Investigating Natural Gas Production and Consumption with My World GIS Teacher Guide

Natural gas is made up of remains of dead plants and animals that lived millions of years ago. In this activity, students will use My World GIS to investigate patterns of natural gas production and consumption. They will
1. Examine countries with natural gas reserves.
2. Compare natural gas production and consumption of countries in 1980 and 2008.
3. Examine populations of countries.

Model the following procedural instructions with your students. It is recommended that you display your computer image at the front of the classroom.

Step 1: Download data.

a. Open your Web browser. Go to **www.ei.lehigh.edu/learners/energy/**

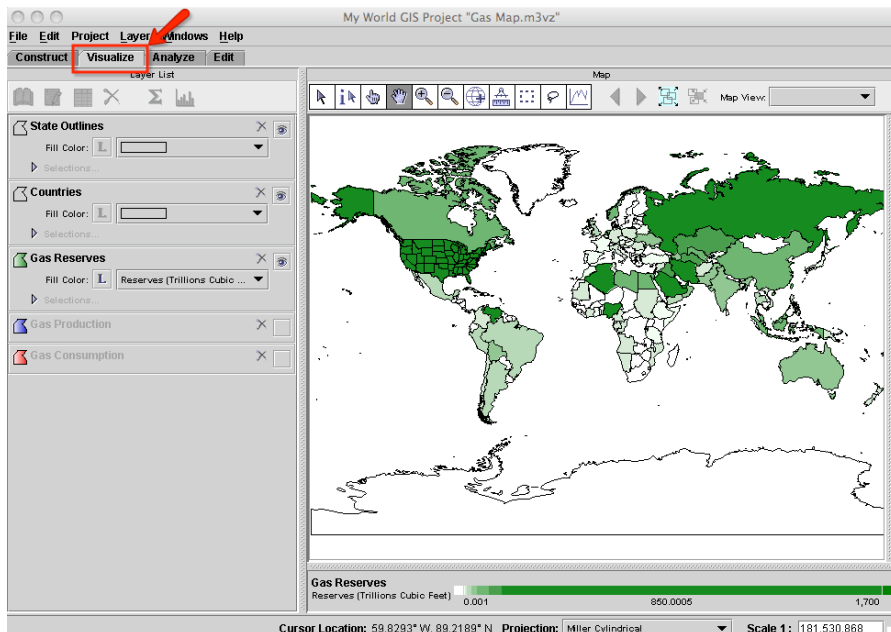b. Click on **Investigating Natural Gas Production and Consumption with My World GIS.**

This downloads the **Gas Map.m3vz** file on to your desktop (see icon below).

Step 2: Load data in My World GIS.

a. **Double click** on the **Gas Map.m3vz** icon to open the file in My World GIS.

The window below should open on your computer. Check to make sure you are in the **visualize** mode (see arrow below).

Step 3: Examine countries with natural gas reserves. (Questions 1 and 2)

Let's investigate which countries have large amounts of natural gas reserves.

a.   Click on the **Gas Reserves** layer to make it active.

b.   Click on the **table** icon on the **Layer List** tool bar.

Instruct students to answer **questions 1** and **2** on their investigation sheet.

Gas reserves are listed in amounts of trillions of cubic feet. 1 trillion = 1,000,000,000,000.
1 cubic foot = 28.32 liters

c.   Close the **Table of Layer "Gas Reserves"** window.

d.   Click the eye in the upper right corner of the **Gas Reserves** layer to turn it off (see arrow below).

Step 4: Analyze natural gas production. (Questions 3 - 6)

Let's investigate,
- ➢ Which countries produced large amounts of natural gas in both 1980 and in 2008?
- ➢ Which countries produced more natural gas in 2008 than in 1980?
- ➢ Which countries produced less natural gas in 2008 than in 1980?

a.   Click the small square at the right end of the **Gas Production** layer to turn the layer on (see arrow below).

b.   Click the **Gas Production** layer to make it active.

This map displays countries that produced natural gas in 2008. Countries that produced a lot of natural gas have a darker blue color. Countries that produced a little natural gas have a lighter blue color. Countries that did not produce any natural gas are white. Countries whose natural gas production data was not yet available are gray in color.

Which countries produced a lot of natural gas in both 1980 and in 2008?

NOTE: GP2008 means gas production in 2008 and **GP1980** means gas production in 1980.

c.   Click on the **table** icon on the **Layer List** tool bar.

d.   Sort the **GP2008 (Billion Cubic Feet)** column in descending order.
Helpful hint: Click the column twice.

Instruct students to answer **question 3** on their investigation sheet. Write the top 4 countries that produced large amounts of natural gas in the **2008 Natural Gas Production Data Chart** on your investigation sheet.

e. Sort the **GP1980 (Billion Cubic Feet)** column in descending order.
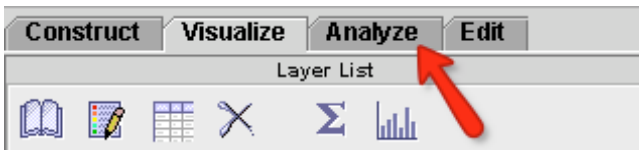   **Helpful hint:** Click the column twice.

Instruct students to write the top 4 countries that produced large amounts of natural gas in the **1980 Natural Gas Production Data Chart** on their investigation sheet. Instruct stuednts to use the **GP2008 (Billion Cubic Feet)** column to answer **question 4**.

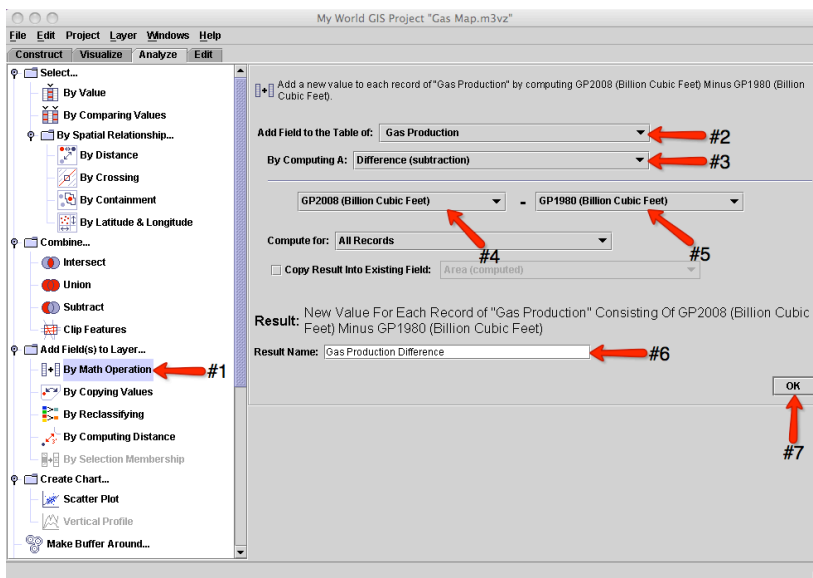f. Close the **Table of Layer "Gas Production"** window.

Which countries produced more natural gas in 2008 than in 1980? Which countries produced less natural gas in 2008 than in 1980?

You will use the **analyze** mode to calculate the difference of natural gas produced by countries in 2008 and in 1980.

g. Click on the **Analyze** tab above the **Layer List** (see arrow below).

Click **By Math Operation** (see arrow #1 below).
Click the box to the right of **Add Field to the Table of** and select **Gas Production** from the list (see arrow #2).
Click the box to the right of **By Computing A** and select **Difference (subtraction)** from the list (see arrow #3).
Below that, select **GP2008 (Billion Cubic Feet)** in the box on the left (see arrow #4) and select **GP1980 (Billion Cubic Feet)** in the box on the right (see arrow #5).
Type **Gas Production Difference** in the **Result Name** text box (see arrow #6).
Click **OK** (see arrow #7).

NOTE: GP2008 means gas production for 2008 and **GP1980** means gas production for 1980.

My World GIS will display the **Gas Production Difference** map.

h. Click on the **table** icon on the **Layer List tool bar.** You will notice that My World GIS added a column called **Gas Production Difference** to the Gas Production data table. This column displays the difference of natural gas produced by countries in 1980 and 2008.

Instruct students to use the **Gas Production Difference** column to answer **questions 5** and **6** on their investigation sheet.

The **positive numbers** at the top of that column mean that those countries **produced more natural gas** in 2008 than in 1980. Their natural gas production increased.

The **zeros** mean that those countries **did not produce** any natural gas in 2008 and 1980. Countries that produced the same amount of natural gas in 2008 and 1980 also have zeros because there was no difference in their natural gas production.

The **negative values** mean that those countries **produced less natural gas** in 2008 than in 1980. Their natural gas production decreased.

The 2008 natural gas production data for some countries at the bottom of the column was not yet available.

i. Close the **Table of Layer "Gas Production"** window.

j. Click the eye in the upper right corner of the **Gas Production** layer to turn it off.

Step 5: Examine natural gas consumption. (Questions 7 - 9)

Let's investigate,
  ➤ Which countries consumed **more** natural gas in 2008 than in 1980?
  ➤ Which countries consumed **less** natural gas in 2008 than in 1980?

a. Click the small square at the right end of the **Gas Consumption** layer to turn the layer on.

b. Click the **Gas Consumption** layer to make it active.

This map displays countries that consumed natural gas in 2008. Countries that consumed a lot of natural gas have a darker red color. Countries that consumed a little natural gas have a lighter red color. Countries that did not consume any natural gas are white. Countries whose natural gas consumption data was not yet available are gray in color.

Which countries consumed more natural gas in 2008 than in 1980? Which countries consumed less natural gas in 2008 than in 1980?

You will use the **analyze** mode to calculate the difference of natural gas consumed by countries in 2008 and in 1980.

c. Click on the **Analyze** tab above the **Layer List**.
Click **By Math Operation**.
Click the box to the right of **Add Field to the Table of** and select **Gas Consumption** from the list.
Click the box to the right of **By Computing A** and select **Difference (subtraction)** from the list.

Below that, select **GC2008 (Billion Cubic Feet)** in the box on the left and select **GC1980 (Billion Cubic Feet)** in the box on the right.
Type **Gas Consumption Difference** in the **Result Name** text box.
Click **OK**.

NOTE: GC2008 means gas consumption for 2008 and **GC1980** means gas consumption for 1980.

My World GIS will display the **Gas Consumption Difference** map.

d. Click on the **table** icon on the **Layer List tool bar.** You will notice that My World GIS added a column called **Gas Consumption Difference** to the Gas Consumption data table. This column displays the difference of natural gas consumed by countries in 1980 and 2008.

 Instruct students to use the **Gas Consumption Difference** column to answer **questions 7** and **8** on their investigation sheet. Instruct students to use the **GC2008 (Billion Cubic Feet)** to answer **question 9**.

The **positive numbers** at the top of that column mean that those countries **consumed more natural gas** in 2008 than in 1980. Their natural gas consumption increased.

The **zeros** mean that those countries **did not consume** any natural gas in 2008 and 1980. Countries that consumed the same amount of natural gas in 2008 and 1980 also have zeros because there was no difference in their natural gas consumption.
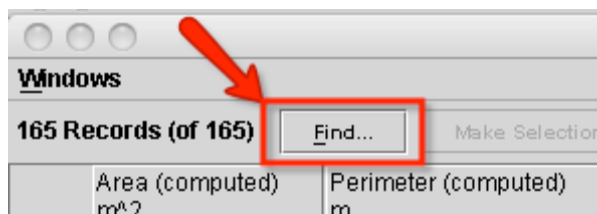
The **negative values** mean that those countries **consumed less natural gas** in 2008 than in 1980. Their natural gas consumption decreased.

The 2008 natural gas consumption data for some countries at the bottom of the column was not yet available.

 Instruct students to use the **GC2008 (Billion Cubic Feet)** column in My World GIS to complete the **Natural Gas Consumed in 2008** column on their investigation sheet.

Students can use the **Find** feature located in the top left side of the data table (see arrow below) to search for the countries.

e. Close the **Table of Layer "Gas Consumption"** window.

f. Click the eye in the upper right corner of the **Gas Consumption** layer to turn it off.

g. Click the small square at the right end of the **Gas Production** layer to turn it on.

h. Click the **Gas Production** layer to make it active.

i. Click on the **table** icon on the **Layer List** tool bar**.**

Instruct students to use the **GP2008 (Billion Cubic Feet)** column in My World GIS to complete the **Natural Gas Produced in 2008** column on their investigation sheet.

Instruct students to answer **questions 10 - 12** on their investigation sheet.