



**Introduction to the
University of Delaware Energy Institute
Mark A. Barteau, Director**

I am pleased to welcome you to the official launch of the University of Delaware Energy Institute.

My name is Mark Barteau, and I am currently the Senior Vice Provost for Research and Strategic Initiatives at the University. Over the past year I have served as the Director of the UD Energy Institute as we have worked to create this new gateway to energy research and education at the University of Delaware.

Today's symposium, and the new Energy Institute that we are launching today, are the product of many converging efforts on our campus and beyond. Certainly energy and the environmental consequences of the ways that we produce and use it have entered the public consciousness in unprecedented ways over the past few years. Over the roughly the same period we have seen increasing grass-roots interest in bringing together the broad expertise within the university to address energy and environmental problems in impactful ways. Those efforts have come to fruition after much hard work during the past year. First, the strategic planning effort launched by President Harker culminated in a plan, the Path to Prominence, which called for new strategic initiatives in energy, the environment, and life and health sciences. I know that Pat will have more to say about the strategic plan later this morning. But we didn't wait for that. I am particularly grateful to the steering committee of university faculty who have worked to create this Energy Institute during the past year – "just in time" for the Path to Prominence! And I would particularly like to acknowledge Dr. Neeloo Bhatti-McAndrew, the Assistant Director of the Institute, who has worked tirelessly on every aspect of this institute, from conceptualization, to publications, to organizing this event today.

Why create this new institute? While I suspect that most of you are well aware of the magnitude and complexity of the energy challenges facing this nation, and indeed, modern society, I am confident that you will gain new perspectives from today's speakers. They will address a variety of energy challenges and solutions, from solar and wind power to electric vehicles, to biofuels, to state and national efforts to secure our energy future. I would like to thank each of them for sharing their perspectives with us at this symposium. At the risk of giving away anyone's punch-line, I would like to make a few key points that I hope you will remember after today, and that I think demand the comprehensive approach to energy research, development and education that motivates our formation of the UD Energy Institute.

WE USE A LOT OF ENERGY!

World Energy consumption is roughly 400 quadrillion BTUs per year. The US, with 5% of the world's population, consumes about 25% of the world's energy. Numbers like this are almost unimaginably large! To put our consumption in slightly more accessible terms, EACH DAY the US uses 20 million barrels of oil PLUS 60 billion cubic feet of natural gas PLUS 3 million tons of coal – still incredibly large amounts of energy any way one looks at it.

THE WORLD WILL NEED EVEN MORE!

Current projections are that in 2100 the world will need 3 times its current level of energy production. On the supply side alone, there is a tremendous need for new, renewable sources of energy. If one considers the need to reduce CO₂ emissions by at least a factor of 3 at the same time to stabilize atmospheric CO₂ levels, we will need to generate about 10 times less CO₂ per unit of energy consumed! We simply cannot do this without significant addition of carbon-neutral and carbon-free energy resources.

WE RELY ON TWO SETS OF ENERGY RESOURCES, AND TWO SETS OF ENERGY INFRASTRUCTURE IN THIS COUNTRY.

Petroleum supplies 96% of our transportation fuels, but only 3% of the fuel we use to generate electricity. Electricity in the US uses coal (50%) and nuclear and natural gas (about 20% each). When we discuss alternative or renewable energy sources, it is important to realize where they might be applied, and what existing sources they might augment or replace. Our “addiction to oil” is really an “addiction to our existing transportation choices.” In the words of the founding secretary of the Department of Energy, James Schlesinger “We are not going to have energy independence as long as the US relies on the internal combustion engine.” Words to remember as we think about energy security today.

Energy is the grand challenge of our time. It is complex, and we need to push forward on many different fronts, recognizing that many resources and technologies can make vital contributions, but that it is very difficult to pick the “winners.” As you will hear during the course of the day, and as you will see from the displays from our existing centers and programs in the lobby, the University of Delaware has exceptional strength in a host of energy fields, from photovoltaics, to wind to fuel cells, to energy and environmental policy. The University of Delaware Energy Institute is targeted at *integration* and *collaboration* among these focused programs, and others that will be created as new opportunities arise. One new example is our new Center for Carbon-free Power Integration, aimed at addressing carbon-free power generation and incorporation into the grid.

The mission of the University of Delaware Energy Institute is to

- Create the enabling science and advance the development and deployment of new and emerging energy technologies.
- Leverage the University’s strengths in research, education and policy, in partnership with industry and government, to meet the challenges posed by our future energy needs.

- Make the University of Delaware a leading resource for energy education and innovation to benefit the State of Delaware and to promote the Nation's energy independence and security.

As the “portal” to the University’s energy efforts, the Institute will bring together collaborators both inside and outside the university who will focus on approaches defined by the challenges to be met, rather than just by the available solutions. It will build on existing educational programs in areas such as Energy and Environmental Policy, and Sustainable Energy Technology, to help create new opportunities for students, and for outreach to the community. Finally, it will help lead the competition for large-scale funding for energy research. University of Delaware researchers are already hard at work there, and in the coming weeks we will submit multi-investigator, multi-institution proposals to the National Science Foundation and the Department of Energy with titles such as

- Green Materials for a Sustainable Energy Environment
- Renewable Energy through Nanoscale Assembly
- Innovative Catalytic Technologies for Biomass Utilization
- Advanced Solar Energy Conversion

The institute will also have a vital role in driving the facilities, infrastructure and instrumentation needed to carry out frontier energy research.

Finally, there is one thing that characterizes energy research and energy researchers at the University of Delaware beyond excellence, and that is **ENGAGEMENT**. UD faculty researchers and teachers who are part of the Energy Institute are heavily involved in demonstration and application projects, as well as cutting-edge research. Some of the existing demonstrations include the fuel cell bus and V2G vehicle demonstration projects, as well as the solar poultry house project being carried out in Sussex County. Our faculty have been involved in policy and programmatic efforts at the state level, from the

Sustainable Energy Utility to the current Energy Planning exercise of the Governor's Energy Advisory Council, to the State Science and Technology Council and its Alternative Energy committee. In short The University of Delaware Energy Institute is founded on a broad base of research strength and practical engagement of our faculty, because we believe that is the way to truly make an impact on this defining challenge of our time.