RENEWABLE ENERGY AND THE ENVIRONMENT

ESPM 150 002
ESPM 290 001
3 Units
FALL SEMESTER 2008

Wesley R. Higbie, Visiting Professor

Thursday 3:30-5:00 pm
306 Wellman Hall

This is a survey of existing, emerging, and possible forms of renewable energy, including electrical generation and motor fuels, with an emphasis on their environmental impacts. The course examines the challenges of technology development and commercialization, as well as government policies to promote development of renewable energy, including research programs and favorable tax treatment.

This course is part of the William Main Distinguished Visitor Series, http://calforestry.cnr.berkeley.edu/lectures/wmmain.html which brings speakers from business, government, and NGO's to teach students about current issues. The Main Series will host 7 dinners for guest speakers, students and other members of the university community at the Faculty Club to promote the fuller exchange of ideas.

The course begins with a survey of current use and sources of energy, and a discussion of state and federal policy goals. Students will be introduced to existing government research funding programs and tax incentives, including the Energy Policy Act of 2005, as well as the fundamentals of environmental impacts analysis and the permitting process.

The course then will discuss various sources of renewable energy, and the potential environmental impacts of each of them.

Biomass –

- boiler fuel for generation of electricity, feedstock for ethanol production.
- biochemical, physico-chemical, and thermo chemical conversion platforms.
- sources of feedstock, including potential for creation of new organisms for feedstock.
- location and scope of potential production.
- environmental impacts of growing, harvesting and use of biomass.
- uncertainty regarding long-term land use.

Solar –

- concentrating solar power systems, photovoltaic systems, solar hot water, passive solar heating and day-lighting, and solar process heat and space heating and cooling.
- land use requirements, location and scope of potential production.
- environmental impacts including the desert tortoise and historic buildings and architectural restrictions.

Wind power –

- existing and emerging technology.
- where is it used.
- potential production in California, US, and other parts of the world.
- environmental impacts including birds and noise.
- CapeWind Project in Nantucket Sound as a case study.

Ocean power –

- tidal power, wave power, and ocean thermal energy conversion.
- proximity to markets and transmission issues.
- environmental impacts including fish and marine mammals.
- Nova Scotia and Maine case study.

Bio-fuels

- Identifying chemical composition of superior fuel, e. g., butanol compounds for jet fuel
- What plants and other organisms can make these new fuels.