**Energy Sources and Conversion – the homework**

You are personnel of an analytical unit within a utility company. In March 2013 the executive board of your company will make a decision about potential investment into a new project – construction of a new energy system. In order to make a sound decision, it is necessary to perform appropriate techno-economic analyses and a pre-feasibility study in advance to determine if the project may be profitable. Those analyses however require collecting a wide range of information – this is your task.

Information you need to collect are as follows:

1. General list of technical solutions for the proposed project. The list should include short description of each technology and your recommendations for accepting and rejecting some of them (including justification).
2. Realistic performance expectations – equipment outputs, efficiency values and all other parameters which you identify as important for the feasibility evaluation.
3. Significant site requirements (e.g. required fuel parameters, site dimensions, noise limitations etc.).
4. List of potential key equipment suppliers (EEQ contractors).
5. List of potential turnkey (EPC) contractors – depending on the type of plant this may or may not be the same as list of equipment suppliers.
6. Information about similar projects recently built in comparable conditions (names, parameters, suppliers, investors).
7. Estimated capital investment (CAPEX) and O&M cost (OPEX).
8. Estimated construction time – from contract signature until commercial operation.
9. Information about potential subsidies from external projects and funds (EU programmes, Polish government’s funds etc.).
10. Recommendations for formal requirements in future request for proposals / tender specifications: recommended criteria for contractors’ qualification and recommended offer evaluation criteria.

During the classes of 17 October you will select your subject.

Until 24 October head of the team (or a person responsible for reporting as nominated by head of the team) shall submit the project execution schedule.

Progress of the project shall be reported in interim reports submitted by email by 1 November, 1 December and 1 January. Final report is due for 14 January 2013.

Interim reports will be evaluated by the Instructor and the team will receive feedback information about necessary improvements.

Therefore the larger part of the work is accomplished early, the more time there will be to implement any required corrections prior to the final report submission.

Evaluation of reports will focus on:

1. Clarity, completeness and briefness of reports.
2. Correctness of provided data.
3. Correctness of justifications for issued recommendations.

The final grade for the homework will be identical for all team members. Failure to present an interim report in due time shall result in unconditional final grade lowering by 0.5 (for each interim report not delivered in due time).

Delay of the final report shall result with lowering final grade by 0.5 for each started day of delay(counting from 8 a.m., 14 January 2013).

Students who get a 2.0 grade from the homework (i.e. fail) are not entitled for final course grade higher than 3.0, regardless of their final exam result.

Otherwise the final grade will be calculated as:

[Final Grade] = 0.6 × [Exam Grade] + 0.4 × [Homework Grade], result being rounded off to the nearest possible grade value (0.5 accuracy level).

Any questions concerning the homework, as well as all the reports, shall be submitted by email to the address [adam.rajewski@gmail.com](mailto:adam.rajewski@gmail.com).

Unfortunately due to unreliability of the official Institute’s email service, I must ask you not to use the official address.

Adam Rajewski

**Subjects**

1. Municipal CHP station
   * Fuel: LNG
   * Required thermal output: 3 MWth
   * Technical parameters compliant with EU CHP Directive and Polish high-efficiency cogeneration definition.
2. Industrial CHP Plant
   * Fuel: high-LHV natural gas (E type as per Polish regulations)
   * Required thermal output: 15 Mg/h process steam at 6 bar(a)
   * Technical parameters compliant with EU CHP Directive and Polish high-efficiency cogeneration definition.
3. Municipal CHP station:
   * Fuel: high-LHV natural gas (E type as per Polish regulations)
   * Required thermal output: 70 MW
   * Technical parameters compliant with EU CHP Directive and Polish high-efficiency cogeneration definition.
4. Offshore wind farm, 30 MW, off the Polish Baltic Sea coast, Pomorskie voivodeship.
5. Nuclear power plant with a total output of 2800-3400 MW
6. Commercial peaking and intermediate load power station.
   * Fuel: high-LHV natural gas (E type as per Polish regulations)
   * Required electrical output: 300-500 MW,
   * Optional hot water generation, up to 40 MW.
7. Grid stability (emergency reserve) power station for the transmission grid operator
   * Fuel: natural gas and light fuel oil (dual-fuel plant)
   * Required output: 150 MW.
   * Required startup time (startup order until full output): 15 minutes.
8. Municipal CHP station:
   * Fuel: agro-type biomass
   * Required thermal output: 1.5 MW
9. Commercial coal-fired power station, 2 × 900 MW, CCS-ready.
10. Biogas plant for a wastewater treatment plant in the City of Warsaw (use real-life data about wastewater amount). Fuel will be biogas generated from wastewater sludge.
11. Waste-to-energy plant with a waste processing capacity of 1000 Mg/day.