Greenhouse Gas Emissions

How the choice of statistic can change our view of a problem

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Downloading Statistics Canada Data to TI InterActive! & the TI-83

Calculating Linear Regression and doing Graphical Analysis

A. Make Connection to TI-83 (Plus)

1. Connect TI-GRAPH LINK cable to communication port and TI-83

2. In TI InterActive!, select in sequence: **Edit**>**Preferences**>**Communications**
   Set: a) calculator type
   b) com port
   c) TI-GRAPH LINK cable type

B. Access Statistics Canada Website (from a computer connected to the Internet)

1. Select the TI InterActive! web browser by clicking the globe icon

2. Go to: www.statcan.ca

Click in sequence: **English**> **Canadian statistics** (in the top bar) > **Environment** (under The Land) > **Air** > Carbon dioxide emissions from fossil fuel combustion
Note: you can also go directly to the page at http://www.statcan.ca/english/Pgdb/Land/Environment/envir10.htm

3. Use the mouse to highlight all the data rows in the table from 1958 to the most recent year shown .

C. Download a Data Table from the StatCanada Canadian Statistics site (containing over 400 tables)

In the TI InterActive! browser click the **Extract** button at the top left of the screen. This downloads the selected data into the Data Editor in TI InterActive!

D. Name the Lists and Copy to TI InterActive! Document

4. In the Data Editor window, double click on the list names

5. Edit the list names to year, CO2mega, CO2cap, CO2GDP

6. Edit any cells in column 1 with superscripts on the year; in this case edit 19902 to 1990.
7. Click on the save icon (below File) to copy the list table into the TI InterActive! document.

E. Download from TI InterActive! to TI-83

1. Double click on the list table

2. In Data Editor, highlight lists to download by:
   Click first list name
   Hold Shift & click second list name

3. Select in sequence: File> Export> to TI Calculator

F. Graphic Manipulation

1. Graph the total CO2 emissions by year in TI InterActive! or your graphing calculator.

2. Calculate the linear regression (line of best fit) for the CO2 emissions. Include this line of best fit on your graph of emissions.

G. Graphic Manipulation Instructions to use in TI InterActive!

Graph 1: CO2 Emissions

1. To graph the CO2 emissions by year, double click on the Data editor.
   Control – click on the columns to be graphed, (year and CO2mega), then click on the **graph** icon (the icon with the scatterplot). This generates a scatter graph of emissions over time.
   You can also add titles, and other labelling by clicking the **Format** button
   When done, save the graph back to your document.

Analyzing the CO2 emissions graph

1) What factors might cause Canada's increase in total CO2 emissions over time? _____
   Answer: lifestyle changes, government policies, en ergy prices, population increase, economic growth

2) Compute the linear regression line to track the overall rate of increase. Is this line a reasonable predictor?
   _____

3) Based on the current trend, what can we say about Canada's goal to meet the Kyoto protocol?
   _____

4) Now let us look at emissions per capita instead of total emissions to obtain an estimate of how much emissions we each generate, on average. How do you think the above graph will change?
   _____

Graph 2: CO2 Emissions per Capita

To graph the CO2 emissions per capita by year, double click on the Data editor.
Control – click on the columns to be graphed, (year and CO2cap), then click on the **graph** icon (the icon with the scatterplot). This generates a scatter graph of emissions per capita over time.
You can also add titles, and other labelling by clicking the **Format** button. When done, save the graph back to your document.

5) While CO2 emissions per capita factors out population growth, it still increased very significantly from 1960 to 1975. How can we explain that? _____
(The increase in Canada's emissions more than compensates for the increase in Canada's population)

6) What are possible reasons for the downturn in this graph in the early 1980s and in the early 1990s?
   _____
   Answer: (recession)

7) In recent years the average CO2 emissions per person has increased to about 15 metric tonnes. Not all of this results directly from the activities of private households. Other major sources of CO2 emissions are businesses, transportation, energy, and industry, all of which relate to economic activity. This leads us to look at the level of emissions related to the economic activity.

Graph 3 – Emissions per $ of GDP

To graph the CO2 emissions per unit of GDP, double click on the Data editor.
Control – click on the columns to be graphed, (year and CO2GDP), then click on the **graph** icon (the icon with the scatterplot). This generates a scatter graph of emissions over time. Add titles, and other labelling by clicking the **Format** button
When done, save the graph back to your document.

8) From graph 3, what can we say about how are we doing with greenhouse gas emissions? _____

9) On graph 3, there was 1.13 kilograms of CO2 emissions per $ of real GDP in 1958. What does that mean?
   _____

10) From 1960 to 1970, the graph seems to be quite horizontal. What does that mean? _____

11) Are CO2 emissions really a problem, since the graph seems to show a decrease? _____