

Texas Renewables Integration Plan
Quarterly Update for the
3-Month Period Ending May 31, 2009

Prepared by the Renewable Technologies Working
Group of the ERCOT Technical Advisory Committee

June 2009

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Status of Renewable Generation Resources in ERCOT

At the end of May 2009, ERCOT had 8,135 MW of “new” wind generation in operation, where “new” represents capacity added since September 1, 1999. In addition, there were approximately 1 MW of new solar, 37 MW of new biomass, 33 MW of new hydro and 72 MW of new landfill gas renewable generation in operation.

For the three months ending May 31, 2009, the following new renewable resources became operational:

- Goat Wind (Sterling County) – Phase 2 – 70 MW (Wind)

Wind generation has provided 7.5% of the total energy produced in ERCOT from January 1, 2009 through May 31, 2009. The monthly ERCOT generation fuel mix is available at:

<http://planning.ercot.com/reports/demand-energy/>

In addition to wind generation capacity that is installed and operating, there are a substantial number of renewable generation projects in various stages of study by ERCOT as part of the Generation Interconnection Process as shown in Figure 1 below.

Project Description	Capacity (MW)		
	Wind	Solar	Biomass
Projects with Interconnect Agreement/Public Letter	7,688	0	145
Projects Under Full Interconnect Study	31,159	369	55
Confidential Projects	10,555	1,268	0
Total	49,402	1,637	200

Figure 1 – New Renewable Generation Capacity Under Study

There are sixteen wind generation projects and two biomass projects with Interconnect Agreements or public letters. In addition, there are 101 wind generation projects undergoing full interconnect studies. There are three solar projects and one biomass project undergoing full interconnect studies.

For the 3-month period ending May 31, 2009, the following renewable resources signed Generation Interconnection Agreements:

- Senate Wind (150 MW)(Jack County)
- Lenorah Wind (200 MW)(Frio County)
- Sterling Energy Center (300 MW)(Sterling County)

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- Langford Wind Power (150 MW)(Tom Green County)
- Panther Creek 3 Wind (200 MW)(Concho County)
- Nacogoches Biomass (100 MW) (Nacogdoches County)
- Penescal Wind Farm II and III (400 MW) (Kenedy County)

The annual ERCOT installed wind generating capacities since 1999 are shown in Figure 2 below.

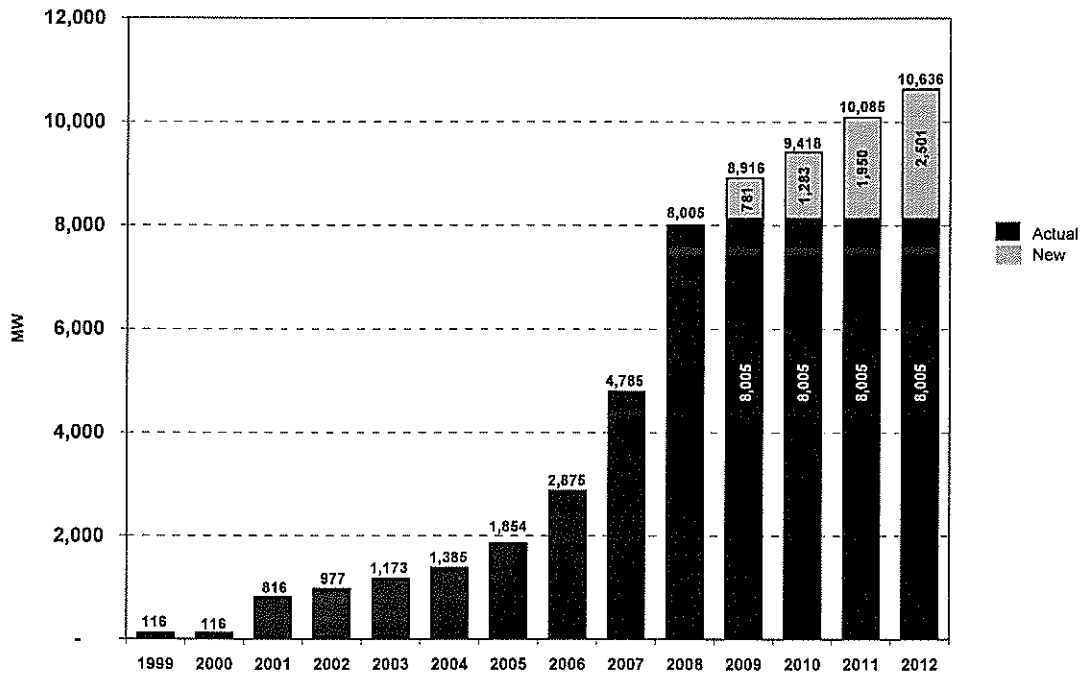


Figure 2 – ERCOT Installed Wind Generating Capacity (End of Year)

Significant Events

During the 3-month period ending May 31, 2009, the Texas Legislature was in session and while several important bills were introduced and under consideration, none were passed that had a significant impact on renewable resources.

Completed Issues

During the 3-month period ending May 31, 2009, the following Issues were completed:

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MD 2 – Ancillary Services Procurement Optimization for 2009
SO 13 – Performance Metrics for Wind Generation
SO 16 – Wind Generation Ramp Limits
SO 21 – Evaluate Emergency Electric Curtailment Plan (EECP) Steps
SO 24 – Settlement of Advanced Meters in the Nodal Market
SO 27 – Manual Curtailment of Wind Generation to Resolve Local Congestion
SP 1 – Verify Wind Turbine Technical Data

For a detailed list of all Issues and their current status, see the Appendix.

In addition, the following Protocol Revision Requests (PRRs) impacting renewable resources in the ERCOT zonal market, were approved and/or became effective:

- PRR 788 - Ramp Rate Limits for Existing WGRs (Effective 02-01-2009)
- PRR 792 - Revised Renewable Portfolio Standards Allocation Process, Pursuant to P.U.C. Subst. R. 25.173 (Effective 02-01-2009)
- PRR 793 - WGR QSE Scheduling Metric (Effective 03-01-2009)
- PRR 794 - Meteorological Data Required from QSEs Representing Wind-powered Generation Resources (Effective 004-01-2009)
- PRR 800 - QSE Day Ahead Metric (Approved on 05-20-2009, effective upon system implementation)

New Issues

During the 3-month period ending May 31, 2009, the RTWG began consideration the following issues related to the integration of renewable resources into the ERCOT market:

- SO 30 – Application of Wind Generation Forecast to PASA
- SO 31 – Tension Monitors on Transmission Line
- SO 32 – Real-Time Wind Generation Capacity
- SO 33 – Real-Time Wind Turbine Availability
- WT 4 – Wind in the Nodal Market

Upcoming Events

The Wind Workshop III is scheduled for June 26, 2009 at the ERCOT Met Center in Austin. There are two main topics that will be discussed during the workshop. The first is the Low Voltage Ride-Through (LVRT) Study. The contractor selected by ERCOT to perform the study will be presenting information including an overview of the study and the process that will be used to obtain the required data from each Wind Generation Resource (WGR). The second topic will be the wind forecasts that are being produced by AWS Truewind for ERCOT. AWS

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Truewind will be presenting material on ERCOT-specific forecasting issues that have been observed during the last several months. Topics for the presentation will include:

- how ERCOT forecasts are produced,
- wind farm data quality/representativeness issues, and
- forecast performance.

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Appendix

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List of Market Design Issues

May 2009 Revised

Issue Category	Issue No.	Title	Description	Current Group	Priority	Impact	Solution Implemented by	Revision Mechanism	Status
MD	1	Ancillary Services Cost Allocations Applicable to Wind	Develop any ancillary services cost allocations applicable to wind generation resources.	TAC	Near Term	Medium	Market Participants	PRR/NPRR	Open issue that will be addressed on a case-specific basis.
MD	3	Non-Spin Requirements	Determine if additional Non-Spin Service procurements are required to accommodate increased amounts of wind generation in ERCOT.	WMS	Near Term	Medium	ERCOT	Other	To be included in MD 4
MD	4	New Ancillary Service Products Needed for Reliability	Determine if new ancillary services are needed to reliably integrate the large amounts of wind generation coming into the ERCOT market.	ROS	Long Term	Medium	ERCOT	PRR/NPRR	Dependent on results of SO-5
MD	5	Benefits of Storage Technologies	Determine benefit and potential applications of storage technologies in the ERCOT market.	RTWG	Long Term	Low	Market Participants	Other	Steve Isser will bring white paper to RTWG.
MD	7	Wind Generating Resources Providing Ancillary Services	Determine possible changes in the ERCOT Nodal Protocols to allow Wind Generation Resources to provide ancillary services.	ROS	Undetermined	Medium	Market Participants	NPRR	List of issues has been circulated; Walter Reid will be developing a NPRR to address market facilitation issues
MD	8	Reactive and Voltage Requirements Applicable to Wind Generators	Review of current ERCOT Protocols to ensure reactive and voltage control requirements are applicable to all generating technologies, including wind generation.	WOTF	Near Term	Low	ERCOT	PRR	In Docket 36482, a motion has been made to dismiss. Wind generators have until June 30 to respond to the motion to dismiss.
MD	9	Wind Generation Dispatch in the Nodal Protocols	Review of Nodal Protocols to ensure proper treatment of wind generation in regard to dispatch response.	WMS	Near Term	Medium	Market Participants	NPRR	Under discussion at QMWG; a draft NPRR will be available for discussion by the QMWG in June.
MD	10	Wind Generation Performance Metrics in the Nodal Protocols	Review of Nodal Protocols to ensure proper treatment of wind generation in regard to performance metrics when negative pricing exists.	WMS	Near Term	Medium	ERCOT	NPRR	Under discussion at QMWG; a draft NPRR will be available for discussion by the QMWG in June.
MD	11	Wind Generation and Base Point Deviation in the Nodal Protocols	Review of Nodal Protocols to ensure proper treatment of wind generation in regard to Base Point deviation.	WMS	Near Term	Medium	ERCOT	NPRR	Under discussion at QMWG; a draft NPRR will be available for discussion by the QMWG in June.

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List of System Operations Issues

May 2009 Revised

Issue Category	Issue No.	Title	Description	Assigned to:	Priority	Impact	Solution Implemented by	Revision Mechanism	Status
SO	1	Inventory of Wind Generation Facilities	Develop forms and collect wind turbine data from Wind Generation Resources to improve ERCOT's modeling and operations databases.	WOTF	Near Term	Low	ERCOT	Other	ERCOT Planning has hired a consultant to do specific studies including database grooming. ERCOT will develop a consolidated data-gathering process.
SO	2	Nodal Tools to Integrate Wind Generation	Determine tools applicable to the Nodal Protocols to successfully integrate wind generation into the ERCOT markets.	RTWG	Undetermined	Medium	Market Participants and ERCOT	PRR	Next steps pending.
SO	3	Wind Generation Response and SCE	Determine proper wind generation response to down balancing instructions from ERCOT and also address SCE issues.	QMWG	Near Term	Low	Market Participants	PRR	PRR 812 has been approved by PRS and is up for review by TAC. The PRR was revised to reduce its impact on ERCOT resources working on the Nodal market design.
SO	4	Smart Grid Implications for Renewable Resources	Determine how development of a "smart grid" could benefit and improve integration of renewable resources into the ERCOT grid.	RTWG	Long Term	Low	Market Participants	Other	Eric Goff and Steve Isser will develop a white paper
SO	5	Operational Studies Related to Wind Generation	Operational studies re: Wind (ramp rate, low load situations, forecasting)	RTWG	Long Term	Medium	ERCOT	NPRR	A white paper has been developed and will be discussed RTWG in July
SO	6	Testing Reactive Capability of Wind Generation	Determine the appropriate testing methodology to measure the reactive capability of wind generation.	ERCOT Operations	Near Term	Medium	ERCOT	OGRR	See MD-8
SO	7	Wind Generation and High System Frequency	Determine impact of wind generation on high system frequency events and develop possible solutions.	WOTF	Near Term	Medium	Market Participants	PRR/NPRR	WOTF has prepared a draft PRR which will be provided to ROS in July
SO	8	Wind Generation and System Inertia	Determine impact of wind generation on system inertia and develop possible solutions.	PDCWG	Long Term	Low	Market Participants	Other	Mark Garnett to ask ROS for status update
SO	9	SCADA Control of Generator Circuit Breakers	Develop guidelines for better control of generator circuit breakers via SCADA.	OGRR TF	Near Term	Low	Market Participants	OGRR	OGRR 226 is under review at OWG
SO	10	Voltage Management Practices Applicable to Wind Generation	Develop appropriate voltage management practices for ERCOT and Transmission Service Providers that would apply to wind generation resources.	RPG	Near Term	High	ERCOT/TSPs	NPRR	ERCOT has issued an RFP for a reactive study of West Texas.
SO	11	Technology-Specific Procedures and Protocols Changes	Develop renewable technology-specific changes in existing ERCOT Protocols, Operating Guides, Interconnection Agreements and interconnection procedures to recognize unique characteristics of various renewable generation technologies.	ROS	Near Term	Low	Market Participants	Other	ERCOT developing a technology-specific procedure for wind. RTWG is considering technology-specific procedures for other renewable technologies
SO	14	Impact of Transmission Outage Planning on Wind Generation	Examine possible ways to improve transmission outage planning to better coordinate with wind generation operations.	RPG	Long Term	High	ERCOT/TSPs	PRR	PRR 795 was approved by the Board - Policy issues still open
SO	15	Communications between Wind Farms and TSPs	Examine possible improvements in real-time communications between wind farms and transmission service providers (TSPs).	WOTF	Near Term	Medium	Market Participants	OGRR	OGRR 226 is under review at OWG
SO	23	Impact of Advanced Meters on Integration of Renewable Resources	Examine impact of advanced metering capabilities on integration and deployment of renewable resources and demand-side management technologies.	DSWG	Long Term	Low	Market Participants	PRR/NPRR	2009 Goal for WMS, on-going in DSWG
SO	25	Generator Governor Response for Wind Generators	Determine proper generator governor response requirements for wind generators in the Nodal Market design.	WOTF	Short Term	Medium	Market Participants	NPRR	See SO-7
SO	26	Impact of Solar Generation on System Operations	Determine potential impact of new solar generation on ERCOT system operations through appropriate studies of solar ramp rate capabilities, forecasting of solar energy production, voltage and reactive control capabilities.	RTWG	Long Term	Medium	Market Participants	NPRR	Steve Isser to develop a white paper to be presented to RTWG

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List of System Operations Issues

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Issue Category	Issue No.	Title	Description	Assigned to:	Priority	Impact	Solution Implemented by	Revision Mechanism	Status
SO	28	SPS Actuation for N-0 Conditions	Determine possible changes to eliminate actuation of special protection systems (SPS) caused by variable output of wind farms.	QMWG	Near Term	Medium	ERCOT	OGRR	ERCOT is planning to prepare an OGRR to address this issue
SO	29	Transmission Outage Planning for CREZ	Determine ways to accommodate large amounts of transmission outages associated with the CREZ buildout while still providing adequate transmission service to existing wind farms and maintaining adequate system reliability.	RPG	Near Term	High	ERCOT	Other	The RTWG will bring this issue up at the July TAC.
SO	30	Application of Wind Generation Forecast to PASA	Determine how the ERCOT wind generation output forecast could be used to improve the Projected Assessment of System Adequacy (PASA).	ERCOT Operations	Near Term	Medium	ERCOT	Other	To be discussed at a future RTWG meeting
SO	31	Tension Monitors on Transmission Lines	Determine the need (if any) to install tension monitors on certain existing transmission lines that will be affected by construction of CREZ transmission facilities.	RPG	Near Term	Low	Market Participants	Other	To be discussed at a future RPG meeting
SO	32	Real-Time Wind Generation Capacity	Determine the value of having a real-time value of available wind generating capacity for use by ERCOT operations.	QMWG	Near Term	Medium	ERCOT	PRR	Draft PRR/OGRR to be developed by QMWG
SO	33	Real-Time Wind Turbine Availability	Determine the value of having a real-time indication of the availability of each wind turbine for use by ERCOT operations.	QMWG	Near Term	Medium	ERCOT	PRR	Draft PRR/OGRR to be developed by QMWG

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List of System Planning Issues

May 2009 Revised

Issue Category	Issue No.	Title	Description	Current Group	Priority	Impact	Solution Implemented by	Revision Mechanism	Status
SP	2	Wind Turbine Computer Models	Collect and verify accuracy of computer models for each type of wind turbine installed on the ERCOT grid.	ERCOT Planning	Near Term	Low	ERCOT	Other	Included in ERCOT's LVRT Study
SP	3	Wind Turbine Fault Tolerance	Prepare a study of the fault tolerance of wind turbines installed on the ERCOT grid.	ERCOT Planning	Near Term	Medium	ERCOT	OGRR	Included in ERCOT's LVRT Study
SP	4	Voltage Transient and Small Signal Stability Study	Update ERCOT voltage transient and small signal stability study and prepare a West Zone to North Zone transfer study.	ERCOT Operations	Near Term	Medium	ERCOT	Other	Limit study is underway; the design study is still under discussion at RPG
SP	5	Impact of Wind Turbines on System Inertia	Determine the potential impact on system reliability of large amounts of wind turbine generating capacity on ERCOT's system inertia requirements.	ERCOT Planning	Long Term	Medium	ERCOT	Other	Will be undertaken following completion of LVRT study
SP	6	Variable Frequency Transformers	Determine potential for variable frequency transformers (VFTs) to solve stability problems caused by the addition of large amounts of remotely-located generation capacity (e.g., wind generation).	RTWG	Long Term	Low	Market Participants	Other	Walter Reid/Paul Hassink to develop white paper
SP	7	Voltage Control Process	Develop a process to better control voltage in areas with large amounts of wind generation (comment: have I described this issue correctly?).	ERCOT Planning	Long Term	Medium	ERCOT	OGRR/NOGRR	Walter Reid to develop a whitepaper
SP	8	Low Voltage Ride-Through (LVRT) Study	Prepare a study of the system reliability and associated requirements applicable to all generators for voltage ride-through capability.	ERCOT Planning	Near Term	High	ERCOT	Other	All study results due to ROS no later than June 2010

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List of Workshop/Training Opportunities

May 2009 Revised

Issue Category	Issue No.	Title	Description	Current Group	Priority	Impact	Solution Implemented by	Revision Mechanism	Status
WT	1	Resource Plan and Schedule Update Process	Determine potential improvements to the Resource Plan and Resource Schedule update process to improve performance and reliability.	RTWG/ERCOT Operations	Undetermined	Low	Market Participants	Other	Potential topic for future Wind Workshop
WT	2	Wind Workshop III - Summer 2009	Develop list of topics and speakers for the ERCOT Wind Workshop III to be held in the summer of 2009.	RTWG/ERCOT Operations	Near Term	Low	Market Participants	Other	Workshop to be held on June 26, 2009
WT	3	Wind Turbine Operator Training	Develop list of topics for use in development of a training session for wind turbine generator operators.	ROS	Long Term	Low	Market Participants	Other	Ask ROS to consider adding wind-specific training to the ERCOT Operator training class
WT	4	Wind in the Nodal Market	Develop presentation for use in the Wind Workshop explaining how wind generation will be treated in the Nodal Market design.	RTWG/ERCOT Operations	Near Term	Low	Market Participants	Other	Include in Wind Workshop III

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List of All Completed Issues

Issue Category	Issue No.	Title	Description	Current Group	Priority	Impact	Solution implemented by	Revision Mechanism	Status
MD	2	Ancillary Services Procurement Optimization for 2009	Develop any ancillary services cost allocations applicable to wind generation resources (see also MD-6).	CMWVG	Complete	Medium	ERCOT	Other	COMPLETE: ERCOT Board approved the 2009 Ancillary Services Procurement methodology at the February Board Meeting
MD	6	Ancillary Service Procurement Methodology	Determine impact and possible changes in amounts of ancillary services to be procured to ensure reliability with increasing amounts of wind generation being installed in the ERCOT market.	WOTF	Complete	Medium	ERCOT	Other	COMPLETE: WOTF reviewed draft procedure method and made comments that were incorporated in the AS methodology approved for 2009
MD	12	Wind Generation Resource LSL as a Percentage of HSL	Establish a minimum percentage for the Low Sustained Limit (LSL) of the High Sustained Limit (HSL) for a wind generation resource.	CMWVG	Complete	Medium	Market Participants and ERCOT	PRR	COMPLETE: PRR 773 approved by the ERCOT Board
MD	13	Use of State of the Art Wind Forecast	Requires Wind Generation Resources to use of a state-of-the-art wind production forecast (AWS Truewind) in their daily resource plan submittals.	N/A	Complete	Medium	Market Participants	PRR	COMPLETE: PRR 763 approved by the ERCOT Board
SO	12	Low-Voltage-Ride-Through for Wind Generators	Develop low-voltage-ride-through requirements for wind generators.	N/A	Complete	Medium	Market Participants	OGRR	COMPLETE: ROS approved OGRR 208
SO	13	Performance Metrics for Wind Generation	Develop appropriate operational performance metrics for wind generation.	CMWVG	Complete	Medium	Market Participants	PRR	COMPLETE: PRR793 approved by the ERCOT Board
SO	16	Wind Generation Ramp Limits	Develop appropriate ramp rate limits for wind farms	ROS	Complete	Medium	Market Participants	PRR	COMPLETE: PRRs 771 and 788 approved by the ERCOT Board
SO	17	Mid-Term and Short-Term Load Forecast Weather Sensitivity	WOTF determined that this was not a determining factor in the February 26, 2008 event.	WOTF	Complete	Low	Market Participants and ERCOT	Other	COMPLETE: Issue resolved as result of ERCOT Operations response to SDWG comments. WOTF recommended no further action.
SO	19	Improve Competitively Sensitive Constraints (CSC) Process	Evaluate increasing the frequency of ERCOT CSC studies to more accurately determine congestion problems that affect wind generation.	WOTF	Complete	Medium	Market Participants and ERCOT	Other	COMPLETE: ERCOT implemented hourly limits effective June 10, 2008
SO	20	Dynamic Transmission Line Ratings	Evaluate cost and benefits of using dynamic transmission line ratings in ERCOT's planning processes to allow more efficient use of transmission lines serving wind farms.	WOTF	Complete	Low	Market Participants	Other	COMPLETE: RPG has agreed to consider dynamic line rating solutions to congestion problems
SO	21	Evaluate Emergency Electric Curtailment Plan (EECP) Steps	Determine if the existing EECP steps need to be modified to take into account the increasing amount of variable wind generation in the ERCOT system.	OWG	Complete	Low	Market Participants	PRR/NPRR	COMPLETE: PRR 769 approved by BOD and NPRR 142 at January 20 BOD meeting
SO	24	Settlement of Advanced Meters in the Nodal Market	Determine appropriate settlement timeline to accommodate use of advanced meters in the Nodal Market design.	AMIT	Complete	Medium	Market Participants	Other	COMPLETE: Go-live date is November 2009; all provisioned advanced meters will be settled on a 15-minute basis.
SO	27	Manual Curtailment of Wind Generation to Resolve Local Congestion	Determine if changes can be made in the existing zonal systems to allow for automating curtailment of wind to resolve local congestion problems.	CMWVG	Complete	High	ERCOT	Other	COMPLETE: ERCOT Operations discussed this issue extensively at February 2009 CMWVG meeting; no reasonable, timely or cost-effective solution is available in the existing zonal market; issue is resolved by the Nodal market design.
SP	1	Verify Wind Turbine Technical Data	Create and maintain an inventory of installed wind turbine characteristics.	ERCOT Operations	Complete	Medium	ERCOT	Other	COMPLETE: Survey has been completed