

EXHIBIT NO. ____ (DEM-3C)
DOCKET NO. UE-07 ____
2007 PSE PCORC
WITNESS: DAVID E. MILLS

**BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION**

**WASHINGTON UTILITIES AND
TRANSPORTATION COMMISSION,**

Complainant,

v.

PUGET SOUND ENERGY, INC.,

Respondent.

Docket No. UE-07 ____

**SECOND EXHIBIT (CONFIDENTIAL) TO THE
PREFILED DIRECT TESTIMONY OF
DAVID E. MILLS
ON BEHALF OF PUGET SOUND ENERGY, INC.**

**REDACTED
VERSION**

MARCH 20, 2007

PUGET SOUND ENERGY, INC.

**SECOND EXHIBIT (CONFIDENTIAL) TO THE
PREFILED DIRECT TESTIMONY OF
DAVID E. MILLS**

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PUGET SOUND ENERGY, INC.

**SECOND EXHIBIT (CONFIDENTIAL) TO THE
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**A. PSE Has Organizational Structures, Policies and Strategies in Place to
Manage Electric and Natural Gas Portfolio Risks**

1. Organizational Structures

Q. What organizational structures does the Company have in place to manage electric and natural gas portfolio risks?

A. PSE's Energy Portfolio Management ("EPM") Department – composed of energy market analysts, quantitative analysts and other professionals – is responsible for identifying, quantifying, monitoring and reporting on risk factors. This department also develops and recommends risk management strategies for the Company. The EPM department includes the Power Supply Operations and Gas Supply Operations groups, which implement the Company's medium-term risk management strategies and manage PSE's medium-term portfolios.

The Energy Risk Control and Credit Risk Management groups provide risk control oversight. These two areas provide mid-office support and risk controls to the transaction process. Since February 2006, these areas have been led by the Chief Financial Officer / Sr. Vice President of Finance.

1 PSE's Energy Management Committee ("EMC") – composed of senior PSE
2 officers – oversees the activities performed by the EPM and the Energy Resources
3 groups. The EMC is responsible for providing oversight and direction on all
4 portfolio risk issues in addition to approving long-term resource contracts and
5 acquisitions. In addition, the Energy Management Committee provides policy-
6 level and strategic direction on a regular basis, reviews position reports, sets risk
7 exposure limits, reviews proposed risk management strategies, and approves
8 policy, procedures, and strategies for implementation by PSE staff.

9 In addition, the Company's Board of Directors provides executive oversight of
10 these areas through certain committees.

11 **Q. Does the Company have the same policies and overarching strategies with**
12 **respect to its electric and gas portfolios?**

13 A. No, PSE's management of its electric portfolio for electric customers (including
14 the natural gas PSE acquires to generate electricity) is not the same as its
15 management of its natural gas portfolio for gas customers (often referred to as the
16 "Core Gas" portfolio). PSE actively manages and hedges both portfolios, but
17 does not always employ the same strategies. This is because management of the
18 electric portfolio involves complexities not present in the Core Gas portfolio such
19 as the relationship between wholesale market power prices and the wholesale
20 market price of natural gas needed to generate power; the extent of water
21 available to generate hydroelectric power; and alternatives available to the

1 Company to generate, purchase or sell power result in additional risks and
2 opportunities in the electric portfolio.

3 **2. Electric Risk Management Policies**

4 **Q. Please describe the Company's current hedging strategy for its electric**
5 **portfolio.**

6 A. The existing programmatic hedging plan (called the "Rolling ■ Month Hedging
7 Plan") was approved July 22, 2004 by the EMC. EPM staff follows this plan to
8 systematically reduce the Company's net power portfolio exposure (including
9 natural gas for power generation) beginning ■ months in advance of the month in
10 which the power will be needed to serve PSE's load. Generally, the plan requires
11 EPM staff to reduce PSE's net electric portfolio exposure each month such that
12 the net exposure by the end of each month falls within the range of exposure –
13 stated in dollars – that is permitted in the plan.

14 On or before ■ months ahead of delivery, the bulk of the hedging strategies and
15 transactions have been made per this programmatic plan. This is why the plan is
16 called the "Rolling ■ Month Hedging Plan" even though it begins ■ months
17 ahead of the time of delivery – it is implemented over the time period from ■ to
18 ■ months ahead of delivery. See the presentation explaining the Rolling ■
19 Month Hedging Plan in Attachment A.

20 ////

1 The “Rolling [REDACTED] Month Hedging Plan” is not entirely programmatic and
2 incorporates elements of discretion. EPM staff determine how to accomplish the
3 required reduction in exposure during the course of each month. For example,
4 EPM staff decides whether to purchase or sell power or gas for power, the
5 quantity to purchase or sell, and the timing during the month to complete such
6 transactions. In addition, staff decides whether to push toward the maximum or
7 minimum monthly dollar limits each month, or to hedge somewhere in between.
8 EPM staff may also recommend departures from this plan, pursuant to market
9 fundamentals, but execution of any such departures from previously approved
10 strategies is subject to EMC approval.

11 **Q. How did the Company develop the existing electric hedging strategy**
12 **described above?**

13 A. PSE initially wished to develop more programmatic hedging strategies because,
14 while one can make projections regarding future market movements, one can
15 never know at the time of a hedging transaction how the future will actually
16 unfold. Thus, the Company saw a benefit in avoiding hedging strategies that are
17 overly reliant on discretionary market timing.

18 Toward this end, PSE implemented a “dollar cost averaging” strategy for its
19 electric portfolio in 2002. The volumetric dollar-cost averaging strategy required
20 EPM staff to purchase or sell a specific volume of gas or power each month, in
21 order to progressively reduce the Company’s projected short or long position

1 during future months.

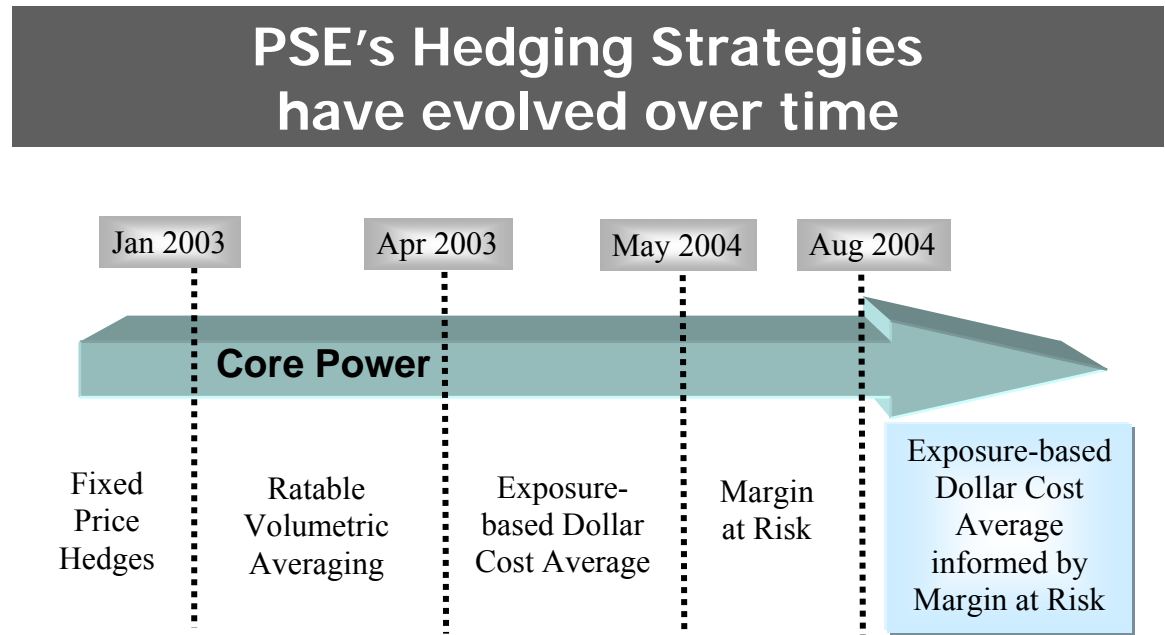
2 **Q. When did the Company change this initial dollar-cost averaging strategy?**

3 A. By spring 2003, the Risk Management Committee (the predecessor to the Energy
4 Management Committee) approved expansion of this concept to an “Exposure-
5 based Dollar Cost Averaging.” This refinement moved the Company from
6 defining a specific commodity and volume to be hedged each month to a dollar
7 amount of risk reduction to be accomplished every month. Under this approach,
8 the Risk Management Committee would approve a dollar amount of risk to be
9 reduced, and PSE staff would determine the appropriate commodity to hedge. As
10 markets moved up or down, the approved dollar amount would allow for less or
11 more volumetric purchases.

12 In May 2004, the Company began to employ a metric called Margin at Risk, to
13 measure risk reduction as a result of incremental hedging. *See* the presentation
14 explaining Margin at Risk in Attachment B. PSE has incorporated the Margin at
15 Risk concept into the evaluation process for hedge strategies to measure risk
16 reduction for various commodity alternatives. A series of hedge strategies, or
17 transaction types, are run through the portfolio risk system, providing a table of
18 how much risk reduction is gained, by month and by strategy. The Margin at
19 Risk concept provides an additional tool in deciding how to allocate dollars across
20 commodities in a credit-constrained environment.

1 **Q. Please summarize how the Company's hedging strategies have evolved over**
2 **time.**

3 A. The following flowchart illustrates these changes:



4
5 **B. PSE'S Sophisticated Modeling Tools & Extensive Information Used**
6 **To Manage Its Portfolio And Implement Risk Management Strategies**

7 **Q. Please describe what PSE's electric portfolio risk system does.**

8 A. PSE's risk system employs production cost modeling techniques to estimate
9 future demand for on- and off-peak power and natural gas for PSE's fleet of gas-
10 fired power plants. This risk system permits PSE to model scenarios of power
11 prices, hydro conditions, load projections, generating and contracted resources
12 and other inputs as required, to represent future projected portfolio needs.

1 To model a variety of scenarios regarding PSE's gas-fired generation, the risk
2 system takes into account each plant's individual operating characteristics,
3 including: unit efficiency, start-up costs, variable operating costs, minimum run
4 times, planned and unplanned outages, and unit availability. The risk system
5 performs simulations of different market conditions and various outages in order
6 to develop an estimate of how much gas is required and how much power will be
7 produced. The plants are modeled on an hourly basis and the information is
8 aggregated into daily and monthly time frames for purposes of developing a
9 forward-looking position. In modeling whether the portfolio is surplus or deficit,
10 the risk system incorporates information about hedges that PSE staff has already
11 executed.

12 The risk system incorporates the inter-relationship between gas and power prices
13 in developing its probabilistic gas and power positions. In different market
14 scenarios, PSE's gas or power requirements will change. The reason is twofold.
15 First, the plants have different operating efficiencies (known as "heat rates") and
16 become economic to dispatch at different price differentials between power and
17 gas. Second, the forward market prices for power and gas change frequently and
18 the price relationship between power and gas, known as the "implied market heat
19 rates," change as well. At certain implied market heat rates, PSE will expect to
20 run each plant at an expected rate, and the expected plant gas requirements can be
21 calculated. But if market conditions change, PSE will expect to adjust its gas and
22 power purchases or sales in order to serve load with the most economic resource.

1 **Q. Please describe the output that the electric portfolio risk system produces.**

2 A. The risk system generates a probabilistic volumetric position, comprised of 100
3 scenarios, for on- and off-peak power and gas for power. The position report
4 shows, for each of the months following the date of the report, the resource types
5 in PSE's power position grouped by: short-term purchase and sale transactions,
6 long-term contracts, Combustion Turbines ("CTs") grouped by heat rate
7 efficiency of the facilities, NUGs/QFs, Coal Plants, Wind and Hydro (both PSE
8 owned and Mid-Columbia ("Mid-C") contracts).

9 Based on this probabilistic volumetric position for each month, the risk system
10 also generates a report showing the potential net cost exposure associated with the
11 "open" positions (defined as any net surplus or deficit amount).

12 **Q. How does PSE use the electric portfolio risk system to help make hedging**
13 **decisions?**

14 A. Once PSE's aggregated energy position and net exposure are defined for a
15 particular period, the EPM staff evaluate and develop risk management strategy
16 proposals and/or execute transactions around the purchase or sale of gas or power,
17 as appropriate, to move toward a balanced position and reduced exposure.
18 Execution entails entering into specific transactions with approved counterparties,
19 approved instruments, executed master agreements and available credit.

20 /////

1 **Q. How is the risk system used to implement the Rolling [REDACTED] Month Hedging**
2 **Plan described above?**

3 A. As described above, the Plan is set up to systematically reduce the total net
4 exposure, for each month of the [REDACTED] months beyond the next [REDACTED] month timeframe,
5 within maximum and minimum limits on the amount of hedging that can or must
6 be done each month, so that the total net exposure for each month will fall within
7 the limits of the plan. The total net exposure for each month is generated out of
8 the risk system.

9 **Q. Does Energy Portfolio Management staff implement the Rolling [REDACTED] Month**
10 **Hedging Plan relying only on the net exposure?**

11 A. No. The net exposure drives transactions only to the point of showing whether
12 PSE's exposure is within the maximum and minimum monthly limits of the plan.
13 EPM staff must then make use of market fundamentals, water supply and weather
14 forecasts that impact the wholesale electric and gas markets to decide whether to
15 press toward the maximum or minimum monthly limits, or somewhere in
16 between. EPM staff also determines when and how to execute such transactions
17 to maintain each months net exposure within the maximum and minimum limits.

18 /////

19 /////

20 /////

1 **Q. How does the Energy Portfolio Management staff develop a view regarding**
2 **how to exercise such discretion?**

3 A. The EPM Department utilizes a wide set of tools and sources of information to
4 help them make informed decisions about dispatching plants, purchasing fuel, and
5 executing hedges approved by the EMC. They also hold several meetings each
6 month so that the team can review operational events, discuss market trends, and
7 review new supply/demand information. Within this context, they work together
8 to understand the exposures in the portfolio and discuss where hedging priorities
9 occur. Underlying all this teamwork is an EPM staff with years of experience in
10 energy trading, optimization and risk management.

11 **Q. What types of information does the Energy Portfolio Management staff**
12 **consider?**

13 A. The EPM Department collects a wide range of data to monitor supply/demand
14 factors, which include but are not limited to: weather trends; macro economic
15 factors; crude oil markets, gas storage inventories across the United States,
16 Canada and in the western United States; hydro run-off forecasts, reservoir
17 storage, precipitation and snowpack; and more. Additionally, PSE staff reviews
18 forecasted wholesale market prices and supply/demand fundamentals, such as
19 trading firm publications and consulting service forecasts.

20 /////

1 EPM staff also receives real-time information from a variety of sources such as:
2 McGraw Hill (Gas Daily, Megawatt Daily), Future Source, Genscape,
3 Intercontinental Exchange (live price data), live broker lines where current
4 transactions are communicated through a speaker system, and other tools. The
5 EPM group also has instantaneous data coming from the Company's systems
6 operations staff so they can view load and generation dispatch data on a real-time
7 basis.

8 In addition to using such information and processes to implement the Rolling REDACTED
9 Month Hedging Plan, the EPM group also uses such information to develop
10 recommendations to the EMC regarding potential changes to the Company's
11 overarching hedging strategies or to recommend transactions that do not fall
12 within those strategies.

13 **Q. Does the Company use any other tools to manage its energy portfolio?**

14 A. Yes. The Company also uses a counterparty credit risk management system to
15 assist the Credit Risk Management group and EPM staff in evaluating potential
16 transactions with respect to credit issues. With this tool, staff can review data
17 including: Moody's and S&P rating of the entity; applicable information about
18 the parent of the entity; amount of parent guarantee credit provided to PSE, if
19 applicable; the entity's amounts payable and receivable; the aggregate mark to
20 market exposure of all open forward transactions with the entity (the dollar value
21 of the difference between the original contract price and current market price); the

1 credit limit assigned to the entity; the existence of netting terms; and FAS 149
2 designation for accounting purposes. This information is gathered and calculated
3 daily.

4 Furthermore, PSE traders can model what impact an incremental trade could have
5 with a specific counterparty. The counterparty credit risk management system
6 models the impact on the credit exposure of the Company and the counterparty of
7 the incremental trade itself, as well as the impact that would result if the market
8 moved significantly away from the price at which the deal was struck. If a
9 significant market movement would cause the credit exposure to exceed the
10 amount allowed with that counterparty, the system would indicate that the trade
11 should not be performed with that counterparty. In that case, the trader would
12 find a different counterparty to complete the transaction.

Attachment A



Hedging strategy for XXXX month
time frame

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July 22, 2004 RMC meeting

Executive Summary

- Staff seeks to improve its [XXXX] month hedging practice.
- Recommend establishing a procedure to eliminate the time between recognizing the need to hedge and receiving specific RMC approval.
- The procedure will:
 - Increase staff's ability to react to position changes due to stream flow variation and forced thermal plant outages.
 - Increase staff's ability to react to changing market conditions.
 - Enhance staff's ability to employ a "dollar-cost averaging informed by margin at risk analysis" hedging strategy.

- 7/22/04 RMC meeting

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Version



Current hedging practices

- Staff currently utilizes the “dollar-cost averaging informed by margin at risk” strategy. We plan to continue using this strategy.
- Staff manages the balance of month plus ☒ months portfolio in accordance with the Energy Supply Hedging and Optimization Procedures Manual. Source: Schedule D of Energy Supply and Optimization Procedures Manual, revised August 7, 2003.
- RMC approval is required to hedge outside this period.
- Staff recommends eliminating the time between recognizing the need to hedge and receiving specific RMC approval.

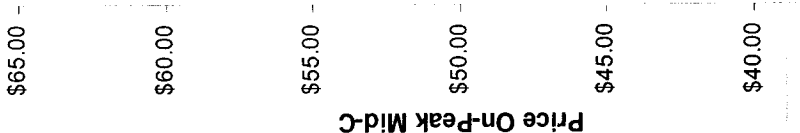
- 7/22/04 RMC meeting

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Goal is to enhance “dollar cost averaging informed by margin at risk” strategy by actively hedging [XXXX] month time frame. Chart illustrates November 04 hedging. Note this strategy does not guarantee lower costs.

Hedging activity for November 04 peak hours Mid-C delivery. Chart compares mid-mark Mid-C prices to weighted average cost of hedge.



Nov 04 Mid-Market Prices
Nov 04 Hedge Transactions

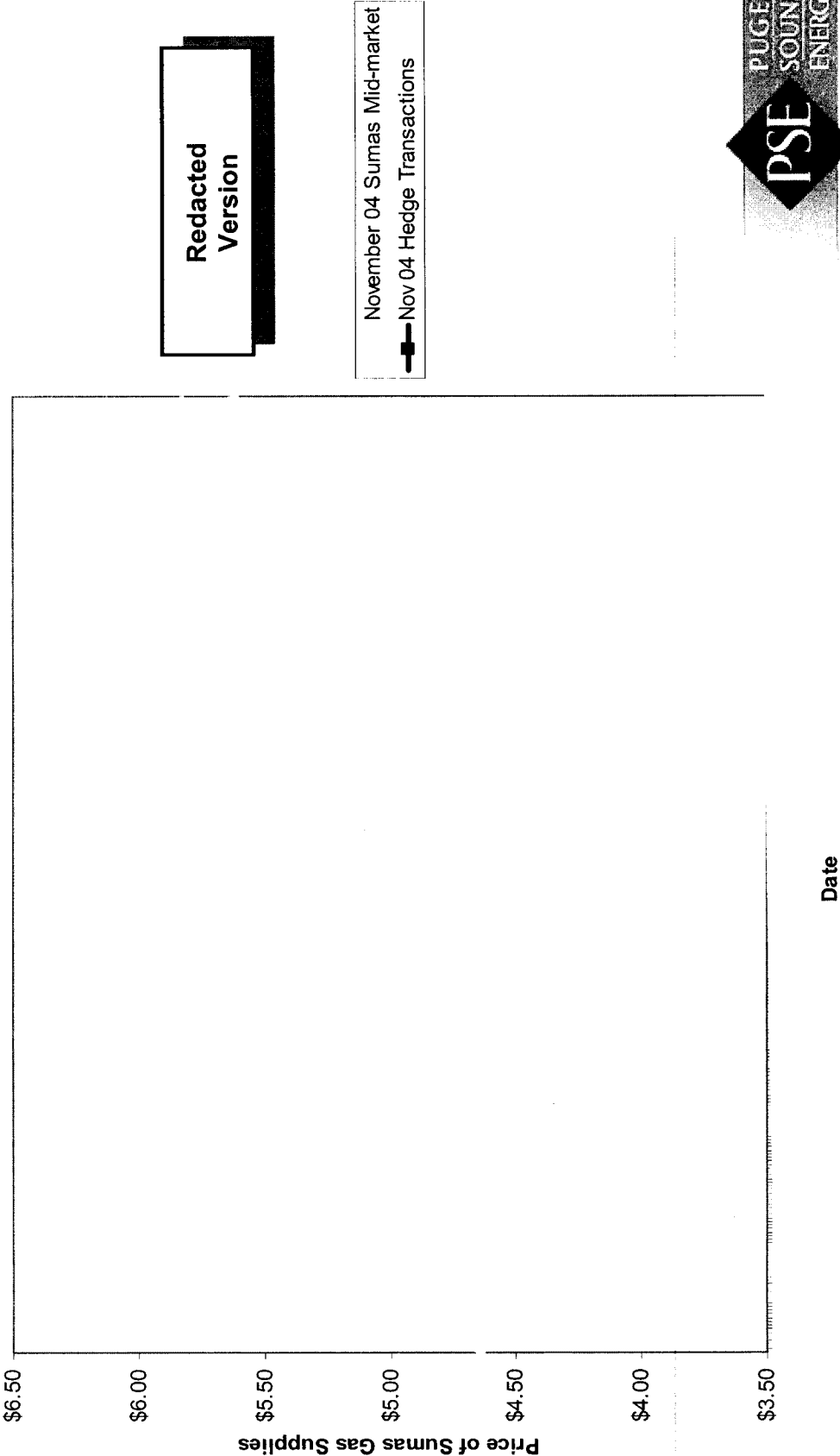
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Date

Goal is to enhance “dollar cost averaging informed by margin at risk” strategy by actively hedging **XXXXX** month time frame. Chart illustrates November 04 hedging. Note this strategy does not guarantee lower costs.

Hedging activity for Sumas settlement in November 04. Chart compares mid-market Sumas prices to weighted average Sumas hedges.



Goal is to enhance “dollar cost averaging informed by margin at risk” strategy by actively hedging XXXXXX month time frame. Chart illustrates December 04 hedging. Note this strategy does not guarantee lower costs.

Hedging activity for December 04 peak Mid-C delivery. Chart compares mid-market Dec 04 Mid-C mid-market price to hedge transactions.



Date



Goal is to enhance “dollar cost averaging informed by margin at risk” strategy by actively hedging [XXXXX] month time frame. Chart illustrates December 04 hedging. Note this strategy does not guarantee lower costs.

Hedging activity for Sumas December 04 settlement. Chart compares mid-market Sumas prices to hedge transactions.



Outline to the **XX** month rolling hedge procedure

- The first KW3000 run of every month will serve as the position for purposes of hedging on a rolling **XX** month basis.
- Maximum and minimum monthly hedging requirements will be established.
- An individual month's **maximum** monthly-hedge will systematically reduce total net exposure so that the total net exposure will be zero when that month falls into staff's BOM plus **X** month purview.
- An individual month's **minimum** monthly-hedge will systematically reduce total net exposure so that the total net exposure will fall within the VP's limits when that month falls into staff's BOM plus **X** month purview.
- Staff will inform the RMC regarding hedge executions on a monthly basis

- 7/22/04 RMC meeting.

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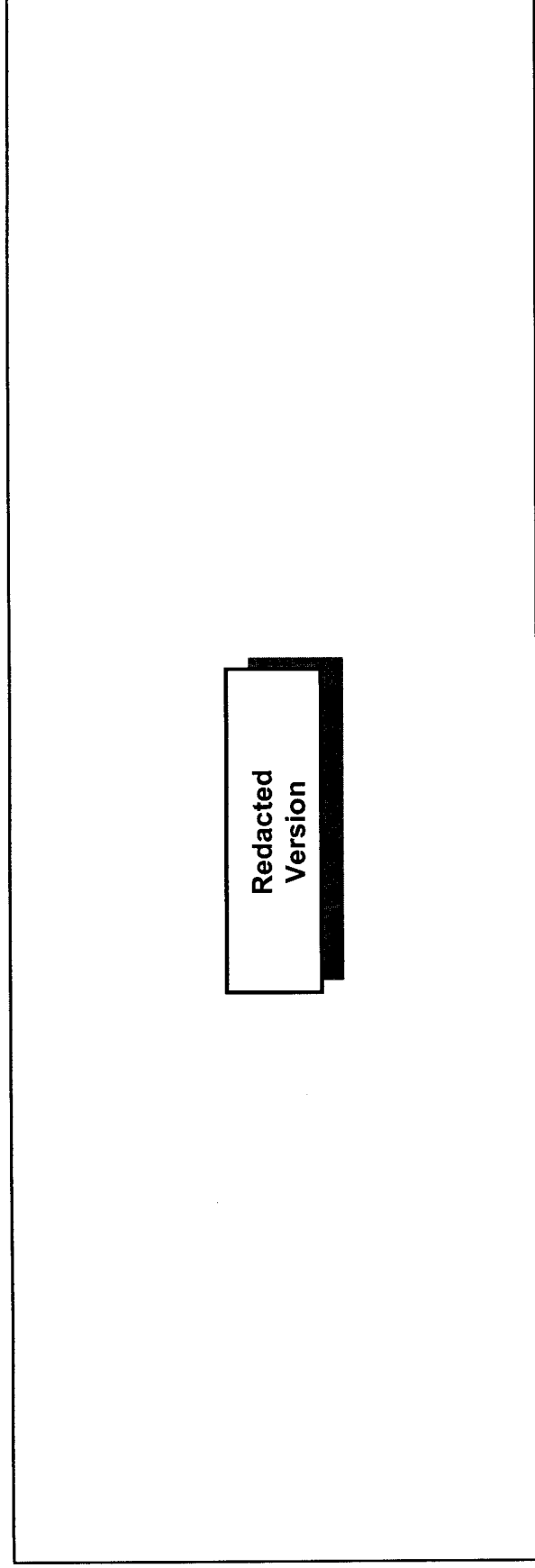


Maximum and minimum monthly hedge calculations

- The **maximum** monthly hedge is calculated by dividing the total net exposure by the remaining months before the position is managed in accordance with the Energy Supply Hedging and Optimization Procedures Manual.
- The **minimum** monthly hedge is calculated by dividing the total net exposure (plus or minus the VP's limit authority) by the remaining months before the position is managed in accordance with the Energy Supply Hedging and Optimization Procedures Manual.
- There is no monthly hedge requirement if the individual month's position already falls within the VP's limit authority.
- 7/22/04 RMC meeting



An example of the XX month rolling hedge executed in July 2004.



Benefits to proposed **XX** month rolling hedge procedure

- Increases staff's ability to react to position changes due to stream flow variation and forced thermal plant outages.
- Increases staff's ability to react to changing market conditions.
- Enhances staff's ability to employ a "dollar-cost averaging informed by margin at risk" hedging strategy on a **XX** month rolling basis.

- 7/22/04 RMC meeting

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Version



Contingencies to the proposal

- Staff will only hedge if adequate credit facilities are in place to enter into more contracted volume.
- Staff will only hedge to forecasted customer demand and will not sell energy in excess of resources.



Attachment B

Margin at Risk And Forward Hedging

May 17, 2004

RMC Meeting

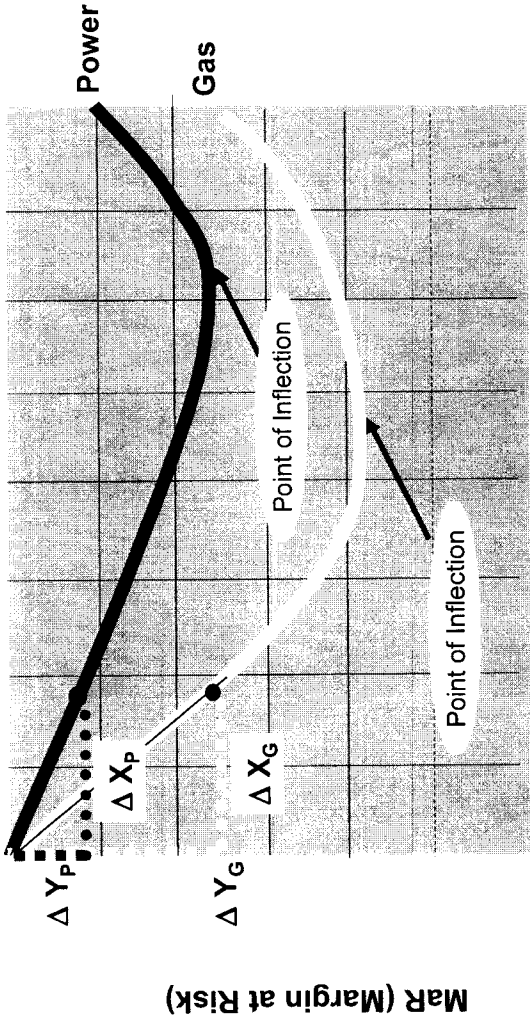
The energy to do great things



Current Basis for Hedging Decisions

- Probabilistic Position
 - ◆ Volumetric forecast of load resource, given energy market volatility, resource outages and hydrological forecasts.
- Exposure Report
 - ◆ Captures portfolio exposure to spot market price fluctuations.
- Fundamental market views
- Marginal MaR Ratio
 - ◆ Measures risk reduction as a result of incremental hedging.
 - ◆ Ratio allows for comparative assessment of different commodity hedges.
 - ☞ Identifies best commodity and month for hedge transactions.
 - ☞ Useful tool to allocate credit.

MaR - Overview



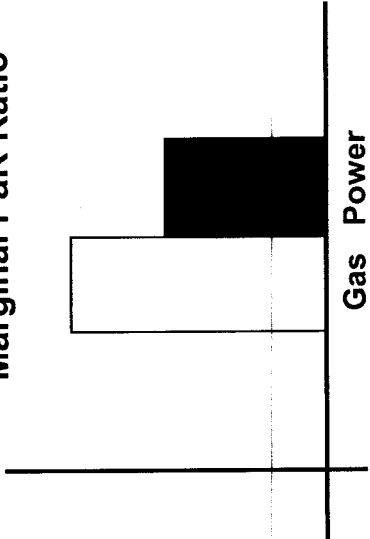
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Hedging \$ Spent

Marginal PaR Ratio

$$\text{Marginal MaR Ratio} = \frac{\text{Change in MaR } (\Delta Y)}{\text{Hedging \$ Spent } (\Delta x)}$$

Marginal MaR Ratio approximates the the amount of portfolio risk removed for each hedging dollar spent.



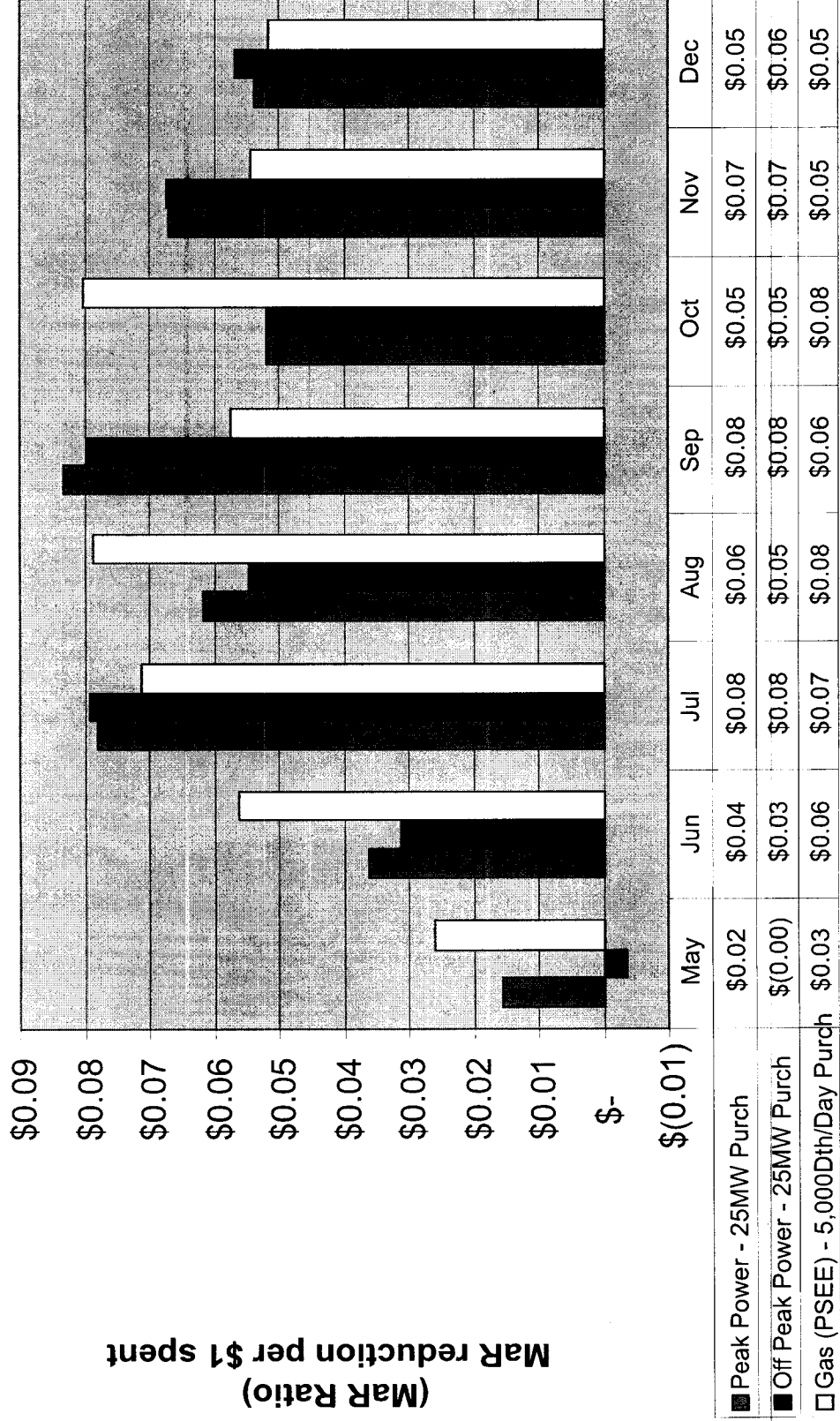
MaR - Calculation

For illustration purposes only

	Probabilistic	Scen 1- Worse Case	Scen 2	Scen 3	Scen 4	Scen 5
Load	-194	-225	-220	-150	-180	-195
Hydro (MWs)	90	70	80	80	110	110
Resources Sensitive to Heat Rates (MWs)	42	50	50	40	40	30
Other Resources & Fixed Price Contracts (MWs)	30	30	30	30	30	30
Total Resources	162	150	160	150	180	170
Fixed Price Gas Hedges (MMBTu's)	400	400	400	400	400	400
Power Spot Position (MWs)	-32	-75	-60	0	0	-25
Gas Spot Position (MMBTu's)	-20	-100	-100	0	0	100
Power Spot Exposure	-\$2,470	-\$6,375	-\$5,100	\$0	\$0	-\$875
Gas Spot Exposure	-\$180	-\$650	-\$650	\$0	\$0	\$400
Margin	\$3,498	\$530	\$1,470	\$3,380	\$5,390	\$6,720
Power Price (\$/MWhr)	\$65.00	\$85.00	\$85.00	\$60.00	\$60.00	\$35.00
Gas Price (\$/MMBTu)	<u>\$5.80</u>	<u>\$6.50</u>	<u>\$6.50</u>	<u>\$6.00</u>	<u>\$6.00</u>	<u>\$4.00</u>
Heat Rate (MMBTu/MWhr)	11.21	13.08	13.08	10.00	10.00	8.75

	MaR	Marginal MaR Ratio
Base Case	\$2,968	
Purchase 25MW Power @ \$65	\$2,468	\$0.31
Purchase 5,000 Dth/Day Gas @ \$5.80	\$2,560	\$0.34

Marginal MaR Ratio (Week Of 4/19/04)



Future Enhancements

- Implement optimal total hedge quantities by month and commodity.
 - Determine sensitivity in probabilistic position with respect to change in price/heat rate. (“gamma”)
 - ◆ Enables better understanding sensitivities of PSE’s asset heat rates vs. market heat rates.
 - ◆ Relationship is nonlinear.
 - Incorporation of nonlinear hedges in Marginal MaR Ratio Analysis (Collars, HR call options etc.)
 - Continued incorporation of fundamental views in generation and price modeling.
 - Enhance optimal hedging strategies to minimize downside and maximize upside.
-

Appendix

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Historical Hedging: Example 1

- Probabilistic June 2004 position as of 4/20/04

Total Net Exposure	(\$.22 million)
Gas Exposure	(\$3.83 million)
Power Exposure (peak)	\$2.3 million
Power Exposure (off-peak)	\$1.32 million

- Portfolio is long power and short gas
- MaR analysis indicates buying gas and selling power reduces downside risk.
- Fundamentally bearish market heat rates. Monetize relatively high heat rates
- Hedging transaction: Sell 75 aMWs flat and purchase 15,000 MMBtus/day.

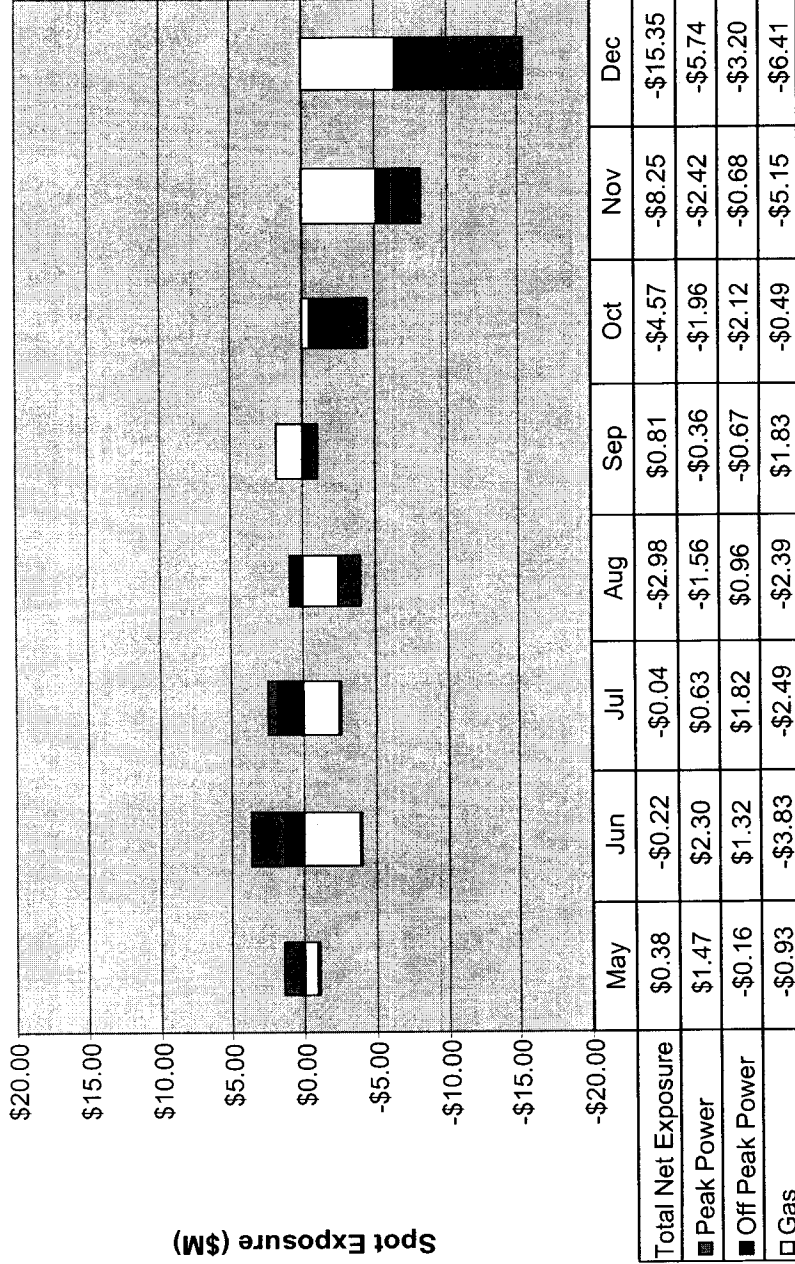
Historical Hedging: Example 2

- Probabilistic August 2004 position as of 4/20/04

Total Net Exposure	(\$2.98 million)
Gas Exposure	(\$2.39 million)
Power Exposure (peak)	(\$1.56 million)
Power Exposure (off-peak)	\$0.96 million

- Portfolio is short on peak power and gas; long off peak power.
- MaR analysis indicates buying gas reduces downside.
- Hedging transaction: Purchase 10,000 MMBtus/day.

Spot Exposure & Probabilistic Position (4/19/04)



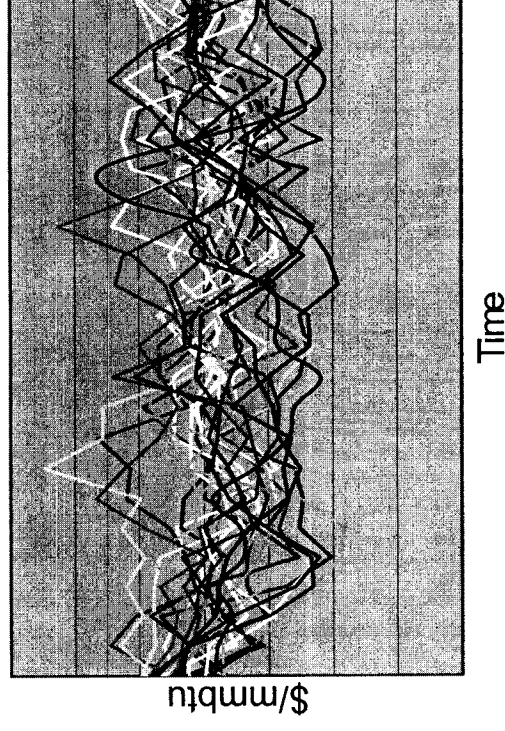
Forecasted Spot Purchases or (Sales)

	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Peak Power	-80	-90	-25	70	35	145	168	281
Off Peak Power	-14	-117	-140	-76	71	184	70	215
Gas	8,103	30,481	19,287	17,818	-9,562	5,802	34,880	40,617

Developing Key Inputs Price Modeling

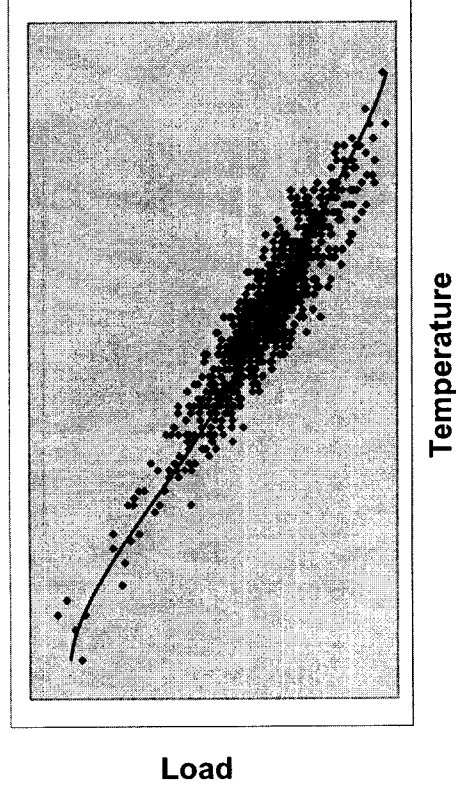
- Scenarios of prices are modeled to represent possible futures spot outcomes.
 - ◆ Econometric regression equations are used to assess correlations between supply and demand factors.
 - ◆ To produce price scenarios, these equations are solved using fundamental forecasts (e.g. GDP) and stochastic variables (e.g. weather).

Example of Price Scenarios



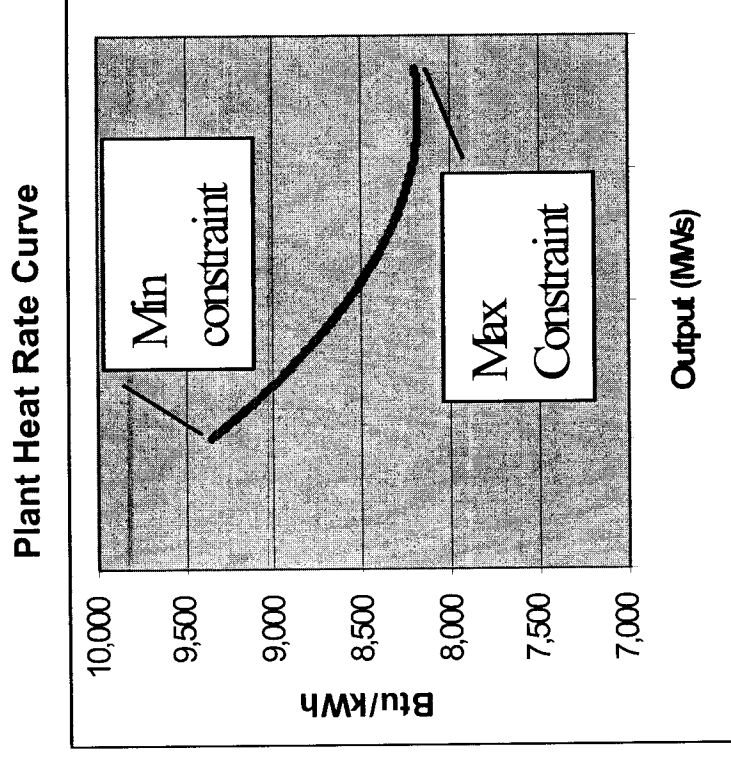
Developing Key Inputs Load Modeling

- Another large risk is load uncertainty due to weather
 - ◆ relationship between load and temperature is derived
 - ◆ historical temperature variations are used in conjunction with load and temperature relationship to develop load scenarios



Developing Key Inputs Thermal Modeling

- Modeling physical characteristics of thermal units
 - ◆ operational constraints
 - ◆ efficiency
 - ◆ outage characteristics
 - ◆ NUG contract complexity
- Gas-Power price correlation
 - ◆ not always linear



Developing Key Inputs Hydro Modeling

- Over one-third of PSE capacity is hydro based
 - ◆ Scenarios of hydro production are modeled to represent possible futures outcomes.
 - ◆ Uncertainty in hydro production represents a huge volumetric uncertainty
 - ◆ Correlation between price and hydro