EXHIBIT NO. DEM-4
DOCKET NO. UE-10____
PCA 8 COMPLIANCE
WITNESS: DAVID E. MILLS

BEFORE THE
WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

In the Matter of the Petition of **PUGET SOUND ENERGY, INC.** **For Approval of its March 2010 Power Cost Adjustment Mechanism Report**	**Docket No. UE-10____**

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

MARCH 31, 2010

Margin at Risk And Forward Hedging

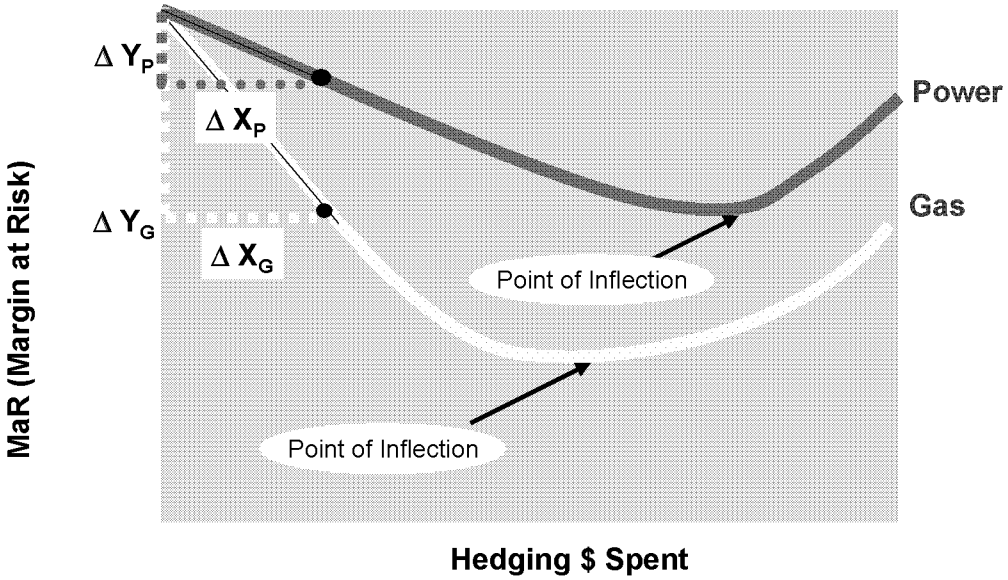
May 17, 2004

RMC Meeting

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.

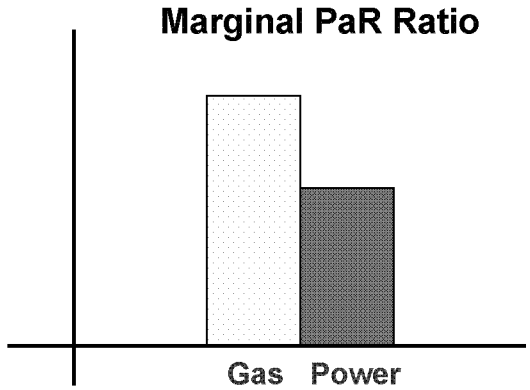
MaR - Overview



For illustration purposes only

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

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



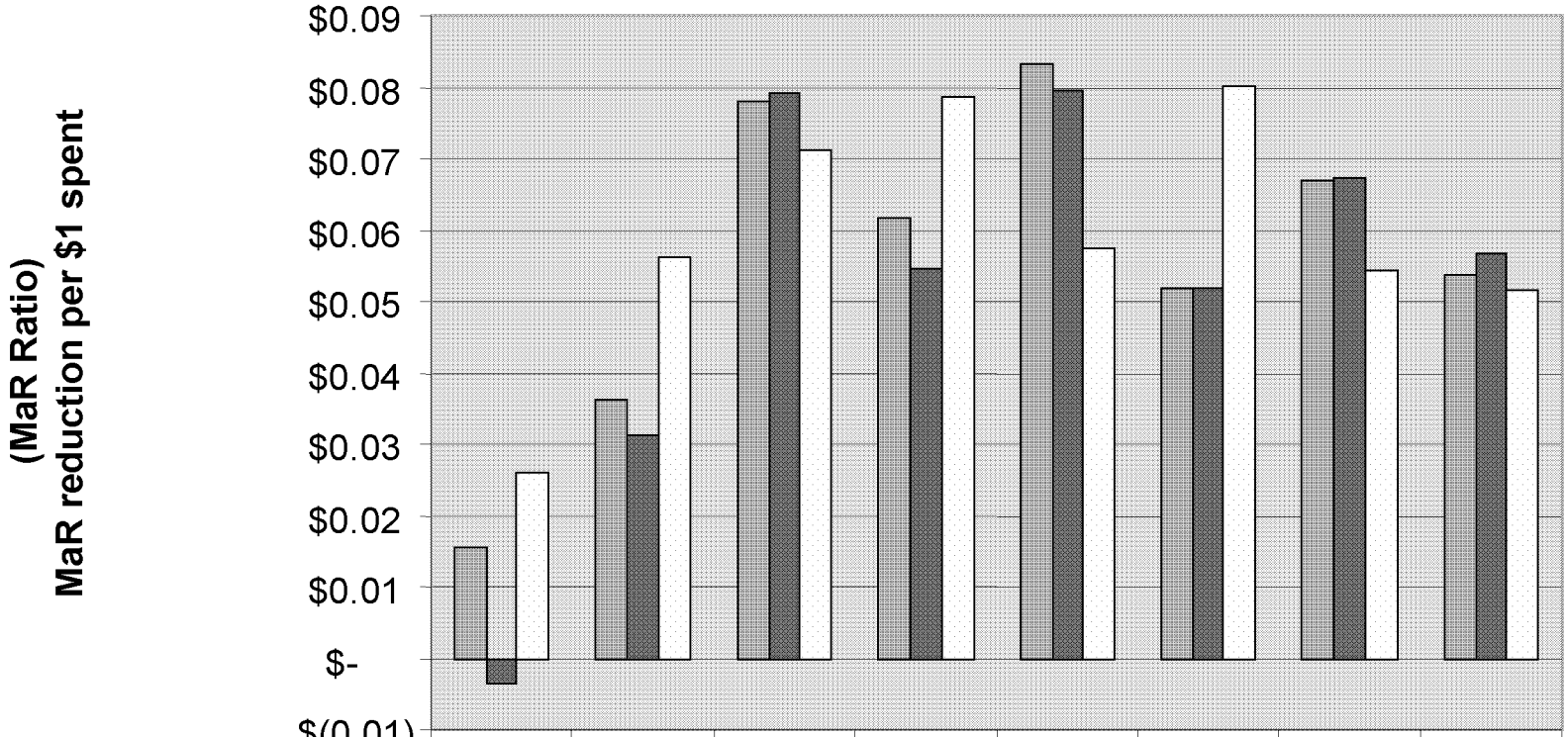
MaR - Calculation

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 Resourses	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)	$5.80	$6.50	$6.50	$6.00	$6.00	$4.00
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)



	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Peak Power - 25MW Purch	$0.02	$0.04	$0.08	$0.06	$0.08	$0.05	$0.07	$0.05
Off Peak Power - 25MW Purch	$(0.00)	$0.03	$0.08	$0.05	$0.08	$0.05	$0.07	$0.06
Gas (PSEE) - 5,000Dth/Day Purch	$0.03	$0.06	$0.07	$0.08	$0.06	$0.08	$0.05	$0.05

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

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.

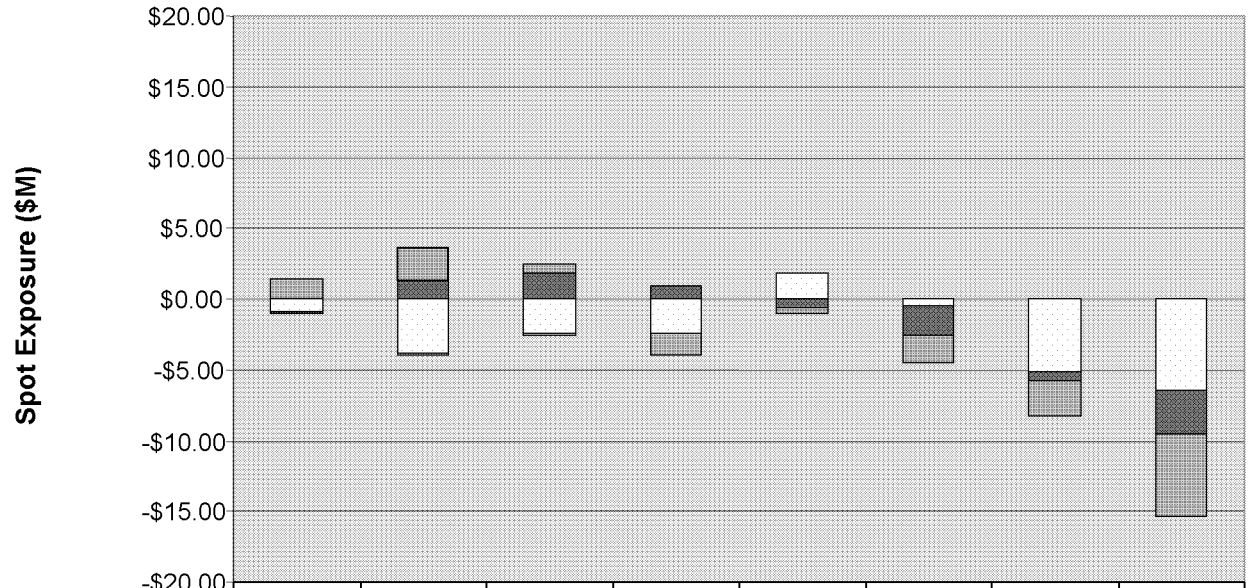
Historical Hedging: Example 2

- 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)



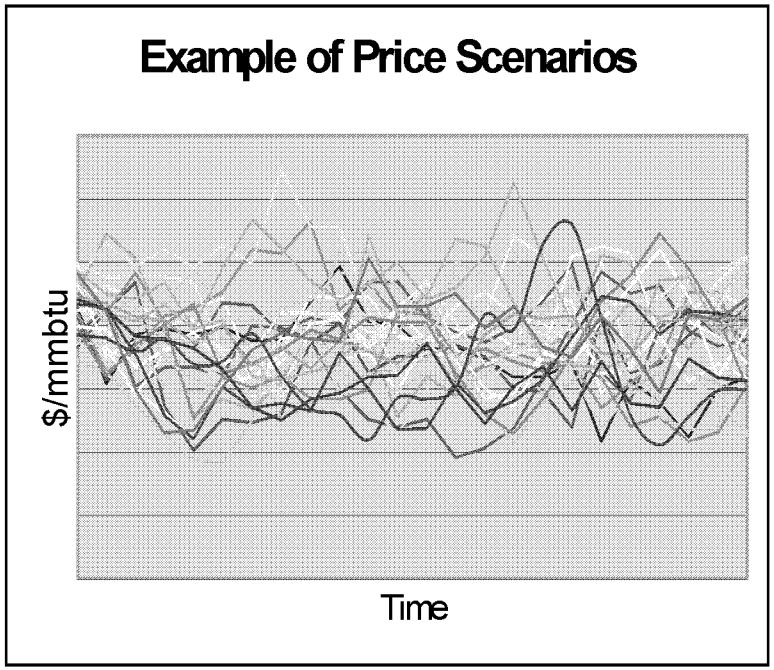
	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Total Net Exposure	$0.38	-$0.22	-$0.04	-$2.98	$0.81	-$4.57	-$8.25	-$15.35
Peak Power	$1.47	$2.30	$0.63	-$1.56	-$0.36	-$1.96	-$2.42	-$5.74
Off Peak Power	-$0.16	$1.32	$1.82	$0.96	-$0.67	-$2.12	-$0.68	-$3.20
Gas	-$0.93	-$3.83	-$2.49	-$2.39	$1.83	-$0.49	-$5.15	-$6.41

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

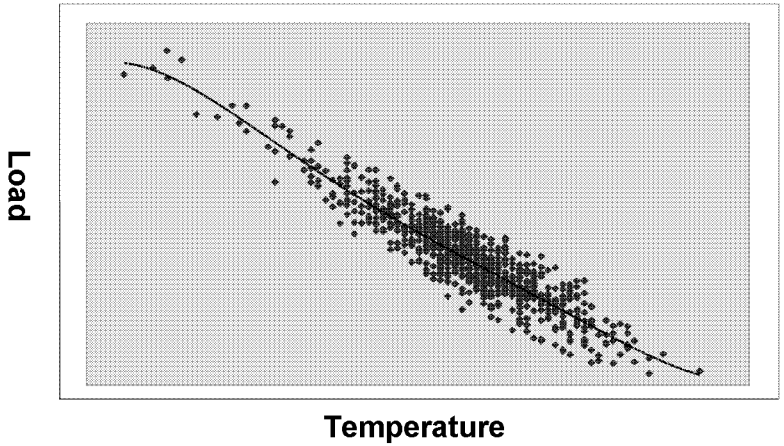
Developing Key Inputs
Price Modeling

- 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).



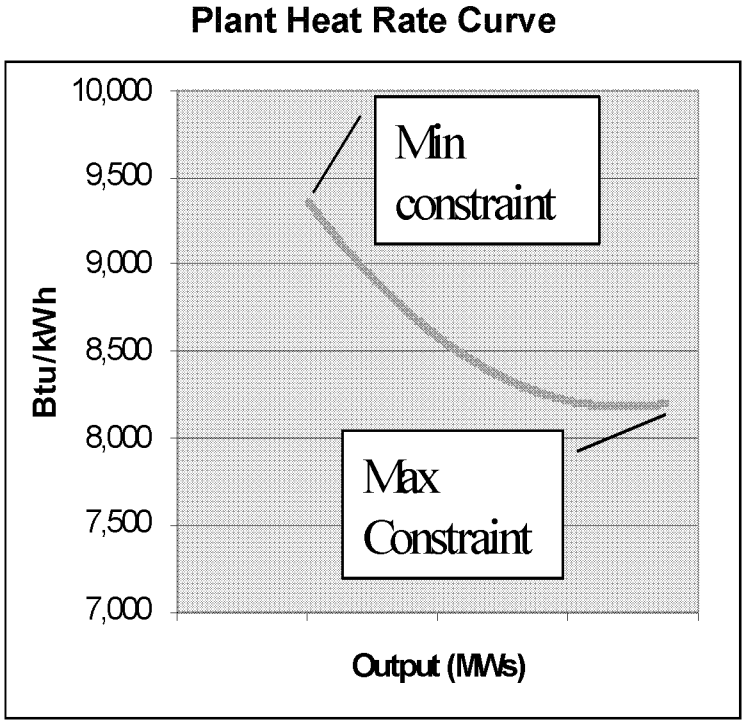
Developing Key Inputs
Load Modeling

- 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