

## Assignment 9&10

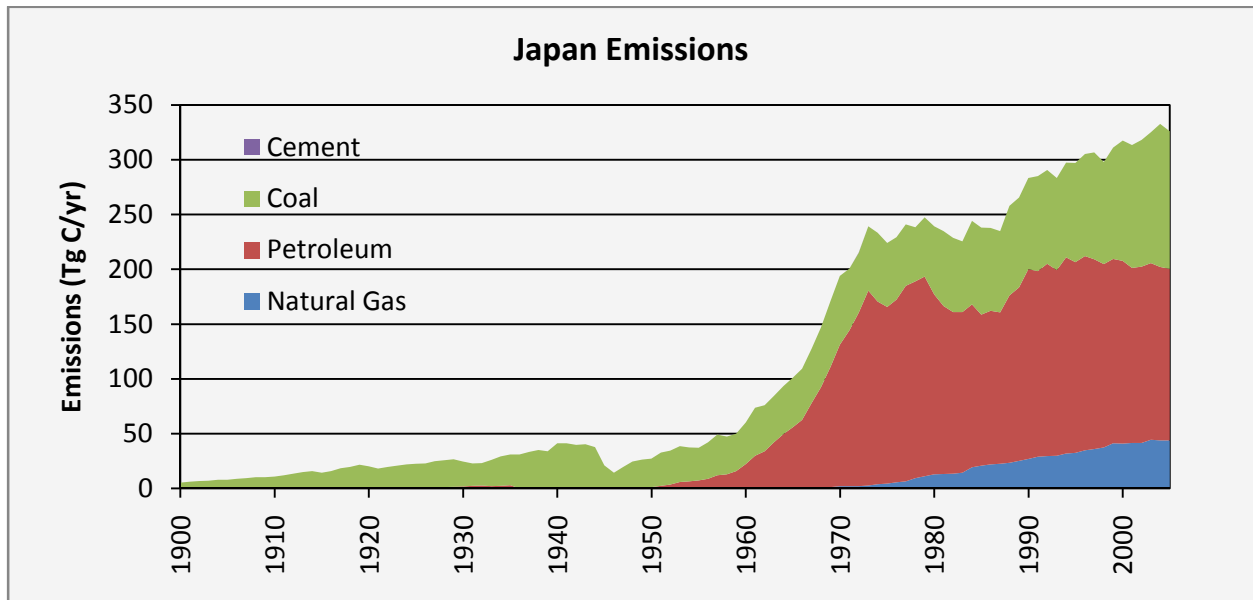
In a word processing document, answer the following questions for assignment 9 and 10. After you have answered the questions, print the document as a .pdf and attach it to an email to [geog345@gmail.com](mailto:geog345@gmail.com). In the subject line, type "Assignment 9&10" (without the quotes). For a pdf creator, go to [www.cutepdf.com](http://www.cutepdf.com), download and install the free version. The cutepdf should then show up in your printer list. This assignment must be submitted by **Thursday, December 4, 11:59 pm EST** (i.e. before midnight). Late assignments will be deleted. Please only submit your completed assignment once.

1. Last Name, First Name

2. Type the honor code followed by your initials.

I pledge on my honor that I have not given or received any unauthorized assistance on this assignment.  
(Add your initials).

3. a.) Open the file Assign9&10.xls. Create a stacked area graph of the emissions from gas consumption, petroleum consumption, coal consumption, and cement production for the US for the years 1900-2007. Put years on the x-axis, emissions on the y-axis. This is an example of what a stacked graph should look like:



b.) Create a stacked area graph of the emissions from gas consumption, petroleum consumption, coal consumption, and cement production for China for the years 1900-2007. Put years on the x-axis, emissions on the y-axis.

c.) Create a graph with one line representing total US emissions and one line representing total China emissions.

4. Create a new column for both China and the US called "Carbon Intensity of GDP". Calculate the carbon intensity for each year 1965-2007. Express this in g C/\$GDP. (Note: a Tg C is equal to a  $10^{12}$  g, so you'll have to multiply the emissions by  $10^{12}$ ). Create a graph that has a line for the US carbon intensity and a line for China carbon intensity, years on the x-axis, carbon intensity (in g C/\$GDP) on the y-axis.

5. Create a new column for both China and the US called "Per Capita Emissions". Calculate the total average emissions for each person for each year 1965-2007. Express this in tonnes/person/yr. (Note: a Tg C is equal to a million tonnes C, so you'll have to multiply the emissions by  $10^6$ ). Create a graph that has a line for the US per capita emissions and a line for China per capita emissions, years on the x-axis, per capita emissions (in tonnes C/person/yr) on the y-axis.

6. Answer the following questions:

a.) Which country has been the historic leader in total emissions from fossil fuel consumption and cement production?

b.) Which country is the current leader in total emissions?

c.) What are the cumulative emissions from the US since 1900? Round to the nearest 10,000 Tg C.

d.) What are the cumulative emissions from China since 1900?

e.) Which country currently has the fastest rate of growth in annual emissions?

f.) Which country currently has lower emissions per unit GDP?

g.) Which country has made the greatest reduction in emissions per GDP in the last decade?

h.) Which country has lower per capita emissions, US or China?

i.) If China had a per capita emissions rate the same as the US for 2007, what would be its total annual carbon emissions? Express your answer in Gt C ( $1 \text{ Gt C} = 10^9 \text{ t C} = 1000 \text{ Tg C}$ ) and round to the nearest unit).

j.) How does your answer in i.) compare to the current global annual fossil fuel emissions (see assignment 3).

7. Create a new column for both China and the US called "Per Capita Fossil Energy Consumption". Calculate the total average energy consumption for each person for each year 1965-2007. Express this in GJ/person/yr. (Note: a PJ is equal to a million GJ, so you'll have to multiply the sum of the energy consumption by  $10^6$ ). Create a graph that has a line for the US per capita energy consumption and a line for China per capita energy consumption, years on the x-axis, per capita energy consumption (in GJ/person/yr) on the y-axis.

8. Make two pie graphs, one for the US and one for China, that show the breakdown of 2007 fossil energy consumption (Natural Gas, Petroleum, and Coal) in percent.

9. Calculate the average carbon emissions per unit energy of natural gas, consumed. To do this, sum the total emissions from natural gas for both countries for all the years 1965-2007. Then sum the total consumption of natural gas for both countries for all the years 1965-2007. Divide the emissions by the energy consumption. Repeat this for petroleum and coal. Express your answer in both g C/MJ (Note: Tg C =  $10^{12}$  g C, PJ =  $10^9$  MJ) and g CO<sub>2</sub>/MJ. Round your answers to the nearest tenth and enter them in the table below:

Fuel	C Emissions (g/MJ)	CO <sub>2</sub> Emissions (g/MJ)
Natural Gas		
Petroleum		
Coal		

10. In climate negotiations between the US and China, the question often centers on who should take responsibility for reducing emissions. The US wants China to take more responsibility, and vice versa. In two paragraphs, one for each country, explain arguments (based on your analysis of the data above) that each side may make to show that the other side should assume more responsibility for reducing emissions.