

Understanding Greenhouse Gas Emissions from Metropolitan Areas

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Central theme or hypothesis:

The central theme of this paper is exploratory research to understand the factors influencing the great variation in greenhouse gas emissions from urban areas. There is considerable variation in emissions even among older industrial cities and newer post-industrial cities in the same geographic regions of the USA. What can we learn about the factors associated with this great variation in GHG emissions that can help us focus research on reducing urban GHG emissions and sustainable urban development.

Approach and methodology:

This paper uses various statistical methods to identify the various characteristics associated with the emission of GHGs in large metropolitan areas. The characteristics investigated are identified from reviews of the literature on urban energy consumption. Different statistical techniques are used to tease out and measure the contribution of important characteristics. A variety of methods are used to control for the strong intercorrelations among the metropolitan characteristics.

Relevance of your work to planning education, practice, or scholarship:

More than half the world's population now live in urban areas where the energy that is consumed is driving global warming. Understanding the factors influencing the great variation in greenhouse gas emissions from urban areas may help us plan interventions in existing cities and plan for new urban growth that helps reduce the extent of the negative effects from global warming and helps move us toward a sustainable future.

Key data sources:

Several sources of data are used for this research:

1. Emissions per capita by selected sources for the 100 largest metropolitan areas in the USA for 2000 and 2005 of carbon dioxide, which is the greatest by volume of the greenhouse gases.
2. Descriptive characteristics of the 100 largest US metropolitan areas, including:
 - a. Total population of metropolitan areas
 - b. Size of metropolitan areas
 - c. Population density of metropolitan areas
 - d. Climate measures (heating degree day and cooling days data for metropolitan areas)
 - e. VMT for metropolitan areas
 - f. Miles of rail transit for metropolitan areas
 - g. Some measure of GDP for each metro area
 - h. Economic base for metropolitan areas
 - i. Age of residential structures for metropolitan areas
 - j. Residential energy source mix (electricity, natural gas, fuel oil) of metropolitan areas
 - k. Educational levels of population of metropolitan areas

Key Words:

Greenhouse Gas Emissions, Metropolitan Areas, Metropolitan Characteristics, Green Urbanism