VII. STANDING COMMITTEES

A. Academic and Student Affairs Committee

Faculty Presentation: Renewable energy landscapes: Appropriate technologies through interfacing of technologic, ecologic, economic and social systems

INFORMATION ONLY

Daniel T. Schwartz is Chairman and Boeing-Sutter Professor of Chemical Engineering at the University of Washington, Seattle. He began as an Assistant Professor at the UW in 1991 and has become a leader in interdisciplinary engineering education and research. He currently directs two multi-faculty interdisciplinary research and education programs supported by the National Science Foundation, one on new nanotechnology-based approaches for photovoltaics manufacturing and the other on integrative strategies for bioenergy. He has supervised 16 Ph.D. graduates in electrochemical topics, developed a unique undergraduate electrochemical technology course, and subsequently has seen 6 former students (3 Ph.D., 3 B.S.) found electrochemical technology companies in the Puget Sound area. In 2010 he received the Electrochemical Society's Linford Award for Outstanding Teaching.

Professor Schwartz will be joined by doctoral student Everett Isaac, an enrolled member of the Yakama Nation. After several years working for tribal programs, he has returned to the University of Washington as a Ph.D. student studying fire science in the School of Forest Resources under Professor Ernesto Alvarado. His doctoral research seeks to understand the broad role of fire on the landscape, including the historical role of fire, implications due to a century of suppression and the delicate reintroduction of fire to the landscape. The approach combines sophisticated physical models with field validation. He is supported by the UW Bioenergy Ph.D. training program, and first learned about the program during collaborative project planning between UW and the Yakama Nation. Mr. Isaac currently has a B.S. and M.S. in Forest Resources from the University of Washington.

Energy production and distribution requires sophisticated technological systems to interact in complex ways with ecologic, economic, and social systems. Developing appropriate renewable energy options within this interacting "system-of-systems" context demands a new kind of integrated research program. Professor Schwartz describes a case-study-oriented Ph.D. energy research and training program that combines the interdisciplinary expertise of engineering and environmental science students with the local knowledge, expertise, and economic development plans of several Northwest Tribes. Lessons learned from two completed case studies, with the Yakama Nation and Confederated Salish and

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Kootenai Tribes, show that the installation of bioenergy production facilities have the potential to develop an economic market that promotes biodiversity and ecological resilience on the landscape, while contributing energy and income for the tribes. Program outcomes also include a national model for engaging Native American's in Ph.D. education (9 of the 33 Ph.D. students in this NSF-funded program are Native American). Barriers to implementation remain, mostly tied to risk premiums associated with uncertainty in several elements of the integrated system.

Attachment
Professor Schwartz's handout on energy

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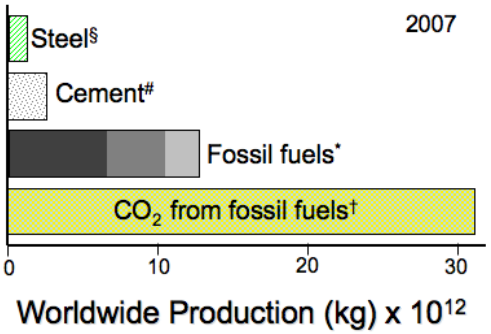
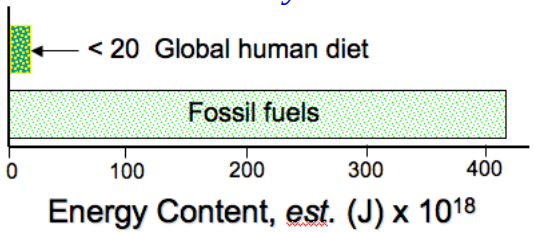
1. Why does energy touch so many things?

a. Because we use it in HUGE quantities.



b, Because it dramatically enhances what humans can do.



2. Renewable energy is a diffuse resource

"Replacing" the energy production from this one 2.4 acre platform (Atlantis) in the Gulf of Mexico will take:

- 6 "Cash for Clunkers" programs
- 15 U.S. nuclear power plants
- 326 eSolar Concentrating Farms (82,000 acres)
- 2 Grand Coulee Dams (170,000 acres)
- 62 Wildhorse Wind Farms (350,000 acres)
- 375,000 acres of Algae Farms
- 1,300,000 acres of Biomass Farms

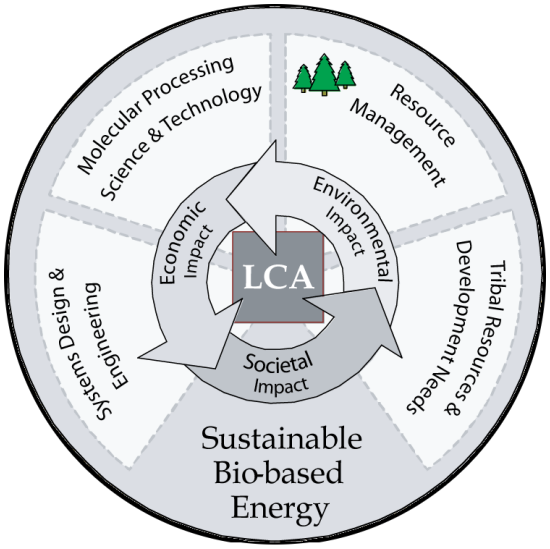
Atlantis is big, but there are roughly 800 other production platforms operating in the GOM.

3. "Not in my back yard" is impossible if renewables are to make a difference.

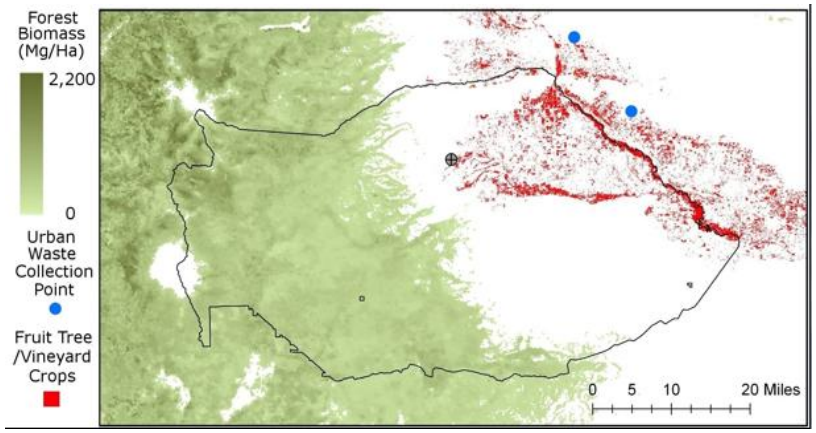
- Renewables drive profound changes in land and water use.
- Start with improving efficiency (no land required)
- New thinking is critical - integrate renewable energy with ecosystem restoration to IMPROVE the environment.
- System thinking is critical
  Technology + Environment + Economy + Society.

Daniel T. Schwartz, Director
Bioresource-based energy for sustainable societies graduate program
University of Washington
http://bioenergy.washington.edu

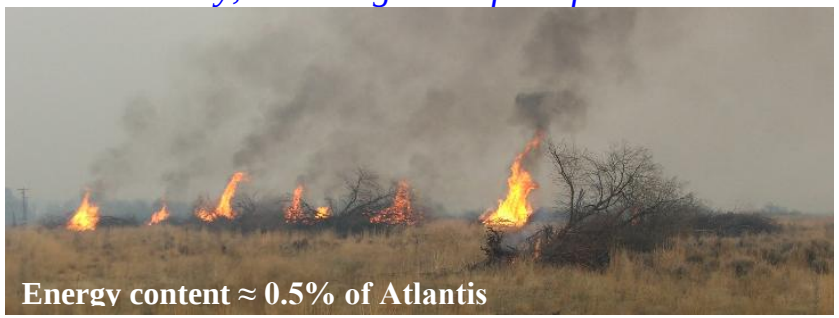
1. Our program takes a systems-level approach by working with Northwest Tribes on renewable energy research.



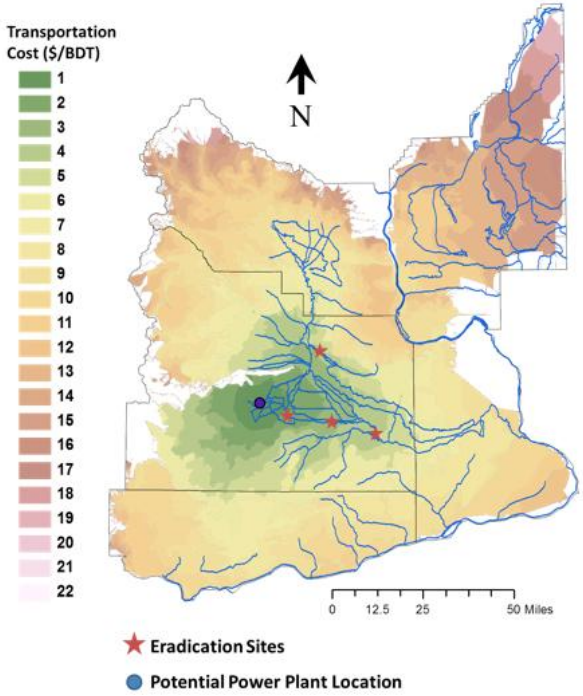
2. Satellite imagery and ground data provide an assessment of the natural resources and can indicate overstocked areas.



3. Example: The Yakama generate ~150,000 tons of woody waste annually, including much from forest restoration.



4. Outcome from System-level thinking: A biopower facility will create a wood-waste market that can self-fund invasive tree eradication over 5 counties (eco+econ+social benefits)



5. This program is a national model for Ph.D. education

- 9 of 33 Ph.D. students are Native Americans (15% of US pool)
- Provides interdisciplinary tools and communication skills along with traditional deep disciplinary scholarship.