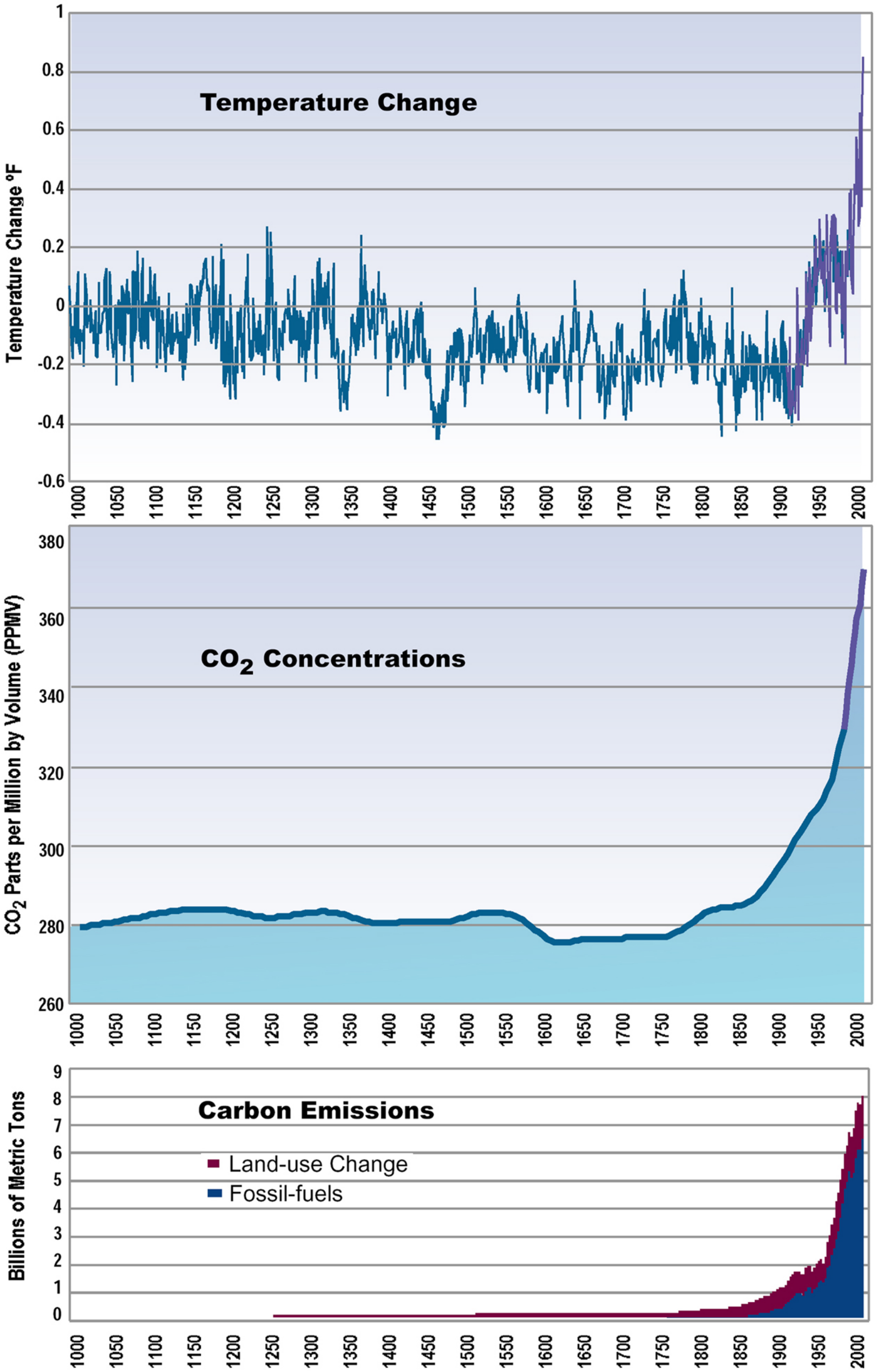
1000 Years of Global CO_2 and Temperature Change



SOURCE: US GLOBAL CHANGE RESEARCH PROGRAM 2000

1000 Years of Global CO_2 and Temperature Change

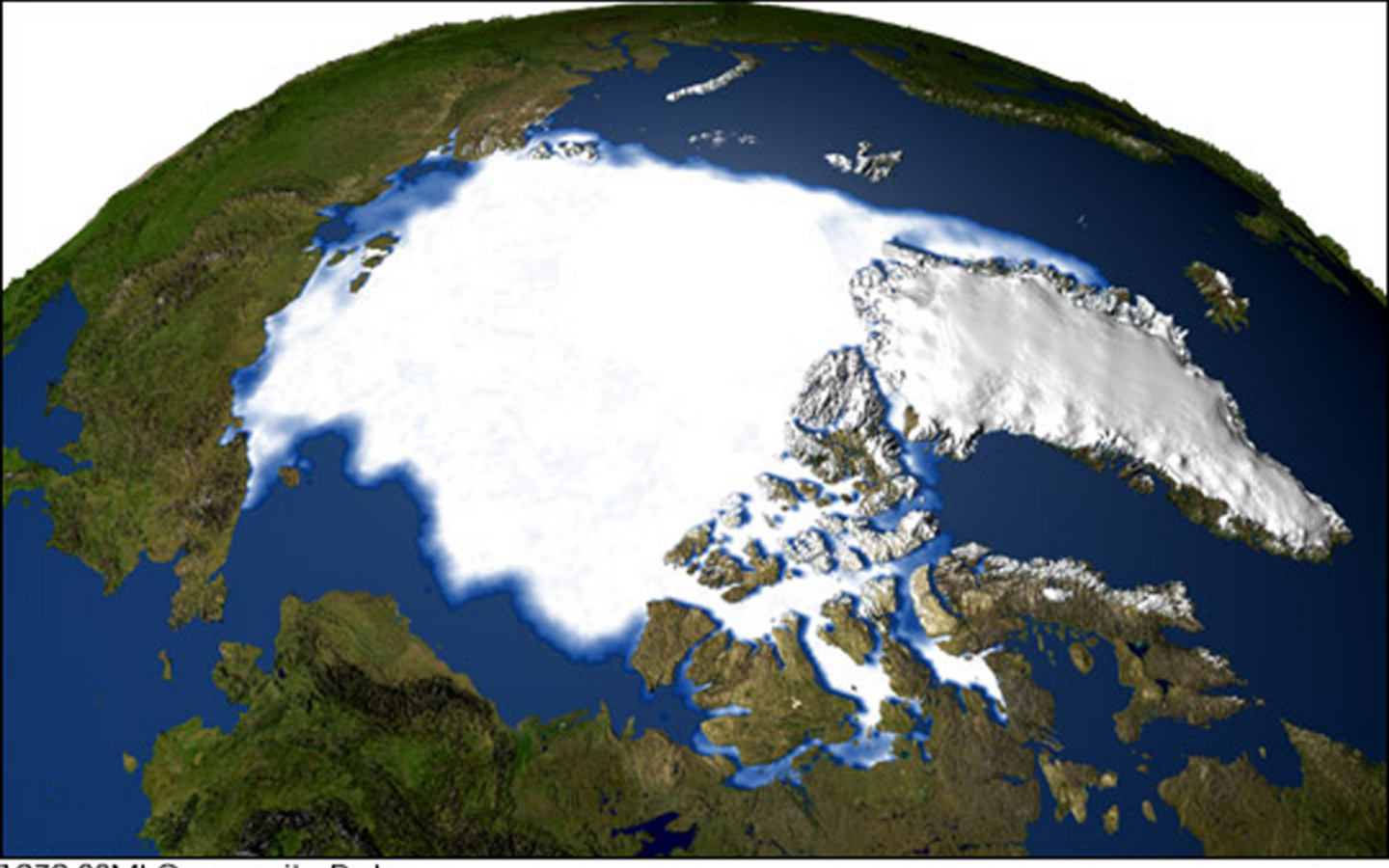
Legend:

Records of Northern Hemisphere surface temperatures, CO_2 concentrations, and carbon emissions show a close correlation.

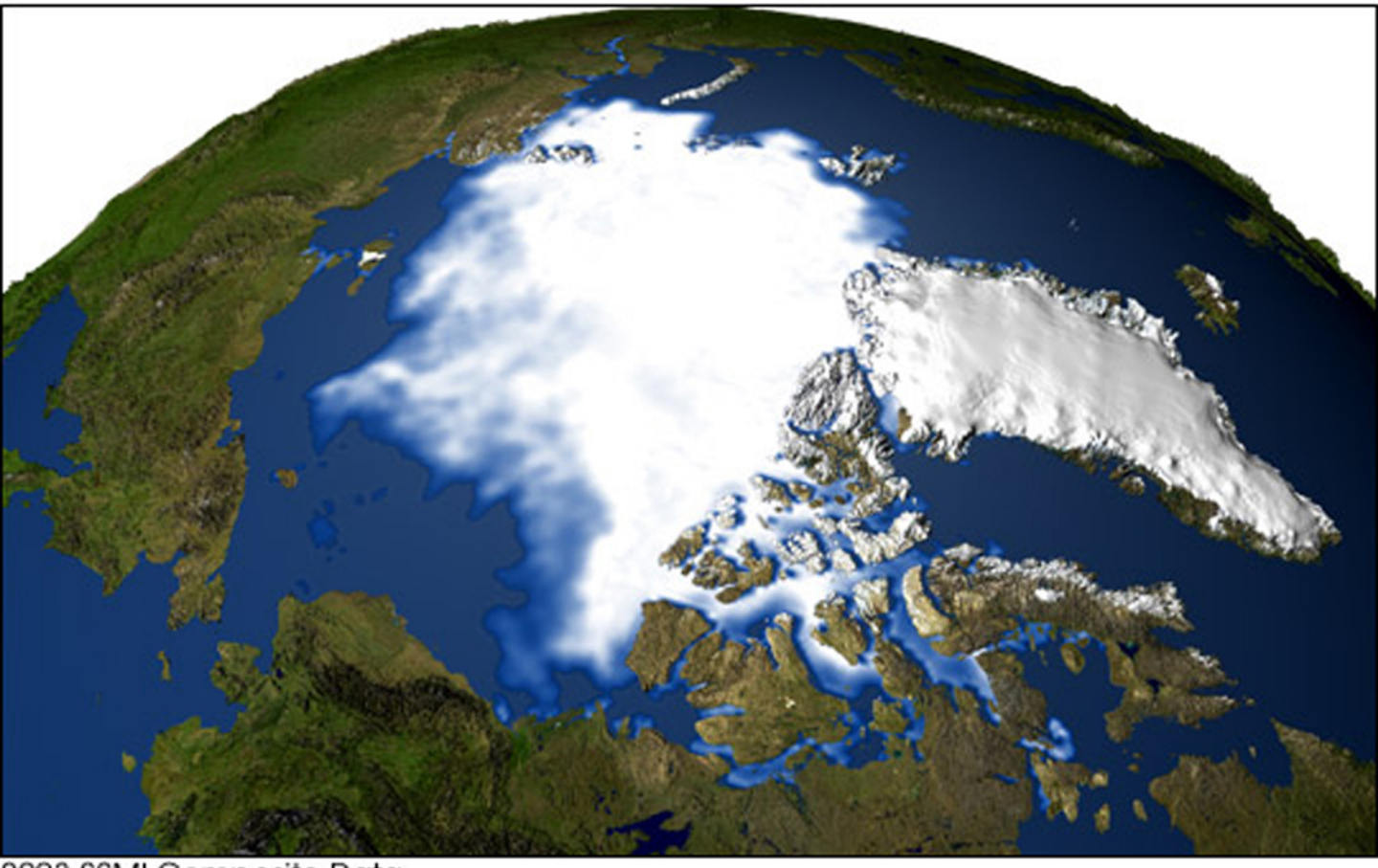
Temperature Change: reconstruction of annual-average Northern Hemisphere surface air temperatures derived from historical records, tree rings, and corals (blue) and air temperatures directly measured (purple).

CO_2 Concentrations: record of global CO_2 concentrations for the last 1000 years, derived from measurements of CO_2 concentration in air bubbles in the layered ice cores drilled in Antarctica (blue line) and from atmospheric measurements since 1957.

Carbon Emissions: reconstruction of past emissions of CO_2 as a result of land clearing and fossil fuel combustion since about 1750 (in billions of metric tons of carbon per year).

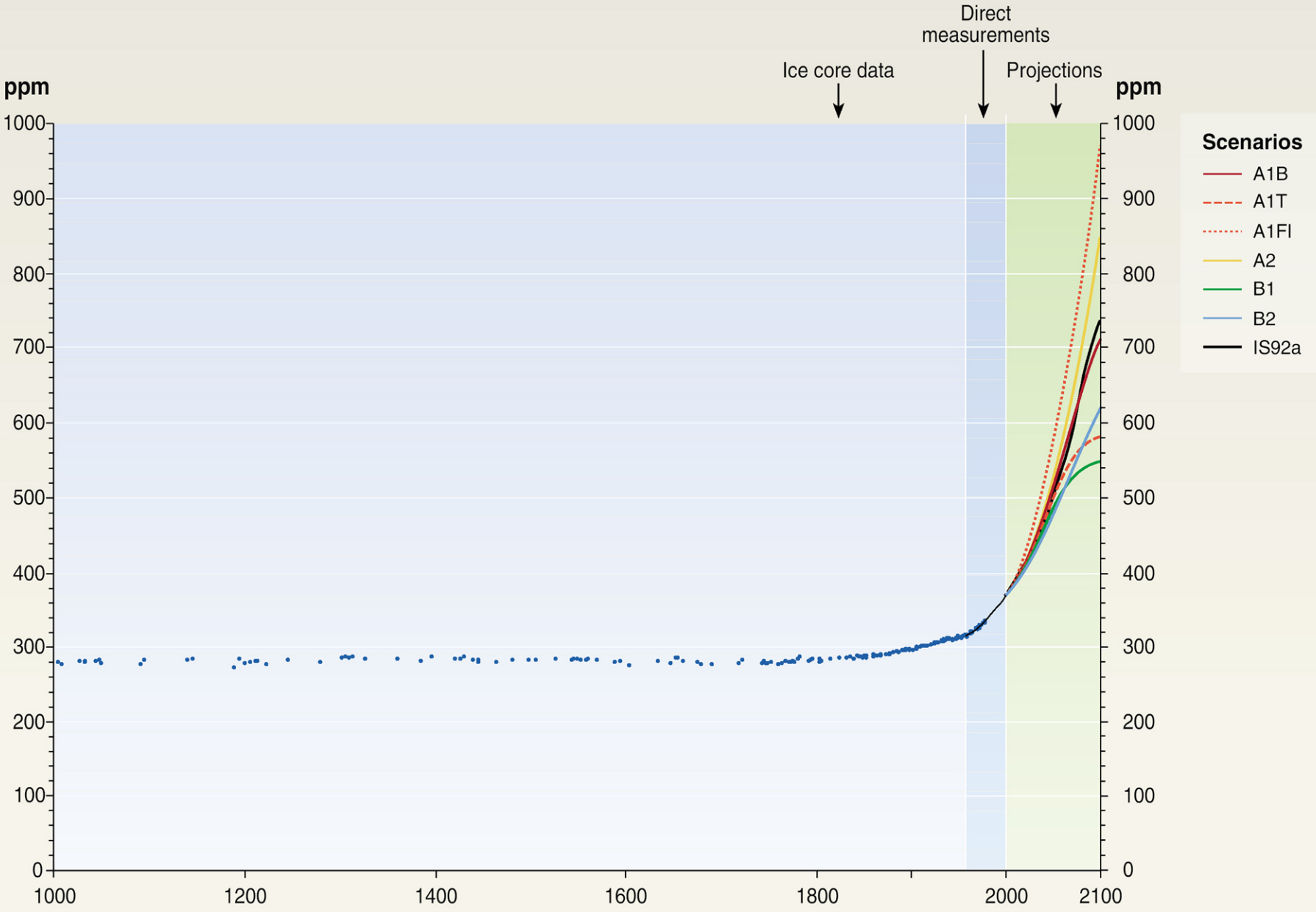


1979 SSMI Composite Data



2003 SSMI Composite Data

Past and future CO_2 atmospheric concentrations



Variations of the Earth's surface temperature: years 1000 to 2100

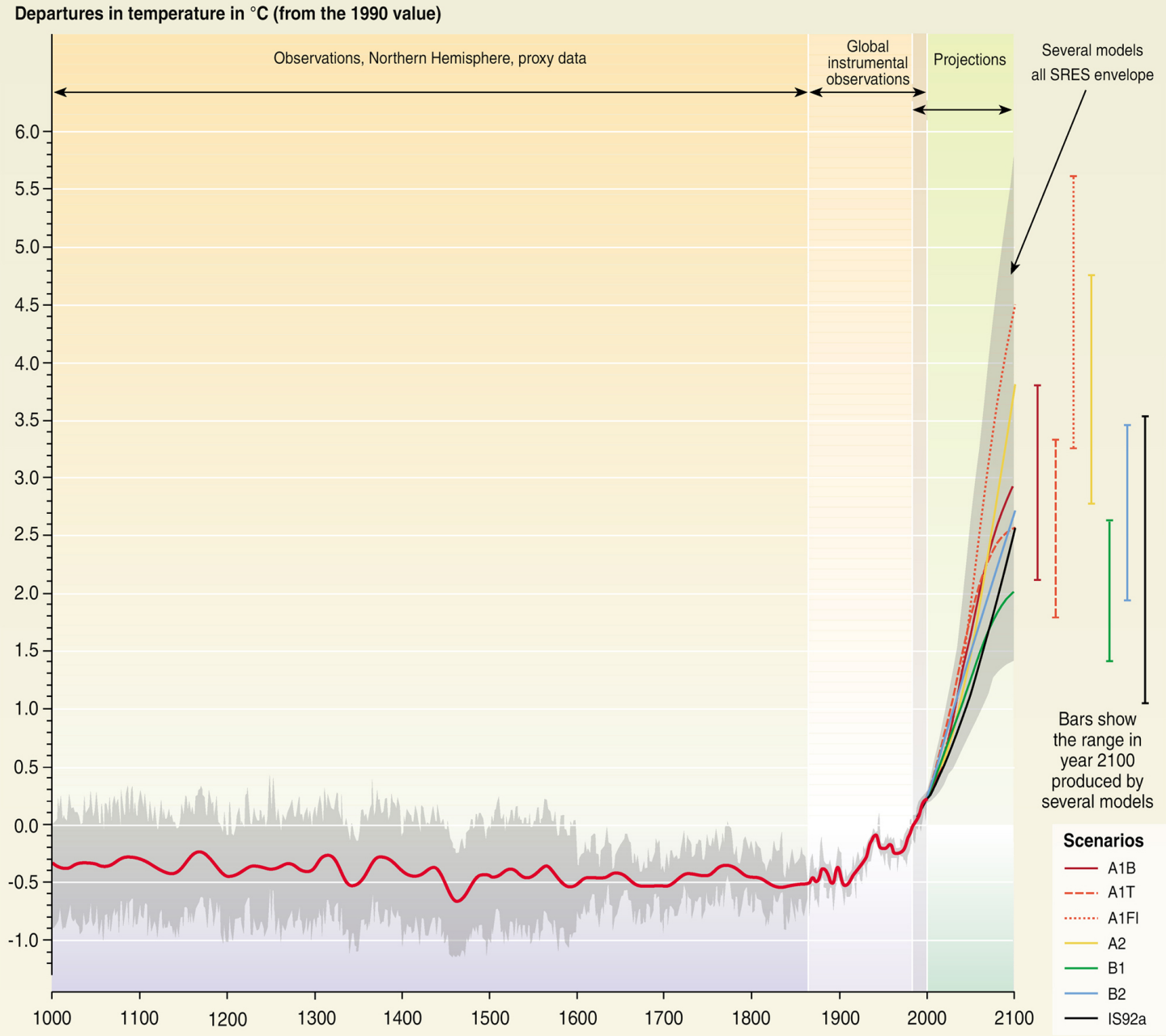
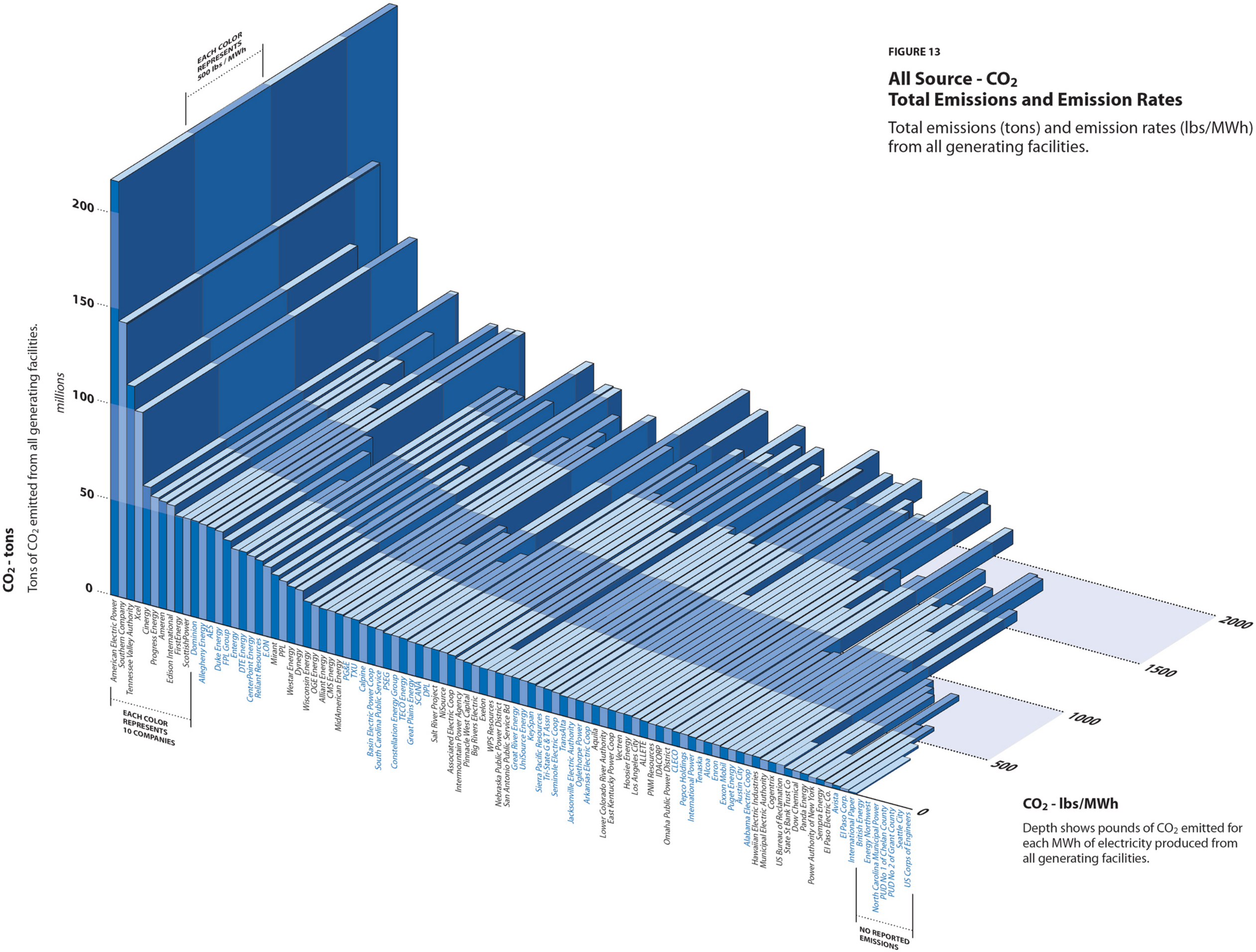


FIGURE 13

All Source - CO_2 Total Emissions and Emission Rates

Total emissions (tons) and emission rates (lbs/MWh) from all generating facilities.



American Electric Power Company

"There is not a lot of debate in the scientific community that rising concentrations of greenhouse gases are occurring and will lead to climatic changes."

- Dale Heydlauff, Senior Vice President, AEP [1]

The Southern Company

"As a company that currently generates nearly 70 percent of our electricity from coal, we release large amounts of CO_2, a greenhouse gas. As a result, carbon emissions remain a challenge and a key focus for us."

- Charles H. Goodman, Senior Vice President of Research and Environmental Affairs [2]

Cinergy Company

"… I am convinced that it is prudent to take action now to address what we do know (about climate change)."

- James E. Rogers, CEO [3]

"Cinergy's core operations account for about one percent of worldwide greenhouse gas emissions, or about 67 million tons of CO_2 equivalents per year."

- Cinergy Press Release [4]

Tennessee Valley Authority

"Carbon dioxide is a 'greenhouse gas,' so named because it traps heat that would ordinarily be radiated into space near the earth's surface. Some scientists are concerned that as atmospheric concentrations of carbon dioxide and other greenhouse gases go up, the earth's climate may change and temperatures may increase, raising the level of the oceans and disrupting food production."

- TVA website [5]

Xcel Company

"At Xcel Energy, we operate 75 power plants -- and we recognize that they have a significant impact on the environment."

- Wayne Brunetti, CEO [6]

"Carbon dioxide -- or CO_2 -- is a greenhouse gas. By 2012, we want to reduce CO_2 intensity by 7 percent from 2003 levels. Intensity refers to pounds of CO_2 emitted per megawatt hour."

- Dick Kelly, COO [7]

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[1] Chicago Tribune, Mar. 28, 2004, C1

[2] Southern Company 2003 Environmental Progress Report, at 5, http://www.southerncompany.com/planetpower/EnvRpt2003.pdf?mnuOpco=soco&mnuType=pp

[3] http://www.pewclimate.org/companies_leading_the_way_belc/company_profiles/cinergy/index.cfm

[4] Press Release, Cinergy Corporation, Cinergy Plans Voluntary Greenhouse Gas Reductions (Sept. 10, 2003), http://www.cinergy.com/News/default_corporate_news.asp?news_id=385

[5] http://www.tva.gov/environment/air/co2.htm

[6] Wayne Brunetti remarks, Minnesota Power Systems Conference, November 4, 2003 http://www.xcelenergy.com/XLWEB/CDA/0,3080,1-1-1_5929_8020_7986-7132-0_0_0-0,00.html

[7] Xcel Energy 2004 shareholder annual meeting, "You Get All of Our Energy" Wayne Brunetti, Dick Kelly, May 20, 2004, Denver, Colorado