DECLARATION OF WARREN P. LASHER

1. I am the Manager of Long-Term Planning and Policy for the Electric Reliability Council of Texas (ERCOT), where I am responsible for long-range transmission planning analysis, generation reserve margin studies and analyses of potential impacts of pending regulatory changes. I have worked at ERCOT for the past seven years. I was previously employed by the Southern Company, where I worked in the Engineering and the Generation Planning and Development organizations. Prior to my employment with the Southern Company, I worked in a consulting role helping clients maintain compliance with a range of Federal and State environmental regulations. I have a Bachelors of Arts degree in Mathematics from Yale University, a Masters of Environmental Management degree from Duke University, and a Masters of Science degree in Computer Science from the University of Alabama at Birmingham. I am providing this declaration on behalf of the ERCOT ISO.

2. **<u>Background: ERCOT's Role in Managing Texas's Electric Grid</u>**

3. Founded in 1970, ERCOT is a membership-based 501(c)(4) nonprofit corporation, governed by a board of directors and subject to oversight by the Public Utility Commission of Texas (PUC) and the Texas Legislature. ERCOT is responsible for overseeing the reliable operation of the electric grid for the ERCOT region of Texas. ERCOT manages the flow of electric power to approximately 23 million Texas customers – representing approximately 85 percent of the state's electric load (i.e., demand for electricity) and approximately 75 percent of the Texas land area. As the independent system operator ("ISO") for the region, ERCOT schedules and dispatches power on a grid that connects approximately 40,500 miles of transmission lines and more than 550 power generation units. ERCOT also manages financial settlement for the competitive wholesale bulk-power market and administers customer switching for 6.6 million premises in competitive choice areas.

4. ERCOT is not an advocacy organization and rarely advocates for particular policies or gets involved in litigation– except in cases where its core functions, including electric grid reliability, may be affected. This is one of those cases where ERCOT believes it has a role to voice its concern that Texas will face a shortage of generation necessary to "keep the lights on" in Texas, if the EPA's Cross-State Air Pollution Rule ("CSAPR") is implemented as written. Pertinent to this declaration, it is important to note that as an ISO, ERCOT and its individual employees have no financial stake in any generator or other market participant. As stated, ERCOT's only interests are relative to its core functions, including the reliable operation of the grid.

5. ERCOT's mission is to serve the public interest by: ensuring open access to transmission and distribution systems; maintaining system reliability and operations; enabling retail choice; operating fair and competitive wholesale markets; maintaining the renewable energy credits registry; and providing leadership and independent expertise to improve system reliability and market efficiency.

6. Ensuring reliable electrical power is critical to economic stability as well as human health and safety. Businesses in Texas depend on the reliable delivery of electricity to support their operations, and individual Texans depend on electric reliability to keep them cool in the summer and warm in the winter and to provide power for their daily needs, such as refrigeration and cooking. Essential services providers such as hospitals, police departments, water and sewer utilities, fire departments, and others also depend on having reliable electricity to fulfill their necessary duties that keep people alive and protect citizens against danger.

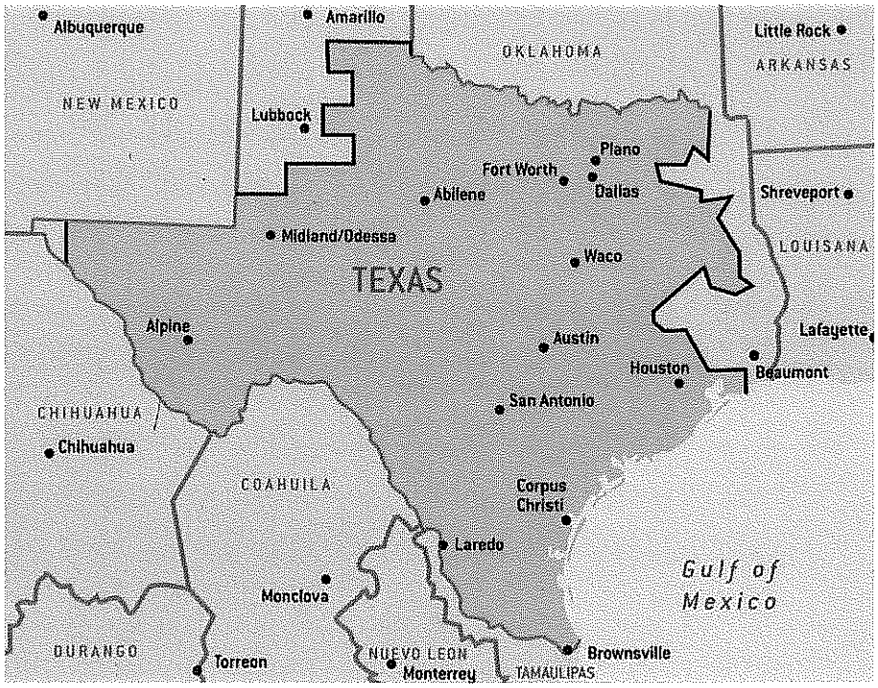
7. The federal Energy Policy Act of 2005 recognized the importance of ensuring reliability of electric grids by creating an Electric Reliability Organization ("ERO"). The ERO function is performed by the North American Electric Reliability Corporation (NERC), which oversees a vast set of reliability standards that govern operations and planning and are designed to ensure the reliability of the bulk power system. Under the NERC reliability construct, ERCOT is designated as both the Reliability Coordinator and the Balancing Authority, and as a Transmission Operator for the ERCOT Region. ERCOT is also registered for several other functions, including the key planning function of Planning Authority.

8. ERCOT is primarily regulated by the PUC and the Texas Legislature. ERCOT is accountable to the Texas Reliability Entity, NERC, and the Federal Energy Regulatory Commission for federal reliability standards.

9. **<u>Most of Texas's Electric Grid is a Standalone System</u>**

10. The ERCOT region, identified in Figure 1 below, covers most of Texas and includes Houston, Dallas, Fort Worth, San Antonio, Austin, Corpus Christi, Abilene and the Rio Grande Valley.

Figure 1 – The ERCOT Region



11. The ERCOT grid is unique in the United States in that it is wholly intra-state and essentially isolated from the two other U.S. grid interconnections (the Western and the Eastern Interconnections). The ERCOT grid is not synchronously connected outside of the state, and there is limited ability for the ERCOT region to import or export electricity. There are 5 asynchronous ties between ERCOT and other interconnections: two linking ERCOT and the Eastern Interconnection (with a combined capacity of 820 MW), and three linking ERCOT and the electrical grid in Mexico (with a combined capacity of 286 MW). Flows on these asynchronous ties are scheduled by market participants. ERCOT can request support from neighboring regions during grid emergency events. Aside from these limited asynchronous ties, from an electrical standpoint, the ERCOT region is an island that must independently ensure its own electric reliability.

12. **<u>Generation Adequacy in the ERCOT Region</u>**

13. Generating capacity in the ERCOT region consists of a mix of generation technologies, fueled by coal (both lignite and sub-bituminous), natural gas, nuclear, wind, and other sources. Approximately forty percent of the energy generation in the ERCOT region comes from coal.

14. Ensuring reliability requires a constant balance between supply and demand. Unlike gas or water, electricity cannot be efficiently stored in large quantities – it must be generated to meet demand on a real-time basis. This means generation and transmission operations must be monitored in real time, 24 hours a day, to ensure a reliable and continuous flow of electricity. Thus, it is critical that ERCOT has enough generating capacity to meet demand at every given moment.

15. ERCOT must have and maintain adequate installed capacity to cover the forecasted load on the system as well as to ensure reliability in case of events such as higher-than-projected demand (e.g., due to extreme temperatures) or unplanned generation outages (e.g., due to mechanical breakdowns), and limited generation from variable resources. Reserve margins reflect a snapshot of existing and currently planned generation resources in excess of forecasted peak demand as a percent of that forecasted peak demand. Having a sufficient reserve margin is necessary to ensure reliability in the case of these events that are outside of normal planning assumptions. In November 2010, the ERCOT board approved a minimum planning Reserve Margin target of 13.75% for the ERCOT region, based on the generally accepted industry criteria of limiting firm load shedding due to supply inadequacy to once every ten years. Firm load shedding is described in more detail below in paragraph 18.

16. ERCOT must also maintain a sufficient amount of generating capacity on-line in each hour to serve the load at that time, cover instantaneous variation in load and to instantaneously replace the generation from any generating units which suffer an unexpected maintenance disruption and are instantaneously disconnected from the electrical grid. This capacity is commonly referred to as operating reserves. When sufficient generation is not available to meet these requirements, ERCOT institutes a progressive series of emergency steps to address the problem. The initial stages focus on maximizing the use of supply resources and the later stages focus on the utilization of ancillary services provided by demand response. With respect to maximizing supply options, ERCOT notifies resource owners to make all generation capacity available and requests assistance from other grids. ERCOT's ability to import power from other regions is physically limited by the capacity of its DC ties, which is approximately 1,106 MW. However, ERCOT is not entitled to any of that capacity. ERCOT has the right to request assistance, but there must be supply available in the adjoining region. In addition, there must be transmission capacity available to accommodate the import.

17. ERCOT has two demand-response programs that can be utilized in grid emergencies to reduce the amount of load connected to the grid in order to balance load with available generation. ERCOT typically procures 1,150 MW of Load Resources (which was until recently known as "Loads Acting As A Resource," or "LAARs") and approximately 450 MW of Emergency Interruptible Load Service (EILS); these programs are utilized by ERCOT in the second and third stages of a grid emergency to maintain system stability. When all of these operational tools are exhausted, ERCOT implements firm load shedding through the use of rotating outages. The progression of these stages is indicative of increased system stress related to increasing demand against decreasing operating reserve margins.

18. In general terms, firm load shedding is the act of temporarily eliminating the supply of electricity to small areas in order to avoid system-wide blackouts. To implement firm load shedding, the transmission owners in ERCOT disconnect small portions of their system for 15 – 30 minute intervals in order to reduce their overall system load. At any given moment during a grid emergency, the number of customers affected by

rotating outages is determined by the disparity between available generation capacity and total system load. Customers in disconnected areas lose all electrical service for the duration of the outage. In some instances, equipment designed to disconnect and reconnect customers fails to operate properly, leading to an extended outage of customers in the affected area. The use of rotating customer outages enables the system operator to maintain the reliability of the electric grid – *i.e.,* to prevent cascading outages, instability and/or uncontrolled separation. Without this safety valve, system conditions could degrade to the point that generators would be forced to disconnect from the system to avoid damage, risking a domino effect of an interconnection -wide outage. In the event of such a system-wide outage, restoring service to all customers would likely require several days.

19. ERCOT administers the planning function for the ERCOT region. This function forecasts future peak demand and establishes transmission and supply requirements over the relevant period to maintain reliability of the electric grid. However, the ERCOT region, under state law, employs a competitive market construct for generation supply. In this environment, generation owners bear the risk of investment and decide when and where to build new generation, and whether to retire or idle existing generation, based on market conditions. ERCOT, the regulated transmission and distribution utilities (which provide only "wires" service and do not own or operate generation facilities), and the PUC do not have the authority to order generators to maintain or to add generating capacity. Rather, the ERCOT market is designed to provide financial signals to competitive generation companies to ensure adequate generation capacity.

20. **Challenges Confronting Reliable Energy in Texas**

21. Grid reliability requires maintaining sufficient generation capacity to serve load given uncertainty associated with weather variability, unit maintenance, and output from variable resources such as wind generation. Evaluating the impacts to reliability of possible changes in generation capacity requires an accurate accounting of available generation. ERCOT compiles and publishes a report on the Capacity, Demand, and Reserves in the ERCOT Region ("CDR") every six months. This document is available to all interested parties on the ERCOT web-site[1] and provides an up-to-date accurate accounting of all currently available and expected future generating capacity in the ERCOT interconnection.

22. The CDR contains a list of all generating units on the ERCOT system, and a summation of the expected contribution of these units during the peak load hours of the year. The capacity values of units that can generate into either the ERCOT region or the eastern interconnect[2] are decreased to the extent that those units have firm contracts to provide power outside the ERCOT region. The capacity value of wind generation is also discounted. Wind is a variable resource, and the peak production period for the majority of the wind on the ERCOT system is in the

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[1] http://www.ercot.com/content/news/presentations/2011/ERCOT_2011_%20Capacity_Demand_and%20Reserves_Report.xls
[2] There are no units capable of generating into the ERCOT region and the western interconnect.

middle of the night or early morning hours of the fall and spring. As a result, in calculating the system reserve margin, ERCOT discounts the capacity of wind generation to its equivalent value compared to dispatchable (e.g., coal, natural gas and nuclear) generation. This discounted capacity value is based on a probabilistic analysis conducted as part of a loss-of-load probability study. Hourly wind shapes, derived through computational fluid dynamics modeling of 15 years of meteorological data, are converted to wind farm generation patterns using a generic wind turbine power curve. The resulting wind patterns are then randomly selected in an hourly simulation model to calculate the capacity value of the resulting wind profiles relative to a generic thermal generating unit. This analysis resulted in the effective load carrying capability (ELCC) of wind in ERCOT, currently 8.7% of nameplate capacity.

23. The latest ERCOT CDR (dated June 9, 2011) indicates that the current maximum generating capacity in the ERCOT region for 2011 is 73,175 megawatts ("MW"), after properly discounting for the expected availability of wind power. The expected maximum generating capacity in the ERCOT region in 2014 is 75,967 MW. Background documentation for the CSAPR provided by the EPA[3] indicates that their projection for the operational capacity in 2014 in ERCOT is 90,405 MW, a discrepancy of 14,438 MW.

24. Based on an assessment of the EPA Integrated Planning Model (IPM) input database[4], which was used by the EPA to analyze the expected impacts of the CSAPR, ERCOT believes that this discrepancy is the result of the inclusion of wind generation resources at their full name-plate capacity, and the inclusion of retired and mothballed generating capacity. ERCOT currently has approximately 9,452 MW of wind generation capacity connected to the grid. In the latest CDR, this wind generation capacity has an ELCC of 822 MW (8.7% of nameplate capacity). The discrepancy which would result from the use of the full nameplate capacity of wind versus the use of the current ELCC of wind is 8,720 MW.

25. The following table provides a list of retired units that appear to be included in the EPA analysis of available capacity in ERCOT.

[3] Technical Support Document (TSD) for the final Transport Rule Docket ID No. EPA-HQ-OAR-2009-0491: Resource Adequacy and Reliability in the IPM Projections for the Transport Rule TSD, US EPA, Office of Air and Radiation, June 2011.

[4] http://www.epa.gov/airmarkets/progsregs/epa-ipm/transport.html

Retired Plant Name	Unit ID	Capacity (MW)
Collin	1	153
Decordova Steam Electric Station	1	818
Eagle Mountain	1	115
Eagle Mountain	2	175
Eagle Mountain	3	375
Handley	1A	21
Handley	1B	21
Handley	2	75
Lake Creek	1	87
Lake Creek	2	230
Laredo	1	33
Laredo	2	33
Laredo	3	105
Morgan Creek	5	175
Morgan Creek	6	511
Mountain Creek	2	30
Mountain Creek	3A	35
Mountain Creek	3B	35
North Lake	1	175
North Lake	2	175
North Lake	3	365
Permian Basin	5	115
Tradinghouse	1	565
Tradinghouse	2	818
TXU Sweetwater Generating Plant	GT01	32
TXU Sweetwater Generating Plant	GT02	72
TXU Sweetwater Generating Plant	GT03	72
TXU Sweetwater Generating Plant	STG1	64
W B Tuttle	1	50
W B Tuttle	3	100
W B Tuttle	4	154

26. These retired units represent a total capacity of 5,784 megawatts. The next table provides a list of units that are currently mothballed, i.e., unavailable to the market for an extended period due to maintenance requirements or market conditions, that appear to be included in the EPA analysis of available capacity in the ERCOT region:

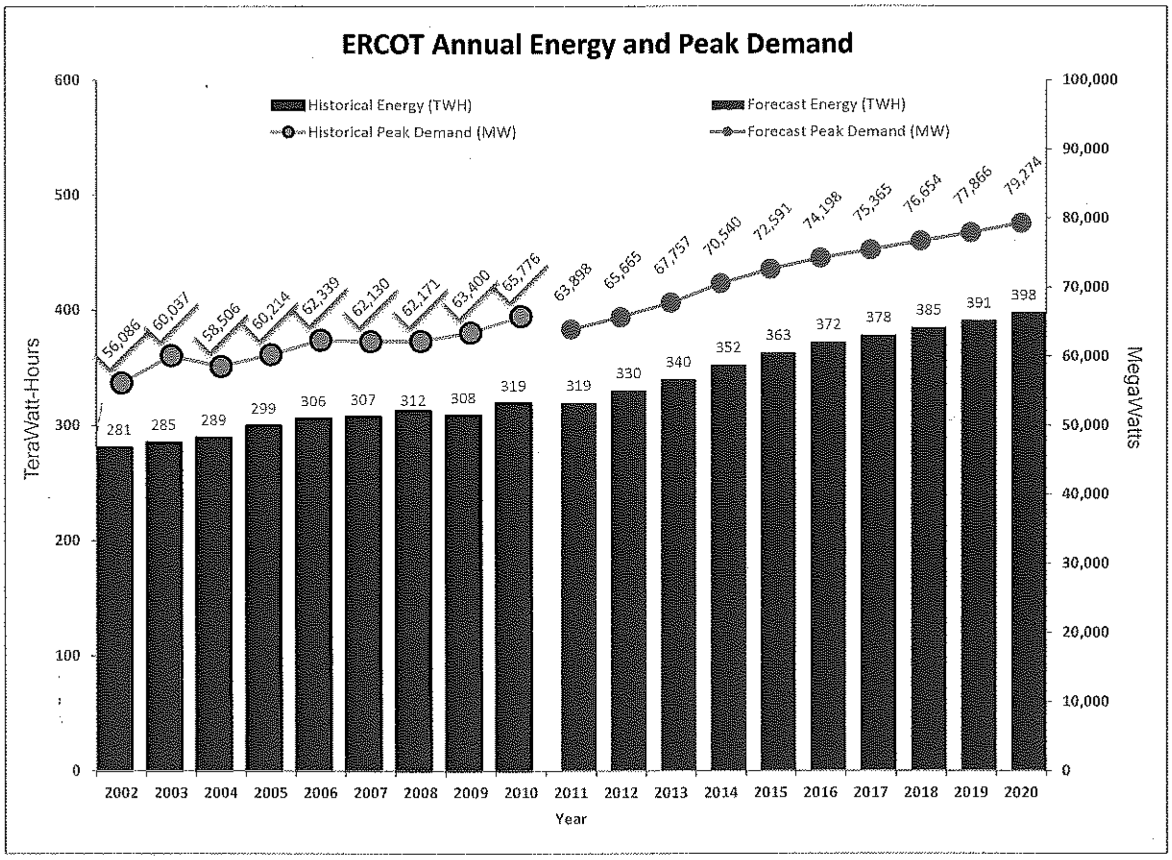
Mothballed Plant Name	Unit ID	Capacity (MW)
AES Deepwater	AAB001	140
Bryan	3	12
Bryan	4	22
Bryan	5	25
Bryan	6	50
C E Newman	BW5	41
Leon Creek	3	60
Leon Creek	4	95
North Texas	1	16.5
North Texas	2	16.5
North Texas	3	38
Permian Basin	6	540
Sam Bertron	SRB1	174
Sam Bertron	SRB2	174
Spencer	4	60
Spencer	5	65
Valley	1	175
Valley	2	550
Valley	3	390

27. These mothballed units represent 2,644 megawatts of capacity that are not available to serve load in ERCOT. The inclusion BY EPA of the full nameplate capacity of wind generation, along with the retired and mothballed generation capacity listed above, creates an unrealistically high generation reserve margin compared to expected peak loads and significantly masks the reliability implications of a potential reduction of available generation due to the CSAPR rule.

28. At any given time, available generating capacity is typically less than the theoretical maximum, for a variety of reasons. For example, all plants have planned and unplanned maintenance outages that can render them unavailable. Available generating capacity in ERCOT changes daily and seasonally. It is lowest in the spring and fall when many plants are scheduled to be off-line for maintenance outages. On average, approximately 10,000 MW of generation capacity is unavailable during the spring and fall months due to scheduled periodic maintenance requirements. Similarly, approximately 4,000 MW of generation capacity is typically unavailable at any given moment due to unplanned forced maintenance outages.

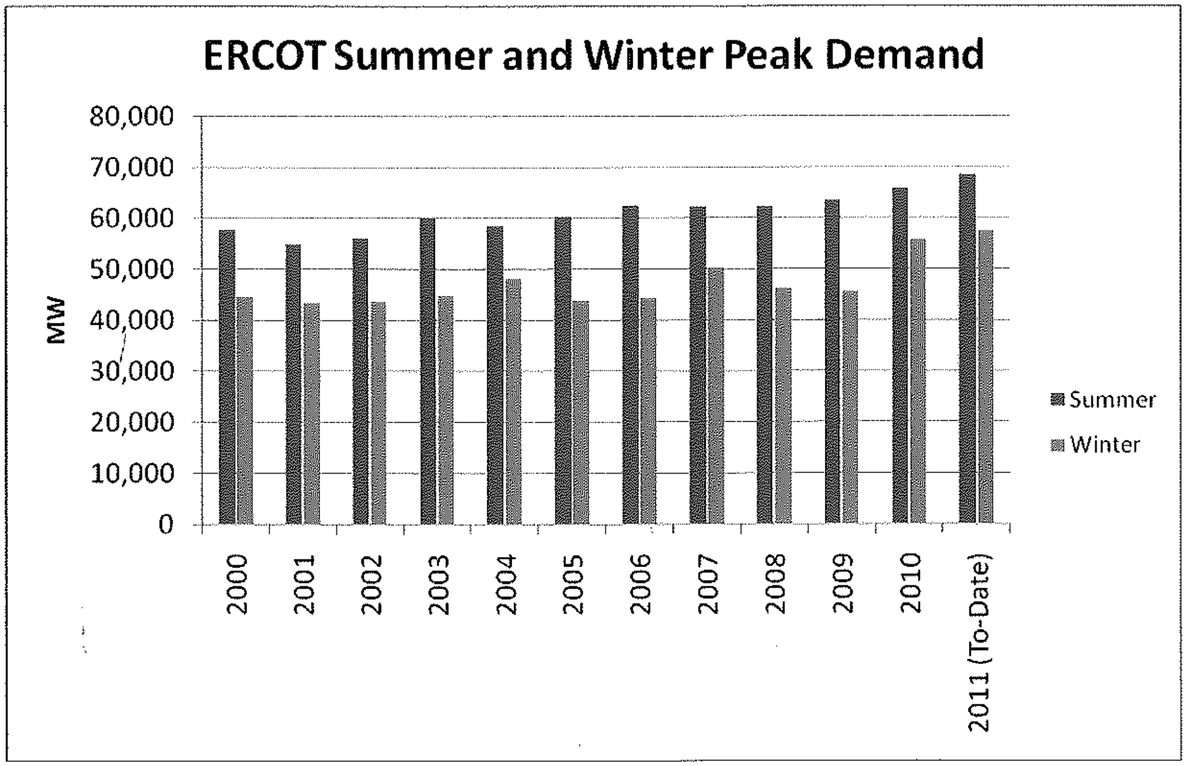
29. ERCOT typically experiences peak demand in the summer season (June – September). Demand has been consistently increasing in Texas and is projected to steadily increase through 2020.

Figure 2 – ERCOT's Historical Load Data and Long-term Load Forecast



30. ERCOT hit a new all-time peak demand for three consecutive years—2009, 2010, and 2011—and has exceeded the previous peak demand in seven of the last eleven years (2000, 2003, 2005, 2006, 2009, 2010, and 2011). Similarly, the winter peak record was broken in 2010 and again in 2011, and the previous winter peak demand record has been broken in six of the last eleven years (2000, 2003, 2004, 2007, 2010, and 2011). Figure 2 shows summer and winter peaks from 2000-2011. These record-breaking peak demands are due in part to the fact that Texas has continued to experience economic and population growth.

Figure 3– ERCOT Historical Summer and Winter Peak Demand



31. In its May 2011 CDR, ERCOT compared this steadily increasing demand to the forecast of available capacity and concluded that ERCOT will fall below its target reserve margin in the summer peak season as early as 2014, based on information that was known at that time, unless new generation capacity comes online to offset the growth in demand. This analysis did not account for the impact of EPA's CSAPR rule.

32. On August 3, 2011, the ERCOT region set a new peak demand record of 68,294 MW, breaking the record set in 2010 of 65,776 MW. The online capacity available for the ERCOT region on August 3, 2011 was 69,504 MW, meaning that total available generating capacity exceeded demand by only 1,210 MW, or less than 2%. Had the grid experienced forced outages of additional units, ERCOT might have had to employ rotating outages. The very next day, on August 4, 2011, in order to avert rotating outages, ERCOT had to deploy its Emergency Interruptible Load Service ("EILS"), which is an emergency load reduction service that involves disconnecting large customers that voluntarily agree to have their service interrupted in an electric grid emergency. If another 300-500 MWs of generating capacity had been unavailable on August 4, 2011, ERCOT would have had to order rotating outages to maintain grid reliability. The record demands from August 3 and 4 were caused by extreme heat – these were two of the hottest days in a record-breaking Texas summer. In fact, the National Oceanic and Atmospheric Administration has

classified the summer of 2011 in Texas as the "warmest summer on record of any state."[5]

33. Extreme weather conditions are expected to continue into next year. Unusually hot and dry conditions in Texas are now forecasted to persist into 2012.[6] If this prediction is correct, the continuing record drought will have an increased impact on generation resources. Currently, four generating units are being derated in order to limit the use of increasingly scarce surface cooling water resources. Operators of additional capacity have notified ERCOT that they will be at risk of derates and/or reduced hours of operation if drought conditions persist through the end of 2011.

34. The continuing drought and elevated temperatures could lead to extreme conditions again next summer. Three new dispatchable generation units (with an aggregate capacity of approximately 1,600 MW) coming on-line between now and the summer of 2012 will only cover expected load growth due to population and economic growth in the ERCOT region, leaving ERCOT in 2012 with a similar reserve margin as in 2011. Combined with persistent drought, ERCOT could face greater challenges in the summer of 2012 than for 2011 (as described above in paragraph 32).

35. Electric reliability is not just a summer problem. On February 2, 2011, extreme cold weather conditions, record electricity demand levels, and the loss of numerous electric generating facilities across the ERCOT region due to weather-related malfunctions resulted in rotating outages. On February 2, 2011, ERCOT set a new winter peak of 56,334 MW. Given generating unit outages (planned and forced) that resulted in available capacity dropping to as low as 54,000 MW that day, ERCOT had to declare an Energy Emergency Alert (EEA) Level 3 and had to shed 4,000 MW of firm load through rotating outages in order to maintain the integrity of the grid. Absent load shed on February 2, demand would have approached 59,000 MW, far outstripping the available capacity.

36. These events demonstrate that the currently installed level of generating capacity is barely sufficient to avoid rotating outages with the level of demand experienced in 2011.

37. **<u>Impacts of the Cross-State Air Pollution Rule</u>**

38. The Cross-State Air Pollution Rule (CSAPR) was issued on July 7, 2011 and requires substantial reductions in NO_x and SO_2 emissions from generating units in Texas. ERCOT was asked by the PUC on July 8, 2011, to evaluate the impacts of the CSAPR on the reliability of the ERCOT grid. ERCOT completed this analysis and issued a report summarizing its findings on September 1, 2011[7]. This report is attached.

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[5] http://www.noaanews.noaa.gov/stories2011/20110908_auguststats.html
[6] http://www.ncdc.noaa.gov/teleconnections/enso/index.php
[7] "Impacts of the Cross-State Air Pollution Rule on the ERCOT System," Electric Reliability Council of Texas,

39. In order to evaluate the potential impacts associated with implementation of the CSAPR, ERCOT met with representatives of the TCEQ and the EPA to evaluate details of the rule and its implementation. ERCOT also reviewed compliance strategies provided by the owners of coal-fired resources in the ERCOT region. ERCOT consolidated these compliance strategies for purposes of evaluating system-wide impacts.

40. Based on the information provided by the resource owners, ERCOT developed three scenarios of potential impacts from CSAPR. The first scenario, derived directly from the compliance plans of individual resource owners, indicates that ERCOT will experience a generation capacity reduction of approximately 3,000 MW during the off-peak months of March, April, October and November, and 1,200 – 1,400 MW during the other months of the year, including the peak load months of June, July and August. These results incorporate Luminant's recently announced plan to comply with the CSAPR. Capacity reductions in the off-peak months are expected to be greater because power prices are lower during these periods, making them a more attractive time for resource owners to take extended outages to conserve allocated allowances.

41. The second scenario is derived from the first, but includes the additional assumption that the increased dispatching of base-load units will lead to increased maintenance outages, especially in the fall months. Over the course of the spring months it may become increasingly apparent that dispatching some of the traditionally base-loaded coal-fired units is leading to increased maintenance requirements. If this occurs, it may be cost-effective to idle these units rather than dispatch them down to minimum levels during off-peak hours. These units would likely be run through the summer peak months, but then would be idled for an extended period in the fall in order to conserve allocated allowances. Given this additional constraint, it is likely that ERCOT would experience an incremental loss of approximately 3,000 MW of capacity in the off-peak months of March and April, approximately 1,200 – 1,400 MW during the remainder of the first nine months of the year, and approximately 5,000 MW of capacity during the fall months of October, November and possibly into December.

42. The third scenario is derived from the second, with the added consideration of possible near-term market limitations on the availability of imported low-sulfur coals, due to nationwide demand exceeding either mine output capacity or railroad shipping capacity. Such limitations are not hypothetical – shipments of low-sulfur coals to plants in ERCOT were disrupted this past summer by floods in the Midwest. In the event of a recurrence of such limitations, coal plant resource owners would be forced to rely on higher sulfur local coals during the spring and the peak season summer months. As a result, they would be forced to further reduce unit output in the fall months, beyond what is currently included in their compliance strategy, and could be required to decommit additional capacity in October and November in

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September 1, 2011.

order to conserve allocated allowances. As a result, given these assumptions, it is likely that ERCOT would experience an incremental loss of approximately 3,000 MW of capacity in the off-peak months of March and April, approximately 1,200 – 1,400 MW during the remainder of the first nine months of the year, and approximately 6,000 MW of capacity during the fall months of October, November and possibly into December.

43. The scenarios analyzed in this study represent best-case (Scenario 1), and two cases with increasing impacts to system reliability. Scenarios 2 and 3 are based on the occurrence of events that are reasonably foreseeable given the circumstances facing generation resources attempting to comply with the CSAPR. Even in the best-case scenario, ERCOT is expected to experience a reduction in available operating capacity of 1,200 – 1,400 MW during the peak season of 2012 due to implementation of the CSAPR. As noted above, the incremental loss of 300 -500 MW of available generating capacity on August 4, 2011 would have resulted in rotating outages. Off-peak capacity reductions in the three scenarios evaluated as part of this study, when coupled with the annual maintenance outages that must be taken on other generating units and typical weather variability during these periods, also place ERCOT at increasing risk of emergency events, including rotating outages of customer load.

44. The implementation timeline provides ERCOT an extremely truncated period in which to assess the reliability impacts of the rule, and no realistic opportunity to take steps that could even partially mitigate the substantial losses of available operating capacity described in each of the three scenarios outlined above and detailed in the attached ERCOT study.

45. If the implementation deadline for CSAPR were significantly delayed, it would expand options for maintaining system reliability. ERCOT is advancing changes in market rules – such as increasing ERCOT's ability to control the number and timing of unit outages and expanding demand response – that could help avert emergency conditions. These measures will not, however, avoid the losses in capacity due to CSAPR that increase the risk of EEA events. These capacity reductions will, at best, present significant operating challenges for ERCOT, including increased likelihood of rotating outages as early as March 2012. If extreme drought and elevated temperatures comparable to what Texas experienced in 2011 continue in 2012, as discussed in paragraphs 33 and 34, the capacity reductions caused by CSAPR would lead to unavoidable rotating outages, possibly even recurring events, which could occur in both peak and off-peak periods, through 2012 and beyond.

I, Warren P. Lasher, declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct. Executed this 21st day of September, 2011.