Syllabus

Renewable Energy Resources

NR 5884, 3 Credits, CRN 97576
Fall Semester 2009

INSTRUCTOR:

Michael A. Champ, Ph.D.
Since 1995, Dr. Champ has conducted and prepared approximately 10 due diligence assessments on different renewable energy technologies and natural resources for investment organizations, industry and for academia consortia. He has also chaired and edited the proceedings for international conference on renewable energy resources, and has conducted research on smart buildings (Office 2000, PG&E) solar (urban and rural, PG&E), wind (both land and at sea), waves, currents, tides (US/JNR), ocean thermal energy conversion LM, & HNEL, biofuels (from corn to algae), and is currently working on an project in Hawaii to produce jet fuel from marine algae, and serves on the Board of Directors for a company that is developing algal biofuels projects in Louisiana, Maryland, and Virginia.
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COURSE DESCRIPTION:

This course is an overview of renewable energy resources [Coal, Solar, Wind, Ocean Energy (Waves, Currents, Tides, OTEC), Hydrogen, and Biofuels (Food and Non Food Crops -Ethanol, Biodiesel and Algae-Green Diesel, JP-8), etc.] and also focuses on how to conduct due diligence and prepare assessments for different technical approaches for a given renewable energy. Students will assigned to different renewable energy resource teams and make presentations for weekly class review of a variable in the Due Diligence Matrix and compile and enhance that material into a stand-alone comprehensive due diligence assessment report of the technical and investment risks, as a team's term project. The goal is to prepare comparable overviews (for ranking) of the assigned renewable energy resources and its most promising technologies. This includes identification of who the players are (companies, research groups, government labs, etc), the literature, review and critique (pro's and con's) of each technical approach, status, efficiency, energy production rates and indentify, and delineate technical problems, economic costs (incl. economies of scale), social, environmental, investment and marketplace risks and barriers (lack of infrastructure, and integration into the grid, etc.) as part of the Matrix that is involved in developing a given technology as a renewable energy resource as of 2009.

GOAL AND EDUCATIONAL OBJECTIVES:

This new course is an overview of renewable energy resources and also focuses on how to conduct due diligence and risk assessments for renewable energy technologies and develops a comparative due diligence assessment of the status (pro's and con's) for each of the most promising renewable energy technologies. A Due Diligence Matrix of the variables for predicting economic investment risk has been developed for the course. Students in the course will spend one week on a different renewable energy resource - covering everything from different

technological approaches, applications, energy production levels, (different scales), plant costs, energy prices, environmental, social and economic impacts, etc., and barriers to commercialization to fill in the matrix.

The goal of the course is to build student expertise in renewable energy and in conducting due diligence assessments for investment risk, ROI, and comparing comparable technologies, which will increase student job marketability and economic value.

COURSE REQUIREMENTS AND GRADING:

The class weekly assignment is to compile the necessary due diligence information to prepare and present to the class their assigned part of the matrix. For example, for wind: students in the class (or teams of students) in the class would be given weekly assignments in an area of the matrix (i.e., different available technologies and pros and cons of each technology) or social, environmental factors, or even the distribution of the natural resource, or barriers such as technological, economics, lack of infrastructure, marketplace, etc. They would find all of the material that they can find about their assigned part of the matrix and organize a presentation to the entire class.

Term Projects are assigned to class students or teams of students (depending on enrollment) of the most promising renewable resource areas. Students or teams of students would take the individual presentations prepared for the weekly class review of a given technology and compile and enhance that material into a stand-alone comprehensive due diligence assessment report of investment risk as of 2008. It would present an overview of the assigned technology, identify who the players (companies, research groups, government labs, etc) are, and review and critique (pro's and con's) of the status and effectiveness (production rates) of different technologies available to develop the renewable energy resource, indentify, and delineate technical, economic, social, environmental, etc. risks involved in developing the most promising available technologies. This would include future R&D needs, estimate investment risks, predict market impact and market share, economies of scale, etc., and identify the investment risk for that renewable energy resource and individual technologies considered. The course cannot cover just the U.S.; it has to be global, since the US is not the global leader in renewable energy.

At the end of the course, all of the Term Projects will be shared with each student, and graded by them. Through the effort, the class would have compiled all the background information that is available, conducted a due diligence Assessment on the most promising of each technology in a resource, and prepared perspectives on the most promising technologies for the major renewable energy resources as of Dec. 31, 2008.

Grading: Weekly Class Presentations (30%) and the Term Project Final Grade (70%).

GRADUATE HONOR CODE

The tenets of the Virginia Tech Graduate Honor Code will be strictly enforced in this course, and all assignments shall be shall subject to the stipulations of the Graduate Honor Code as outlined in the Graduate Catalog at http://www.ncr.vt.edu. For more information on the Graduate Honor Code, please refer to the GHS Constitution, located online at http://fbox.vt.edu/studentinfo/gradhonor/ Please contact the instructor immediately if you have questions.

SPECIAL ACCOMMODATIONS

If you need adaptations or accommodations because of a disability (learning disability, attention deficit disorder, psychological; physical, etc.), if you have emergency medical information to share with me, or if you need special arrangements in case the building must be evacuated, please contact me as soon as possible.

COURSE EVALUATIONS

In the spirit of continuous improvement, the instructor seeks ways to improve this course and values your input. To that end, you will be asked to complete an informal evaluation mid-term and at the end of the semester as well as a formal evaluation on May 13. At any point during the course, your suggestions and comments are most welcome.

NOTE: The course syllabus is a work in progress. Changes and updates will be made to accommodate the needs and interests of the students. Modifications may also be made if natural resource communications issues surface during the semester that may provide a unique learning experience for students.