MSc in Energy Systems

BUILDING ENERGY MANAGEMENT

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ASSIGNMENT PROJECT 1 (60%)

Due Date: June 27, 2020

The goal of this assignment is to perform a short building energy audit, collect and synthesize information, perform supporting calculations and present properly analyzed and supported results to address the objectives outlined below.

- Select and perform a short audit of a residential building - apartment building or house (*). The presentation should include: one general building picture (or a picture of each façade) and a typical floor layout (e.g. scan floor plans or provide a simple drawing-sketch). Tabulate information for: location, address, construction year, basic building dimensions, overview of construction materials of opaque elements & fenestration for all orientations (specify materials and if there is thermal insulation along with the corresponding U-values & area per orientation), total heated and/or air-conditioned floor area, discussion on the site layout (e.g. the building's location in relation to neighboring buildings) and the immediate outdoor environment - microclimate, detailed description of the building's central heating system (e.g. boiler, pumps and other major equipment in the mechanical room, distribution system, delivery units (e.g. radiators etc) or any other heating systems (e.g. use of portable radiators, fire place), mechanical ventilation (if any) and cooling (air-conditioning) equipment, solar collectors (e.g. area of solar collectors, hot water storage tank etc), lighting and all other major electromechanical (E/M) installations and equipment/appliances that consume energy (include number of units, type, year of installation, power rating at different modes, operating hours, controls, option for stand-by mode, etc). *Organize your presentation using proper sections-headings (you may consult the Sample Assignment Report).*
  Relevant data should be properly presented in tables with suitable references & detailed calculations - analysis in Appendices. *You may wish to use the building energy audit forms of TOTEE 20701-4/2017 to facilitate your work.*
  Collect energy bills and data over at least the past three years for: a) thermal (oil or gas) and b) electrical (for common use spaces and your apartment – in case of an apartment building). If possible, collect data from other apartments.
  Clearly state any assumptions, if necessary, and elaborate. Provide all sources-references used.
- Estimate the heating power demand of the building and compare against the installed heat production unit.
- Estimate the average annual thermal and electrical energy use per unit floor area of the entire building.
  Use **1)** the energy bills; **2)** the method presented in class for calculating the energy use for space heating and estimate the electrical energy use for the other final end-uses (e.g. cooling, DHW, cooking, major appliances etc). Discuss & comment on the results of the: **a)** average thermal & electrical energy use intensity over the past years; **b)** building's energy use intensity against national average values of Hellenic buildings (provide references).

(*) *You may choose your residence if the necessary data is available. Alternatively, you need to find another residential or even non-residential building that you have easy access to and the necessary data is available.*

Instructions

- Submit your report in **English,** in a **single file** both **electronically** (email/CDROM) & as a **hard copy** at the **secretariat's office**.
- The text should be typed using a font size 12 pt and the number of pages of the main report (without the Appendices) should not exceed **10 pages** (otherwise your grade will be penalized). Follow the guidelines of a **technical report** structure (*Sample Assignment Report: cover page, contents, introduction, main contents using proper section headings, conclusions, references, appendices*). Include in Appendices any calculations, detailed drawings, draft notes or computer results (e.g. Excel sheets or other software output), technical specifications or brochures etc., in order to support any results or conclusions presented in the main body of the report. Don't forget to cross reference the main body of the report to the Appendices. Carefully quote references. **Elaborate & substantiate results (***simple observations are NOT sufficient*).
- **Grading** is based on the following breakdown: Overall presentation (10%), Text coherence and organization (10%), Completeness, technical content, accuracy of calculations, and text originality (80%).
- **Late submissions** past the due date will be penalized with a grade reduction of 5% per day, for upto five days. Reports will not be accepted past this deadline.