



# Homework #1 Help

## Energy Production and Consumption Problem

### Background Information

The United States Energy Information Administration regularly publishes reports on energy production and consumption both in the United States and around the world. Throughout the U.S., a wide variety of sources generate energy including fossil fuels such as coal and natural gas along with renewable sources like solar, wind, and hydropower.



### Problem Statement

In this assignment, students will analyze energy production sources and consumption by different economic sectors across the United States.

### Instructions

**IMPORTANT:** This is not the actual Homework for your section. You will not receive any credit for completing this project.

**IMPORTANT:** Complete the steps below in the order they are given. Completing the steps out of order may complicate the assignment or result in an incorrect result.

1. Download and extract the provided Data Files ZIP file. It contains the following files for use in this assignment:
  - a. **production.csv** – Information on the various sources of energy (electricity and otherwise) produced in each state during 2014 [1].

Column Name	Type	Description
<b>State</b>	Text	Name of the state.
<b>Coal</b>	Number	Energy produced from coal in trillion BTUs.
<b>Natural Gas</b>	Number	Energy produced from natural gas in trillion BTUs.
<b>Petroleum</b>	Number	Energy produced from petroleum in trillion BTUs.
<b>Nuclear</b>	Number	Energy produced from nuclear power in trillion BTUs.
<b>Renewable</b>	Number	Energy produced from renewable sources (wind, solar, hydropower, geothermal) in trillion BTUs.
<b>Total Production</b>	Number	Total energy production in trillion BTUs.



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- b. **consumption.csv** – Information on energy consumed by different sectors of the economy in 2014 [2].

Column Name	Type	Description
<b>State</b>	Text	Name of the state.
<b>Residential</b>	Number	Energy used residentially in trillion BTUs.
<b>Commercial</b>	Number	Energy used commercially in trillion BTUs.
<b>Industrial</b>	Number	Energy used industrially in trillion BTUs.
<b>Transportation</b>	Number	Energy used on transportation in trillion BTUs.
<b>Total Consumption</b>	Number	Total energy consumption in trillion BTUs.

- Begin by creating a new Microsoft Excel workbook named **lastname\_firstname\_hh1\_epcp.xlsx**.
- We must adjust the sheets in our workbook.
  - Rename *Sheet1* to *Production*.
  - Add a new sheet named *Consumption*.
  - Add a new sheet named *Analysis Questions*.
- Import the following items into the workbook:
  - production.csv** file – Import starting in cell **A3** of the *Production* sheet. The file is comma-delimited and has headers.
  - consumption.csv** file – Import starting in cell **A3** of the *Consumption* sheet. The file is comma-delimited and has headers.
- We wish to apply formatting to the *Production* sheet.
  - Create a table based on cells **A3** through **G54** using a style of your choice. The table has headers.

The table will overlap external data ranges. Convert the selection to a table and remove all external connections.
  - We need to add additional columns to store rank and percentage data.
    - Insert two new table columns to the right of existing column **G**.
  - For the table, turn on the **Total Row** option.
  - Enter text in the cells as indicated below.
    - A1**: Energy Production - *Firstname Lastname*
    - H3**: Total Production Rank
    - I3**: Renewable Percentage
  - Merge-and-center cells **A1** through **I1**.
  - Set the font size to 16-point for cell **A1**.



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6. We need to perform additional calculations to analyze the *Production* sheet data.
- In column **I**, calculate the percentage of total energy production from renewables using the formula:
$$\frac{[\textit{Renewable}]}{[\textit{Total Production}]}$$
  - In column **H**, use the `RANK.EQ()` function to rank each state by the total production of energy.
  - We would like to summarize our usage data.
    - In the total row, individually sum columns **B** through **G**.
    - In the total row, do not display any statistics in columns **H** and **I**.
7. We must apply additional formatting to the *Production* sheet.
- Add borders to the cells as indicated below:
    - G3** through **G55**: left – thick solid line
    - H3** through **H55**: left – thin solid line
  - Format the cells as indicated below:
    - B4** through **G55**: number with 1 decimal place, use 1000 separator
    - I4** through **I54**: percentage with no decimal places
  - AutoFit the widths of columns **A** through **I**.
  - Apply conditional formatting to the renewable percentage in cells **I4** through **I54**.
    - If the percentage was less than 25% ( $< 0.25$ ), change the cell fill color to red and the text color to white.
    - If the percentage was at least 50% ( $\geq 0.5$ ), change the fill color to green and the text color to white.
8. We also wish to apply formatting to the *Consumption* sheet.
- Create a table based on cells **A3** through **F54** using a style of your choice. The table has headers.

The table will overlap external data ranges. Convert the selection to a table and remove all external connections.
  - We need to add an additional column to store percentage data.
    - Insert one new table column to the right of column **F**.



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- c. Enter text in the cells as indicated below:
    - i. **A1**: Energy Consumption by State
    - ii. **G3**: Transportation Percentage
  - d. Merge (but do not center) cells **A1** through **G1**.
  - e. Apply the *Title* cell style to cell **A1**.
9. On the *Consumption* sheet, we wish to calculate consumption statistics.
- a. In column **G**, calculate the percentage of total energy consumed by transportation using the formula:
$$\frac{[Transportation]}{[Total\ Consumption]}$$
10. We must apply additional formatting to the *Consumption* sheet.
- a. Format the cells as indicated below:
    - i. **B4** through **F54**: number with 1 decimal place, use 1000 separator
    - ii. **G4** through **G54**: percentage with no decimal places
  - b. AutoFit the widths of columns **A** through **G**.
11. We need to setup the *Analysis Questions* sheet so that it can store responses to the analysis questions.
- a. Enter text in the cells as indicated below:
    - i. **A1**: Question Number
    - ii. **B1**: Response
  - b. Bold the contents of row **1**.
  - c. AutoFit the width of column **A**. Set the width of column **B** to 100 (8.39").
  - d. Set the height for rows **2** through **5** to 110 (1.53").
  - e. Change the vertical alignment setting for columns **A** and **B** so that the text is displayed at the top of each row.
  - f. Turn on text wrapping for column **B**.
12. Starting in row **2** of the *Analysis Questions* sheet, answer four of the five analysis questions below. Respond to one question per row.
- a. In many states, renewables are the largest source of energy. Why might this be the case?
  - b. West Virginia produced 4,154 trillion BTUs of energy in 2014, but only consumed 753 trillion BTUs. What happened to the rest?
  - c. Do you see any patterns in the states that have a large percentage of energy consumed by transportation? Explain your reasoning.



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- d. Hawaii has the highest percentage of energy used on transportation of any state. Why do you think this is the case?
- e. What sort of factors might influence the sources of energy used in a state?

### Grading Rubric

This is a practice assignment and is worth no points. A comparable Homework would be worth 50 points and graded using this rubric, with partial credit awarded as appropriate:

Steps 3a-c	1.5 points total	Steps 7d(i)-(ii)	4 points total
Step 4	5 points	Steps 8a-e	3 points total
Steps 5a-f	3.5 points total	Step 9a	4 points total
Step 6a	4 points total	Steps 10a-b	1.5 points total
Step 6b	5 points total	Steps 11a-f	3 points total
Steps 6c(i)-(ii)	3.5 points total	Steps 12a-e (pick 4 of 5)	2.5 points each
Steps 7a-c	2 points total		

The analysis questions in Steps 12a-e can be evaluated using this rubric:

Standard	Meets Requirements (1.25 points)	Does Not Meet Requirements (0 points)
Answer is reasonable.	Answer addresses the question prompt and is factually correct or a reasonable interpretation of available data.	Answer does not address the question prompt, is factually incorrect, or is an unreasonable interpretation of available data.
Answer is supported.	Logical rationale is provided to support the given answer.	Logical rationale is not provided to support the given answer.

### Acknowledgments

The image in the introduction appears courtesy of Brian M. Powell [3].

### References

- [1] "State Energy Production Estimates: 1960 through 2014," *Energy Information Administration*. Available: [http://www.eia.gov/state/seds/sep\\_prod/SEDS\\_Production\\_Report.pdf](http://www.eia.gov/state/seds/sep_prod/SEDS_Production_Report.pdf).
- [2] "Energy Consumption Overview: Estimates by Energy Source and End-Use Sector," *Energy Information Administration*. Available: [http://www.eia.gov/state/seds/data.cfm?incfile=/state/seds/sep\\_sum/html/sum\\_btu\\_1.html&sid=US](http://www.eia.gov/state/seds/data.cfm?incfile=/state/seds/sep_sum/html/sum_btu_1.html&sid=US).
- [3] B. M. Powell, *Mount Storm Power Plant*. 2010. Available: <https://flic.kr/p/8QsRmx>.