BACKGROUND

• U.S.E.P.A. closely monitors areas that exceed safe levels of Ozone.
• Reducing oxides of nitrogen (NO\textsubscript{x}) contributes to reductions in Ozone.
• Hence, controlling NO\textsubscript{x} emissions is a priority in Texas.

Houston…we have a problem!
EPA CRITERIA FOR SIP CREDITS

EPA GUIDANCE ON SIP CREDITS FROM EE/RE (2004)

• **Quantifiable:** The emission reductions generated by measures to reduce emissions must be quantifiable and include procedures to evaluate and verify over time the level of emission reductions actually achieved.

• **Surplus:** Emission reductions are surplus as long as they are not otherwise relied on to meet air quality attainment requirements in air quality programs related to your SIP.

• **Enforceability:** Measures that reduce emissions from electricity generation may be: (1) Enforceable directly against a source; (2) Enforceable against another party responsible for the energy efficiency or renewable energy activity; or (3) Included under our voluntary measures policy.

• **Record Keeping:** The measure should be permanent throughout the term for which the credit is granted unless it is replaced by another measure or the State demonstrates in a SIP revision that the emission reductions from the measure are no longer needed to meet applicable requirements.

NOx REDUCTIONS FROM CODE COMPLIANT CONSTRUCTION - VALIDATION

NOx REDUCTIONS FROM CODE COMPLIANT CONSTRUCTION – NEW TOOLS

OZONE ALERTS – Why spatial & temporal?

ENERGY EMISSIONS - IMPACT FACTOR

<table>
<thead>
<tr>
<th>Use</th>
<th>NOx</th>
<th>Avg. Life</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industries:</td>
<td>60%</td>
<td>5 – 20 yr</td>
<td>1 – 5</td>
</tr>
<tr>
<td>Vehicles:</td>
<td>19%</td>
<td>7 – 10 yr</td>
<td>4 – 5</td>
</tr>
<tr>
<td>Buildings:</td>
<td>21%</td>
<td>25 – 50 yr</td>
<td>5 – 11</td>
</tr>
</tbody>
</table>

Buildings substantially impact emissions!

SOURCE: Statewide Use: USDOE/EIA, 1999

Statewide Emissions: TCEQ 2009
Wind energy is the largest portion.

- Industrial energy use down
- Residential/Commercial = flat/down
- Transportation = flat

Total Energy Use per Capita (10^6 Btu) 1960-2006
(Source: U.S. E.I.A. and U.S. Census Bureau)

Renewables: What Are They?

- Wind energy is the largest portion.
- Landfill gas, hydro are next.

UseIA Data Analyzed Top-down to look for reduced energy use (12 states from 2000).
- Overall Energy Use/Cap = flat
- Texas Energy Use/Cap = flat

Total Residential Commercial Industrial Transportation Electric Power US Total per Capita

NOx reductions from code compliant construction – New Tools

Top-down analysis of state-wide energy use (SEEC project)

- Industrial energy use down
- Residential/Commercial = flat/down
- Transportation = flat
RENEWABLES: WHAT ARE THEY?

Wind energy is the largest portion.

Landfill gas, hydro are next.

Biomass, solar are smallest.

WIND PROJECTS IN TEXAS

Wind energy farms coming online ahead of legislative goals.

WIND PROJECTS IN TEXAS

Substantial increases in measured electricity from wind energy.

WIND PROJECTS IN TEXAS

Substantial increases in measured electricity from wind energy.

WIND PROJECTS IN TEXAS

However, wind generation during Ozone Season Period less than other periods.
RESULTS: WIND ANALYSIS – ALL SITES

Method used to Analyze Total Wind Production in 2009.

Results:
Weather-normalizing to 1999 with 1999 and 2007 eGRID produces more accurate savings.

RESULTS: WIND ANALYSIS – ALL SITES

Final result: prediction of NOx reduction in 1999 and 2007 (annual and OSP) by county using EPA’s 2007 eGRID.
OTHER ISSUES

Other issues remain regarding SIP credits from EE/RE:

Wind:
- Degradation?
- Distribution of power on the grid?
- Curtailment?
- Combined Heat and Power:
  - How to analyze/mixing layer?

ISSUES: WIND ANALYSIS

Degradation?

Sliding analysis used to see month-by-month variations.

Distribution of power on the grid?

Curtailment is an issue.

To better understand curtailment data from Indian Mesa analyzed.
FUTURE: BETTER BASE-YEAR WIND PREDICTIONS

Improve Base-year Wind Modeling using met. models

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