

# Appendix

# Assessment of wind generation impacts on ancillary services and discussion of cost allocation methodologies

presented to the  
ERCOT Wholesale Market Subcommittee  
Feb. 17, 2010

# Overview and Summary

## **1. Contextual considerations**

Wind Cost Allocation Task Force (WCATF) deliberations have occurred in a vacuum. Various solutions, *i.e.*, cost allocation methodologies, have been proposed in search of a largely non-existent problem with no balanced examination of benefits relative to costs. The benefits of wind generation to ERCOT consumers far exceed any related costs and the relative importance of the ancillary services cost allocation debate has been dramatically overstated.

## **2. Procedural considerations**

The WCATF process was fundamentally flawed, resulting in an unfortunate squandering of resources. Contrasted with the deliberations of the original WMS Cost Allocation Task Force and the TAC Renewable Technologies Working Group (RTWG), the WCATF process stands as a textbook example of the danger inherent in a stakeholder-driven process.

## **3. Data analysis**

Total dollars spent on ancillary services have declined even as installed wind capacity has increased. Costs of ancillary services to date have been primarily driven by factors other than wind generation penetration. Even where ancillary services procurement methodologies have changed due to wind considerations, costs have not increased. The data does not support revised allocation.

## **4. Principles of cost allocation, market design, and policy implementation**

The WCATF options fail to meet key principles of cost allocation. The WCATF options are not consistent with principles of sound market design nor with the institutional history of the ERCOT market design. Arbitrary assignment of ancillary services costs to wind generation would thwart public policy goals of the State of Texas.

## **5. Conclusions and recommendations**

The current ancillary services cost allocation methodology should be maintained. A proper procedure for cost allocation examination should be conducted post-Texas Nodal Market Implementation Date, if at all. WMS should disband the WCATF and recommend TAC continue the deliberative approach of the RTWG while maintaining the current allocation structure through TNMID until it becomes possible to consider alternatives based on sound data.

# 1. Contextual considerations

## 1.1 Historic costs of ancillary services

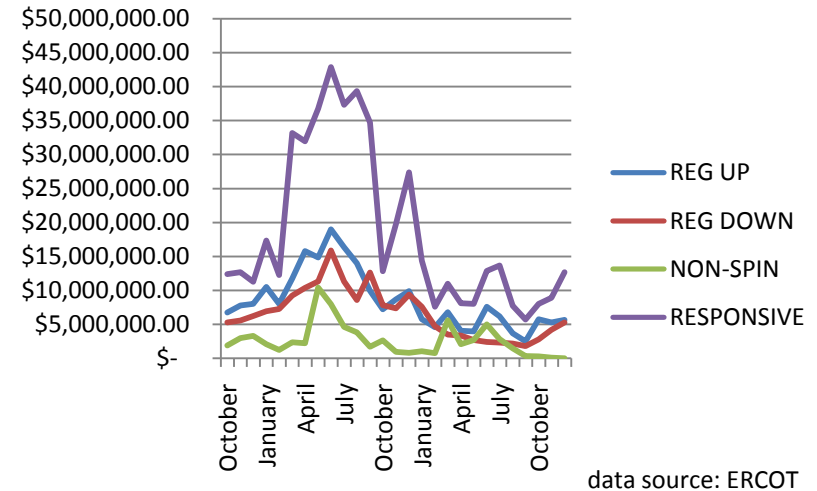
The Wholesale Market Subcommittee (WMS) of the ERCOT Technical Advisory Committee (TAC) created the Wind Cost Allocation Task Force (WCATF) and charged it to “Address the allocation of the cost of ancillary services to wind generation.”

This charge was given despite the fact that overall ancillary services costs for the market-based services have declined in recent history. The chart at top right shows the actual monthly costs of the 4 market-based ancillary services from October 2007 through December 2009. Each of them has declined significantly during this period.

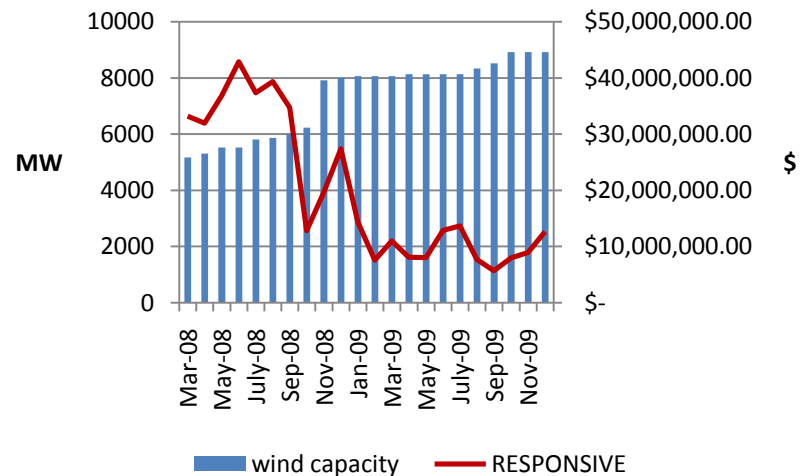
This is especially interesting when juxtaposed with the installed wind capacity in ERCOT as illustrated in the chart at bottom right which depicts the total monthly dollars spent on the most expensive market-based service, Responsive Reserve Service, from March 2008 – December 2009. Even though installed wind capacity increased 3,400 MW during this period, monthly costs for RRS dramatically fell from a high of \$42.8 million in June 2008 to a low of \$5.7 million in Sept. 2009 .

Additional historic data is presented in Section 3.

Monthly Cost of Market-Based Ancillary Services Oct. 2007 – Dec. 2009



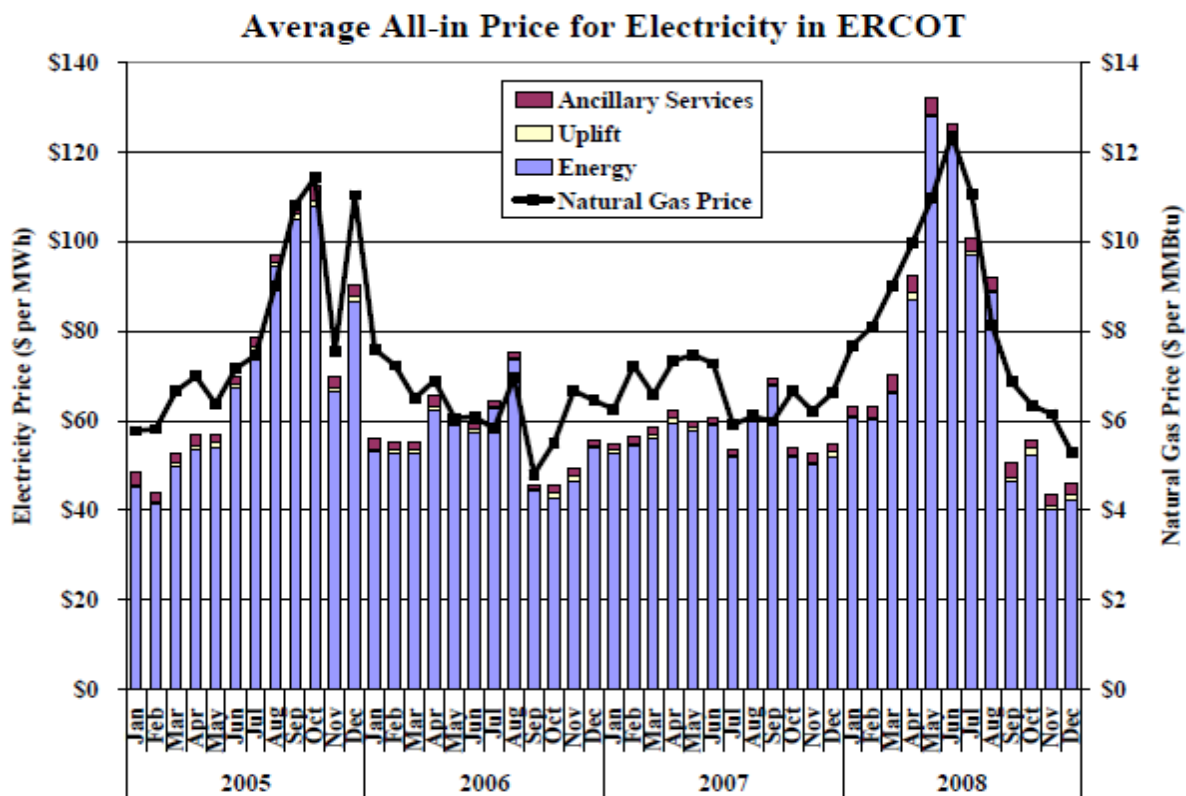
Monthly Cost of RRS March 2008 - Dec. 2009



# 1. Contextual considerations

## 1.2. Ancillary Services as a portion of the total cost of energy

Missing from the WCATF debate thus far is recognition that ancillary services comprise a very small portion of the total cost of energy in ERCOT. The chart below shows that ancillary services have long comprised a very small portion of the all-in price for electricity in ERCOT.

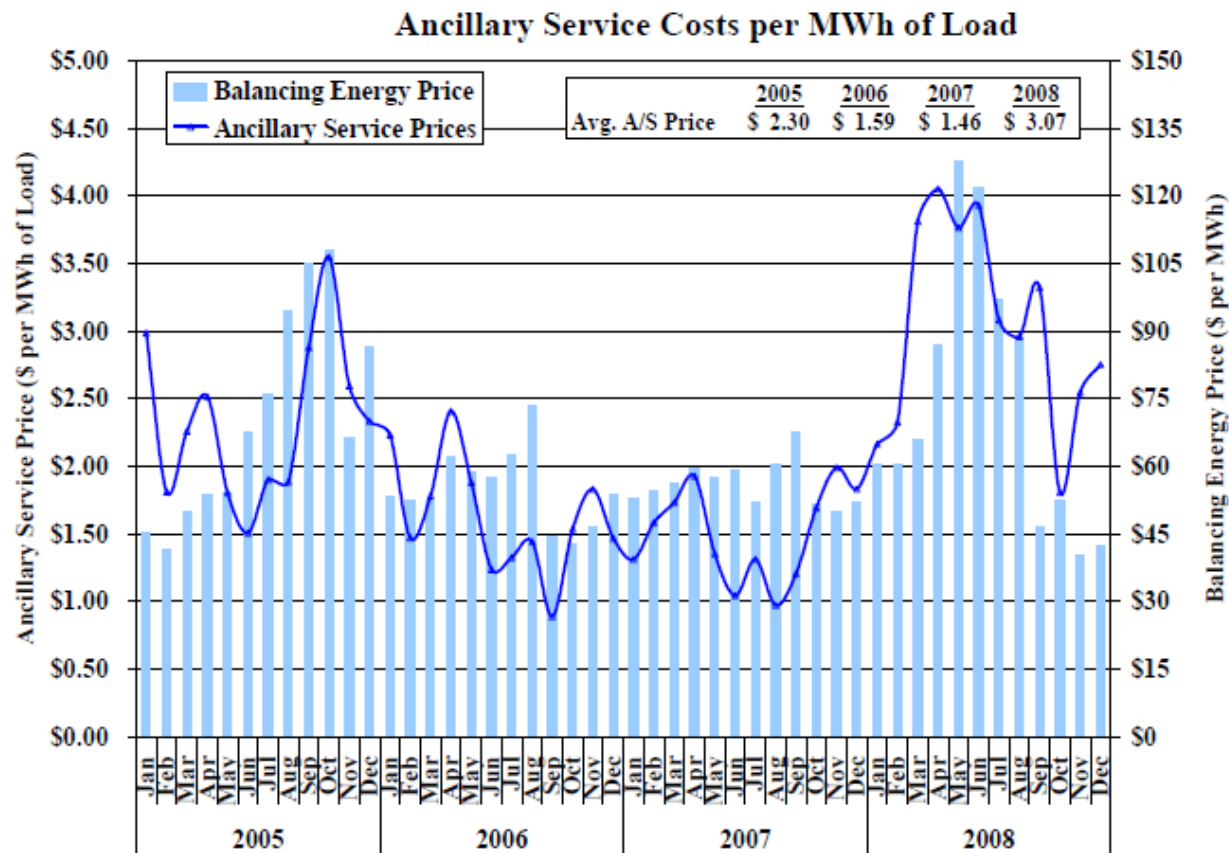


source: Potomac Economics, 2008 ERCOT State of the Market Report, p. 3.

# 1. Contextual considerations

## 1.2. Ancillary Services as a portion of the total cost of energy (cont.)

Similar to the previous slide, the chart below demonstrates that ancillary services prices typically follow Balancing Energy Service prices and when examined on the basis of cost per MWh of load served comprise a very small portion of total energy costs. Moreover, even if some small portion of ancillary services costs could be directly attributed to wind generation, it would comprise a very small portion of the cost to serve load in ERCOT.



source: Potomac Economics, 2008 ERCOT State of the Market Report, p. 33.

# 1. Contextual considerations

## 1.3. Impact of wind generation on Market Clearing Price of Energy and bilateral contracts

Not only do ancillary services comprise a small fraction of the total costs of energy (and ancillary services costs attributable to wind a fraction of that) but wind energy significantly contributes to lower prices in the Balancing Energy Services market which, in turn, influences the bilateral energy markets.

The difference between savings brought by wind energy and costs associated with wind energy is dramatic and provides the necessary context in which to view the ancillary services cost allocation discussion.

The table at right demonstrates in some measure the impact of wind energy on zonal pricing. Note that the West consistently trails other zones due to the significant levels of wind generation. As zonal constraints are relieved in the future due to the CREZ transmission expansion, zonal prices are expected to converge closer to the West Zone price. This should continue to exert downward pressure on bilateral energy markets as well, saving Texas consumers billions of dollars.

### Total Load Weighted Average Price (\$/MWh)\*

[MCPE weighted by Total Zonal Load]

*\*Represents the average price for loads within the zone*

LOAD ZONE	Nov 2009	Oct 2009	Sep 2009	Aug 2009	Jul 2009	Jun 2009	May 2009	Apr 2009	Mar 2009	Feb 2009	Jan 2009
South	\$27.77	\$31.22	\$30.82	\$32.51	\$35.67	\$82.81	\$32.97	\$24.27	\$26.35	\$27.27	\$34.69
North	\$27.75	\$30.25	\$26.96	\$32.47	\$35.81	\$35.15	\$32.99	\$24.82	\$32.21	\$27.89	\$32.31
Houston	\$27.72	\$31.61	\$31.25	\$32.81	\$35.68	\$61.82	\$32.70	\$24.58	\$29.11	\$27.19	\$32.78
West	\$27.02	\$27.84	\$24.32	\$29.84	\$33.75	\$32.95	\$24.57	\$12.93	\$25.70	\$19.93	\$24.04

LOAD ZONE	Nov 2008	Oct 2008	Sep 2008	Aug 2008	July 2008	Jun 2008	May 2008	Apr 2008	Mar 2008	Feb 2008	Jan 2008
South	\$41.11	\$55.19	\$46.77	\$88.47	\$97.86	\$147.24	\$171.09	\$83.65	\$64.34	\$63.26	\$60.24
North	\$40.69	\$48.98	\$45.38	\$89.19	\$97.08	\$104.37	\$86.41	\$74.92	\$69.64	\$59.05	\$62.31
Houston	\$40.88	\$56.01	\$48.61	\$88.40	\$97.30	\$129.48	\$152.76	\$100.00	\$68.19	\$60.06	\$60.16
West	\$34.62	\$41.16	\$43.72	\$84.92	\$90.98	\$82.22	\$58.01	\$58.59	\$38.52	\$56.84	\$52.04

source: Market Operations Report to the ERCOT Board of Directors, Jan. 19, 2010

***Even if one assumes Texas consumers pay some additional cents per MWh of load served in ancillary services costs to manage wind-related issues, the total market savings provided by wind energy dwarf such considerations. Consumers win with wind.***

# 1. Contextual considerations

## **1.4. Impacts of Competitive Renewable Energy Zones transmission plan**

Interestingly, the WCATF deliberations did not include any analysis of the PUCT's CREZ transmission plan. No studies were performed to determine whether the alleviation of West Texas transmission limitations will increase or decrease the need for ancillary services or the costs associated with those services. Even the casual observer, however, should be able to draw some intuitive conclusions. Down Balancing Energy Service and OOME Down deployments should decrease as transmission capacity is increased. Additionally, more wind energy flowing from the West Zone generation pocket to the load centers in the eastern half of the state will likely further reduce wholesale energy prices in ERCOT. There has been no evidence to suggest such expected consumer benefits will be offset or compromised by increased ancillary services costs. To the contrary, the considerable body of evidence relied upon by the PUCT's adoption of the CREZ plan in Docket No. 33672 demonstrates Texas consumers will accrue significant economic benefits from additional wind energy even including additional infrastructure and ancillary services costs.

## **1.5. Impacts of Texas Nodal Market transition on energy costs and ancillary services**

It is also worth noting that even though the WCATF agreed that no ERCOT settlement system changes could likely be implemented to alter the allocation of ancillary services costs prior to the TNMID, the WCATF failed to consider what, if any impacts the nodal market transition itself will have on the amount and costs of ancillary services. It is reasonable to assume that more granular pricing, unit-specific deployments, and more frequent system dispatch will tend to reduce ERCOT's reliance on certain ancillary services such as Regulation Up and Down and Responsive Reserve Service. It seems odd that the WCATF would recommend cost allocation methodologies for a market design in which the costs to be allocated have not been analyzed.



## 2. Procedural considerations

### **2.1. WCATF charter turns the stakeholder process on its head**

As noted several times in recent meetings of the WMS, the WCATF is a “how to” task force, not a “should we” task force. While such an approach enabled a determined minority to procedurally advance their aims, the task force charter turns the stakeholder process on its head. Many “solutions” have been offered, but no “problem” has yet been identified, let alone analyzed. This is the first instance in the history of the contemporary ERCOT stakeholder process where the cart has formally been placed before the horse. Every other task force ever created was designed to address an identified issue of concern, provide fact-based analysis, and develop consensus-based recommendations. For the first time in memory, a small collection of market participants effectively barred another group of market participants from presenting evidence or offering arguments to support or oppose a policy position.

### **2.2. WCATF process raises serious political and legal concerns**

The WCATF process described above raises serious concerns about the validity of a stakeholder-driven process and provides ample ammunition to those who claim self-interested market participants should not be allowed to develop market rules. Moreover, given that the task force was essentially driven by incumbent non-wind generators who stand to reap financial gain from ancillary services sales and higher energy prices brought about by dissuading future investment in alternative generation technologies, the WCATF raises serious anti-trust concerns which should be carefully considered by all parties involved in this debate.

### **2.3. Cost allocation resource impacts on nodal implementation effort are unwise**

That this debate occurs as ERCOT Staff and stakeholders begin nodal market trials and that many of the individuals participating in and monitoring WCATF activity are actively involved in nodal readiness is itself enough evidence to support the assertion that the WCATF is an inappropriately-timed drain on stakeholder resources.

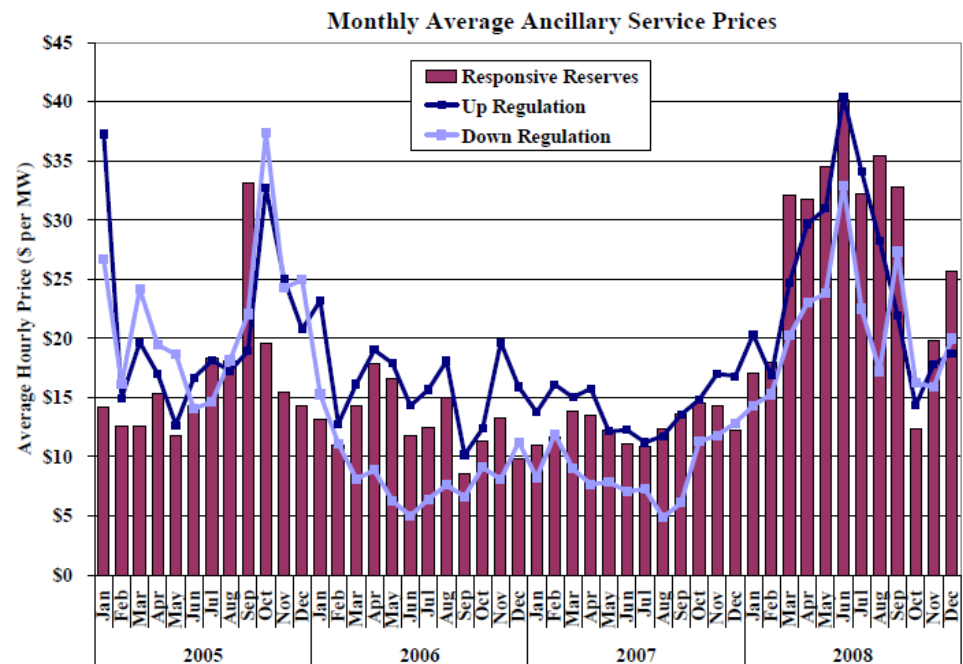
## 3. Data analysis

### 3.1. Ancillary services costs are primarily driven by factors other than wind generation penetration

Note the explanation which accompanied the chart at right in the Independent Market Monitor's 2008 *ERCOT State of the Market Report*.

"This figure shows that after two years of relative stability, 2008 experienced a significant increase in ancillary service capacity prices. The price movements can be primarily attributed to the variations in energy prices that occurred over the same timeframe. In addition to the effect of higher energy prices on ancillary services prices, ERCOT increased its procurement of responsive reserve quantities January through August 2008 from the historical constant quantity of 2,300 MW to as high as 2,800 MW during peak hours in the summer."

"... significant transmission congestion materialized in April, May and June 2008 leading to significantly higher prices in the Houston and South Zones. These pricing outcomes had the effect of increasing the opportunity costs for providers of responsive reserve in these locations, thereby causing an upward shift in the supply curve for responsive reserve in these months."



source: Potomac Economics, 2008 *ERCOT State of the Market Report*, p. 29

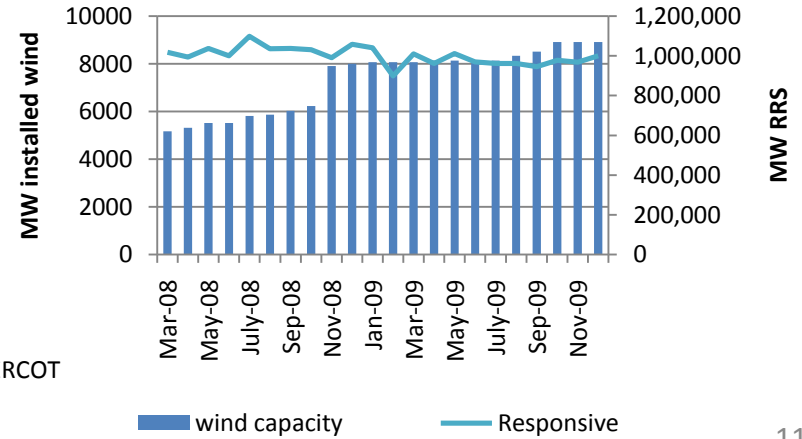
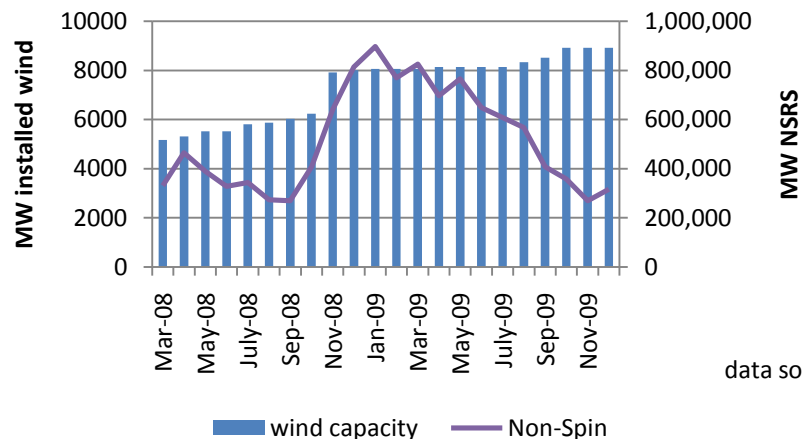
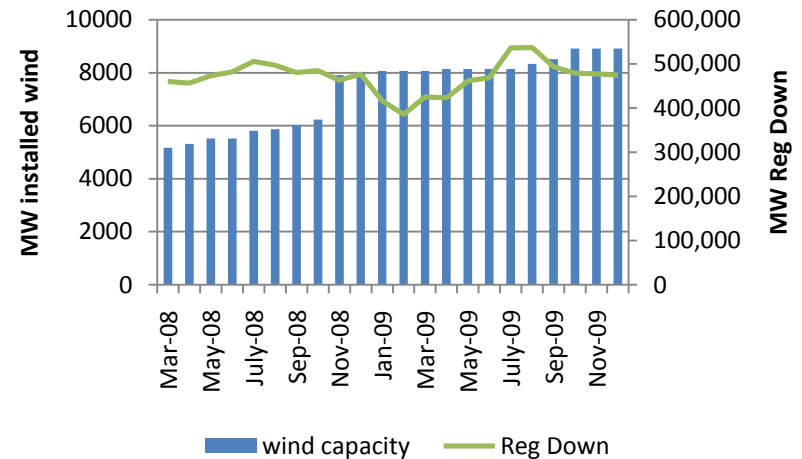
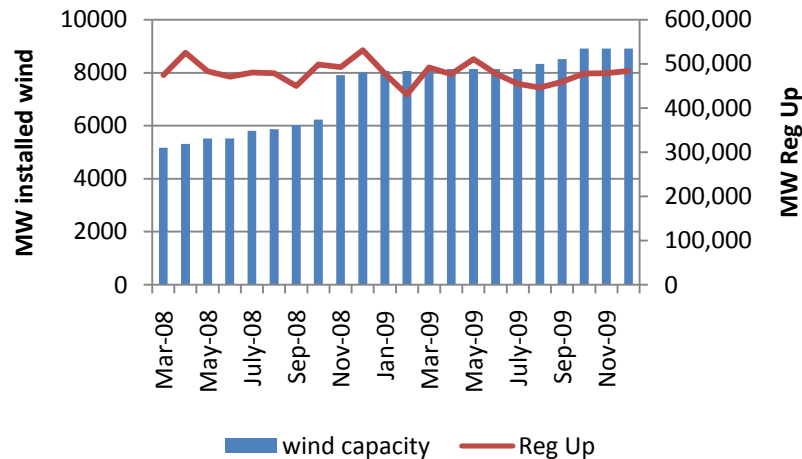
"A final factor affecting responsive reserve pricing outcomes in 2008 was the provision of responsive reserves by Loads acting as Resources ... the quantity of LaaRs providing responsive reserves was moderately reduced in March through May, and experienced more significant reductions in September, part of October, and in November and December. The reduction in the provision of responsive reserves by LaaRs in these months resulted in a corresponding increase in the quantity of responsive reserve provided by generation resources, which are typically more expensive, thereby placing an upward pressure on responsive reserve prices."

### 3. Data analysis

#### 3.2. Wind generation has had limited impact on ancillary services procurement

In November 2008, ERCOT modified the methodology for procurement of NSRS to account for net load uncertainty. No other ancillary services procurement methodologies have been modified due to wind penetration on the system. As the charts below illustrate, the monthly procured volumes of capacity services have remained relatively stable with the exception of NSRS.

Comparisons of installed wind capacity vs. monthly volume procured for Reg Up, Reg Down, NSRS, and RRS (March 2008-Dec. 2009)



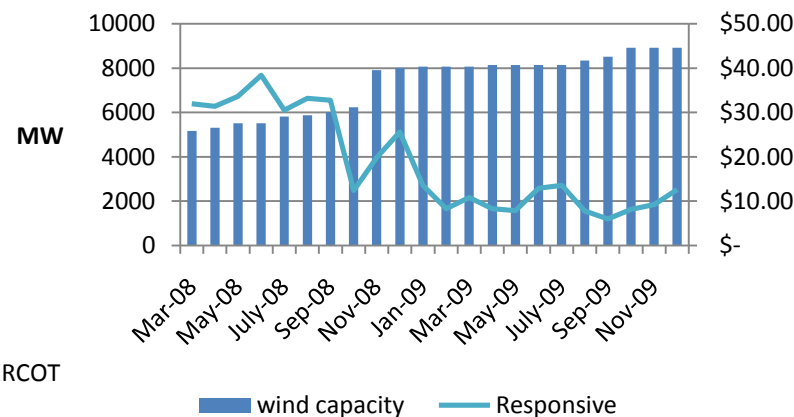
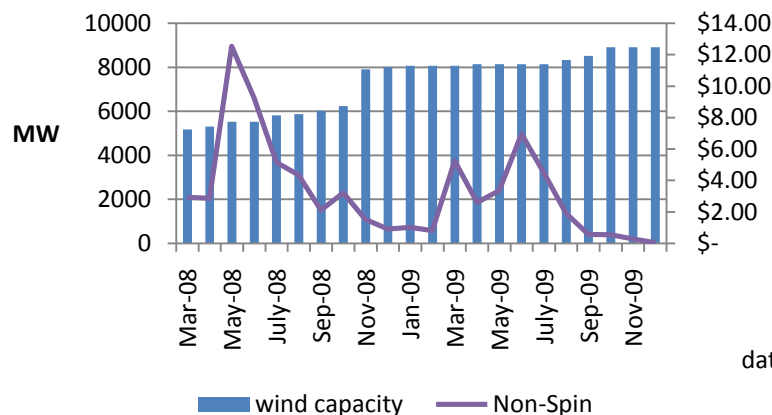
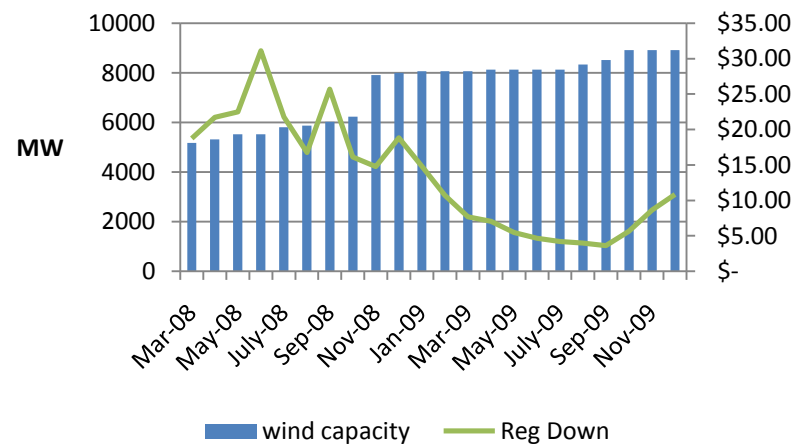
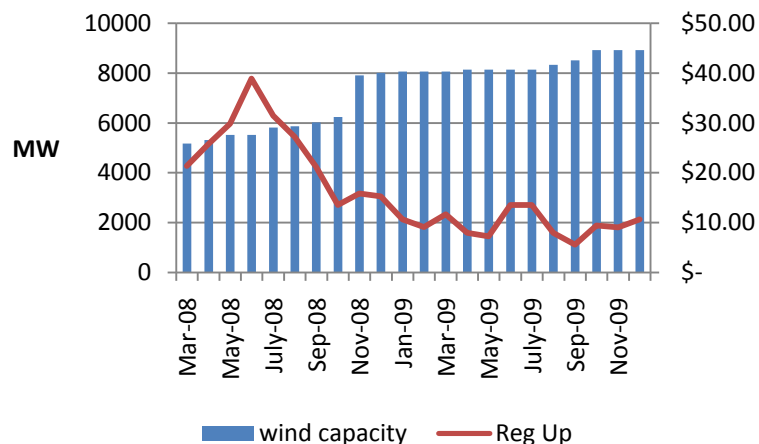
data source: ERCOT

## 3. Data analysis

### 3.3. Cost per MW for capacity services has decreased as wind capacity has increased

The average daily price per MW for capacity services has generally declined from a multi-year peak in April-June 2008 even as installed wind capacity has increased approximately 3,400 MW. Note the fluctuations in per MW cost of NSRS do not synch with the Nov. '08 methodology change. Also note the one service with a wind consideration added to the procurement methodology has been and still remains the least expensive of the market-based capacity services.

Comparisons of installed wind capacity vs. average daily price per MW for Reg Up, Reg Down, NSRS, and RRS (March 2008-Dec. 2009)



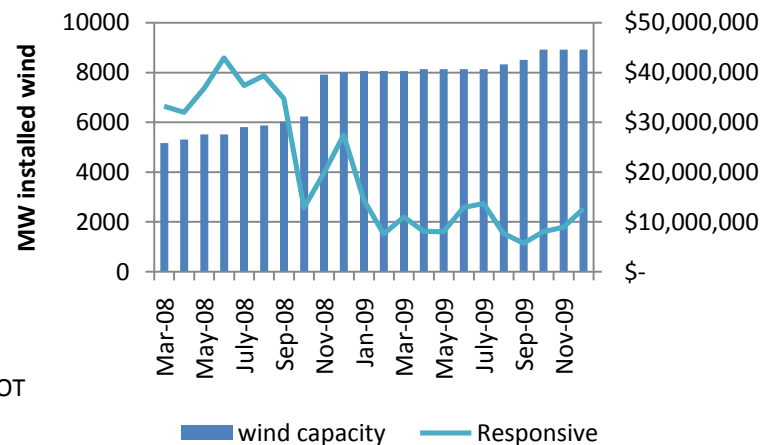
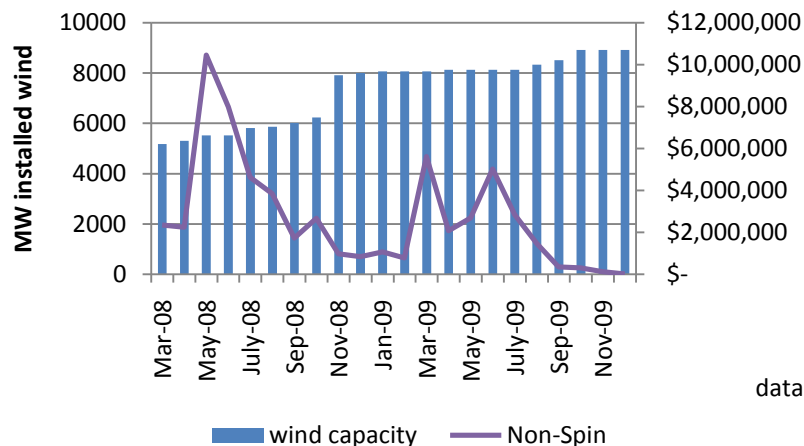
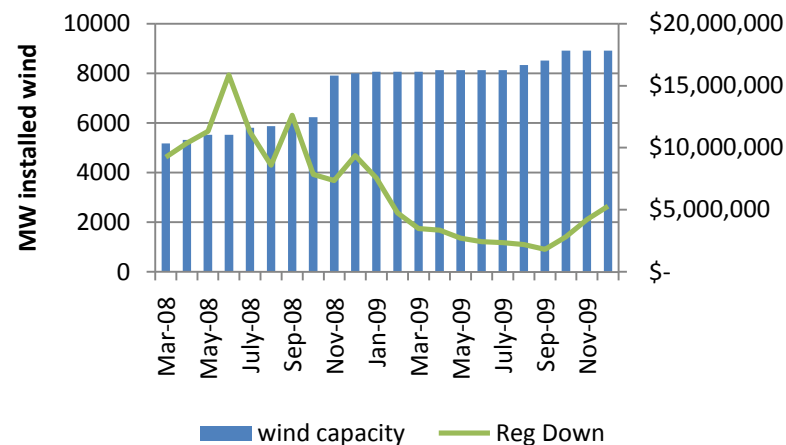
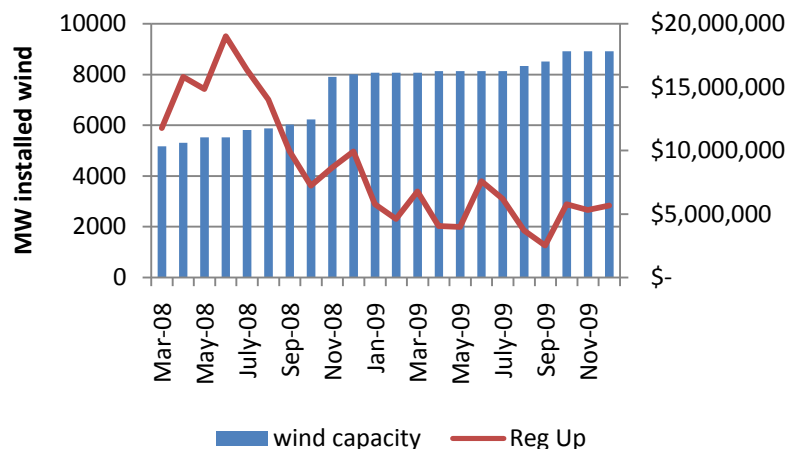
data source: ERCOT

### 3. Data analysis

#### 3.4. Total ancillary services costs have decreased as wind capacity has increased

Ancillary services pricing outcomes through much of 2009 trended downward even as installed wind capacity significantly increased. As the charts below illustrate, the combined monthly costs of Regulation, Non-Spin, and Responsive fell from a June 2008 high of \$85.7 million to a Sept. 2009 low of \$10.4 million while installed wind increased 3,000 MW during those months.

Comparisons of installed wind capacity vs. monthly cost of Reg Up, Reg Down, NSRS, and RRS (March 2008-Dec. 2009)



data source: ERCOT

## 4. Principles of cost allocation, market design, and policy implementation

### 4.1. WCATF options fail to meet principles of cost causation and non-discrimination

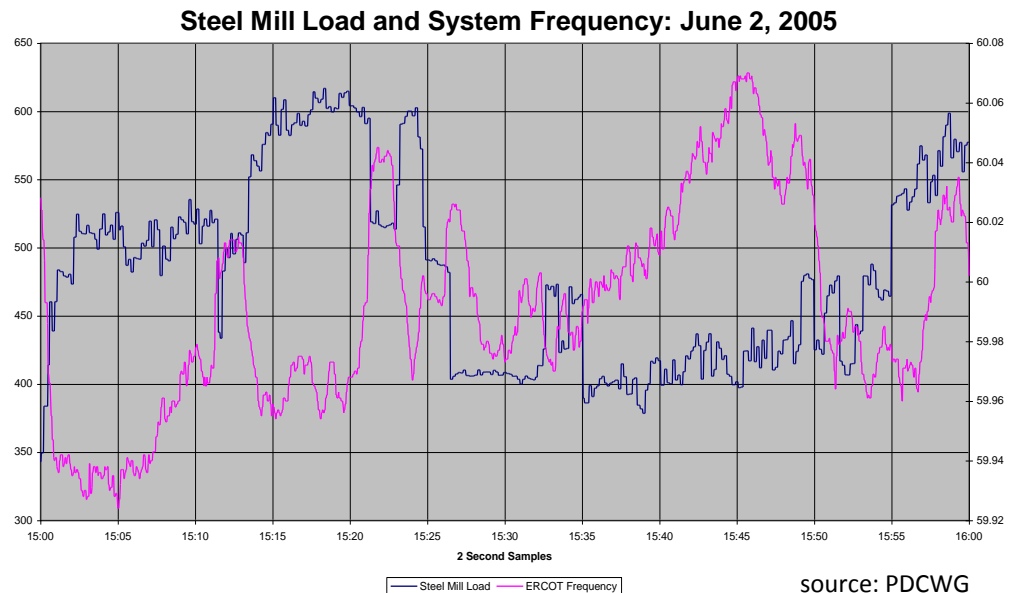
The two WCATF options do not truly assign costs based on a causation principle, rather they provide approximations of cost. It is interesting to note some of the same parties who have indicated support for such an approach protested the failed attempt years ago to directly assign local congestion costs because the assignment of such costs could only be approximated and not specifically defined. Moreover, as discussed below, the limited attempt at assigning “caused” costs is clearly non-uniformly applied to Resource types and, therefore, discriminatory. Because other “cost-causers” can be identified but are not included in any cost allocation mechanism, the application of such a mechanism exclusively to wind generation fails the non-discrimination test.

### 4.2. Allocation to wind generators is contrary to PUCT policy and ERCOT philosophy

The PUCT approved the original zonal Protocols with all ancillary services costs shared equally among the parties who benefit from the system reliability created by such services – loads. No Resource in ERCOT has ever been assigned a portion of these costs and the PUCT has never addressed this issue in rulemaking or contested case. Such a significant departure from Commission-approved ERCOT market design should not be made lightly by the stakeholders without PUCT input.

### 4.3. Examples of non-wind drivers of ancillary services procurement and deployment

As discussed above, the fact that market participants other than wind generators can be shown to directly or disproportionately contribute to the need for specific ancillary services and yet are not directly allocated their portion of such costs makes the WCATF options inherently discriminatory. For example, the chart at left shows the often discussed impact of steel mill operations on system frequency, which clearly has a disproportionate impact on the need for Regulation Service compared to most loads.



source: PDCWG

## 4. Principles of cost allocation, market design, and policy implementation

### 4.3. Examples of non-wind drivers of ancillary services procurement and deployment (cont.)

Other examples of non-wind cost causers abound. The procurement of RRS is specifically made to cover the loss of the largest two units on the system, STP 1 and 2. But it would be inappropriate to foist all of RRS costs on STP since those units are really only a proxy for a large unit trip. Should units that trip be allocated some share of RRS? A casual glance at the monthly System Operations reports provided to ROS demonstrates how simple it would be to identify the units which “cause” ERCOT to carry RRS. ERCOT has reported at least one fossil unit trip every month from December 2007 to December 2009. These “cost-causers” are readily identifiable, yet completely excluded from the WCATF debate, lending support to the assertion that the WCATF process and outcomes are intentionally discriminatory.

### 4.4. Cost allocation to wind generators will not result in improved market outcomes

Another fundamental principle of market design is that costs are properly allocated where they incentivize proper market behavior. However, to the extent that costs are allocated to market participants based upon events or circumstances beyond their reasonable control, such an allocation is punitive, not corrective. Wind energy provides tremendous economic benefits to Texas consumers. That those benefits are mildly eroded (but not erased) by infrastructure and operational costs is not sufficient reason to allocate costs to wind generators. Using the WCATF Reliability Credits proposal as an example, a charge for Regulation Service to a 10-year-old wind turbine technology which does not provide (and was never capable of providing) primary frequency response will not cause the Resource owner to install primary frequency response capability if such capability does not exist. It is just a cost that the Resource owner must bear until it can be recovered through power purchase agreements or market rates – a cost back to loads in either case. Technical capabilities for wind technologies are improving and ERCOT continues to capture the benefits of these improvements everywhere possible through Protocols revisions and Operating Guide changes, a far more specific, useful, and fair approach than the random allocation of costs not properly assigned to such market participants.

### 4.5. Cost allocation to wind generators thwarts state and federal public policy goals

Perhaps the most disturbing aspect of the WCATF effort is the fact that such fundamental market design changes will likely have the effect of chilling investment not only in wind technology but in any new technology which does not conform to the market structure built around large, conventional, central station generation technologies. Developers of solar, energy storage, or any other new technology are anxiously watching the WCATF debate on the sidelines to see if the economics of such projects can be arbitrarily eroded by a dedicated group of incumbent stakeholders. More disturbing still is the appearance that such an effort is a deliberate attempt to undermine the successful policies of Texas and the United States to encourage the deployment of these new technologies.

## 5. Conclusions and recommendations

### 5.1. Data does not support ancillary services cost allocation to wind generators

Although the installed wind capacity on the ERCOT system has dramatically increased in recent years, procured volumes of ancillary services have remained fairly stable with the notable exception of NSRS which was specifically increased to address net load forecast error. The total cost of ancillary services, however (including NSRS), has declined. The data shows that wind energy is providing tremendous economic benefit to the ERCOT market and that reallocation of ancillary services costs will not meaningfully impact the market economics except to harm the very generators who are providing the benefits to loads.

### 5.2. Stakeholder efforts are better directed at other market activities

All stakeholders should be focused on nodal market transition issues and there is too little knowledge about this issue in the nodal environment for any meaningful work to take place at this time. The serious technical work of better integrating wind and other renewable technologies remains underway in a number of stakeholder venues and should continue.

### 5.3. Reject the WCATF cost allocation methodology options

The WCATF options should be rejected and the task force disbanded. The options are not based on actual cost causation. The options are discriminatory in nature. The options are contrary to established PUCT policy and ERCOT philosophy. The options are not supported by evidence. The options are presented too late for zonal implementation and have not been properly constructed for nodal implementation. Nodal implementation cannot occur until significantly later than the TNMID. The ancillary services cost allocation debate is best laid to rest.

### 5.4. Recommended motion for adoption by WMS

WMS declines to endorse the WCATF options for assignment of ancillary services costs to wind generators and disbands the WCATF. WMS recommends to TAC that the work of better integrating wind and other renewable technologies continue through the Renewable Technologies Working Group and other standing TAC subcommittees and working groups. WMS recommends TAC report to the ERCOT Board of Directors that further discussion of assignment of ancillary services costs to wind generators is not appropriate at this time, primarily due to the pending transition from zonal to nodal market systems. WMS re-emphasizes its original conclusion, consistent with the PUCT order adopting the ERCOT Protocols, that ancillary services are procured for the reliability benefits enjoyed by all loads on the system who appropriately bear the costs associated with such benefits.