MEMO

To: Regional Greenhouse Gas Initiative Stakeholders  
From: Derek Murrow  
Date: October 6, 2004  
Re: Historical CO₂ Data for the RGGI Region

The RGGI process needs to develop cap levels and cap decline pathways that are built on a thorough understanding of what the regulated units emit today. Modeling of the electricity sector will also help with this process, but actual emissions levels must be understood with some level of certainty. The regulators are discussing regulating CO₂ emissions from power generation units in a nine state region (New England, NY, NJ, and DE) with a name plate capacity greater than or equal to 25 MWs. The regulators have posted a list of plants to be regulated on the RGGI web site. Understanding and gathering data on the historical emissions from these plants turns out to be more complicated than you might think. There are a number of different data sources available but they compile the data differently and include different facilities in their totals.

The following are potential sources of data for northeastern electric power plants:

- **EPA CEMS**: US Environmental Protection Agency, Acid Rain Program (Clean Air Markets Division) collects data reported by the regulated sources from continuous emissions monitors (CEMS); these data cover all units regulated by EPA under the acid rain program, which covers most RGGI units but not all; CO₂ emissions are reported by these units but a number of different monitoring and calculation options are available to facilities in reporting this information ([http://cfpub.epa.gov/gdm/](http://cfpub.epa.gov/gdm/))

- **EIA Form 906 Data**: The US Department of Energy’s Energy Information Agency collects fuel use and generation data from power plants on an annual basis through Form 906 (old version was called Form 920); this data source can be queried to select information only on the RGGI plants; however, emissions have to be calculated using fuel use and emissions factors; these data are also reported at the plant or facility level and not the unit level, which may mean small units are included at some facilities that would not be regulated under RGGI (another data source is EIA Form 767, which is at the unit level but only covers steam generating plants) ([http://www.eia.doe.gov/cneaf/electricity/page/eia906_920.html](http://www.eia.doe.gov/cneaf/electricity/page/eia906_920.html))
• **EIA Electric Power Annual:** The US Department of Energy’s Energy Information Agency publishes an annual report on the electric power industry that includes consumption, production, and emissions data for most electric power generators; this data set is reported at the state level—not the unit level and it includes plants that would not be regulated by RGGI ([http://www.eia.doe.gov/cneaf/electricity/epa/epa_sum.html](http://www.eia.doe.gov/cneaf/electricity/epa/epa_sum.html))

In an effort to understand the trends in emissions over the period from 1990 to today ENE has compiled data from all three of these sources.

EPA CEMS data were downloaded from EPA and summarized by state and year using an MS Access database. The results are shown in Table 1 (Page 4).

The EIA Form 906 data were downloaded from EIA and ENE calculated emissions based on annual fuel consumption (weight or volume by fuel type) and fuel specific emissions factors from EIA and EPA (lbs per ton, Mcf, etc). An MS Access database was built that allowed us to calculate emissions for each plant and fuel type on an annual basis. The emissions factors used are from EIA’s Fuel and Energy Source Codes and Emission Coefficients ([http://www.eia.doe.gov/oiaf/1605/coefficients.html](http://www.eia.doe.gov/oiaf/1605/coefficients.html)). The plants were then screened based on the plant list from the RGGI state agencies and plant totals were then summed to yield annual totals by state. These results are shown in Table 2 (Page 4).

The EIA Electric Power Annual data were downloaded from EIA and summarized by state and year using an MS Access database. The results are shown in Table 3 (Page 4).

As Tables 1, 2, and 3 illustrate there is significant variability in the final emissions numbers from the three sources. The trends in terms of regional totals are also shown in Figure 1 on Page 5. Table 2 represents data from only RGGI sources, and it is surprising that there are periods when these emissions are lower than the totals from EPA CEMS data. The emissions data calculated by ENE from EIA 906 data is most problematic in the early 1990s which was the period when merchant plants started reporting separately from utility owned plants. In the early 1990s all plant data was reported by EIA in one file and most plants were utility owned making us more confident with that data. In 2002 and 2003 EIA started reporting all the plant data in a combined format again and we feel more confident with these numbers as well. This is consistent with what NESCAUM discovered when compiling the CT GHG Emissions Inventory, in that some of the non utility owned plants (especially coal units) were reporting to EIA and being classified as industrial sector sources. Essentially the 1990 data and 2002 and 2003 data appear to be the most reliable and the emissions numbers compiled for the early 1990s are too low, as it misses some emitters who were classified as industrial units.

There seems to be confidence in the EPA CEMS data (Table 1) among regulators but not all RGGI sources are covered and some sources use O2 monitors or base their reporting on fuel use and emissions
factors. The EPA CEMS data should be fairly accurate but should also be under reporting the total emissions for RGGI sources in each year. This is consistent with the trends seen in Figure 1.

The emissions numbers from EIA’s Electric Power Annual should be fairly accurate but they include more units than will be regulated by the RGGI program so the emissions should exceed those from RGGI sources.

ENE feels that the numbers we have calculated based on EIA Form 906 data are the closest we have to the actual emissions numbers in 1990 and in 2002 and 2003. The following are those emissions totals for the nine RGGI states:

1990 Emissions: ~131 million short tons of CO₂
2002 Emissions: ~128 million short tons of CO₂
2003 Emissions: ~131 million short tons of CO₂

Total CO₂ emissions in 1990 and 2003 are the same for power plants in the RGGI region that are greater than or equal to 25 megawatts in size. This same emissions level was achieved even though generation (MWh) increased between 1990 and 2002 by 16% (ENE calculation based on EIA Electric Power Annual, 2002 data) indicating an overall improvement or decrease in emissions intensity.

The difference between the total emissions from EIA’s Electric Power Annual (all sources) and the emissions calculated by ENE for RGGI units (25 MW and above) should also be noted. This represents the emissions that are excluded from the program (units under 25 MW) and makes up almost 7% of the total. Future expansion of the program to include smaller units should be seriously considered.

The trends in emissions over the last 14 years presented in this memo should help to inform the decision making around RGGI cap levels and rates of cap decline with time.

We appreciate the help and advice we received in compiling this information from: David Schoengold, MSB Energy Associates, Inc.; Chris Nelson, CT DEP; Joe Chaisson, The Clean Air task Force; and Marco Buttazzoni, Environmental Resources Trust.
### Table 1: Acid Rain Units - EPA CEMS CO2 Emissions (Short Tons)

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<tbody>
<tr>
<td>New Hampshire</td>
<td>4,859,100</td>
<td>4,629,377</td>
<td>5,938,808</td>
<td>5,612,438</td>
<td>5,578,224</td>
<td>5,178,731</td>
<td>4,862,446</td>
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<td>New Jersey</td>
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<td>9,430,467</td>
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<td>11,194,723</td>
<td>10,948,596</td>
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<td>Rhode Island</td>
<td>270,330</td>
<td>1,635,736</td>
<td>1,736,192</td>
<td>1,487,341</td>
<td>1,301,185</td>
<td>1,182,345</td>
<td>1,775,894</td>
<td>2,025,068</td>
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<tr>
<td>Vermont</td>
<td>209,528</td>
<td>232,991</td>
<td>245,483</td>
<td>246,784</td>
<td>319,976</td>
<td>404,811</td>
<td>295,121</td>
<td>294,459</td>
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### Table 2: ENE Calculations for RGGI Plants - EIA 906 Fuel Consumption Based CO2 Emissions (Short Tons)

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<tr>
<td>Massachusetts</td>
<td>6,603,292</td>
<td>6,818,337</td>
<td>6,571,238</td>
<td>7,844,789</td>
<td>7,548,559</td>
<td>7,795,559</td>
<td>7,836,549</td>
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<td>New Hampshire</td>
<td>5,019,573</td>
<td>4,357,229</td>
<td>4,384,872</td>
<td>4,623,089</td>
<td>4,561,909</td>
<td>4,451,800</td>
<td>4,197,902</td>
<td>5,226,122</td>
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<td>Rhode Island</td>
<td>12,212,964</td>
<td>11,604,713</td>
<td>9,161,407</td>
<td>8,816,995</td>
<td>9,163,542</td>
<td>9,419,278</td>
<td>9,745,823</td>
<td>8,733,936</td>
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### Table 3: All Electricity Generation - EIA Electric Power Annual (2002) - Fuel Consumption Based CO2 Emissions (Short Tons)

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<tr>
<td>Rhode Island</td>
<td>794,603</td>
<td>1,485,232</td>
<td>2,088,685</td>
<td>2,275,216</td>
<td>2,412,601</td>
<td>2,240,214</td>
<td>3,872,365</td>
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<td>Vermont</td>
<td>444,524</td>
<td>69,814</td>
<td>49,987</td>
<td>23,626</td>
<td>20,948</td>
<td>26,068</td>
<td>19,772</td>
<td>17,045</td>
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### Footnotes

- Historical CO2 Data - 1990 to 2003
- Regional Greenhouse Gas Initiative
- RGGI & All Observers
- RGGI & PA
- RGGI States
- RGGI & All States
Figure 1: RGGI States - Total Annual CO₂ Emissions

- Acid Rain Units - EPA CEMS
- RGGI Plants - EIA 906 Fuel (ENE)
- All Electric - EIA ElecPA Fuel