

THE FALLS BROOK CENTRE

Energy Experience Design Competition Handbook



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The Energy Experience Design Competition is a unique and rewarding experience for youth participants, mentors and teachers. Teams will gain valuable experience and develop lasting friendships.

1 Lexicon...

Falls Brook Crew (FBCrew): People at Falls Brook Centre communicating with outside, working on problem definition and the teams.

Team Facilitator: Teacher or volunteer who coordinates the high school team, mediates conflicts, oversees finances, main communication line with FBCrew.

Mentor: Engineer or technically oriented person from the community willing to volunteer with a team to help them design and build their electro-mechanical system.

Project Launch: Moment where the system characteristics, rules and regulations... are announced publicly.

Rally: Week-end in early 2008 where all teams will come for an evaluation of their systems, workshops, and fun activities.

2 About the Energy Experience Design Competition

The primary purpose of the competition is to promote the science and engineering of sustainable energy systems with high school students. This is done through hands on experiences, allowing students to apply science, engineering and team work principles. The competition will also open a dialogue on sustainable energy systems in education, industry and government. This fun activity will therefore promote an innovative and sustainable future for the province.

The competition has a focus on energy efficiency, energy conservation, and renewable energy. It is open to high school students and fits very well with the Applied Technology 11-0 course and the enrichment program. It is also ideal for students who learn experientially. The competition involves the definition of a specific energy related problem and the provision of a toolkit of materials and equipment to each participating team. There will be a need to source other materials. The first competition will occur in the 2007/2008 academic year. The specific electro-mechanical problem definition, the competition arena and other competition details will be available in early 2008 at <http://fallsbrookcentre.ca/experience/design.htm>.

It is important to start early as the actual design and build time will be quite short. Fundraising and team building must begin early if teams are to complete the challenge.

The designs and experiences of each group will be officially shared with all other participating groups in a final rally organized at the Falls Brook Centre. Judges will evaluate the systems on criteria previously outlined. Workshops and activities will also fill the weekend long rally.

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3 Create a team...

If you are interested in forming a team we recommend following the following steps.

3.1 Form a Core Group

Find a few friends or classmates who are also interested in the competition. Read through this document together and make sure you have a good idea of what the Energy Experience is all about.

3.2 Find a Facilitator

Teams need a facilitator. The team facilitators should have a mutual respect with the members of the team. They will be responsible for mediating conflicts, overseeing funds, communication with the Falls Brook Crew as well as ensuring communication with mentors and various team volunteers. For the first part of the academic year, the facilitator will help create a solid foundation. This foundation will be needed when all the team's energy will go towards developing the electro-mechanical system.

3.3 Recruit students...

There are no size limits on teams but we recommend four dedicated youths as a minimum. More is not necessarily better but two heads are better than one. There are many ways of recruiting. You may find that a general announcement is sufficient to creating a team. Once the students are gathered and know what the project is about, you may find that getting their names and contact information is good enough. You may prefer a formal interview and application form.

Remember that different kinds of students may be interested in participating. Hands-on learning may be a good environment for some while others may be looking for an extra challenge. Others yet might simply be looking for a chance to get a better understanding of renewable energy even though it may not be their career path.

3.4 Team dynamics...

Discuss what type of work environment the team wants at the beginning of the year. As the stress levels rise, it will be important to fall back on the original reasons for participating in the Energy Experience Design Competition.

All team members should be valued and respected. Not everyone will bring the same skills but all skills are important. This is a learning experience; placing challenges in this respect will help keep the team positive and moving forward.

There are many ways of building team spirit. Team shirts, a team web-site, rallies and events are all great ways of building excitement (and finding sponsors). This is not a

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project for future engineers only. Encourage diversity in the team. You'll be surprised at the level of engagement of students once they get comfortable with the challenge.

3.5 Responsibilities

Each team will work in their own way. However it is important to spread out the workload in order to limit stress. Dividing up the various tasks and responsibilities between members can make life easier for the whole team.

There are many facets to the competition. Depending on team size and members' interest, it may be beneficial to divide up tasks and responsibilities among members or among smaller groups. Keeping tasks project-oriented and groups smaller will help ensure that your team will complete the system on time. Rotating responsibilities is also a good way to get everyone to learn a wider variety of skills while limiting cliques.

3.6 Recruit mentors...

Mentors are engineers or technically oriented people from your community who agree to help out. Mentors can offer general workshops earlier in the year in order to allow your team to jump into the design right after the launch. During the actual design and building phase, your team may need to meet every evening. Having mentors there will guarantee a safe working environment that fosters learning. Mentors are also a great way to get sponsorship for the team so don't be shy and go out into the community.

Mentors, like the team facilitator and all volunteers are likely to spend a lot of time with teams. In order to clarify the expectations and make communication easier, we recommend drafting a *memorandum of understanding*.

4 Materials and mechanics...

Building the electro-mechanical system will require materials, machinery and skills. Mentors are valuable resources in this area. Ask if whether or not they have access to metal workshops or welding equipment for example. Asking around is also a great way of getting the project known in the community and rallying up support.

The toolkit will only include basic materials. Be creative in how you find additional materials. Used or donated materials reduce costs of the project. Try businesses in the community, they usually love to support projects and feel part of the community.

5 Communication & History...

The FBCrew will continuously place updates on the Calendar. Keeping up to date on these announcements is key. The team facilitator will be the main contact person and should be present in the team's work.

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A well organised and easily accessible data log will facilitate the teams work. It will also make it possible for others to take on the challenge the following year. Put all communications and relevant information in one space. A backup is always a good idea.

It should include:

- Sponsor recruiting efforts
- Budget
- Team contacts, including emergency medical information
- Archives
- Consent forms
- Communications with Falls Brook Crew

6 Finances...

The Energy Experience Design Competition was started with funding from the National Science and Engineering Research Council (NSERC) Promo-Science program. Many more partners have joined the team since then such as the Association of Professional Engineers and Geoscientists of New Brunswick (APEGNB), The New Brunswick Department of Education, and the TD Friends of the Environment foundation.

Money received from these partnerships cover basic expenses for Falls Brook Centre. Each team will be responsible for fundraising to cover their expenses. Fundraising is a challenging activity and will require patience and hard work. It is also a great opportunity to start team building and build the level of engagement from team members.

The registration fee will depend on successful funding activities by Falls Brook. It will be, along with the transportation costs, the minimum amount a team needs to fundraise. Registration will allow teams to receive the toolkit and participate in the final rally at Falls Brook Centre. The toolkit does not include all materials needed because we want to test the teams' ingenuity and leave space for creativity. However, this does mean more funds will be required for additional materials and maybe a little celebration after the whole project is done. As each team will have their own way of doing things, the budgets may vary extensively.

7 Safety...

Safety is the most important aspect of the Energy Experience Design Competition, both in terms of creating a safe space for student creativity and physical safety of team members. There are basic rules when working with machinery and electricity that must be taught at the beginning of the year. This can be a good opportunity to get mentors engaged early. Safety education can also be a good assignment for the safety group.

Basic safety rules when working with machinery include:

- Wear safety glasses;
- When working in proximity to fumes and dust, wear a protective respiratory mask;
- No loose clothing, long hair or jewelry while working with machinery;
- Wear good, strong shoes;

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- Proper lifting techniques;
- Releasing stored energy before leaving a working environment and place all equipment in resting position;
- Know where the stop button is on machinery prior to using it;
- Be patient and don't rush;
- Report any damaged or lost equipment;
- Keep hands away from moving and rotating parts.

8 Brainstorming...

Brainstorming is the first stage of project development. Projects must take into consideration the group's interests, strengths, capacity, and desires. In a brainstorming session, all ideas should be respected and not immediately dismissed. This will help to decrease the feeling of risk and the fear of rejection that group members have when contributing ideas. One thing to remember while starting to brainstorming is to focus on the problem, not a specific solution. The time for brainstorming on specific solutions should be kept for a later time.

8.1 Brainstorming tips...

- Remember there are always lots of right answers and the trick is to get as many ideas as possible.
- Pay attention to details and all kinds of information.
- Don't overlook the obvious.
- Try different ways of searching for ideas.
- Don't set a precise end to the brainstorming but don't be afraid to recess or table a session.

8.2 Mind mapping...

- Focus -- print the central idea in a circle in the center of the page
- Free Association -- allow ideas to flow free, without judgment
- Connect ideas -- print key ideas or thoughts on lines connected to the centre focus
- Key words -- print key words only
- Symbols or images -- use symbols and images

8.3 Questions to move along...

- What assumptions are we making?
- What's clouding my thinking?
- What are the chances of success?
- Is the timing right for this idea?



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9 Goals and Objectives...

Goals put into words what the expected achievements of the project are. Remember Who, What, When, Where, Why, and How?

Objectives are the outcome of activities, not the activities themselves. A good format is setting SMART objectives:

- Specific:** objectives specify precisely what you are talking about.
- Measurable:** throughout and at the end of the project you will be able to measure whether or not each objective was met.
- Achievable:** objective should be possible to achieve within the guidelines of the project
- Realistic:** objectives should be practically possible to accomplish within the time frame and project guidelines.
- Time-bound:** objectives should have a time frame of when it will be completed.

10 Timetable...

For the official timetable, stay in contact with the Falls Brook Crew or check out <http://www.fallsbrookcentre.ca/experience/design.htm>.

11 Evaluate and Celebrate...

You will likely go through many highs and lows while answering this challenge. Remember that this is a learning experience and proper evaluation will likely make future attempts at projects easier. An evaluation can be done simply by getting the team to sit down for a talking circle or with an evaluation sheet.

Most importantly, don't forget to celebrate your amazing achievement. An honest pat on the back and a thank you go a long way.