



# Homework #1 Help

## Energy Production Problem

### Background Information

The United States Energy Information Administration regularly publishes reports on energy production 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 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 the United States for the years 1960 to 2021 [1].

Column Name	Type	Description
<b>Year</b>	Number	Year of the data.
<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, biofuel) in trillion BTUs.
<b>Total Production</b>	Number	Total energy production in trillion BTUs.

2. Create a new Microsoft Excel workbook named **hwhelp1\_epp\_lastname\_firstname.xlsx**.



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3. We must adjust the sheets in our workbook.
  - a. Rename *Sheet1* to *Production*.
  - b. Add a new sheet named *Analysis Questions*.
4. Import the following items into the workbook:
  - a. **production.csv** file – Import starting in cell **A3** of the *Production* sheet. The file is comma-delimited. Its first row contains headers.
5. We wish to apply formatting to the *Production* sheet.
  - a. We must set up a table to store data on energy production.
    - i. If a table does not already exist in cells **A3** through **G65**, create one using a style of your choice. The table has headers and will overlap external data ranges. If prompted, convert the selection to a table and remove all external connections.
    - ii. If a table already exists in cells **A3** through **G65**, format the table using a style of your choice other than the default table style.
  - b. We need to add additional columns to store rank and percentage data.
    - i. Insert two new table columns to the right of existing column **G**.
  - c. For the table, turn on the **Total Row** option.
  - d. Enter text in the cells as indicated below.
    - i. **A1**: Energy Production - *Firstname Lastname*
    - ii. **H3**: Total Production Rank
    - iii. **I3**: Renewable Percentage
  - e. Merge-and-center cells **A1** through **I1**.
  - f. Set the font size to 16-point for cell **A1**.
6. We need to perform additional calculations to analyze the *Production* sheet data.
  - a. In column **I**, calculate the percentage of total energy production from renewables using the formula:
$$\frac{[Renewable]}{[Total Production]}$$
  - b. In column **H**, use the `RANK.EQ()` function to rank each state by the total production of energy.
  - c. We would like to summarize our usage data.
    - i. In the total row, individually sum columns **B** through **G**.
    - ii. In the total row, do not display any statistics in columns **H** and **I**.



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7. We must apply additional formatting to the *Production* sheet.
  - a. Format the cells as indicated below:
    - i. **B4** through **G66**: number with 1 decimal place, use 1000 separator
    - ii. **I4** through **I65**: percentage with no decimal places
  - b. AutoFit the widths of columns **A** through **I**.
  - c. Apply conditional formatting to the renewable percentage in cells **I4** through **I65**.
    - i. If the percentage was less than 8% ( $< 0.08$ ), change the cell fill color to red and the text color to white.
    - ii. If the percentage was at least 11% ( $\geq 0.11$ ), change the fill color to green and the text color to white.
  
8. We wish to create a chart to plot the energy production for each year.
  - a. Create a 2-D line chart based on cells **A3** through **G65** of the *Production* sheet. Move the chart to a new sheet named *Production Chart*.

Ensure the years are shown as labels for the horizontal (category) axis, not plotted as chart data. Specify appropriate chart and axis titles.
  - b. Add a trendline based on the total energy production. Use the trendline type that best fits the data and forecast the values forward 10 periods (through the year 2031). Display the **R-squared** value on the chart.

**NOTE:** You cannot use the *Moving Average* type for your trendline.
  
9. We need to set up 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.
  - d. Set the height for rows **2** through **4** to 110.
  - 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**.



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10. Starting in row **2** of the *Analysis Questions* sheet, answer three of the five analysis questions below. Respond to one question per row.
- Which trendline type did you use on *Production Chart*? Why did you choose this type of trendline?
  - In many states, renewables are the largest source of energy. Why might this be the case?
  - American production of petroleum and natural gas took a sharp upturn starting around 2011. What is the reason for this strong growth?
  - West Virginia produced 5,497 trillion BTUs of energy in 2021 but only consumed 853 trillion BTUs. What happened to the rest?
  - Hydropower production has been on a downward trend over the past several years. Do you believe this decreasing pattern is likely to continue? Why?

## Grading Rubric

This is a practice assignment and is worth no points. A comparable Homework would be worth 60 points and graded using this rubric, with partial credit awarded as appropriate:

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

The analysis questions in Steps 10a-e will be evaluated using this rubric:

Standard	Meets Requirements (1.5 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 [2].



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### References

- [1] "State Energy Data System: Production Estimates 1960-2021," 2023. Available:  
[https://www.eia.gov/state/seds/sep\\_prod/xls/Prod\\_dataset.xlsx](https://www.eia.gov/state/seds/sep_prod/xls/Prod_dataset.xlsx).
- [2] B. M. Powell, *Mount Storm Power Plant*. 2010. Available:  
<https://flic.kr/p/8QsRmx>.