

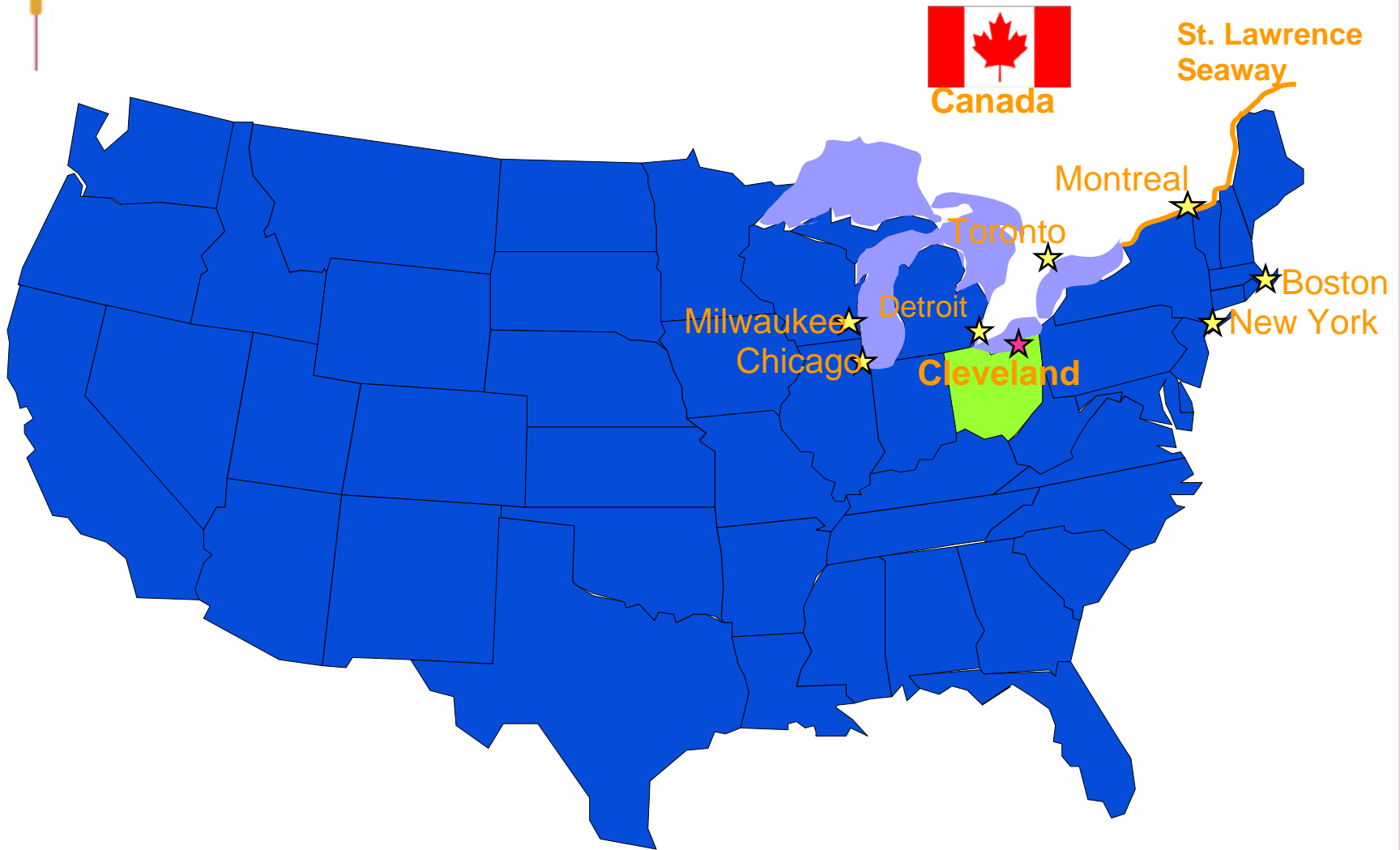
Great Lakes Wind Energy Center: Demonstration Project and Research Center



ClevelandTMdt

Akron+Canton+Youngstown

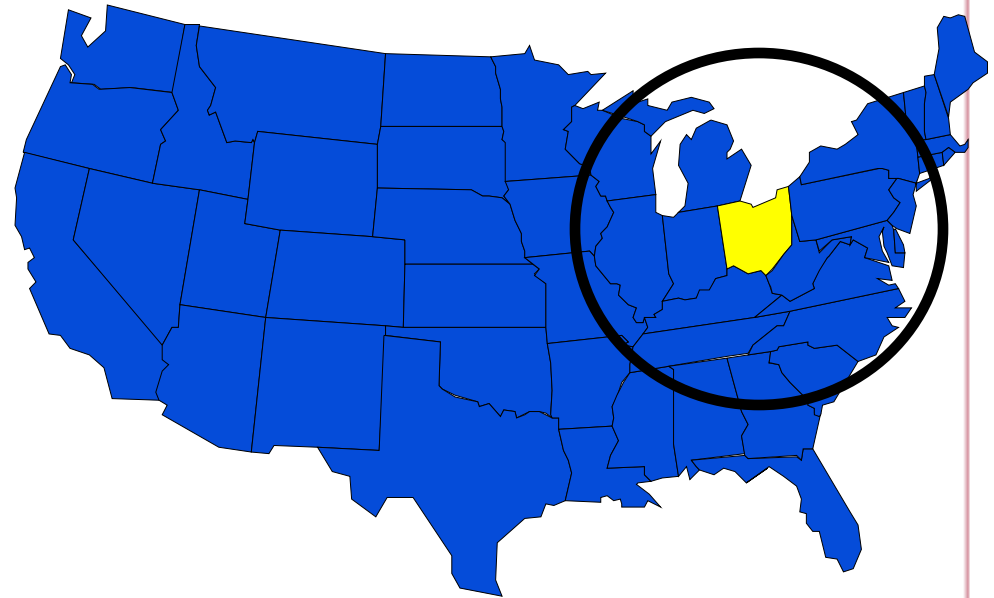
Orientation



Close to Major Markets

Within 800 km of Cleveland +:

- 44% of US Households
- 43% of US Population
- 45% of US Effective Buying Income
- 46% of US Earnings
- 49% of US Manufacturing Employment
- 56% of Fortune 500 US Headquarters



Advanced Energy in Cleveland+

Manufacturing expertise and existing supply chain ideally suited to emerging alternative energy industries

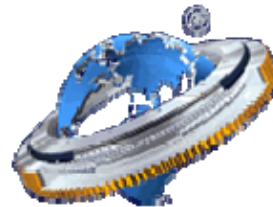
TIMKEN

EATON

**SHERWIN
Williams**

Swagelok

Rotek



LUBRIZOL
Fluid technologies for a better world

Parker

**SWIGERCOIL
SYSTEMS LLC**

Advanced Energy in Cleveland+

As well as major research universities with global impact



Cleveland State University



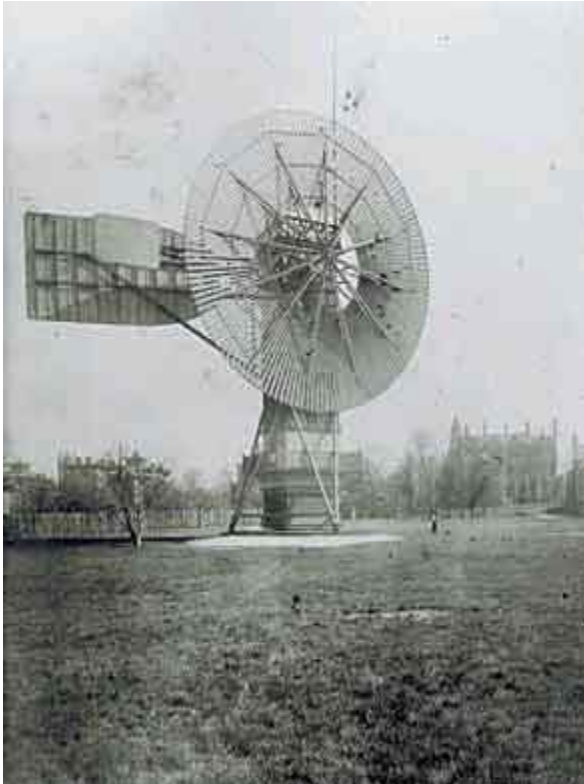
And major governmental research facilities



National Aeronautics
and Space Administration

Wind History in Cleveland+

First wind electricity generator:
Charles Brush, Cleveland, 1888



Experimental turbine:
NASA, Sandusky, late 1970's



Wind Today in Cleveland+

Wind monitoring equipment at 50 meters, 5 km offshore downtown Cleveland

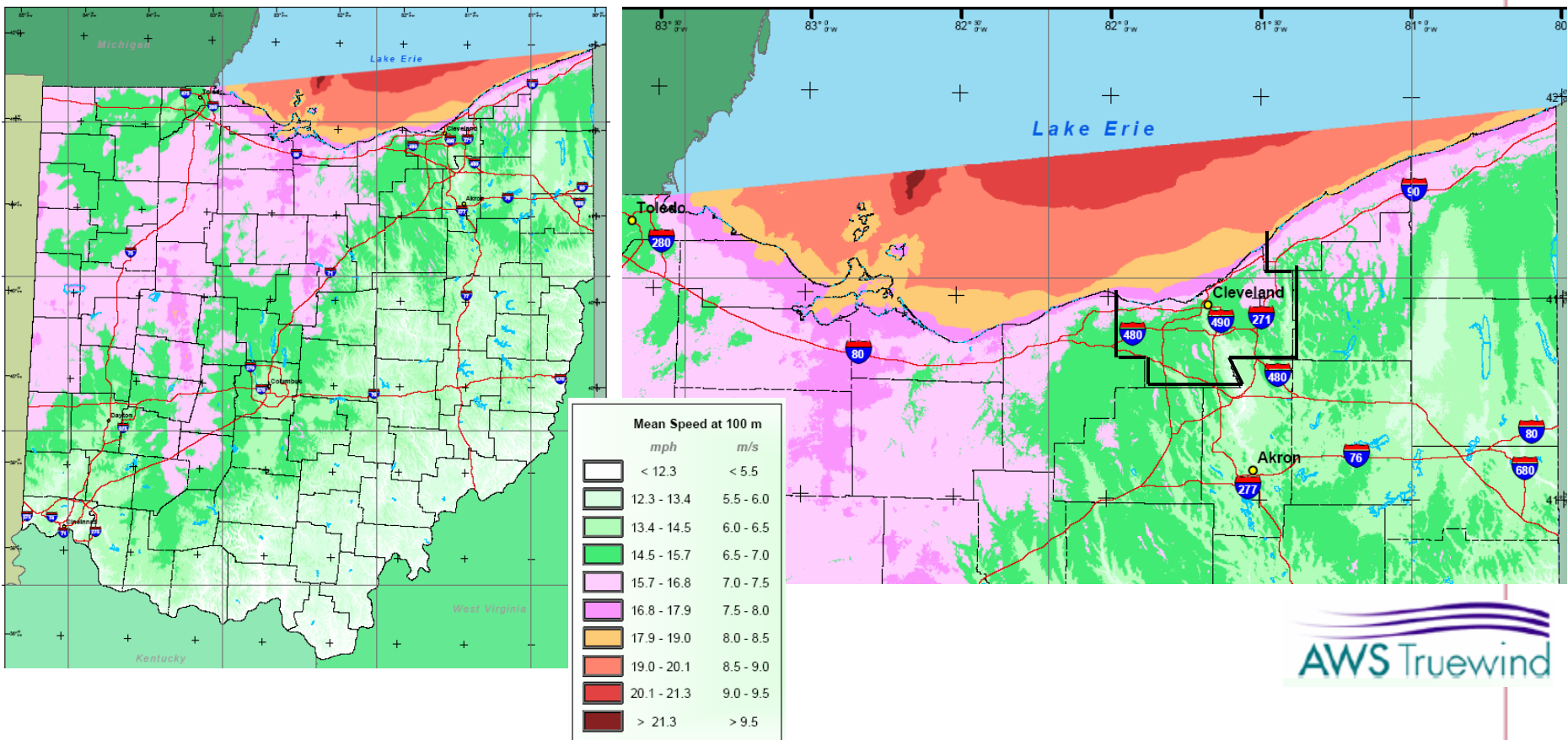
<http://www.livedata.clevelandcrib.org>

<http://www.webcam.clevelandcrib.org>



225 kw turbine on Lake Erie waterfront, downtown Cleveland

Lake Erie Wind Resource



Great Lakes Wind Potential

- Enormous market opportunity for wind energy in Great Lakes:

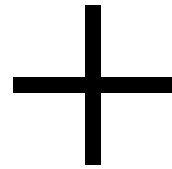
Depth	Lake Erie	All Great Lakes
< 20 m	44 GW	151 GW
20-30 m	21 GW	58 GW
30-40 m	3 GW	40 GW
Total < 40 m	68 GW	249 GW

Source: "The Great Lakes as a Regional Renewable Energy Source" by David Bradley, February 2004, www.greengold.org/wind

- But, no company or region in leading position to exploit:
 - Few offshore projects completed to date, all in Europe and in saltwater (not freshwater)
 - Selected manufacturers (GE, Vestas, Siemens) with still-modest experience, a few others (e.g., Enercon, RePower) developing products
 - No-one in North America focusing on offshore wind logistics (shipping, engineering, installation, etc.)

Great Lakes Wind Energy Center

Demonstration project consisting of:
2-10 turbines located 5-8 km offshore
downtown Cleveland for energy production
and monitoring & diagnostics



Technology Center consisting of:

- Certification Test Center
- Manufacturing Test Center
- Advanced Research Center

Demonstration Project

- 5-20 megawatts (2-10 turbines) 5-8 km offshore downtown Cleveland:
 - Energy production
 - Monitoring and diagnostics (M&D) for continuing technical advancement
- Objectives:
 - Proof of concept (regulatory precedents and improved economics) to stimulate development of Great Lakes wind markets
 - Visual icon for area
- Progress:
 - Selection of juwi, GmbH & JW Great Lakes Wind LLC as project managers
 - Core Team: Germanischer, Lloyd GmbH and DLZ Ohio, Inc.
 - Subcontractors: Black & Veatch Corp., Curry & Kerlinger, LLC, Econnect Group, Ltd., Ocean Surveys, Inc., Squire, Sanders & Dempsey, LLP.

Technology Center

- Potential configuration(s):
 - Affiliated with Case Western Reserve University
 - “Plug-and-play” test towers just onshore
 - Pre-wired/pre-permitted offshore plots
- Certification Test Center:
 - Open-access facility for commercial clients
 - Operated by independent company
- Manufacturing Test Center :
 - Testbed for commercializing freshwater offshore wind technologies
 - Designed for applied product engineering by industrial partners
- Advanced Research Center:
 - New technology development programs
 - Ability to calibrate laboratory results with offshore wind project
- Objectives:
 - Economic development: attractor of research, entrepreneurial and manufacturing activity in wind technologies and products/services
 - Recognition of area as an important center of North American wind industry

Long-Term Wind Vision

- Cleveland+ as a major North American center of wind technology R&D and manufacturing
- Ohio and other neighboring states as a large market for onshore wind deployment
- Great Lakes (starting with Lake Erie) as a growing market for offshore wind installation, with Cleveland+ as primary logistics hub

Cleveland+ EOW2007 Delegation

- David H. Matthiesen, Ph.D.
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Cleveland+ The City on the Lake

