

CONSIDERATIONS RELATED TO INVESTING IN SMALL WIND SYSTEMS

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FOCUS OF PRESENTATION

- ❖ Review factors to consider when exploring whether to invest in small wind systems
- ❖ Use case studies to illustrate the key factors that impact the economics of small wind



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SMALL WIND SYSTEMS

- ❖ Michigan has good opportunities
 - Good wind resources
 - Anemometer loan program data
 - New net-metering provisions encourage the use of this resource
 - Small industries that can make effective use of this power
 - Farms
 - Schools
 - Greenhouses



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WHY SMALL WIND?

- ❖ Reduce electricity costs over the long run
- ❖ Ease demand on the power grid
- ❖ Energy independence – produce your own!
- ❖ Clean energy source – no pollution



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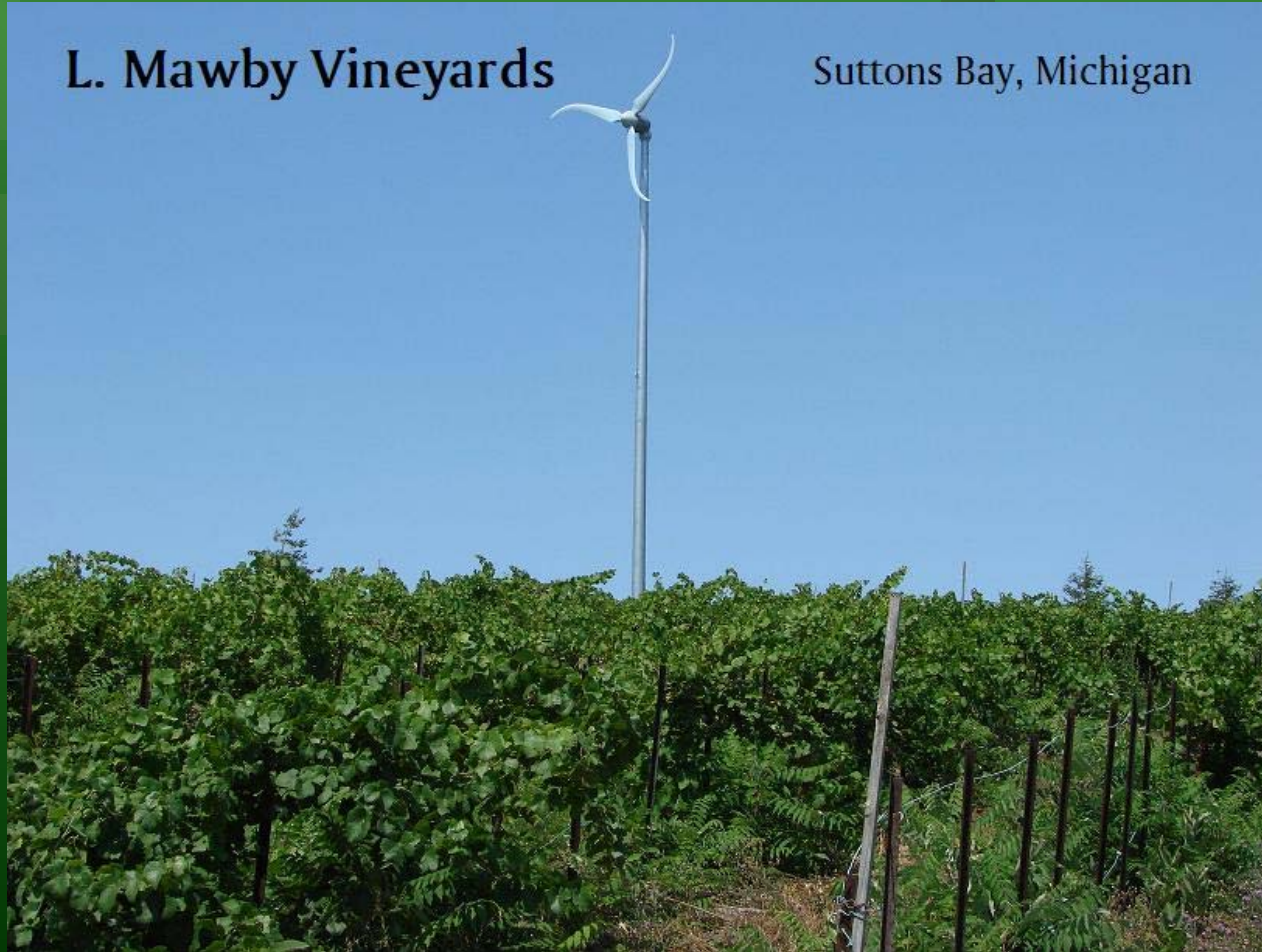


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1.8 kW Skystream

L. Mawby Vineyards

Suttons Bay, Michigan



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Zeeland West High School



10-kW Bergey
XL-10 on an 85-
foot tower

Mainly gift
financed

School uses all of
the electricity
generated



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Laker Public Schools Three 65 kW



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THREE BIG QUESTIONS

1. How much energy do I use?
2. Do I have enough wind?
3. Do I have enough space?



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1. Energy Use/Energy Cost

- ❖ Need a year's worth of electricity use
- ❖ Utility bills or call your utility for history
- ❖ Patterns of use - steady or heavy vs light use?

Detail of Current Charges

Ann Arbor, MI

Detroit Edison Residential Electric Service

Current Charges		Current Billing Information	
Power Supply Charges:			
Power Supply Energy	475 KWH @ 0.06728		32.02
	29 KWH @ 0.08136		2.37
Renewable Energy Plan Surtax			3.00
Other Power Supply Surcharges*			-3.99
Delivery Charges:			
Service Charge			8.00
Distribution	515 KWH @ 0.04150		21.38
Energy Optimization	515 KWH @ 0.000081		.42
Other Delivery Surcharges**			4.91
Residential Michigan Sales Tax			2.68
Total Detroit Edison Current Charges			69.56
Total Current Charges			69.56

*Other Power Supply surcharges include costs associated with Power Supply Cost Recovery (PSCR) and Enhanced Security Surcharges.

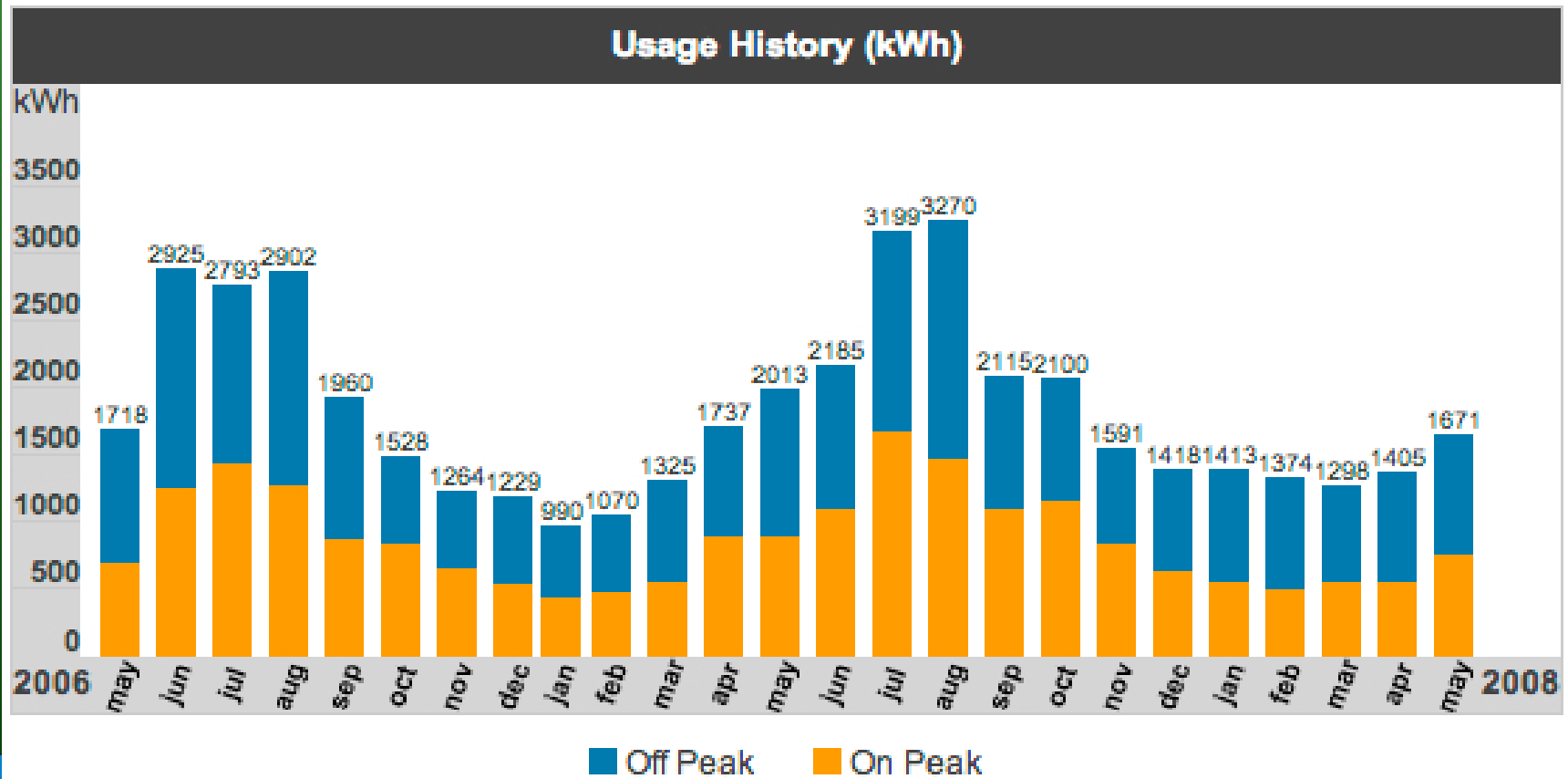
**Other Delivery Surcharges include Nuclear Decommissioning, Choice Implementation Surcharges, Best Bond and Bond Tax charges.



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Example history....



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Energy Efficiency....



- ❖ Can you reduce your electricity use?
- ❖ Cheapest kilowatt is the one you don't use – think energy efficiency **FIRST**, renewable energy **SECOND**

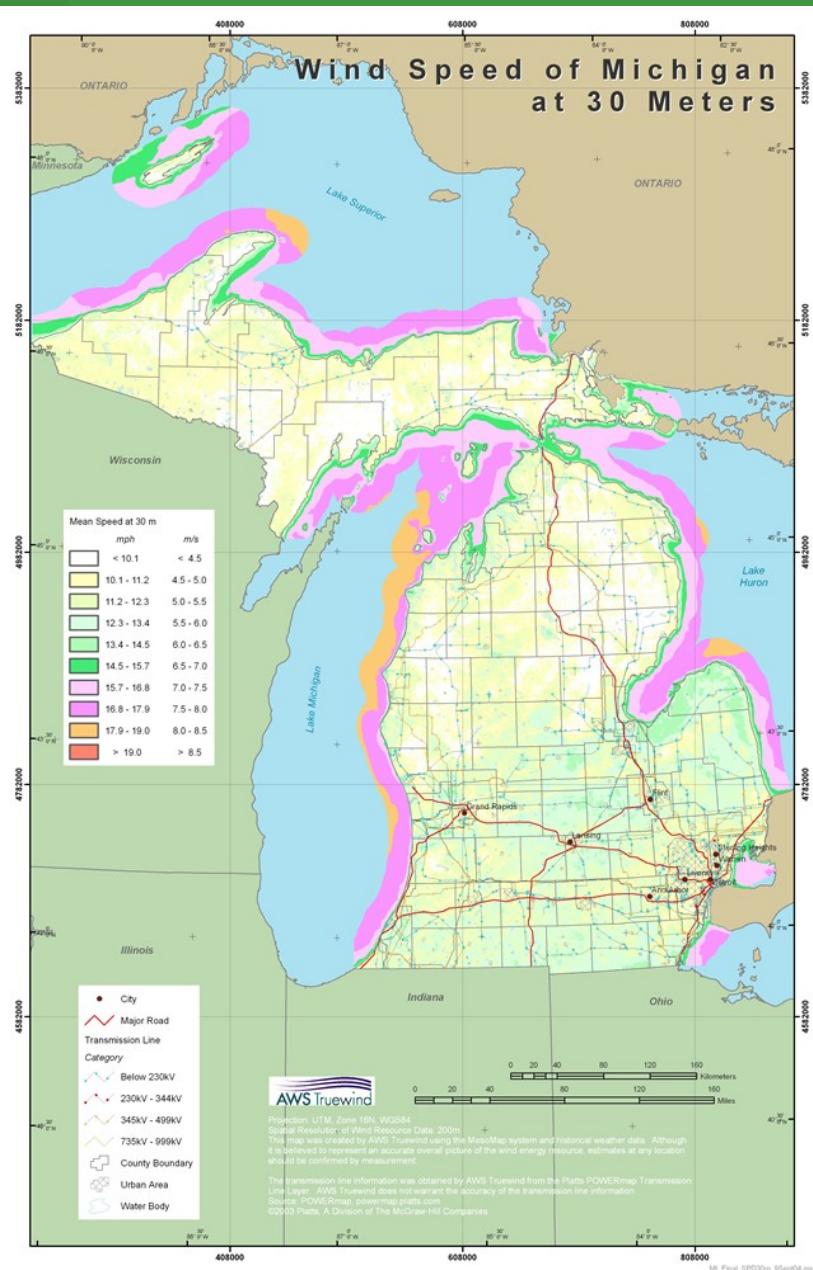


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2. Wind Resource

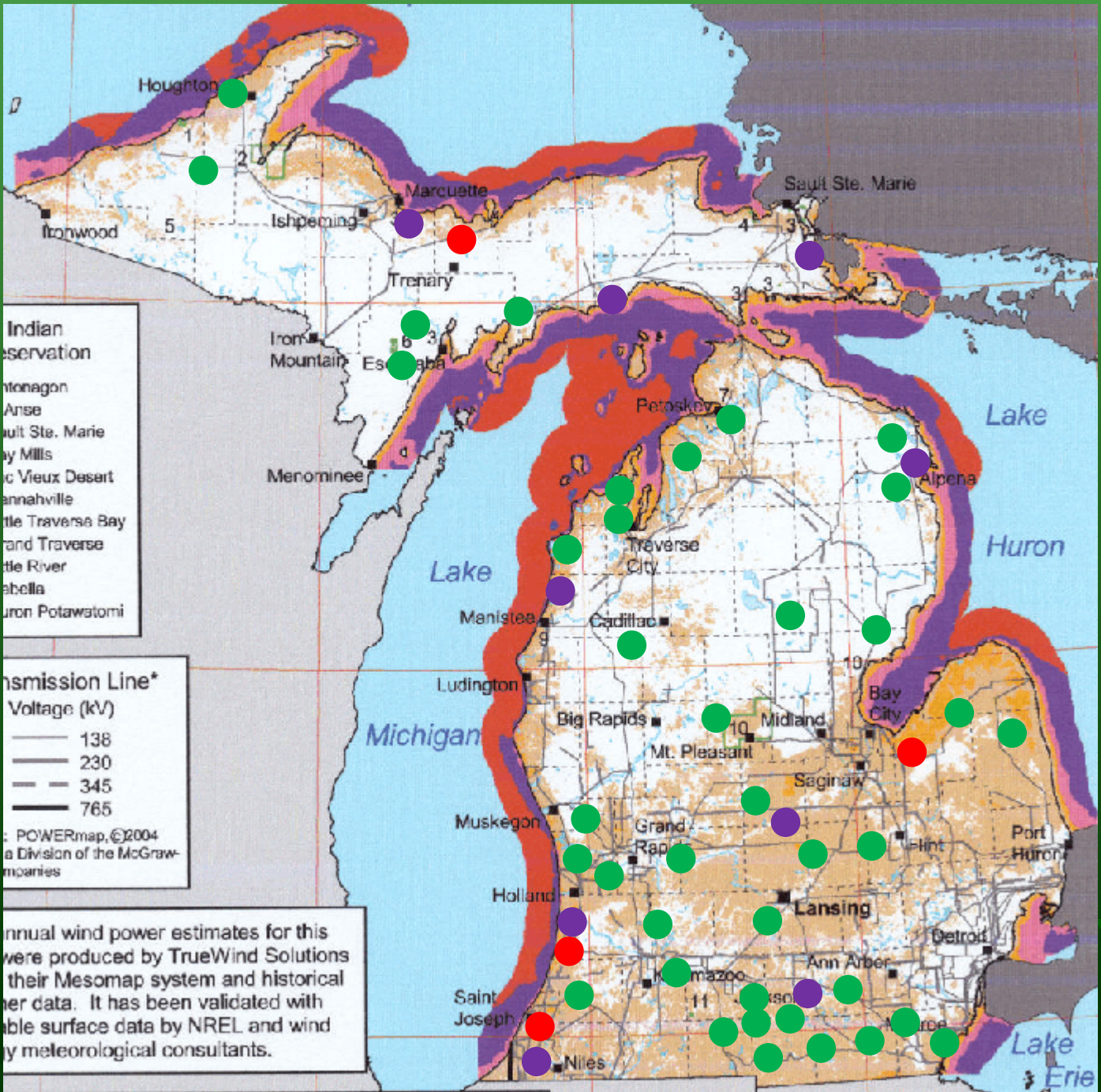
- ❖ Do you have wind of at least 10-12 mph?
- ❖ Check Michigan Wind Map
- ❖ See if anemometer data is nearby
- ❖ Check local meteorological data



BE SURE TO KNOW YOUR WIND POTENTIAL



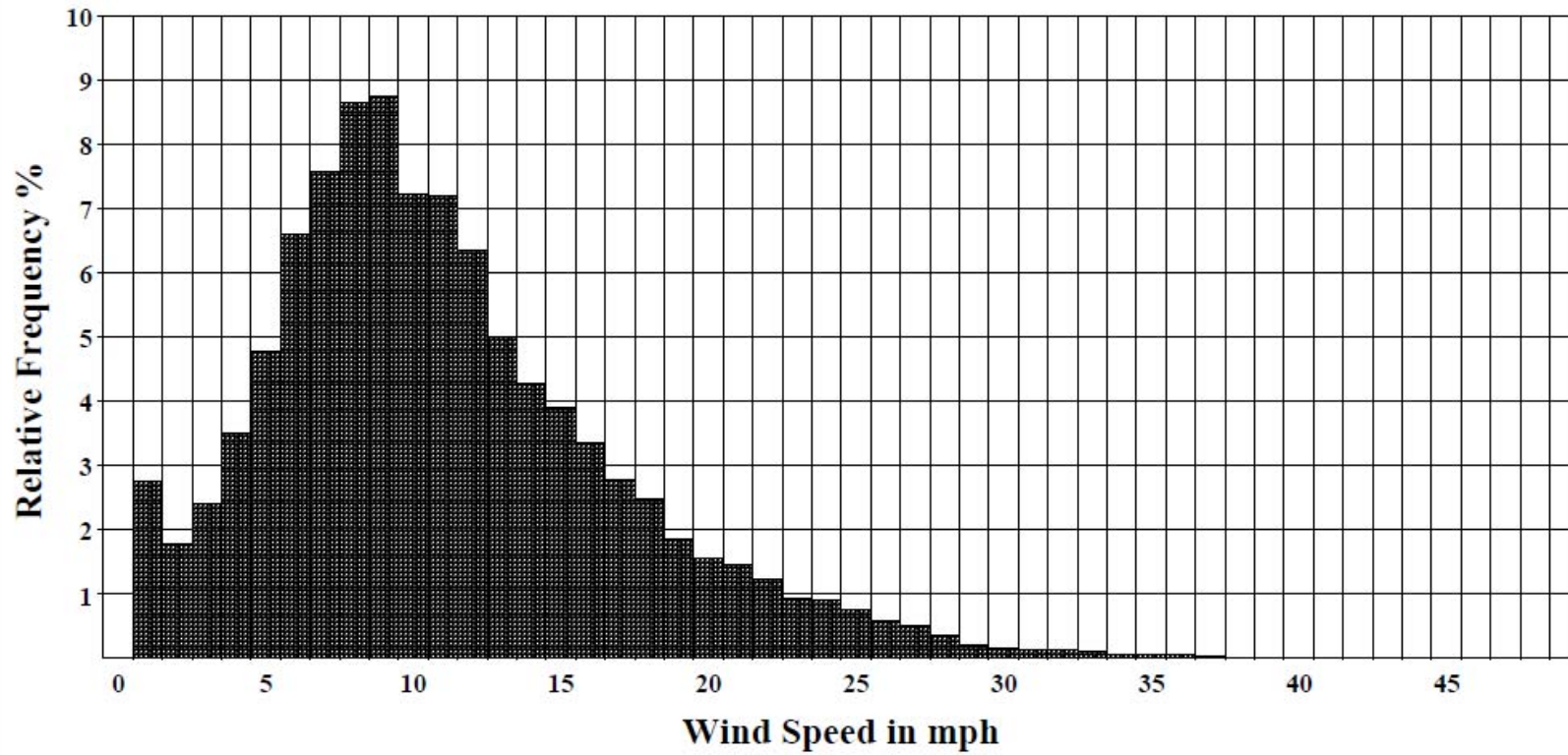
Michigan Anemometer Loan Program



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Frequency Distribution



Zeeland Data



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SUMMARY RESULTS FROM PROGRAM

Wind Speed (MPH)	Percentage of Cases
Less than 8	6
8.0 – 8.9	19
9.0 – 9.9	31
10.0 – 10.9	31
11.0 – 11.9	13
Average	9.7



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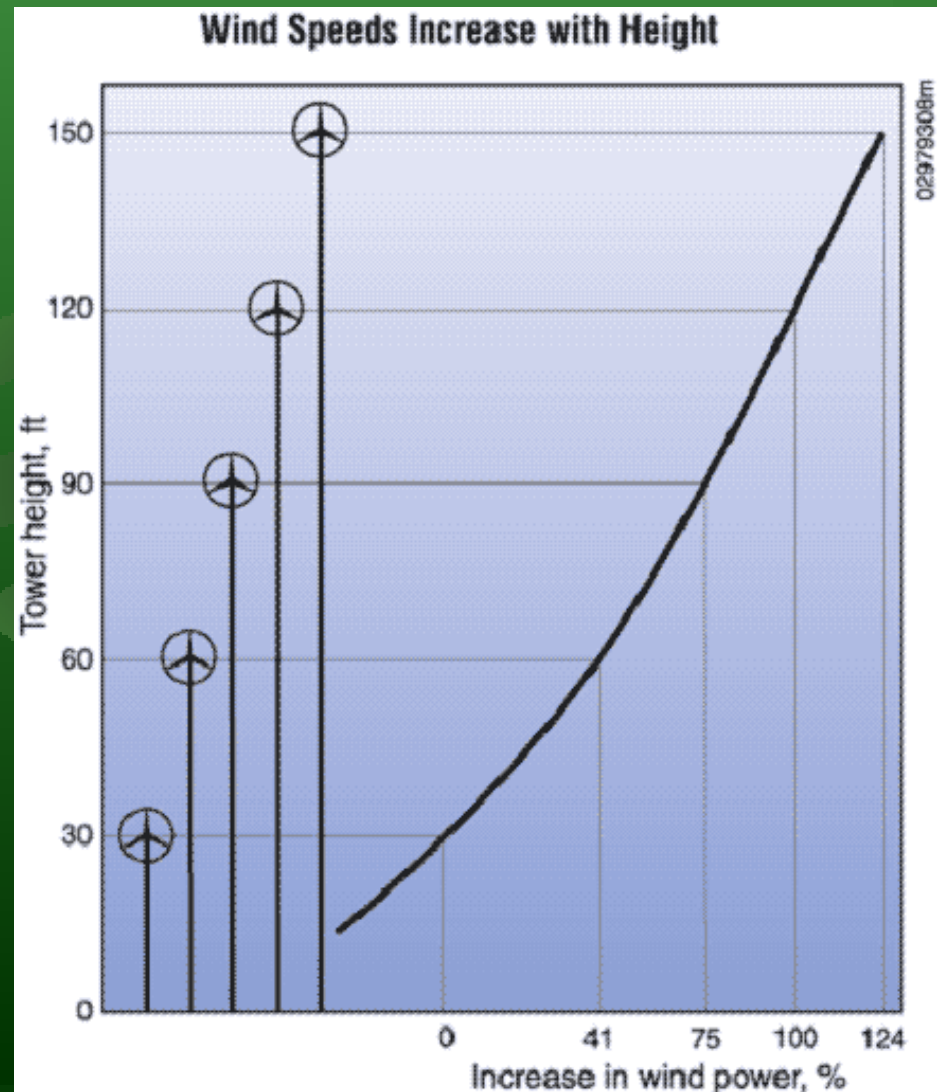
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TOWER HEIGHT MATTERS

- ◆ Wind speed increases with height
- ◆ Small increases in wind speed result in large increases in power
- ◆ Tall towers often needed for clearance above obstacles (*turbulence*)
- ◆ May require a variance or a special use permit



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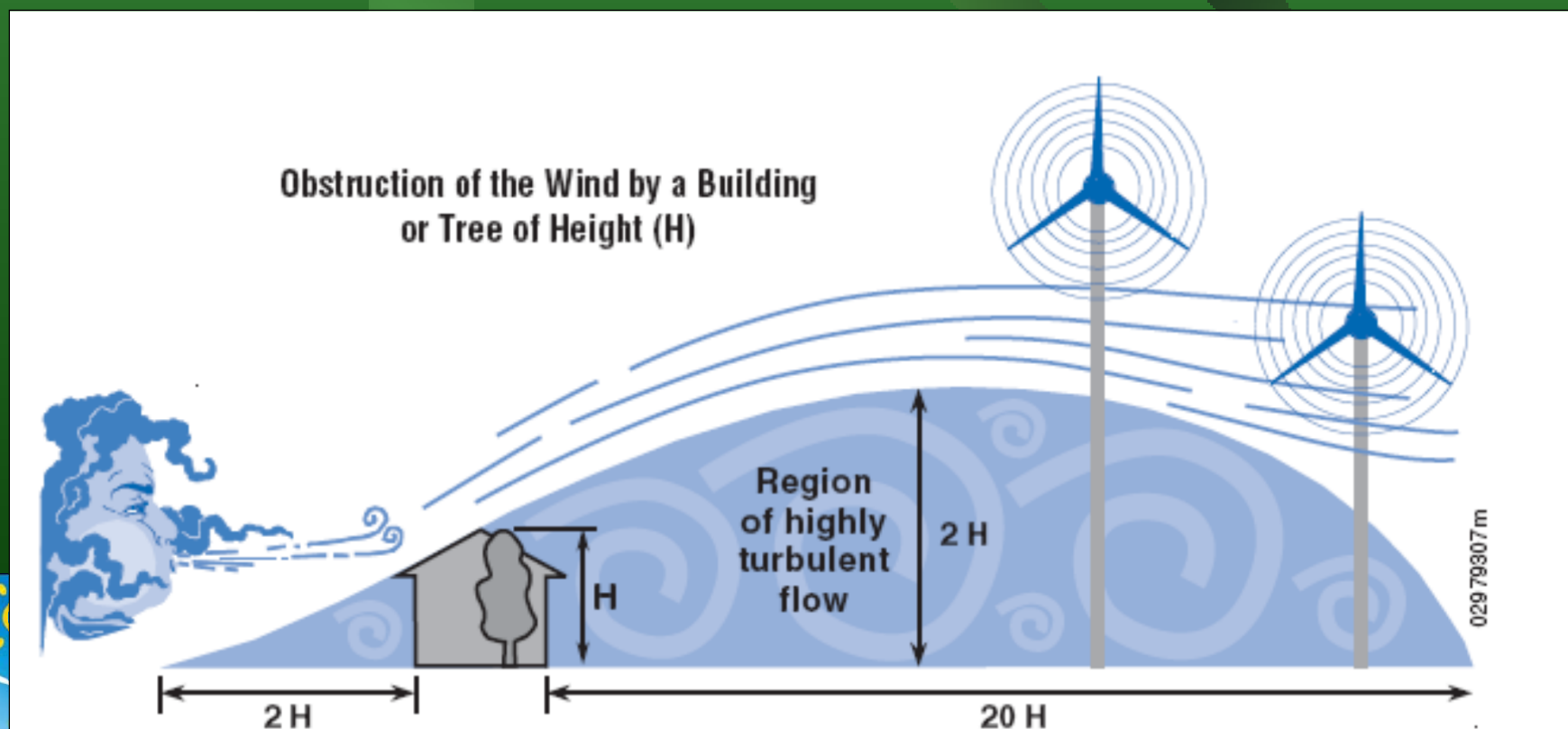
3. Space considerations

- * Most installers recommend at least one acre parcels
- * Need space for setbacks from property lines (at least 1.25 times the turbine height) – also guy wires for towers
- * Less chance of neighbor annoyance with more space



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Turbulence issues – turbine should be 300 feet away from obstructions...



Example of Poor Turbine Siting....



- ❖ Tower is too short
- ❖ Too close to trees
- ❖ Trees are same height as tower



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ADMINISTRATIVE ISSUES

4. Zoning – height or setback restrictions

5. Building permits

6. Insurance

7. Interconnection



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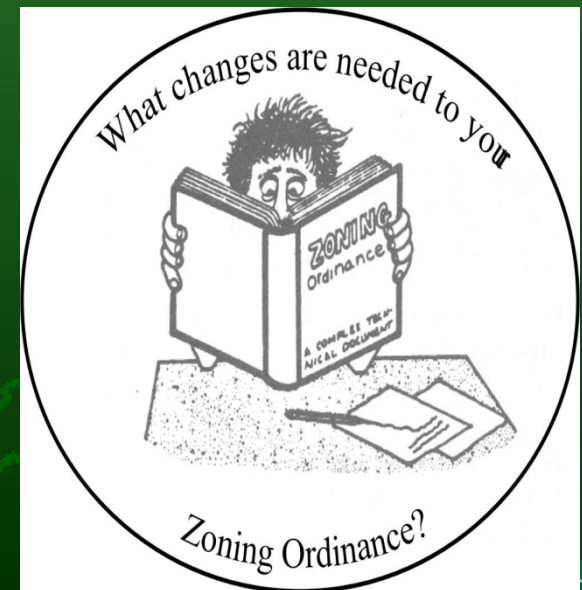
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4. Zoning

- ❖ Check with township, county or municipal government
- ❖ Main concern – height restrictions and setbacks
- ❖ Can request a variance
- ❖ Get sign off from neighbors prior to request



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5. Do I

- May I
or do I
info

6. Do I

permit?

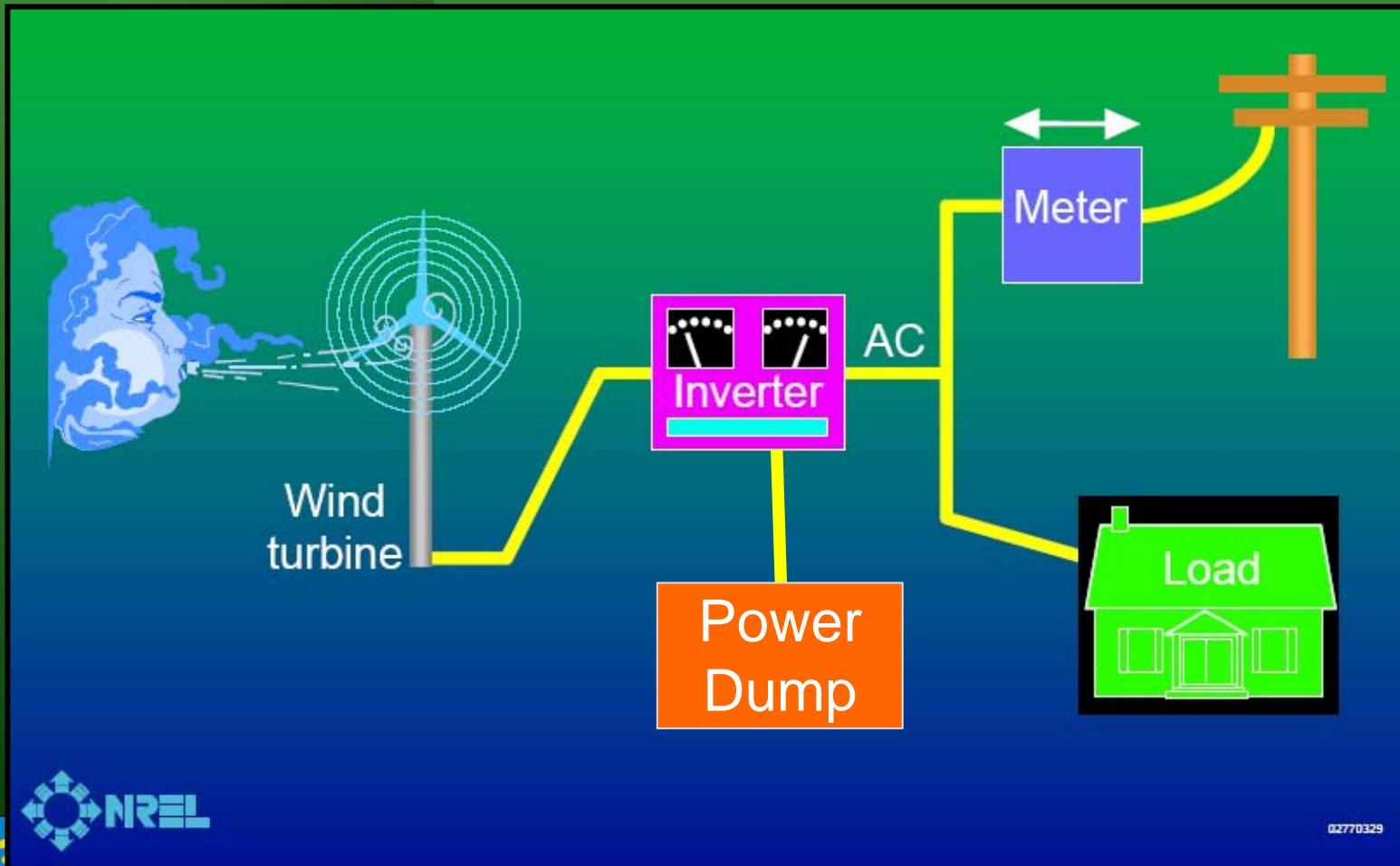
municipal
and what



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7. Interconnect to Utility



Most people will, unless using a turbine for an off-grid use

Interconnection, continued...

- ❖ Utility acts as back-up system, and is much cheaper and more efficient than batteries
- ❖ For 20 kW or smaller turbines, interconnect fee is \$100
- ❖ Expedited process for small wind turbines



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WHAT WILL IT COST AND WILL IT PAY?

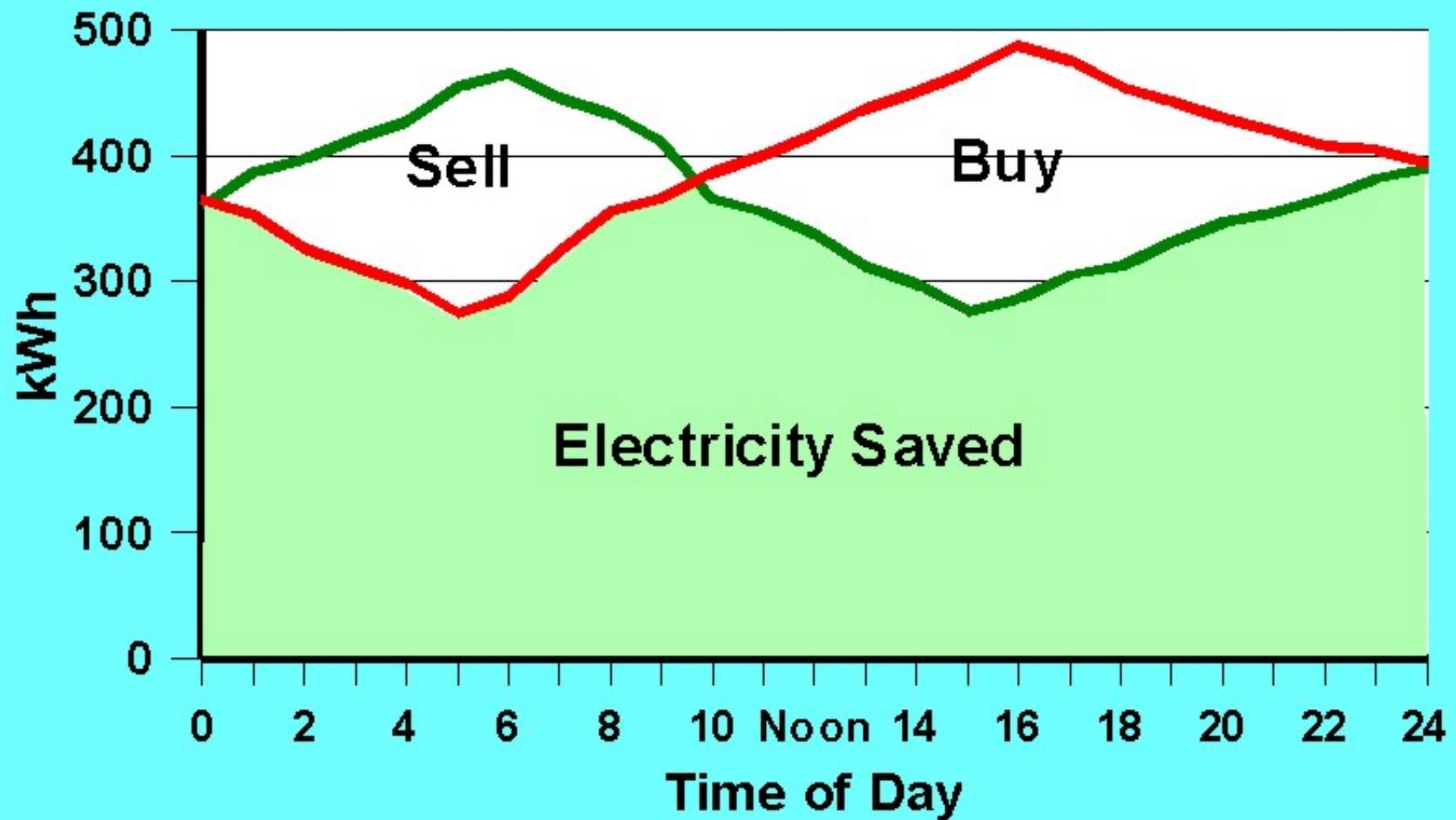
8. Can I net meter my turbine?
9. Are there grants/incentives to help offset the cost?
10. What will be the return on the investment?



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Electricity Generated and Used



— Generated — Used



9. INCENTIVE PROGRAMS

❖ USDA REAP Program

- 25% Cost sharing
- Loan program to 75% of cost

❖ Federal tax incentive

- 30% of cost can be used for a tax credit if installed and credit used by 2016.



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10. WHAT WILL BE THE RETURN ON INVESTMENT

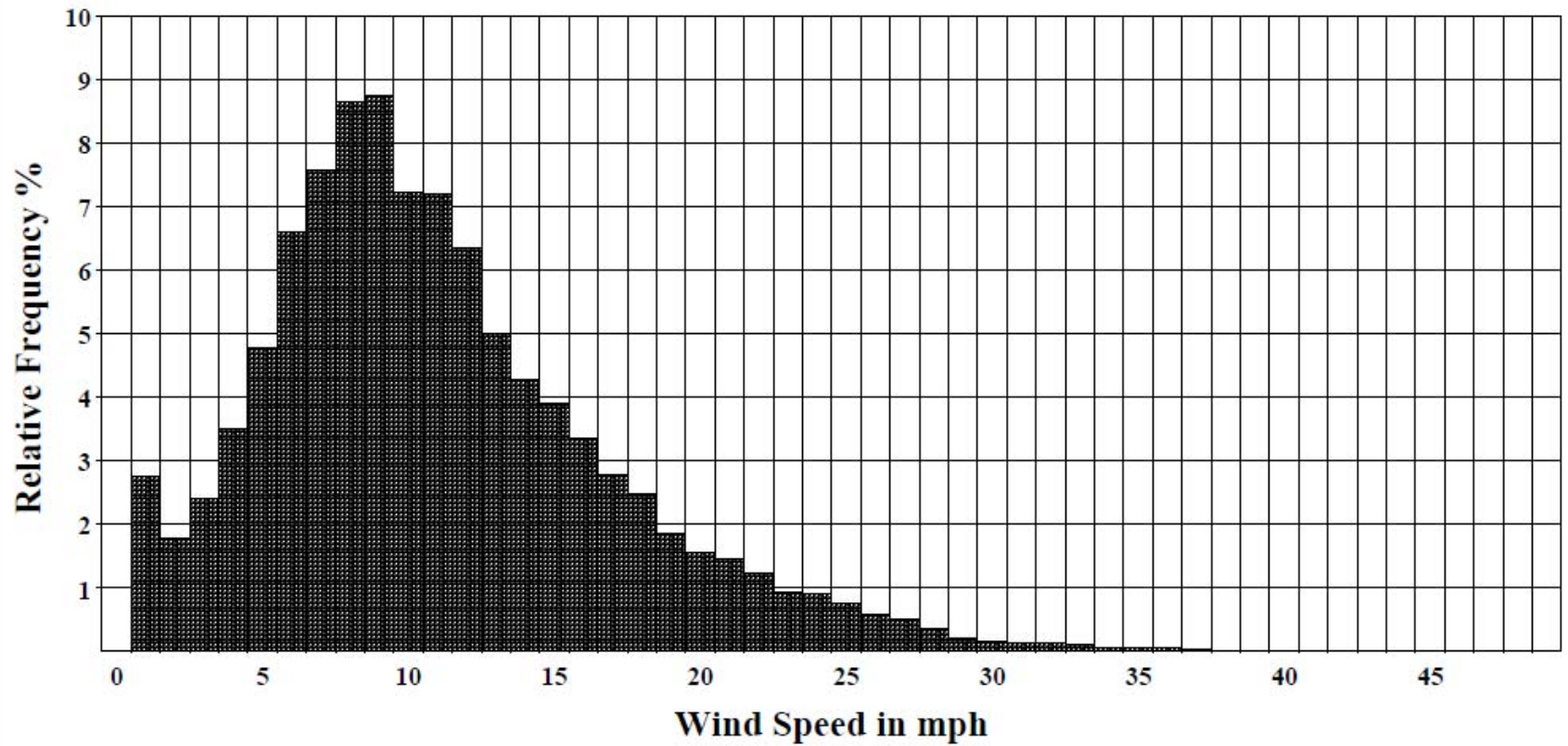
- ❖ Dairy farm considering a 20kw turbine on a 100 foot tower
 - System information:
 - Total cost of project is \$83,500 (\$4.18/watt)
 - Assumed life of investment = 20 years
 - Will get “true” net metering
 - Financing 40% of the cost
 - 25% cost share under REAP
 - Will take Federal Tax Credit at full 30% of cost



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Frequency Distribution



Average wind speed = 11.1 mph



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Case 1 Results

- ❖ Analyzed with the Small Wind Investment Model
 - Used after-tax discounted flows
- ❖ Results (Case 1, Base Situation):
 - Before-tax internal rate of return = 12.5 %
 - Payback period = 7 years

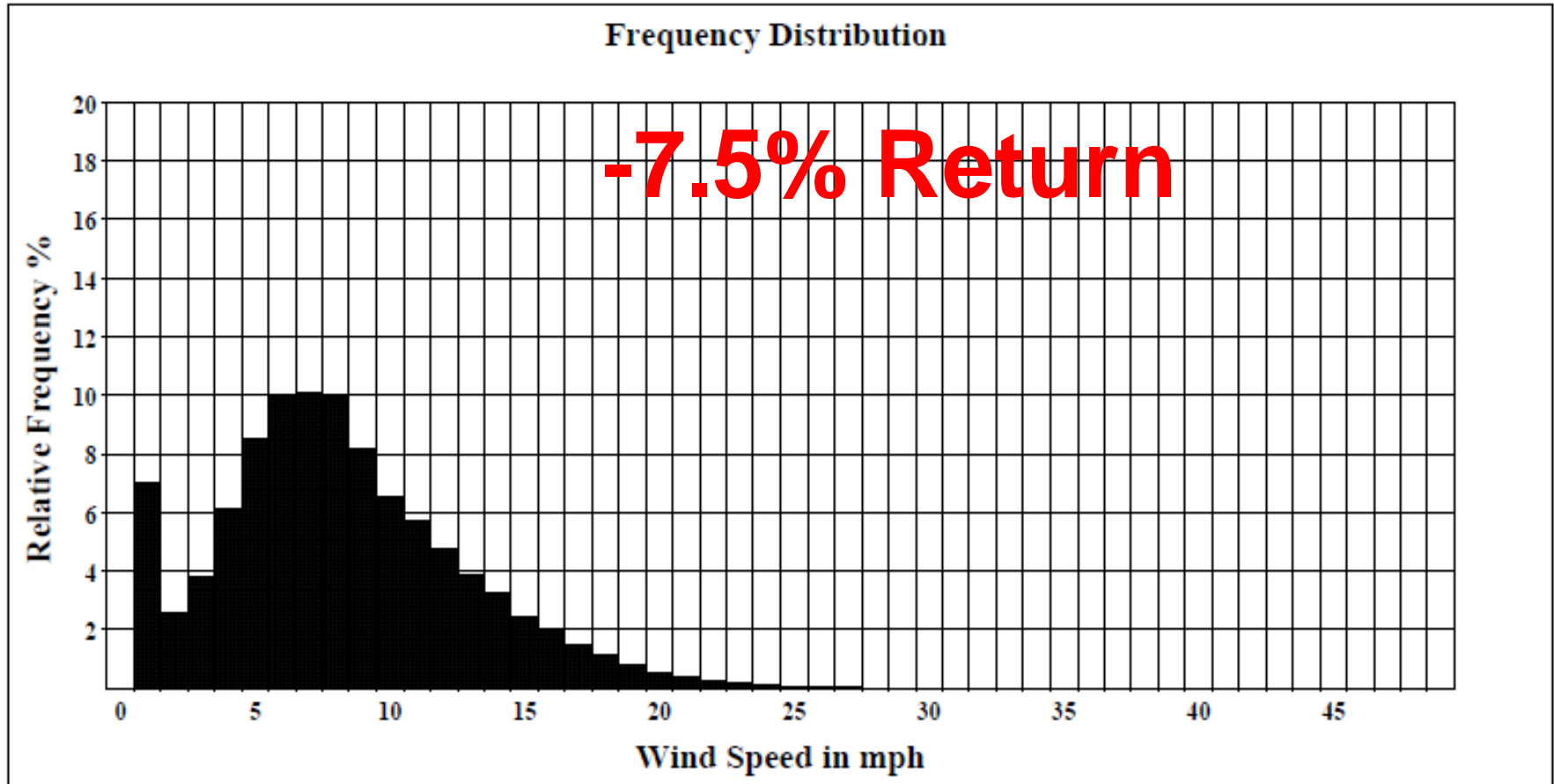


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CASE 2



Average wind speed = 8.4 mph

OTHER IMPORTANT ISSUES (BEYOND THE SCOPE OF THIS PRESENTATION)

11. What type of turbine?

12. How to find an installer?



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SMALL WIND SUMMARY

- ❖ **Small wind systems will play a role in meeting Michigan energy needs**
 - Distributed energy generation has many advantages
- ❖ **Be sure you take time to evaluate your situation before you make a major financial commitment**
 - Pay particular attention to your wind resource



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COMMUNITY WIND



**A Vestas 1.65 Mw turbine being constructed in Minnesota
A MinWind project**

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<http://miwind.info>

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