Year-by-year, state-by state per-capita carbon dioxide emissions for the USA

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Sponsor: DOE/OBER (B&R code 1204010)

- **Carbon cycle models are limited by coarse spatial resolution of the anthropogenic CO_2 input from fossil fuel consumption.**
- **Present spatial apportioning of emissions by population distribution is inadequate**
- **Per-capita emissions reveal complex and changing spatial patterns.**
- **Per-capita emissions for individual states provide useful results for modelers.**
- **State-level results better characterize carbon emissions and energy consumption.**

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The goal of this project is to improve the spatial resolution of annual data on anthropogenic carbon dioxide emissions from the USA for input to numerical models of the global carbon cycle. National data cannot be apportioned properly using population data alone, as indicated by the order-of-magnitude differences of per capita emissions among the states shown in Figure 1. Moreover, time series of per-capita fossil-fuel carbon emissions for individual states reveal a changing spatial pattern of anthropogenic carbon emissions since 1960. This is mostly due to increasing spatial diversity in coal combustion, as states with abundant coal supplies are generating increasing amounts of electricity for states with lesser coal supplies and/or legislation to restrict coal burning. Thus, the diversity of per capita carbon dioxide emissions among the states has greatly increased, primarily due to coal combustion as shown in the time series in Figure 2. These changes do not appreciably effect the overall amount emitted. Although these data were derived for use in providing input to numerical models of the global carbon cycle, they also reveal effects of social and legislative changes on carbon dioxide emissions as an important side benefit. The data suggest that differences in per capita emissions arise from differences in many technological, physical, resource, social, and economic factors. These results present a challenge for trying to use per capita emissions as a measure of equity or to provide mitigation targets.

Figure 1. Per capita fossil-fuel carbon emissions, to the nearest whole number, by state for year 2000.

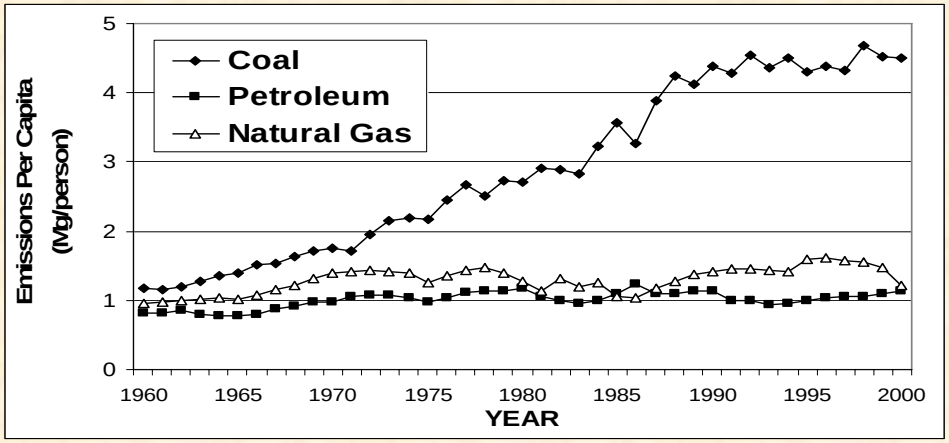

Figure 2 Standard deviations of per capita emissions among the states.