**Integration and Testing Documentation**

***Integration***

Data importation refers to the process of transferring data from an external source into Excel. This allows you to work with larger datasets or combine data from different sources for analysis and reporting purposes.

* Open a new SQL server workbook.
* Create three tables: Households, Energy Sources, and Consumption Records.
* In the import wizard, ensure the data is correctly separated into columns.
* Click load to import the data into the respective sheets.

Data Consistency and Accuracy:

* Check for any missing values or inconsistencies in the imported data.
* Ensure all numeric values are formatted correctly (e.g., energy consumption as numbers, dates in a consistent format).
* Verify that the household\_id and source\_id in the Consumption Records sheet match the IDs in the Households and Energy Sources sheets.
* Use Excel's data validation features to set acceptable ranges for numeric values.

Data Preparation:

* Create named ranges for each dataset to make referencing easier in formulas.
* Set up any necessary lookup tables or helper columns for calculations.

***Testing***

Test the functionality of the Excel dashboard:

Data Accuracy:

* Cross-check the total energy consumption calculated in Excel against the sum we calculated earlier (1507.6 kWh).
* Verify that the household rankings match our previous analysis (Cape Town highest, Sydney lowest).
* Confirm that the energy source efficiency ratings are correctly displayed and ranked.

Chart and Visualization Testing:

* Ensure the bar chart of household energy consumption accurately reflects the data and is sorted correctly.
* Check that any pie charts or other visualizations correctly represent the proportions of energy consumption or efficiency ratings.
* Verify that chart labels, titles, and legends are clear and accurate.

Interactivity Testing

* Test any filters or slicers to ensure they correctly update the visualizations and calculations.
* Verify that any drop-down menus or selection tools work as intended.

Calculation Testing:

* Manually calculate a few key metrics (e.g., average consumption, percentage above/below average) and compare with Excel's results.
* Check that any complex formulas or array functions are returning expected results.

Error Handling:

* Test the dashboard with extreme or unexpected values to ensure it handles them gracefully.
* Verify that any error messages or warnings are clear and helpful.

Performance Testing:

* Check the file size and calculation speed, especially if working with larger datasets.
* Optimize any resource-intensive formulas or features if necessary.

User Experience Testing:

* Navigate through the dashboard as an end-user would, ensuring the flow is logical and intuitive.
* Verify that all text is readable and that color schemes are appropriate (including for color-blind users).

Documentation:

* Ensure any instructions or notes within the dashboard are clear and up-to-date.
* Document any assumptions made in calculations or data processing.