New Mexico Tech

Research & Economic Development

Dr. Van D. Romero
Vice President
## Comparative Emissions

### Emission Levels: Natural Gas vs. Oil & Coal

*Pounds per Billion Btu of Energy Input*

<table>
<thead>
<tr>
<th>POLLUTANT</th>
<th>NATURAL GAS</th>
<th>OIL</th>
<th>COAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Dioxide</td>
<td>117,000</td>
<td>164,000</td>
<td>208,000</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>40</td>
<td>33</td>
<td>208</td>
</tr>
<tr>
<td>Nitrogen Oxides</td>
<td>92</td>
<td>448</td>
<td>457</td>
</tr>
<tr>
<td>Sulfur Dioxide</td>
<td>1</td>
<td>1,122</td>
<td>2,591</td>
</tr>
<tr>
<td>Particulates</td>
<td>7</td>
<td>84</td>
<td>2,744</td>
</tr>
<tr>
<td>Mercury</td>
<td>0.000</td>
<td>0.007</td>
<td>0.016</td>
</tr>
</tbody>
</table>

*Source: EIA—Natural Gas Issues and Trends*
U.S. Primary Energy Consumption by Source, 2007

- Petroleum: 39%
- Natural Gas: 23%
- Coal: 23%
- Renewable Energy: 7%
- Nuclear Electric Power: 8%

Source: EIA
U.S. Production

Production has Increased Over the Last Few years, Largely due to a Decade of Increased Unconventional Production

- Total U.S. production reached 20.5 Tcf/year by the end of 2008, a 7.3% increase over the 19.1 Tcf/year level at the end of 2007.
- Over the last decade, production from unconventional sources has increased almost 65% from 5.4 Tcf/year in 1998 to 8.9 Tcf/year in 2007.
- Unconventional production has increased from 28% of total production in 1998 to 46% in 2007.

Source: EIA- Natural Gas Production Reports
Gas Shales have Experienced Tremendous Growth in Recent Years with Barnett Leading the way

- Barnett has grown from 94 MMcf/day production levels in 1998 to 3,104 MMcf/day in 2007; an increase of more than 3000%
- Fayetteville, Haynesville and Woodford show similar signs of ramping production
- Technology has allowed access to and economic production of a vastly greater resource base. Specifically, improved hydraulic fracturing techniques and greatly improved horizontal drilling have allowed tight, geographically diffuse reserves to be developed in large volumes.

Source: American Clean Skies
US Gas Resources Continue to Increase
Monthly U.S. Natural Gas Wellhead Price

Source: U.S. Energy Information Administration
Good News?

• Production is down in New Mexico
  (25% of tax revenue comes from oil and gas)
• Major producers are leaving the state
• Independent producers shutting wells
• Research budget eliminated at DOE
EPACT 2005
Section 999

• Provides $37.5M for unconventional onshore and ultra deep water oil and gas research
• Section is perceived as “give away” to big oil
• Section is under attack
• Funding supports University research
• Educating the next generation workforce
• Increases domestic oil and gas production