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July 2, 2008

## MEMORANDUM

**TO:** Power Committee

**FROM:** Christopher Collier

**SUBJECT:** Tools used for forecasting monthly natural gas prices

This agenda item will give Power Committee members a chance to see the preliminary results to an updated approach of forecasting monthly natural gas prices. The presentation for the Power Committee will also review recent changes in regional natural gas prices. The presentation will be sent to Council members next week.

The monthly natural gas price data used for the analysis is current through April 2008. These prices are collected from Natural Gas Week and the U. S. Energy Information Administration. Since 2000, natural gas prices have been characterized by very erratic behavior due to changes in the infrastructure, severe weather, and the increase in demand for natural gas.

After updating our natural gas database, staff ran regressions relating natural gas prices at various points in the U.S. These regressions are similar to those used in the Fuel Price Forecasting Model but are done on a monthly level. The regressions have provided insight regarding the changes in relationships between regional natural gas pricing hubs. For example, through the regressions, we have learned more about the relationship between natural gas prices at Sumas and natural gas prices in the Rockies. The information collected for the regressions will help us refine our current natural gas forecast by improving the method of estimating monthly natural gas prices from our annual price forecasts.

We will continue to develop revised forecasts of natural gas prices for the Sixth Power Plan as new information about the natural gas industry becomes available. Over the next few years, proposed pipeline projects are set to come online which will change the natural gas infrastructure and alter relationships between regional hubs.



# Regional Natural Gas Hub Relationships

Chris Collier  
Power Committee  
July 15, 2008  
Kalispell, MT

## Goals for Today

- Discuss the relationship between regional natural gas hub prices
- Investigating transient and structural changes
- Discuss future pipeline proposals that will impact regional prices
- Present preliminary monthly gas prices forecasts



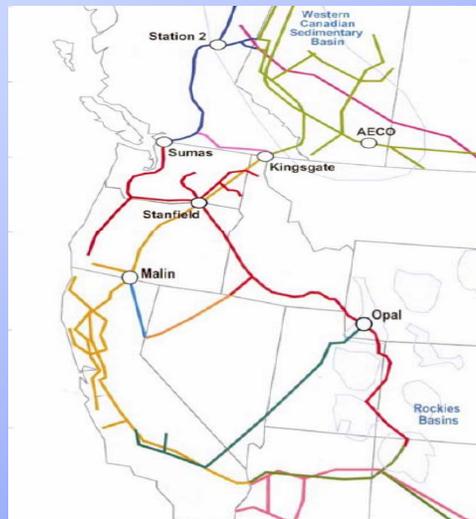
## How Natural Gas Price Forecast is Used

- Annual Prices
  - Demand Forecast
- Monthly Prices
  - Conservation Resource Assessment
  - Electricity Price Forecast
  - Resource Optimization

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## Pipelines Serving NW



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## The Relationship Between Regional Natural Gas Hub Prices



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## Structural Changes in Natural Gas Hub Prices

- From 2000-present there has been high volatility in the natural gas market.
- Increase in demand for Natural gas due to
  - Residential demand for gas
  - Electric utility increasing demand
 Has led to higher natural gas prices
- Pipeline capacity constraints puts downward pressure on gas prices in some producing regions.



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## Recent Volatility

Henry Hub Monthly Prices

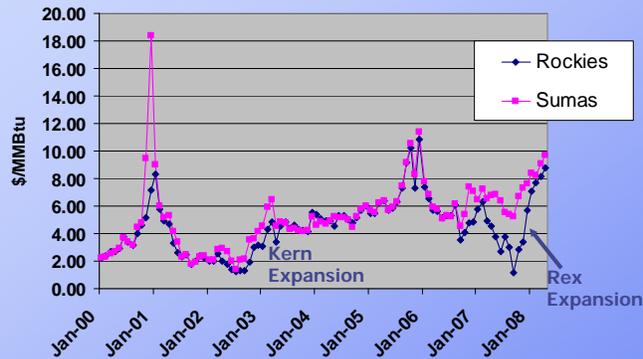


## Investigating Transient and Structural Effects on Prices

- Severe Weather
  - Hurricanes (Katrina and Rita)
  - Harsh Winters
- Pipeline capacity constraints
  - Prices drop significantly when pipelines are unable to transport the full supply of natural gas (i.e. 2007 Rockies)
- High oil prices



## Impact of Pipeline Constraints on Rockies & Sumas Relationships



•Rockies and Sumas prices have become disconnected due to capacity constraints.

•After completion of pipelines relationship should become active again



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## Future Pipeline Proposals that could Impact Regional Prices

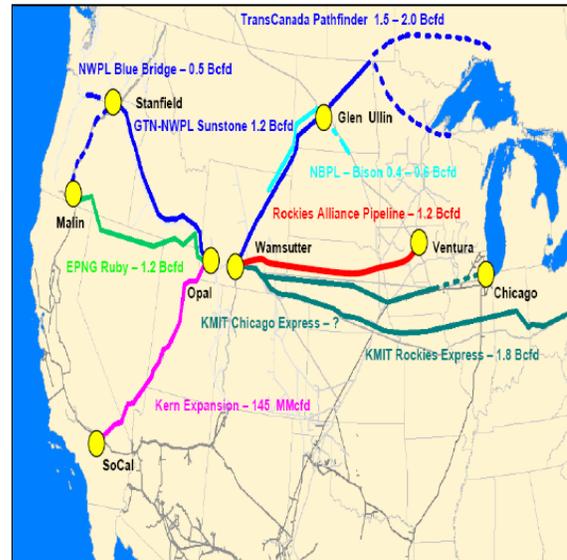
➤ There are many pipeline proposals that are set to come on line that will expand capacity.

- Some of major pipeline proposals are:
  - Sunstone pipeline-November 2011 (Opal to Stanfield)
  - Rockies Alliance-2011 (Rockies to Chicago)
  - Ruby Pipeline-2011 (Opal to Malin)
  - Blue Bridge Project (Stanfield Expansion)



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## Rockies Pipeline Proposals



## Forecasting Gas Prices

- In the past Plans we would forecast annual hub prices and apply monthly factors to them.
- In the revised approach we have developed independent forecast for monthly prices for each hub.



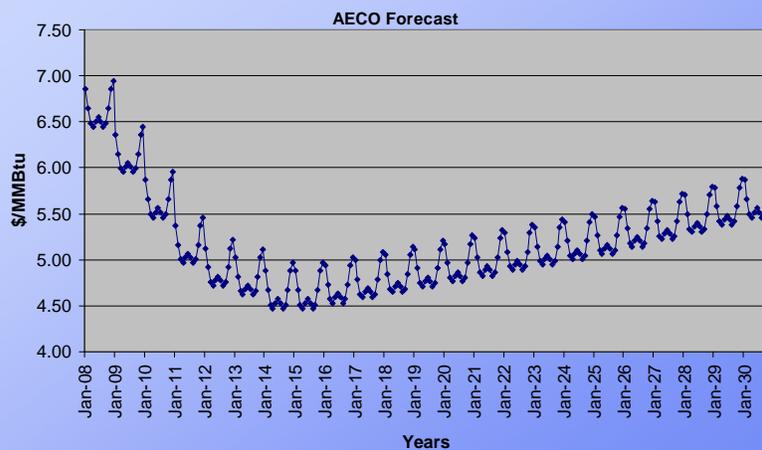
## Developing Gas Price Forecast

- Used historical prices from each Hub (Natural Gas week)
- Structural relationships estimated
- Forecasted monthly prices
  - January 2008-December 2030
- Cross checked forecast to historical data

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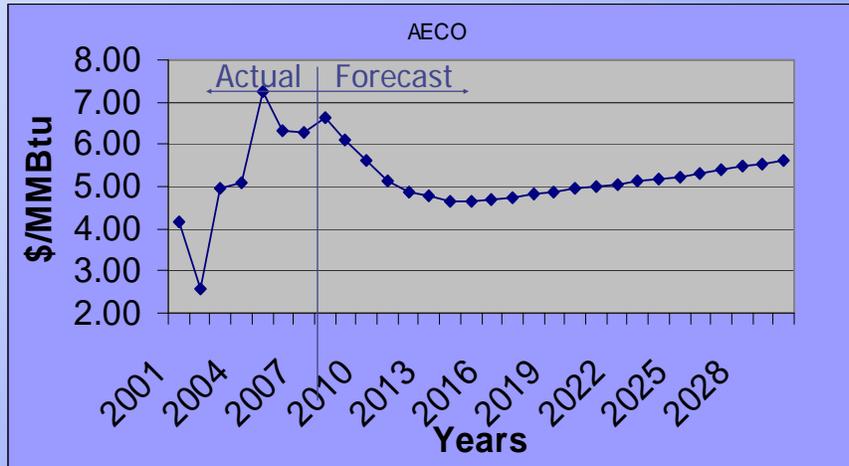
## Monthly AECO Forecast



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## Example of an Annual Price Forecast for Major Pricing Hubs in the West



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## Summary

- Our forecast projects normal monthly natural gas patterns for regional hubs from Jan 2008- Dec 2030. We will use our updated monthly natural gas forecast in the Aurora, Procost and Portfolio models.
- The Natural Gas Advisory Committee inputs will be incorporated into our final forecasts.

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