November 2008

The Wind Energy Center at the University of Massachusetts Amherst: America's Leading University Program in Wind Power Engineering

Patrick Quinlan
UMass Amherst - Wind Energy Center

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America's Leading University Program in Wind Power Engineering

History, Research, and Training

November, 2008

College of Engineering
University of Massachusetts at Amherst

UMASS

UMASS Wind Energy Center

- Managed within the Mechanical and Industrial Engineering Department (MIE) at UMASS
- Co-directors: Professor Manwell and McGowan
- Other PIs: Department Head Mario Rotea and Assistant Professor Robert Hyers
- About 12 graduate students
- Associate Director: Patrick Quinlan
- Seven other professional staff
- Approximately $1.5 million in annual activity
- Major sponsors: MRET, Mass. DOER, US DOE

Current Research at the Wind Energy Center

- Wind resource assessment in Massachusetts
- Turbine siting and external design conditions analysis
- Icing research, noise research
- Addressing Massachusetts issues—towns, museums, farmers, students
- Turbine electrical and control issues
- Turbine machine design, structural analysis and materials issues
- Hybrid power systems/distributed generation
- State/federal and international activities
- Offshore wind energy

Graduate Students!

Wind Power Firms: General Electric, Vestas North America, Mitsubishi, Southwest Windpower, US Windpower, ESI, Flowind, Atlantic Orient Corporation, Enertech, Fayette, Carter Wind Systems, Bergey Power, Kennetech, Zond, Enron Wind, Clipper Wind, Northern Power, and Second Wind.

Wind Power Consultants: Garrad Hassan America, Global Energy Concepts, UPC Wind, NEOS Corporation, McNiff Lite Industries, Windpower Associates, Pace Global Energy Services, and GPCo (Canada).

Utilities and Wind Developers: Florida Power and Light, Southern California Edison, Northeast Utilities, Alaska Energy Authority, Ontario Hydro, Tennessee Valley Authority, and Oak Creek Energy Systems.

Universities: MIT, U. Texas/Arlington, Babson College, University of Wisconsin, James Madison University, University of California Davis, and University of Massachusetts.

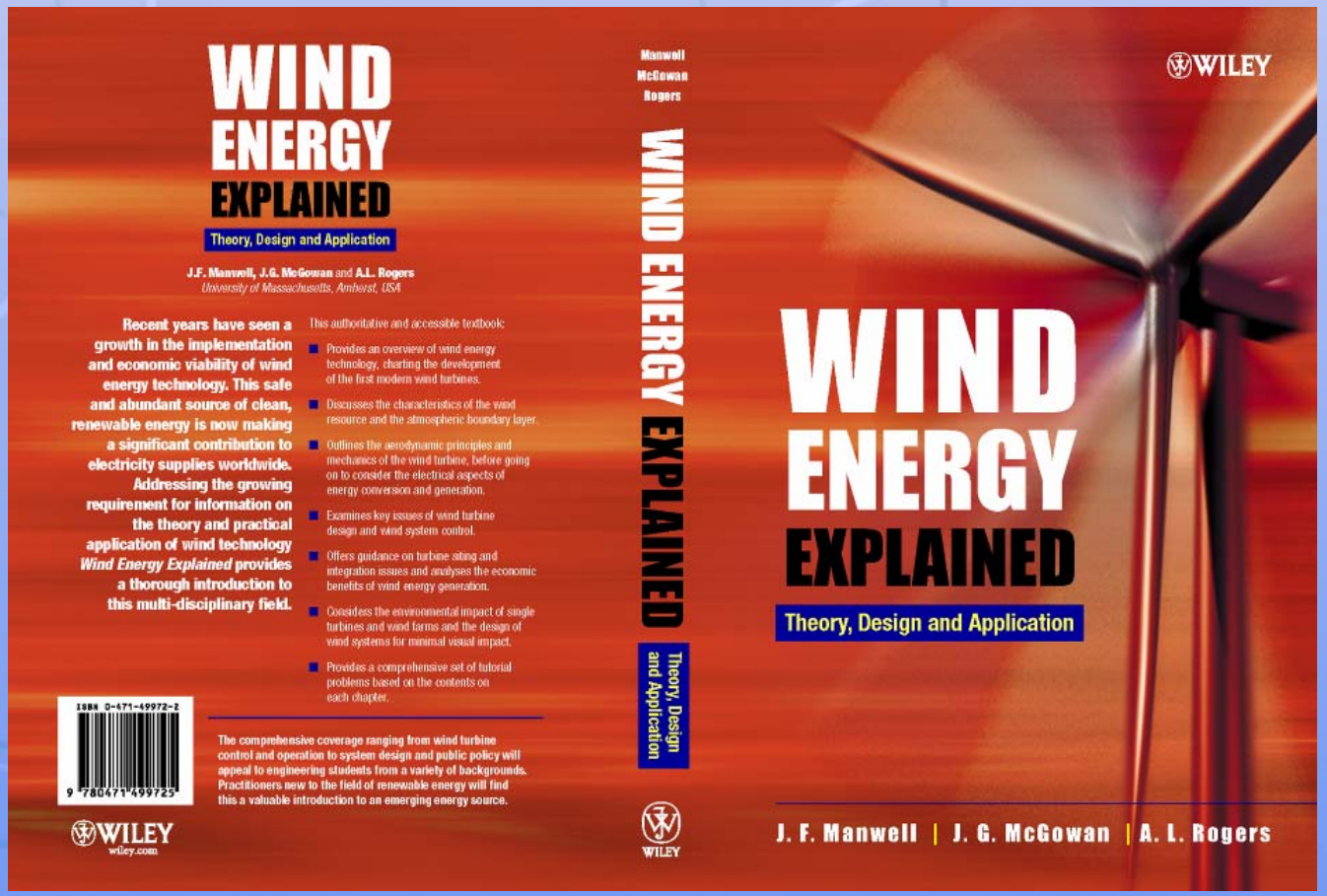
National and State Agencies: White House Office of Science and Technology Policy, US Congress, US Department of Energy, National Renewable Energy Laboratory, Sandia National Laboratory, Massachusetts Department of Energy Resources, New York State Energy Research and Development, and Wisconsin Energy Office.

International Laboratories: Rutherford Appleton Laboratories (UK), Riso National Laboratories (Denmark), TU Delft (Netherlands), and World Institute for Sustainable Energy (India).

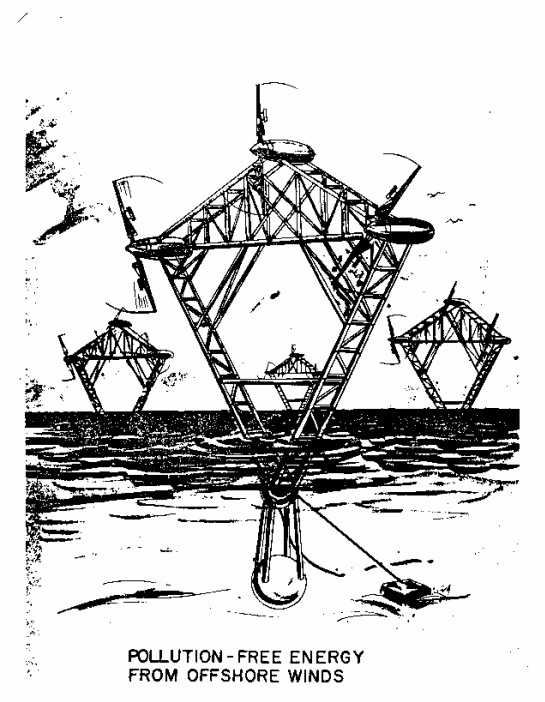
UMASS

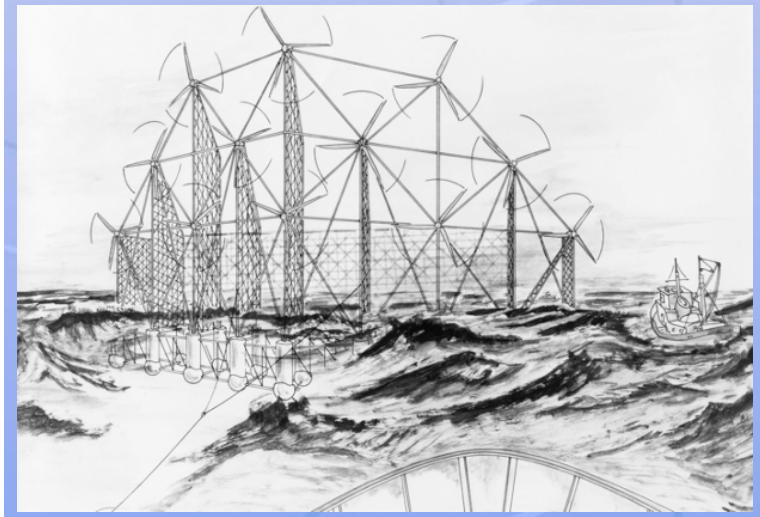
Advanced Remote Data Collection

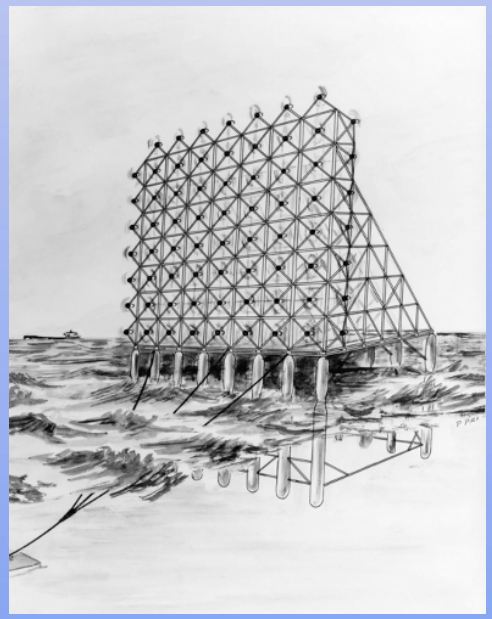
Wind Engineering Education: Authors of the Leading College Text on Wind Energy



History: 1970s
Early Conceptual Designs for Offshore Wind in New England







Wind Turbine/ Spar Buoy; Multi Rotor Systems

(Heronemus, UMass, 1973)

History: 1990s

Mt Tom, Massachusetts Experimental Test Site:

ESI 80 WTG:

2 Bladed

Downwind

250 kW

Many Modifications

History: 2000s
Hull, Mass. Wind Turbines

Hull 1-660 kW

Hull 2- 1.8 MW

Training Programs at the UMASS Wind Energy Center

This year, first-time technician-level certificate-based educational programs sponsored by the Massachusetts Renewable Energy Trust.

- Pilot—meteorological tower installation training
- Following years—data loggers, computer methods, remote sensing
- Potential hybrid on-line on-site format

Next year: wind energy course at Greenfield Community College.

The new Green Jobs Act opens up some funding for our staff and students to share some of our expertise in:

- Wind energy resource assessment tools and techniques, including SODAR (sonic anemometer) and LIDAR (laser anemometer), both of which track wind speed and direction at the "hub height" of modern utility-scale turbines
- Wind turbine site assessment and mapping tools
- Turbine performance monitoring and testing

Wind Energy Center

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