

MECH3023 Building Energy Management and Control Systems

<http://me.hku.hk/bse/mech3023/>

Assignment 02 – Building Energy Analysis

Objective

To develop the knowledge and skills for building energy analysis and energy management.

Methodology

An Engineer is performing building energy analysis for a university building in Hong Kong and has collected the following information for the years 2009 and 2010. The building has a total gross floor area of 18,940 m² and the average electricity charge is HK\$1.4 per kWh. This building is used for engineering laboratories on the floors LG to 3/F, a canteen on 4/F and departmental offices on the floors 5/F to 8/F.

Monthly electricity consumption (x 1000 kWh)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2009	298	319	303	336	351	409	396	397	481	379	348	294
2010	308	328	328	337	376	392	383	414	431	399	360	290

Monthly mean air temperature (°C)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2009	15.3	20.5	19.7	22.0	25.5	28.1	29.1	29.4	28.8	26.2	20.5	17.3
2010	16.8	17.9	20.2	21.0	25.6	27.1	29.2	28.8	28.0	24.8	21.2	18.1

You are asked to prepare a technical report for the analysis which should include the following information.

- 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 two 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.
- Suggestions on how to better monitor the building energy use and what other information should be collected for further energy analyses.

Report Submission

Each student shall prepare the technical report in a systematic way. The report should be not more than ten (10) A4 pages to address the above aspects. Other important issues may also be included. If appropriate, a list of references should be provided at the end of the report. The report shall be submitted in electronic format (PDF file) to the lecturer (cmhui@hku.hk).