WATERLOO
ENGINEERING

Consulting Engineering Design Problem

Spring 2011
Waterloo Engineering Competition
July 8 - 9

General Rules & Guidelines

1. All communication devices must be turned off.
2. Competitors will be allowed to use:
    a. Computers, USB keys, CDs, pre-existing files etc.
    b. Internet
    c. Reference books

    All other tools must be cleared with the competition coordinator before use. Cell phones, online communication (e.g. MSN, GoogleChat, Skype) or other communication devices are prohibited.

    Violation of these rules may result in disqualification.
3. Visitors are not allowed throughout the development and build stage.
4. Keep work stations clean. Tidy up at the end.

Schedule

The schedule for Consulting Engineering is as follows:

Friday, July 8th	6:15 p.m. – 6:30 p.m.	Check-In	WEEF Lab
	6:30 p.m. – 7:00 p.m.	Welcome/Briefing/Question period	WEEF Lab
	7:00 p.m. – 12:00 a.m.	Design	WEEF Lab
	12:00 a.m. – 12:30 a.m.	Submissions/Debriefing	WEEF Lab
Saturday, July 9th	8:30 a.m. – 9:00 a.m.	Competitor Check-In	RCH 3rd Floor Lobby
	9:00 a.m. – 12:00 p.m.	Presentation/Demonstration	RCH 309
	12:00 p.m. – 12:30 p.m.*	Prizes and Winner Announcements	RCH 309

Volunteers will bring food and drinks around to teams between 9:00 and 9:30 p.m. Each competitor will be given one (1) can of drink. Competitors are encouraged to bring water bottles as bottled water will not be provided. There will be water fountains nearby for refills. Please remind the competition coordinators and volunteers of your dietary restrictions and/or allergies.

There will be a question period after the problem is presented during the briefing session. No questions will be answered during the development and build stage to ensure fairness in the competition.

Background Information:

Ontario's government is moving toward a sustainable future, with plans to close down all coal generation, implement time of use metering and refine standards for buildings. Commercial and Industrial buildings account for 17% of energy consumption in Canada [1].

Ontario's 2006 building code strengthened guidelines for green principles in building design [2], and there is the possibility to make the 2011 code even stronger. The Canadian Green Building Council is also working to enhance the sustainability of Canadian buildings with its LEED (Leadership in Environmental and Energy Design) certification program. Building designers and owners can earn LEED credits through various green practices, which reduce energy among other factors. LEED certification seeks a more holistic approach which incorporates life cycle design and tries to impact occupant behaviour.

As early as 2000, Ontario has been considering the prospect of partially meeting Ontario's energy needs through co-generation [3], and this continues to be an area of active research. There is also significant potential for conservation and demand management techniques for existing commercial and industrial buildings [4].

While institutions across the province and around the world are constantly working at addressing the technical challenges facing buildings, it is clear that policy and other government directives can influence operators and designers plans and choices.

P**roblem Statement**

Your group has been hired by the Government of Ontario to reduce energy consumption from commercial and industrial buildings. You are free to consider both policy and technical solutions.

Any recommendations that are not revenue-neutral should be justified with the understanding that taxpayer dollars are limited and the government has a mandate to ensure businesses and consumers are satisfied, even in the recession.

Ideally, your solution will minimize both energy and demand from buildings and help facilitate the government's plan to close down the last remaining coal generation in the province by 2014, without detrimental impacts to the Ontario economy.

Assume any current policy can be changed, upcoming projects can be cancelled or modified, and past projects can be continued or revived

Advice

Go here: http://wec.uwaterloo.ca/consulting_engineering.html to see how you will be judged ("Marking Scheme") and what you're supposed to be doing ("Deliverables").

It is highly recommended (as the marking scheme shows) to use a structured engineering design method to form the outline of the report and presentation.

Some questions that can get you started (but that do not necessarily have to be answered word-for-word; they are just meant to help you address the problem statement):

- What different strategies are there to address energy and demand at the building and provincial level?
- What other factors affect sustainable design?
- By what criteria can we measure the success of past, current and future projects?
- Where is the greatest opportunity for savings-how can we achieve the greatest benefit for our investment?
- What effect can advanced technologies play in reducing demand and consumption?
- What effect can occupant behaviour play in reducing demand and consumption?
- How do commercial and industrial buildings pay for energy and how does this shape their behaviour?

Deliverables:

1) A technical report detailing your analysis and suggested solution (body no more than 15 pages long)

2) A PowerPoint Presentation, 15-20 minutes in length.

Additional Resources

Statistics from Canadian Green Building Council, in Reference to LEED www.cagbc.org/Content/NavigationMenu/Programs/LEED/ProjectProfilesandStats/

Ontario's Green Energy Act

http://www.mei.gov.on.ca/en/energy/gea/

For Competition Details and Marking Scheme; Deliverables; Permissible Tools please refer to http://wec.uwaterloo.ca/consulting_engineering.html

You are expected to find your own data and statistics to support your analysis and solution

References

[1] Natural Resources Canada, http://canmetenergy-canmetenergie.nrcan-rncan.gc.ca/eng/buildings_communities/buildings.html

[2] Ministry of Municipal Affairs and Housing, http://www.mah.gov.on.ca/AssetFactory.aspx?did=7313

[3] HaglerBailly Canada, *Potential for Cogeneration in Ontario-Final Report*, prepared for Ministry of Energy, Science and Technology

[4] ICF Consulting, *Electricity Demand in Ontario-Assessing the Conservation and Demand Management (CDM) Potential*, prepared for Ontario Power Authority