



The University of Toledo's Role in Advancing Northwest Ohio's Renewable Energy Economy

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TMACOG Professional Day Presentation



Our Message



- UT has a twenty year history in advanced renewable energy research
- UT has established strong leadership in renewable energy research, technology transfer and incubation
- We are seeing this make a difference in our local economy
- UT has established centers and institutes to support research and technology development

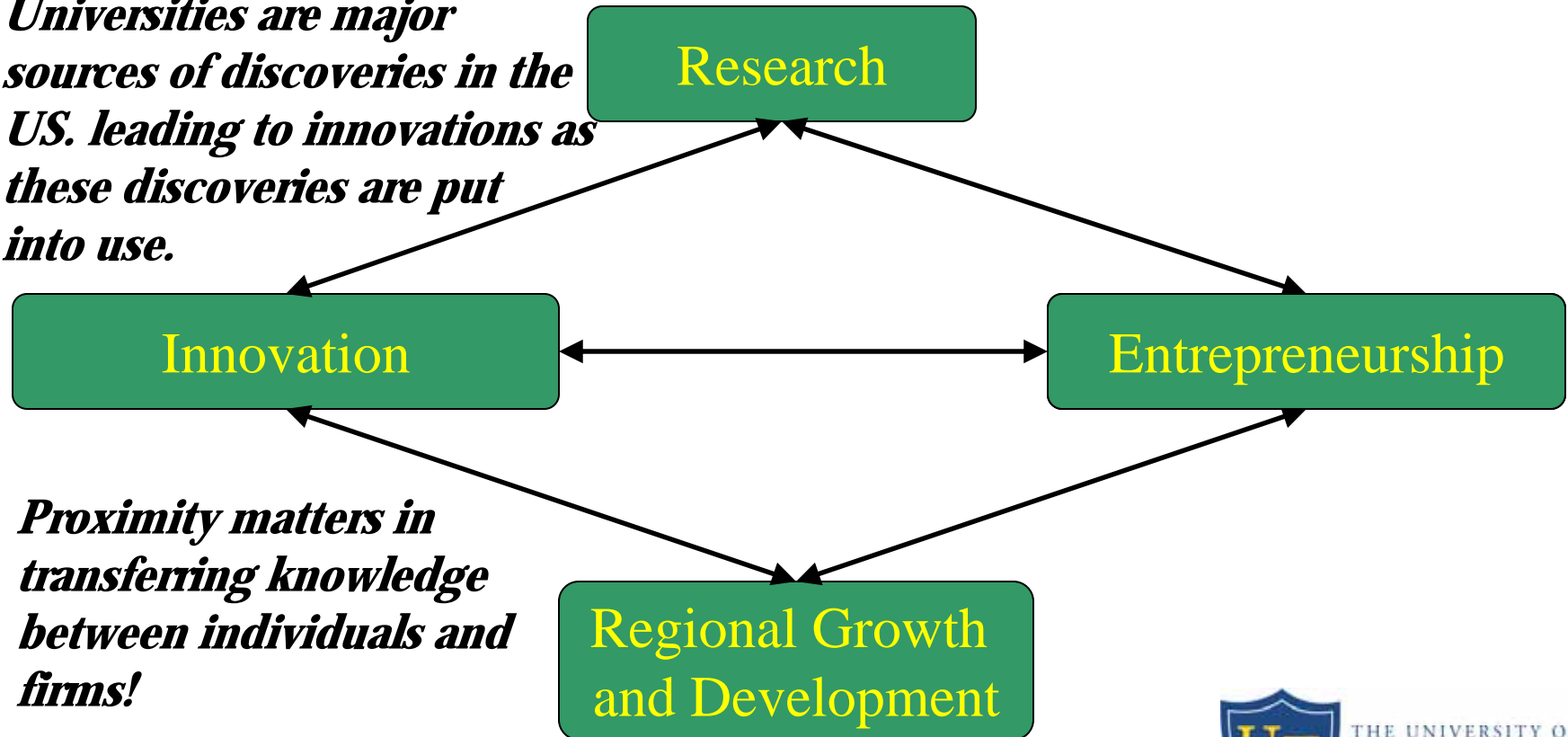
We are creating high wage jobs

- Jobs directly from university research
- Jobs created by research in collaboration with local industry
- Jobs created as new enterprises are formed
- Jobs attracted as new companies move into region to be near this industry cluster



Research, Innovation, Entrepreneurship, and Regional Growth and Development

Universities are major sources of discoveries in the US. leading to innovations as these discoveries are put into use.



Proximity matters in transferring knowledge between individuals and firms!

Supporting the Growth of Innovative Companies

Harold McMaster—
visionary inventor



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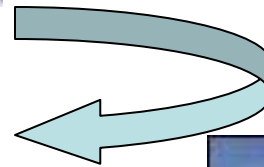


Professor Alvin
Compaan—wrote
proposals
To bring in funding to
develop
Laser scribing
technology

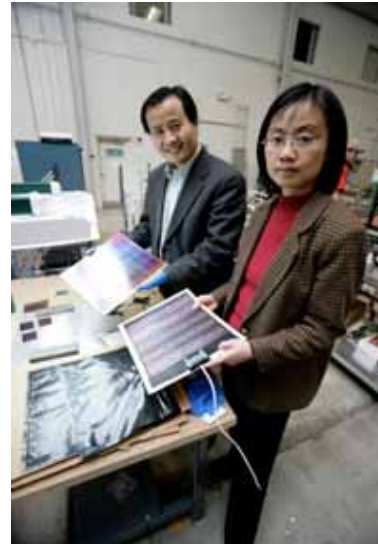
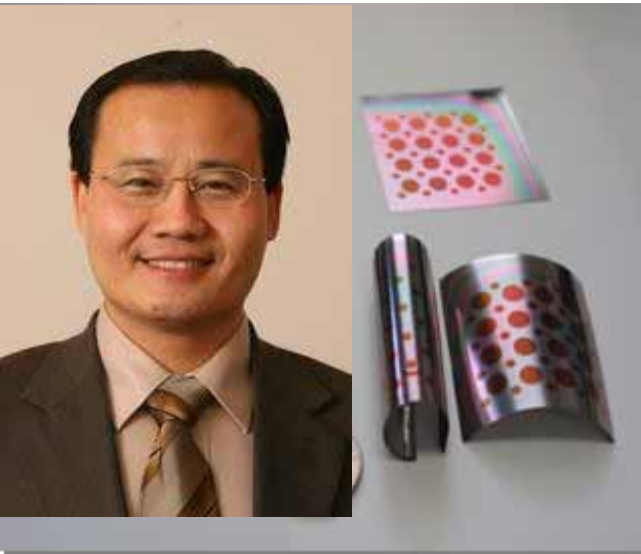
External investment and
further
R&D and manufacturing
improvements



First Solar —Nation's
leading solar cell producer

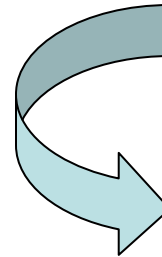


Solar Cell Research to Solar Cell Manufacturer



Scaled up and tested
In UT
Incubator

Dr. Deng advanced research
In his UT Lab on a-Si solar
cells



Biomass Research to Biomass Start-up Company

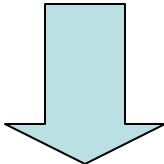


Dr. Connie Schall and Dr. Sas Varanesi, UT College Of Engineering receive seed funding from University to begin research in biofuels and Ionic liquids.

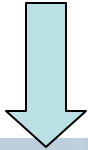
Supported by NSF Partnership For Innovation Grant



Dr. Varanesi presents Research results at conference And meets Praveen Paripati



SuGanit Systems Formed



Locates in UT Incubator



University of Toledo Research

- Growing enterprise by investments in faculty and research infrastructure
- Commitment to industrial collaboration, particularly in NW Ohio
- Strong participation in State of Ohio Third Frontier Projects
- Closely aligned with technology transfer and commercialization
- Helps to grow new technology firms in NW Ohio
- Strong partnerships with federal R&D agencies
 - Department of Energy (NREL)
 - NASA
 - Air Force
 - USDA



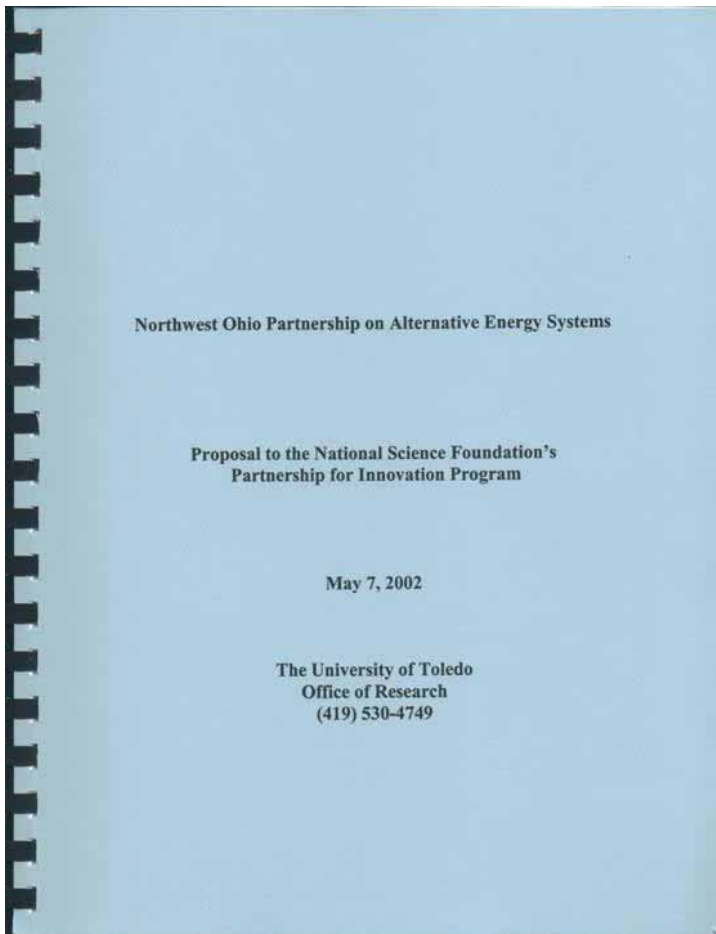
Formation of the “alternative energy cluster”



Northwest Ohio Partnership on Alternative Energy Systems

National Science Foundation award in 2002 (PFI--\$600K) to develop Northwest Ohio into a nationally recognized center for alternative energy research, development, manufacturing, and use.

“Our plan is to develop Northwest Ohio into a nationally recognized center for alternative energy technologies in which the knowledge from our universities is transformed locally into innovations and wealth creation”



Breadth of UT Advanced Renewable Energy Research

- Photovoltaic electricity
- Photovoltaic hydrogen
- Biomass energy
- Energy storage and batteries
- Wind energy proposals underway
- Transportation technologies
(Intermodal Transportation Institute)
- Fuel cells – focus on technologies to convert fuel to hydrogen



Our Accomplishments are Getting Noticed

"Here in northwest Ohio, we have an opportunity to focus on advanced alternative energies: solar and wind. Already, northwest Ohio has made a name for itself. ... It is becoming the solar capital of the world."



-Lt. Governor and Director of the Ohio Department of Development, Lee Fisher, *Toledo Blade*, January 23, 2008

New York Times, due to print October 4, 2008

CNN, March 28, 2008

Wall Street Journal, December 18, 2007

Newsweek, October 8, 2007

The Economist, May 24, 2007



UT- Serious Commitment to Renewable Energy Excellence

- Hiring of photovoltaics experts
- 2001 Research Focus Area selection
- Research into other areas of alternative energy
- Investments into new positions
- Graduate Program investments
- Multi-university collaborations
- 2005- UT Clean and Alternative Energy Incubator established
- State-wide leadership through the University Clean Energy Alliance of Ohio (UCEAO)



Evidence of Quality

- UT won two of only 11 Solar Energy America projects national awards in 2007
- UT's proposal to the Ohio Research Scholars Program for four new solar energy faculty was the only proposal to receive the top recommendation of both the National Academy of Sciences and the Ohio Department of Development
- Two preeminent NREL PV scientists joined UT in 2008
- UT won 3 of 17 proposals awarded by the state's Third Frontier Advanced Energy program in 2008
- UT won 1 of only 6 projects funded by the U.S. Department of Energy for biofuels research in September 2008
- UT was invited by the National Science Foundation to sponsor a conference in Washington DC on best practices in using university research to drive innovation economies (held in April 2008 with 350 nationwide participants)



Top Universities in US in translating research into license agreements*

- 1) Iowa State University
- 2) Brigham Young University
- 3) Duquesne University
- 4) North Carolina State University
- 5) University of Oregon
- 6) **University of Toledo**
- 7) New Jersey Institute of Technology
- 8) Western Kentucky University
- 9) Stevens Institute of Technology
- 10) Montana State University



**(FY2005 AUTM; Innovation Associates) www.InnovationAssociates.us*



Top Universities in US in translating research into university spin-off companies*

- 1) Brigham Young University
- 2) Stevens Institute of Technology
- 3) University of North Carolina at Charlotte
- 4) University of Texas, Arlington
- 5) Duquesne University
- 6) University of Akron
- 7) **University of Toledo** 
- 8) Catholic University
- 9) Creighton University
- 10) Arizona State University



**(FY2005 AUTM; Innovation Associates) www.InnovationAssociates.us*



UT's Clean and Alternative Energy Incubator

September 2005

2 companies
0 graduated companies
0 joint ventures formed
0 International Co. interested
1 incubation facility
0 centers
N/A incubation prospects
8 jobs

September 2008

8 companies
3 graduated companies
3 joint ventures formed
4 International Co. interested
2 facilities with 2 more under construction (2009)
6 centers
13 incubation prospects
105 jobs, 36 postings, 11.5 FTE Center jobs, 10 postings

Est. \$6,990,000 new wages + \$2,760,000 wages for posted positions

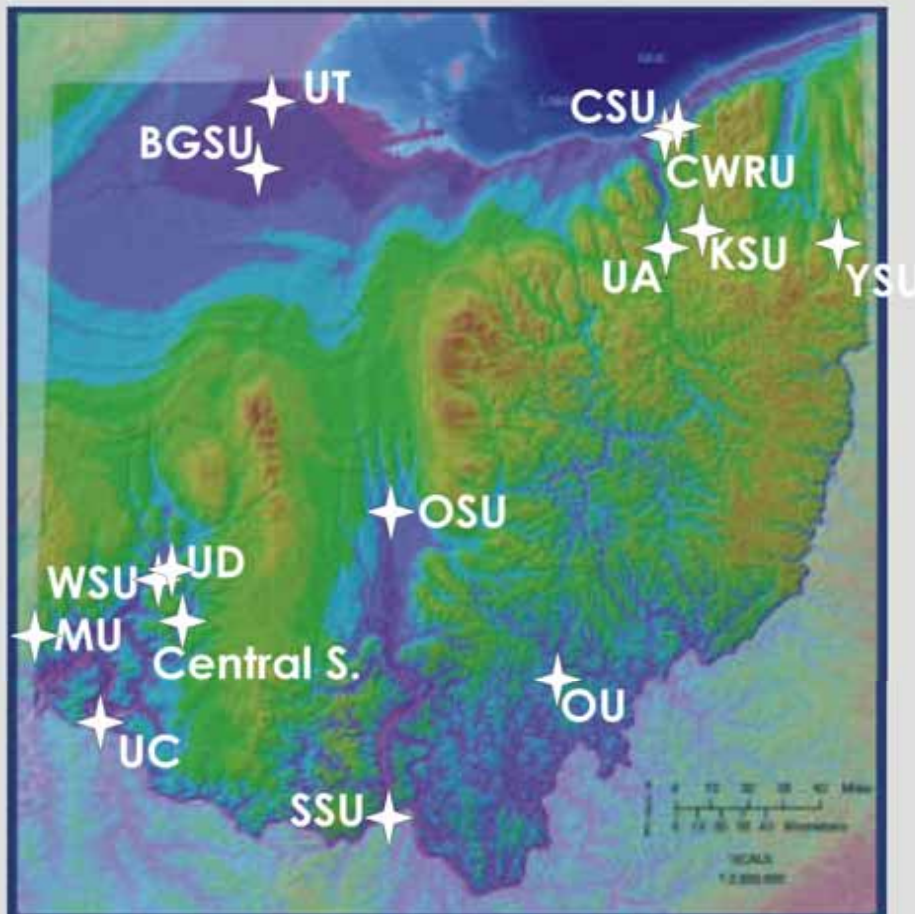
= \$9,750,000 total wage impact



2600 Dorr St.

UCEAO

University Clean Energy Alliance of Ohio



Statewide commitment
to Academic Research in
Alternative Energy

Housed at the UT Clean
and Alternative Energy
Incubator



Taking our Message to the World

UT/China 2008 Solar Initiative

Sino-American Solar-PV Industry Seminar

December 9-13, 2008

Drs. Calzonetti, Heben, Giolando, Lee, Kory, Norm Stevens, & Stephen Snider



WORLD FUTURE ENERGY SUMMIT

Abu Dhabi

January 21-24, 2009

Dr. Calzonetti, Norm Stevens, Megan Reichert-Kral, & Diane Miller



Objectives

China

- Establish UT as a leader in thin-film solar energy research
 - Broaden industry sponsored solar research base
- Attract top talent (faculty/students) to NW Ohio
- Obtain support of Central Chinese government officials
- Identify licensing opportunities
- Attract Chinese solar companies to NW Ohio

World Future Energy Summit

- Place UT as an international player in advanced renewable energy
- Promote Toledo as the place to go for renewable energy R&D
 - Identify advanced renewable energy collaborators
- Bring information to investors about opportunities in Toledo
- Survey technologies to help position UT's research programs
- Advance UT's Strategic Direction to be a transformative force in the world
 - Provide global leadership in renewable energy for Toledo and Ohio

WORLD **FUTURE ENERGY** SUMMIT

Abu Dhabi
January 21-24, 2009

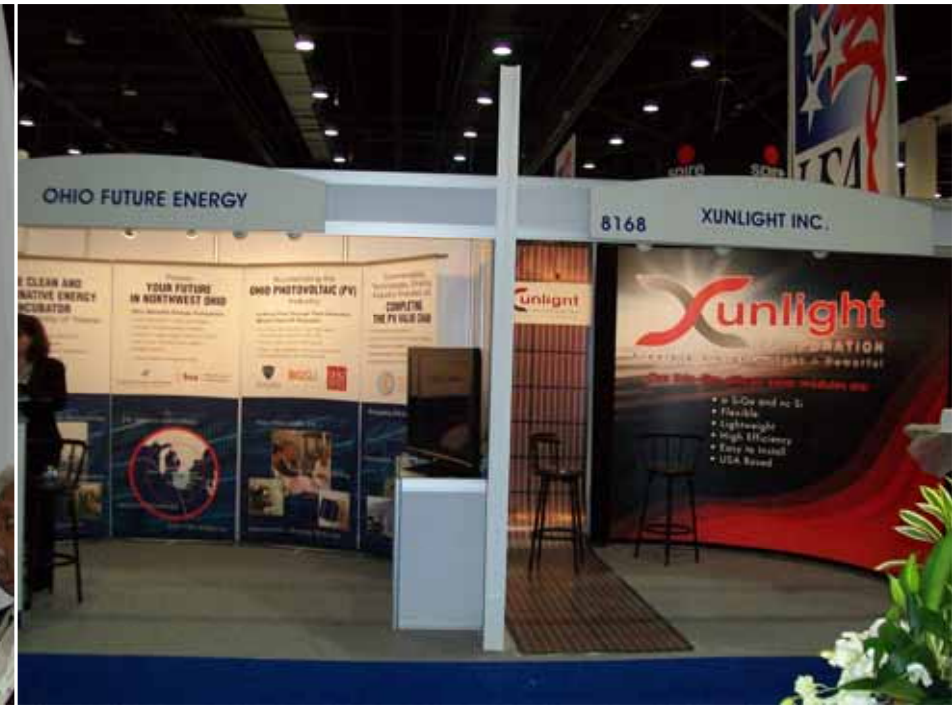


Frank Calzonetti, Megan Reichert-Kral,
Norm Stevens, & Diane Miller



Exhibit Visibility

- 16,427 people from 79 countries visited 359 exhibitors at the 2nd World Future Energy Summit. This figure includes the 2,634 delegates kicking off the energy debate in 2009 with some of the world highest leaders and renewable energy experts.
- 535 members of press attending from around the world



Investing in a Regional Priority

- State support for Center and UCEAO
- Creation of the School of Solar and Advanced Renewable Energy
- Scott Park Campus plans
- Sustainable funding to support economic development mission
- Assist in obtaining private and foundation support for new faculty positions and other university investments
- Support for University incubation and Science and Technology Corridor
- Rally industry support



The University of Toledo is a transformative force for the world.



Thank you.

Dr. Frank Calzonetti

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Opportunities in Advanced Renewable Energy



- “By 2020, hundreds of billions of dollars of investment capital will probably boost global solar-generating capacity 20-40 times higher than its current level” ***McKinsey & Company, June 2008***
- Since 1990 wind has been the fastest-growing power source worldwide on a percentage basis, with an annual average growth rate exceeding 30%. ***American Wind Energy Association***
- “The Chinese government endorsed the Renewable Energy Law in February 2005; the law aims to boost China's renewable energy capacity to 15 percent by the year 2020 and outlines a commitment to invest \$180 billion in renewable energy over this period. Other financial issues under discussion include a national fund to foster renewable energy development as well as low-cost loans and tax breaks for renewable energy projects.”
Worldwatch