

# Impact of Wind Forecasting

based on

“Analysis of Wind Generation Impact on ERCOT  
Ancillary Services Requirements”

*Prepared for:* Electric Reliability Council of Texas  
March, 2008

**UWIG Workshop  
October 2, 2008  
Gary Jordan**



imagination at work

# Scenarios Evaluated

**Modeled ERCOT system for 2008**

**Wind Penetration:**

**5,000 MW**

**10,000 MW (2 alternative scenarios)**

**15,000 MW**

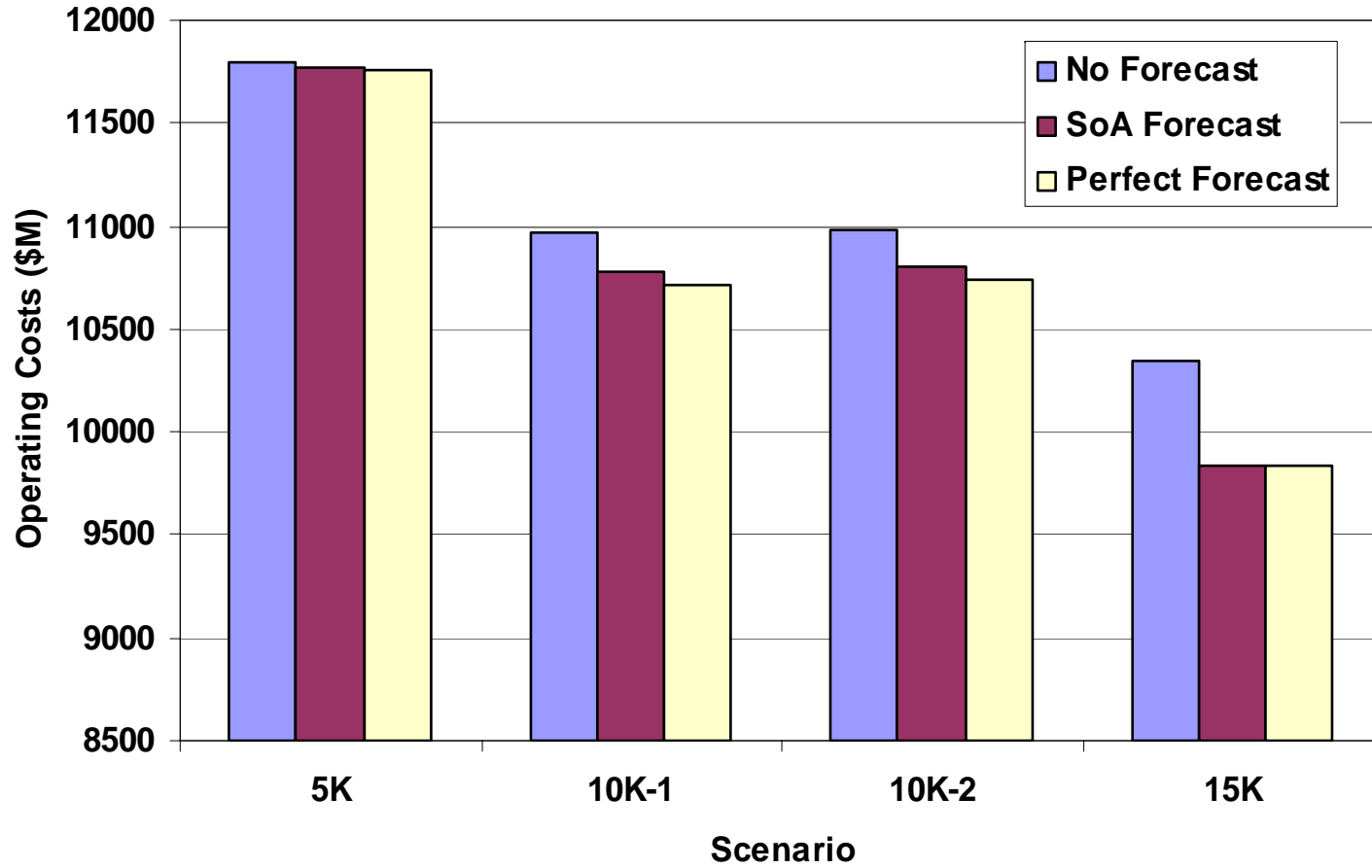
**Wind day ahead Forecast Options:**

**No Forecast**

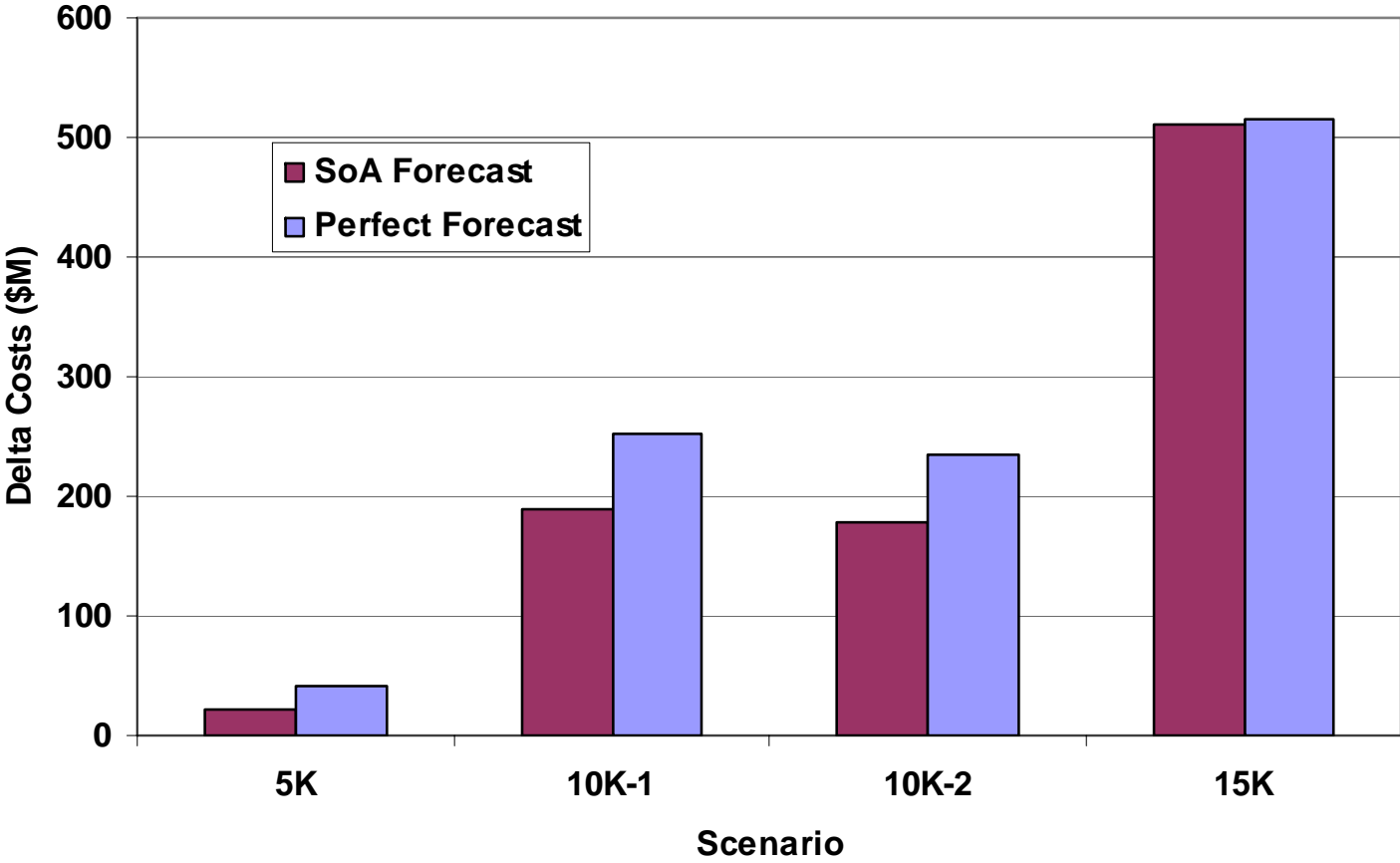
**State-of-Art Forecast**

**Perfect Forecast**

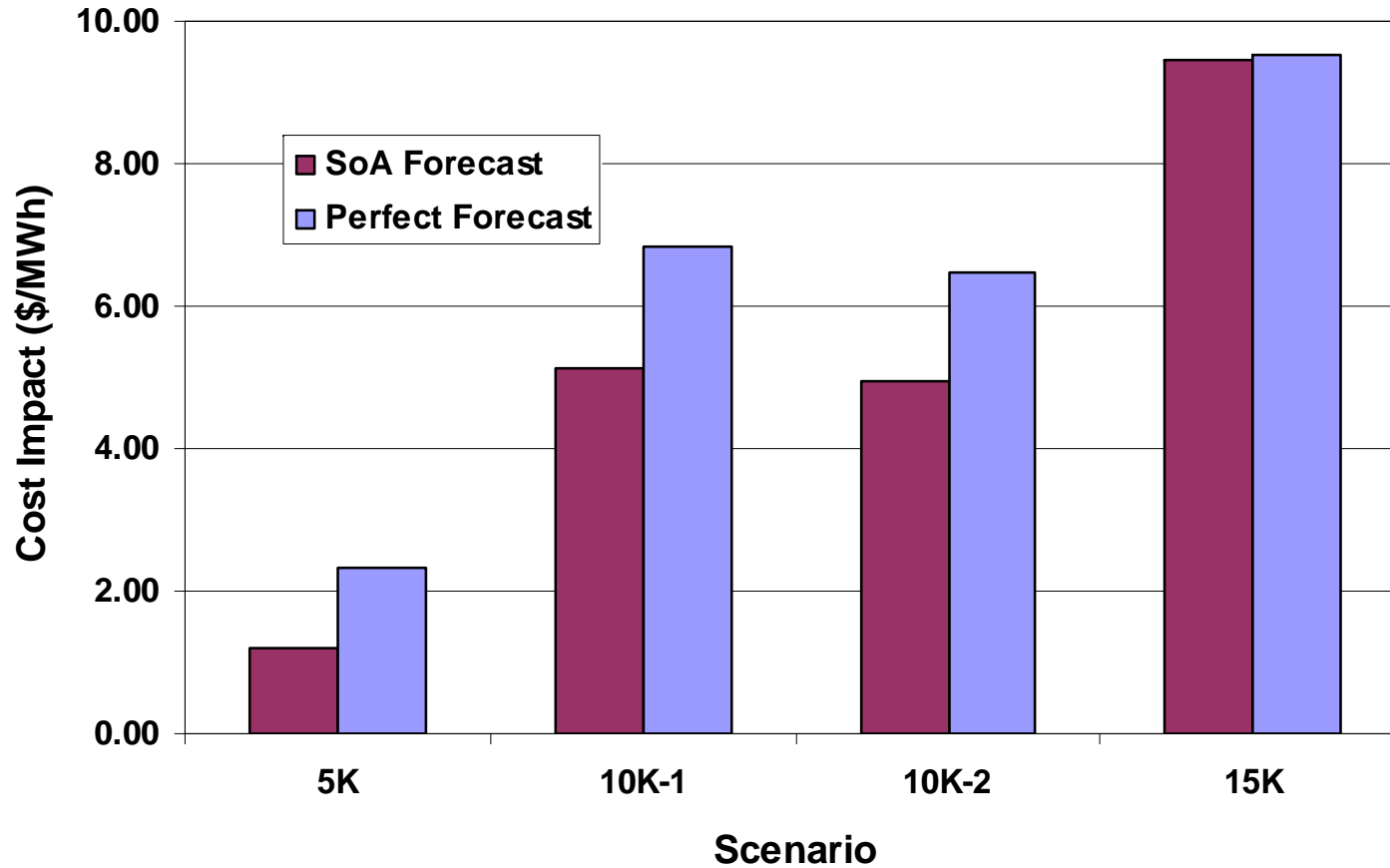
# Total Variable Cost (\$M)



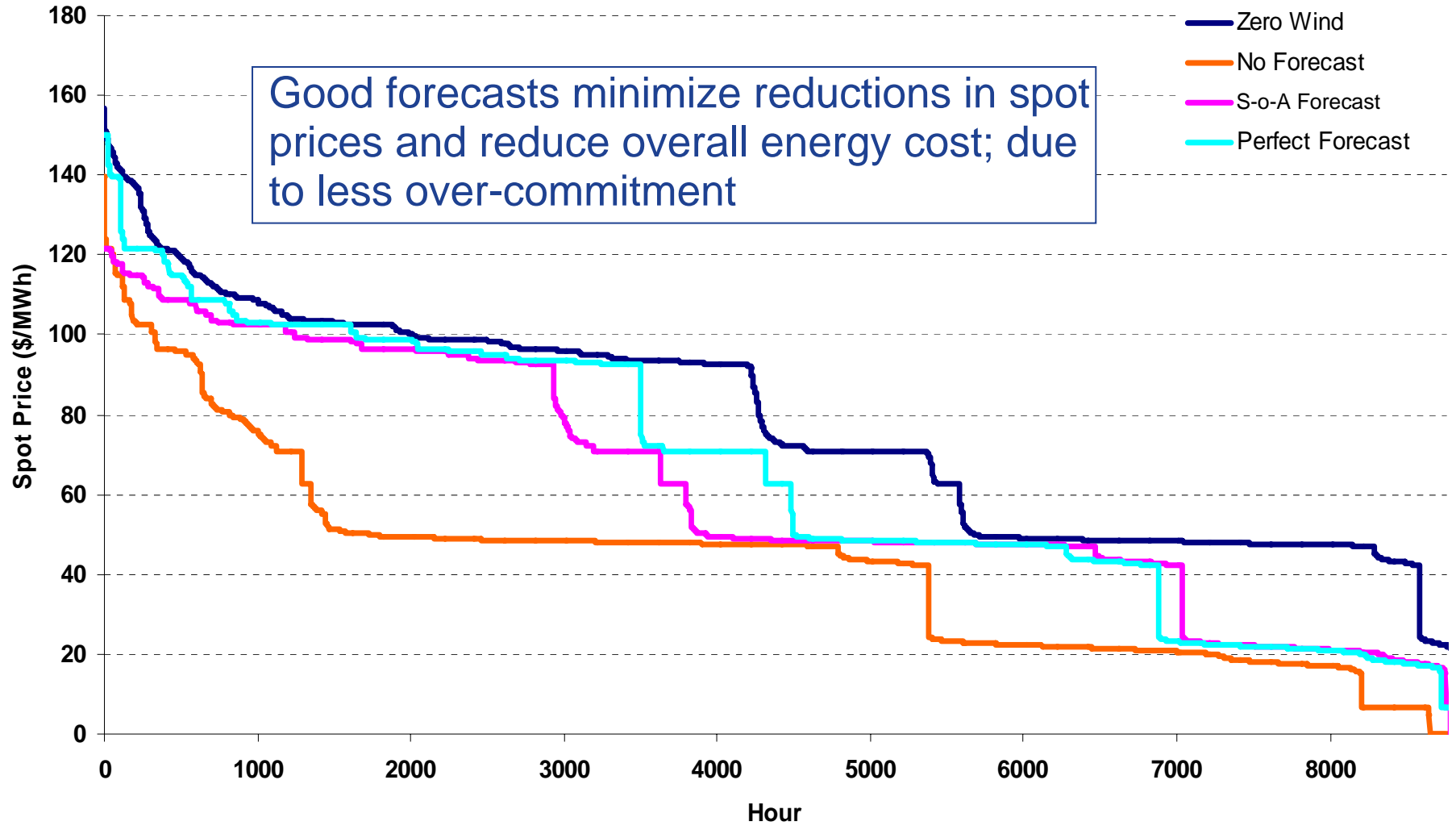
# Operating Cost Delta from No Forecast (\$M)



# Variable Cost Impact of Wind Forecasting (\$/MWh of Wind Generation)



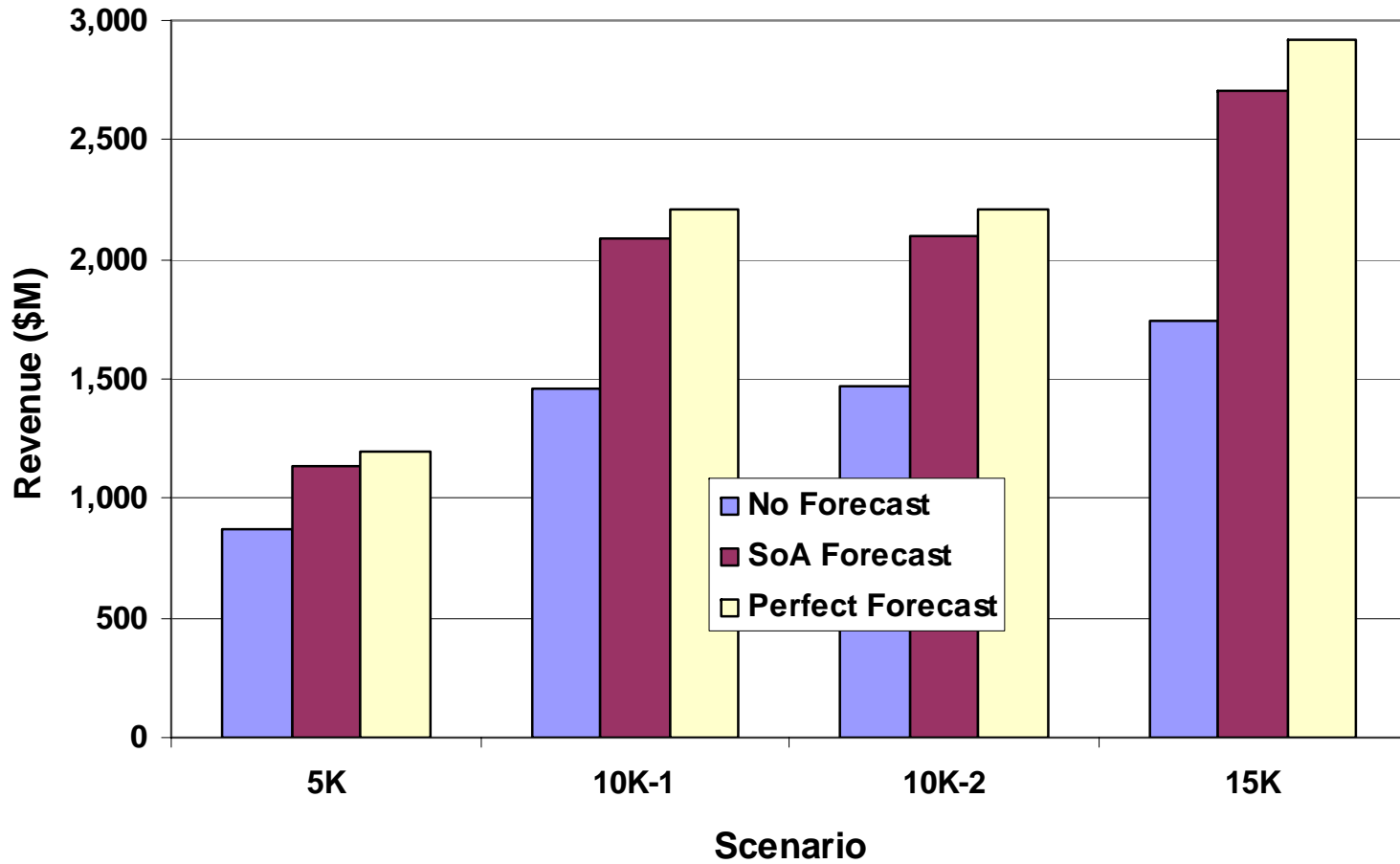
# Impact of Wind Forecast on Energy Prices with 15 GW Wind



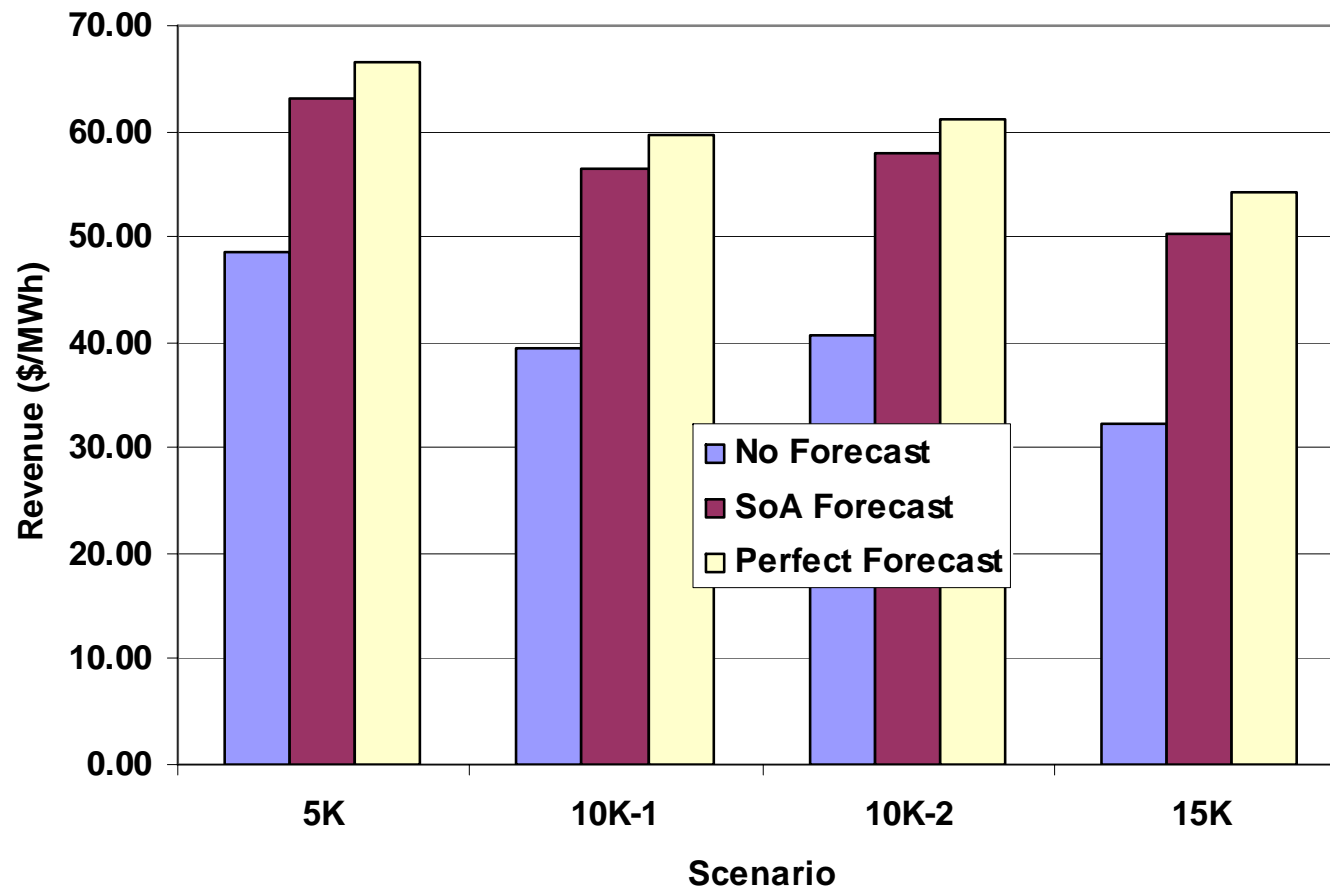
# Revenue Calculations

**In a Locational Marginal Cost (LMP) market the hourly Revenue (\$) is the product of the Generator Output for the hour (MWh) times the Spot Price of Energy (\$/MWh).**

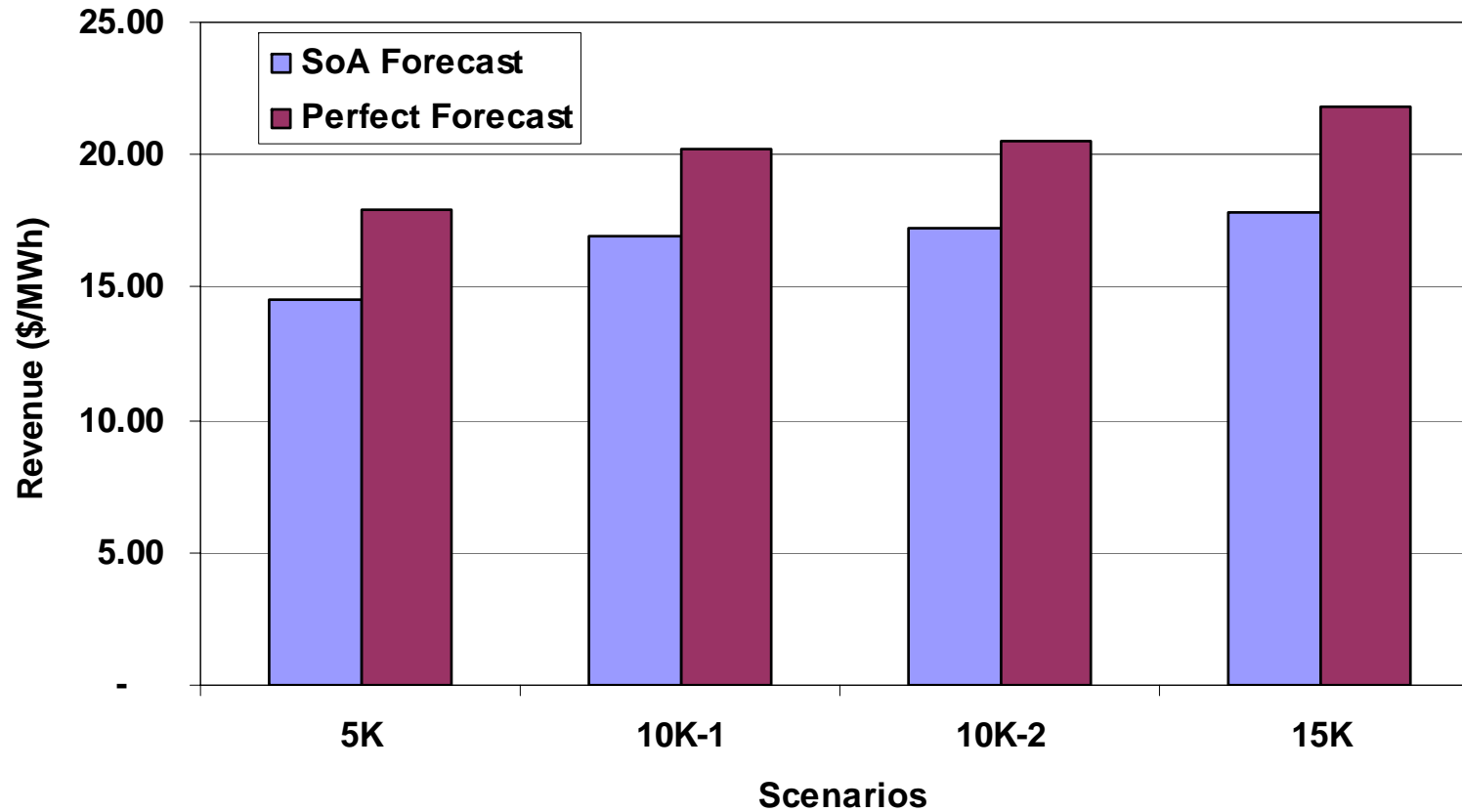
# Wind Generation Revenue (\$M)



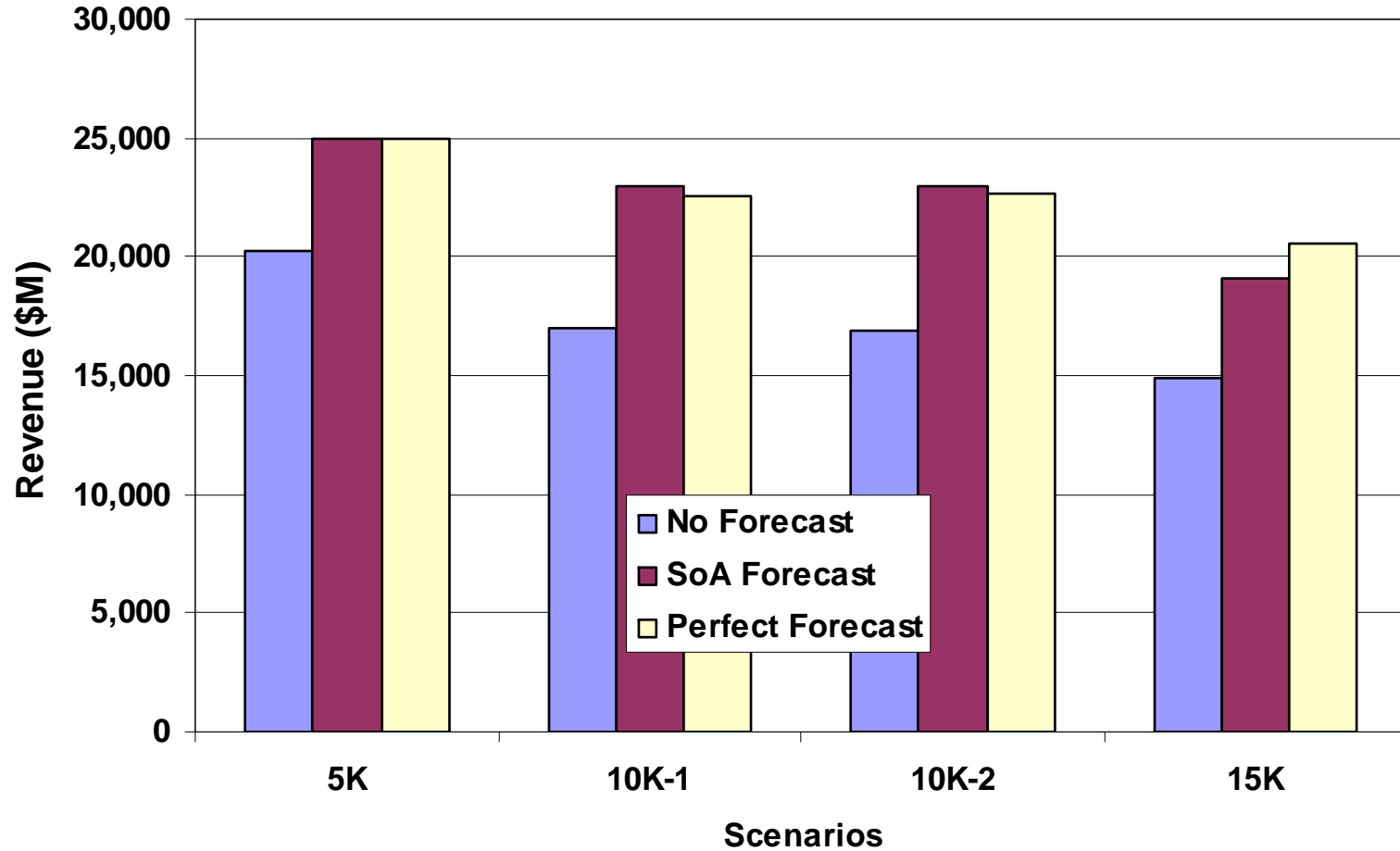
# Impact of Forecasting on Wind Generation Revenue (\$/MWh)



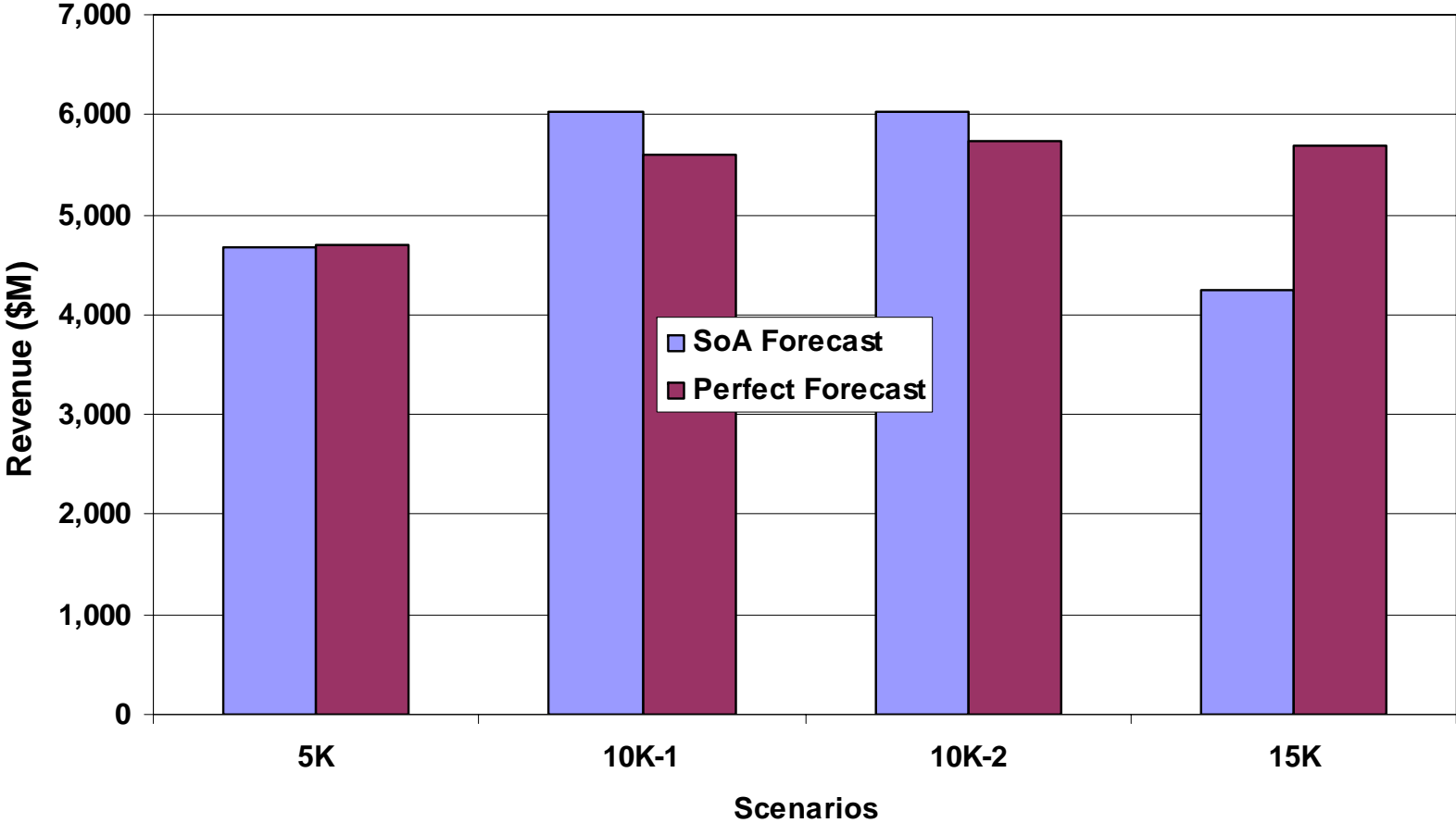
# Incremental Impact of Forecasting on Wind Generation Revenue (\$/MWh)



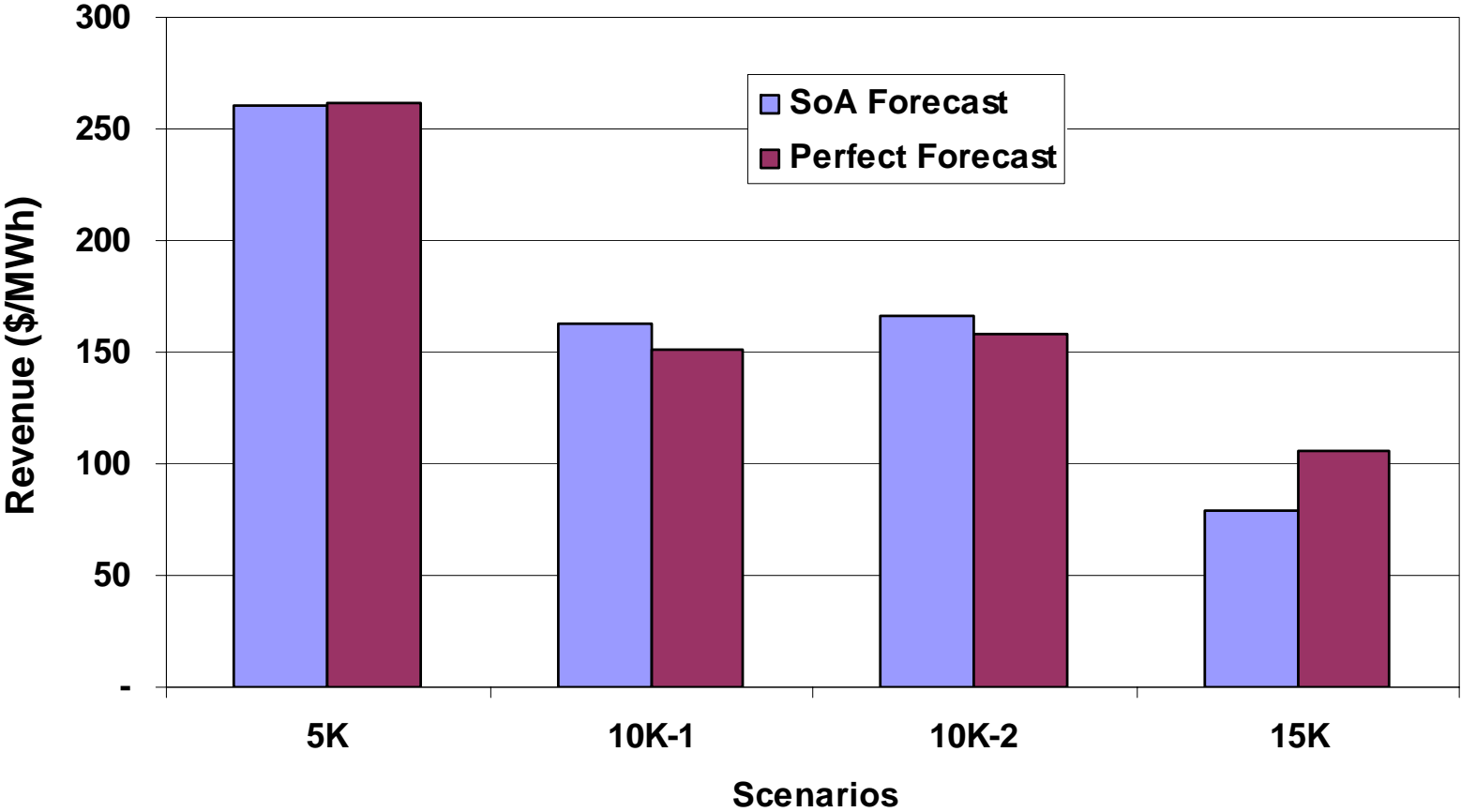
# Non-Wind Generation Revenue (\$M)



# Impact of Forecasting on non-Wind Generation Revenue (\$M)



# Impact of Forecasting on non-Wind Revenue (\$/MWh of Wind Generation)



# Conclusions

**Ignoring the Wind generation forecast in**

- **day ahead scheduling of hydro resources**
- **day ahead commitment of thermal generation**

**can have a significant impact on**

- **the cost of system operations**
- **the resulting revenue for wind and non-wind generation alike.**