



# The Environmental Challenge Program

...a competition for university students

## THE PROBLEM – 2011

November 8-11, Missoula, MT

*“Cross Border Air and Waste Solutions”*

### The Purpose

The Environmental Challenge gives student teams the opportunity to develop solutions to a mock environmental problem and have the experience of presenting their solution to a panel of environmental professionals. We do not give you a lot of numbers to crunch. We are more interested to hear about the issues involved, how you interpreted the problem, how you got to your conclusions, and how well you can communicate your thoughts. We want you to have fun! This exercise gives everyone attending the conference a chance to participate and gets the professionals of tomorrow to interact with the professionals of today.

### The Problem

Over the past century, modern society has seen the rise and dominance of fossil fuel use as the primary source of energy we use and depend upon. Now, over the past few decades, with the looming inevitability of “peak” oil, national security concerns over dependence on foreign oil, and growing evidence of anthropogenic contributions to climate change through greenhouse gas emissions from fossil fuel combustion, there is a mounting drive to shift our energy infrastructure to one that is based on sources that are more sustainable and less pollution generating. One popular and promising form of sustainable energy is that of wind farming, the process of harvesting wind energy and converting it into electricity. As of June 2011, the world wind energy association reported that the top five wind harvesting countries around the world were as follows: 1) China with ~ 53 GW; 2) United States with ~ 42 GW; 3) Germany with ~27 GW; 4) Spain with ~ 21 GW; and 5) India with 14 GW. As more and more wind power installations are installed across the landscape, it becomes increasingly important to consider the compatibility of this source of power to the grid. Since wind farming is only generating energy when the wind is blowing, it is important to ensure a reliable backup power source that can supply electricity during low wind events. New power sources can only be installed into the grid if they can be counted on for a reliable source of power, so that the grid supply does not fall below the demand and induce rolling blackouts.

Vancouver, British Columbia, is a city on the move. It’s looking to contribute to the rise of Canada on the wind farm scene from its current status at ~ 5 GW. The mayor has commissioned Windy Bellows Incorporated, whose motto is “The Answer My Friend is Blowing in the Wind,” to install numerous wind turbines, totaling 300 MW, in various locations around the greater Vancouver Area. The company was founded by none other than Windy Bellows, and has taken

personal responsibility for launching this project. The location and permitting for the wind farm are all but complete except for the decisions that still need to be made on what type of load shaping power plant will provide backup power and where to locate the backup plant.

Windy Bellows Inc. has installed many wind farms over the years throughout North America, however, they seem to be having a greater than usual difficulty with negative publicity with required backup power plant. It seems that an insider to the Mayor's office leaked a memo from Windy Bellows to Mayor Chuck Canuck outlining current options for the proposed load shaping plant. Recently riled up from the current oil shale debate, the anti fossil fuel non-governmental organization, Greener Rinks through Ethical Environmental Energy Now (GREEN), is up in arms and flooding local news papers with op-eds. GREEN was founded by a group of environmentally conscious hockey fans whose initial charter was to advocate for reducing the carbon footprint of hockey rinks, but has now branched out to larger national issues. Although, no specific type of backup power plant has been established, GREEN is leading a campaign to push Windy Bellows to establish a non-fossil fuel backup power option.

*“How can we sit idly by and let this beneficial green technology, wind energy, be sullied by the installation of a dirty fossil fuel based energy system. We must take a stand and have a no tolerance policy. It seems to me that it's one step forward and two steps back. What good is a clean energy wind farm if we have black soot settling on our rinks? We demand that Vancouver's citizens must hold our community to a higher standard and insist that backup power solution be a green power solution!”*

**Fin Willie ~ GREEN Spokesman**

The mayor of Vancouver is determined to get this issue settled before the elections this next year. He doesn't care what the final decision is, as long as he gets to tout adding 300 MW of wind power to the local grid.

*“I want to make clear that no decision has been made at this time regarding what type of supplemental power plant will be utilized to realize our goal of installing this wind farm. I am committed to keeping Vancouver a global leader in alternative energy, but we must keep all options on the table to come up with an affordable and sustainable power generating option. I assure you we are employing the brightest minds so come up with the very best solution. Vancouver will certainly be better off, I assure my constituents this.”*

**Chuck Kanuck ~ Vancouver Mayor**

To complicate matters, another local group is strongly advocating the use of Canada's abundant fossil fuel natural resources. Better Economies through Enabling Resources (BEER) is rallying a large contingent of potential voters around the idea that coupling a fossil fuel based backup power plant is just what Canada needs in these hard economic times, considering the abundant supply of natural gas, coal, and oil found in the country.

*“Sure we’d like to see renewable energy being utilized, but isn’t that what’s already happening here. They’re going to get a 300 MW wind farm going on line, which is 100 percent electricity coming from a sustainable source. We’re just asking that the supplemental power come from our natural resources that are local and cheap. By using our resources, we create jobs and increase revenue, how is that a bad thing?”*

Ivana Maika DePower ~ **BEER Enthusiast**

Windy Bellows has remained absent from public comment. Windy understands that this is a sensitive issue for her client, Chuck Kanuck, and do not want to stir the pot, so to speak, they just want to get a solution that is defensible to the mayor as soon as possible. Since Windy Bellows primarily works with wind farm technology, the company is requesting bids for a solution to their supplemental power.

The local regulatory agency, represented by Abet Con Cerned, has made an attempt at keeping a neutral stance on the issue.

*“Our main concern and focus is essentially that whatever power solution is eventually employed, that it not significantly affect local air and water quality. Greenhouse gas emissions are no joke, and we require that any new facility to abide by the strictest protocol. These concerns must be adequately addressed before any permit will be issued.”*

Abet Con Cerned ~ **Local Regulatory Agency**

## **Your Assignment**

You represent a consulting group responding a call for proposals put out by Windy Bellows. Your group must come up with the location for and type of viable load shaping power supply plant and ultimately give a recommendation for the most optimal solution. In your assessment you must consider environmental issues associated with the local environment and how this may affect local water quality, air quality, and soil contamination. It is important to hear all stakeholders’ opinions and engage each representative. Site descriptions and environmental factors are listed at the end of this problem.

As hired consultants, you must demonstrate an understanding of the process and provide solutions to any and all potential environmental and economic issues. Questions you must answer as part of your proposal:

- What type of load shaping power plant will you use?
  - Why is your technology choice the best for this application?
  - Economically, how does your choice compare to other options?
- What site do you recommend the facility be built upon?
  - What problems to you avoid by picking this site?
  - What problems must you overcome by picking this site?

Remember, you are competing for this bid against other consulting groups. You must consider all angles and really sell why Windy should pick your solution. If your solution costs more than another group, you better be ready to justify the extra expense.

## **The Expectation**

Numbers are not what is most important – logic train, process, conceptualizations, and creativity are the most important considerations for your **proposal** and **presentation** (described below) composition. As you may notice, and as we have intended, you have not been given all the information you might require or desire to solve this problem, such is life. We encourage you to make assumptions, but you must be ready to defend them and pass the “straight-face” test. Keep in mind that this is a competition and every team may make assumptions with the given information differently. Just remember the fundamental principle for success on any project is KISS (keep it simple stupid). You will be expected to present your thoughts in a public forum.

*A note on professionalism:* You will notice that a bit of humor has been woven into this problem. It has been PNWIS’s tradition to keep it light and to have fun with the EC. We encourage you to do the same, keep it light and have fun with it. That being said, choose wisely the humor you wish to employ. The judges are a collective of professionals ranging from those who are young and early in their career, to those who are heads of companies and presidents of national organizations. You are under the microscope by an eclectic group of individuals, so keep it tasteful and be respectful.

**The Proposal** (submit Sunday November 6<sup>st</sup> by midnight, 2011 (before conference via e-mail: [sdent@wsu.edu](mailto:sdent@wsu.edu))

The proposal should outline the team members by name and the role they will have in the project (ie “Nilly Willy” is going to be engineer and will address waste issues, “Jim Beam” is going to be your air expert, “Justin Timberlake” is going to be our ‘architect’, and “Martha Stewart” is going to be your shaman etc, - you put in the disciplines that you think you need). The proposal should also illustrate the technologies and strategies your team has identified along with a clear approach of how you will be implementing them. The proposal should be in summary form and limited to three pages (this does not include title page or diagrams). Each proposal will be judged and given points as a factor in the competition. Pay close attention to the protocol and follow the rules to a tee. This is a game of points, and last year there was a 4 point spread between first and third place.

## **The Tweak**

No matter how much you do and know, in real life unexpected events and expectations can and do occur. To this end, you should expect (when you pick up your registration package) some late breaking information that might alter your approach and/or require your plan to evolve. The problem and the tweak will require that you find and talk to “experts” and attend various functions during the conference, for answers and important information (details on where you need to be to interact with key players will be provided on the first day of the conference). Remember, those who are most successful in the “real world” are those that can identify what resources they have and use them. You are at a professional conference, what resources do you have?

## **The Presentation**

Your team will need to demonstrate your understanding of the issues that you addressed in your proposal. You must include not only your key elements from your proposal, but also demonstrate your adaptive management in dealing with the “Tweak.” Sustainable approaches for these and other site issues are of great interest to the owners. The winning team presentation will be strong in approach, logic, clarity, application, and creativity.

Each team will present their problem solution on Thursday morning the 4<sup>th</sup> of November as part of the technical session program that day. When we know how many schools will be presenting we will develop a schedule, but plan on presentations beginning at 8:30 AM and conclude an hour before the Awards Luncheon. PNWIS will have a projector and a laptop (w/Microsoft Power Point). Please bring a data stick or disk burner so we transfer your presentation to the laptop. **Plan for no more than 15-minute presentation followed by 5 minutes of questions and answers. You will be timed and the 15 minute rule is strictly enforced.**

# **Potential Sites**

### **Site 1:**

Site 1 is a greenfield location adjacent to the Scorching Hot Springs National Park, which is frequently visited by Vancouver residents to enjoy views of the hot springs, geysers, and endangered ninja turtles. Surface water rights are abundant with good water quality.

### **Site 2:**

Site 2 is located on the old Filthy Rich Company smelter site, which was demolished only a couple years ago. The site has access to an existing deep-water port with a foreshore lease, as well as natural gas utilities. An existing water supply source provides up to 45 gpm, and water quality testing indicates 200 mg/L hardness.

### **Site 3:**

Site 3 is a recently capped landfill located only a few blocks away from Mayor Chuck Kanuck’s office. The site is zoned for industrial use, although the surrounding area has experienced rapid growth in residential subdivisions, including a new elementary school and a city park. Several homeowners have successfully installed geothermal heating units in the area; however, a recent geophysical survey conducted by a developer found minimal geothermal activity for industrial energy production. The facility has an existing natural gas line and an industrial water production well that produces 200 gpm with good water quality.

### **Site 4:**

Site 4 is adjacent to the Vancouver Papermill located a few miles north of the city within the Really Windy Basin. Nearby residents use wood stoves and heating oil to heat their houses

because natural gas lines have not been developed this far out of town. An active coal mine lies at the head of the Basin with rail service to the site.

