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Research Note

Carbon Dioxide Displacement (Getting in Shape for the Carbon Police)

Despite conflicting scientific opinion on whether the planet is undergoing significant warming caused by human-induced carbon dioxide emissions, politicians are eagerly working on legislation designed to force corporate America to cut greenhouse gas emissions. (To think the U.S. Senate voted 95-0 against Kyoto.) Managements, resigned to the inevitable, are seeking a role in the process, hoping to soften the economic impact. To date, the proposed bills would raise electric rates sharply, even assuming the technology to achieve proposed CO₂ emission cuts becomes commercially feasible. In one legislative hearing on America's Climate Security Act of 2007, S.2191 (Lieberman-Warner proposal) last November, Anne E. Smith, Ph.D, Vice President of CRA International, presented a model that forecast marginal costs of controls at \$32 to \$55 a short ton by 2015, and a net reduction in GDP of 1.0% to 1.6%.

But, if you're a non-regulated nuclear generator like **Exelon (\$77-NYSE-Hold)**, all is good since margins in non-CO₂ emitting generation would expand. Not so though in the case of primarily-coal generators like **American Electric Power (\$42-NYSE-Hold)** or **Southern Co. (\$34-NYSE-Hold)**. Carbon dioxide legislation is likely in the next administration (Democrat or Republican) perhaps in 2010/11. Resolution may not be pretty.

This exercise calculates CO₂ tonnage of hypothetical 100 megawatt coal and combined cycle natural plants and megawatt hour output of similar sized nuclear and wind units. Sort of a "starter kit" for preparing "what ifs" as legislation evolves.

Natural gas would reduce coal's CO₂ tonnage by 422,898 tons, or 58%, from 727,299 to 304,401.

Nuclear would displace all 727,299 tons of coal and the equivalent of 2.4 100-megawatt combined cycle units.

Wind is a little more problematical since load factors vary and may require back-up fossil fuel support. Wind at a 28% capacity factor would displace 226,271 tons of coal-generated CO₂ (245,280 MWH multiplied by 0.9225 tons MWH). Displacement of combined cycle gas unit works out to 94,703 CO₂ tons (245,280 MWH multiplied by 0.3861 tons MWH).

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Table 1
Carbon Dioxide Production
Hypothetical 100-Megawatt Unit

| Column | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---------|------|-------------------------|--------------|--------------------|---------------|--------------------------------|-----------------------------------|
| Type | Size | CO ₂ Rate | Heat Rate | Capacity Factor | Annual MWH | CO ₂ Tons MWH | CO ₂ Annual Tons |
| | MW | lb/mmBtu | Btu/kwh | % | MWH | MWH | Tons |
| Wind | 100 | 0 | | 28.0% | 245,280 | 0 | 0 |
| Nuclear | 100 | 0 | | 90.0% | 788,400 | 0 | 0 |
| Coal | 100 | 205 | 9,000 | 90.0% | 788,400 | 0.9225 | 727,299 |
| Gas | 100 | 117 | 6,600 | 90.0% | 788,400 | 0.3861 | 304,401 |

Source: Southern Co.

According to **Constellation Energy (CEG-\$92-NYSE-Hold)**, the national average of CO₂ production for all generators, including nuclear, is 1,340 pounds per MWH (0.670 per short ton). For PJM, comparable tonnage is 1,268 pounds per MWH (0.634 per short ton).

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I Raymond E. Moore certify that the views expressed in this research report accurately reflect my personal views about the subject companies and their securities. I also certify that I have not been and will not be receiving direct or indirect compensation in exchange for expressing the specific recommendations in this report.

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Buy Total return is expected to exceed significantly the average total return of the analyst's industry coverage universe over the next 12 months.

Market Perform & Hold Total return is expected to equal the average total return of the analyst's industry coverage universe over the next 12 months.

Sell Total return is expected to significantly under perform (15% plus) the total return of the industry coverage universe over the next 12 months.

Analyst's Ratings Distribution

| | | % Investment Banking |
|------|-----|----------------------|
| Buy | 17% | 0% |
| Hold | 83% | 0% |
| Sell | 0% | 0% |

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Our target prices are based on projected earnings for the following calendar year, and an assumed price/earnings ratio in line with the company's historical valuation or those of other companies with similar businesses and prospects.

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