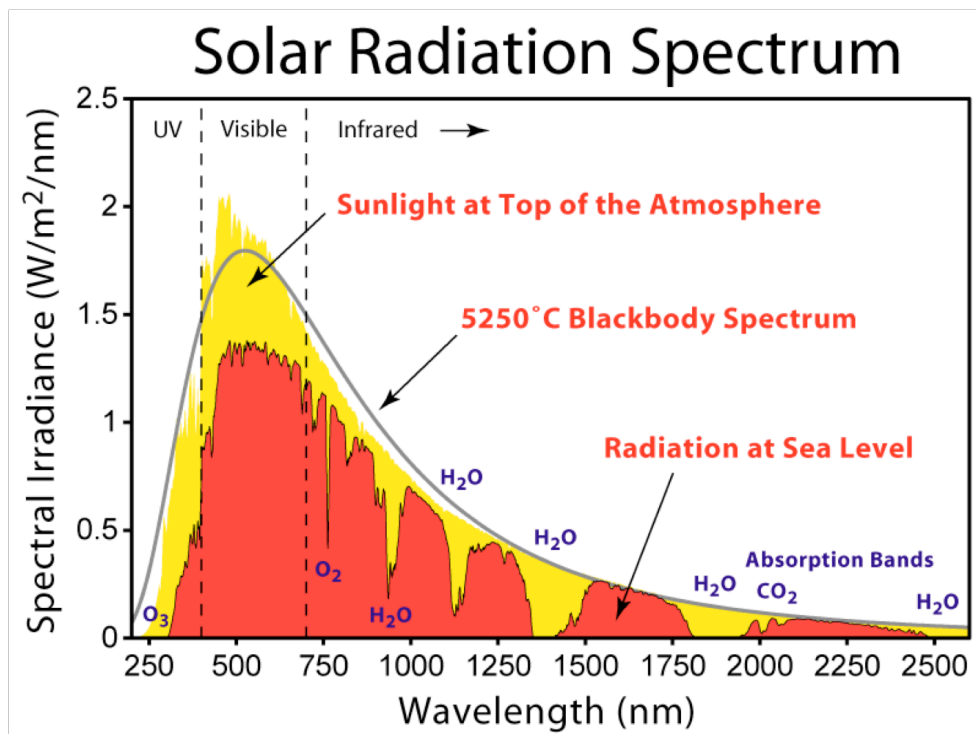
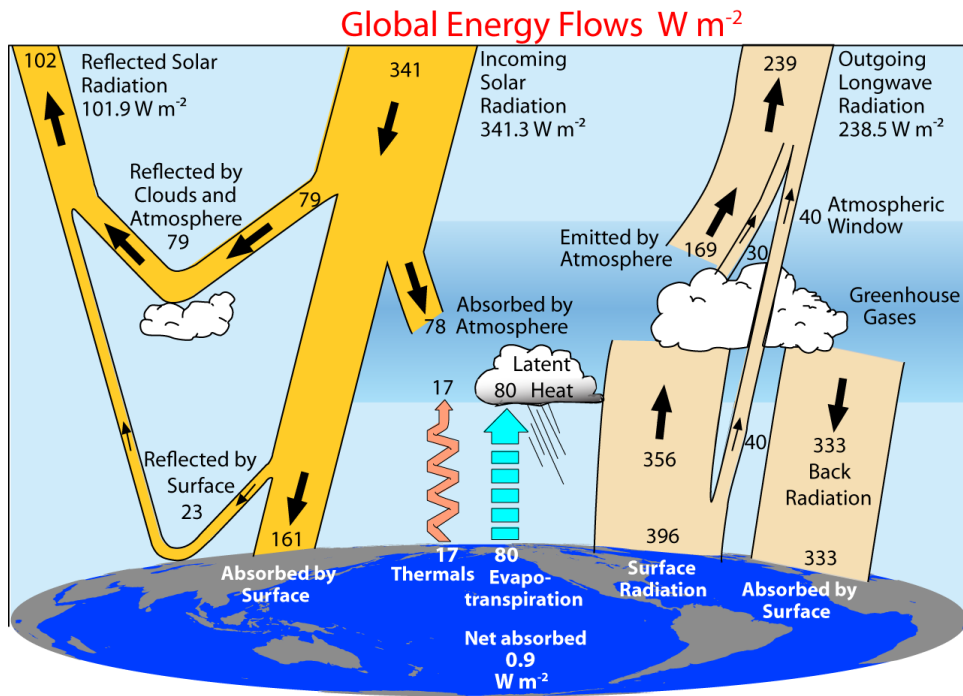
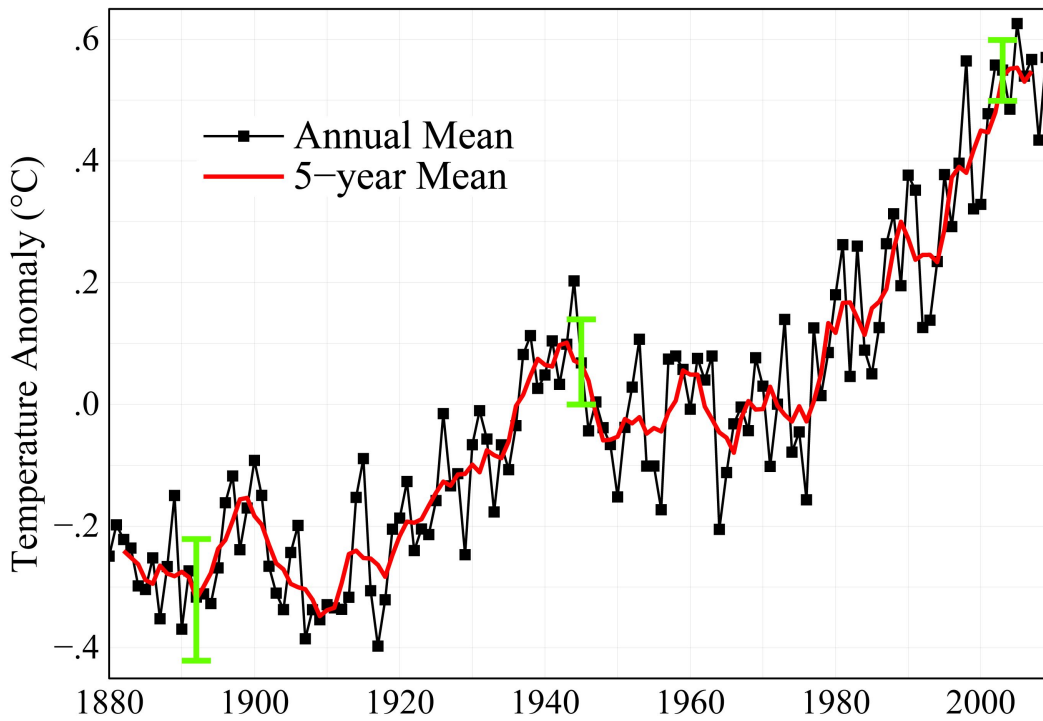


Climate Change Science and Negotiations: Lecture 2 Graphs

Chapter 1



Global Land–Ocean Temperature Index



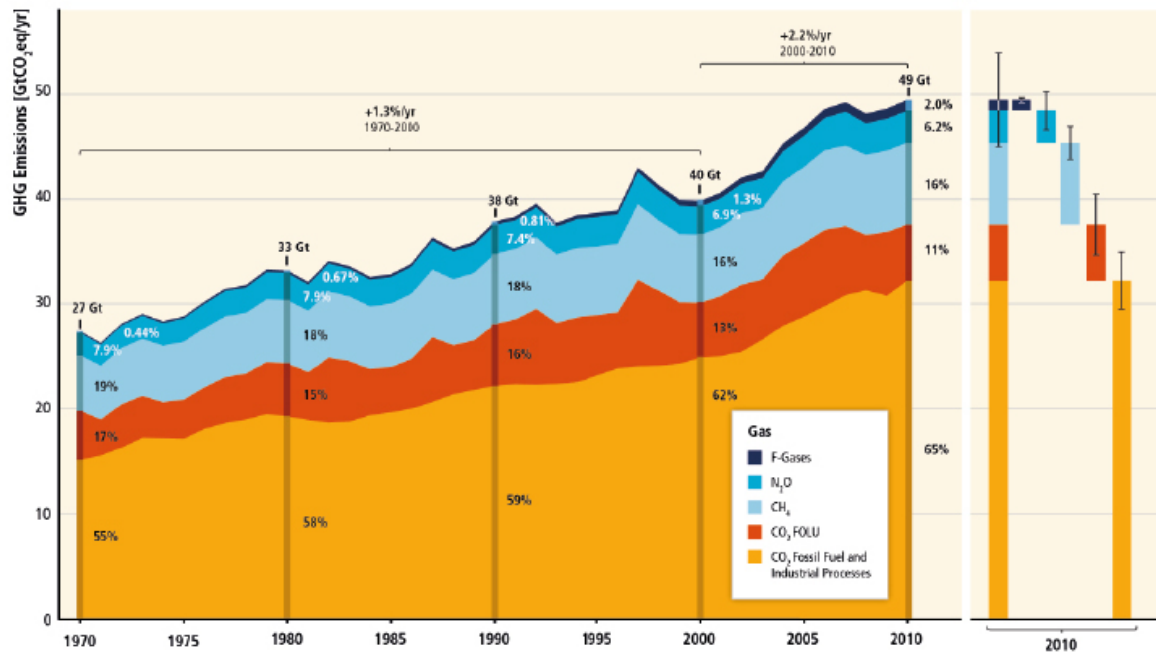
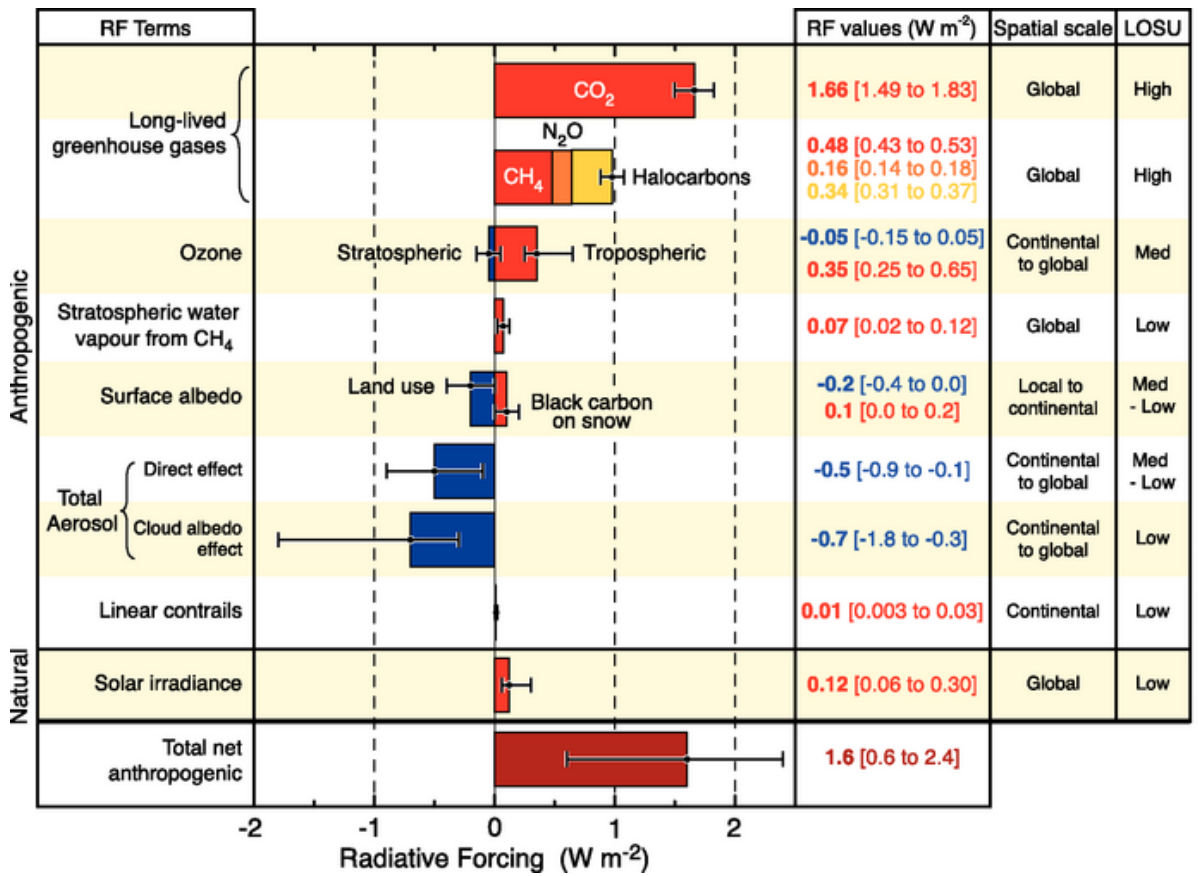
Chapter 2

Greenhouse Gases

Characteristics of Kyoto Greenhouse Gases

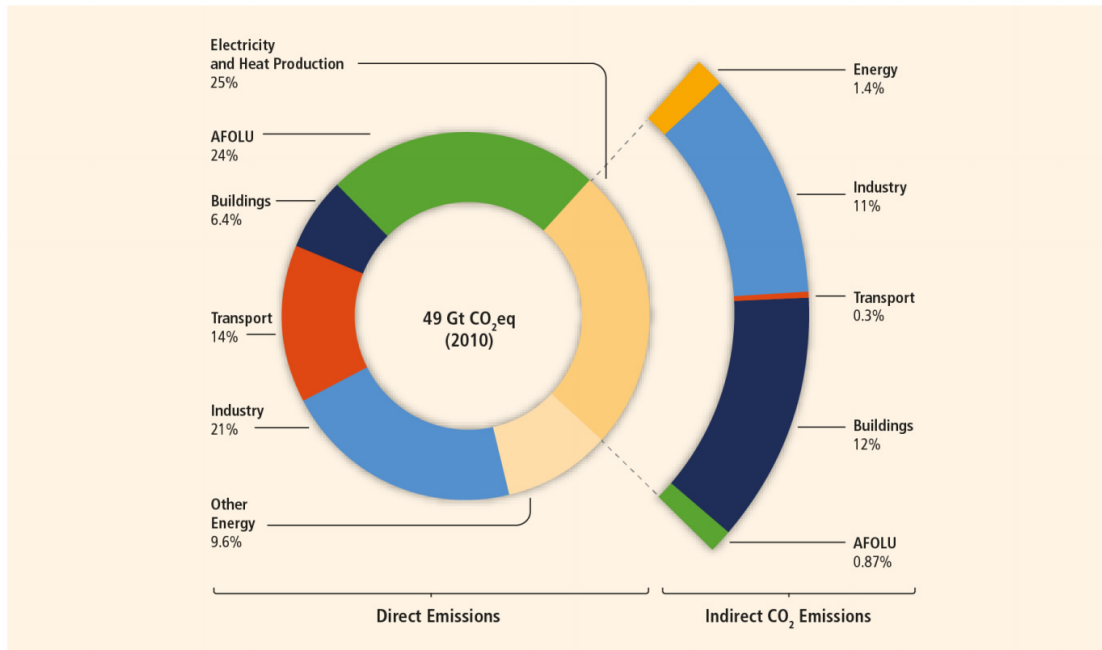
	Lifetime in the atmosphere (years)	100-year Global Warming Potential (GWP)	Percentage of 2000 emissions in CO ₂ e
Carbon dioxide	5-200	1	77%
Methane	10	23	14%
Nitrous Oxide	115	296	8%
Hydrofluorocarbons (HFCs)	1-250	10-12,000	0.5%
Perfluorocarbons (PFCs)	>2500	>5,500	0.2%
Sulphur Hexafluoride (SF ₆)	3,200	22,200	1%

Source: Ramaswamy et al. (2001)¹ and emissions data from the WRI CAIT database.²

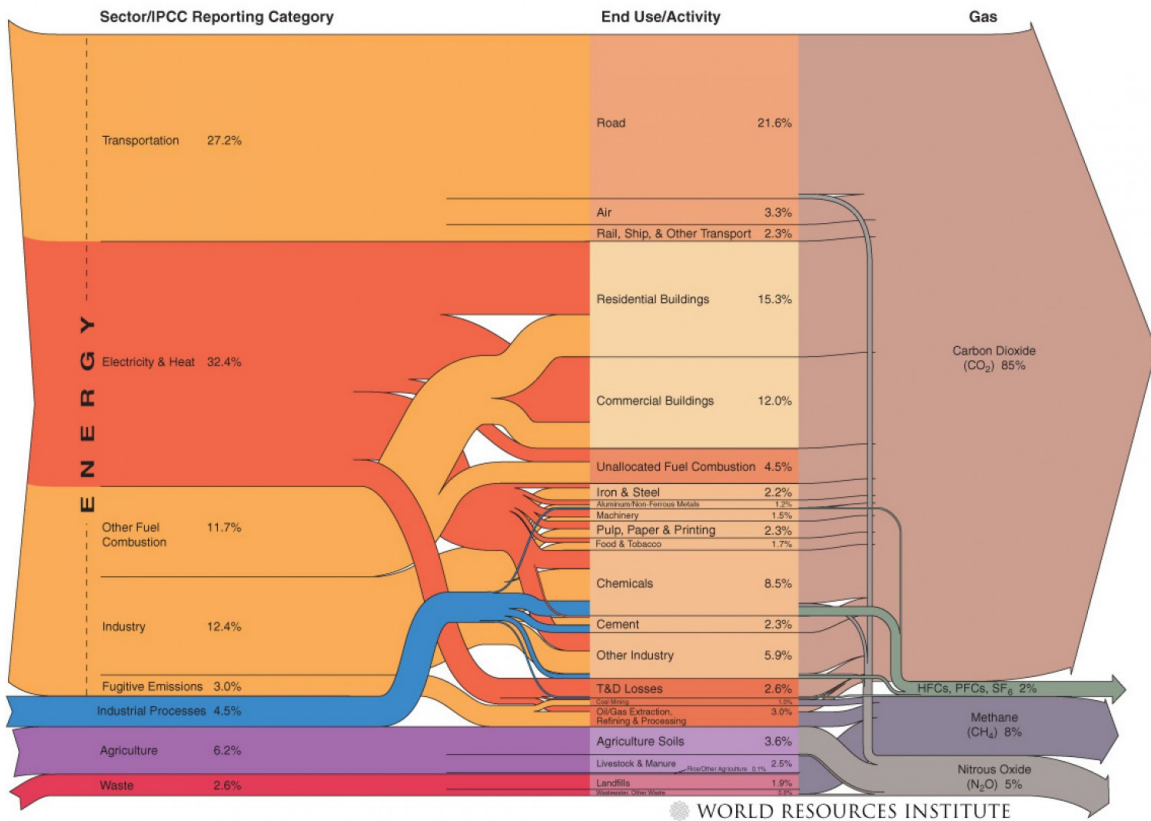


Source: IPCC 5th Assessment Report (April 2014)

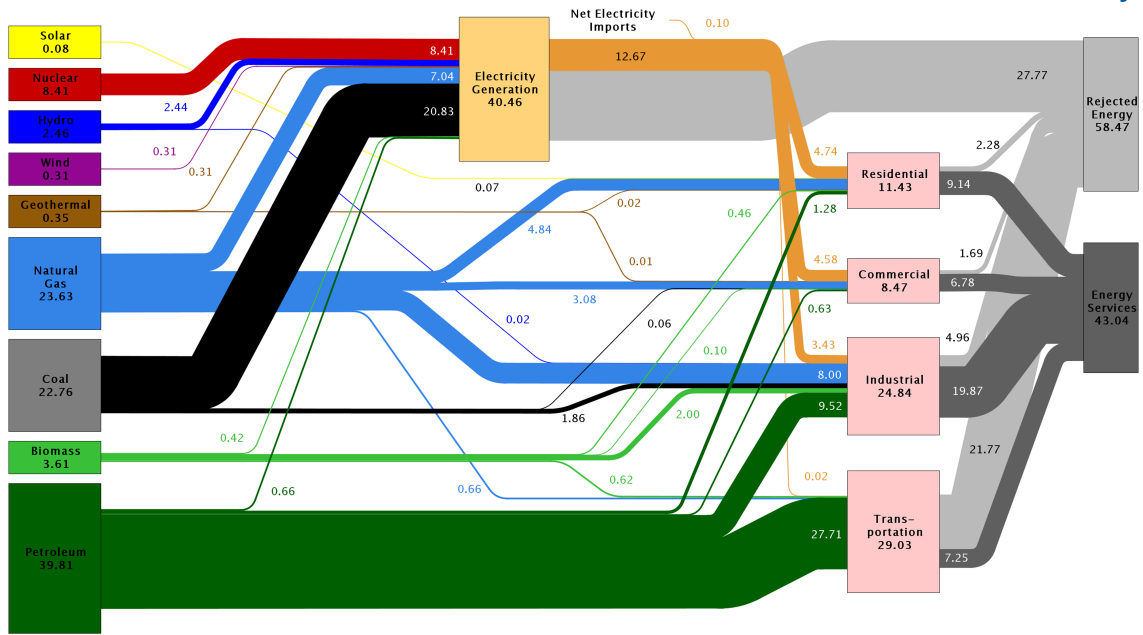
Greenhouse Gas Emissions by Economic Sectors



U.S. GHG Emissions Flow Chart



Estimated U.S. Energy Use in 2007: ~101.5 Quads



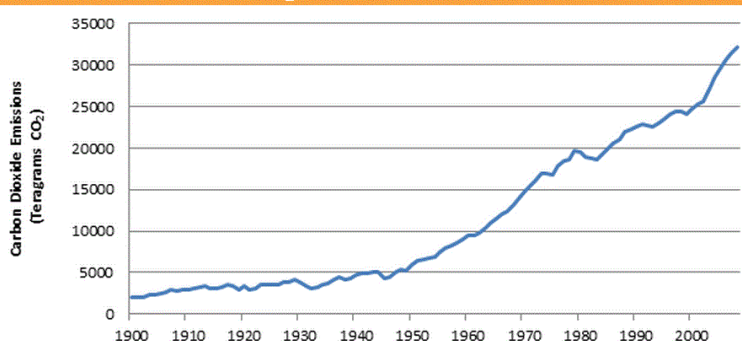
Source: LLNL 2008. Data is based on DOE/EIA-0384(2007), June 2008. If this information or a reproduction of it is used, credit must be given to the Lawrence Livermore National Laboratory and the Department of Energy, under whose auspices the work was performed. Distributed electricity represents only retail electricity sales and does not include self-generation. EIA reports flows for non-thermal resources (i.e., hydro, wind and solar) in BTU-equivalent values by assuming a typical fossil fuel plant "heat rate." The efficiency of electricity production is calculated as the total retail electricity delivered divided by the primary energy input into electricity generation. End use efficiency is estimated as 80% for the residential, commercial and industrial sectors, and as 25% for the transportation sector. Totals may not equal sum of components due to independent rounding. LLNL-MI-410527

Chapter 3

www.epa.gov/climatechange/ghgemissions/global.html

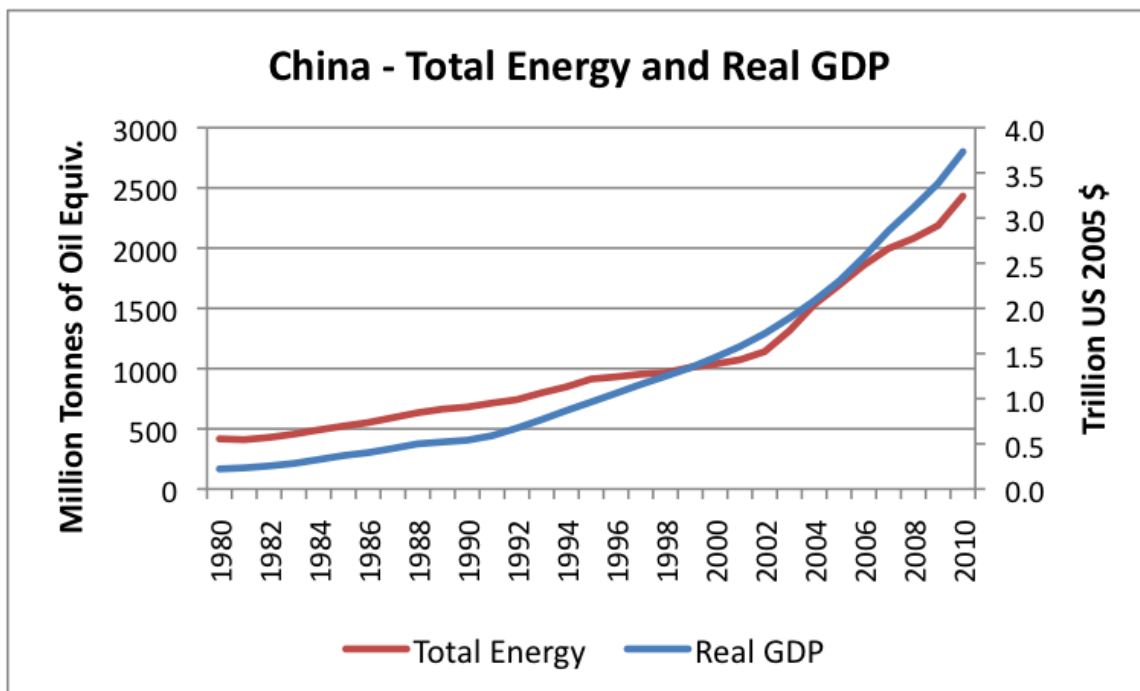
Trends in Global Emissions

Global Carbon Dioxide (CO₂) emissions from fossil-fuels 1900–2008



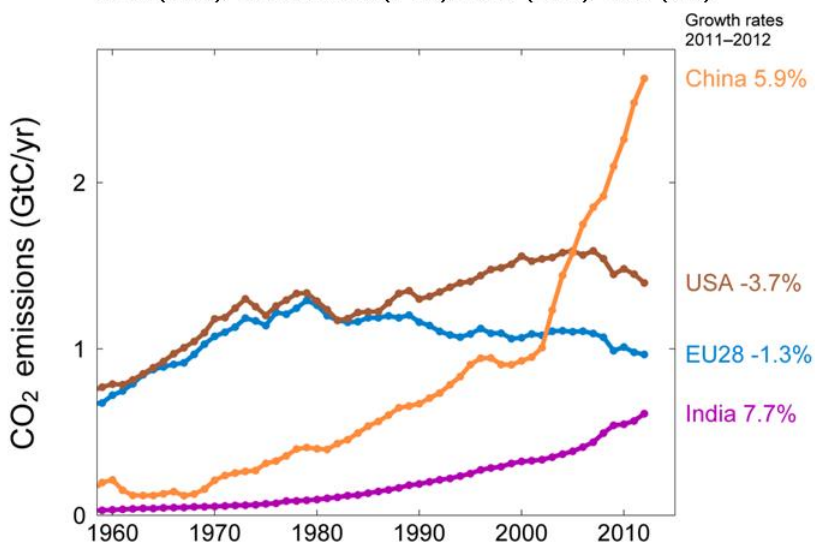
Source of data: [Boden, T.A., G. Marland, and R.J. Andres \(2010\). Global, Regional, and National Fossil-Fuel CO₂ Emissions.](#) Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tenn., U.S.A. doi 10.3334/CDIAC/00001_V2010.

Global carbon emissions from fossil fuels have significantly increased since 1900. Emissions increased by over 16 times between 1900 and 2008 and by about 1.5 times between 1990 and 2008.



Top Fossil Fuel Emitters (Absolute)

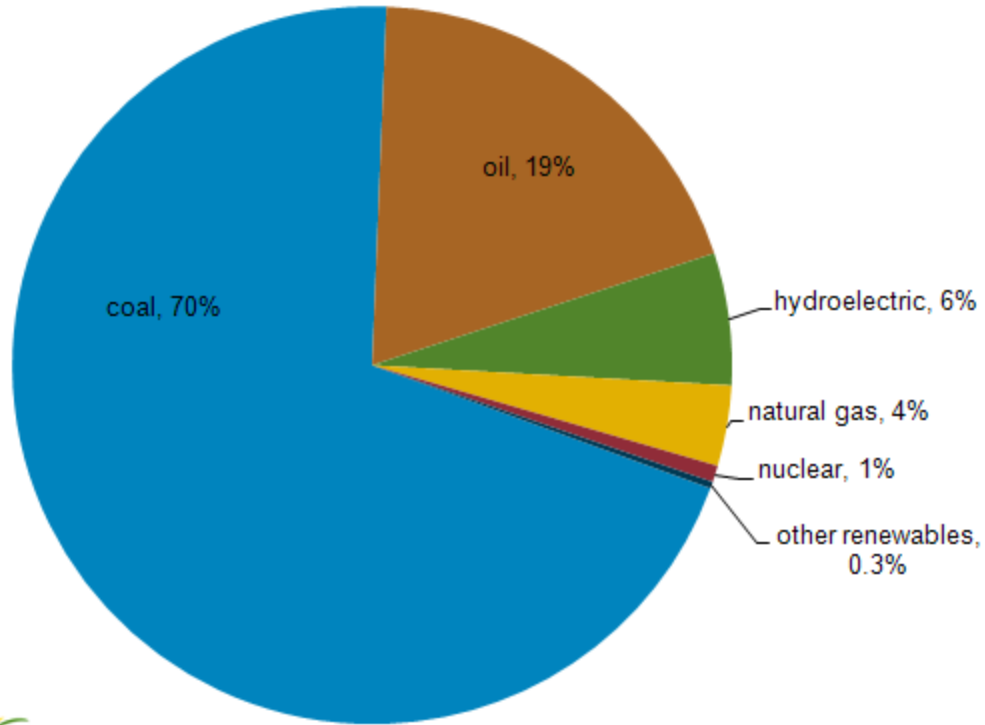
Top four emitters in 2012 covered 58% of global emissions
 China (27%), United States (14%), EU28 (10%), India (6%)



With leap year adjustment in 2012 growth rates are: China 5.6%, USA -4.0%, EU -1.6%, India 7.4%.

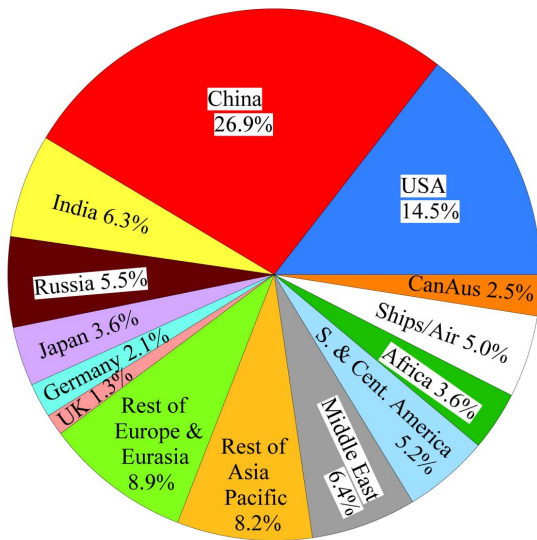
Source: [CDIAC Data](#); [Le Quéré et al 2013](#); [Global Carbon Project 2013](#)

Total energy consumption in China by type, 2009

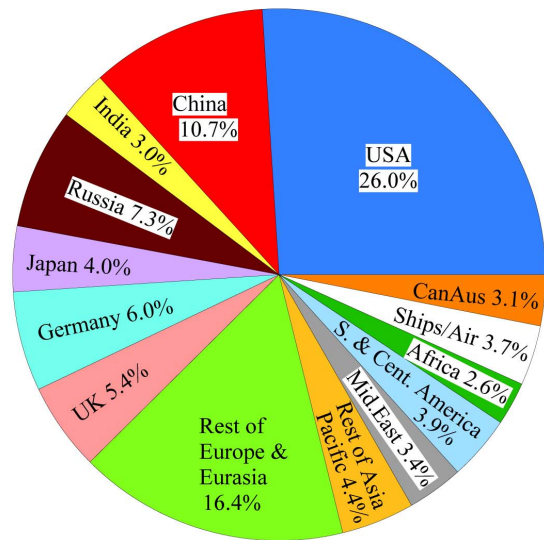


Source: U.S. Energy Information Administration, *International Statistics*

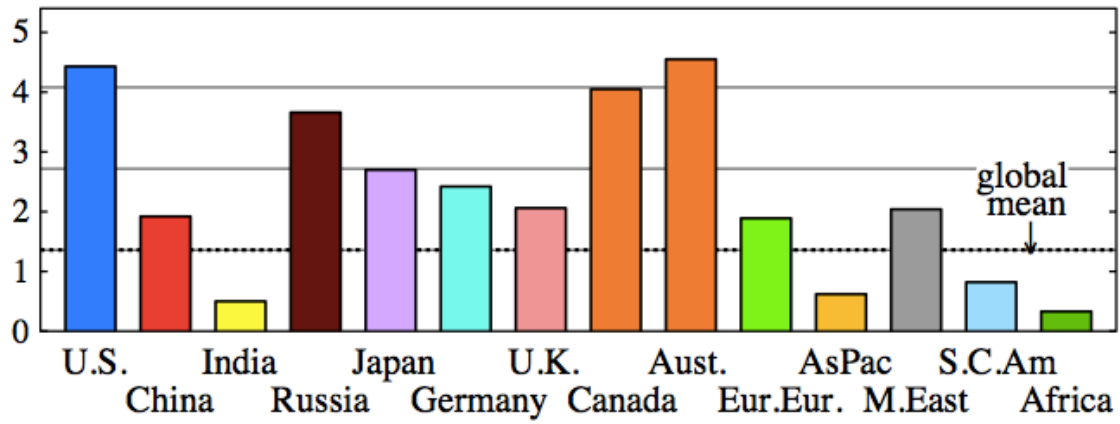
A 2012 Annual Emissions (9.6 GtC/yr)



B 1751–2012 Cumulative Emissions (384 GtC)

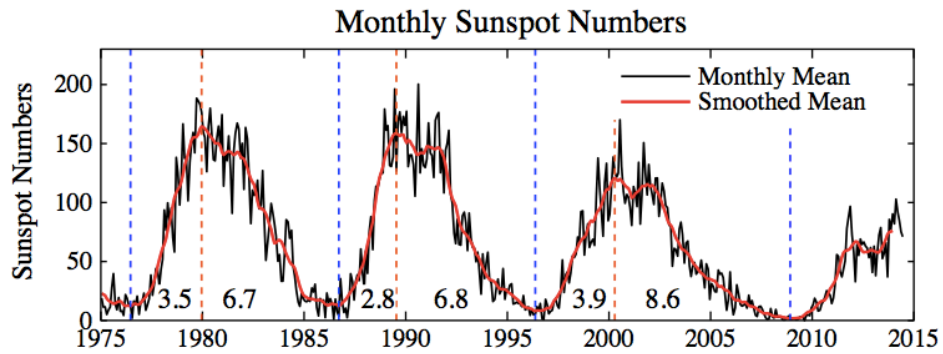
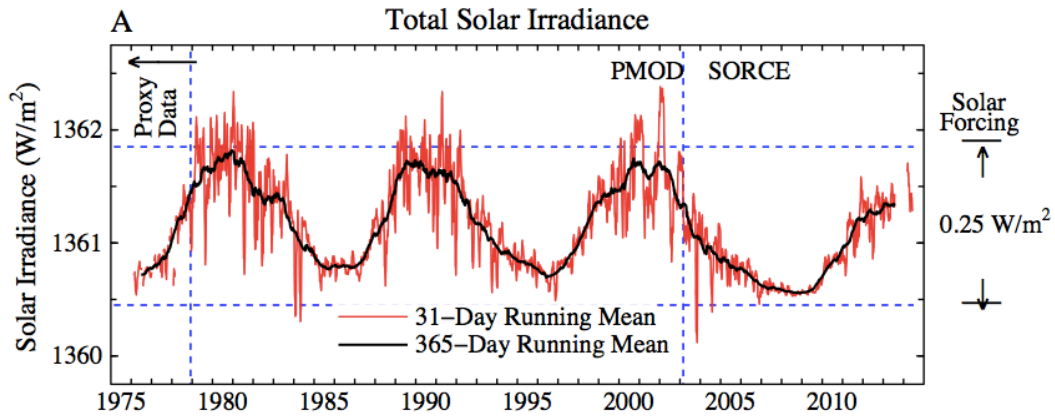
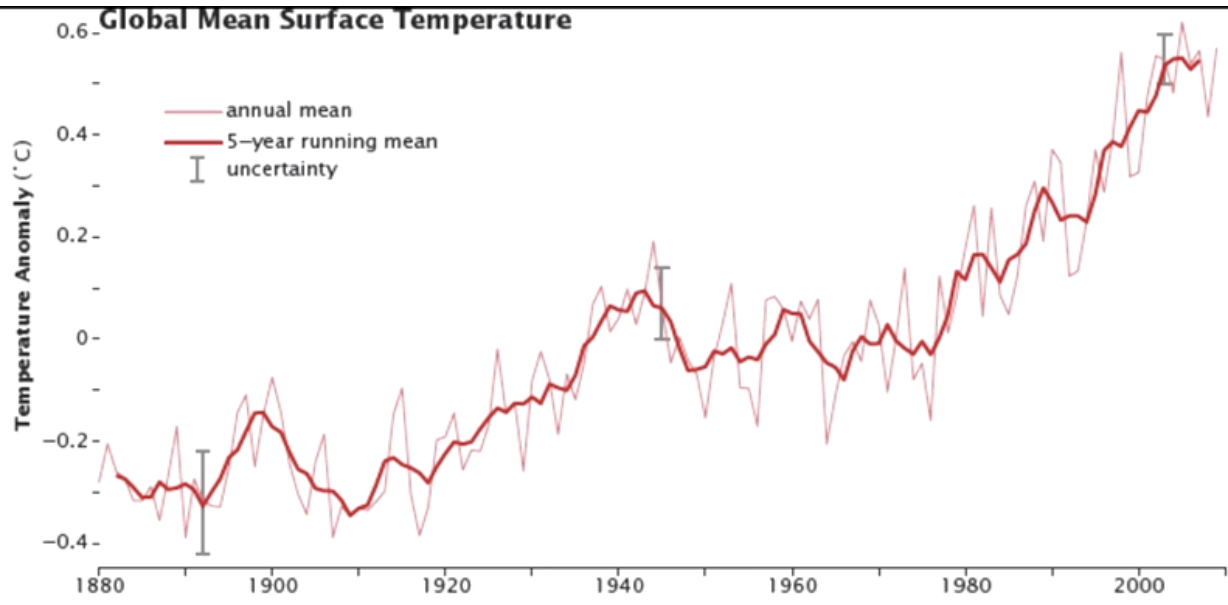


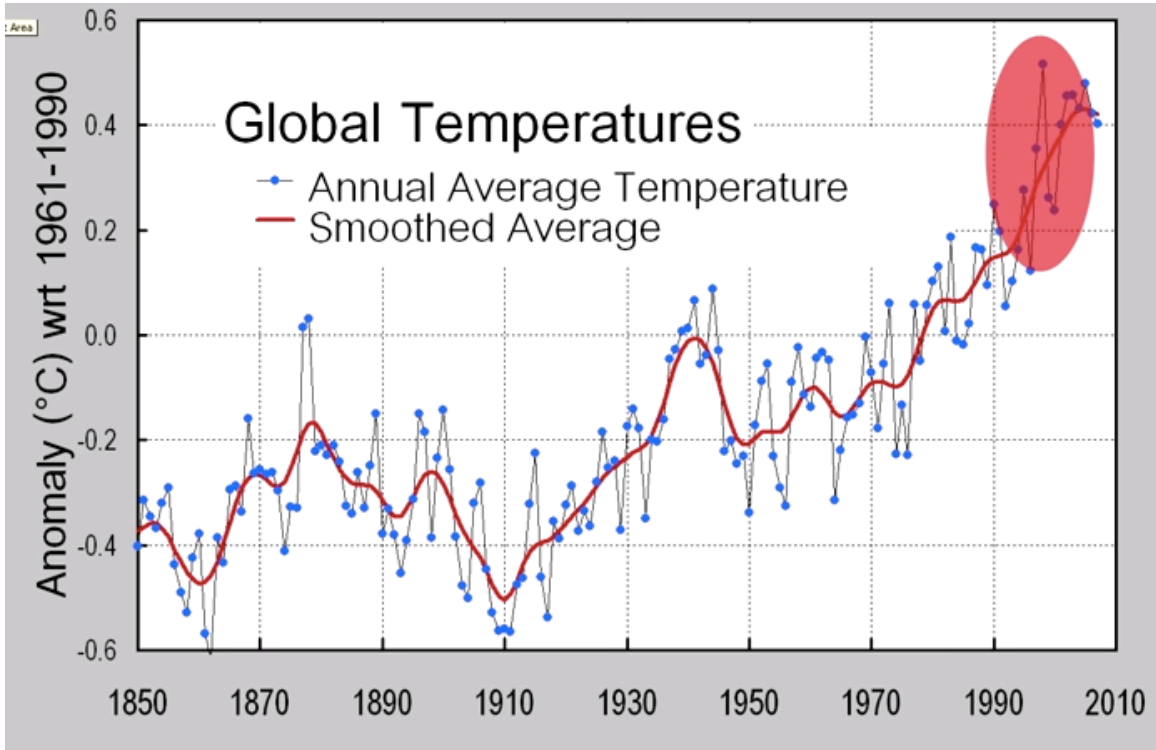
A 2012 Per Capita Emissions (tons Carbon/yr/person)



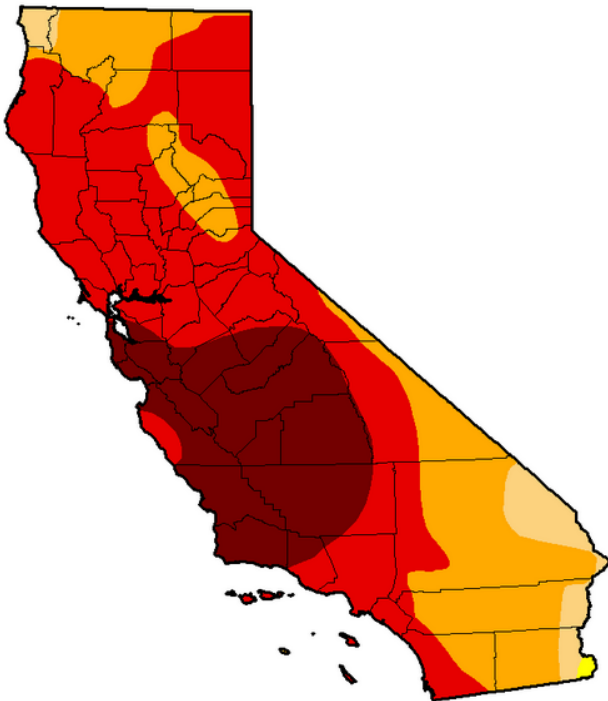
Chapter 4







Chapter 5

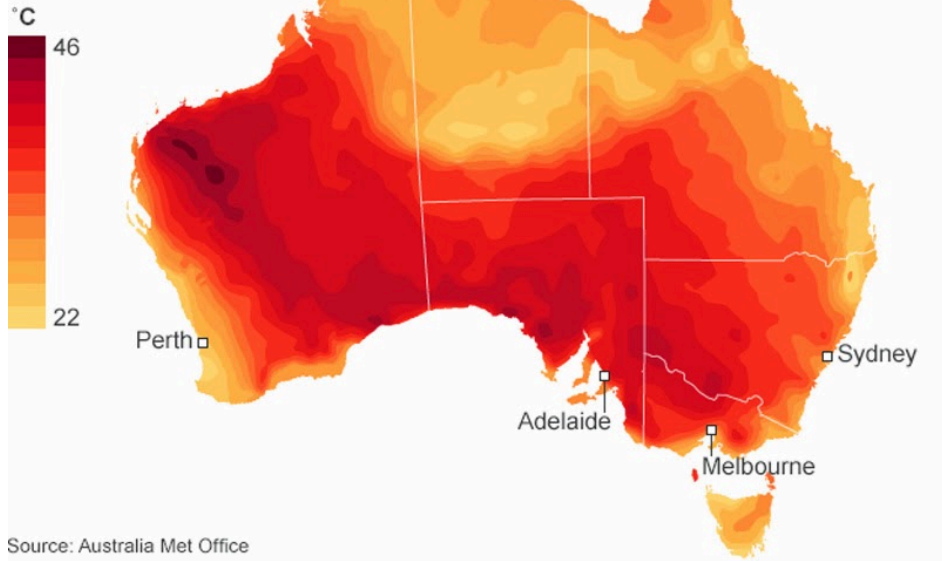


Intensity:

- D0 - Abnormally Dry
- D3 - Extreme Drought
- D1 - Moderate Drought
- D4 - Exceptional Drought
- D2 - Severe Drought

Temperatures across Australia

Wednesday 15 January
20:00 local time (09:00 GMT)



Source: Australia Met Office

MIDDLE EAST: 2008 Regional Drought Impact

