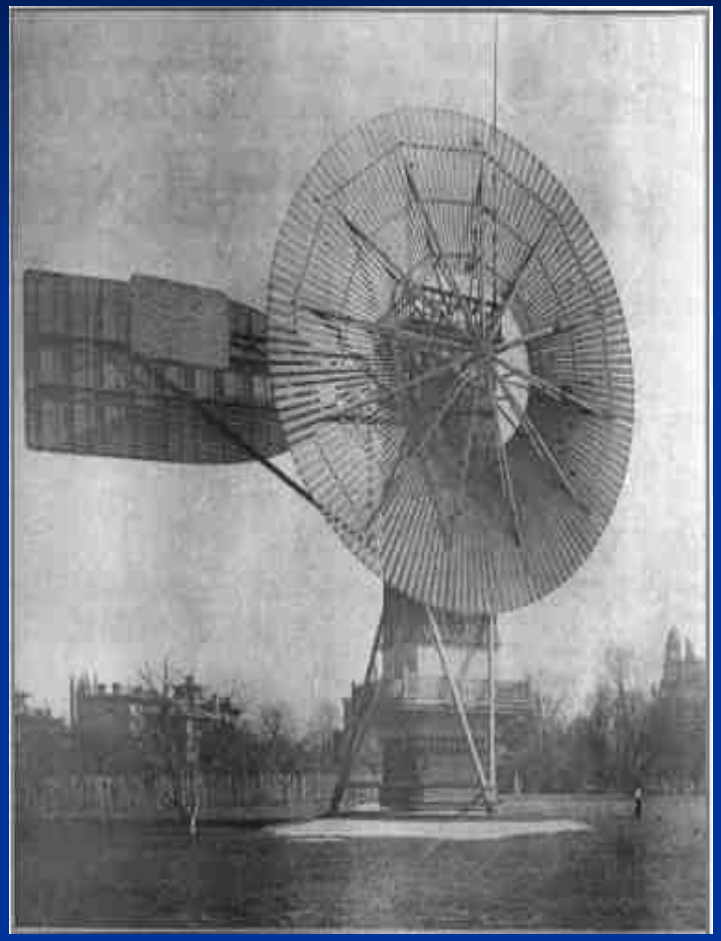
Multi-State Working Group
Regional Meeting

Overview of Ohio Wind Power

Bill Spratley, Executive Director
Green Energy Ohio

Columbus, Ohio
January 24, 2006

Ohio Wind Power Pioneers



1888 Wind Turbine by Charles Brush – First to Make Electricity - Cleveland

NASA Lewis – Plum Brook

Wind Tests at Sandusky, Ohio

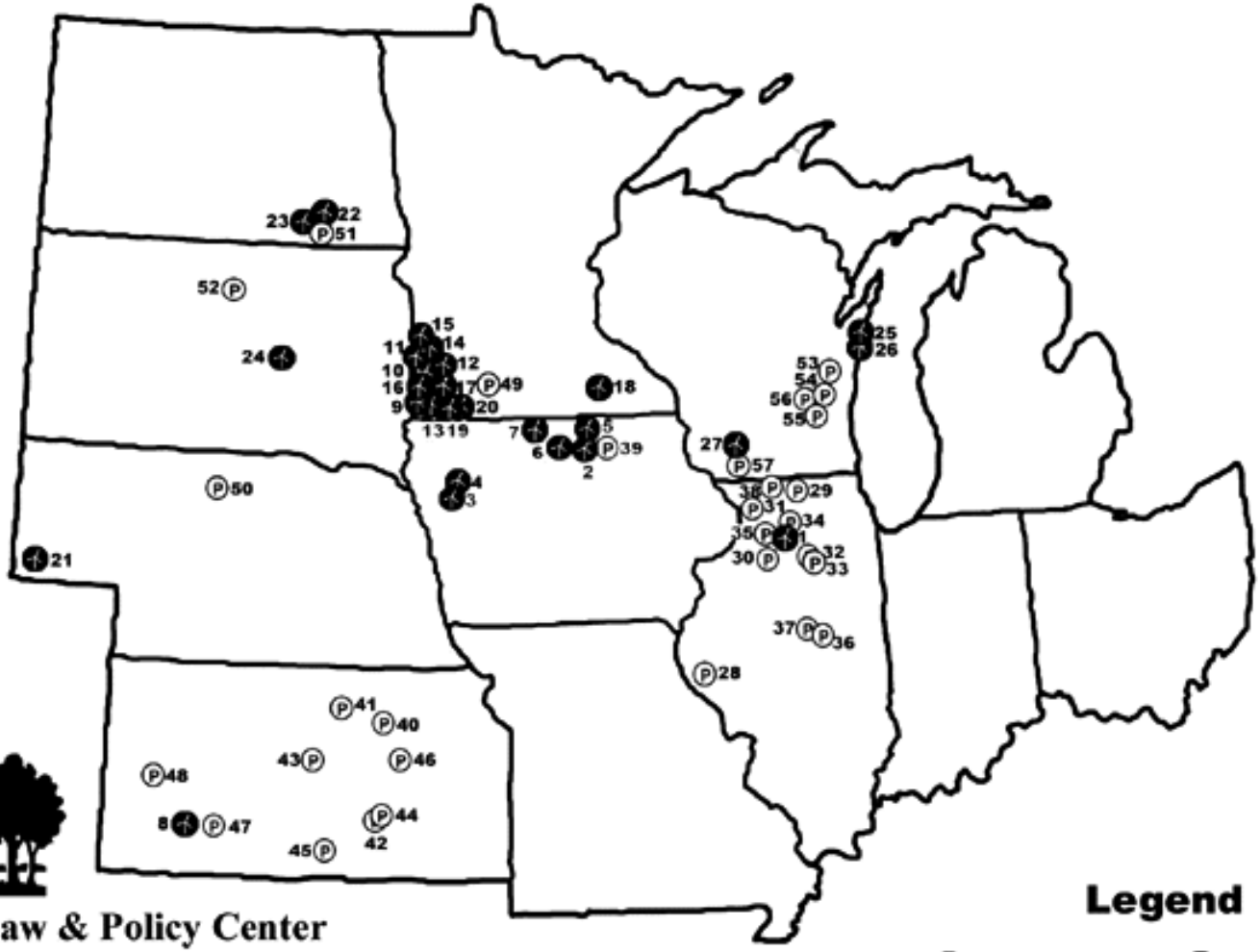
100kW Experimental Wind-Turbine Generator

Two slender blades span 125 feet

Midwest Wind Power Projects: 10 MW or More

1,250 MW Operating, 3,480 MW Proposed

Updated May 2004



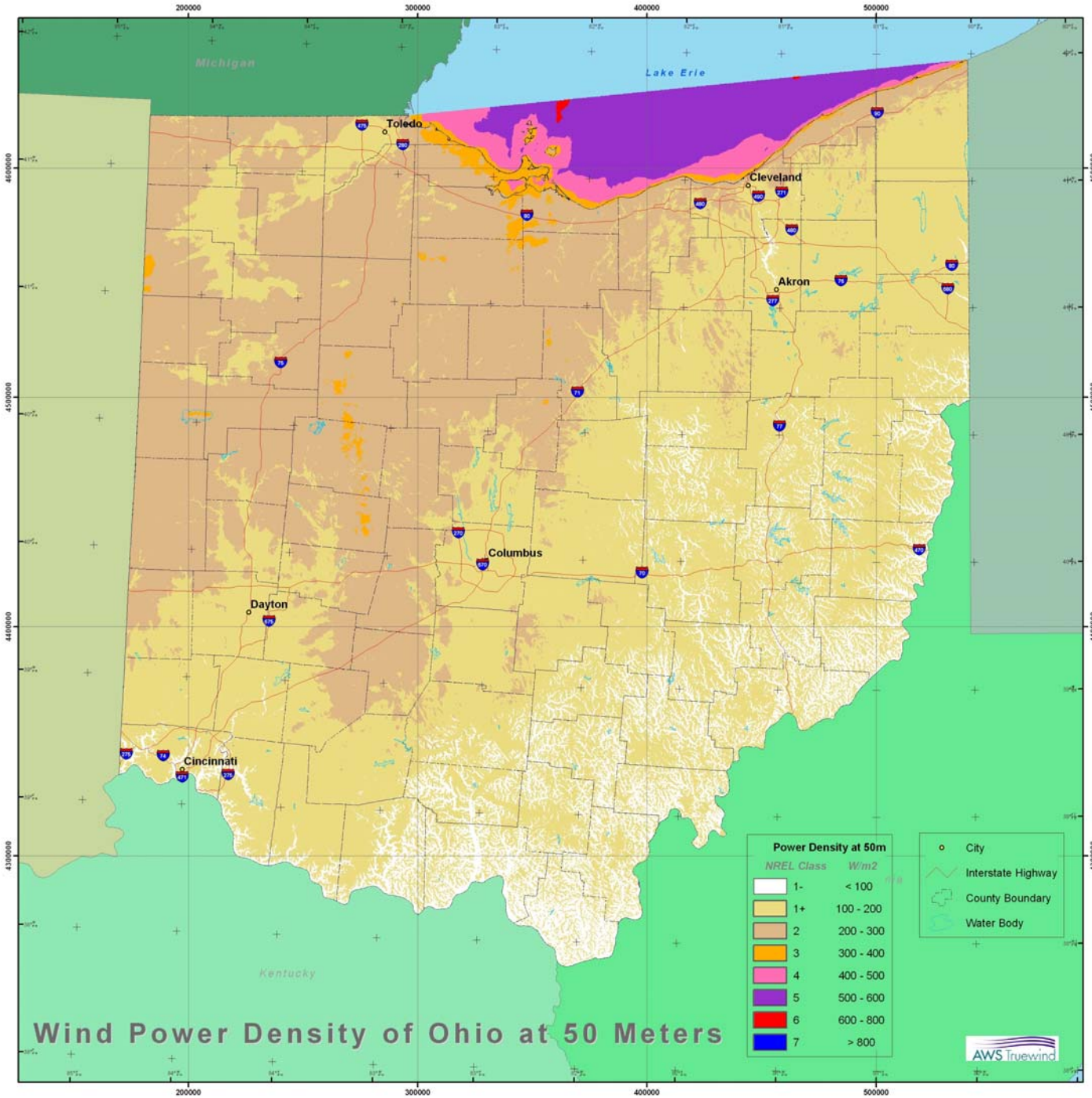
Environmental Law & Policy Center

35 East Wacker Drive, Suite 1300
Chicago, IL 60601
(312) 673-6500 www.elpc.org

Legend

Wind - Operating Wind - Proposed

Please see the list of projects on back



OHIO Wind Map

200 m grid resolution

Avg speeds ≥7 m/s @ 70 m available on only ~1% of land area (excluding parks, urban areas, etc.)

Strongest winds along the Lake shore and offshore

Ohio has a “significant potential for renewable energy production with a unique diversity of energy opportunities that could generate from 1,170 to 1,680 megawatts of renewable energy production.

Some form of renewable energy potential exists in virtually every county within the State.”

- March 2004 Ohio Biofuels Task Force

Renew Ohio!

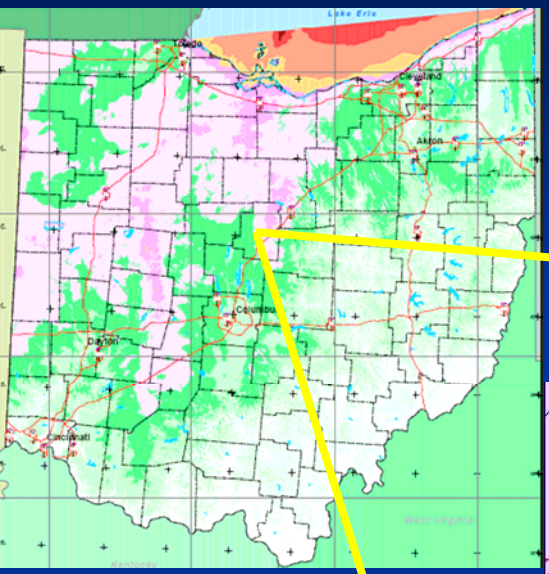
In 2006 Green Energy Ohio will:

- *Reach ALL 88 Ohio counties with a new volunteer/staff Speakers Bureau – Solar, Wind, Biomass*

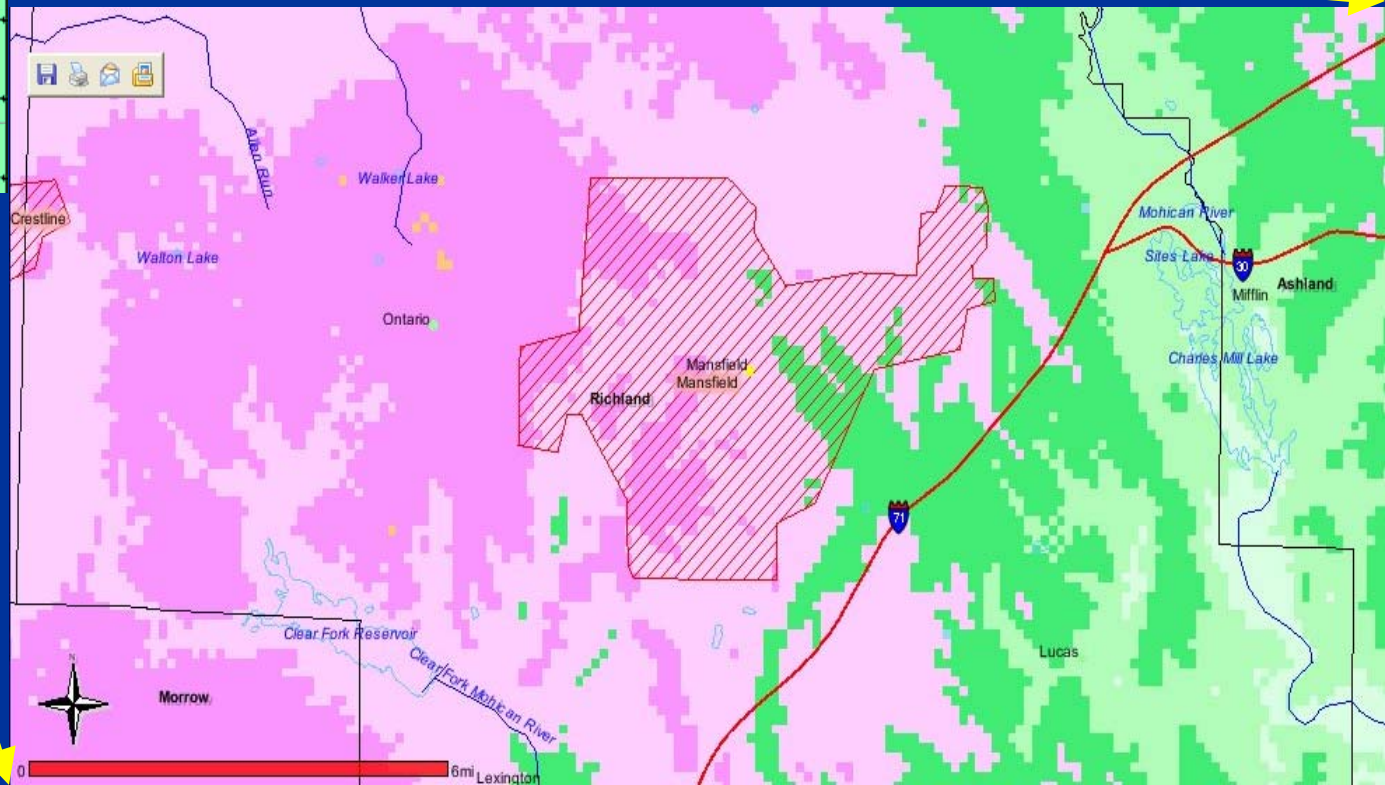
- *Expand the Ohio Solar Tour in 2006 seeking a clean energy site in ALL counties on Solar Tour 2007*

> *Focus on Clean Energy Incentives & Opportunities*
  * *Solar Tax Credits, State Grants, SOLAR 2007 Conference (Cleveland July 8-12, 2007)*
  * *Current Ohio Wind Development Activities Utility-Scale and Small-Scale Wind Power*

Ohio's Wind Energy Potential



Richland County on Ohio Wind Map
Mansfield, Ohio *Renew Ohio!*
December 15, 2007



Wind Resource at 30, 50, 70 & 100 Meters

GEO Wind Activities

Utility-Scale

Bowling Green Wind Farm Wind Test / Kiosk 2001-2006

Ohio Wind Power Conferences 2002, 2004 & 2006?

Ohio Wind Working Group 2003 - 2006

Cleveland Water Intake Crib Wind Test 2001 – 2008

Ohio Tall Towers Project 2004 – 2007

Great Lakes Coastal Tall Towers 2005-2007

Monitoring Ohio Wind (MOHW) 2006 - 2007

Anemometer Loan Program 2006 – 2007

Great Lakes Offshore Collaborative April 4-5, 2006

Ohio Wind Manufacturing Initiative Proposal

Ohio's First Commercial Wind

GEO Volunteers' 2001 Wind Test Saves 1 Year in Deploying Turbines

Ohio's Wind Power Future Now

Northwest Ohio

AMP-OH and Green Mountain Energy Wind Farm
Bowling Green, Ohio

- Ohio's first utility-scale wind farm.
- Four 1.8 MW wind turbines mounted on 257' towers with three 132' blades *(taller than a 30-story building).*
- Powers over 1500 homes.
- Partners: City of Bowling Green, Wood County, AMP-OH, Green Mountain Energy Company

2004 Ohio Wind Power Conference

Promote Ohio Wind Power for Small & Utility-Scale Sites

- Attended by 310 people
- Over 30 speakers
- 17 Industry Exhibits

Cleveland Sequel on June 24, 2005
for Utility Scale Wind Seminar

Ohio's opportunity for wind industry manufacturing jobs Is second only to California.

Up to 12,000 new jobs could be created in Ohio, one of the states hardest hit by manufacturing job losses

- Renewable Energy Policy Project (REPP) www.repp.org

Ohio Wind Working Group

Smart Wind Energy Plan for Ohio

First OWWG Meeting at Bowling Green – Sept. 03

Ohio Wind Working Group

American Electric Power

American Municipal Powet

American Wind Energy Association

Arcadia Windpower/Bluewater Wind

Bowling Green Municipal Utilities

Bowling Green State University

Cinergy Corp.

The Cleveland Foundation

Community Energy

Entrepreneurs for Sustainability

First Energy Corp

Gamesa

Green Energy Ohio

Green Mountain Energy Company

Sustainable Cleveland

Ohio Wind Working Group

Ohio Office of Consumers' Counsel
Ohio Department of Development
Ohio Department of Natural Resources
Ohio Environmental Protection Agency
Ohio Environmental Council
Ohio Farm Bureau Federation
Ohio Farmers Union
Ohio Power Siting Board
Ohio Rural Electric Cooperatives, Buckeye Power
Public Utilities Commission of Ohio
TrueWind Solutions, LLC
US Army Corps of Engineers
USDepartment of Energy Chicago Regional Office
US Environmental Protection Agency – Region 5
US Fish & Wildlife Service

Ohio Wind Working Group

Smart Wind Energy Plan for Ohio

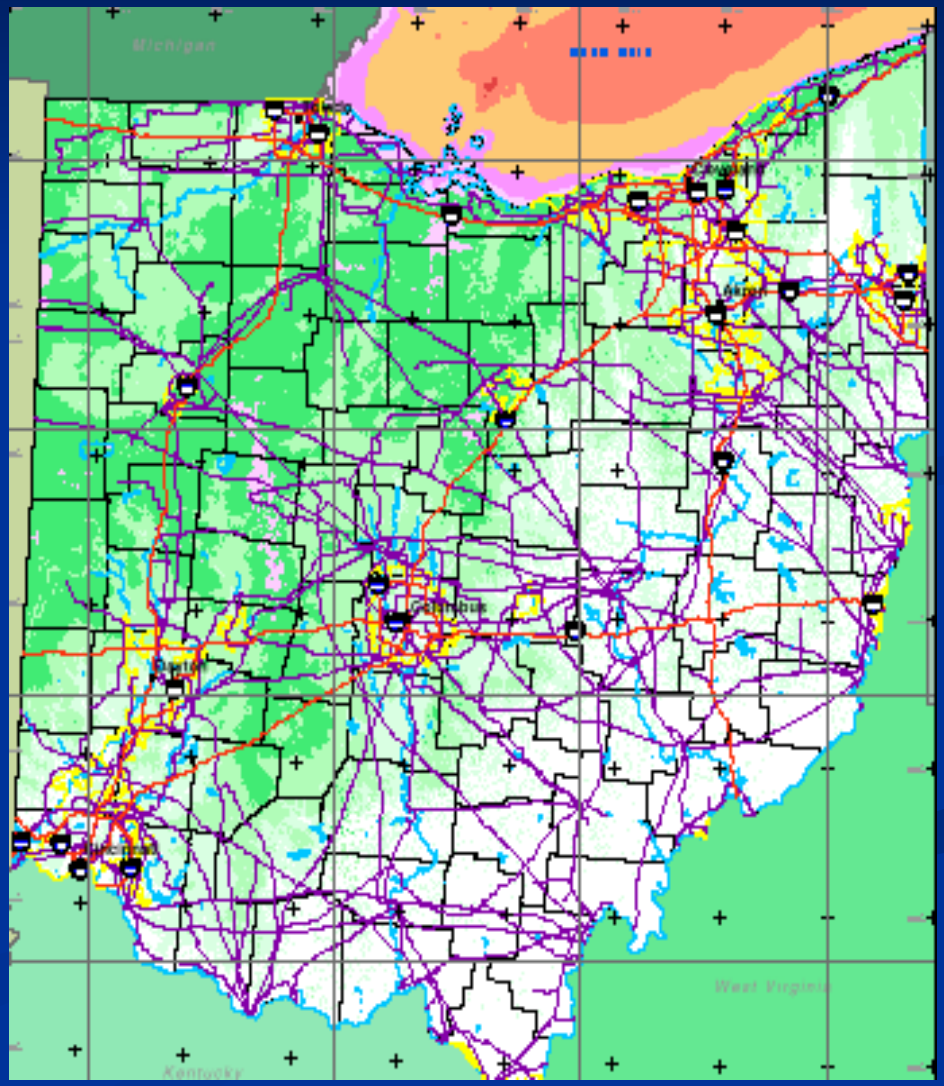
35 Ohio Stakeholders' Share Perspectives

Ohio's Interactive Wind Resource Map

More Wind Resource Assessment in 2006

OWWG Web Site

www.OhioWind.org



Ohio Wind Working Group

Recent Activities / Participants

> Avian/Wildlife Focus on Ohio Wind Map

> New Ohio Wind Power Firms

- North Coast Wind & Power, LLC
- Renaissance Group

> New Participants

- Industrial Plants
- School Superintendent
- City of Huron/BGSU Firelands

Other Ohio Wind Activity

Wind Developments

> Gamesa Wind Farm Near Bellefontaine

> Community Wind Tests – Ottawa County

> Heartland Agdeavor – Henry County

> Juwi Community Wind

> Other Wind Developer Contacts

Ohio Wind Manufacturers

> Timken, Cleveland Gear, Magna Machine & Other Ohio Firms in REPP Report

Windmill parts in big demand Local machine companies catch the wave

Cincinnati Enquirer
January 17, 2006

By Mike Boyer
Enquirer staff writer

The Enquirer/Gary Landers

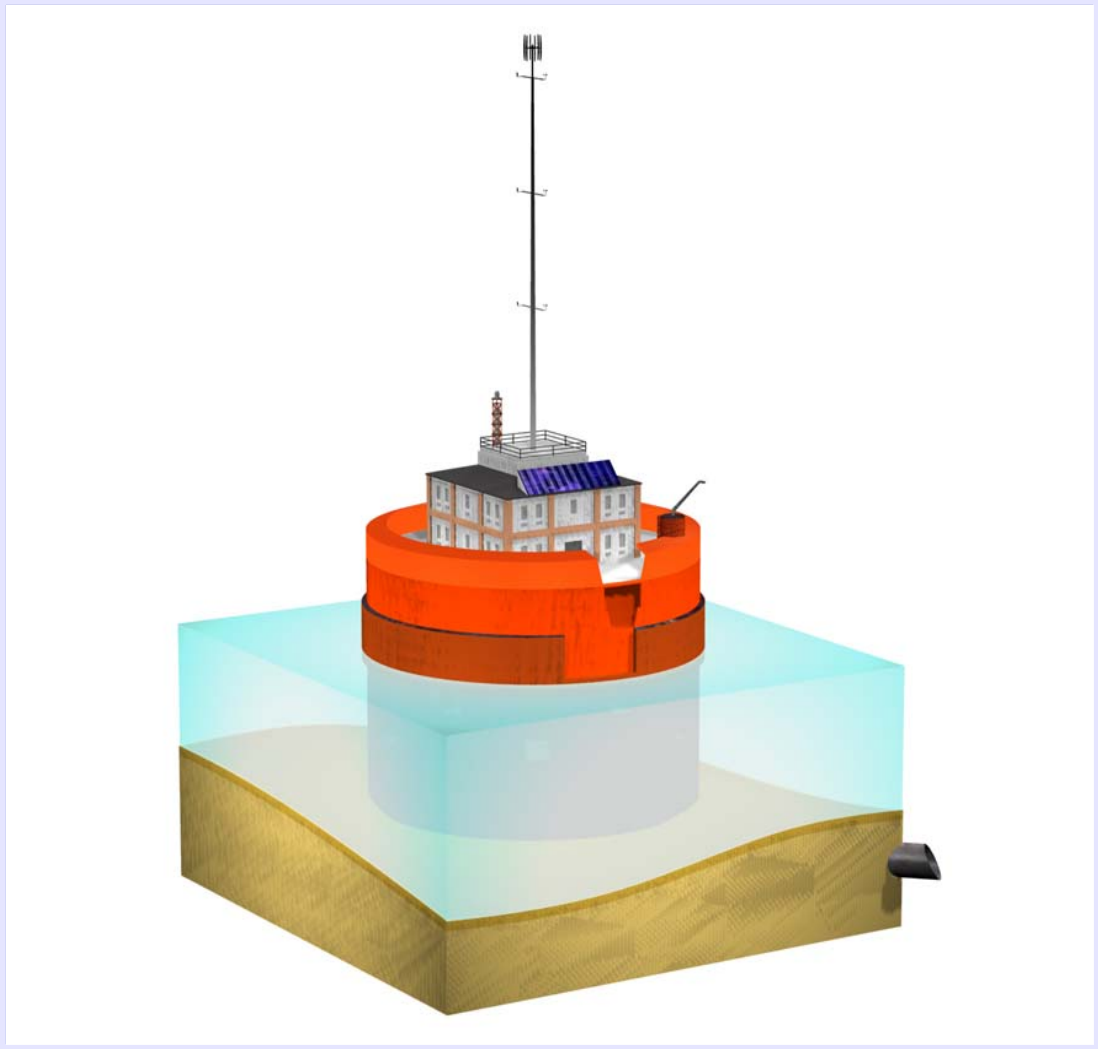
Sales engineer David Myers looks through the blade hub for a large wind turbine at Magna Machine Co. in Forest Park. The company is helping to supply increasing demand for wind power.

2006 Meetings of Ohio Wind Working Group

- February 17 – Columbus
- April 7 – Columbus or
  April 4-5 Toledo for
  Great Lakes Offshore Collaborative
- June 5 – Pittsburgh –AWEA Meetings
- August 11 – Cleveland
- November 17 – Columbus

National Meeting on Great Lakes Offshore Wind
Toward A Great Lakes Offshore Collaborative
Toledo, Ohio
April 4-5, 2005
Sponsored by: Wind Powering America

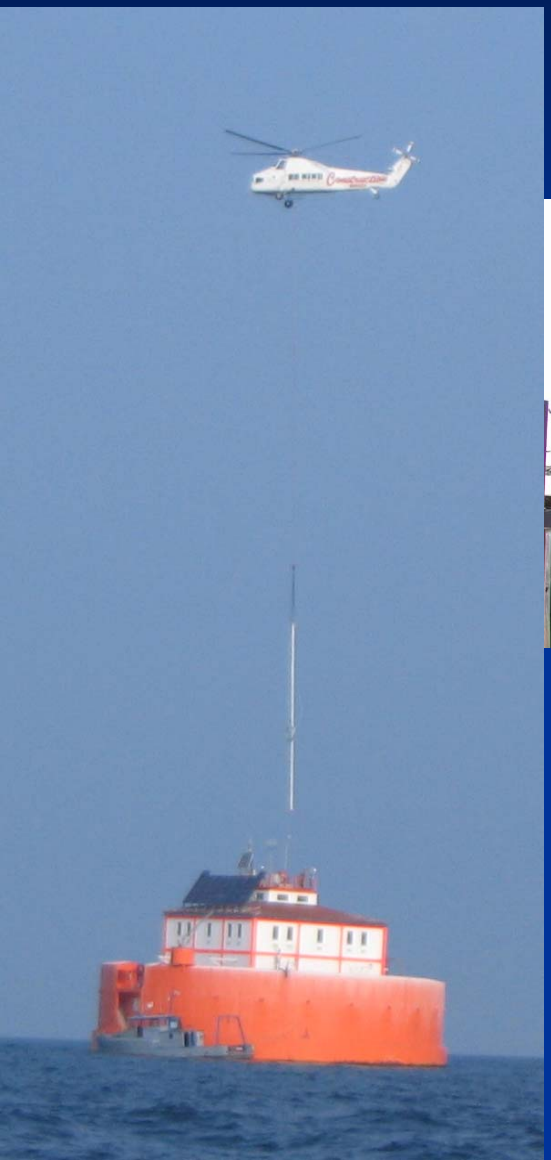
North Coast Wind Assessment Initiative, "The Crib Project"



Crib in 1947
Below = First offshore wind?

North Coast Wind Initiative

Northeast Ohio



'Crib' Project:
Wind Monitoring Tower in Lake Erie

- Feasibility study of Lake Erie offshore wind development
- Wind-monitoring tower 150 ft above water level
- GEO partnership with City of Cleveland, NOAA, NASA, US Coast Guard & Leadership Cleveland

In the late afternoon and evening of August 29, 2005, Green Energy Ohio installed the key component of its wind monitoring system on Lake Erie near the Cleveland Harbor

A current GEO web site presents:

Photographs

Real-Time Weather Data

Web Video Camera from 3.5 miles off shore looking towards downtown Cleveland

Conclusions of First Study of Lake Erie – AWS Truewind

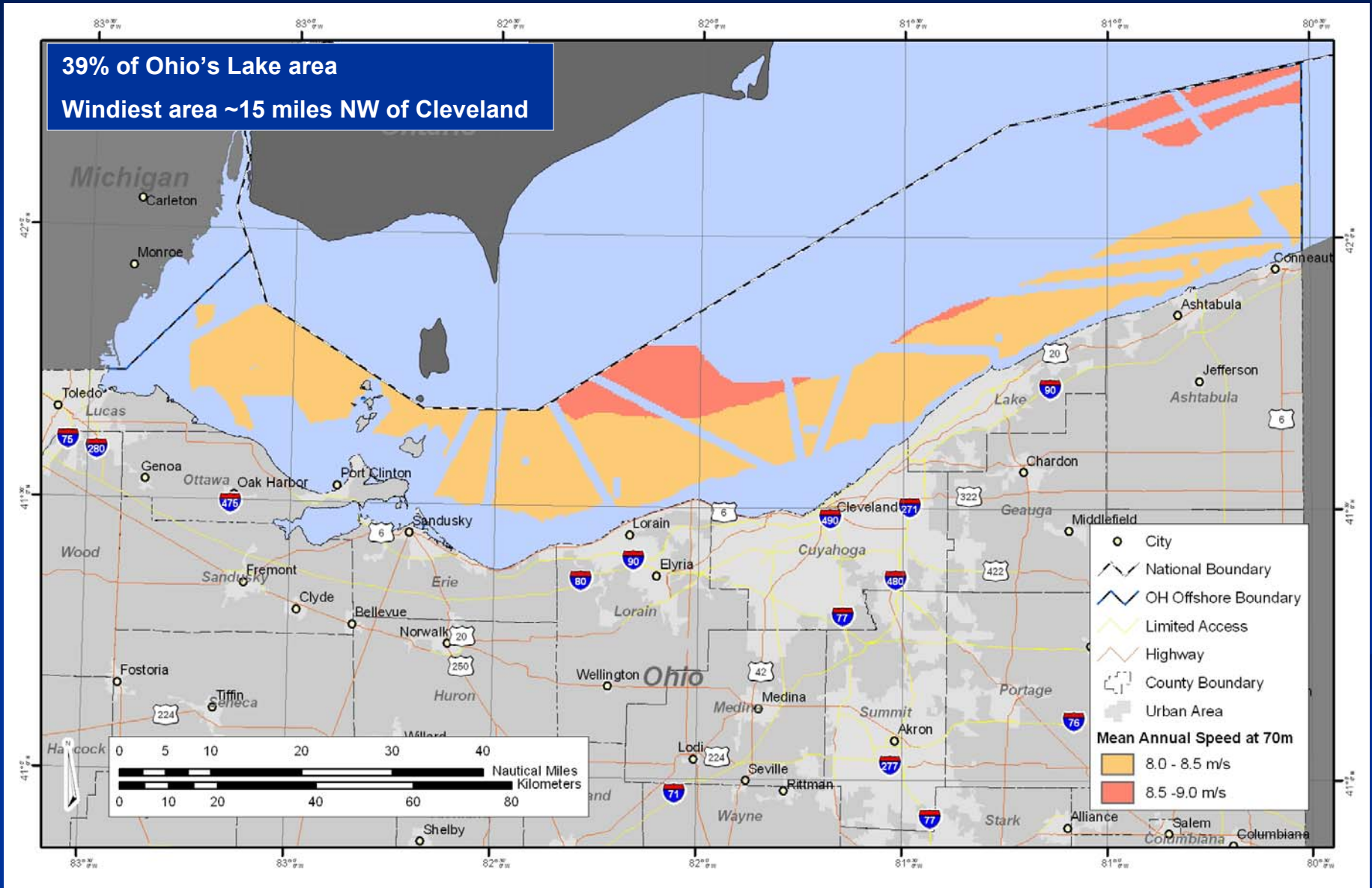
- Initial screening of Lake Erie finds that 40% of State's lake waters are "conditionally viable"
- Environmental screening parameters not yet considered, which would reduce area further
- Good transportation and transmission infrastructure
- Costs of energy and project risks are currently higher for offshore projects
- Lake ice a cost and engineering uncertainty

- Ohio's Offshore Wind Energy Development Potential,

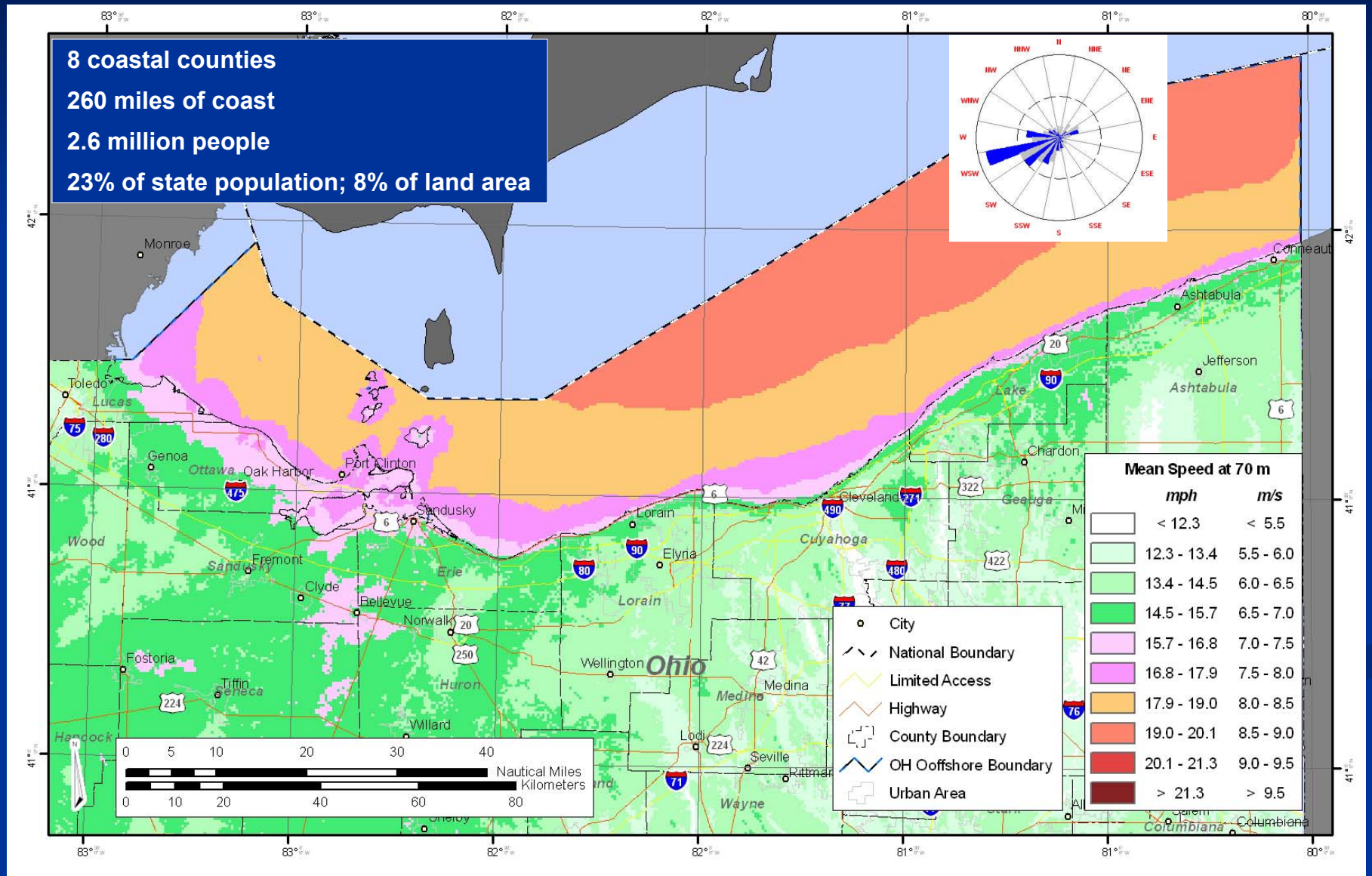
Bruce Bailey, President, AWS Truewind – Utility-Scale Wind Seminar

June 24, 2005, Cleveland

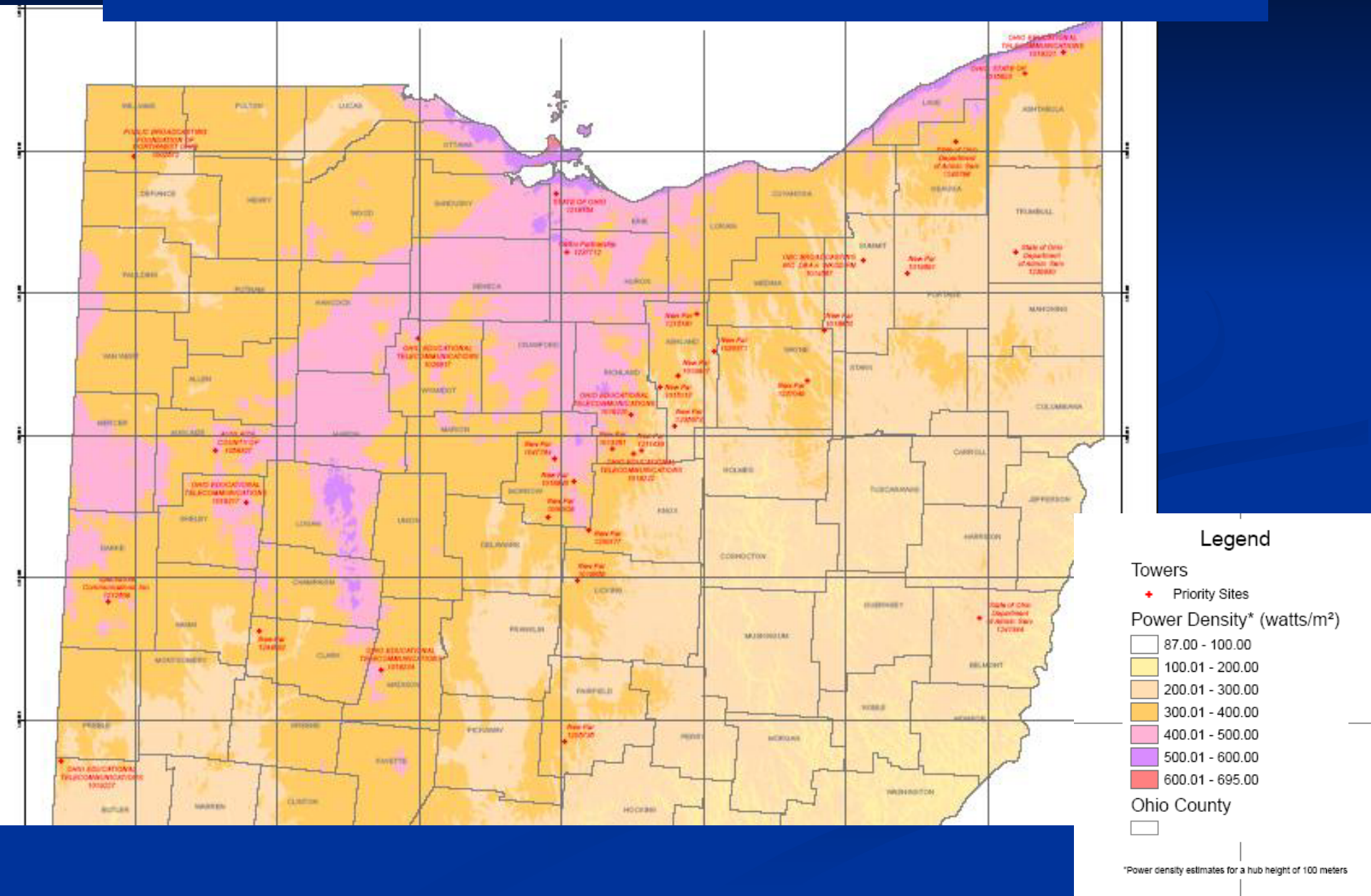
Conditionally Viable Siting Areas



Wind Resource @ 70 m

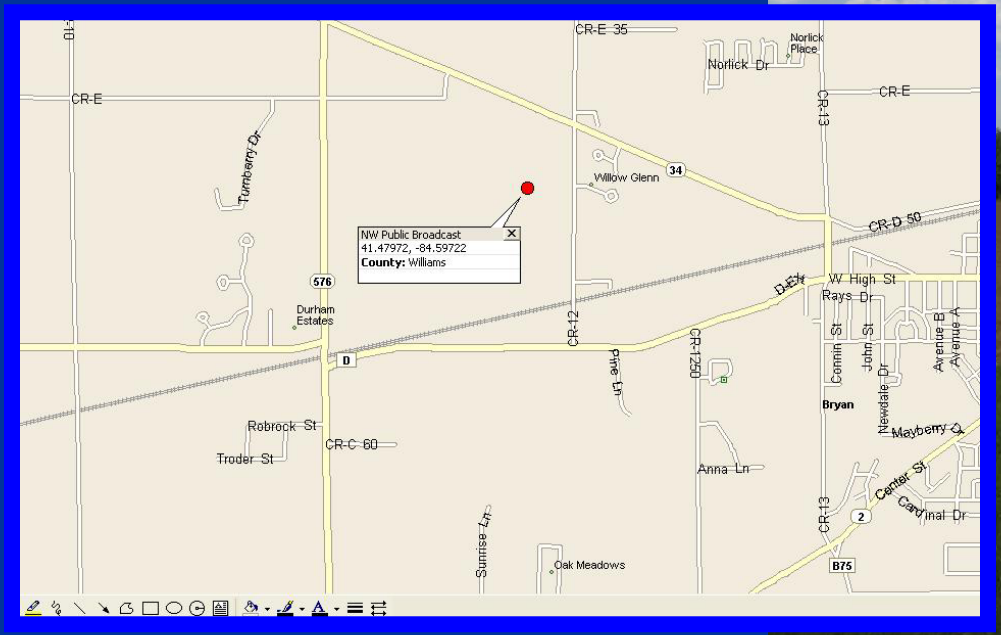


Power Density Map (100M) with Tall Tower Locations



Bryan Site

FCC Tower Registration: 1002572
Site Location (description): Williams Co.;
0.32 miles SW of intersection SR34 and CR1
GPS coordinates: 41.47972N, 84.59722W
Ground Elevation: 243.8 M
Height of structure: 122.0 M
Nominal Boom Heights: 40M, 70M, 100M



Toledo Blade, Thursday, May 12, 2005

ALTERNATIVE POWER

Bryan is hoping to take energy project for a spin

City considers a wind farm

BRYAN - Metaphorically speaking, the state of Ohio was scaling new heights yesterday when a steeplejack climbed a 350-foot FM radio tower on County Road 12, a mile west of this Williams County town, for a nonprofit group called Green Energy Ohio.

The short-term purpose: getting wind instrumentation installed at elevations of 130 feet, 230 feet, and 330 feet.

The big-picture goal: getting banks as excited about wind power as renewable energy buffs.

Bryan is one of several small towns that have taken notice of the AMP-Ohio/Green Mountain Energy wind farm near Bowling Green, Ohio's first utility-scale wind farm.

Wapakoneta Site

FCC Tower Registration: 1058327

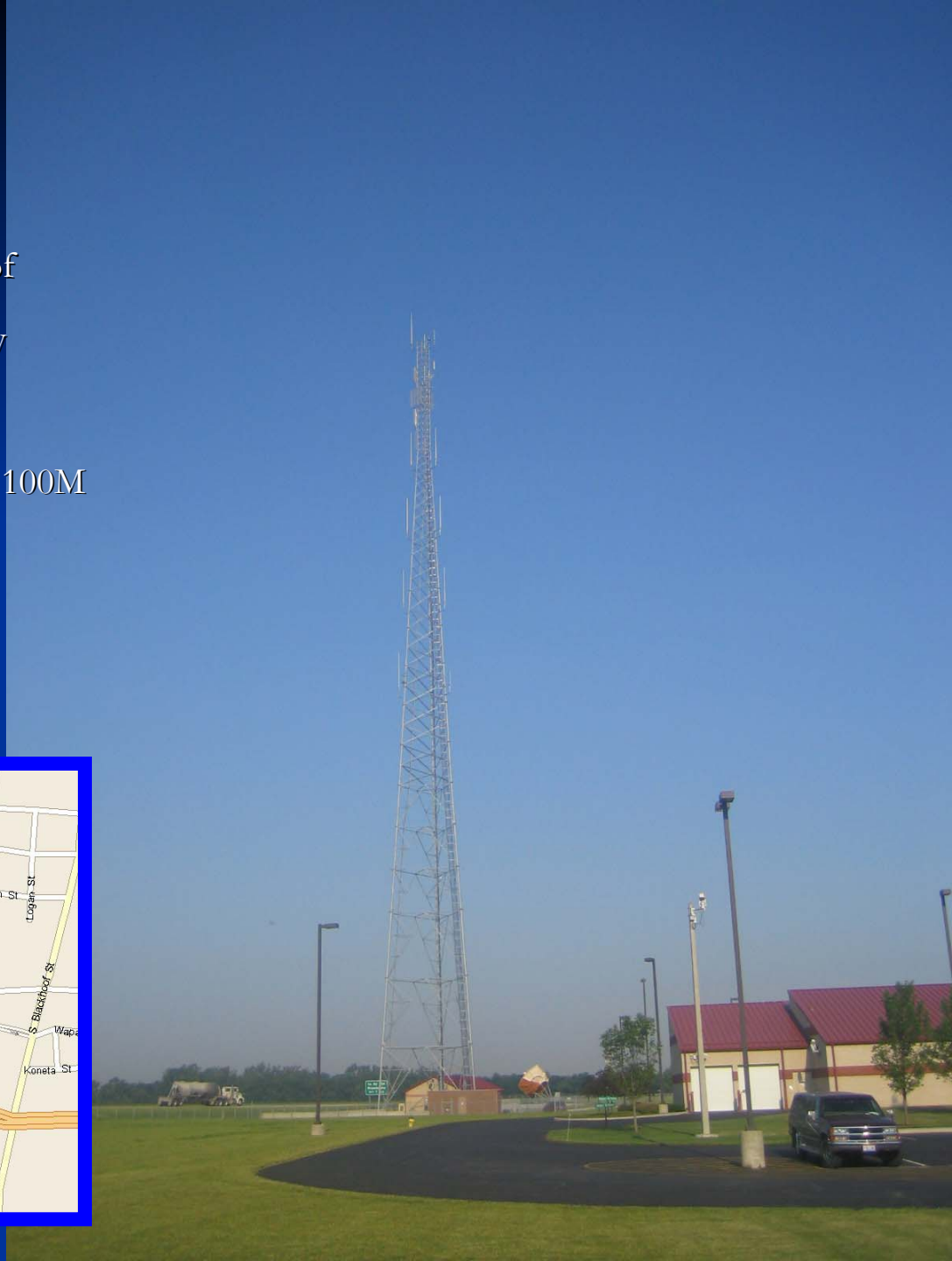
Site Location (description):.; 74 yards NW of intersection, US33 and CR137

GPS coordinates: 40.558333N, 84.208056W

Ground Elevation: 271.0 M

Height of structure: 128.0 M

Nominal Boom Heights: 40M, 70M, 100M



C:\NRG\Reports\6188\2005-05-16 to 2005-06-23\Hourly Averages Graph Ch 6 2005 June.wmf

Site Information:
Project: DOE Ohio Tall Towers
Location: Williams Co. Jct. SR34 & CR12
Elevation: 799.9

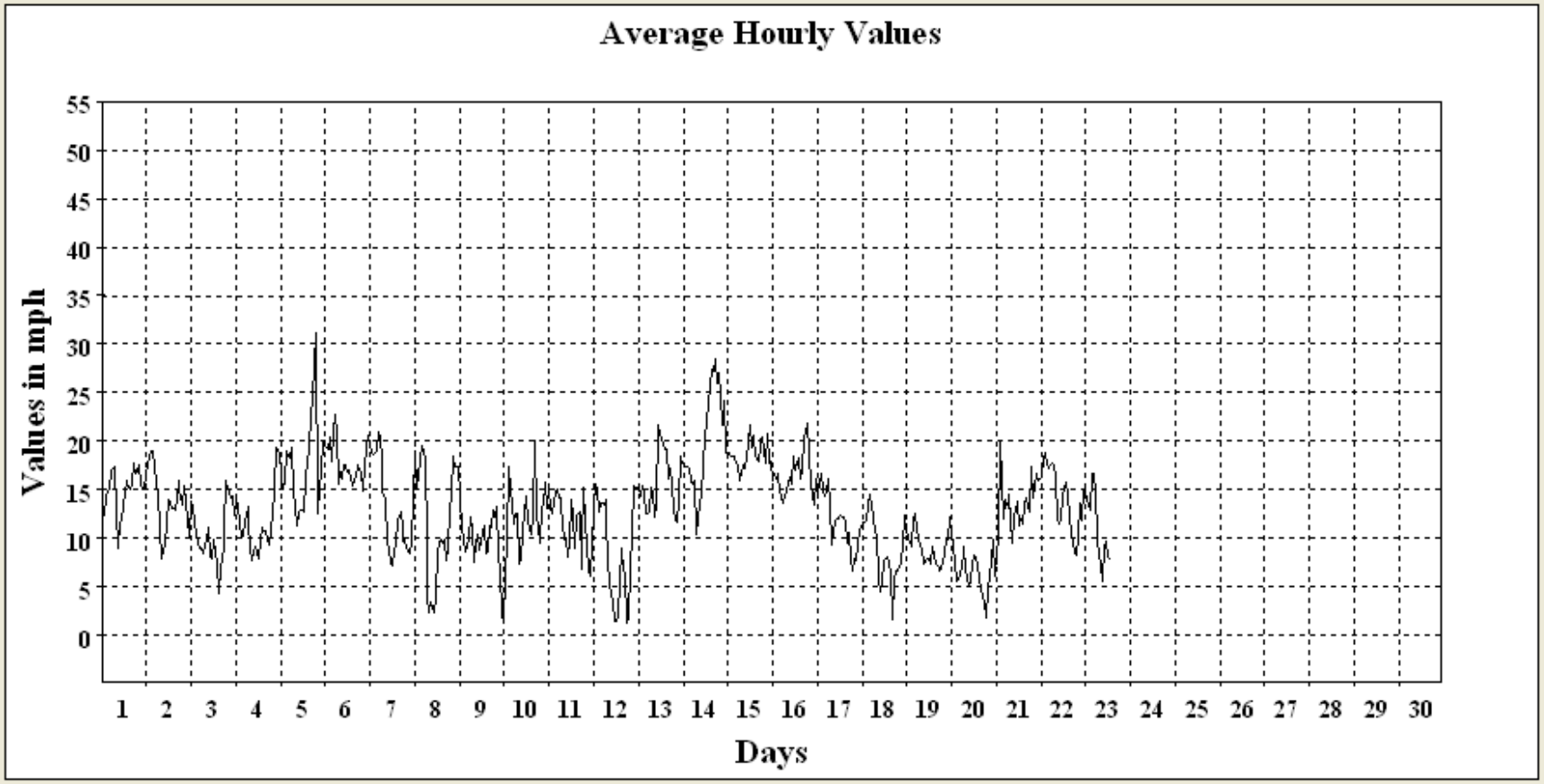
Sensor on channel 6:
NRG #40 Anem. mph
Height: 332 ft
Serial #: SN:21175

June 2005
Hourly Averages Graph Ch 6
SITE 6188
Bryan Municipal Utilities

Print and Clo

Cancel

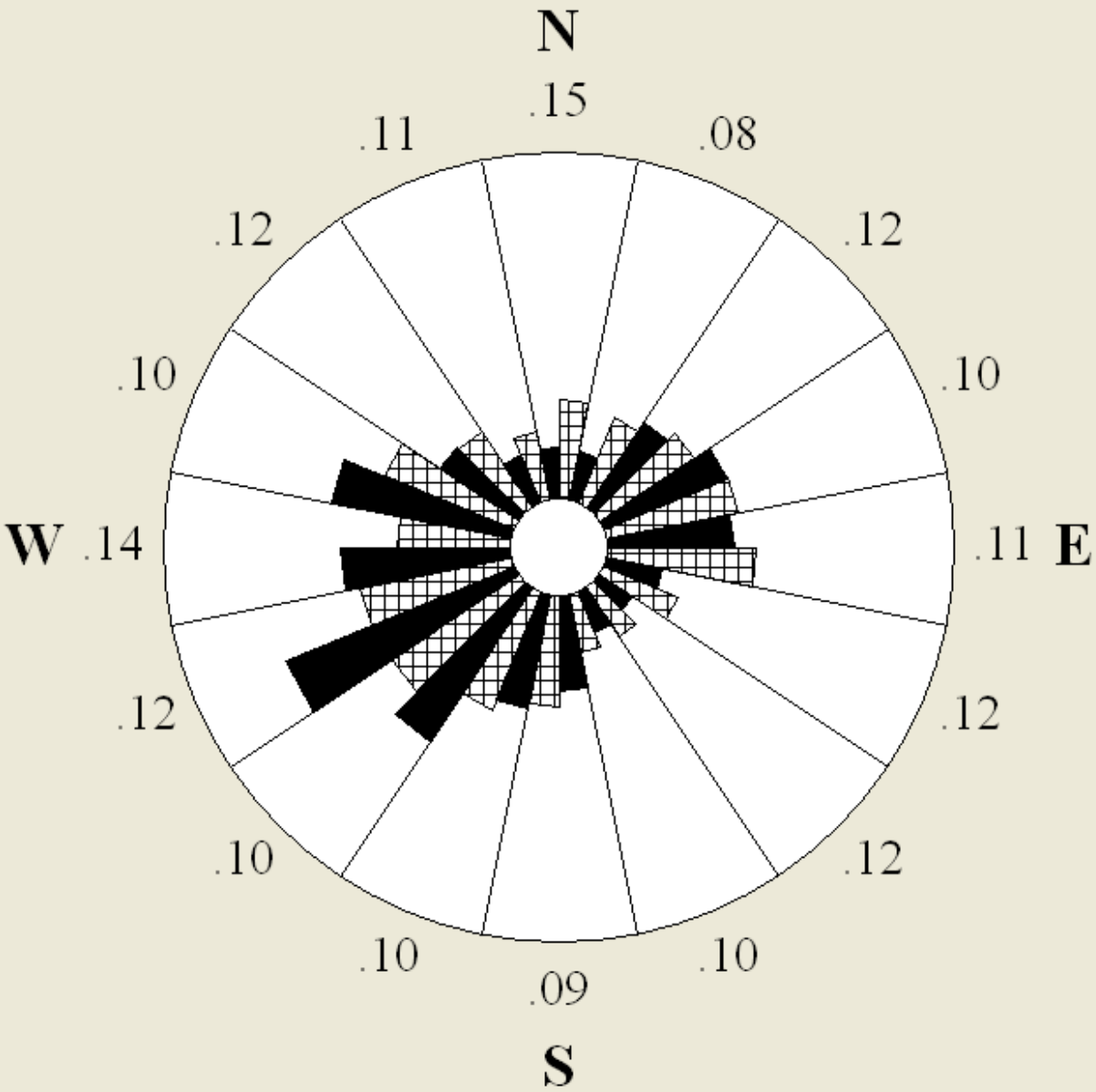
Print Setup



Average Value: 13.0

Generated Friday, June 24, 2005 Total 10-minute intervals: 4320 Intervals used in calculations: 3252 Percent data used: 75.3 NRG Systems SDR Version 5.02

C:\NRG\Reports\6188\2005-05-16 to 2005-06-23\Wind Rose Ch 5, 9.wmf



5/16/2005 to 6/23/2005

Wind Rose Ch 5, 9

SITE 6188

Bryan Municipal Utilities

Site Information:

Project: DOE Ohio Tall Towers

Location: Williams Co. Jct. SR34

Elevation: 799.9

Anemometer on channel 5:

NRG #40 Anem. mph

Height: 330 ft

Serial #: SN:112

Vane on channel 9:

#200P Wind Vane

Height: 330 ft

Serial #: SN:315

Outer Numbers are Average TIs for speeds greater than 10 mph

Inner Circle = 0%

Outer Circle = 20%

Percent of Total Wind Energy

Percent of Total Time

Print and Clo

Cancel

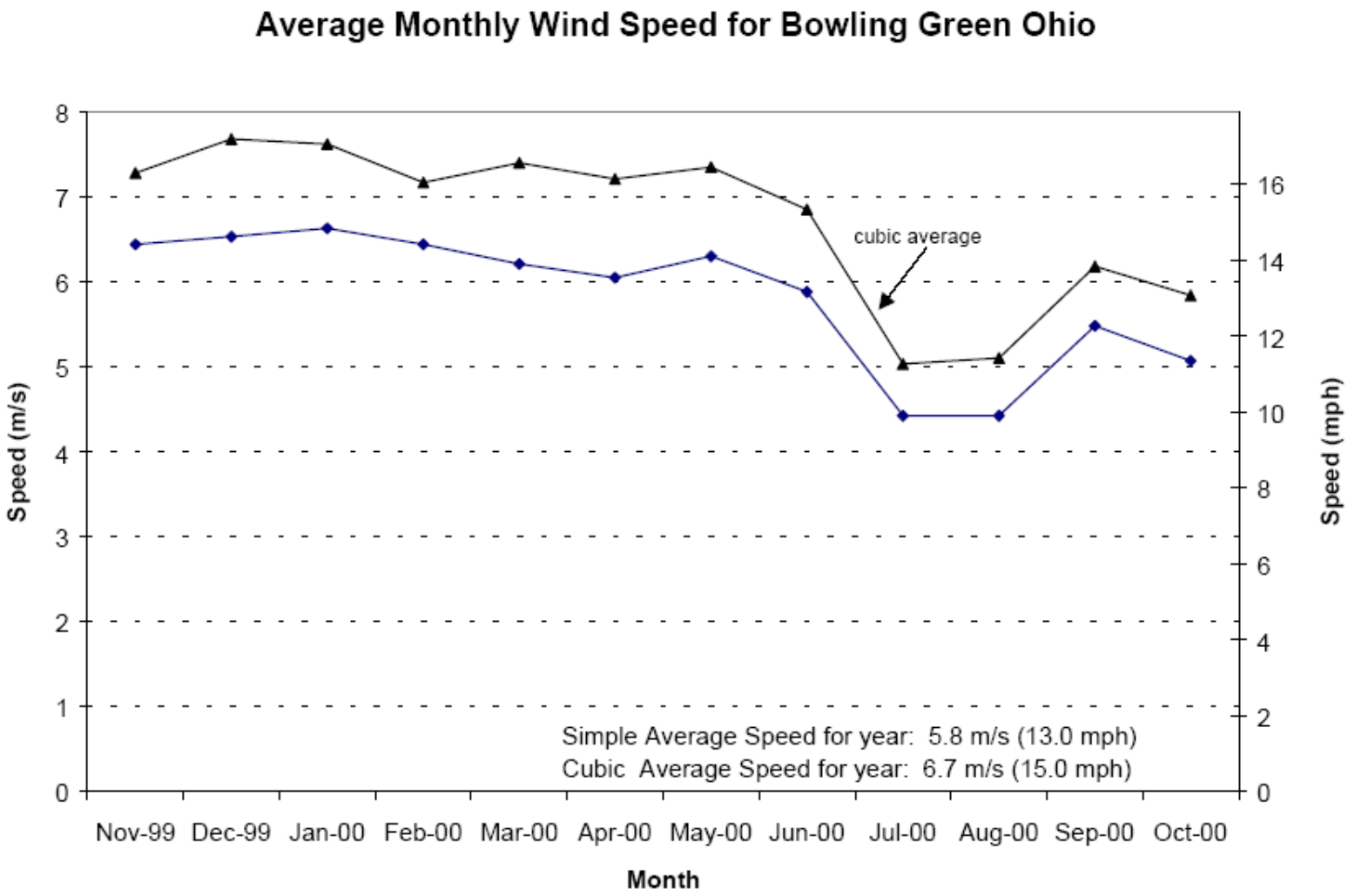
Print Setup

Generated Friday, June 24, 2005

Total 10-minute intervals: 5616 Intervals used in calculations: 5442 Percent data used: 96.9

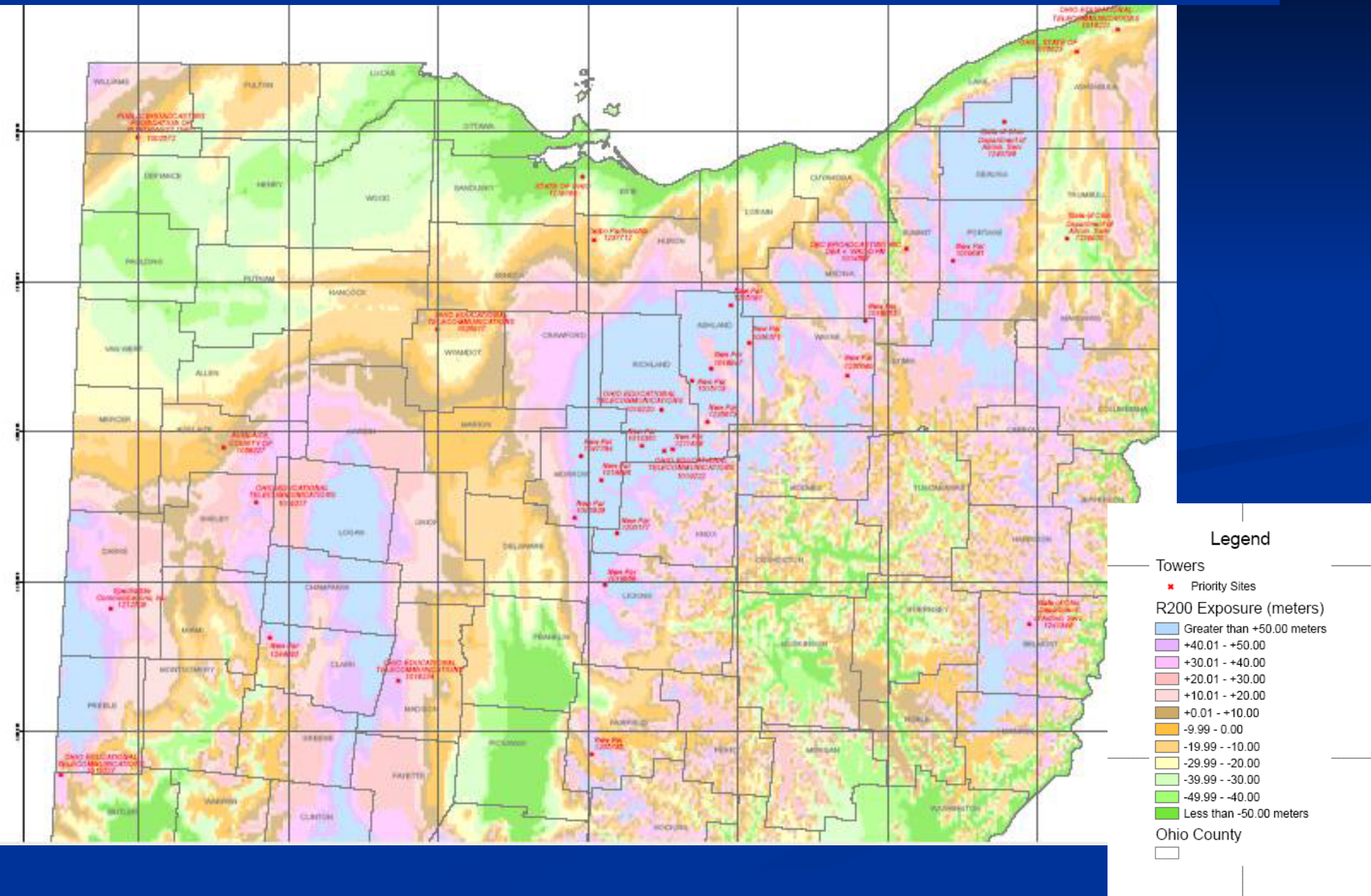
NRG Systems SDR Version 5.02

Adobe Reader - [BowlingGreenFinalReport.pdf]
File Edit View Document Tools Window Help
Open Save a Copy Print Email Search Select Text
Special Offers for Dell customers
150% eBooks
Bookmarks Signatures Layers Pages

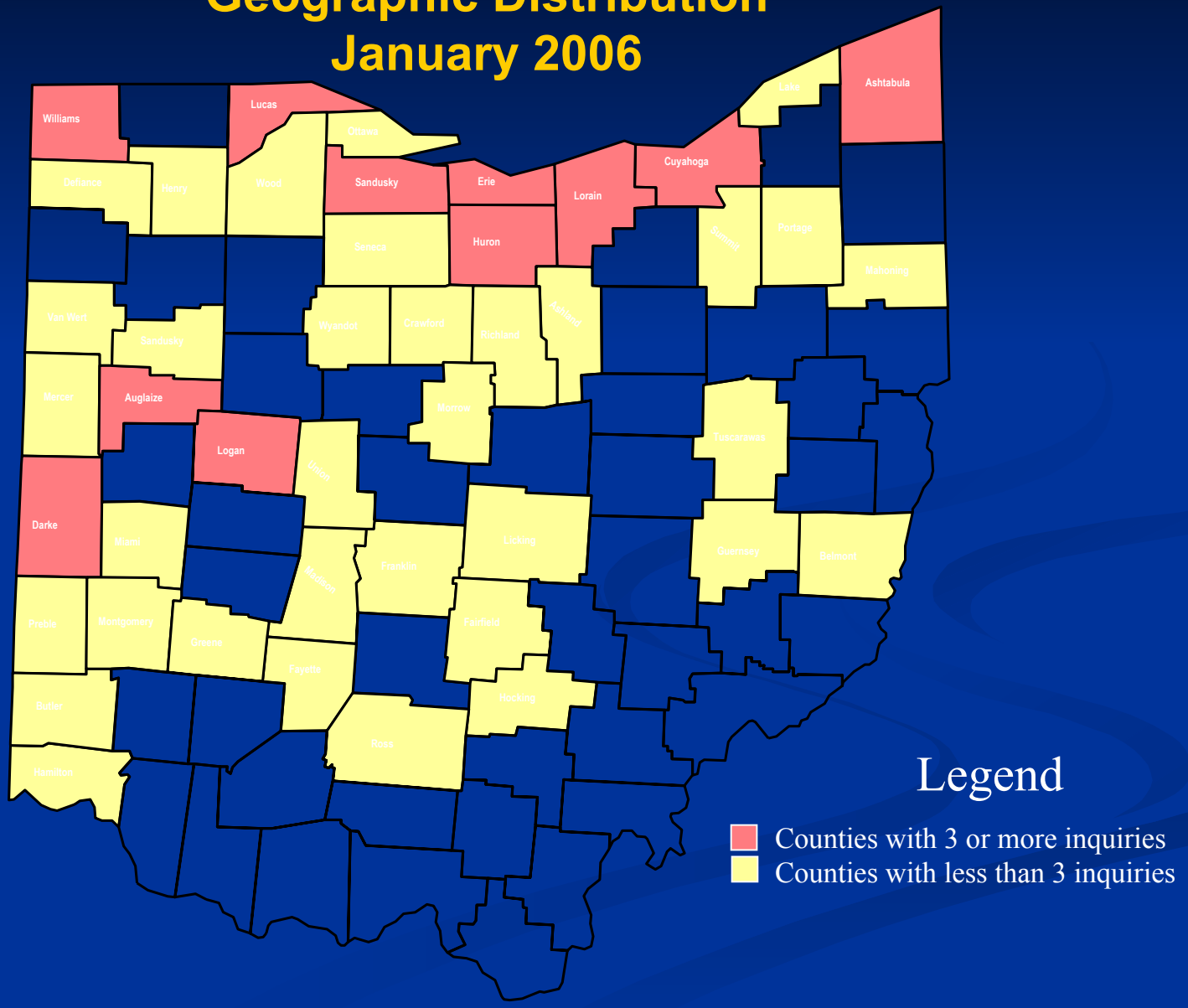


8.5 x 11 in
9 of 27
start 6:23 AM

R200 Relative Exposure Map w/ Tower Locations



GEO's Ohio Wind Development Interest List
Geographic Distribution
January 2006



Ohio Manufacturing Wind Initiative

- Companies looking at wind-power projects to offset power consumption at Ohio manufacturing facilities (including two companies on Fortune's Global 500 list)
- High profile applications including: auto manufacturing, plastic injection molding, metals foundry
- Large base load requirements, 10- 25 MW per facility
- Power consumption equivalent to 20-50 " Bowling Green turbines"
- NREL, and a national wind development specialist are interested in supporting Ohio in this effort.

GEO Wind Activities

Small-Scale

Wind Sites on Ohio Solar Tours 2001-2006

Ohio Wind Power Conferences 2002. 2004 & 2006?

Ohio Wind Power Toolkit - 2002

Ohio Wind Working Group 2003 - 2006

Columbus Glacier Ridge Metro Park 2003 – 2006

Regional Small Wind & Solar Workshops 2003 - 2006

Lake Farmpark Metropark 2001 – 2006

Ohio Farm Science Review 2005 - 2006

Dull Homestead Workshop 2005

Ohio Solar Tour 2005

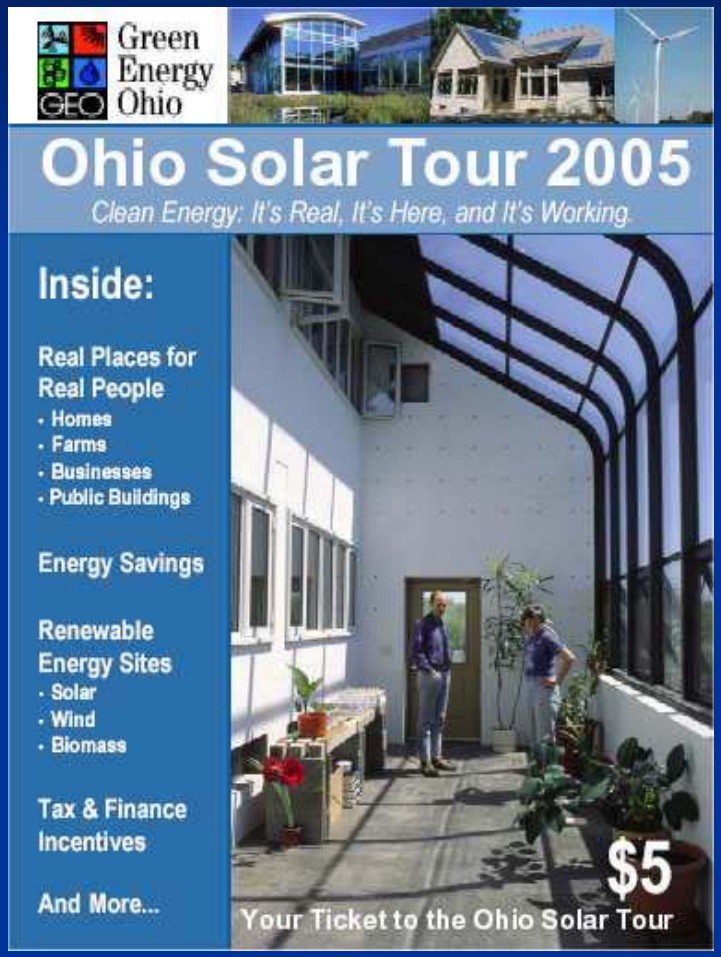
Clean Energy:

It's Real, It's Here and It's Working.

Saturday

October 1, 2005

Ohio Solar Tour 2005
Guidebook



- Magazine: 84-page, full color cover and B&W inside pages
- Sites: over 160 solar, wind, biomass, green design and energy-saving technologies featured
- Tours: description, photos & directions for 21 tours
- Articles: 6 pieces on GEO, energy savings, RE Q&A, and financial incentives

Your Ticket on the Ohio Solar Tour - $5

2002 Ohio Wind Power

Glacier Ridge Metro Park 18 kW Bergey Wind Turbine
Proposed Wind/Solar Learning Center

- Continued utility-scale wind development in Ohio,
- Ohio's manufacturing opportunities for the wind industry.

Small Wind at Ohio Homes

Central Ohio

Victory Farms
Blacklick, Ohio

- 20 kW wind turbine and 2 solar arrays (PV)
- First net-metered wind turbine in Ohio

"Net metering has a dramatic effect on our electric bill and the battery system can provide power for a week if the power gird goes down."

- Robert Howard, owner

Small Wind at Public Places

Northeast Ohio

Lake Farmpark,
Kirtland, Ohio

- 26 kW PV installation, Ohio's first commercial solar array in May 2002.
- 20kW wind turbine

"The solar array & wind turbine are wonderful teaching tools that help the 185,000 annual visitors to see how electricity is made and understand the benefits of pollution-free, clean electricity."

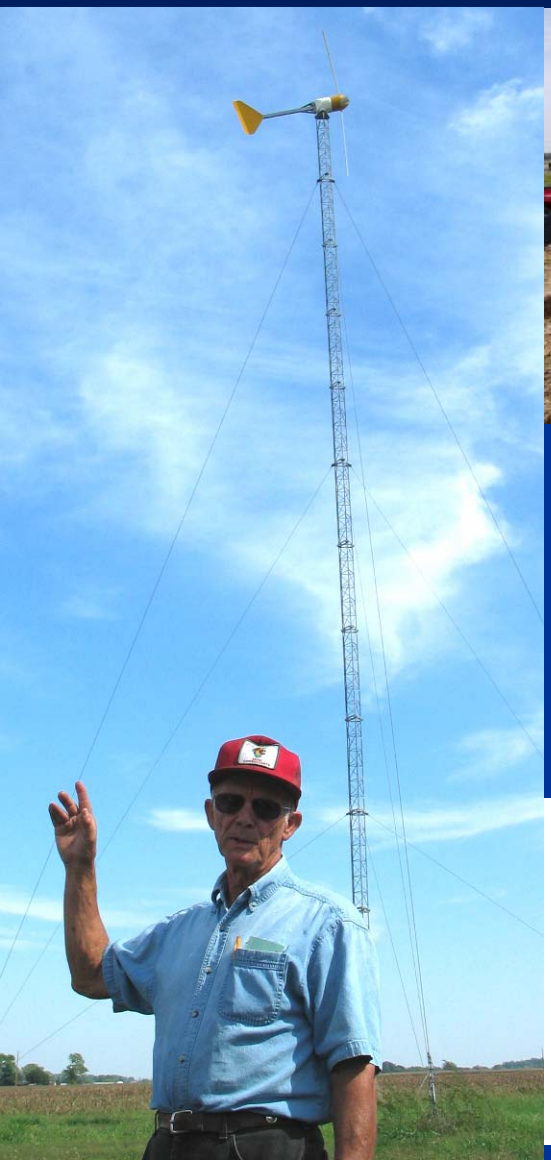
- Andy Baker, Lake Farmpark Administrator

Dull Farm – 6 Small-Wind Turbines

Largest U.S. Grid-Tied
10 kW Bergey Wind Turbine Site
West of Dayton near Brookville

Small Wind on Ohio Farms

Southwest Ohio



Dull Homestead
Brookville, Ohio

- Six 10 kW wind turbines on 120' towers and help power the farming operation

The revenue from the projects and the prospect of reducing energy bills are appealing, especially as energy prices keep increasing.

"Farmers realize, just as well as everyone, that the time is right for some of these [clean energy] initiatives."

- Ralph Dull, owner

”One of the major problems in Ohio is that there is virtually no market available for renewable energy. The sale of energy from renewable fuels is limited to few customers, because no obligation or mandate exists to make this energy resource available to a broader customer base and because of this,

Ohio may be missing opportunities for up to $500 million of project development and the long term jobs associated with this development.”

- March 2004 Ohio Biofuels Task Force

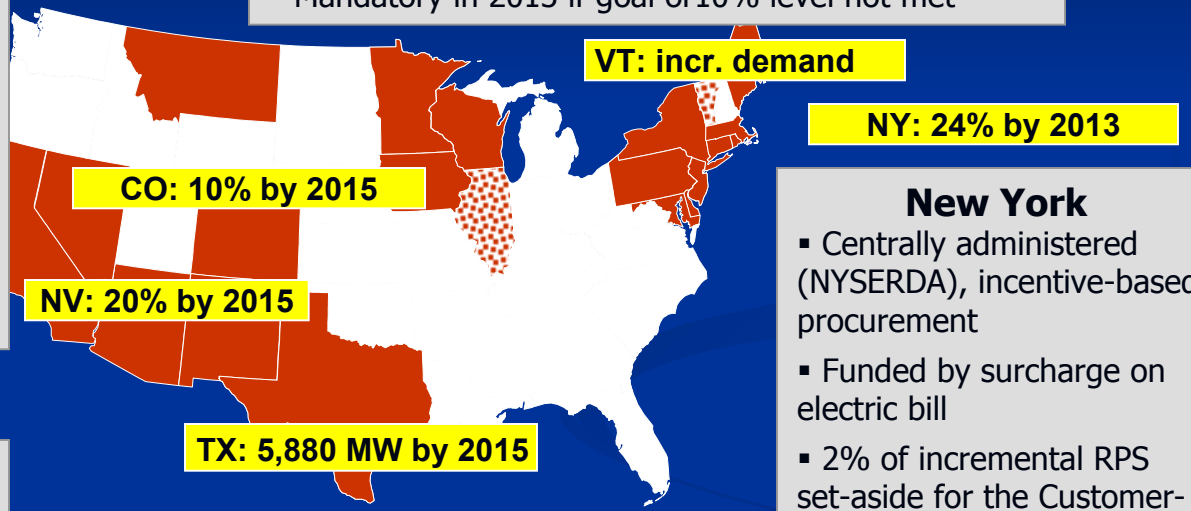
Renewables Portfolio Standards

Colorado

- First RPS decided via ballot initiative
- >40,000 customers
- 4% of the RE from solar
- 1/2 of this 4% from customer-sited solar
- Incentive program under development
- state-wide net metering

Vermont (goal)

- Total incremental energy growth between 2005-2012 to be met with new RE and EE up to 10% RE
- Mandatory in 2013 if goal or10% level not met



New York

- Centrally administered (NYSERDA), incentive-based procurement
- Funded by surcharge on electric bill
- 2% of incremental RPS set-aside for the Customer-Sited Tier (PV, fuel cells, wind)

Nevada

- Increased from 15% by 2013
- 5% of RE must be solar
- Customer-sited EE eligible for up to 25% of std.

Texas

- New capacity required up from 2,000 MW to 5,000 MW (~5%)
- 500 MW non-wind
- Rate recovery for transmission upgrades

New in 2004-05
State RPS
Goal

The Alternative Energy Bill requires that 18% of the electricity sold in Pennsylvania must come from renewable and advanced energy sources within 15 years – 8% from Renewables

The bill will:

- generate eight times more green energy – most of it wind power – than right now. That's enough to power more than one million homes;
- create thousands of manufacturing and construction jobs;
- attract billions in private investment to Pennsylvania;
- stimulate local tax bases;
- help clean our air and water;
- provide incentives to reclaim piles of coal waste, including those at abandoned mines;
- spur energy conservation; and
- actually lower electricity prices by creating a greater, more diverse supply of electricity.

- John Hanger, PennFuture, May 13, 2005

2006 GEO Goal: Initiate Policy Advocacy

Build a Broad-Based, Statewide Coalition for Supportive Clean Energy Policies

Provide Policy Advocacy Materials in GEO Educational Programs

Participate in Government Processes to Fashion Supportive Clean Energy Policies

Green Energy Ohio and Greater Cleveland Host the American Solar Energy Society

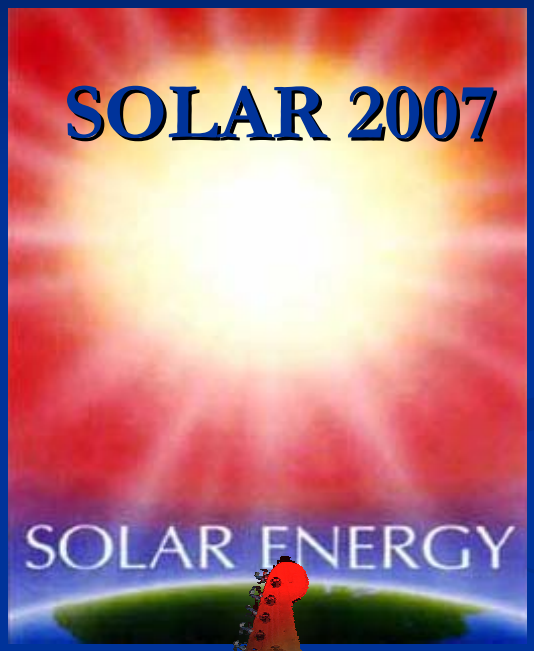
SOLAR 2007

National Solar Conference

July 7 - 12 2007

Cleveland, Ohio

Advance the Use of Solar & Wind Energy as the Ohio Chapter of the American Solar Energy Society (ASES)



2007 ASES National Solar Conference