

Grading Rubric: Campus Energy Audit — Analysis with Python in Excel

9 tasks | 100 points total

Task Requirements

#	Pts	Location	Requirement	Automated checks
1	5	Analysis!B2	In cell B2 of the Analysis sheet, write a formula that sums all values in the ElectricityKWh column (Readings!F2:F121) to find the total electricity consumed across all buildings and months. (Skills: sum)	sheet exists: 'Analysis' formula in cell: Analysis!B2 uses SUM calculated, not typed: Analysis!B2
2	5	Analysis!B3	In cell B3 of the Analysis sheet, write a formula that calculates the average monthly TotalCost (Readings!J2:J121) across all buildings and months. (Skills: average)	sheet exists: 'Analysis' formula in cell: Analysis!B3 uses AVERAGE calculated, not typed: Analysis!B3
3	10	Analysis!C8, C9, C10, C11, C12, C13	In cells C8 through C13 of the Analysis sheet, first type the six building names in B8:B13 (Wells Hall, Engineering, Library, Union, Chemistry, Recreation — one per row). Then in C8, write a SUMIF formula that totals ElectricityKWh (Readings!F2:F121) where the Building column (Readings!C2:C121) matc	sheet exists: 'Analysis' formula in cell: Analysis!C8 uses SUMIF formula in cell: Analysis!C13 uses SUMIF calculated, not typed: Analysis!C8, C9, C10, C11, C12, C13
4	10	Analysis!B16	In cell B16 of the Analysis sheet, write a SUMIF formula that sums TotalCost (Readings!J2:J121) only for rows where BuildingType (Readings!D2:D121) equals "Academic". This will reveal how much of the total utility budget is spent on academic buildings. (Skills: sumif)	sheet exists: 'Analysis' formula in cell: Analysis!B16 uses SUMIF calculated, not typed: Analysis!B16
5	15	Analysis!E2	In the Analysis sheet, beginning at cell E2, create a PivotTable sourced from Readings!A1:J121. Configure it so that Building names appear as Row Labels, the column field is empty, and the Values area shows the Sum of ElectricityKWh and the Sum of GasTherms — one column for each measure. This table	sheet exists: 'Analysis' pivot table present on 'Analysis'
6	15	Dashboard	In the Dashboard sheet, insert a Bar Chart (clustered) that visualises total ElectricityKWh and total GasTherms per building, using the PivotTable data you created in Task 5 (Analysis!E2 and surrounding cells) as its source. The chart should have a descriptive title such as 'Energy Consumption by Bu	sheet exists: 'Dashboard' chart present: BarChart on 'Dashboard'

#	Pts	Location	Requirement	Automated checks
7	10	Analysis!A2	In cell A2 of the Analysis sheet, write a Python in Excel formula that reads the entire Readings data (Readings!A1:J121) as a DataFrame with headers, then returns a new DataFrame containing only the columns Building, ElectricityKWh, GasTherms, and TotalCost. The resulting object will spill into surr	sheet exists: 'Analysis' formula in cell: Analysis!A2 uses PY
8	15	Analysis!A25	In cell A25 of the Analysis sheet, write a Python in Excel formula that loads Readings!A1:J121 as a DataFrame, computes the Pearson correlation coefficient between HeatingDegreeDays and GasTherms and the Pearson correlation between CoolingDegreeDays and ElectricityKWh, and returns a two-row DataFram	sheet exists: 'Analysis' formula in cell: Analysis!A25 uses PY
9	15	Dashboard!A2	In cell A2 of the Dashboard sheet, write a Python in Excel formula that loads Readings!A1:J121 as a DataFrame, computes each building's average energy intensity as total ElectricityKWh divided by SquareFeet (aggregated per building), and produces a horizontal bar chart (using matplotlib) with buildi	sheet exists: 'Dashboard' formula in cell: Dashboard!A2 uses PY

Grading Policy

- A cell that holds a typed number where the task required a calculation fails that requirement even if the number is right.
- A correct formula in the wrong cell is a placement error. Award most of the credit and note the correct location.
- A misspelled sheet name that is clearly the intended sheet costs presentation points, not the whole requirement.

Checks listed as automated are verified programmatically against the submitted workbook. Requirements without automated checks are assessed by review.

Reference Solutions

Task 1 (5 pts) — Analysis!B2
`=SUM(Readings!F2:F121)`

Task 2 (5 pts) — Analysis!B3
`=AVERAGE(Readings!J2:J121)`

Task 3 (10 pts) — Analysis!C8, C9, C10, C11, C12, C13
`=SUMIF(Readings!$C$2:$C$121, B8, Readings!$F$2:$F$121)`

Task 4 (10 pts) — Analysis!B16
`=SUMIF(Readings!D2:D121, "Academic", Readings!J2:J121)`

Task 7 (10 pts) — Analysis!A2
`df = xl("Readings!A1:J121", headers=True)`
`df[["Building", "ElectricityKWh", "GasTherms", "TotalCost"]]`

Task 8 (15 pts) — Analysis!A25
`df = xl("Readings!A1:J121", headers=True)`
`r_heat = df["HeatingDegreeDays"].corr(df["GasTherms"])`
`r_cool = df["CoolingDegreeDays"].corr(df["ElectricityKWh"])`

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pd.DataFrame({"Comparison": ["HDD vs GasTherms", "CDD vs ElectricityKWh"], "Correlation": [r_heat, r_cool]})
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Task 9 (15 pts) — Dashboard!A2

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df = xl("Readings!A1:J121", headers=True)
intensity = df.groupby("Building").apply(lambda g: g["ElectricityKWh"].sum() / g["SquareFeet"].iloc[0]).sort_values()
fig, ax = plt.subplots(figsize=(8, 5))
ax.barh(intensity.index, intensity.values)
ax.set_xlabel("kWh per Square Foot")
ax.set_title("Electricity Intensity by Building (kWh / sq ft)")
plt.tight_layout()
fig
```