

University of Texas at Dallas Institute for Innovation and Entrepreneurship Tackles Challenges of Energy Generation and Storage

Top engineering and nanotech minds address next generation solutions to support the world's appetite for more low cost energy

October 21, 2011, Dallas, Texas - The University of Texas at Dallas sponsored a forward-looking conference on October 21st where UT Dallas researchers and industry leaders addressed developments impacting solar power, wind energy, storage integration and the design of advanced electronics used in the management and control of electricity. Since the sun does not shine at night and the wind does not blow consistently during the day, researchers are seeking to discover innovative solutions for generating and storing renewable energy both day and night. The Research & New Venture Showcase event addressed such technical and business issues as:

- ⤴ New materials testing and validation
- ⤴ Nanotech innovations improving solar power
- ⤴ Wind turbine reliability
- ⤴ Battery & ultracapacitor nanomaterial characterization
- ⤴ Energy storage systems integration and testing
- ⤴ Green jobs, the economy, and regulatory factors impacting the development of renewable energy



Presenters included Drs. Daniel Viassolo and Juan Santiago Santos from Vestas Technology R&D Americas

According to the U.S. Energy Information Administration, the annual need for energy is expected to increase to approximately 770 quadrillion British thermal units (Btu) by 2035, a rise of 53% from 2008 numbers. Vestas Technology R&D Americas estimates this increase in demand to be worth \$278 billion in economic potential. UT Dallas is helping students and companies address both this increased demand for energy and the resulting economic potential.

“Energy expenditures account for about 8% of GDP worldwide and play a significant role in the US and global economies,” said Madison Pedigo, the Associate Director of Innovation and Entrepreneurship Programs at UT Dallas and event co-chair. “With seven of the top ten companies in Fortune’s Global 500 directly involved in energy, the economic and environmental impact of next generation production, storage, utilization and transportation make it a critical area for education, innovation and investment,” added Joseph C. Picken, PhD, Executive Director, The Institute for Innovation and Entrepreneurship at UTD. “By focusing on these technologies, we are preparing our students and groundbreaking companies to plan for that future.”

Below are some of the innovations and technologies UTD is developing to affect the future of energy generation and storage.

Today's commercial technology misses the mark on solar power efficiency

Our sun radiates the earth at a 14,000 times higher rate than the entire population's energy consumption. The question is how to capture and use that energy. Today's solid state photovoltaics (solar panels) are very expensive, inflexible, inefficient and require a lot of energy to produce. “Silicon is also very inefficient,” said Anvar Zakhidov, Ph.D, co-founder and deputy director of the Nanotech Institute at UT Dallas. “They need to be more than 70% efficient (versus ~21% in today's applications). In our labs we have been able to create photo-induced transparent sheets that enable new functionality and architectures. These organic and hybrid thin films,

we predict, will reduce costs by about 1/10th of their current levels (at less than .50 cents per watt) and be many times more efficient.”

Success in wind power is about technology coupled with smart legislation

As with all power related issues, there are multiple factors needing to be addressed related to wind: generation, storage and transportation. “The fact is that wind blows stronger during the night than daytime and most wind turbines are positioned far from the energy consumers,” said Dr. Robert Helms, professor emeritus at Stanford University, and former Dean of UT Dallas' Erik Jonsson School of Engineering and Computer Science. “If we had more efficient storage, wind power output in the U.S. could be doubled since we would have that power when and where we need it. The challenge is how to do it at twice the power and energy density, twice the number of discharge cycles and at one-half the leakage rate.”

“Can we marry wind farm technology with cost effective storage? The greatest burden for technology innovation is our regulatory systems,” adds Helms. “Combining technology with intelligent regulation along with capital investment will create the large power generation systems we need. This takes strong engineering know-how coupled with companies and politicians willing to invest.”

Harnessing the wind and the jobs of tomorrow

“Significant improvements have been made, but there is still a critical need for more research into advanced control systems for wind energy, to enable more reliable wind turbines, more efficient wind farms and the integration of wind and storage systems,” said Dr. Mario Rotea, Head of UTD’s Mechanical Engineering Department, Jonsson School Chair, and co-chair of the event.

According to Dr. Daniel Viassolo and Dr. Juan Santiago Santos of [Vestas Technology](#) R&D Americas, innovations in wind turbines enable the production of 120 times more energy from a single turbine than 25 years ago. That means that a single 90 meter turbine can generate power to around 3,400 households at an average wind speed of 9 meters per second. Wind energy is not only becoming more efficient, but is creating more U.S. jobs. “Vestas is creating jobs in the region, for the region, and proof is in the investment of \$595 million for 3 new factories in Colorado; Blades in Windsor, Nacelles in Brighton and Towers in Pueblo”. The Vestas team believes that national standards, climate change, environmental protection, water scarcity, energy security and green jobs will all have an effect on the integration of wind and solar energy generation, but ultimately the cost of energy will be a leading factor in determining what drives the future of wind energy.

Better storage capacity equals lighter vehicles and creates jobs

Dr. Bruce Gnade, Vice President for Research and the Distinguished Chair in Microelectronics at UT Dallas addressed low cost, high-K dielectric capacitors as a solution to the inefficient and expensive batteries in use today. “Supercapacitors can be used for electric vehicles, power grid stabilization, and pulse power. Today, in our labs, we are creating lead acid battery power and capacity without the lead and the acid.

The event was highlighted with a keynote address by Mark Armentrout, President and CEO of Texas Technology Partners and a Managing Director of the Texas Institute, who addressed the current and future challenges of the geographic limitations, intermittent nature, transmission, reliance on federal production, tax credits, environmental and aesthetic challenges of renewable energy sources.

The conference was co-sponsored by the Institute for Innovation and Entrepreneurship and the Institute for Intelligent Energy Systems at UT Dallas, and by the Texas Institute. A subsequent program, planned for Spring 2012, will focus on electrical energy efficiency and utilization.

For more information, go to <http://innovation.utdallas.edu>

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