

Temperature of the Earth

Known Facts:

Greenhouse Effect

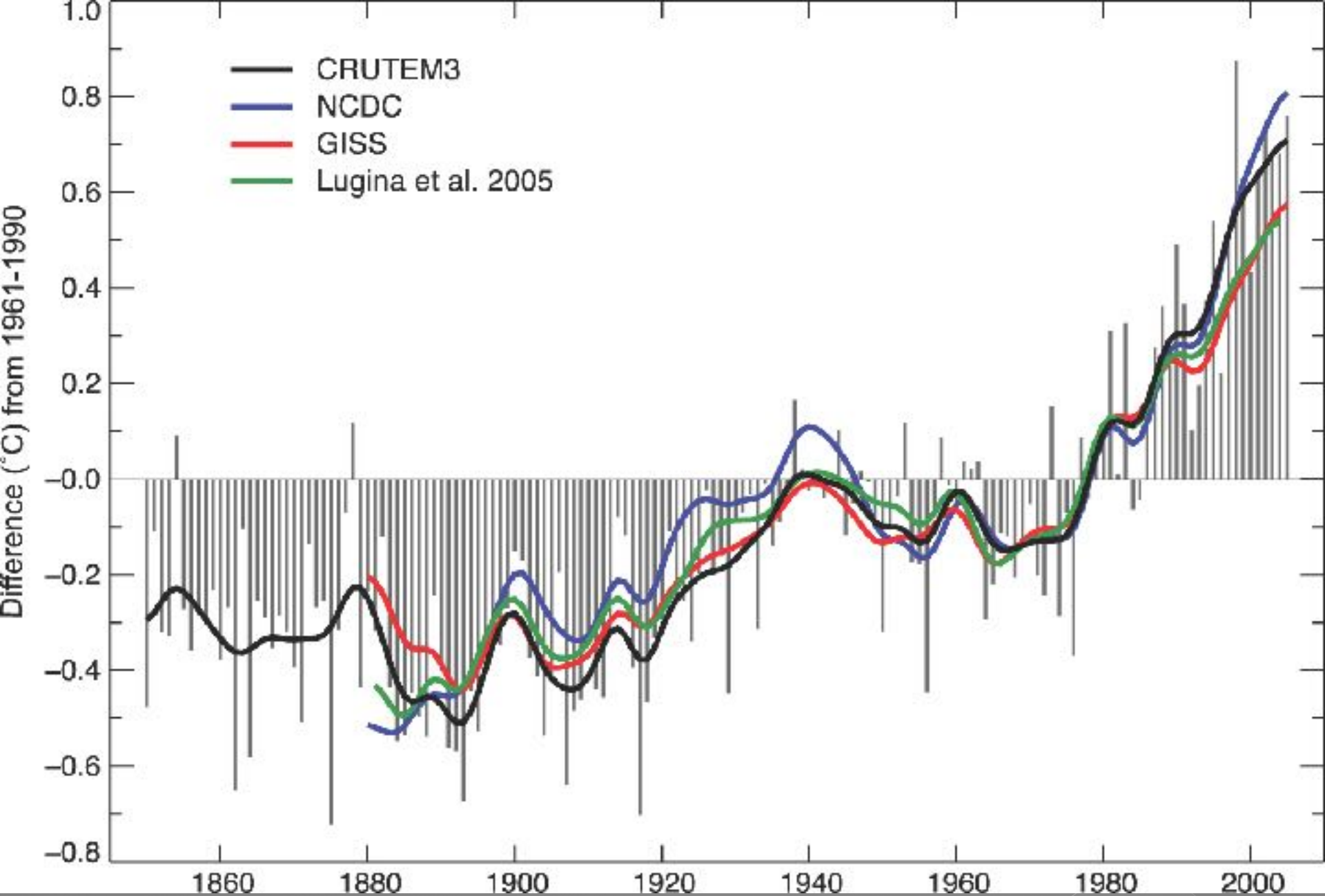
CO₂ and CH₄ are increasing

Almost all the increase in CO₂ comes from human activity.

BUT

Is the Earth warming?





Why the decrease from 1940 to 1970?

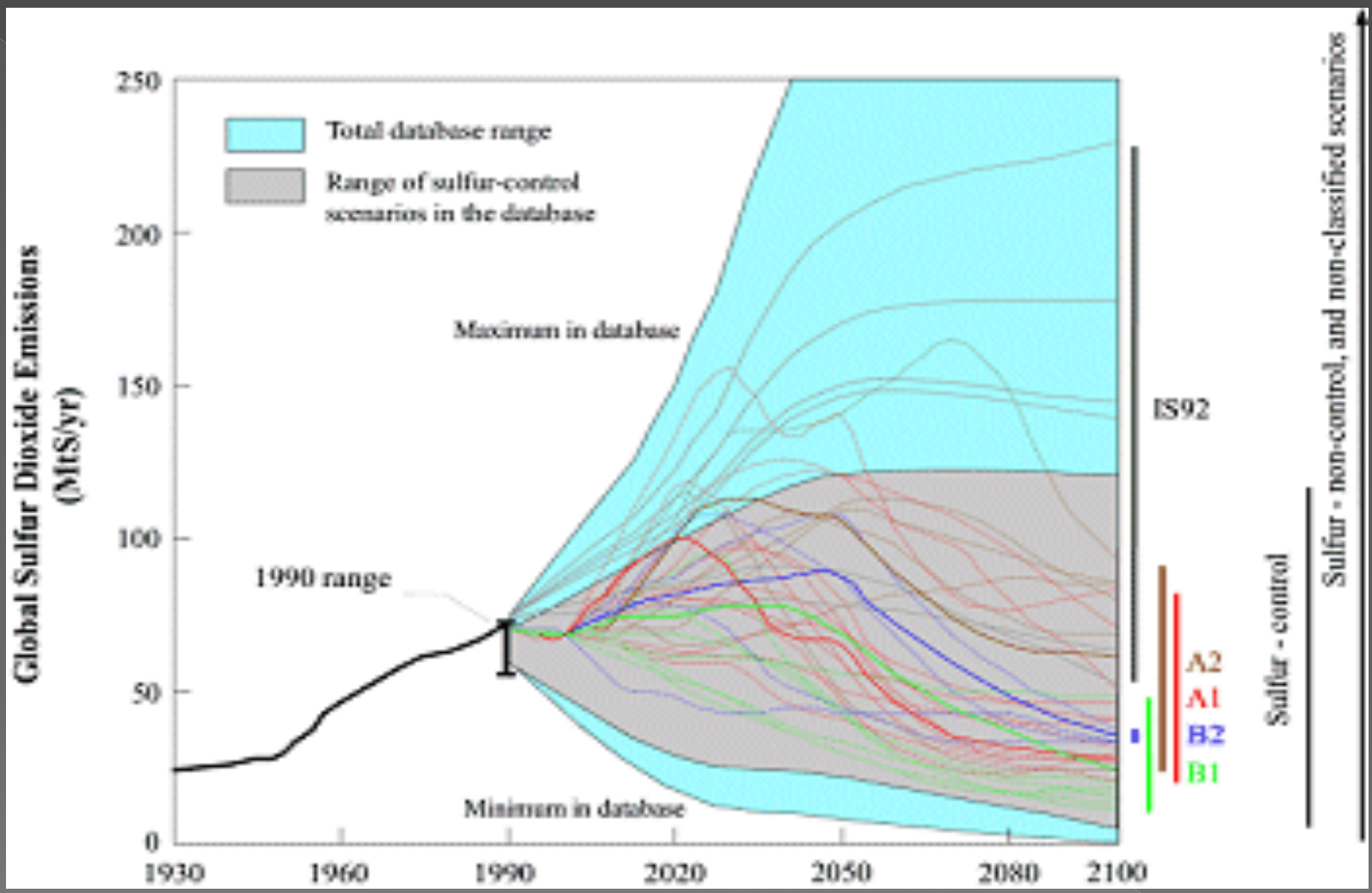
The CO₂ Keeling Curve continually increases!

Humans put many gases besides greenhouse gases into the atmosphere.

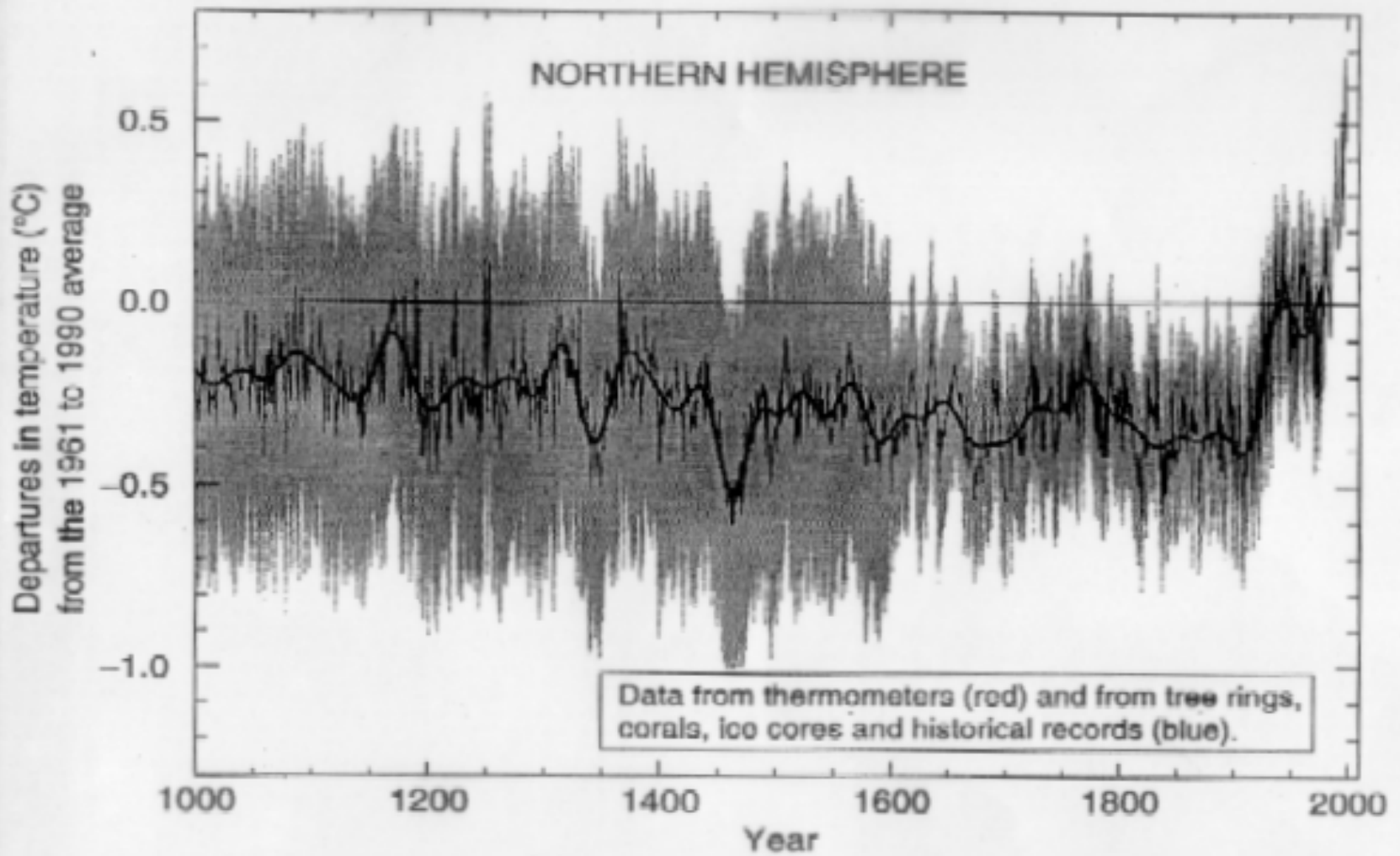
In particular, we put sulfur dioxide (SO_2) into the atmosphere, primarily by burning coal.

SO_2 combines with water vapor to form sulfate aerosols in the atmosphere. These aerosols are great reflectors of sunlight.

Thus the emissions of SO_2 cools the Earth!!

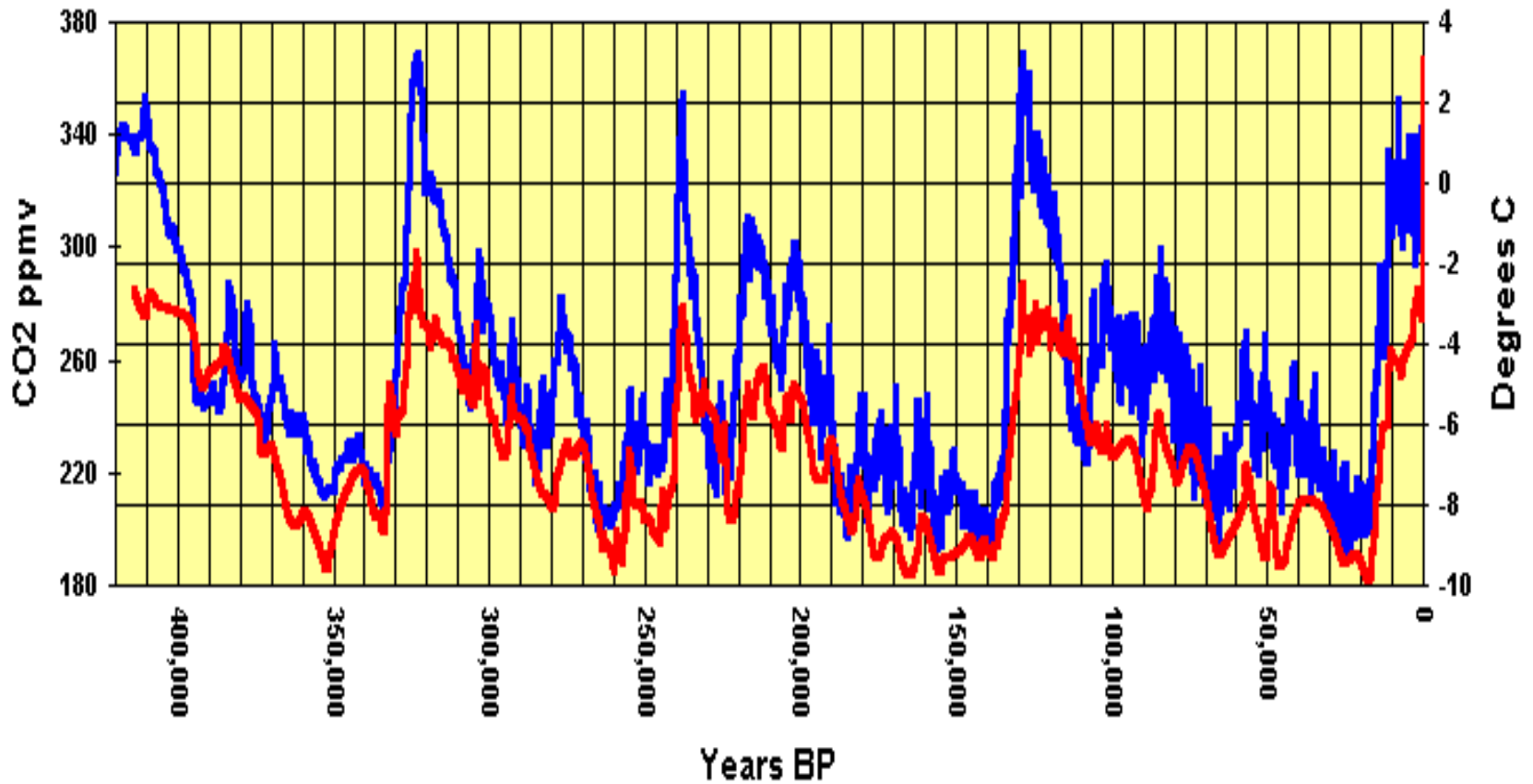


(b) the past 1,000 years



Antarctic Ice Core Data 1

— Temperature Variation — CO2 Concentration



Graph Data

1) Historical carbon dioxide record from the Vostok ice core:

Graphics & Digital Data

Period of Record: 414,085-2,342 years BP

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2) Historical Isotopic Temperature Record from the Vostok Ice Core:

Graphics & Digital Data

Period of Record: 420,000 years BP-present

J.R. Petit, D. Raynaud, and C. Lorius: Laboratoire de Glaciologie et Géophysique de l'Environnement, CNRS, Saint Martin d'Hères Cedex, France

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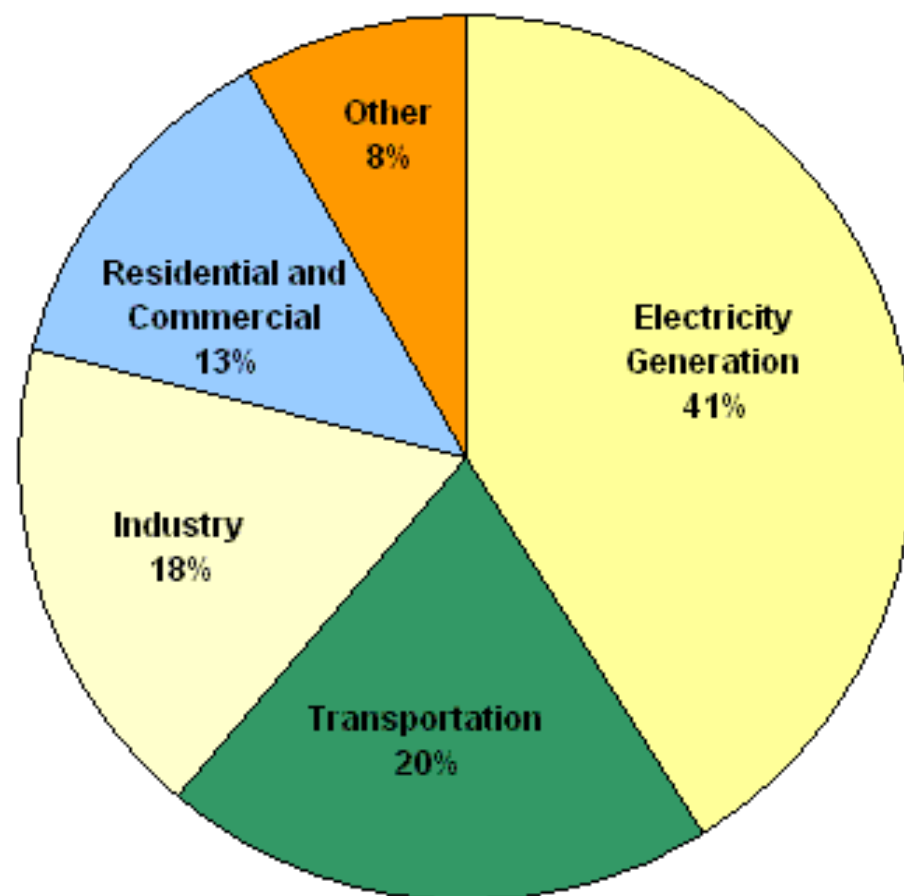
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http://cdiac.esd.ornl.gov/trends/temp/vostok/jouz_tem.htm

b		
2006		
Country	Emissions	Share of Global Total
	Million Tons of Carbon	Percent
United States	1,656	19.8
China	1,480	17.7
Russia	437	5.2
India	391	4.7
Japan	342	4.1
Germany	221	2.6
Canada	177	2.1
United Kingdom	171	2.0
South Korea	130	1.6
Mexico	123	1.5
All Other Countries	3,249	38.8
Global Total	8,379	100.0

Source: Compiled by Earth Policy Institute from G. Marland, T. A. Boden, and R. J. Andres, "Global, Regional, and National CO₂ Emissions," **Trends: A Compendium of Data on Global Change** (Oak Ridge, TN: Carbon Dioxide Information Analysis Center, 2007); BP, **Statistical Review of World Energy** (London: 2007)

Global Carbon Dioxide Emissions from Fossil Fuel Burning by Sector, 2004



Source: IEA