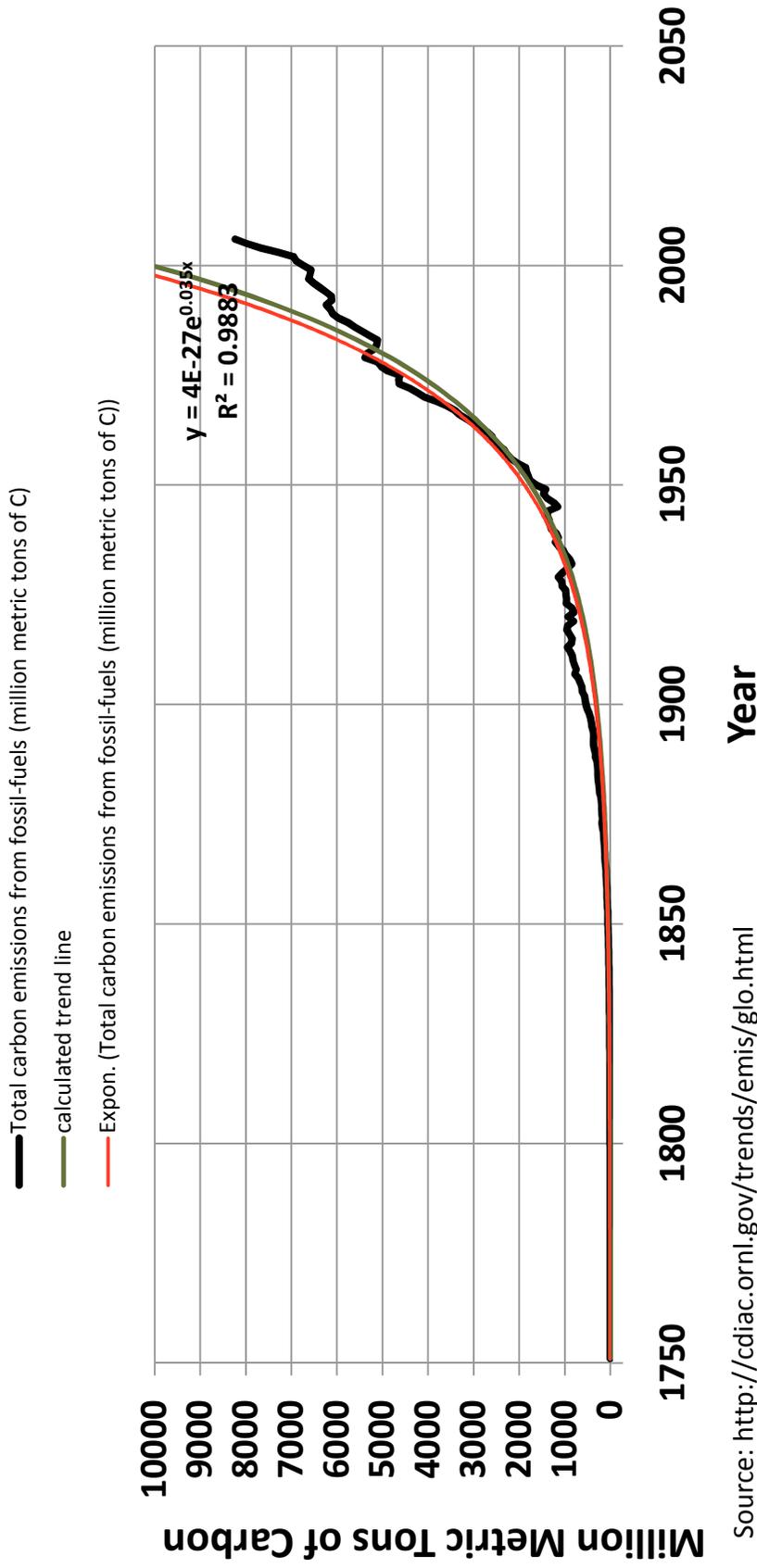


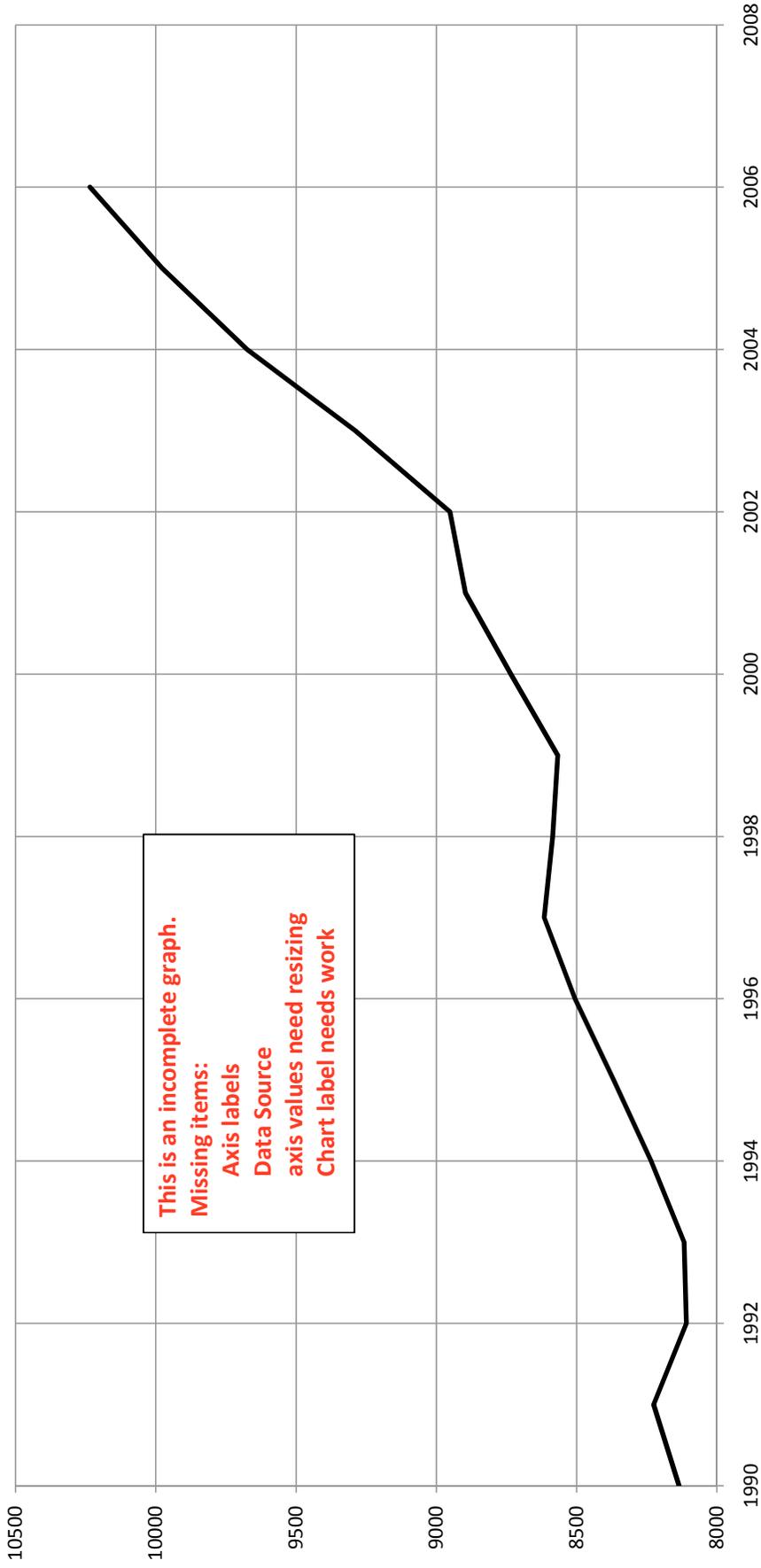
Portland Community College
ENGR-101 Engineering Fundamentals
Sustainability Assignments
Gregory Monahan
11-Sep-09

Total Carbon Emissions From Fossil-Fuels (1751 - 2006)



Source: <http://cdiac.ornl.gov/trends/emis/glo.html>
The Carbon Dioxide Information Analysis Center (CDIAC) is the primary climate-change data and information analysis center of the U.S. Department of Energy (DOE).

Total Fossil-Fuel & Bunker Oil CO2 Emissions (million metric tonnes C)



Problem 1

1. Go to the NOAA web site:

http://www.ncdc.noaa.gov/paleo/icecore/antarctica/vostok/vostok_co2.html
Your browser screen should look like this:

The screenshot shows a web browser window with the address bar containing the URL: http://www.ncdc.noaa.gov/paleo/icecore/antarctica/vostok/vostok_co2.html. The page title is "NOAA Paleoclimatology World Data Centers Vostok Ice Core CO2 Data - Windows Intern...". The browser interface includes a search bar, navigation buttons (File, Edit, View, Favorites, Tools, Help), and a status bar at the bottom showing "Internet" and "100%".

The main content of the page is as follows:

NOAA Paleoclimatology World Data Centers Vostok Ice Core CO2 Data
National Environmental Satellite, Data, and Information Service (NESDIS) U.S. Department of Commerce

WDC for Paleoclimatology

Home • Data • Perspectives • Outreach • About Paleo • Site Map

Ice Core Gateway

Access Data: [Listed by Project](#) [Listed by Data Type](#) [Search \(Free Text\)](#) [Search by Variable, PI, More](#)

Vostok Ice Core CO₂ Data

Petit et al. 1999
File contains depth, Ice Age, Gas Age, and CO₂ concentration to 414,000 Years BP. Published Reference: Petit et al, Nature v.399 (6735), pp. 429-436. (1999)
Click here to download [Data](#), [Description](#), and [GT4 Timescale](#)

Barnola et al. 1987
File contains depth, Age, and CO₂ concentration to 160,000 Years BP. Published Reference: Barnola et al, Nature, 329, 408-414 (1987)
[Click here to download data](#)

Fischer et al. 1999
File contains depth, Age, and CO₂ concentration, 75-250,00 Years BP. Published Reference: Fischer et al, Science 283, 1712-1714 (1999)
<http://www.ncdc.noaa.gov/>

2. Download the data from:

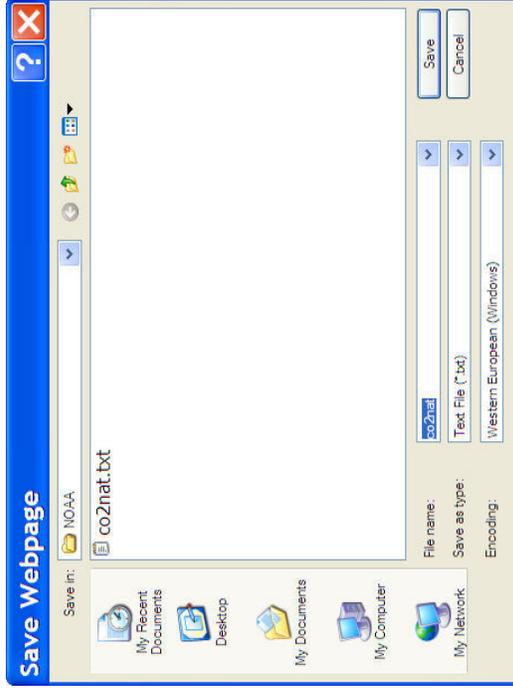
Vostok Ice Core CO2 Data

Petit et al. 1999

File contains depth, Ice Age, Gas Age, and CO2 concentration to 414,000 Years BP. Published Reference: Petit et al, Nature v.399 (6735), pp. 429-436. (1999)

3. Save the data to a text file

File -> Save As will bring up a pop-up like this:



4. Open Excel and Import the data to Sheet 1

5. Add a column to calculate the date of the Gas

Use 2001 as basis for the date

6. Create a plot the CO2 (ppmv) (y-axis) as a function of year (x-axis).

Produce a graph suitable for use in a report or presentation. Be sure to include gridlines, Axis labels and a Chart Label. Modify the default line (color and weight) to produce an easily viewable graph line.

7. Go back to the web site and get the Description of the data

Produce a graph suitable for use in a report or presentation. Be sure to include gridlines, Axis Labels and a Chart Label. Modify the default line (color and weight) to produce an easily viewable graph line.

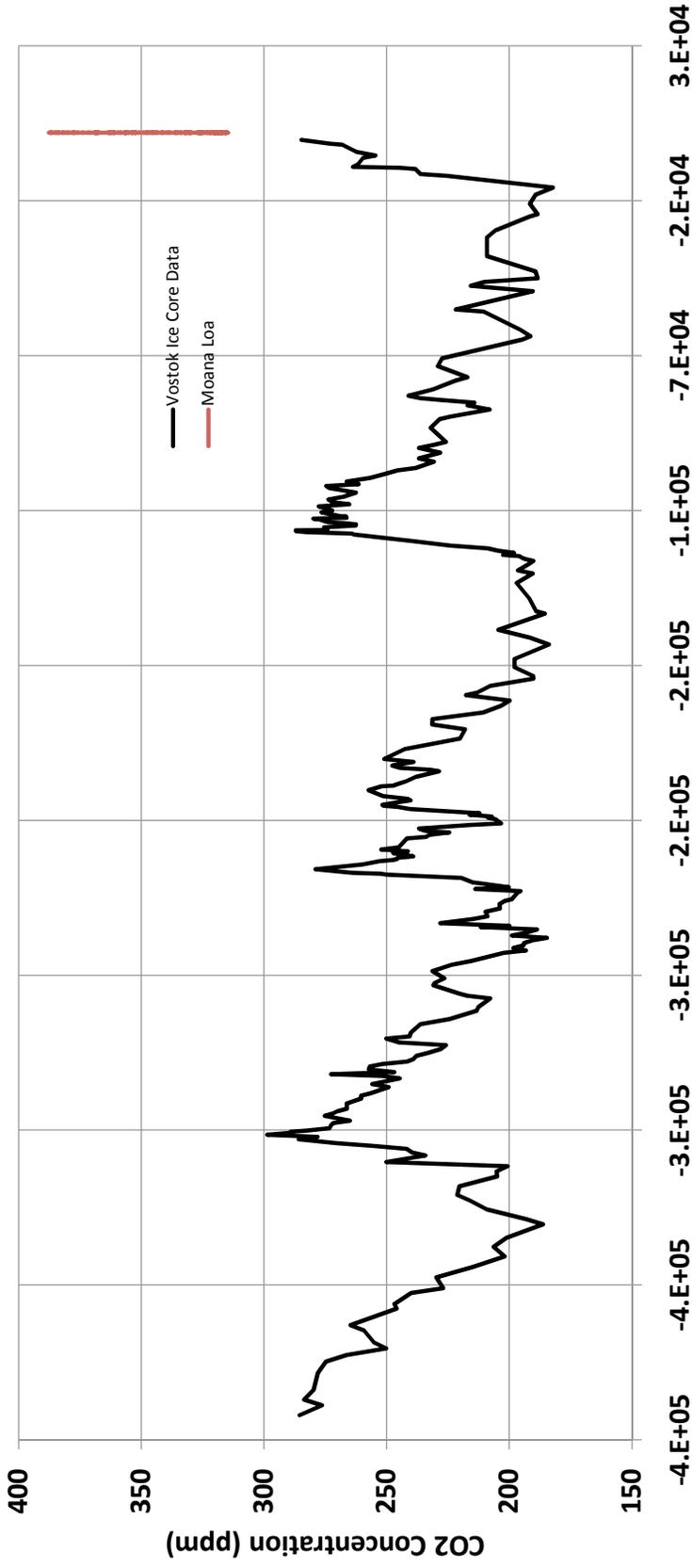
Problem 2

1. Go to the web site for Moana Loa Observatory Atmospheric Carbon dioxide.

Get the data by clicking on the **Mauna Loa CO2 monthly mean data** link.
http://www.esrl.noaa.gov/gmd/ccgg/trends/co2_data_mlo.html

2. Add the Trend data from this data set to the Graph previously created

Atmospheric CO2 Concentration from Antarctic Ice Core



DATA CITATION: Petit, J.R., et al., 2001,
Vostok Ice Core Data for 420,000 Years, IGBP PAGES/World Data Center
for Paleoclimatology Data Contribution Series #2001-076.
NOAA/NGDC Paleoclimatology Program, Boulder CO, USA.

Moana Loa Data Source:
http://www.esrl.noaa.gov/gmd/ccgg/trends/co2_data_mlo.html

ENGR-101 Project Assignments

For each of these assignments prepare a 15 minute presentation with no more than 10 slides. Be prepared to answer any questions your audience may have. Presentations will "open to the public". Form a team of no more than 4 students and register your project with the instructor. All topics and team formations are subject to instructor approval. Projects other than #1 can be done by only one group. So register your topic early?

The metrics by which presentations will be graded are as follows:

- a. Are the ideas conveyed in an easy to read and understandable way?
- b. Does presentation demonstrate basic understanding of sustainability? (and the difference between sustainable and "less unsustainable"?)
- c. Does presentation demonstrate basic understanding of sustainability? (and the difference between sustainable and "less unsustainable"?)

1. Given that a Sustainable Society must have zero fossil emissions, describe such a society.

Would such a society be necessarily post industrial?

Would all countries/cultures need to follow the same pattern?

2. Describe a transportation system for a Sustainable City.

3. Choose one of the following metals (glass, steel, aluminum or copper) and describe how it could be produced sustainably.

4. Describe a sustainable residential wall building system. Such a system must protect the occupants against weather (cold, heat, moisture), provide enough structural stability to support a second story floor and roof, support the distribution of utilities, and provide an decoratable interior finish. Compare your target system to a typical system in use today might consist of a 2 X 4 stud wall with exterior sheathing, vinyl siding, fiberglass insulation and drywall interior surface.

5. Choose one of the plastics in use today and determine if its use is at present sustainable. If its use is not at present sustainable, what changes in its mfg or use could make it sustainable? Choose a plastic from the recycling categories (1 - 7)

6. Describe the kinds of items which would be placed in a sanitary landfill in a sustainable society.

7. Choose an "essential" food from the following (coffee, tea or chocolate) and describe how it could be produced, transported and used in a sustainable way. Contrast this to present day practices.

8. Cost Analysis of Photo-Voltaic Solar Co-generation system for a home

What is the payback period in Portland, Oregon at the time of the analysis?

How many systems would it take to replace a power plant?

What is the environmental impact?

How much carbon emissions would be saved

9. Describe a sustainable municipal waste water treatment facility and compare it one in operation today.

10. Choose a commonly used product from the following list and describe how its components would be used in a cradle to cradle design (Personal Computer, household appliance (e.g.: dish washer, range, refrigerator, washing machine).
11. Any other project relating to sustainability that interests you, subject to instructor approval