

Atlantic Wind Test Site

North Cape, Prince Edward Island



Building Our Renewable Energy Future

It's an ill wind that blows no good!

While most people bristle at the thought of persistent and strong winds, engineers and technicians at the Atlantic Wind Test Site see only good. They know that the systems they test and develop, which convert the abundant power in the wind into clean non-polluting electricity, will play a key role in our future energy supplies.

The Atlantic Wind Test Site (AWTS) was established in 1980 as Canada's National Wind Energy Laboratory. Since then it has been the cornerstone of Canada's wind energy R&D program. AWTS Inc. is a subsidiary of the PEI Energy Corporation and obtains operating income from the governments of Canada and PEI and from contract research and testing work.

As public efforts increase to solve the problems related with climate change, wind energy will emerge as one of the most important new energy sources for the 21st century.

Wind energy systems are already providing large quantities of clean electricity worldwide. Global wind capacity is expected to double in less than five years.

The United States and several European countries are aggressively investing in wind turbine development and commercial generation projects. Many developing countries are also realizing that wind energy can help them meet their rapidly increasing demands for electricity.



(Caption fig.1 - AWTS is ideally located for testing of prototype and

Environmental Stewardship: Responding to the Challenge

Climate change, poor air quality, and depletion of non-renewable resources are among the most troublesome issues of our time. They threaten the global environment, our future economic growth and, in some regions, political stability.

The challenge is to find sustainable and clean energy technologies that are economically attractive. Wind energy systems, with zero-emissions and with costs that are competitive with other conventional options for new power, meet this challenge. Also, the manufacture and installation of wind energy systems will create many new jobs.

commercial wind turbines and related technology.)

Canada's Opportunities in Wind Technology

With a huge land base, Canada's wind resource is immense. Wind energy can provide large amounts of energy to existing utility systems as well as providing many additional benefits if appropriate technologies are developed.

Canada also has a strong interest in developing wind energy systems for its many remote and northern communities where the operation of conventional diesel plants is costly.

Studies indicate that there is potential for thousands of megawatts of wind power in Canada.

AWTS Mandate

AWTS has been designed to perform a range of technical and scientific services for the wind energy industry. Among these are:

- Testing of commercial and prototype wind energy systems to determine operational characteristics, safety and reliability.
- Development of collaborative projects, with industry, utilities and government, especially for Arctic and remote locations
- The development and testing of wind resource monitoring equipment and methodology
- Participation in the development of national and international standards for performance testing, safety and electrical interconnections
- Development and testing of wind-diesel and other wind energy technology R&D
- Education and supply of information on wind energy technology to the public.

An Established Facility Equipped for a Challenging Environment

For twenty years, AWTS has been dedicated to the development of wind energy. A unique engineering laboratory staffed by experienced and dedicated experts, AWTS is ideal for developing and evaluating wind energy systems and technologies suitable to a range of uses and climatic conditions.

AWTS is situated on the northwest tip of PEI exposed, for 300-degrees, to the wind-swept Gulf of St Lawrence.

Energetic winds, a corrosive marine environment, occasional freezing spray and icing provides both a harsh climate for testing wind turbines and a highly productive wind energy generation site.



(Caption fig 2 Enertech 40 kW overlooks the main office and workshop.)

The 48 hectare (120 acre) site can accommodate a number and variety of wind turbines for testing.

AWTS is easily accessible by highway and is within 2 hours of the Charlottetown airport. AWTS is connected to the world with advanced telecommunications.

Strong Technical Expertise

AWTS offers a range of services to a variety of clients, including utilities, industry, governments as well as international interests:

- Wind technology design evaluation and primary research and development
- Monitoring and testing of prototypes and commercially available wind turbines
- Control systems development, particularly for systems which integrate wind turbines with other sources
- Wind resource assessment and remote monitoring
- Project planning and management

- Engineering consulting

The private sector looks to AWTS for unbiased and confidential testing and developmental work.



(Caption fig 3- The harsh climate presents difficult working conditions but it provides an ideal testing environment.)

In-house R&D Programs

In addition to testing externally developed wind turbines, AWTS is engaged in an expanding program of in-house R&D, with a view to creating valuable spin-offs for commercial development.

In recent years, projects have concentrated on technical areas with near-term viability where Canadian companies can develop a market niche in the domestic and global market place.

Wind-Diesel Systems

The integration of fuel-saving wind turbines with diesel generating sets is a significant innovation for remote community electrical systems. AWTS has developed Canada's only wind-diesel test bed into a world class facility. This facility has allowed the AWTS to test and to develop different wind-diesel configurations and control systems to achieve reliable and smooth operation.

Innovative Wind Turbines

One interesting and innovative technology under study at AWTS is the Vertical Axis Wind Turbine (VAWT). This design, pioneered in Canada over twenty years ago, has many key advantages, such as easy access at ground level for maintenance and no requirement for a yawing system to align the wind turbine with the wind direction. A "dynamically soft" design, using non-rigid supports, has been computer modeled and fabricated at AWTS and is now ready for testing.

When fully developed, this concept is expected to have significant commercial potential.



(Caption fig 4 -AWTS provides long term testing for wind turbine manufacturers and for others wishing to evaluate equipment.)

Wind-Diesel Integrated Control System

Integrating wind turbines with diesel-electric generators can offer significant energy cost savings, especially in remote communities where fuel and other costs are high.

The key to reliable and economic wind-diesel systems with good power quality is computerized control. To meet this challenge, AWTS has developed an advanced Wind-Diesel Integrated Control System (WDICS) which will soon be commercially available.



(caption 5 -The "dynamically soft" vertical axis turbine – "SoftVAWT")



(Caption 6 -Engineering and Programming the Wind-Diesel Integrated Control System (WDICS))

Testing Programs

A variety of wind turbines have been tested over the years at AWTS. Some examples include:

Lagerwey : Dutch Industries of Regina, Saskatchewan is marketing Lagerwey wind turbines in Canada. A Lagerwey 18/80 was installed in 1993 and continues to provide long term operating experience. This unit is also being used for advanced inverter and control system technology development.

Atlantic Orient Corporation: AWTS has been operating an AOC 15/50, 65 kW turbine since 1993. This turbine is of interest for Canadian applications because it is suitable for remote community installations. This Vermont-based firm has a Canadian subsidiary for manufacturing machines for Canadian and world markets.

Wenvor Technologies Inc. This Ontario wind turbine manufacturer, a partner of French company, Vergnet SA is working with AWTS to evaluate and further develop their wind turbine.



(caption fig 8: A 50 kW low speed generator is ready for installation on UNB's facility for renewable energy conversion. The facility will open at AWTS in the fall of 1999.)



(caption 7: AWTS-UNB collaboration produced a new power inverter and provided advanced students with hands-on experience.)

Collaborative Projects

AWTS is expanding collaborations with other institutions and the private sector to advance technology development. Combining the strengths of AWTS with that of other groups greatly enhances the rate and quality of developments.

AWTS-Hydro Quebec

IREQ, the research agency of Hydro Quebec, is working with AWTS to demonstrate the feasibility of IREQ's "High Penetration No Storage Wind-Diesel System", using AWTS' wind-diesel test bed.

AWTS-UNB-CFI

Collaborations between AWTS and the University of New Brunswick, Department of Electrical and Computer Engineering department has resulted in the design and testing of three innovative new inverters to efficiently convert variable wind and solar power to stable utility grade electric power.

Now, with the support of AWTS' funding agents and the Canadian Foundation for Innovation (CFI) this cooperation is being expanded with the construction of a new R&D facility that will enhance the research into renewable energy conversion and storage technologies.

Public Education

AWTS is a primary source of technical information for government and the private sector.

AWTS hosts many renewable energy engineers, scientists and enthusiasts each year as well as nearly 50,000 tourist visitors.

Fostering Innovation in Renewable Technologies

Canada's energy diversity and competitiveness will depend on a continuing commitment by governments and the private sector to develop innovative renewable energy systems for our future.

AWTS is a knowledge-based organization designed to help find Canadians solutions to the energy-environment issue over the next decade.

AWTS is committed to meet to the challenge of developing sustainable and economic renewable energy technologies.

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