

Ocean Thermal Energy Conversion (OTEC)

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Type: Design Problem
Student Time: Six weeks
Location: Classroom/Home

Summary

This project is intended for a first year engineering class.

The design group must create a conceptual design that will use the ocean as a resource to develop electric power. This project is to develop the "concept", not to develop a specific design.

There will be a design review meeting with the instructor after 3 weeks. The final report will be submitted and an oral presentation made after 6 weeks.

ABET Descriptors

Engr Sci Content: First Year Engineering
Type: System, component
Elements: Conceptualization, synthesis
Features: Creativity, open-ended, design methodology
Constraints: Time, resources
Effort: Team

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The class will be divide into teams of 3-4 students.

The design group must create a conceptual design that will use the ocean as a resource to develop electric power. Note: this project is to develop the "concept", not to develop a specific design.

Milestones

There will be a design review meeting with the instructor after 3 weeks. The final report will be submitted and an oral presentation made after 6 weeks.

Report

This project is to be reported in both written and oral presentation form. The format should be of the students' design. This project will require a library literature search, development of system schematic diagrams, and a description of operation provided including the functional role of each system component identified. The report should document the different technologies employed in OTEC power production systems and document the merits of each technology reported. A cost-benefit discussion and a list of operating plants currently using this technology should be reviewed. Each team member will participate in the oral presentation by having individual presentation responsibilities as determined by the group.

The project will be evaluated by the instructor and by peer review.

Ocean Thermal Energy Conversion (OTEC)**Engineering Notes:****Objectives/Comments:**

This project is intended to encourage team building to satisfy a design objective with constraints of time and resources (limited experience with open-ended problems).

The instructor should make note of:

1. comparisons between the reporting formats used and accepted Engineering Report Formats
2. compare the sketches submitted with industry drawing practice
3. has the student team made a comprehensive search of the reference literature for current technologies available.

Possible approaches to this problem might include wave energy, tidal energy, and thermal temperature gradients available in the ocean (OTEC - Ocean Thermal Energy Conversion). The OTEC option offers collateral benefits of providing seafood as a food source and the reduction in hurricane formation probabilities.

Expected outcomes:

Group dynamics and interactions should be carefully observed and intervention should be considered wherever it may be constructively applied. Effective time management on the part of the student teams is not expected, but should be encouraged.

Discussion/follow-on:

Note should be made of the iteration potential for this project in follow-up courses where a greater depth of design analysis, conceptualization, and system construction will be possible (Thermodynamics, Energy Systems, Heat Transfer, Fluid Mechanics, and Capstone Design).