



# **Impacts of the Cross-State Air Pollution Rule on ERCOT Grid Operations**

**H.B. (Trip) Doggett**

**The Electric Reliability Council of Texas, Inc.**

**September 13, 2011**

# June Study of Pending Environmental Regulations

- **In June, ERCOT completed a study requested by the Public Utility Commission of Texas reviewing the potential impacts of pending environmental regulations on grid reliability in the ERCOT region.**
- **Four pending regulations were evaluated:**
  - Clean Air Act – new emission limits for Hazardous Air Pollutants (HAP);
  - Clean Water Act – Section 316(b), regarding new requirements for cooling-water intake structures;
  - Clean Air Transport Rule (CATR); and,
  - Coal Combustion Residuals (CCR) Disposal regulations.
- **Primary intent of the analysis was to develop reasonable compliance scenarios and then determine impacts to both generation capacity and transmission reliability.**
- **ERCOT's Study is documented in a report, available at the following link:**

[http://www.ercot.com/content/news/presentations/2011/ERCOT\\_Review\\_EPA\\_Planning\\_Final.pdf](http://www.ercot.com/content/news/presentations/2011/ERCOT_Review_EPA_Planning_Final.pdf)

## Results of June Study

- In the proposed CATR Rule, Texas was only included in the peak season NO<sub>x</sub> program. Based on this proposed rule, the June study did not include any incremental impacts from the CATR.
- The overall study indicated that the coal fleet has sufficient economic value to justify investments that will achieve expected compliance requirements for the other pending regulations.
- Older gas steam units are not expected to produce sufficient revenue to justify investment in new control technologies.
- Much of the retired generation would likely be replaced with new generation capacity. However, new generation investment will require sufficient energy prices (including potential hours of scarcity pricing) to provide adequate incentive.
- We highlighted that, even if there is sufficient market interest in new generation capacity, system reliability may be at risk if the timing of the new regulatory requirements is such that there is insufficient lead-time for favorable market conditions to become apparent.

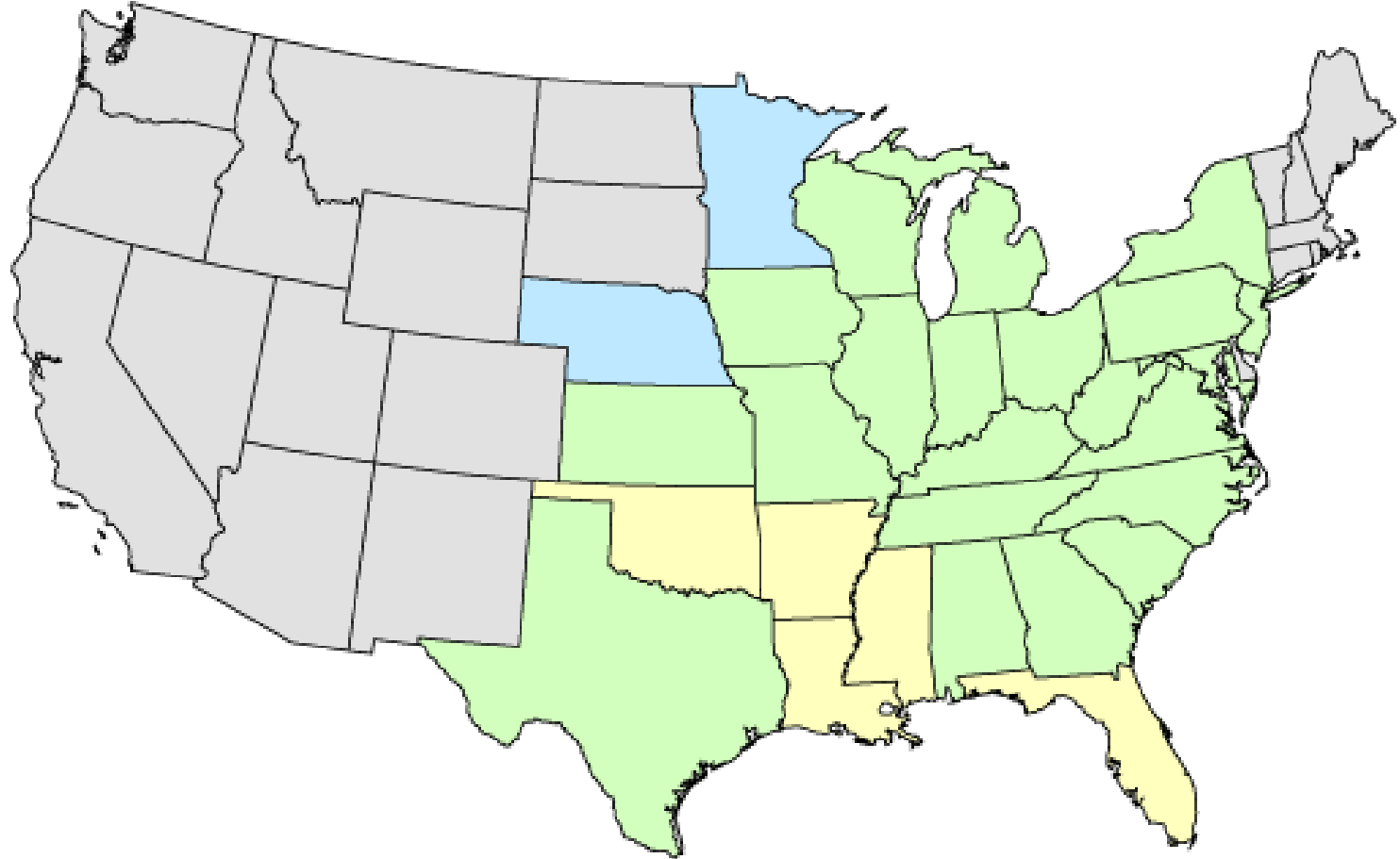
## **EPA Issues CSAPR in July**





- **In the final rule (now known as the Cross-State Air Pollution Rule [CSAPR]), Texas is included in the annual SO<sub>2</sub> and annual NO<sub>x</sub> programs, as well as the peak season NO<sub>x</sub> program. For Texas, the annual SO<sub>2</sub> limits appear to be the most restrictive.**
- **In July, ERCOT was asked by the Public Utility Commission of Texas to review the potential impacts of the final rule on generation resources and transmission system reliability in the ERCOT region.**
- **The rule is effective on January 1, 2012. This initial analysis is focused on near-term reliability implications.**

# CSAPR Rule Requirements

- **The CSAPR affects generating units in most of the eastern US (depicted on next slide).**
- **Under the CSAPR, generating units must have CSAPR allowances to match annual emissions of SO<sub>2</sub> and NO<sub>x</sub> and separate allowances for peak season (May – Sept.) NO<sub>x</sub> emissions.**
- **Units are allocated a number of allowances based on historical generation. These unit allocations have been published.**
- **Trading of allowances within a state is unlimited. Interstate trading of allowances is allowed, but net state-wide imports of allowances are capped at approximately 18% of a state's total allocation.**
- **For SO<sub>2</sub> allowances, owners of resources in Texas will be allowed to trade with owners of resources in the “Group 2” states: Kansas, Nebraska, Minnesota, Alabama, Georgia, and South Carolina. However, based on information obtained to date, ERCOT does not anticipate the emergence of an active market for trading of Group 2 SO<sub>2</sub> allowances.**

# States Included in the CSAPR



-  States controlled for both fine particles (annual SO<sub>2</sub> and NO<sub>x</sub>) and ozone (ozone season NO<sub>x</sub>) (21 States)
-  States controlled for fine particles only (annual SO<sub>2</sub> and NO<sub>x</sub>) (2 States)
-  States controlled for ozone only (ozone season NO<sub>x</sub>) (5 States)
-  States not covered by the Cross-State Air Pollution Rule

# Study Methodology

- **ERCOT met with TCEQ and EPA personnel to determine details of rule implementation.**
- **ERCOT consulted with owners of coal-fired generating resources to determine their plans for rule compliance.**
- **Individual resource owner compliance strategies were reviewed and aggregated to determine implications for system reliability.**
- **ERCOT's analysis did not include a calculation of the costs of compliance for resource owners, or the impact of CSAPR on electricity market prices.**

# Compliance Options

- **Reduce sulfur content of fuel (switch from lignite to sub-bituminous Powder River Basin (PRB) coal or from PRB coal to ultra-low-sulfur sub-bituminous coal)**
  - Near-term availability of low-sulfur sub-bituminous coals and rail transport capacity is likely to be exceeded by demand
  - Switching from lignite to PRB can require a reduction in unit capacity
- **Dry sorbent injection (injected into flue gas)**
  - Potential operational issues
  - Not tested on a wide range of units
  - May result in need for public notice or permit modification



## Compliance Options (Cont.)

- **Maximize use and effectiveness of scrubbers**
  - Limited to a small subset of units
  - Scrubber use results in reduction in net unit output
- **Reduce unit output (dispatch down to low sustainable limit or decommit unit)**
  - Daily dispatch of base-load units may increase unit maintenance requirements and decrease unit availability
  - Limited unit availability if fully decommitted - cold start time for most coal plants is several days
  - Increased number and length of unit outages increases the need for ERCOT approval of planned generator outages

# Reliability Implications – Scenario 1

- **ERCOT has developed three possible scenarios of impacts from the CSAPR.**
- **The first scenario models successful implementation of the compliance plans of the resource owners. In this scenario, the incremental capacity reductions due to CSAPR are expected to be approximately 3,000 MW in the off-peak months (March, April, October and November) and approximately 1,200 – 1,400 MW in the peak months.**
  - 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, required to comply with the Rule.
- **In 2011, if ERCOT had experienced the incremental reductions in available generation expected to result from CSAPR, customers in the ERCOT region would have experienced rolling outages during days in August 2011.**

## Reliability Implications – Scenario 2 and 3

**Scenario 2: Incremental capacity reductions are expected to increase to approximately 5,000 MW in the fall off-peak months.**

- The resource owners' compliance plans include daily dispatching of base-load coal units from minimum sustainable output at night to maximum output during the peak hours in order to reduce total emissions. Daily ramping of these units, designed to operate as base-load units, will increase their maintenance requirements.

**Scenario 3: Incremental capacity reductions are expected to increase to approximately 6,000 MW in the fall off-peak months.**

- The resource owners' compliance plans also rely on availability of low sulfur western sub-bituminous coals. Near-term availability of these coals may be limited. If this is the case, resource owners may be forced to shut down units in the fall in order to reduce annual emissions. Scenario 3 includes the impact of the maintenance outages from Scenario 2 as well as additional unit outages resulting from the limited availability of low sulfur coals.

## **Other CSAPR Uncertainties**

- **Resource owners have not finalized their compliance strategies. Overall system impacts could be affected by changes in specific unit operations.**
- **Reliability impacts in 2013 and 2014 will be greater as unit retrofit projects are implemented**
  - Retrofit projects will require Clean Air Act permit modifications which could cause delays
- **CSAPR will have impacts on national fuel markets, increasing demand for natural gas and low sulfur sub-bituminous coals. Near-term demand for low-sulfur coal will likely exceed existing mine and/or railroad capacity.**
- **ERCOT does not expect a liquid market for Group 2 CSAPR SO<sub>2</sub> allowances in Texas.**
  - If correct, units will be required to comply with limits imposed by annual allocations
- **Resource owners may sell allowances outside ERCOT (in other parts of Texas or out-of-state). A reduction in allowances available in ERCOT can increase reliability impacts.**

---

# Questions