpetuity. The Company is correct to be concerned about customers "gaming the system" by frequent switching between these options. However, allowing a switch between fixed and variable monthly pricing once every year or two on a set schedule should assuage any concerns about gaming. The Company's terms and conditions for its retail rates allow customers to change rates every twelve months. I believe that the same provision should apply to commercial customers in their choice of a fixed or variable SOS rate.

THE RESIDENTIAL CUSTOMER GROUP

Q. Please comment on the proposed SOS procurement plan for the newly defined Residential Customer group.

A. Once steady state is reached under the Company's plan, 90% of the SOS power supplies for the Residential Customer group will come from FRS purchases and 10% will be supplied via the spot market. The structure of this plan is based upon layered and laddered contract with terms of six, twelve, eighteen, and 24 months. Two 24-month contracts will each supply 15% of the load, and will be staggered by twelve months. Two eighteen months contracts will each be for 20% of the load, and there will be one contract each with a six and twelve month term for 15% of the load, bringing to total to 90% via

FRS contracts. Procurements will be made four times per year. The general structure of this program provides the diversity in the amount, timing, and length of contracts.

Q. Do you have any concerns with the proposed procurement plan for the Residential Customer group?

A. The concern cited above regarding the length of time it will take to reach steady state for the Commercial Customer group applies equally to the Residential Customer. Steady state for this customer group will also not be reached until 2013. As I noted above, this seems like a long term to transition to the preferred plan.

I also believe that contracts to purchase standard peak and off-peak Block Products should replace the FRS contracts in the Company's proposed plan for this customer group.

Q. Can you define what you mean by standard Block Products?

A. Within the ISO-NE energy markets, peak hours are defined as a sixteen-hour period for each non-holiday weekday that extends from hour ending 8am to hour ending 11pm. A peak Block Product is a purchase of a fixed amount of MW for each of these sixteen hours in a peak day. Off-peak hours are defined as the other eight hours on those peak days and all hours on holidays and weekend days. An off-peak Block Product is a fixed amount of MW in each of the off-peak hours. Using a combination of peak and off-peak blocks, purchases can be designed to effectively serve any load shape.

Q. Can you illustrate how peak and off-peak Block Products can be designed to serve a load shape?

A. Figure 1 below depicts the load shape for an illustrate non-holiday weekday, and how peak and off-peak Block Products can be designed to serve that load shape. When the hourly load is above the amount of blocks purchased, incremental spot purchases are made. When the hourly load is below the amount of blocks purchased, incremental spot sales are made. The size of Block Products can be designed to minimize or even eliminate the net cost of these incremental purchases and sales.

Figure 1

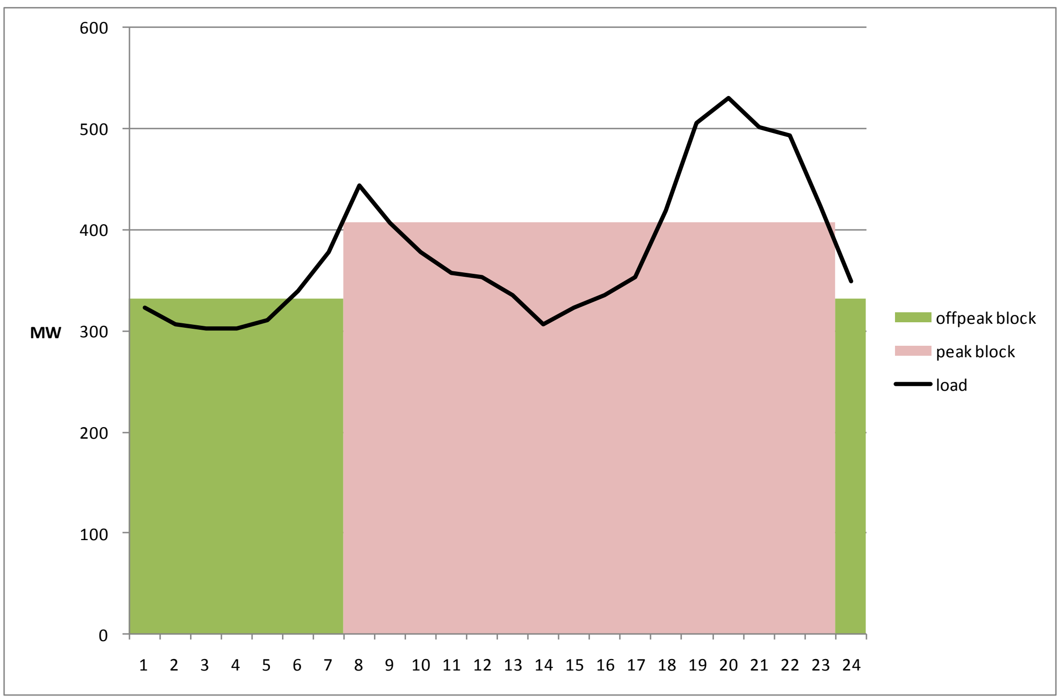
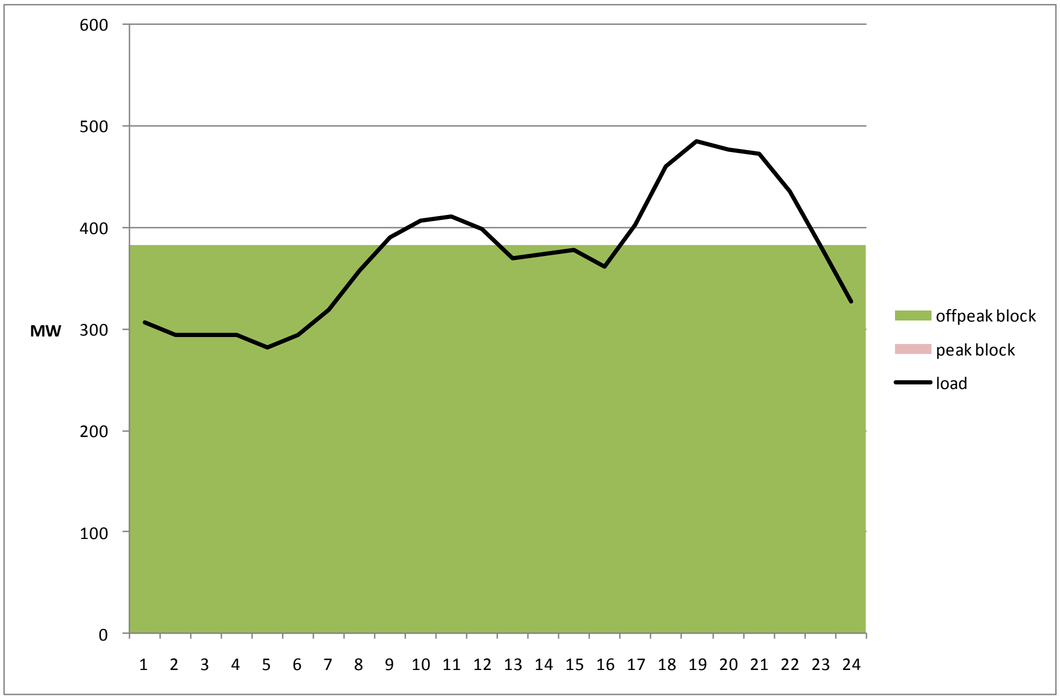


Figure 2 below depicts a typical weekend day, where only off-peak blocks are purchased. For any given load shape, Block Products can be sized over any period of time, such as a day, week, or month. Block Products purchases are frequently made on a monthly basis, and financial products based upon these Block Products are traded on the New York Mercantile Exchange ("NYMEX"), providing transparent market pricing.

Figure 2



Q. Doesn't the Northbridge study conclude that FRS contracts are a superior procurement mechanism to Block Products?

A. This is the conclusion that Northbridge and NGRID attempt to draw from that study. I disagree with the conclusion. In a later section of this testimony, I will specifically address the Northbridge study and explain the basis for my conclusion that contracts for Block Products are superior to FRS contracts for procuring SOS power supplies for the Residential Customer group.

Q. How difficult would it be for NGRID to revise its proposed procurement plan to utilize purchases of Block Products instead of FRS contracts?

A. The change in the plan itself and in the implementation activities is quite simple. Block Products can be designed and substituted for any FRS contracts. Both can be purchased with contract terms ranging from six to 24 months. Both are standard products, both are procured via competitive solicitations, and price is the sole basis for awarding contracts to bidders. Security and collateral provisions apply equally, and the vast majority on the language in the documents can be retained. Block Products do have one important advantage over FRS contracts. They cost less, and would results in lower SOS rates for residential Customers, who are the least likely to switch to a competitive supplier. And, as I will show in the later section of this testimony discussing the Northbridge study, Block Products are equal, if not superior to, FRS contracts at hedging price and volume risk for residential customers. On this basis, I recommend that the NRGID SOS procurement plan for the Residential Customer group be based upon Block Products.

RATE DESIGN

Q. What has the Company proposed for rate design for its 2011 SOS procurement plan?

A. For the Industrial Customer group, no changes from the 2010 plan are proposed. SOS rates for these customers will be a fixed but different rate each month. I note that the tariff would only need to be slightly revised if spot purchased were used in place of FRS contracts, but this change can be easily accommodated within the structure of the tariff.

For the Commercial and Residential Customer groups, the Company proposed to use change rates every six months with reconciliation, a change from the current practice of annual rate changes and reconciliation. This change will not be effective until 2012. For the first three months of 2011, SOS rates for the Commercial and Residential Customer groups will be set using the formerly defined Large and Small Customer groups. For the last nine months of 2011, the will be one nine-month rate period with a reconciliation at the end of 2011 using the newly defined Commercial and Residential groups, but under the transition plan.

Q. Do you agree with the change to six month rate changes and reconciliation?

A. I find the change to six-month rate periods once steady state conditions to be reasonable and recommend that the Commission approve it for the 2012. If the Company is able to shorten the time to transition to the steady state preferred procurement plans, this change could be implemented sooner than 2012.

THE NORTHBRIDGE STUDY

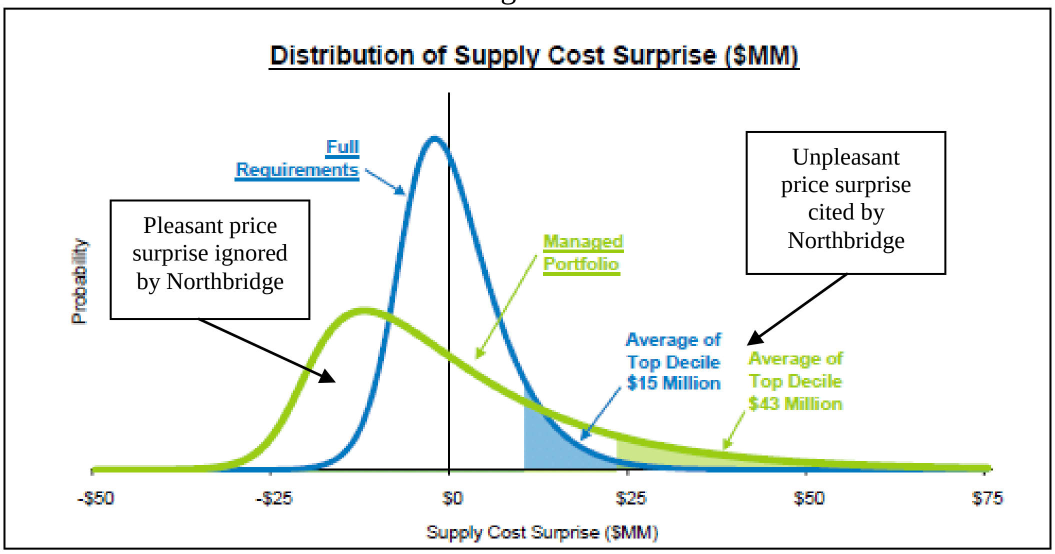
Q. Can you describe the Northbridge study?

A. Northbridge, a consulting firm based in Concord, MA, was retained by NGRID to evaluate the effectiveness of FRS contracts versus a Managed Portfolio approach, which includes a portfolio of Block Products and spot purchases, versus reliance upon 100% spot purchases as methods to procure SOS power supplies. Northbridge developed a model based upon options theory and Monte Carlo probabilistic simulation techniques to test the performance of each method as applied by Northbridge. Northbridge concluded that 100% spot purchases resulted in the lowest expected value SOS rate, but had a large degree of price volatility. Northbridge also concluded that a Managed Portfolio approach yielded lower expected value SOS rates than did FRS contracts, but had higher potential price volatility, which could produce a "supply cost surprise". This supply cost surprise was defined as the upper decile of potential SOS rates derived from the probabilistic model simulation.

Q. Can you illustrate how Northbridge has defined the supply cost surprise?

A. Figure 3 below is an excerpt from the PowerPoint presentation by Northbridge dated January 2010, which was provided as part of the Company's filing and discussed at the technical hearings on April 14, 2010.

Figure 3



As shown in Figure 3, Northbridge has calculated the unpleasant price surprise by focusing on the upper decile of probabilistic outcomes. The Northbridge price surprise statistic ignores any "pleasant price surprises" where prices turn out to be lower than expected. In fact, based upon Northbridge's own exhibit, a Managed Portfolio not only has a lower expected value price, its probability of having a lower price exceeds that of FRS contracts.

Q. Were you able to reproduce the Northbridge model results?

A. No. The Northbridge model represents an internally developed proprietary tool. Northbridge and NGRID did meet with me to try and further my understanding of the Northbridge model. As a result of that meeting, I submitted some discovery questions seeking backup information underlying this model. Responses to these questions, including DVDs with considerable amounts of data, were received on May 12, 2010. As of the writing of this testimony, I did not have sufficient time to review these responses. I had anticipated not receiving discovery responses in time to reflect those answers in this testimony, and wanted to address the issue of Block Products versus FRS contracts. Therefore, I developed a simpler spreadsheet model that attempted to assess the performance of these procurement methods. This model is far more transparent than the Northbridge model in that all of its calculations and assumptions can be seen and understood.

Q. Please describe the model you refer to.

A. The model I developed can be used to assess the performance of three procurement methods: (1) FRS contracts, (2) Block Product purchases, and (3) 100% spot purchases. I chose to evaluate these three procurement methods over one calendar year billing period based upon twelve-month contracts for FRS and Block Product purchases. The development of this model can be described by following steps.

1. Using historical load shapes and a forecast of hourly spot market prices, determine the size of peak and off-peak block purchases for each month of the calendar year that will minimize any expected net spot purchases and sales for hourly loads above and below the block sizes.
2. Using futures prices as the forecast for the cost of Block Products, determine the expected cost of power purchases using each of the three procurement methods.

3. Calculate fixed annual SOS rates at the beginning of the calendar year that will be charged assuming each of the three procurement methods, including any deferrals required.
4. With the annual SOS rates now fixed, determine how much customers will actually pay if spot market prices and SOS load levels deviate from the assumptions used in developing the SOS rates. Under different levels of actual spot prices and SOS loads, calculate what the actual costs paid by SOS customers will be at the end of the calendar year after an annual reconciliation including the impact of any over or under collections and deferrals.

The results can measure the performance of each procurement method assess their respective ability to serve as a hedge against both price and volume risk.

It should be noted that this model assumed that capacity and ancillary services costs are zero in order to simplify the calculations and increase transparency into the workings of the model. Inclusion of these costs would add the same amount in all three procurement methods, so their exclusion does not affect the usefulness of, or the conclusions drawn from, the model.

Q. What hourly loads did you use in the analysis?

A. I used actual hourly loads for 2008 for NGRID's Residential Customer group in Rhode Island.

Q. How were the forecast of prices developed?

A. I used NYMEX peak and off-peak Block Product futures prices for each calendar month for 2009 as they settled on December 30, 2008. Hourly spot prices were assumed to be

2008 RI zone LMPs scaled down to result on a spot market prices that was $2 to $3 per MWH lower than Block Products, which is consistent with the Northbridge base case model.[2] FRS rates were assumed to be $3.92 per MWH above the cost of the Block Products, which is also consistent with the Northbridge base case model.[3]

Q. What interest rate was used in estimating the impact of over or under collections and deferrals?

A. An interest rates of 3.26% was used, which is the rate used for customers' deposits as well as for the standard offer reconciliation account as of March 1, 2010.

Q. How were the block sizes established?

A. The peak and off-peak block sizes for each month were established so that the monthly sum of the cost of hourly purchases when load exceeded the block amount approximately equaled the monthly sum of revenues from hourly sales when loads were less than the block amount. Block sizes were rounded to the nearest 5 MW. Exhibit RSH-2 provides the monthly peak and off-peak block sizes that were established using the approach. The peak block size ranged from 285 MW to 555 MW, while the off-peak block size ranged from 260 MW to 435 MW. With these block sizes, the net purchases and sales of spot market energy were less than 0.1% of the cost of the block purchases, indicating that the blocks have been appropriately sized to meet the expected loads. I refer to analyses using these block sizes as Scenario A.

Q. How were the fixed SOS rates established at the beginning of the year?

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2 See page 11 of NGRID Exhibit 1.

3 See page 15 of NGRID Exhibit 1. The assumed REC cost of $3 per MWH was deducted from the FR residual of $6.92 per MWH to arrive at the $3.92 per MWH differential.

A. For each of the three procurement methods, a fixed rate to be charged for each month of the year was determined such that the result of any expected over or under collection including interest by the end of the year was approximately zero. Figure 4 below provides the resulting SOS rates that would be set at the beginning of the year, including any deferrals expected by the Company. Exhibit RSH-3 provides additional details regarding how these rates were established. If the forecast of loads and spot prices were precisely accurate, these are the rates that SOS customers would pay after the annual true-up at the end of the year. Later in this testimony, I will test what happens to these rates when actual loads and market prices vary from the forecasted values.

Figure 4

	Fixed Rate Set @1st of Year	Actual Costs to Ratepayers
100% Spot	$63.31	$63.31
Block Products	$65.67	$65.67
FRS	$69.59	$69.59

Exhibit RSH-4 provides a summary of the output of the model showing greater detail on the components of the prices in Figure 4 above.

Q. Can you illustrate how your model can be used to assess the performance of each of the three procurement methods under different outcomes of spot prices and load levels?

A. SOS power procurement methods should provide reasonable hedges against both price risk (*i.e.*, changes in future prices) and volume risk (*i.e.*, changes in future levels of MWH sales). Suppose hypothetically that spot prices fall by 20% and SOS loads fall by 10% immediately after the SOS rates are established at the beginning of the year. Figure

5 below shows what the actual costs will be at the end of the year after the annual reconciliation is completed. Exhibit RSH-5 provides greater detail on how these rates were determined.

Figure 5
Actual spot prices 20% less than expected
Actual loads 10% less than expected

	Fixed Rate Set @1st of Year	Actual Costs to Ratepayers
100% Spot	$63.31	$50.42
Block Products	$65.67	$67.39
FRS	$69.59	$69.59

For the 100% spot price option, the SOS rate after true-up falls to $50.42 per MWH from the $63.31 per MWH rate set at the beginning of the year. For the FRS option, the rate is fixed and remains at $69.59 per MWH. With the Block Product procurement method, the size and the cost of the blocks was fixed at the beginning of the year. However, because SOS loads were assumed to decrease by 10%, net MWH spot sales increased to 392,430 MWH from the expected level of 90,932 MWH. Net revenue from these sales, including the impact of lower spot market prices, increased to $15.4 million from approximately zero. In this example, the utility providing SOS service had revenues from SOS sales of $178.2 million and revenues from spot market sales of $15.4 million, or total revenues of $193.6 million. The cost of block purchases was $198.2 million, which resulted in an under-collection of $4.6 million, representing a variance of approximately 2%. This under-collection would be recovered during the year-end reconciliation, plus interest of $0.1 million. The total actual cost of supplying the lower SOS load of 2,713,490 MWH, including deferrals, is $182.9 million, for an actual rate of $67.39 per MWH, compared to the original rate of $65.67 per MWH. This value is lower than the rate using FRS, which results in annual savings to Residential Customers of $6.0 million from the Block Product method.

Q. Can you illustrate what happens if spot prices and loads increase?

A. Consider the following example where spot prices increase by 20% and loads increase by 10%. Figure 6 below shows what the actual costs will be at the end of the year after the annual reconciliation is completed. Exhibit RSH-6 provides greater detail on how these rates were determined.

Figure 6
Actual spot prices 20% higher than expected
Actual loads 10% higher than expected

	Fixed Rate Set @1st of Year	Actual Costs to Ratepayers
100% Spot	$63.31	$76.20
Block Products	$65.67	$66.62
FRS	$69.59	$69.59

Using the 100% spot procurement method, the actual SOS rate would increase to $76.20 per MWH. The SOS rate using FRS contracts remains at $69.59 per MWH. The SOS rate with Block Products increases to only $66.62 per MWH, compared to the original rate of $65.67 per MWH. In this example, the utility providing SOS service had revenues from SOS sales of $217.8 million. The cost of block purchases was $198.2 million and the cost of spot purchases was $22.7 million, which resulted in total costs of $220.9 million. This results in an under-collection of approximately $3.1 million, representing a variance of approximately 1%. This under-collection would be recovered during the year-end reconciliation, plus interest of $0.1 million. The total actual cost of supplying the higher SOS load of 3,316,487 MWH, including deferrals, is $220.9 million, for an actual rate of $66.62 per MWH. This value is lower than the rate using FRS, which results in annual savings to Residential Customers of $9.9 million from the Block Product method.

Q. Have you performed analyses of other possible scenarios of price and volume changes?

A. I analyzed four different categories of possible outcomes to assess how the three procurement methods performed in hedging against price and volume risk.

1. Price risk only: price changes from -50% to +50%
2. Volume risk only: load changes from -15% to +15%
3. Price and volume risk – positive correlation: price and volume change in the same direction (*i.e.*, price change of -20%, load change of -10%, which was illustrated in Exhibit RSH-5) A wide range of outcomes, from a 50% price decrease with a 15% load decrease to a 50% price increase with a 15% load increase, was analyzed.
4. Price and volume risk – negative correlation: price and volume change in the opposite direction (*i.e.*, price change of +20%, load change of -+10%, which was illustrated in Exhibit RSH-6). A wide range of outcomes, from a 50% price decrease with a 15% load increase to a 50% price increase with a 15% load decrease, was analyzed

Exhibit RSH-7, RSH-8, RSH-9, and RSH-10 respectively provide the results of each of these four scenarios. Exhibit RSH-7 assesses the ability to hedge price risk alone (*i.e.*, no volume change). Both the Block Product method and FRS contracts performed equally well and kept rates very stable. The total cost using Block Products is approximately $198 million over all price changes considered, while the total cost with FRS contracts is approximately $210 million over all price changes considered. This outcome is expected, as there is very little spot market net power purchased or sold when block sizes are properly designed and load levels do not change. Therefore, changes in prices do not have a significant effect on SOS costs based on Block Products.

Exhibit RSH-8 assesses the ability to hedge volume risk alone (*i.e.*, no price change). Looking at load changes from -15% to +15%, the total costs for Block Products ranges from approximately $169 million to approximately $227 million, compared to approximately $178 million to approximately $241 million for FRS contracts. The difference between the highest and lowest SOS cost scenario is approximately $57 million for the Block Product method, compared to approximately $63 million for FRS contracts.

Exhibit RSH-9 and RSH-10 examine combinations of price and load changes. Exhibit RSH-9 examines outcomes where price changes and load changes are positively correlated. That is to say, if prices decline, SOS loads will also decline. The Block Product method performs as well as, if not better than, FRS contracts. The total costs for both Block Products and FRS contracts ranges from approximately $178 million to approximately $241 million. The difference between the highest and lowest SOS cost scenario is approximately $63 million for both the Block Product method and for FRS contracts. At price changes in excess of -30% and load changes of -15%, FRS contracts do yield lower SOS rates, but these are at the extremes of the outcomes analyzed.

Exhibit RSH-10 examines outcomes where price changes and load changes are negatively correlated. That is to say, if prices decline, SOS loads will increase and vice versa. As before the Block Product method performs as well as if not better than FRS contracts. The total costs for Block Products ranges from approximately $155 million to approximately $218 million, compared to approximately $178 million to approximately $241 million for FRS contracts. The difference between the highest and lowest SOS cost scenario is approximately $63 million for both the Block Product method and FRS contracts. For outcomes with negative correlation between price and volume, the SOS rates are lower with Block Product purchases.

Q. Did you perform any other analyses?

A. I performed two analyses to test the results of the model to changes in the determination of block sizes. In one of these sensitivity analyses, block sizes were set to the average monthly peak and off-peak loads, while the other analysis, block sizes were based upon average yearly peak and off-peak loads. The results of these scenarios are provided in Exhibits RSH-11 and RSH-12. As shown in these exhibits, the ability of the Block Product approach to effectively hedge price and volume risk was unaffected by changes in block sizes.

One additional analysis was performed to assess the impact of a higher interest rate to be applied over or under collections. All of the above analyses were performed using an interest rate of 3.26%. Exhibit RSH-13 depicts how the results of Scenario A-3 described in Exhibit RSH-9 would change if an interest rate of 8% was used. As can be seen by comparing Exhibits RSH-9 and RSH-13, there was no material impact from changing the interest rate. It must be noted that I am not advocating a change in the interest rate. I am simply conducting a sensitivity analysis to assess the performance of the three procurement models <u>if</u> that assumption were changed to a higher value.

Q. Can you specifically address the ability of Block Products to mitigate volatility and to avoid an unpleasant surprise of a big under-recovery?

A. Examination of the summary results in Exhibits RSH-7 through RSH-10 shows that the Block Product procurement method provides excellent protection against large over or under-recoveries. For example, Exhibits RSH-7 and RSH-8, which assesses the performance of the three procurement methods against price and volume volatility, shows a maximum over or under recovery of approximately $1 million. This represents a variance of approximately 0.5%. Exhibits RSH-9 and RSH-10 examine the same performance under combinations of price and volume volatility. When price and volume changes are negatively correlated, only over-collections result, as shown in Exhibit RSH-10. When price and volume changes are positively correlated, under-collections result, as shown in Exhibit RSH-9. At the extremes of the outcomes analyzed (*i.e.*, price change is -50% and load change is -15%), these under-collections can be as high as 8%. Under more likely outcomes, such as changes in price of + /- 30% and changes in load of + / - 15%, the, under-collections are approximately 2% or less. Even if the cost of collecting this under-recovery is included, customers will pay less with Block Products than with FRS contracts in most of the scenarios analyzed. The above analysis is based upon a yearly reconciliation. With reconciliation every six months as proposed by the Company, these under-recoveries will be cut in half.

It must be noted that FRS contracts do provide complete protection against any over or under collections. However, achieving this result comes at a high price, which will be paid even if such protection is not warranted, needed, or used.

Q. Can you provide a real-world example of a reasonable hedge versus a complete hedge?

A. The purchase of automobile insurance is a good example. Most people buy car insurance to protect against the cost of being in an accident. Going without car insurance exposes both parties to an accident to its full cost. For that reason, few people go without insurance, and in some states, it is mandatory to purchase such insurance. When people do buy car insurance, they have a choice. One can purchase a policy with no deductible or with some level of deductible (*i.e.*, $500 per incident). A policy with no deductible is a complete hedge against the cost of an accident, but that comes with a much higher premium. A policy with a deductible carries a much lower premium. Most people I know opt for coverage with a deductible, as this represents a reasonable, cost-effective hedge against the cost of an accident. The Block Product method is analogous to car insurance with a deductible. It is not a complete hedge, but it is a reasonable, cost-effective one.

Q. What do you conclude from the above analyses?

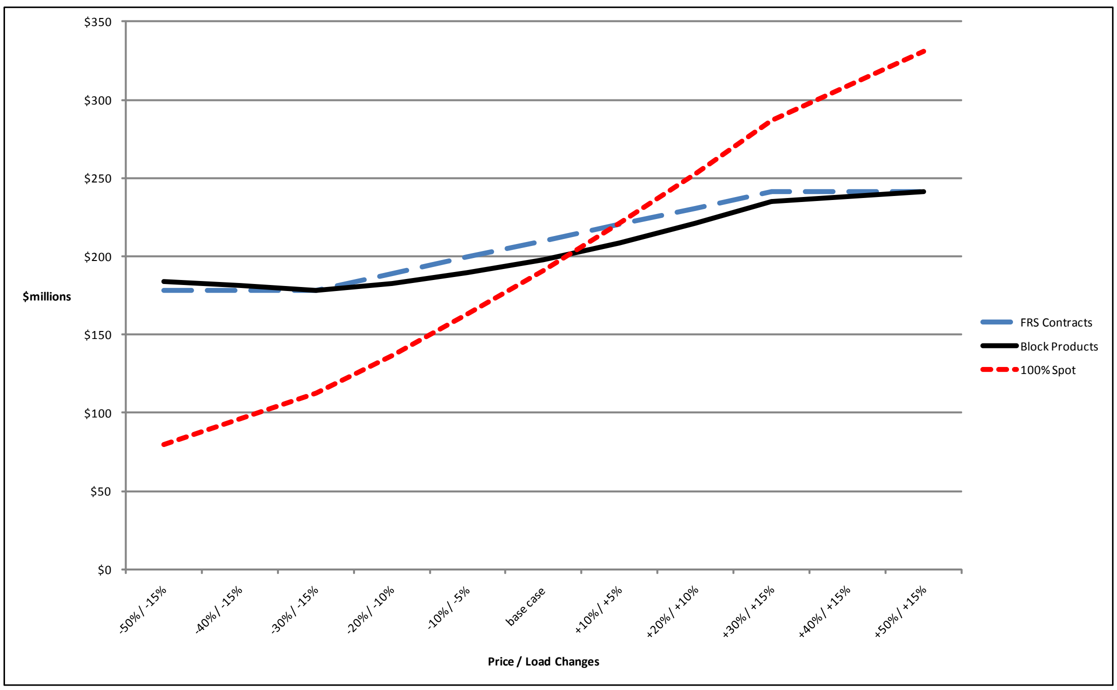
A. The analyses described above shows that for a wide range of outcomes, including large changes in both price and volume, the Block Product method of procuring SOS power supplies for Residential Customers is equally effective, if not more effective, than FRS contracts in hedging price and volume risk. And, as Northbridge has acknowledged, the expected SOS rates are lower with Block Product purchases. Figure 7 below displays the results for scenario A-3, which are taken from Exhibit RSH-9. This graphic depiction clearly demonstrates the ability of the Block Product method to serve as an effective hedge against price and volume volatility.

Figure 7

TOTAL ANNUAL COST OF RESIDENTIAL CUSTOMER SOS POWER SUPPLIES

After Annual Reconciliation

Price / Load Change	-50% / -15%	-40% / -15%	-30% / -15%	-20% / -10%	-10% / -5%	base case	+10% / +5%	+20% / +10%	+30% / +15%	+40% / +15%	+50% / +15%
FRS Contracts	$178	$178	$178	$189	$199	$210	$220	$231	$241	$241	$241
Block Products	$184	$181	$178	$183	$189	$198	$208	$221	$235	$238	$241
100% Spot	$80	$96	$113	$137	$163	$191	$221	$253	$287	$309	$331



Although I have not discussed the results of using the 100% spot purchase procurement method, this figure also shows that using 100% spot purchases is not a good procurement model for the Residential Customer group. The level of price volatility produced by this approach is inappropriate for customers who are very unlikely or unable to switch to competitive suppliers.

It is important to note that in some circumstances, FRS contracts could produce lower rates than with Block Product purchases. However, such a situation is unlikely to occur in every year or even in the majority of years. The situations where FRS contracts did result in lower SOS rates occurred at the extremes of the range of plausible outcomes. Under the vast majority of reasonable outcomes, the Block Product method of procuring SOS power supplies for Residential Customers outperforms FRS contracts. On average over time, the Block Product method will produce lower, more stable rates for Residential Customers.

Q. Can the Block Product method be implemented as easily as FRS contracts?

A. Absolutely. The use of Block Products in place of FRS contracts represents the exact same burden to the Company and the Commission. Both methods rely upon standard market products and competitive solicitations with price as the sole determinant of the winning bidders. The timing and amount of power supplies procured can be exactly the same with both methods. Each method can be applied in tranches of approximately 50 MW. Under either method, a portion of the SOS power supplies can be targeted to come from spot market purchases, such as the 10% spot market purchase proposed by NGRID. The Company has already demonstrated that it can solicit and evaluate Block Products, as they have already done so with the Financial Swaps considered in 2009.

Q. The procurement schedule proposed by NGRID calls for solicitations commencing fairly soon to procure SOS power supplies for the remainder 2011. Could the Company implement the Block Products method within that time frame?

A. Block Products can be substituted for FRS contracts at any time with very little advance notice required, so it would be possible to do so for the remainder of 2011 SOS power supplies. As an alternative, in order to facilitate on orderly transition to Block Products, the Company's plan for the last nine months of 2011 using FRS contracts can be implemented in 2011, with the transition to Block Products commencing for deliveries starting January 1, 2012.

REVIEW OF THE RES PROCUREMENT PLAN

Q. Please comment on the Company's proposed RES procurement plan,

A. NGRID proposes to continue its 2010 RES procurement plan, under which it solicited separate pricing for Renewable Energy Certificates ("RECs"). I concur with this approach and recommend that the Commission approve it. I note that this approach for REC procurement will function effectively with the substitution of Block Products for FRS contracts for the Residential Customer group.

REVIEW OF THE RFP DOCUMENTS

Q. Have you reviewed the Procurement Plan Documents filed as part of the Company's filing?

A. I have performed a preliminary review of the following Plan Documents provided as part of the Company's filing.

- Master Power Agreement (MPA) – Schedule MMJ-5
- SOS RFP Summary (Template) – Schedule MMJ-6
- SOS RFP Notice (Template) – Schedule MMJ-7
- 2011 Renewable Energy Standard Procurement Plan – Schedule MMJ-8

- Certificate Purchase Agreement (CPA) – Schedule MMJ-9
- RES RFP Notice (Template) – Schedule MMJ-10
- RES RFP Summary (Template) – Schedule MMJ-11

Q. Do you have any comments on these Plan Documents?

A. Overall, I find that these documents serve as reasonable templates for the SOS and RES RFPs, and should be approved. If NGRID does utilize Block Products in place of FRS contracts for the Residential Customer group, these documents will require minor modifications.

I do have one comment on the SOS RFP Summary (Template), which is Schedule MMJ-6. On the second page of the document, which is labeled as page 98 in the lower right hand corner, it states that the lowest indicative and final bids for each load block were compared to NGRID's estimate of expected bids. It appears that this language may be left over from the prior procurement process where NGRID evaluated FRS contracts and Financial Swaps by comparing the bids received for each of those products to the levels expected by NGRID. In the current RFP, no such comparisons are proposed. I recommend that this language be changed to state that the lowest price will determine the winning bidders. Note that NGRID could use its expected prices as a means to determine that all bids received were excessive and should be rejected. Such a test is utilized in other states. If that is NGRID's intention, the documents should be clarified to state that intent.

CONCLUSION

Q. Does this conclude your testimony?

A. Yes. Since this testimony was prepared before a review of the discovery responses from NGRID or Northbridge was completed, I reserve the right to supplement this testimony as appropriate upon reviewing those responses.

Exhibit RSH-1

Resume of Richard S. Hahn

Richard S. Hahn

Principal Consultant

Mr. Hahn is a senior executive in the energy industry, with diverse experience in both regulated and unregulated companies. He joined La Capra Associates in 2004. Mr. Hahn has a proven track record of analyzing energy, capacity, and ancillary services markets, valuation of energy assets, developing and reviewing integrated resource plans, creating operational excellence, managing full P&Ls, and developing start-ups. He has demonstrated expertise in electricity markets, utility planning and operations, sales and marketing, engineering, business development, and R&D. Mr. Hahn also has extensive knowledge and experience in both the energy and telecommunications industries. He has testified on numerous occasions before the Massachusetts Department of Public Utilities, and also before FERC.

SELECTED EXPERIENCE – *LA CAPRA ASSOCIATES*

- Served as an advisor to the developer of a utility-scale Solar PV facility in Massachusetts.
- Evaluated a proposed Solar PV installation for a large retail customer in Massachusetts. Performed an analysis of the appropriate rate of return and its impact on facility electric costs and financial feasibility.
- Performed an economic evaluation of a proposed transmission line in New England. Assessed the project's ability to deliver renewable energy to load centers and the impact of the project on Locational Marginal Prices.
- Analyzed a proposed interconnection of a large new industrial load in Massachusetts. Evaluated proposed substation configuration and developed alternatives that achieved comparable reliability at lower costs. Assessed cost recovery options.
- Reviewed the Energy Efficiency and Conservation Programs proposed by Pennsylvania Power & Light and Philadelphia Electric Company in response to Act 129, Pennsylvania legislation that requires Electric Distribution Companies to achieve certain annual consumptions and demand reduction by 2013. Provided expert testimony before the Pennsylvania Public Utilities Commission regarding program design, benefit cost analyses, and cost recovery.
- Assisted in the review and analysis of a proposed retail rate increase by National Grid before the Rhode Island Public Utilities Commission. Provided expert testimony before the Rhode Island Public Utilities Commission regarding the Company's proposed Inspection & Maintenance Program, its Capital Plan, its Storm Funding Plan, and its Facilities Plan

- Reviewed and analyzed Time-of-Use rates proposed by Pennsylvania Power & Light. Provided expert testimony before the Pennsylvania Public Utilities Commission regarding compliance with Commission requirements, rate design, cost recovery, and consumer education issues.
- Assisted in the review and analysis of a proposed retail rate increase by National Grid before the Massachusetts Department of Public Utilities. Provided expert testimony before the Massachusetts Department of Public Utilities regarding the Company's proposed Inspection & Maintenance Program, its Capital Plan, its Storm Funding Plan, and it's Facilities Plan.
- Performed a review and analysis of the proposed merger between Exelon and NRG. Provided expert testimony before the Pennsylvania Public Utilities Commission regarding merger policy, benefits and market power issues.
- Reviewed the needs analysis and load forecast supporting a proposed Transmission Project in Rhode Island. Provided expert testimony before the Rhode Island Public Utilities Commission.
- Performed an assessment of plans to procure Default Service Power Supplies for a Rhode Island utility. Provided expert testimony before the Rhode Island Public Utilities Commission.
- Served as an advisor to Vermont electric utilities regarding the evaluation of new power supply alternatives. Developed and applied a probabilistic planning tool to model uncertainty in costs and operating parameters.
- Conducted a review of Massachusetts electric utilities' proposal to construct, own, and operate large scale PV solar generating units. Served as an advisor to the Massachusetts Attorney General in settlement negotiations. Performed an analysis of the appropriate rate of return and its impact on ratepayer costs and financial feasibility. Provided expert testimony before the Massachusetts Department of Public Utilities.
- Served as a key member of a La Capra Associates Team evaluating wind generation RFPs in Oklahoma.
- Performed an assessment of plans to procure Default Service Power Supplies for Pennsylvania utilities. Provided expert testimony before the Pennsylvania Public Utilities Commission.
- Performed an assessment of a merchant generator proposal to construct, own, and operate 800 MW of large scale PV solar generating units in Maine.
- Analyzed proposed environmental upgrades to several existing coal-fired power plants in Wisconsin, including an economic evaluation of this investment compared to alternative supply resources. Provided expert testimony in three separate proceedings before the Public Service Commission of Wisconsin.
- Performed a study of non-transmission alternatives (NTAs) to a proposed set of transmission upgrades to the bulk power supply system in Maine.

- Served as a key member of the La Capra Associates Team advising the Connecticut Energy Advisory Board (CEAB) on a wide range of energy issues, including integrated resources plan and the need for and alternatives to new transmission projects.
- Performed a study of non-transmission alternatives (NTAs) to a proposed set of transmission upgrades to the bulk power supply system in Vermont.
- Served as an advisor to the Delaware Public Service Commission and three other state agencies in the review of Delmarva Power & Light's integrated resource plan and the procurement of power supplies to meet SOS obligations.
- Served as an expert witness in litigation involving a contract dispute between the owner of a merchant power plant and the purchasers of the output of the plant.
- Served as an advisor to the Maryland Attorney General's Office in the proposed merger between Constellation Energy and the FPL Group.
- Reviewed and analyzed outages for Connecticut utilities during the August 2006 heat wave. Prepared an assessment of utility filed reports and corrective actions.
- Conducted a study of required planning data and prepared forecasts of the key drivers of future power supply costs for public power systems in New England.
- Reviewed and analyzed Hawaiian Electric Company integrated resource plan and its DSM programs for the State of Hawaii. Prepared written statement of position and testified in panel discussions before the Hawaii Public Utility Commission.
- Assisted the Town of Hingham, MA in reviewing alternatives to improve wireless coverage within the Town and to leverage existing telecommunication assets of the Hingham Municipal Light Plant.
- Conducted an extensive study of distributed generation technologies, options, costs, and performance parameters for VELCO and CVPS.
- Analyzed and evaluated proposals for three substations in Connecticut. Prepared and issued RFPs to seek alternatives in accordance with state law.
- Performed an assessment of merger savings from the First Energy – GPU merger. Developed a rate mechanism to deliver the ratepayers share of those savings. Filed testimony before the PA PUC.
- Prepared long term price forecasts for energy and capacity in the ISO-NE control area for evaluating the acquisition of existing power plants.
- Conducted an assessment of market power in PJM electricity markets as a result of the proposed merger between Exelon and PSEG. Developed a mitigation plan to alleviate potential exercise of market power. Filed testimony before the PA PUC.
- Performed a long-term locational installed capacity (LICAP) price forecast for the NYC zone of the NYISO control area for generating asset acquisition.
- Served as an Independent Evaluator of a purchase power agreement between a large mid-west utility and a very large cogeneration plant. Evaluated the

implementation of amendments to the purchase power agreement, and audited compliance with very complex contract terms and operating procedures and practices.

- Performed asset valuation for energy investors targeting acquisition of major electric generating facility in New England. Prepared forecast of market prices for capacity and energy products. Presented overview of the market rules and operation of ISO-NE to investors.
- Assisted in the performance of an asset valuation of major fleet of coal-fired electric generating plants in New York. Prepared forecast of market prices for capacity and energy products. Analyzed cost and operations impacts of major environmental legislation and the effects on market prices and asset valuations.
- Conducted an analysis of the cost impact of two undersea electric cable outages within the NYISO control area for litigation support. Reviewed claims of cost impacts from loss of sales of transmission congestion contracts and replacement power costs.
- Reviewed technical studies of the operational and system impacts of major electric transmission upgrades in the state of Connecticut. Analysis including an assessment of harmonic resonance and type of cable construction to be deployed.
- Conducted a review of amendments to a purchased power agreement between an independent merchant generator and the host utility. Assessed the economic and reliability impacts and all contract terms for reasonableness.
- Assisted in the development of an energy strategy for a large Midwest manufacturing facility with on-site generation. Reviewed electric restructuring rules, electric rate availability, purchase & sale options, and operational capability to determine the least cost approach to maximizing the value of the on-site generation.
- Assisted in the review of the impact of a major transmission upgrade in Northern New England.
- Negotiated a new interconnection agreement for a large hotel in Northeastern Massachusetts.

SELECTED EXPERIENCE – *NSTAR ELECTRIC & GAS*

President & COO of NSTAR Unregulated Subsidiaries

Concurrently served as President and COO of three unregulated NSTAR subsidiaries: Advanced Energy Systems, Inc., NSTAR Steam Corporation, and NSTAR Communications, Inc.

Advanced Energy Systems, Inc.

- Responsible for all aspects of this unregulated business, a large merchant cogeneration facility in Eastern Massachusetts that sold electricity, steam, and chilled water. Duties included management, operations, finance and accounting, sales, and P&L responsibility.

NSTAR Steam Corporation

- Responsible for all aspects of this unregulated business, a district energy system in Eastern Massachusetts that sold steam for heating, cooling, and process loads. Duties included management, operations, finance and accounting, sales, and P&L responsibility.

NSTAR Communications, Inc.

- Responsible for all aspects of this unregulated business, a start-up provider of telecommunications services in Eastern Massachusetts. Duties included management, operations, finance and accounting, sales, and P&L responsibility.
- Established a joint venture with RCN to deliver a bundled package of voice, video, and data services to residential and business customers. Negotiated complex indefeasible-right-to-use and stock conversion agreements.
- Installed 2,800 miles of network in three years. Built capacity for 230,000 residential and 500 major enterprise customers.
- Testified before the Congress of the United States on increasing competition under the Telecommunications Act of 1996.

VP, Technology, Research, & Development, Boston Edison Company

- Responsible for identifying, evaluating, and deploying technological innovation at every level of the business.
- Reviewed Electric Power Research Institute (EPRI), national laboratories, vendor, and manufacturer R&D sources. Assessed state-of-the-art electro-technologies, from nuclear power plant operations to energy conservation.

VP of Marketing, Boston Edison Company

- Promoted and sold residential and commercial energy-efficiency products and customer service programs.
- Conducted market research to develop an energy-usage profile. Designed a variable time-of-use pricing structure, significantly reducing on-peak utilization for residential and commercial customers.
- Designed and marketed energy-efficiency programs.
- Established new distribution channels. Negotiated agreements with major contractors, retailers, and state and federal agencies to promote new energy-efficient electro-technologies.

Vice President, Energy Planning, Boston Edison Company

- Responsible for energy-usage forecasting, pricing, contract negotiations, and small power and cogeneration activities. Directed fuel and power purchases
- Implemented an integrated, least-cost resource planning process. Created Boston Edison's first state-approved long-range plan.
- Assessed non-traditional supply sources, developed conservation and load-management programs, and purchased from cogeneration and small power-production plants.
- Negotiated and administered over 200 transmission and purchased power contracts.
- Represented the company with external agencies. Served on the Power Planning Committee of the New England Power Pool.
- Testified before federal and state regulatory agencies.

EMPLOYMENT HISTORY

La Capra Associates, Inc.	Boston, MA
Principal Consultant	*2004 – present*
Advanced Energy Systems, Inc.	Boston, MA
President and COO	*2001-2003*
NSTAR Steam Corporation	Cambridge, MA
President and COO	*2001-2003*
NSTAR Communications, Inc.	
President and COO	*1995-2003*
Boston Edison Company	Boston, MA
VP, Technology, Research, & Development	*1993-1995*
VP, Marketing, Boston Edison Company	*1991-1993*
Vice President, Energy Planning, Boston Edison Company	*1987-1991*
Manager, Supply & Demand Planning	*1984-1987*
Manager, Fuel Regulation & Performance	*1982-1984*
Assistant to Senior Vice President, Fossil Power Plants	*1981-1982*
Division Head, Information Resources	*1978-1981*
Senior Engineer, Information Resource Division	*1977-1978*
Assistant to VP, Steam Operations	*1976-1977*
Electrical Engineer, Research & Planning Department	*1973-1976*

EDUCATION

Boston College Boston, MA
Masters in Business Administration *1982*

Northeastern University Boston, MA
Masters in Science, Electrical Engineering *1974*

Northeastern University Boston, MA
Bachelors in Science, Electrical Engineering *1973*

PROFESSIONAL AFFILLIATIONS

Director, NSTAR Communications, Inc.	*1997-2003*
Director, Advanced Energy Systems, Inc.	*2001-2003*
Director, Neuco, Inc.	*2001-2003*
Director, United Telecom Council	*1999-2003*
Head, Business Development Division, United Telecom Council	*2000-2003*
Elected Commissioner – Reading Municipal Light Board	*2005-present*
Registered Professional Electrical Engineer in Massachusetts	

Exhibit RSH-2

MONTHLY PEAK AND OFFPEAK BLOCK SIZES
Scenario A with 0 % price change and 0 % load change

BLOCK SIZES

	Block Size		Avg Load		Total MWH Load			MWH Purch / (Sale)			$ Purch / (Sale)		
month	peak	offpeak	peak	offpeak	peak	offpeak	total	peak	offpeak	total	peak	offpeak	total
1	400	350	385	337	135,595	132,127	267,721	(5,205)	(5,073)	(10,279)	($42,765)	$31,590	($11,175)
2	395	355	392	344	131,749	123,706	255,455	(971)	(4,094)	(5,065)	$51,826	$16,336	$68,162
3	340	325	338	312	113,443	127,227	240,670	(797)	(5,373)	(6,170)	$7,649	($50,575)	($42,926)
4	295	270	296	259	104,188	95,385	199,573	348	(3,975)	(3,627)	$9,885	($45,290)	($35,405)
5	285	260	288	253	96,796	103,093	199,889	1,036	(2,987)	(1,951)	$24,023	$18,477	$42,499
6	410	360	394	336	132,533	129,206	261,739	(5,227)	(9,034)	(14,261)	$50,155	($65,574)	($15,419)
7	555	435	541	414	190,431	162,268	352,698	(4,929)	(8,252)	(13,182)	($4,839)	($12,033)	($16,872)
8	420	360	413	344	138,656	140,477	279,133	(2,464)	(6,403)	(8,867)	($44,896)	($31,524)	($76,419)
9	340	305	336	295	113,020	113,335	226,355	(1,220)	(3,785)	(5,005)	($25,523)	$41,634	$16,111
10	335	280	330	273	121,474	102,495	223,969	(1,806)	(2,785)	(4,591)	($39,707)	$19,013	($20,694)
11	360	315	354	305	107,531	126,767	234,299	(1,909)	(4,273)	(6,181)	($35,004)	$8,430	($26,574)
12	415	355	403	335	141,991	131,496	273,487	(4,089)	(7,664)	(11,753)	($19,698)	($39,226)	($58,924)
					1,527,406	1,487,583	3,014,988	(27,234)	(63,697)	(90,932)	($68,894)	($108,742)	($177,635)
										-2.9%	percent of total block purchases		-0.1%

Calc1

Net Purchase / (Sale) Summary

Purchases		110,225	150,454	260,679	$8,839,361	$9,873,980	$18,713,341
	$/MWH				$80.19	$65.63	$71.79
Sales		(137,459)	(214,151)	(351,611)	($8,908,255)	($9,982,721)	($18,890,977)
	$/MWH				$64.81	$46.62	$53.73
net		(27,234)	(63,697)	(90,932)	($68,894)	($108,742)	($177,635)
	$/MWH				$2.53	$1.71	$1.95

Exhibit RSH-3

ACTUAL ANNUAL COSTS AFTER TRUE-UP

Scenario A with 0 % price change and 0 % load change

Calc2

COSTS FOR 100% SPOT PURCHASES

month	MWH	100% Spot Costs	Load Wtd Avg	Fixed Rate Set @1st of Year	Revenue	Over / (Under) Collection	Actual Costs to Ratepayers
1	267,721	$17,724,795	$66.21	$63.31	$16,949,833	($774,962)	
2	255,455	$15,001,648	$58.73	$63.31	$16,173,226	$1,171,578	
3	240,670	$14,613,484	$60.72	$63.31	$15,237,200	$623,717	
4	199,573	$13,621,957	$68.26	$63.31	$12,635,292	($986,665)	
5	199,889	$15,138,114	$75.73	$63.31	$12,655,252	($2,482,862)	
6	261,739	$22,555,952	$86.18	$63.31	$16,571,115	($5,984,837)	
7	352,698	$31,039,398	$88.01	$63.31	$22,329,877	($8,709,521)	
8	279,133	$15,361,999	$55.03	$63.31	$17,672,337	$2,310,337	
9	226,355	$11,436,475	$50.52	$63.31	$14,330,853	$2,894,377	
10	223,969	$10,299,806	$45.99	$63.31	$14,179,838	$3,880,032	
11	234,299	$11,027,168	$47.06	$63.31	$14,833,795	$3,806,628	
12	273,487	$12,880,771	$47.10	$63.31	$17,314,893	$4,434,122	
total	3,014,988	$190,701,567	$63.25	$63.31	$190,883,510	($0)	$190,883,510
						$181,944	sum w/o interest
						($181,944)	interest
							$63.31

Summary

	Fixed Rate Set @1st of Year	Actual Costs to Ratepayers
100% Spot	$63.31	$63.31
Block Products	$65.67	$65.67
FRS	$69.59	$69.59

COSTS FOR BLOCK PRODUCTS +/- SPOT PURCHASES

Calc3

month	Block Size peak	Block Size offpeak	Hours peak	Hours offpeak	Block MWH peak	Block MWH offpeak	Block Prices peak	Block Prices offpeak	Block Costs peak	Block Costs offpeak	Total Block Costs	Spot Costs	Total Costs	Fixed Rate Set @1st of Year	Revenue	Over / (Under) Collection	Actual Costs to Ratepayers
1	400	350	352	392	140,800	137,200	$75.75	$62.30	$10,665,600	$8,547,121	$19,212,721	($11,175)	$19,201,546	$65.67	$17,582,355	($1,619,192)	
2	395	355	336	360	132,720	127,800	$75.75	$62.30	$10,053,540	$7,961,531	$18,015,071	$68,162	$18,083,233	$65.67	$16,776,767	($1,306,466)	
3	340	325	336	408	114,240	132,600	$66.31	$54.29	$7,574,855	$7,198,523	$14,773,377	($42,926)	$14,730,451	$65.67	$15,805,812	$1,075,361	
4	295	270	352	368	103,840	99,360	$64.99	$51.51	$6,748,925	$5,118,034	$11,866,959	($35,405)	$11,831,554	$65.67	$13,106,807	$1,275,253	
5	285	260	336	408	95,760	106,080	$65.78	$50.63	$6,299,217	$5,370,968	$11,670,186	$42,499	$11,712,685	$65.67	$13,127,512	$1,414,827	
6	410	360	336	384	137,760	138,240	$69.19	$51.64	$9,530,926	$7,138,893	$16,669,819	($15,419)	$16,654,400	$65.67	$17,189,505	$535,105	
7	555	435	352	392	195,360	170,520	$77.94	$56.06	$15,226,691	$9,558,499	$24,785,189	($16,872)	$24,768,317	$65.67	$23,163,168	($1,605,149)	
8	420	360	336	408	141,120	146,880	$77.94	$56.06	$10,999,133	$8,233,358	$19,232,491	($76,419)	$19,156,072	$65.67	$18,331,821	($824,251)	
9	340	305	336	384	114,240	117,120	$65.90	$51.01	$7,528,702	$5,973,706	$13,502,407	$16,111	$13,518,518	$65.67	$14,865,641	$1,347,123	
10	335	280	368	376	123,280	105,280	$72.58	$55.79	$8,947,490	$5,873,824	$14,821,314	($20,694)	$14,800,620	$65.67	$14,708,992	($91,628)	
11	360	315	304	416	109,440	131,040	$72.58	$55.79	$7,943,002	$7,311,036	$15,254,038	($26,574)	$15,227,464	$65.67	$15,387,353	$159,889	
12	415	355	352	392	146,080	139,160	$72.58	$55.79	$10,602,282	$7,764,070	$18,366,352	($58,924)	$18,307,428	$65.67	$17,961,038	($346,390)	
			4,096	4,688	1,554,640	1,551,280			$112,120,361	$86,049,563	$198,169,924	($177,635)	$197,992,288		$198,006,770	$0	$198,006,770
						3,105,920					$63.80	-0.1%	$65.67			$14,482	sum w/o interest
																($14,482)	interest
																	$65.67

FRS COSTS

$69.59	$209,825,525

Exhibit RSH-4

SUMMARY OUTPUT

Scenario A with 0 % price change and 0 % load change

	Actual	Original
Price Change	0.00%	0.00%
Load Change	0.00%	0.00%
MWH sold	3,014,988	3,014,988

	Actual	Original
Full Requirement Service		
Fixed SOS Rate at 1st of year ($/MWH)	$69.59	$69.59
Total Cost to Ratepayers ($millions)	**$209.8**	**$209.8**
Block Products +/- Spot Purchases		
Fixed SOS Rate at 1st of year ($/MWH)	$65.67	$65.67
Revenue Before True-up ($millions)	$198.0	$198.0
Cost of Block Costs ($millions)	$198.2	$198.2
Incremental Spot Purchases / (Sales) (MWH)	(90,932)	(90,932)
Cost of Incremental Spot Purchases / (Sales) ($millions)	($0.2)	($0.2)
Over / (Under) Collection ($millions)	$0.0	$0.0
Interest on Over / (Under) Collections ($millions)	($0.0)	($0.0)
Total Cost to Ratepayers After True-up ($millions)	**$198.0**	**$198.0**
Actual Rate Paid After True-up ($/MWH)	$65.67	$65.67
Savings with a Block Products ($millions)	**$11.8**	**$11.8**
100% Spot Purchases		
Fixed SOS Rate at 1st of year ($/MWH)	$63.31	$63.31
Revenue Before True-up ($millions)	$190.9	$190.9
Cost of Spot Purchases ($millions)	$190.7	$190.7
Over / (Under) Collection ($millions)	$0.2	$0.2
Interest on Over / (Under) Collections ($millions)	($0.2)	($0.2)
Total Cost to Ratepayers After True-up ($millions)	**$190.9**	**$190.9**
Actual Rate Paid After True-up ($/MWH)	$63.31	$63.31

ACTUAL ANNUAL COSTS AFTER TRUE-UP
Scenario A with -20 % price change and -10 % load change

Calc2

COSTS FOR 100% SPOT PURCHASES

month	MWH	100% Spot Costs	Load Wtd Avg	Fixed Rate Set @1st of Year	Revenue	Over / (Under) Collection	Actual Costs to Ratepayers
1	240,949	$12,761,852	$52.96	**$63.31**	$15,254,849	$2,492,997	
2	229,909	$10,801,186	$46.98	$63.31	$14,555,903	$3,754,717	
3	216,603	$10,521,708	$48.58	$63.31	$13,713,480	$3,191,772	
4	179,616	$9,807,809	$54.60	$63.31	$11,371,762	$1,563,953	
5	179,900	$10,899,442	$60.59	$63.31	$11,389,726	$490,285	
6	235,565	$16,240,285	$68.94	$63.31	$14,914,004	($1,326,282)	
7	317,429	$22,348,367	$70.40	$63.31	$20,096,889	($2,251,477)	
8	251,220	$11,060,640	$44.03	$63.31	$15,905,103	$4,844,464	
9	203,719	$8,234,262	$40.42	$63.31	$12,897,767	$4,663,505	
10	201,572	$7,415,860	$36.79	$63.31	$12,761,855	$5,345,994	
11	210,869	$7,939,561	$37.65	$63.31	$13,350,416	$5,410,855	
12	246,139	$9,274,155	$37.68	$63.31	$15,583,404	$6,309,248	
total	2,713,490	$137,305,128	$50.60	$63.31	$171,795,159	$34,968,397	$136,826,763
						$34,490,031	sum w/o interest
						$478,365	interest
							$50.42

Summary

	Fixed Rate Set @1st of Year	Actual Costs to Ratepayers
100% Spot	$63.31	$50.42
Block Products	$65.67	$67.39
FRS	$69.59	$69.59

Calc3

COSTS FOR BLOCK PRODUCTS +/- SPOT PURCHASES

	Block Size		Hours		Block MWH		Block Prices		Block Costs								
month	peak	offpeak	peak	offpeak	peak	offpeak	peak	offpeak	peak	offpeak	Total Block Costs	Spot Costs	Total Costs	Fixed Rate Set @1st of Year	Revenue	Over / (Under) Collection	Actual Costs to Ratepayers
1	400	350	352	392	140,800	137,200	$75.75	$62.30	$10,665,600	$8,547,121	$19,212,721	($1,426,923)	$17,785,798	**$65.67**	$15,824,119	($1,961,678)	
2	395	355	336	360	132,720	127,800	$75.75	$62.30	$10,053,540	$7,961,531	$18,015,071	($1,145,602)	$16,869,469	$65.67	$15,099,090	($1,770,378)	
3	340	325	336	408	114,240	132,600	$66.31	$54.29	$7,574,855	$7,198,523	$14,773,377	($1,203,420)	$13,569,957	$65.67	$14,225,231	$655,273	
4	295	270	352	368	103,840	99,360	$64.99	$51.51	$6,748,925	$5,118,034	$11,866,959	($1,118,080)	$10,748,878	$65.67	$11,796,126	$1,047,248	
5	285	260	336	408	95,760	106,080	$65.78	$50.63	$6,299,217	$5,370,968	$11,670,186	($1,177,050)	$10,493,136	$65.67	$11,814,760	$1,321,625	
6	410	360	336	384	137,760	138,240	$69.19	$51.64	$9,530,926	$7,138,893	$16,669,819	($1,816,811)	$14,853,008	$65.67	$15,470,554	$617,547	
7	555	435	352	392	195,360	170,520	$77.94	$56.06	$15,226,691	$9,558,499	$24,785,189	($2,496,649)	$22,288,540	$65.67	$20,846,851	($1,441,688)	
8	420	360	336	408	141,120	146,880	$77.94	$56.06	$10,999,133	$8,233,358	$19,232,491	($1,290,095)	$17,942,396	$65.67	$16,498,639	($1,443,757)	
9	340	305	336	384	114,240	117,120	$65.90	$51.01	$7,528,702	$5,973,706	$13,502,407	($902,029)	$12,600,378	$65.67	$13,379,077	$778,699	
10	335	280	368	376	123,280	105,280	$72.58	$55.79	$8,947,490	$5,873,824	$14,821,314	($840,539)	$13,980,774	$65.67	$13,238,093	($742,682)	
11	360	315	304	416	109,440	131,040	$72.58	$55.79	$7,943,002	$7,311,036	$15,254,038	($903,433)	$14,350,605	$65.67	$13,848,618	($501,988)	
12	415	355	352	392	146,080	139,160	$72.58	$55.79	$10,602,282	$7,764,070	$18,366,352	($1,077,601)	$17,288,751	$65.67	$16,164,934	($1,123,817)	
			4,096	4,688	1,554,640	1,551,280			$112,120,361	$86,049,563	$198,169,924	($15,398,234)	$182,771,690		$178,206,093	($4,646,132)	$182,852,225
						3,105,920					$63.80	-7.8%	$67.36			($4,565,597)	sum w/o interest
																($80,535)	interest
																	$67.39

FRS COSTS

$69.59	$188,842,972

SUMMARY OUTPUT

Scenario A with -20 % price change and -10 % load change

	Actual	Original
Price Change	-20.00%	0.00%
Load Change	-10.00%	0.00%
MWH sold	2,713,490	3,014,988

Full Requirement Service		
Fixed SOS Rate at 1st of year ($/MWH)	$69.59	$69.59
Total Cost to Ratepayers ($millions)	**$188.8**	**$209.8**

Block Products +/- Spot Purchases		
Fixed SOS Rate at 1st of year ($/MWH)	$65.67	$65.67
Revenue Before True-up ($millions)	$178.2	$198.0
Cost of Block Costs ($millions)	$198.2	$198.2
Incremental Spot Purchases / (Sales) (MWH)	(392,430)	(90,932)
Cost of Incremental Spot Purchases / (Sales) ($millions)	($15.4)	($0.2)
Over / (Under) Collection ($millions)	($4.6)	$0.0
Interest on Over / (Under) Collections ($millions)	($0.1)	($0.0)
Total Cost to Ratepayers After True-up ($millions)	**$182.9**	**$198.0**
Actual Rate Paid After True-up ($/MWH)	$67.39	$65.67
Savings with a Block Products ($millions)	**$6.0**	**$11.8**

100% Spot Purchases		
Fixed SOS Rate at 1st of year ($/MWH)	$63.31	$63.31
Revenue Before True-up ($millions)	$171.8	$190.9
Cost of Spot Purchases ($millions)	$137.3	$190.7
Over / (Under) Collection ($millions)	$34.5	$0.2
Interest on Over / (Under) Collections ($millions)	$0.5	($0.2)
Total Cost to Ratepayers After True-up ($millions)	**$136.8**	**$190.9**
Actual Rate Paid After True-up ($/MWH)	$50.42	$63.31

ACTUAL ANNUAL COSTS AFTER TRUE-UP

Scenario A with 20 % price change and 10 % load change

Calc2

COSTS FOR 100% SPOT PURCHASES

month	MWH	100% Spot Costs	Load Wtd Avg	Fixed Rate Set @1st of Year	Revenue	Over / (Under) Collection	Actual Costs to Ratepayers
1	294,493	$23,396,729	$79.45	**$63.31**	$18,644,816	($4,751,914)	
2	281,000	$19,802,175	$70.47	$63.31	$17,790,548	($2,011,627)	
3	264,737	$19,289,799	$72.86	$63.31	$16,760,920	($2,528,878)	
4	219,531	$17,980,983	$81.91	$63.31	$13,898,821	($4,082,162)	
5	219,877	$19,982,310	$90.88	$63.31	$13,920,777	($6,061,533)	
6	287,913	$29,773,856	$103.41	$63.31	$18,228,227	($11,545,630)	
7	387,968	$40,972,005	$105.61	$63.31	$24,562,865	($16,409,140)	
8	307,046	$20,277,839	$66.04	$63.31	$19,439,571	($838,269)	
9	248,990	$15,096,147	$60.63	$63.31	$15,763,938	$667,791	
10	246,366	$13,595,744	$55.19	$63.31	$15,597,822	$2,002,078	
11	257,728	$14,555,862	$56.48	$63.31	$16,317,175	$1,761,313	
12	300,836	$17,002,618	$56.52	$63.31	$19,046,382	$2,043,764	
total	3,316,487	$251,726,068	$75.90	$63.31	$209,971,861	($42,739,151)	$252,711,013
						($41,754,207)	sum w/o interest
						($984,945)	interest
							$76.20

Summary

	Fixed Rate Set @1st of Year	Actual Costs to Ratepayers
100% Spot	$63.31	$76.20
Block Products	$65.67	$66.62
FRS	$69.59	$69.59

Calc3

COSTS FOR BLOCK PRODUCTS +/- SPOT PURCHASES

	Block Size		Hours		Block MWH		Block Prices		Block Costs								
month	peak	offpeak	peak	offpeak	peak	offpeak	peak	offpeak	peak	offpeak	Total Block Costs	Spot Costs	Total Costs	Fixed Rate Set @1st of Year	Revenue	Over / (Under) Collection	Actual Costs to Ratepayers
1	400	350	352	392	140,800	137,200	$75.75	$62.30	$10,665,600	$8,547,121	$19,212,721	$2,113,566	$21,326,287	**$65.67**	$19,340,590	($1,985,697)	
2	395	355	336	360	132,720	127,800	$75.75	$62.30	$10,053,540	$7,961,531	$18,015,071	$1,881,992	$19,897,063	$65.67	$18,454,444	($1,442,619)	
3	340	325	336	408	114,240	132,600	$66.31	$54.29	$7,574,855	$7,198,523	$14,773,377	$1,702,106	$16,475,483	$65.67	$17,386,393	$910,909	
4	295	270	352	368	103,840	99,360	$64.99	$51.51	$6,748,925	$5,118,034	$11,866,959	$1,592,149	$13,459,108	$65.67	$14,417,487	$958,379	
5	285	260	336	408	95,760	106,080	$65.78	$50.63	$6,299,217	$5,370,968	$11,670,186	$1,867,573	$13,537,758	$65.67	$14,440,263	$902,505	
6	410	360	336	384	137,760	138,240	$69.19	$51.64	$9,530,926	$7,138,893	$16,669,819	$2,688,211	$19,358,030	$65.67	$18,908,455	($449,575)	
7	555	435	352	392	195,360	170,520	$77.94	$56.06	$15,226,691	$9,558,499	$24,785,189	$3,704,481	$28,489,671	$65.67	$25,479,485	($3,010,186)	
8	420	360	336	408	141,120	146,880	$77.94	$56.06	$10,999,133	$8,233,358	$19,232,491	$1,751,737	$20,984,228	$65.67	$20,165,003	($819,225)	
9	340	305	336	384	114,240	117,120	$65.90	$51.01	$7,528,702	$5,973,706	$13,502,407	$1,391,710	$14,894,117	$65.67	$16,352,206	$1,458,088	
10	335	280	368	376	123,280	105,280	$72.58	$55.79	$8,947,490	$5,873,824	$14,821,314	$1,211,144	$16,032,458	$65.67	$16,179,891	$147,433	
11	360	315	304	416	109,440	131,040	$72.58	$55.79	$7,943,002	$7,311,036	$15,254,038	$1,291,371	$16,545,409	$65.67	$16,926,088	$380,679	
12	415	355	352	392	146,080	139,160	$72.58	$55.79	$10,602,282	$7,764,070	$18,366,352	$1,474,984	$19,841,336	$65.67	$19,757,142	($84,194)	
			4,096	4,688	1,554,640	1,551,280			$112,120,361	$86,049,563	$198,169,924	$22,671,025	$220,840,949		$217,807,447	($3,124,623)	$220,932,070
						3,105,920					$63.80	11.4%	$66.59			($3,033,502)	sum w/o interest
																($91,121)	interest
																	$66.62

FRS COSTS

$69.59	$230,808,077

SUMMARY OUTPUT

Scenario A with 20 % price change and 10 % load change

	Actual	Original
Price Change	20.00%	0.00%
Load Change	10.00%	0.00%
MWH sold	3,316,487	3,014,988

Full Requirement Service		
Fixed SOS Rate at 1st of year ($/MWH)	$69.59	$69.59
Total Cost to Ratepayers ($millions)	**$230.8**	**$209.8**

Block Products +/- Spot Purchases		
Fixed SOS Rate at 1st of year ($/MWH)	$65.67	$65.67
Revenue Before True-up ($millions)	$217.8	$198.0
Cost of Block Costs ($millions)	$198.2	$198.2
Incremental Spot Purchases / (Sales) (MWH)	210,567	(90,932)
Cost of Incremental Spot Purchases / (Sales) ($millions)	$22.7	($0.2)
Over / (Under) Collection ($millions)	($3.0)	$0.0
Interest on Over / (Under) Collections ($millions)	($0.1)	($0.0)
Total Cost to Ratepayers After True-up ($millions)	**$220.9**	**$198.0**
Actual Rate Paid After True-up ($/MWH)	$66.62	$65.67
Savings with a Block Products ($millions)	**$9.9**	**$11.8**

100% Spot Purchases		
Fixed SOS Rate at 1st of year ($/MWH)	$63.31	$63.31
Revenue Before True-up ($millions)	$210.0	$190.9
Cost of Spot Purchases ($millions)	$251.7	$190.7
Over / (Under) Collection ($millions)	($41.8)	$0.2
Interest on Over / (Under) Collections ($millions)	($1.0)	($0.2)
Total Cost to Ratepayers After True-up ($millions)	**$252.7**	**$190.9**
Actual Rate Paid After True-up ($/MWH)	$76.20	$63.31

Exhibit RSH-7

SCENARIO A-1 : Price Risk

	a	b	c	d	e	base case	f	g	h	i	j		HI - LO	Average	St Dev
Price Change	-50.00%	-40.00%	-30.00%	-20.00%	-10.00%	0.00%	10.00%	20.00%	30.00%	40.00%	50.00%				
Load Change	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%				
MWH sold	3,014,988	3,014,988	3,014,988	3,014,988	3,014,988	3,014,988	3,014,988	3,014,988	3,014,988	3,014,988	3,014,988	MWH			
Full Requirement Service															
Fixed SOS Rate at 1st of year ($/MWH)	$69.59	$69.59	$69.59	$69.59	$69.59	$69.59	$69.59	$69.59	$69.59	$69.59	$69.59	$/MWH			
Total Cost to Ratepayers ($millions)	**$209.8**	**$209.8**	**$209.8**	**$209.8**	**$209.8**	**$209.8**	**$209.8**	**$209.8**	**$209.8**	**$209.8**	**$209.8**	$millions	**$0.0**	**$209.8**	**$0.0**
Block Products +/- Spot Purchases															
Fixed SOS Rate at 1st of year ($/MWH)	$65.67	$65.67	$65.67	$65.67	$65.67	$65.67	$65.67	$65.67	$65.67	$65.67	$65.67	$/MWH			
Revenue Before True-up ($millions)	$198.0	$198.0	$198.0	$198.0	$198.0	$198.0	$198.0	$198.0	$198.0	$198.0	$198.0	$millions			
Cost of Block Costs ($millions)	$198.2	$198.2	$198.2	$198.2	$198.2	$198.2	$198.2	$198.2	$198.2	$198.2	$198.2	$millions			
Incremental Spot Purchases / (Sales) (MWH)	(90,932)	(90,932)	(90,932)	(90,932)	(90,932)	(90,932)	(90,932)	(90,932)	(90,932)	(90,932)	(90,932)	MWH			
Cost of Incremental Spot Purchases / (Sales) ($millions)	($0.1)	($0.1)	($0.1)	($0.1)	($0.2)	($0.2)	($0.2)	($0.2)	($0.2)	($0.2)	($0.3)	$millions			
Over / (Under) Collection ($millions)	($0.1)	($0.1)	($0.0)	($0.0)	($0.0)	$0.0	$0.0	$0.1	$0.1	$0.1	$0.1	$millions			
Interest on Over / (Under) Collections ($millions)	($0.0)	($0.0)	($0.0)	($0.0)	($0.0)	($0.0)	($0.0)	($0.0)	($0.0)	($0.0)	($0.0)	$millions			
Total Cost to Ratepayers After True-up ($millions)	**$198.1**	**$198.1**	**$198.1**	**$198.0**	**$198.0**	**$198.0**	**$198.0**	**$198.0**	**$198.0**	**$197.9**	**$197.9**	$millions	**$0.2**	**$198.0**	**$0.1**
Actual Rate Paid After True-up ($/MWH)	$65.70	$65.70	$65.69	$65.69	$65.68	$65.67	$65.67	$65.66	$65.66	$65.65	$65.64	$/MWH			
Savings with a Block Products ($millions)	**$11.7**	**$11.7**	**$11.8**	**$11.8**	**$11.8**	**$11.8**	**$11.8**	**$11.9**	**$11.9**	**$11.9**	**$11.9**	$millions			
100% Spot Purchases															
Fixed SOS Rate at 1st of year ($/MWH)	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$/MWH			
Revenue Before True-up ($millions)	$190.9	$190.9	$190.9	$190.9	$190.9	$190.9	$190.9	$190.9	$190.9	$190.9	$190.9	$millions			
Cost of Spot Purchases ($millions)	$95.4	$114.4	$133.5	$152.6	$171.6	$190.7	$209.8	$228.8	$247.9	$267.0	$286.1	$millions			
Over / (Under) Collection ($millions)	$95.5	$76.5	$57.4	$38.3	$19.3	$0.2	($18.9)	($38.0)	($57.0)	($76.1)	($95.2)	$millions			
Interest on Over / (Under) Collections ($millions)	$1.6	$1.2	$0.9	$0.5	$0.2	($0.2)	($0.5)	($0.9)	($1.3)	($1.6)	($2.0)	$millions			
Total Cost to Ratepayers After True-up ($millions)	**$93.7**	**$113.2**	**$132.6**	**$152.0**	**$171.5**	**$190.9**	**$210.3**	**$229.7**	**$249.2**	**$268.6**	**$288.0**	$millions	**$194.3**	**$190.9**	**$64.4**
Actual Rate Paid After True-up ($/MWH)	$31.09	$37.54	$43.98	$50.42	$56.87	$63.31	$69.75	$76.20	$82.64	$89.09	$95.53	$/MWH			

Exhibit RSH-8

SCENARIO A-2 : Volume Risk

	a	b	c	base case	d	e	f		HI - LO	Average	St Dev
Price Change	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%				
Load Change	-15.00%	-10.00%	-5.00%	0.00%	5.00%	10.00%	15.00%				
MWH sold	2,562,740	2,713,490	2,864,239	3,014,988	3,165,738	3,316,487	3,467,237	MWH			
Full Requirement Service											
Fixed SOS Rate at 1st of year ($/MWH)	$69.59	$69.59	$69.59	$69.59	$69.59	$69.59	$69.59	$/MWH			
Total Cost to Ratepayers ($millions)	**$178.4**	**$188.8**	**$199.3**	**$209.8**	**$220.3**	**$230.8**	**$241.3**	$millions	**$62.9**	**$209.8**	**$22.7**
Block Products +/- Spot Purchases											
Fixed SOS Rate at 1st of year ($/MWH)	$65.67	$65.67	$65.67	$65.67	$65.67	$65.67	$65.67	$/MWH			
Revenue Before True-up ($millions)	$168.3	$178.2	$188.1	$198.0	$207.9	$217.8	$227.7	$millions			
Cost of Block Costs ($millions)	$198.2	$198.2	$198.2	$198.2	$198.2	$198.2	$198.2	$millions			
Incremental Spot Purchases / (Sales) (MWH)	(543,180)	(392,430)	(241,681)	(90,932)	59,818	210,567	361,317	MWH			
Cost of Incremental Spot Purchases / (Sales) ($millions)	($28.8)	($19.2)	($9.7)	($0.2)	$9.4	$18.9	$28.4	$millions			
Over / (Under) Collection ($millions)	($1.1)	($0.7)	($0.3)	$0.0	$0.4	$0.7	$1.1	$millions			
Interest on Over / (Under) Collections ($millions)	($0.0)	($0.0)	($0.0)	($0.0)	($0.0)	($0.0)	($0.0)	$millions			
Total Cost to Ratepayers After True-up ($millions)	**$169.4**	**$178.9**	**$188.5**	**$198.0**	**$207.5**	**$217.1**	**$226.6**	$millions	**$57.2**	**$198.0**	**$20.6**
Actual Rate Paid After True-up ($/MWH)	$66.10	$65.94	$65.80	$65.67	$65.56	$65.46	$65.36	$/MWH			
Savings with a Block Products ($millions)	**$9.0**	**$9.9**	**$10.9**	**$11.8**	**$12.8**	**$13.7**	**$14.7**	$millions			
100% Spot Purchases											
Fixed SOS Rate at 1st of year ($/MWH)	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$/MWH			
Revenue Before True-up ($millions)	$162.3	$171.8	$181.3	$190.9	$200.4	$210.0	$219.5	$millions			
Cost of Spot Purchases ($millions)	$162.1	$171.6	$181.2	$190.7	$200.2	$209.8	$219.3	$millions			
Over / (Under) Collection ($millions)	$0.2	$0.2	$0.2	$0.2	$0.2	$0.2	$0.2	$millions			
Interest on Over / (Under) Collections ($millions)	($0.2)	($0.2)	($0.2)	($0.2)	($0.2)	($0.2)	($0.2)	$millions			
Total Cost to Ratepayers After True-up ($millions)	**$162.3**	**$171.8**	**$181.3**	**$190.9**	**$200.4**	**$210.0**	**$219.5**	$millions	**$57.3**	**$190.9**	**$20.6**
Actual Rate Paid After True-up ($/MWH)	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$/MWH			

Exhibit RSH-9

SCENARIO A-3 : Price & Volume Risk - Positive Correlation

	a	b	c	d	e	base case	f	g	h	i	j		HI - LO	Average	St Dev
Price Change	-50.00%	-40.00%	-30.00%	-20.00%	-10.00%	0.00%	10.00%	20.00%	30.00%	40.00%	50.00%				
Load Change	-15.00%	-15.00%	-15.00%	-10.00%	-5.00%	0.00%	5.00%	10.00%	15.00%	15.00%	15.00%				
MWH sold	2,562,740	2,562,740	2,562,740	2,713,490	2,864,239	3,014,988	3,165,738	3,316,487	3,467,237	3,467,237	3,467,237	MWH			
Full Requirement Service															
Fixed SOS Rate at 1st of year ($/MWH)	$69.59	$69.59	$69.59	$69.59	$69.59	$69.59	$69.59	$69.59	$69.59	$69.59	$69.59	$/MWH			
Total Cost to Ratepayers ($millions)	**$178.4**	**$178.4**	**$178.4**	**$188.8**	**$199.3**	**$209.8**	**$220.3**	**$230.8**	**$241.3**	**$241.3**	**$241.3**	$millions	**$62.9**	**$209.8**	**$26.5**
Block Products +/- Spot Purchases															
Fixed SOS Rate at 1st of year ($/MWH)	$65.67	$65.67	$65.67	$65.67	$65.67	$65.67	$65.67	$65.67	$65.67	$65.67	$65.67	$/MWH			
Revenue Before True-up ($millions)	$168.3	$168.3	$168.3	$178.2	$188.1	$198.0	$207.9	$217.8	$227.7	$227.7	$227.7	$millions			
Cost of Block Costs ($millions)	$198.2	$198.2	$198.2	$198.2	$198.2	$198.2	$198.2	$198.2	$198.2	$198.2	$198.2	$millions			
Incremental Spot Purchases / (Sales) (MWH)	(543,180)	(543,180)	(543,180)	(392,430)	(241,681)	(90,932)	59,818	210,567	361,317	361,317	361,317	MWH			
Cost of Incremental Spot Purchases / (Sales) ($millions)	($14.4)	($17.3)	($20.1)	($15.4)	($8.7)	($0.2)	$10.3	$22.7	$37.0	$39.8	$42.6	$millions			
Over / (Under) Collection ($millions)	($15.5)	($12.6)	($9.7)	($4.6)	($1.3)	$0.0	($0.6)	($3.0)	($7.4)	($10.3)	($13.1)	$millions			
Interest on Over / (Under) Collections ($millions)	($0.3)	($0.2)	($0.2)	($0.1)	($0.0)	($0.0)	($0.0)	($0.1)	($0.2)	($0.2)	($0.3)	$millions			
Total Cost to Ratepayers After True-up ($millions)	**$184.1**	**$181.1**	**$178.2**	**$182.9**	**$189.5**	**$198.0**	**$208.5**	**$220.9**	**$235.3**	**$238.2**	**$241.1**	$millions	**$62.9**	**$205.2**	**$24.7**
Actual Rate Paid After True-up ($/MWH)	$71.82	$70.67	$69.53	$67.39	$66.15	$65.67	$65.86	$66.62	$67.87	$68.70	$69.54	$/MWH			
Savings with a Block Products ($millions)	**($5.7)**	**($2.8)**	**$0.2**	**$6.0**	**$9.9**	**$11.8**	**$11.8**	**$9.9**	**$6.0**	**$3.1**	**$0.2**	$millions			
100% Spot Purchases															
Fixed SOS Rate at 1st of year ($/MWH)	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$/MWH			
Revenue Before True-up ($millions)	$162.3	$162.3	$162.3	$171.8	$181.3	$190.9	$200.4	$210.0	$219.5	$219.5	$219.5	$millions			
Cost of Spot Purchases ($millions)	$81.0	$97.3	$113.5	$137.3	$163.0	$190.7	$220.3	$251.7	$285.1	$307.0	$329.0	$millions			
Over / (Under) Collection ($millions)	$81.2	$65.0	$48.8	$34.5	$18.3	$0.2	($19.8)	($41.8)	($65.6)	($87.5)	($109.4)	$millions			
Interest on Over / (Under) Collections ($millions)	$1.4	$1.1	$0.8	$0.5	$0.2	($0.2)	($0.6)	($1.0)	($1.4)	($1.9)	($2.3)	$millions			
Total Cost to Ratepayers After True-up ($millions)	**$79.7**	**$96.2**	**$112.7**	**$136.8**	**$162.9**	**$190.9**	**$220.8**	**$252.7**	**$286.5**	**$308.9**	**$331.2**	$millions	**$251.5**	**$198.1**	**$88.3**
Actual Rate Paid After True-up ($/MWH)	$31.09	$37.54	$43.98	$50.42	$56.87	$63.31	$69.75	$76.20	$82.64	$89.09	$95.53	$/MWH			

Exhibit RSH-10

SCENARIO A-4 : Price & Volume Risk - Negative Correlation

	a	b	c	d	e	base case	f	g	h	i	j		HI - LO	Average	St Dev
Price Change	-50.00%	-40.00%	-30.00%	-20.00%	-10.00%	0.00%	10.00%	20.00%	30.00%	40.00%	50.00%				
Load Change	15.00%	15.00%	15.00%	10.00%	5.00%	0.00%	-5.00%	-10.00%	-15.00%	-15.00%	-15.00%				
MWH sold	3,467,237	3,467,237	3,467,237	3,316,487	3,165,738	3,014,988	2,864,239	2,713,490	2,562,740	2,562,740	2,562,740	MWH			
Full Requirement Service															
Fixed SOS Rate at 1st of year ($/MWH)	$69.59	$69.59	$69.59	$69.59	$69.59	$69.59	$69.59	$69.59	$69.59	$69.59	$69.59	$/MWH			
Total Cost to Ratepayers ($millions)	**$241.3**	**$241.3**	**$241.3**	**$230.8**	**$220.3**	**$209.8**	**$199.3**	**$188.8**	**$178.4**	**$178.4**	**$178.4**	$millions	**$62.9**	**$209.8**	**$26.5**
Block Products +/- Spot Purchases															
Fixed SOS Rate at 1st of year ($/MWH)	$65.67	$65.67	$65.67	$65.67	$65.67	$65.67	$65.67	$65.67	$65.67	$65.67	$65.67	$/MWH			
Revenue Before True-up ($millions)	$227.7	$227.7	$227.7	$217.8	$207.9	$198.0	$188.1	$178.2	$168.3	$168.3	$168.3	$millions			
Cost of Block Costs ($millions)	$198.2	$198.2	$198.2	$198.2	$198.2	$198.2	$198.2	$198.2	$198.2	$198.2	$198.2	$millions			
Incremental Spot Purchases / (Sales) (MWH)	361,317	361,317	361,317	210,567	59,818	(90,932)	(241,681)	(392,430)	(543,180)	(543,180)	(543,180)	MWH			
Cost of Incremental Spot Purchases / (Sales) ($millions)	$14.2	$17.1	$19.9	$15.1	$8.4	($0.2)	($10.7)	($23.1)	($37.4)	($40.3)	($43.2)	$millions			
Over / (Under) Collection ($millions)	$15.3	$12.5	$9.6	$4.5	$1.3	$0.0	$0.6	$3.1	$7.6	$10.4	$13.3	$millions			
Interest on Over / (Under) Collections ($millions)	$0.2	$0.2	$0.1	$0.1	$0.0	($0.0)	$0.0	$0.1	$0.2	$0.2	$0.3	$millions			
Total Cost to Ratepayers After True-up ($millions)	**$212.1**	**$215.0**	**$217.9**	**$213.2**	**$206.6**	**$198.0**	**$187.5**	**$175.0**	**$160.6**	**$157.7**	**$154.7**	$millions	**$63.2**	**$190.8**	**$24.8**
Actual Rate Paid After True-up ($/MWH)	$61.18	$62.02	$62.85	$64.29	$65.26	$65.67	$65.46	$64.50	$62.67	$61.52	$60.38	$/MWH			
Savings with a Block Products ($millions)	**$29.2**	**$26.3**	**$23.4**	**$17.6**	**$13.7**	**$11.8**	**$11.9**	**$13.8**	**$17.8**	**$20.7**	**$23.6**	$millions			
100% Spot Purchases															
Fixed SOS Rate at 1st of year ($/MWH)	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$/MWH			
Revenue Before True-up ($millions)	$219.5	$219.5	$219.5	$210.0	$200.4	$190.9	$181.3	$171.8	$162.3	$162.3	$162.3	$millions			
Cost of Spot Purchases ($millions)	$109.7	$131.6	$153.5	$167.8	$180.2	$190.7	$199.3	$206.0	$210.7	$226.9	$243.1	$millions			
Over / (Under) Collection ($millions)	$109.9	$87.9	$66.0	$42.2	$20.2	$0.2	($17.9)	($34.2)	($48.5)	($64.7)	($80.9)	$millions			
Interest on Over / (Under) Collections ($millions)	$1.8	$1.4	$1.0	$0.6	$0.2	($0.2)	($0.5)	($0.8)	($1.1)	($1.4)	($1.7)	$millions			
Total Cost to Ratepayers After True-up ($millions)	**$107.8**	**$130.2**	**$152.5**	**$167.2**	**$180.0**	**$190.9**	**$199.8**	**$206.8**	**$211.8**	**$228.3**	**$244.8**	$millions	**$137.0**	**$183.6**	**$41.5**
Actual Rate Paid After True-up ($/MWH)	$31.09	$37.54	$43.98	$50.42	$56.87	$63.31	$69.75	$76.20	$82.64	$89.09	$95.53	$/MWH			

Exhibit RSH-11

SENSITIVITY ANALYSIS B-3 - Scenario A-3 with Block Sizes Based on Average Monthly Loads

	a	b	c	d	e	f	g	h	i	j	k		HI - LO	Average	St Dev
Price Change	-50.00%	-40.00%	-30.00%	-20.00%	-10.00%	0.00%	10.00%	20.00%	30.00%	40.00%	50.00%				
Load Change	-15.00%	-15.00%	-15.00%	-10.00%	-5.00%	0.00%	5.00%	10.00%	15.00%	15.00%	15.00%				
MWH sold	2,562,740	2,562,740	2,562,740	2,713,490	2,864,239	3,014,988	3,165,738	3,316,487	3,467,237	3,467,237	3,467,237	MWH			
Full Requirement Service															
Fixed SOS Rate at 1st of year ($/MWH)	$69.58	$69.58	$69.58	$69.58	$69.58	$69.58	$69.58	$69.58	$69.58	$69.58	$69.58	$/MWH			
Total Cost to Ratepayers ($millions)	**$178.3**	**$178.3**	**$178.3**	**$188.8**	**$199.3**	**$209.8**	**$220.3**	**$230.7**	**$241.2**	**$241.2**	**$241.2**	$millions	**$62.9**	**$209.8**	**$26.5**
Block Products +/- Spot Purchases															
Fixed SOS Rate at 1st of year ($/MWH)	$65.66	$65.66	$65.66	$65.66	$65.66	$65.66	$65.66	$65.66	$65.66	$65.66	$65.66	$/MWH			
Revenue Before True-up ($millions)	$168.3	$168.3	$168.3	$178.2	$188.1	$198.0	$207.9	$217.7	$227.6	$227.6	$227.6	$millions			
Cost of Block Costs ($millions)	$192.8	$192.8	$192.8	$192.8	$192.8	$192.8	$192.8	$192.8	$192.8	$192.8	$192.8	$millions			
Incremental Spot Purchases / (Sales) (MWH)	(454,740)	(454,740)	(454,740)	(303,990)	(153,241)	(2,492)	148,258	299,007	449,757	449,757	449,757	MWH			
Cost of Incremental Spot Purchases / (Sales) ($millions)	($11.7)	($14.1)	($16.4)	($11.1)	($3.9)	$5.1	$16.2	$29.1	$43.9	$47.3	$50.6	$millions			
Over / (Under) Collection ($millions)	($12.8)	($10.5)	($8.1)	($3.5)	($0.8)	$0.0	($1.1)	($4.1)	($9.0)	($12.4)	($15.8)	$millions			
Interest on Over / (Under) Collections ($millions)	($0.2)	($0.2)	($0.1)	($0.1)	($0.0)	($0.0)	($0.0)	($0.1)	($0.2)	($0.3)	($0.3)	$millions			
Total Cost to Ratepayers After True-up ($millions)	**$181.3**	**$178.9**	**$176.5**	**$181.7**	**$188.9**	**$198.0**	**$209.0**	**$222.0**	**$236.9**	**$240.3**	**$243.8**	$millions	**$67.3**	**$205.2**	**$26.4**
Actual Rate Paid After True-up ($/MWH)	$70.74	$69.81	$68.87	$66.97	$65.94	$65.66	$66.02	$66.93	$68.32	$69.31	$70.30	$/MWH			
Savings with a Block Products ($millions)	**($3.0)**	**($0.6)**	**$1.8**	**$7.1**	**$10.4**	**$11.8**	**$11.3**	**$8.8**	**$4.4**	**$0.9**	**($2.5)**	$millions			
100% Spot Purchases															
Fixed SOS Rate at 1st of year ($/MWH)	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$/MWH			
Revenue Before True-up ($millions)	$162.3	$162.3	$162.3	$171.8	$181.3	$190.9	$200.4	$210.0	$219.5	$219.5	$219.5	$millions			
Cost of Spot Purchases ($millions)	$81.0	$97.3	$113.5	$137.3	$163.0	$190.7	$220.3	$251.7	$285.1	$307.0	$329.0	$millions			
Over / (Under) Collection ($millions)	$81.2	$65.0	$48.8	$34.5	$18.3	$0.2	($19.8)	($41.8)	($65.6)	($87.5)	($109.4)	$millions			
Interest on Over / (Under) Collections ($millions)	$1.4	$1.1	$0.8	$0.5	$0.2	($0.2)	($0.6)	($1.0)	($1.4)	($1.9)	($2.3)	$millions			
Total Cost to Ratepayers After True-up ($millions)	**$79.7**	**$96.2**	**$112.7**	**$136.8**	**$162.9**	**$190.9**	**$220.8**	**$252.7**	**$286.5**	**$308.9**	**$331.2**	$millions	**$251.5**	**$198.1**	**$88.3**
Actual Rate Paid After True-up ($/MWH)	$31.09	$37.54	$43.98	$50.42	$56.87	$63.31	$69.75	$76.20	$82.64	$89.09	$95.53	$/MWH			

Exhibit RSH-12

SENSITIVITY ANALYSIS C-3 - Scenario A-3 with Block Sizes Based on Average Yearly Loads

	a	b	c	d	e	f	g	h	i	j	k		HI - LO	Average	St Dev
Price Change	-50.00%	-40.00%	-30.00%	-20.00%	-10.00%	0.00%	10.00%	20.00%	30.00%	40.00%	50.00%				
Load Change	-15.00%	-15.00%	-15.00%	-10.00%	-5.00%	0.00%	5.00%	10.00%	15.00%	15.00%	15.00%				
MWH sold	2,562,740	2,562,740	2,562,740	2,713,490	2,864,239	3,014,988	3,165,738	3,316,487	3,467,237	3,467,237	3,467,237	MWH			
Full Requirement Service															
Fixed SOS Rate at 1st of year ($/MWH)	$69.82	$69.82	$69.82	$69.82	$69.82	$69.82	$69.82	$69.82	$69.82	$69.82	$69.82	$/MWH			
Total Cost to Ratepayers ($millions)	**$178.9**	**$178.9**	**$178.9**	**$189.4**	**$200.0**	**$210.5**	**$221.0**	**$231.5**	**$242.1**	**$242.1**	**$242.1**	$millions	**$63.1**	**$210.5**	**$26.6**
Block Products +/- Spot Purchases															
Fixed SOS Rate at 1st of year ($/MWH)	$65.90	$65.90	$65.90	$65.90	$65.90	$65.90	$65.90	$65.90	$65.90	$65.90	$65.90	$/MWH			
Revenue Before True-up ($millions)	$168.9	$168.9	$168.9	$178.8	$188.7	$198.7	$208.6	$218.5	$228.5	$228.5	$228.5	$millions			
Cost of Block Costs ($millions)	$191.3	$191.3	$191.3	$191.3	$191.3	$191.3	$191.3	$191.3	$191.3	$191.3	$191.3	$millions			
Incremental Spot Purchases / (Sales) (MWH)	(449,980)	(449,980)	(449,980)	(299,230)	(148,481)	2,268	153,018	303,767	454,517	454,517	454,517	MWH			
Cost of Incremental Spot Purchases / (Sales) ($millions)	($10.6)	($12.8)	($14.9)	($9.4)	($2.0)	$7.3	$18.6	$31.7	$46.7	$50.3	$53.9	$millions			
Over / (Under) Collection ($millions)	($11.8)	($9.7)	($7.6)	($3.1)	($0.6)	$0.0	($1.3)	($4.5)	($9.6)	($13.2)	($16.8)	$millions			
Interest on Over / (Under) Collections ($millions)	($0.2)	($0.2)	($0.1)	($0.0)	($0.0)	($0.0)	($0.0)	($0.1)	($0.2)	($0.3)	($0.3)	$millions			
Total Cost to Ratepayers After True-up ($millions)	**$180.9**	**$178.7**	**$176.6**	**$182.0**	**$189.4**	**$198.7**	**$209.9**	**$223.1**	**$238.3**	**$241.9**	**$245.6**	$millions	**$69.0**	**$205.9**	**$27.1**
Actual Rate Paid After True-up ($/MWH)	$70.59	$69.75	$68.90	$67.07	$66.11	$65.90	$66.31	$67.28	$68.72	$69.77	$70.83	$/MWH			
Savings with a Block Products ($millions)	**($2.0)**	**$0.2**	**$2.3**	**$7.4**	**$10.6**	**$11.8**	**$11.1**	**$8.4**	**$3.8**	**$0.1**	**($3.5)**	$millions			
100% Spot Purchases															
Fixed SOS Rate at 1st of year ($/MWH)	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$63.31	$/MWH			
Revenue Before True-up ($millions)	$162.3	$162.3	$162.3	$171.8	$181.3	$190.9	$200.4	$210.0	$219.5	$219.5	$219.5	$millions			
Cost of Spot Purchases ($millions)	$81.0	$97.3	$113.5	$137.3	$163.0	$190.7	$220.3	$251.7	$285.1	$307.0	$329.0	$millions			
Over / (Under) Collection ($millions)	$81.2	$65.0	$48.8	$34.5	$18.3	$0.2	($19.8)	($41.8)	($65.6)	($87.5)	($109.4)	$millions			
Interest on Over / (Under) Collections ($millions)	$1.4	$1.1	$0.8	$0.5	$0.2	($0.2)	($0.6)	($1.0)	($1.4)	($1.9)	($2.3)	$millions			
Total Cost to Ratepayers After True-up ($millions)	**$79.7**	**$96.2**	**$112.7**	**$136.8**	**$162.9**	**$190.9**	**$220.8**	**$252.7**	**$286.5**	**$308.9**	**$331.2**	$millions	**$251.5**	**$198.1**	**$88.3**
Actual Rate Paid After True-up ($/MWH)	$31.09	$37.54	$43.98	$50.42	$56.87	$63.31	$69.75	$76.20	$82.64	$89.09	$95.53	$/MWH			

Exhibit RSH-13

SENSITIVITY ANALYSIS D-3 - Scenario A-3 with Higher Interest Rate

	a	b	c	d	e	f	g	h	i	j	k		HI - LO	Average	St Dev
Price Change	-50.00%	-40.00%	-30.00%	-20.00%	-10.00%	0.00%	10.00%	20.00%	30.00%	40.00%	50.00%				
Load Change	-15.00%	-15.00%	-15.00%	-10.00%	-5.00%	0.00%	5.00%	10.00%	15.00%	15.00%	15.00%				
MWH sold	2,562,740	2,562,740	2,562,740	2,713,490	2,864,239	3,014,988	3,165,738	3,316,487	3,467,237	3,467,237	3,467,237	MWH			
Full Requirement Service															
Fixed SOS Rate at 1st of year ($/MWH)	$69.60	$69.60	$69.60	$69.60	$69.60	$69.60	$69.60	$69.60	$69.60	$69.60	$69.60	$/MWH			
Total Cost to Ratepayers ($millions)	**$178.4**	**$178.4**	**$178.4**	**$188.9**	**$199.4**	**$209.8**	**$220.3**	**$230.8**	**$241.3**	**$241.3**	**$241.3**	$millions	**$63.0**	**$209.8**	**$26.5**
Block Products +/- Spot Purchases															
Fixed SOS Rate at 1st of year ($/MWH)	$65.68	$65.68	$65.68	$65.68	$65.68	$65.68	$65.68	$65.68	$65.68	$65.68	$65.68	$/MWH			
Revenue Before True-up ($millions)	$168.3	$168.3	$168.3	$178.2	$188.1	$198.0	$207.9	$217.8	$227.7	$227.7	$227.7	$millions			
Cost of Block Costs ($millions)	$198.2	$198.2	$198.2	$198.2	$198.2	$198.2	$198.2	$198.2	$198.2	$198.2	$198.2	$millions			
Incremental Spot Purchases / (Sales) (MWH)	(543,180)	(543,180)	(543,180)	(392,430)	(241,681)	(90,932)	59,818	210,567	361,317	361,317	361,317	MWH			
Cost of Incremental Spot Purchases / (Sales) ($millions)	($14.4)	($17.3)	($20.1)	($15.4)	($8.7)	($0.2)	$10.3	$22.7	$37.0	$39.8	$42.6	$millions			
Over / (Under) Collection ($millions)	($15.5)	($12.6)	($9.7)	($4.5)	($1.3)	$0.0	($0.5)	($3.0)	($7.4)	($10.2)	($13.1)	$millions			
Interest on Over / (Under) Collections ($millions)	($0.7)	($0.5)	($0.4)	($0.2)	($0.1)	($0.0)	($0.1)	($0.2)	($0.5)	($0.6)	($0.7)	$millions			
Total Cost to Ratepayers After True-up ($millions)	**$184.5**	**$181.4**	**$178.4**	**$183.0**	**$189.5**	**$198.0**	**$208.6**	**$221.1**	**$235.6**	**$238.6**	**$241.5**	$millions	**$63.1**	**$205.5**	**$24.7**
Actual Rate Paid After True-up ($/MWH)	$71.98	$70.80	$69.63	$67.43	$66.16	$65.68	$65.88	$66.66	$67.95	$68.80	$69.66	$/MWH			
Savings with a Block Products ($millions)	**($6.1)**	**($3.1)**	**($0.1)**	**$5.9**	**$9.9**	**$11.8**	**$11.8**	**$9.8**	**$5.7**	**$2.8**	**($0.2)**	$millions			
100% Spot Purchases															
Fixed SOS Rate at 1st of year ($/MWH)	$63.40	$63.40	$63.40	$63.40	$63.40	$63.40	$63.40	$63.40	$63.40	$63.40	$63.40	$/MWH			
Revenue Before True-up ($millions)	$162.5	$162.5	$162.5	$172.0	$181.6	$191.1	$200.7	$210.3	$219.8	$219.8	$219.8	$millions			
Cost of Spot Purchases ($millions)	$81.0	$97.3	$113.5	$137.3	$163.0	$190.7	$220.3	$251.7	$285.1	$307.0	$329.0	$millions			
Over / (Under) Collection ($millions)	$81.4	$65.2	$49.0	$34.7	$18.5	$0.4	($19.6)	($41.5)	($65.3)	($87.2)	($109.1)	$millions			
Interest on Over / (Under) Collections ($millions)	$3.4	$2.6	$1.9	$1.2	$0.4	($0.4)	($1.4)	($2.4)	($3.6)	($4.6)	($5.6)	$millions			
Total Cost to Ratepayers After True-up ($millions)	**$77.6**	**$94.6**	**$111.6**	**$136.1**	**$162.6**	**$191.1**	**$221.7**	**$254.2**	**$288.7**	**$311.6**	**$334.6**	$millions	**$256.9**	**$198.6**	**$90.1**
Actual Rate Paid After True-up ($/MWH)	$30.30	$36.92	$43.54	$50.16	$56.78	$63.40	$70.02	$76.64	$83.26	$89.88	$96.50	$/MWH			