

MEBS6016 Energy Performance of Buildings

<http://me.hku.hk/bse/MEBS6016/>

Assignment 02: Building Energy Analysis

An Engineer is performing building energy analysis for a university building in Hong Kong and has collected the following information for the years 2012 to 2014. The building has a total gross floor area of 23,357 m² and the average electricity charge is HK\$1.4 per kWh. This building is now used for classrooms on the floors LG1 to 2/F, offices cum classrooms on the floors LG3, LG2, 3/F to 13/F, and a staff restaurant on 14/F and 15/F. Before 2012, the floors 1/F and 2/F were used for a branch library. During 2012, the branch library has moved to another building and these two floors together with some departmental and staff offices on 3/F to 13/F have been renovated and modified.

Monthly electricity consumption (x 1000 kWh)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2012	231	272	267	326	341	333	306	289	267	237	215	176
2013	188	224	223	241	274	316	325	317	342	290	257	219
2014	205	240	258	316	320	346	380	330	348	298	270	231

Monthly mean air temperature (°C)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2012	15.1	15.8	19.0	23.9	27.0	28.1	28.8	29.5	28.0	25.6	22.2	17.8
2013	16.7	19.1	20.5	21.5	25.7	28.2	28.0	28.6	27.5	25.7	21.7	16.1
2014	16.3	15.5	18.7	22.6	26.4	29.0	29.8	29.0	29.0	26.2	22.6	16.3

Building floor plan (before 2012): <http://www.safety.hku.hk/homepage/pdf/FPKKL.pdf>
(http://www.safety.hku.hk/homepage/manual_Floorplan.html)

You are asked to evaluate the energy use of this building and prepare a technical report for the analysis. The report should include the following information and it should be not more than 15 nos. of A4 pages.

- A summary of the annual total consumption and electricity cost of the building.
- The energy utilization index (EUI) in kWh/m² based on the annual consumption and gross floor area.
- Comparison of monthly electricity consumption and the deviations for the three years.
- Graph(s) to show the monthly profiles of the electricity consumption and air temperature.
- Evaluation to determine if the air temperature is a condition driver influencing the electricity consumption.
- Discussions on the main characteristics of the building and how they affect the electricity consumption. Comments on how the recent renovation and modification affect the analysis results.
- Suggestions on how to assess the energy use of this building and carry out building energy audit in a systematic way.
- Recommendations on energy management opportunities and possible technologies for improving energy efficiency of this building.