



Market Benefits Observed The First 6 Months

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* Revised July 5, 2011 to include corrections on Slide 14

Objective

- **What benefits were expected in the Nodal Market over the Zonal Market ?**
- **Is there evidence that these benefits are materializing in the first six months of operation of the Nodal Market?**
- **What does the future hold?**

PUCT ORDER ADOPTING §25.501

“The rule is expected to yield important benefits, such as

- a reduction in local congestion costs;**
- reduced opportunities for gaming and manipulation in the wholesale electricity market;**
- increased price transparency and liquidity in the wholesale electricity day-ahead energy market;**
- increased locational price transparency for resources;**
- more efficient and transparent dispatch of resources in real-time;**
- improved siting of new resources; and**
- a reduction in the amount of new transmission facilities needed to support the reliability of, and competition in, the wholesale electricity market.”**

Order Adopting Rule, @ Page 1

Is there evidence that these benefits are materializing in the first 6 months of operation of the Nodal Market?

“The rule is expected to yield important benefits, such as

- a reduction in local congestion costs;”
 - ERCOT has performed a back-cast analysis comparing Zonal and Nodal congestion management
- “increased price transparency and liquidity in the wholesale electricity day-ahead energy market;”
 - Day-Ahead and Real-Time Hub & Load Zone prices have converged in first six months
- “increased locational price transparency for resources;”
 - The Nodal prices per settlement point are computed and posted versus only the Zonal MCPs
- “more efficient and transparent dispatch of resources in real-time;”
 - Resources receive base points that correctly manage congestion and also provide proper price incentives

Is there evidence that these benefits are materializing in the first 6 months of operation of the Nodal Market?

- The following expected benefits will take more time to measure:
 - “reduced opportunities for gaming and manipulation in the wholesale electricity market;”
 - ERCOT passed NPRR 342, Notification and Actions to Address Outcomes Inconsistent With Efficient Operation of the ERCOT Market
 - “improved siting of new resources; and”
 - “a reduction in the amount of new transmission facilities needed to support the reliability of, and competition in, the wholesale electricity market.”

Nodal Analysis of Zonal Constraint

- One hour was chosen for the Zonal/Nodal congestion management comparison
 - May 20th 2008 Hour Ending 15 was selected
- Zonal Market design was limited to only interface flow management
 - Utilized average shift factors instead of physical shift factors
 - Dispatched portfolio for market constraints
 - Constraints were not resolvable in the original Zonal case
- Nodal Market design allows management of individual constraints
 - Utilized physical shift factors
 - Dispatched units individually
 - Constraint was resolved in Nodal dispatch

Analysis Assumptions

- The same units that were online in the Zonal case were used in the Nodal analysis
- The unit-specific offer curves for these units were taken from offers submitted during Nodal market trials
- Unit-specific offers were scaled up to account for the difference in gas prices during market trials versus in May 2008 (i.e. \$10.885 per mmbtu /\$4.12 per mmbtu)

Estimated Cost Savings with Nodal

OpDay 5/20/2008 HrEnd15	Load Charge estimate 52,000MW	Generation Revenue	Congestion Rent
Zonal Pricing	\$86,438,077 /Hr	\$77,732,096 /Hr	\$8,705,982 /Hr
Nodal Pricing (EOC based on May 2008 FIP)	\$6,523,751 /Hr	\$6,237,579 /Hr	\$286,172 /Hr

Nodal /Zonal Equivalent comparison	2008 CM Zone			
	HOUSTON	NORTH	SOUTH	WEST
Nodal price with Energy Offer Curve updated to reflect the FIP in May 2008	\$126.96	\$81.57	\$168.67	\$33.64
Zonal MCPE / Shadow Price (\$/MWh)	\$2,674.44	\$105.16	\$3,176.76	\$276.52

The 2008 State of the Market report identifies 90 unresolved 15-minute intervals, which resulted in 22.5 hours of unresolved congestion.

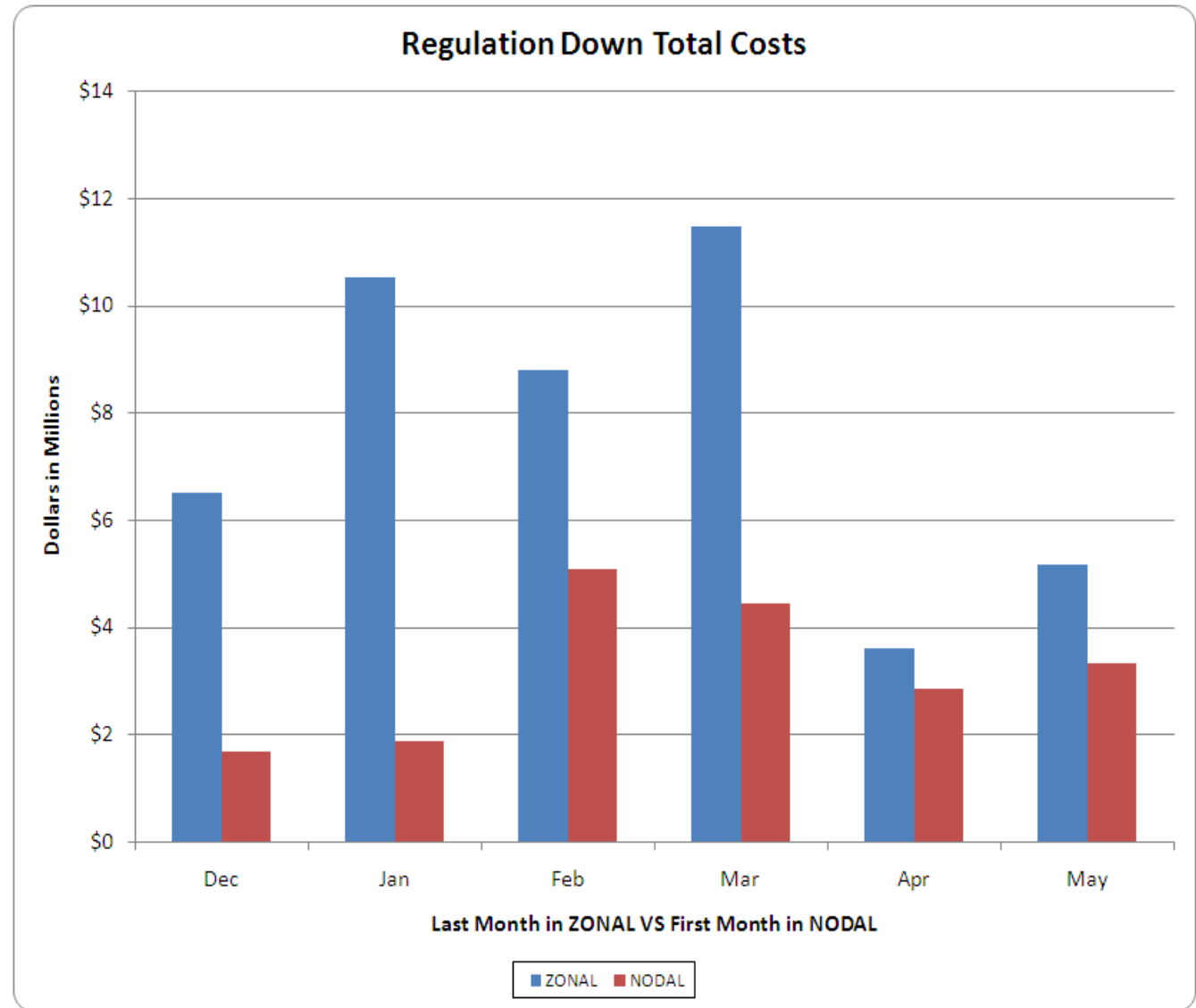
This analysis assumes that if one hour of unresolved congestion in Zonal can be solved by Nodal congestion management then all 22.5 hours can be similarly solved.

This indicates that the efficiencies of the nodal market—had it been in place—could have reduced the load charge costs for customers by \$90 to \$180 million in 2008 assuming *5 -10 % of customers in the South and Houston Zones were exposed to balancing energy prices.

**Historically, approximately 5-10% of demand is served through the Balancing Energy Market.*

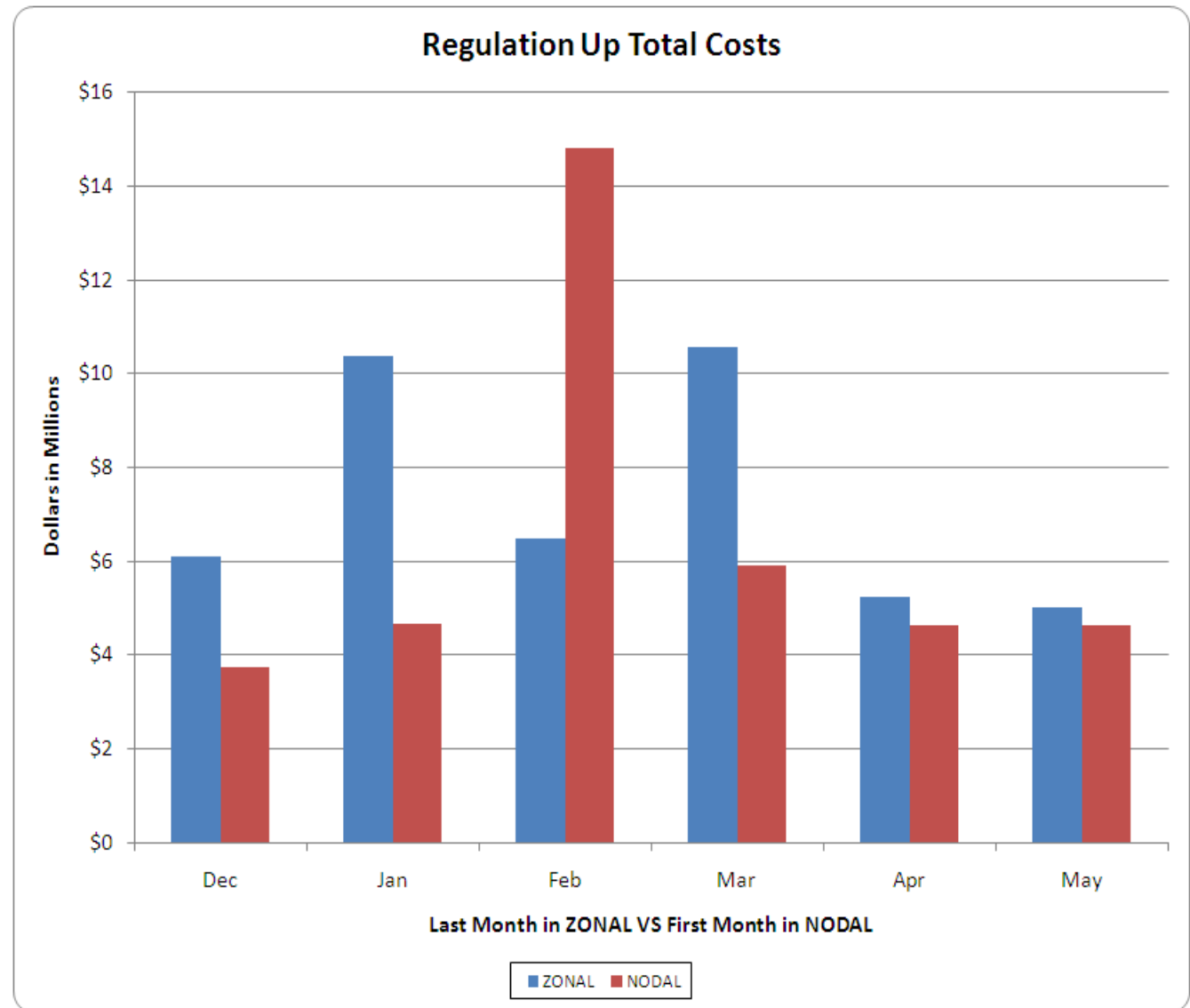
Ancillary Services Cost Comparison Zonal to Nodal

- Nodal cost was \$27.6 million cheaper in first six months of operation
- Nodal market requires less Regulation Down capacity



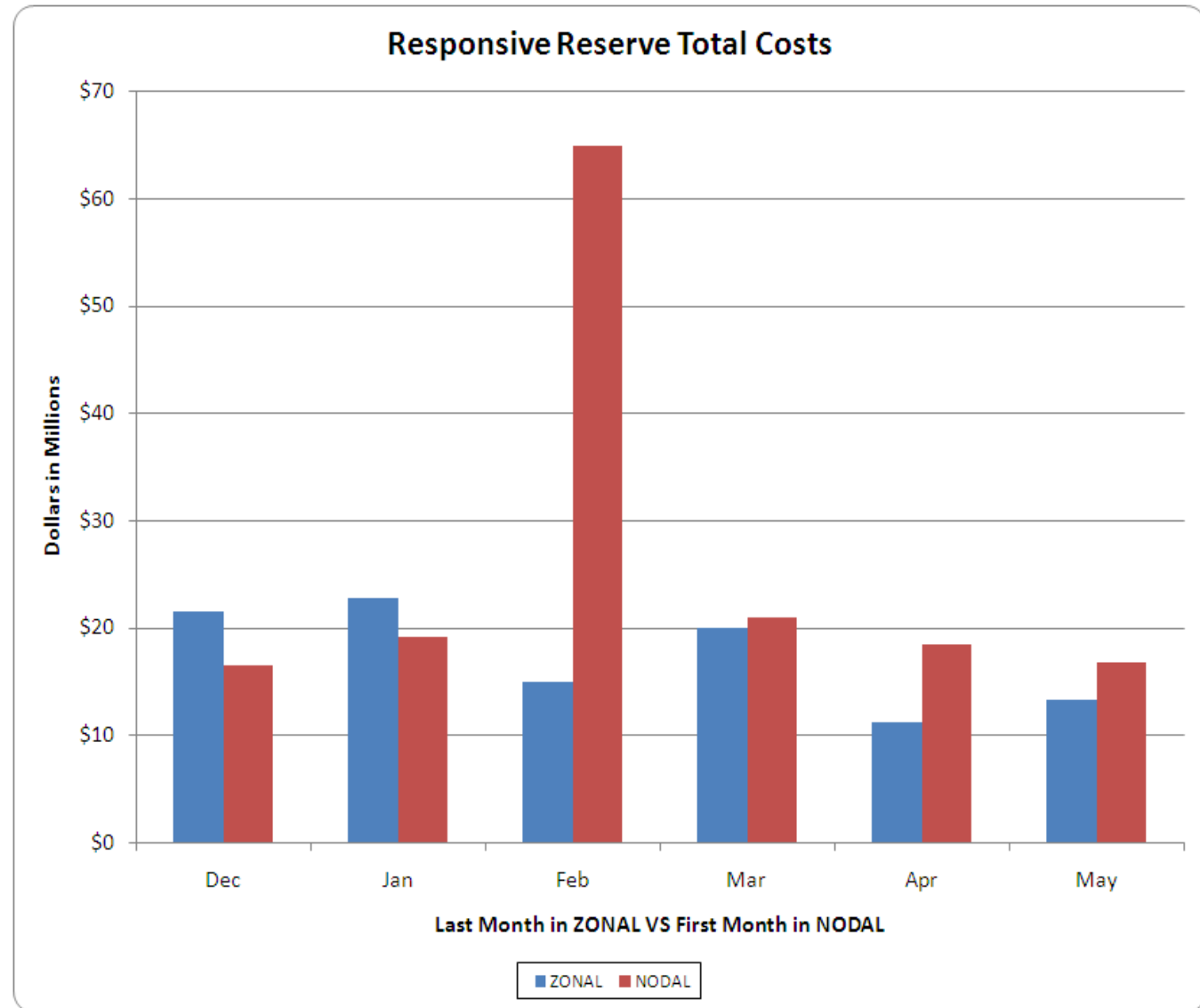
Ancillary Services Cost Comparison Zonal to Nodal

- Nodal cost was \$8.2 million cheaper in first six months of operation
- Nodal market requires less Regulation Up capacity



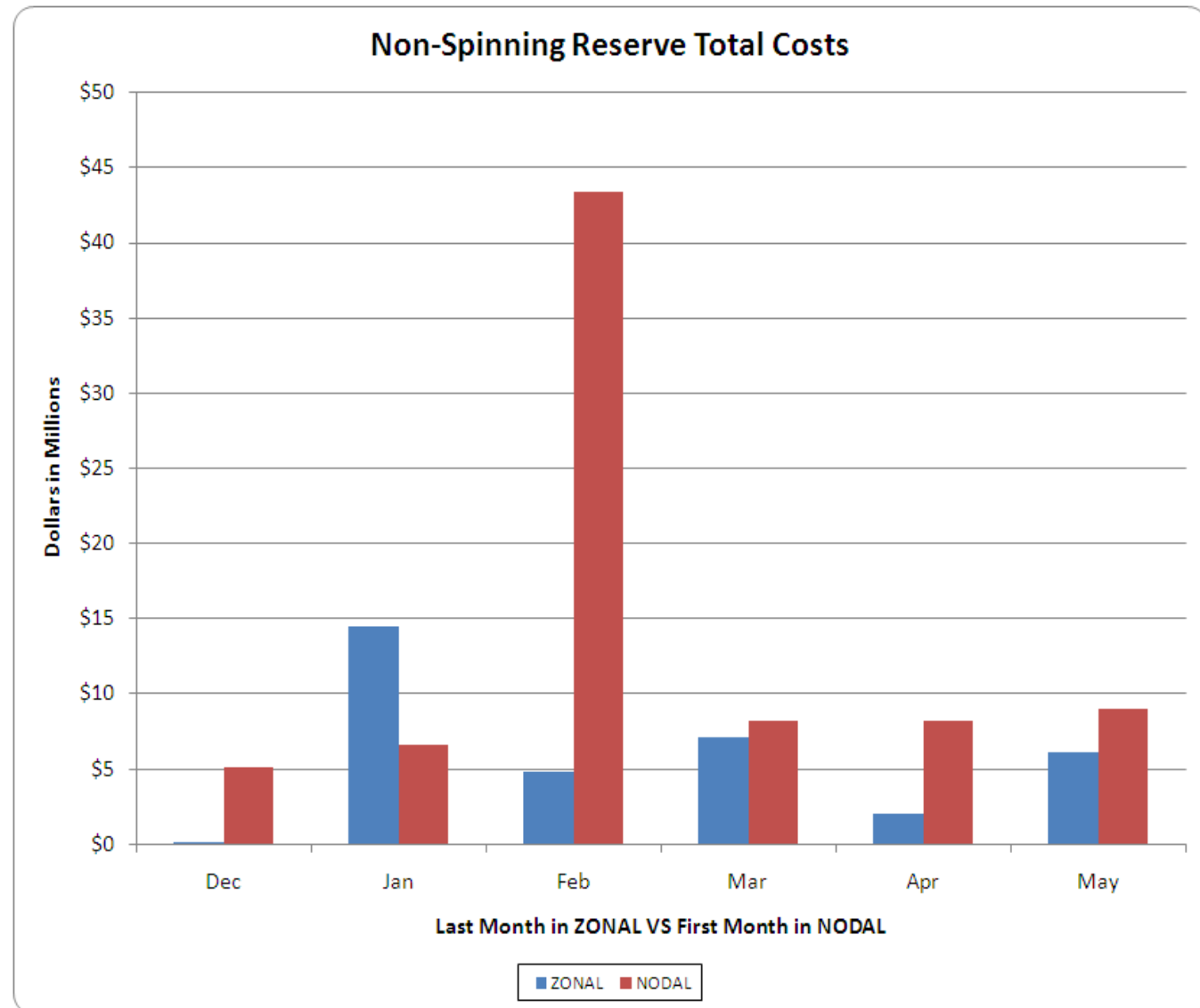
Ancillary Services Cost Comparison Zonal to Nodal

- Responsive Reserve obligation in Nodal and Zonal has remained constant at 2300 MW
- Nodal allows co-optimization of energy and ancillary services in order to yield a cheaper net system cost and may be affecting the higher cost of responsive reserve in Nodal



Ancillary Services Cost Comparison Zonal to Nodal

- Non-Spinning Reserve has been more expensive in Nodal primarily because of the Zonal administrative pricing of the energy deployments
- Non-Spinning Reserve deployments in Zonal received an administrative price adjustment of $15 \text{ HR} * \text{FIP} + \120 ; Nodal currently does not have an administrative adjustment, therefore we are unable to compare the Nodal vs. Zonal product



Ancillary Service Cost Comparison Summary

- **Total Savings Between Markets 1st Six Months**

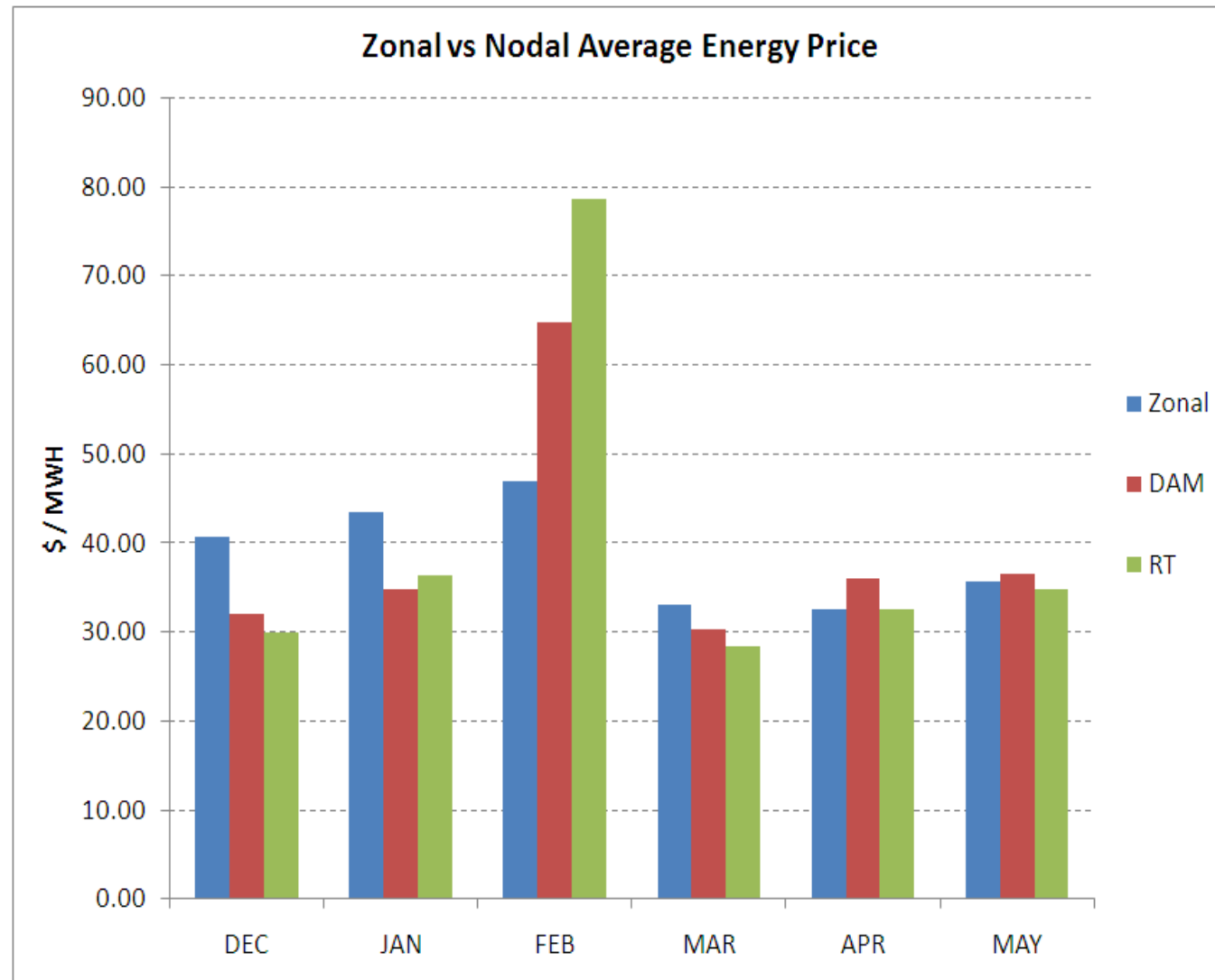
- Regulation Down: \$27,611,944.94
- Regulation Up: \$8,207,053.37
- Responsive Reserve: -\$53,210,845.00
- Non-Spinning Reserve: -\$45,827,279.92

- **Total Savings without Feb 1st to Feb 5th**

- Regulation Down: \$26,809,318.62
- Regulation Up: \$14,622,430.74
- Responsive Reserve: -\$9,943,682.00
- Non-Spinning Reserve: -\$14,529,528.89

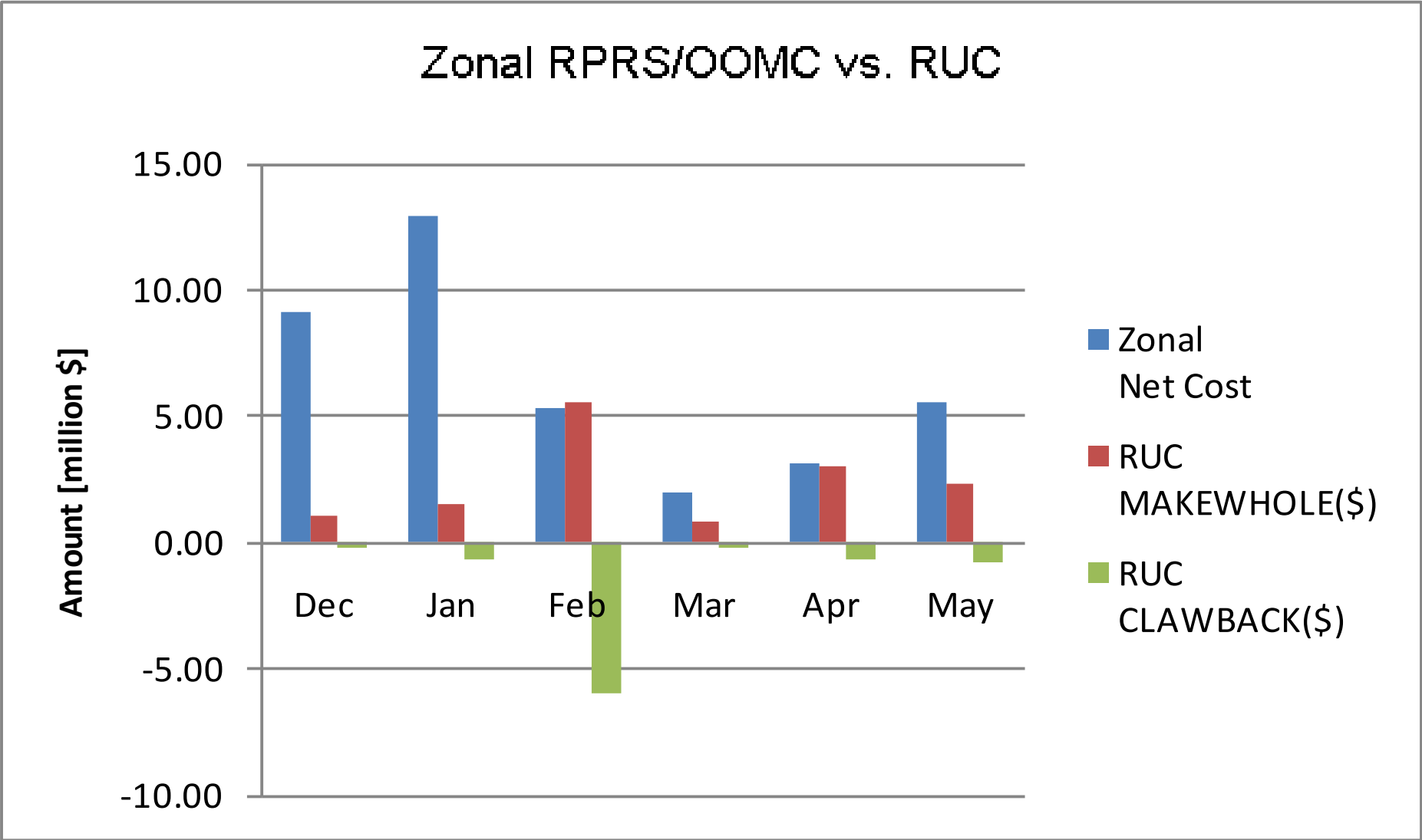
Energy Cost Comparison Summary

- Resource specific offers and dispatch are more efficient in serving demand and managing congestion
- Co-Optimization of Ancillary Services and energy result in a reduction of overall system cost



* Graph revised July 5, 2011

Reliability Commitment Cost Comparison Summary



Operational Benefits

- Improved Ancillary Service Monitoring
 - Transparency of units providing services
- Unit Specific management of congestion
- Quicker response to volatility
 - Managing the West to North Interface
 - 5 minute dispatch allows better management of up/down changes in load and wind output

What does the future hold?

- The ERCOT Nodal Market Applications are operating in a stable and expected manner
- ERCOT expects to continue to evaluate the performance of these systems and based on the experiences in ERCOT and other RTOs, will identify opportunities to fine tune the performance or add features to support new desirable benefits including:
 - The incorporation of demand response in the SCED optimization
 - Continuing achievement of the desired minimum ERCOT Reserve Margin
 - The incorporation of new technology for energy production in the ERCOT systems