

ENERGIZE: The clean Energy Challenge

INTRODUCTION

" It's too late to be a pessimist " - From the documentary, HOME

India is one of the fastest growing countries in terms of energy consumption. Currently, it is the fifth largest consumer of energy in the world, and will be the third largest by 2030.

A quick analysis of the following stats would convince even a layman of the present world scenario and of the impending environmental disaster.

- 1) 2005 was the hottest year on Earth since the late 19th century, when scientists began collecting temperature data. The past decade featured five of the warmest years ever recorded, with the second hottest year being 1998.
- 2) Deaths from global warming will double in just 25 years to 300,000 people a year.
- 3) CO2 levels higher now than in the past 650,000 years.

The universe is approximately 13 billion years old. Compared to that our(mankind's) time on earth is just a speck on the cosmic timeline. In spite of that we have wreaked havoc on the only planet capable of sustaining life. All other problems fade into oblivion in the face of these issues. In this dire situation, our only hope is clean, renewable energy.

Energize is an attempt to address the biggest environmental challenges the earth faces today. The main aim is to develop products or methods to harness the largely untapped Ocean and Geothermal Energies. However, do not restrict yourselves. Innovations are also invited in any other form of renewable/clean energy or improvement in existing products and methods.

We know that the solutions are there. We all have the power to change, so what are we waiting for?

PROBLEM STATEMENT

1) Geothermal Energy

INTRODUCTION:

Geothermal energy involves harnessing the natural heat stored within the earth. This heat is transmitted to the surface of the earth through conduction. Circulating groundwater within the earth gets heated due to the heat and emerges to the surface as hot springs. The source of heat is 'magma' within the earth's deeper layers or the earth's core itself.

Geothermal aquifers are naturally occurring underground reservoirs of hot water that can be found in deep porous rocks. The heat energy contained in aquifers can be used via boreholes in a variety of ways. Ex. For power generation, space heating and cooling, green house cultivation etc.

How to tap the resource?

Direct use systems are typically composed of three components:

- a. A production facility – usually a well – to bring the hot water to the surface.
- b. A mechanical system – piping, heat exchanger, controls – to deliver the heat to the space or process and.
- c. A disposal system – injection well or storage pond – to receive the cooled geothermal fluid.

Geothermal power plants need no back-up power, no submergence of land, no displacement of people and no deforestation. The energy is renewable and sustainable. Only a small fraction of our available geothermal energy's true value will lead to a greatly increased amount of this clean, reliable resource being developed in essentially all countries of the world. Geothermal energy is a vital part of a sustainable future.

AIM

Innovations are invited to harness Geothermal Energy for:

- 1) Electricity Generation.
- 2) Agriculture and Food Processing – Dehydration of agricultural produce, greenhouse cultivation or as steam for sterilizing food processing facilities.
- 3) Central heating and/or cooling system that pumps heat to or from the ground.
- 4) Any other useful form of work.

2) Ocean Energy

INTRODUCTION

The ocean is an enormous source of energy. It is estimated that 0.1% of the energy in ocean waves could be capable of supplying the entire world's energy requirements five times over. The ocean is largely, relatively untapped renewable energy resource.

Ocean energy has significant advantages over other renewable energy resources like wind and solar for the following reasons:

Ocean energy is a very predictable and consistent (less intermittent) energy resource which means:

- (a) fewer technical problems; and
- (b) potential for higher Rs./kWh sale price.

Also, ocean energy is not subject to fuel cost increase.

Though ocean energy technologies are not yet economically competitive with more mature renewable energy technologies such as wind, in the medium term these technologies will become significant contributors to those markets adjacent to the resource.

In the longer term, ocean energy could become a much more important part of the world's energy portfolio. The potential worldwide wave energy contribution to the electricity market is estimated to be of the order of 1-10 TW, which is the same order of magnitude as world electrical energy production capacity. Wave energy has the highest density among all renewable energy sources

AIM

Innovations can include devices to exploit the mechanical energy of waves, tides and ocean currents or the salinity and temperature gradients in water bodies and harness it as electricity or any other useful form.

3) EVERYTHING ELSE:

A) Innovations are also invited for utilization of any other renewable source of energy(solar, wind, biomass, Integrated wave and wind systems etc.) in a useful form. Solutions may even include out of the box methods to generate electric power. For example, generation of electricity through stair climbing, tapping the heat and sound losses in braking or from vehicles moving on roads equipped with piezoelectric sensors.

B) Improvement in efficiency and environmental compatibility of existing products or energy generation methods for electrical and thermal energy is also allowed. For example, development of low cost, efficient programmable thermostats or conversion of municipal solid waste into an alternative fuel.

COMPETITION STRUCTURE

Abstract Stage	August 29th, 2010	To be considered for mentorship stage, participants have to register and submit their abstract before August 29th in the format specified below.
Mentorship Stage	September 20th, 2010 - November 14th, 2010	Mentors will be allotted to the shortlisted participants on September 20th. Participants will have to submit a progress report of their project before October 18th. The final documentation with video of the working model should be submitted before November 14th.
Registration Deadline	November 10th, 2010	Registration closes for both national as well as international participants.
Result	November 30th	Declaration of shortlisted teams for final presentation on the basis of final report and prototype video.
Improvisation Stage	November 30th, 2010 - January 6th, 2011	Shortlisted participants are to improve upon the working prototype of their project and prepare a presentation for the same.
Presentation Stage	January 7th-9th, 2011	Final presentation along with the demonstration of the working prototype.

Mentorship

Mentorship is the unique feature of Prayaas (Elixir, Energize, Utkarsh and Verizon) which makes it different from our other competitions. Our mentors are the most knowledgeable intellectuals from elite educational institutes and industries. Teams can become beneficiary of this opportunity by submitting an abstract on their idea **latest by 29th August, 2010.**

Participants unable to submit their abstracts by 29th September 2010 or those who haven't been shortlisted for mentor allocation can still participate by sending us a detailed technical report along with the video by 14th November 2010 (which is the last date for registration).

Abstract

Teams should mail the abstract to **energize[at]techfest[dot]org** latest by 29th August, 2010 with the subject "**Prayaas: Energize Abstract Reg. No. (xxxx)**" For ex. Prayaas: Energize Abstract Reg. No. 1234. **Please do not forget to mention your registration number in your abstract while sending it.**

Abstract should cover following points in brief and concise manner.

1. **Introduction**
 - a. Problem background.
 - b. Overview.
2. **Idea**
 - a. Concept with technical details involved.
 - b. Pictorial representation of technicalities involved in the idea.
 - c. Innovation involved.
3. **Impact**
 - a. Environmental.
 - b. Social.
4. **Any other unique features.**
5. **Areas/Topics related to which mentorship is required.**

Progress Report

Teams allotted with mentors, will be required to submit a progress report before **18th October, 2010** to the respective mentor as well as **energize[at]techfest[dot]org**. This report should contain updates of your solution i.e up to which extent you have designed the solution and where you are facing difficulties.

Mentorship may be discontinued in case a team fails to submit this report.

Model Documentation- Final Report and Video

Participants will have to make a physical model for the solution, which will be reviewed in this stage. The participants will be required to submit a technical report and a video to demonstrate the progress made on their working model. The technical report should cover all the parameters mentioned in the Judging criteria. The last date for the submission of the technical report and the video is **14th November, 2010**. The panel of judges will analyze the report and the video and will give them a detailed feedback as to how the model can be modified to achieve a better result. The details of the shortlisted participants along with feedback from the judges would be communicated to them by **30th November, 2010**.

The report and the video should be mailed by post to the following address:

**Techfest Office
Students' Gymkhana,
IIT Bombay, Powai
Mumbai - 400076.**

Working Prototype and Final presentation

After declaration of the finalists, participants will be required to make a working prototype of the project as well as a presentation covering the technical and financial aspects in a detailed manner. The teams will have to bring their prototypes to be judged and showcased at Techfest 2011.

The working prototype should be as close as possible to the product you intend to present to the end user.

No new entries will be entertained after 10th November 2010.

Energize will be judged by a panel of experts. Following are the broad criteria for judging:

1. Innovation and creativity of the method or product developed.
2. Implementability of the product to be assessed on the following parameters:
 - a. Technical feasibility.
 - b. Cost of the product.
 - c. How reliable/durable is the product or method developed.
3. Performance and efficiency.
4. Environmental impact and sustainability.

RULES

General Rules

1. The competition is open to all (student, research scholars and professionals).
2. Every team has to register online at our website for the competition. A registration number will be allocated to the team on registration which shall be used for future reference.
3. A team can participate at any point of time before 10th November, 2010. However, the abstracts submitted before 29th August 2010 would be considered for mentorship. Teams which submit their abstracts at a later stage would be provided with mentors only if their idea is exceptionally good.
4. Judges decision shall be treated as final and binding on all.
5. Note that at any point of time the latest information will be that on the site. The information provided in the pdf downloaded earlier may not be the latest. However, registered participants will be informed through mail about any changes on the site.

Certificate Policy

Those participants whose ideas and plan of action are recommended by the judges on the basis of their ability to get implemented will be provided with certificate of participation. The top entries from this event will be provided with certificates of excellence.

Team Specification

The participating entries must be in a team of a maximum six people. If the participating team feels that their idea requires more participants to in their team, they can forward their request, with suitable reasons, to energize@techfest.org with the subject "Energize team number increase" on or before 1st November, 2010.