

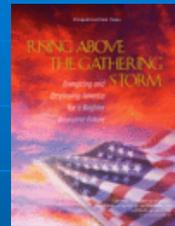
Delaware Excellence in Science and Engineering Program

Eric W. Kaler
kaler@udel.edu



A Clear National Need...

- "Above the Rising Storm..."
 - Obvious needs to focus on investment in science and engineering research and education to maintain societal strengths and business competitiveness
 - A UD response: Delaware Excellence in Science and Engineering Program (DESEP)



Delaware Excellence in Science and Engineering Program (DESEP)

- An initiative to support science and engineering activity at UD to fuel research and economic development
- Connections to industry and other higher educational institutions
- Interdisciplinary
- Ongoing (!)



Framework: Science and Technology Council Thrust Areas

- Agriculture
- Human Health
- Complex Environment Systems
- Alternative Energy
- Nanotechnology



Science and Technology Council Thrust Areas: Progress

- Agriculture
 - Avian Bioscience Center
- Human Health
 - Center for Translational Cancer Research
- Complex Environment Systems
- Alternative Energy
 - PV on Poultry Houses
- Nanotechnology



Science and Technology Council Thrust Areas: Next Steps

- Agriculture
 - Avian Bioscience Center
- Human Health
 - Center for Translational Cancer Research
- Complex Environment Systems
- Alternative Energy
- Nanotechnology



Mechanism:

Delaware Excellence in Science and Engineering Program (DESEP)

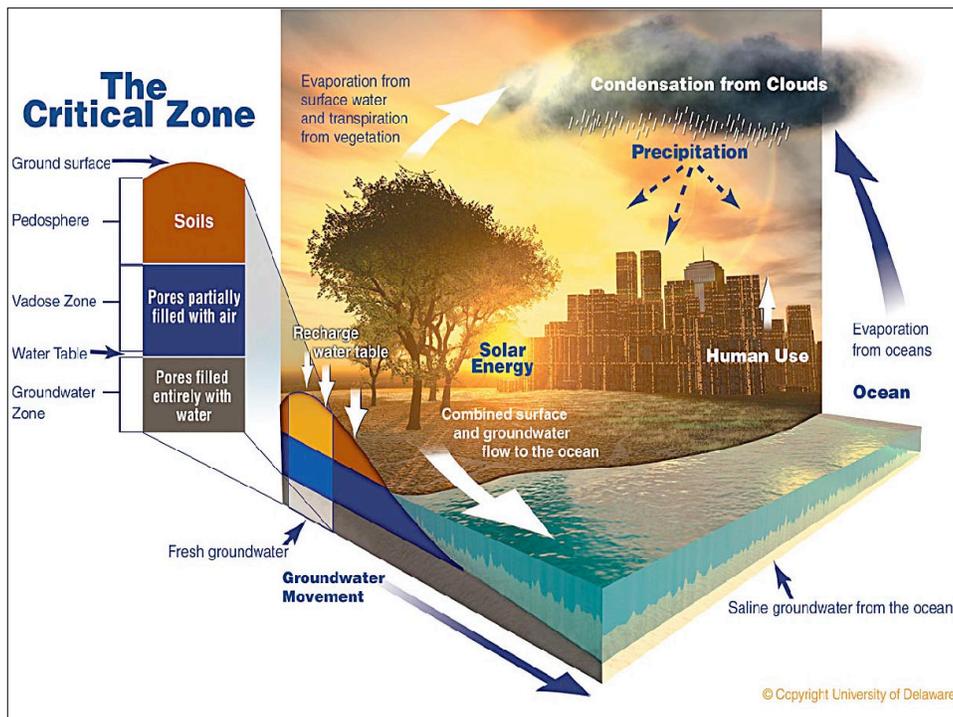
- Complex Environmental Systems
 - Center for Critical Zone Research
- Alternative Energy
 - Solar, fuel cells, transportation, wind
- Nanotechnology
 - Interdisciplinary work in science and engineering



Center for Critical Zone Research

- Proposal
 - - To develop a new Center for UD that focuses on leading edge environmental research of the Earth's Critical Zone ("the heterogeneous, near surface environment in which complex interactions involving rock, soil, water, air and living organisms regulate the natural habitat and determine the availability of life-sustaining resources" (NRC, 2001)). The Center would be led by a team of UD faculty with management support from the Delaware Biotechnology Institute.





Active Program!

- Don Sparks, J. Thomas Sims, Plant and Soil Sciences
- George W. Luther III, S. Craig Cary, David L. Kirchman, Marine Studies
- Dominic M. Di Toro, John F. Rabolt, Stanley I. Sandler, Engineering
- Thomas P. Beebe, Murray V. Johnston III, Chemistry and Biochemistry
- John M. Byrne, Center for Energy and Environmental Policy



Alternative Energy

■ Solar Power

- Long history at UD (Birkmire, Russell)
 - Institute for Energy Conversion – DOE center established in 1972; a DOE Center of Excellence since 1992. Focuses on thin-film photovoltaic solar cells from a scientific and engineering point of view (Birkmire, Russell)
 - DARPA 50% Efficiency Program
 - Largest University-based solar program in the world: \$53M initial budget (Barnett, Honsberg). Significant Dupont partnership for commercialization

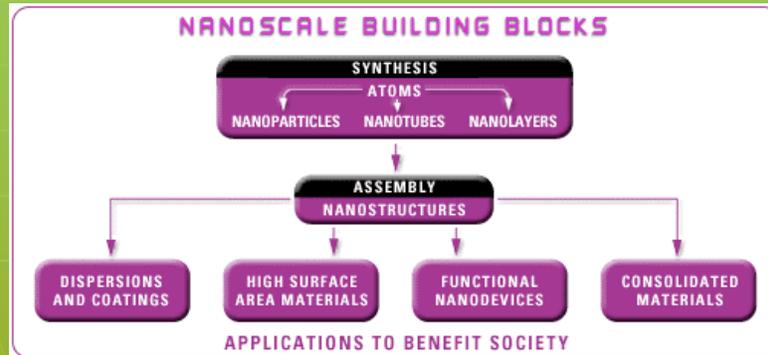


Alternative Energy (cont.)

- Fuel Cells (Fahgri, Advani, Wagner...)
 - Fundamental work, connection with industry
 - Transportation applications: DOT funding of fuel cell bus for UD; Air Liquide interactions
- Wind Energy
 - Resource assessment ongoing (CEMS)
- Policy
 - UD Center for Energy and the Environment
 - Center for Energy and Environmental Policy - Established in 1980 - leading institution for interdisciplinary graduate education, research, and advocacy in energy and environmental policy



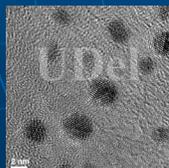
Nanotechnology



Plenty of room at the bottom – RP Feynman, 1959... no limit to the Smallness of scale....*Encyclopedia Britannica on the head of a pin*

Nanotechnology at UD

- Nanotechnology council formed: Science and Engineering faculty
- Clean room facilities
- Electron microscopy facilities – W.M. Keck Center
- Substantial extramural support, probably now above \$40M



Next Step

- UD has built substantial capacity and faculty expertise in these important areas
- UD and external support will continue, but *the critical need is to expand our partnership with the State of Delaware to support new efforts in interdisciplinary work*



DESEP Request

- | | |
|--------------------------------|-------------|
| ■ Four faculty lines: | \$500,000 |
| ■ Scholarships for Delawareans | \$400,000 |
| ■ Infrastructure, equipment | \$100,000 |
| ■ Critical Zone Center | \$125,000 |
| • Four Graduate Fellowships | |
| ■ Total | \$1,225,000 |

