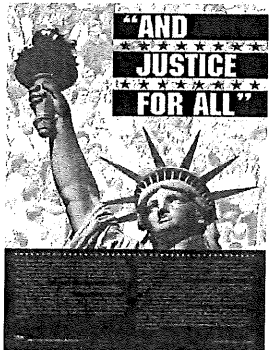



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"I know of no safe depository of the ultimate powers of the society but the people themselves, . . .



. . . and if we think them not enlightened enough to exercise their control with wholesome discretion, the remedy is not to take it from them, but to inform their discretion."

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Planning and Zoning for Wind Energy Systems


March 22, 2017

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What We Will Cover

A. Wind Resource Potential	C.2. Standards:
B. Acceptance Factors	A. Setbacks
C. Sample Zoning	B. Noise
1. Definitions	C. Visual Impact
2. Standards...	D. Avian and Wildlife
	E. Shadow Flicker
	F. Decommissioning
	G. Complaint Resolution
	H. EM Interference

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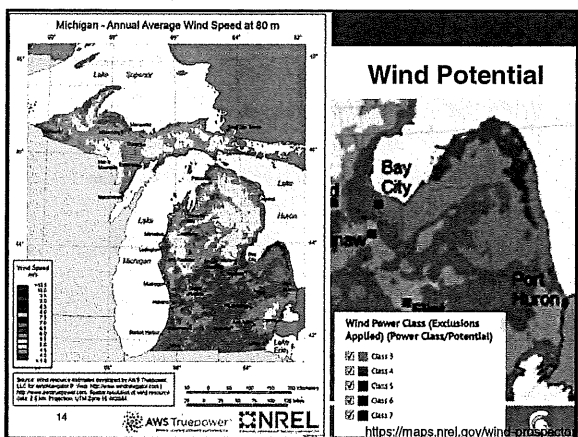
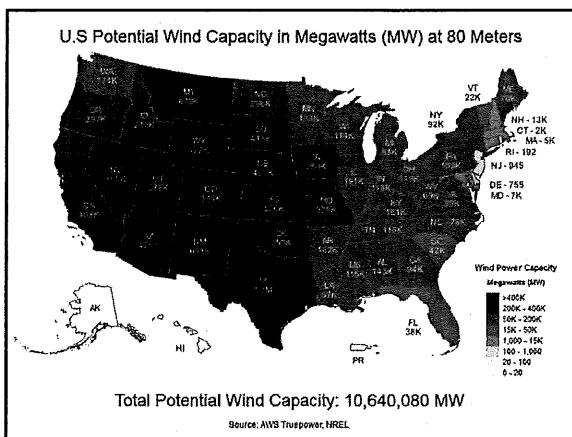
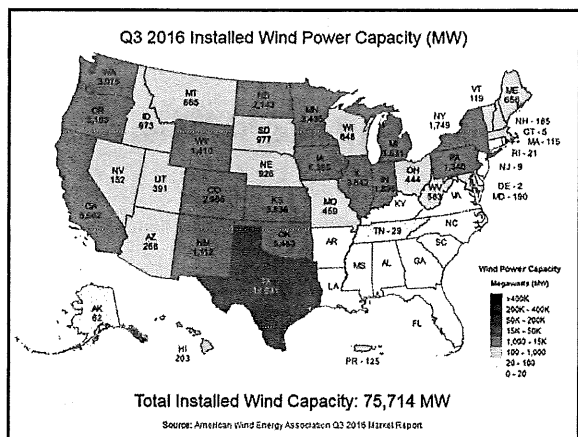
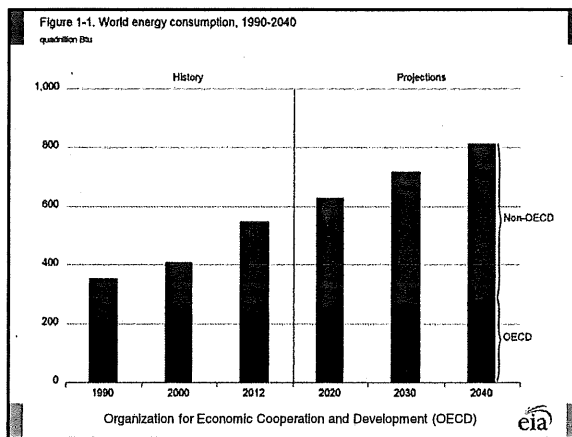
What We Will Cover, continued

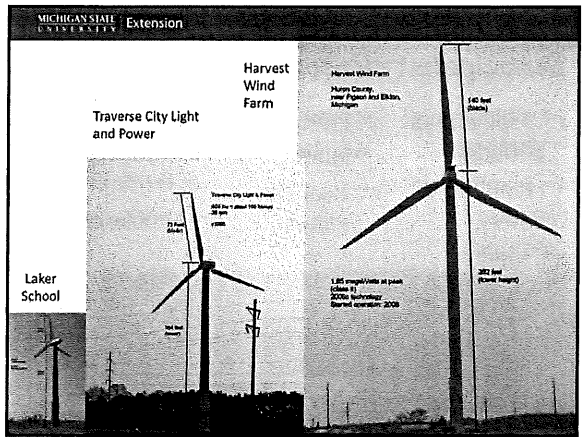
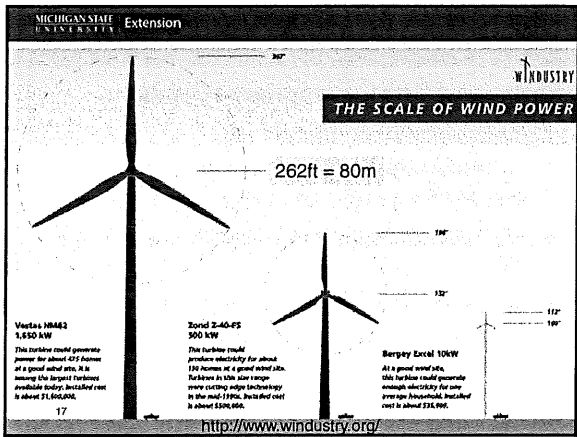
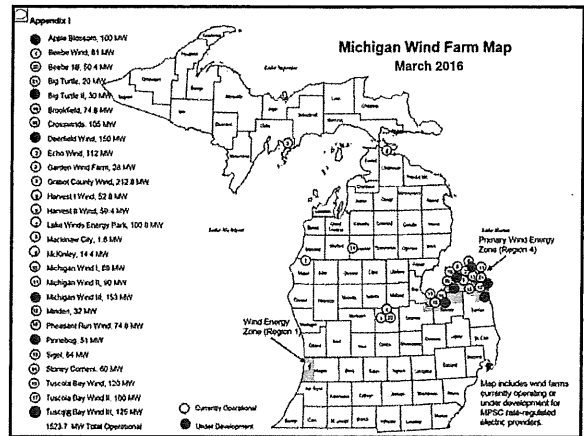
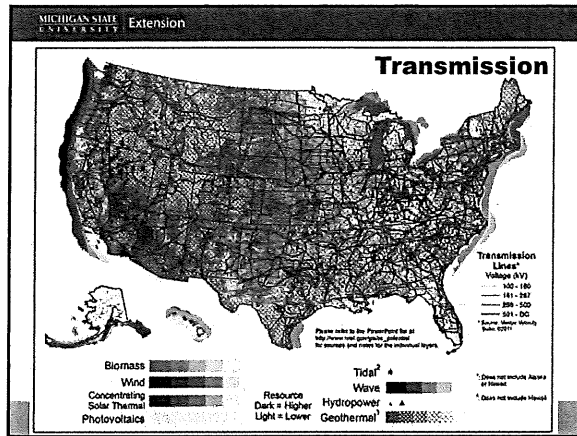
- D. Zoning Districts
- E. Site Plan Review
- F. Property Values
- G. Economic Impact (Job Creation)
- H. Planning and Zoning Legal Framework
- I. Adopting Local Energy Regulations
- J. Additional Resources

9

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A. Wind Resource Potential





B. Acceptance Factors

U.S. Public Attitudes

U.S. Should Place "More Emphasis" on Each Source of Domestic Energy Production, by Region

	All Americans	East	Midwest	South	West
	%	%	%	%	%
Solar power	76	79	75	74	78
Wind	71	74	75	65	72
Natural gas	65	62	58	68	68
Oil	46	38	43	53	46
Nuclear power	37	38	28	42	38
Coal	31	25	27	40	28

March 7-10, 2013
GALLUP®

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Renewable Energy and the Social Gap


- The “social gap:” (Bell et al., 2005; 2013)
 - High general support for renewable energy is incongruent with a slow rate of deployment for renewable energy technologies.
- Wind energy and the social gap:
 - Polls indicate high levels of individual support for renewable energy, including wind energy.
 - But opposition to specific wind projects is common.

21

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Acceptance Factors

- **Concern or opposition** to a wind farm might be categorized into three areas:
 1. Anticipated effects,
 2. Fairness of the development, and
 3. Values and beliefs



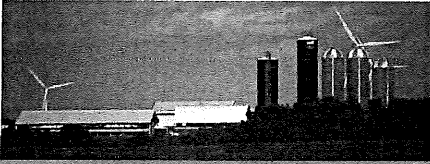
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Bidwell, D. 2013. "The role of values in public beliefs and attitudes towards commercial wind energy." *Energy Policy*, 58, 189-199.

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Anticipated Effects

- Wildlife and habitat
- Health and safety
- Traffic
- Road use
- Noise
- Property values
- Economic impact on community
- Landscape



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Fairness of the Development Process

Includes beliefs and results as:

1. **Outside interests** are profiting or **benefitting more** than local community,
2. Opposition directed toward the developer, and
3. If procedural fairness such as unbiased decision making, **stakeholders are treated fairly** is being done.

24

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Values and Beliefs


- More altruistic values toward others and community, more likely one might express caution toward wind energy.
- General environmental beliefs tend to result in enthusiasm for wind energy.
- Holding traditional values has a strong link to a person with a strong self-identity to place and likely skepticism of wind.

25

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Acceptance Factors

- **Not all wind farms are controversial**
- Significant is a community's and developer's ability to:
 - provide **meaningful education**,
 - **collaborative discussions**,
 - with a strong public **participatory process** very **early** in the process.




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C. Sample Zoning



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Review of Sample Zoning

- "Sample Zoning for Wind Energy Systems":

MICHIGAN STATE UNIVERSITY Extension **Land Use Series** March 6, 2017

Sample zoning for Wind Energy Systems

Bringing Knowledge to Life!

"They soon realize it's not all the things we see here."


James G. Wilson

This flyer presents a sample zoning ordinance for utility scale wind energy systems and smaller wind electric generation systems for an individual business or home.

Introduction and History of this Sample Zoning

These guidelines were originally developed in April 2009 by the Energy Office, Michigan Dept. of Labor and Economic Growth (MDEG) for the Michigan Agency for Energy (<http://www.michigan.gov/energy>) to assist local governments in developing zoning requirements for wind energy systems. The 2009 sample zoning is still applicable in many areas. It has been developed with the intent of striking an appropriate balance between the need for a clean, renewable energy and the necessity to protect the public health, safety, and welfare.

Authors:




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Sample zoning is based on

- October 2007 MSUE bulletin
- Peer reviewed research
- University and Industry expertise

MiEnergy Michigan Agency for Energy


PURE MICHIGAN Energy Office




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Sample zoning needs to be edited

- It is over-written: edit for use as a zoning amendment
- Edit to match your zoning ordinance style
- Select which parts are wanted: some, or all



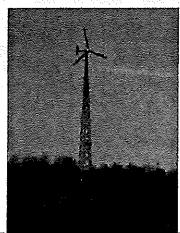
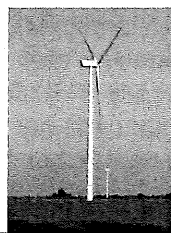
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Organization / Format

- Requirements differ for On-site Use vs. Utility Grid wind energy systems


31 MSUE; Neumann MSUE; Schindler



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Sample ordinance outline

- Definitions
- General Provisions
- Special Use Standards
- Zoning Districts
- Site Plan Review



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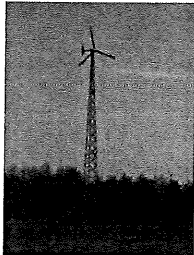
C.1. Definitions

94

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On-Site Use Wind Energy System

- A land use for generating electric power from wind and is an accessory use that is intended to primarily serve the needs of the consumer at that site.



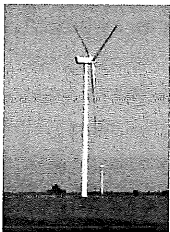
MSUE: Neumann

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Utility Grid Wind Energy System

- A land use for generating power by use of wind at multiple tower locations in a community and includes accessory uses.
- A Utility Grid wind energy system is designed and built to provide electricity to the electric utility grid.




MSUE: Schindler

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Permitted vs. Special Use

- Adopt different requirements for:
 - On-Site Use systems → (accessory use of land)
 - Utility Grid systems → (principal use of land)




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Definition - Principal Use

- A principal use is a use of land or a building that fulfills a primary function on the property in which it is located.
(City of Palo Alto, CA)




Brad Neumann; MSUE

97

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Definition - Accessory Use

- Accessory uses are uses of land that are found on the same parcel as the principal use but are subordinate and incidental.



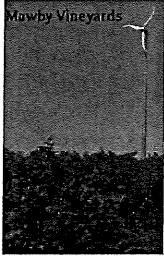
Lindsey Turner; CreativeCommons

98

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Definition - Permitted Use

- Permitted Use - Any use authorized or permitted alone or in conjunction with another use in a specific district and subject to the limitations of the regulations of such use district. (Concrete, WA.)




39

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Definition - Special Land Use

- Special Land Use - A use of property specifically authorized by a zoning ordinance, but not permitted unless certain stated conditions have been met. (Handbook for Planning Commissioners in Missouri)



40

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C.2. Standards

41

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On-Site Use – Permitted Use

- On-Site Use WES is an accessory use; shall meet:
 - Serve needs of home, business, farm
 - Tower height of 20 meters (65ft) or less
 - Setback equal to height of system including blade in its vertical position
 - Not exceed 40 dB(A) at property line*
 - Construction...
 - Safety...

* Deviation from Mt. Sample Zoning for Wind Energy Systems

42

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Utility Grid – Special Use

- Utility Grid WES, On-Site Use > 20m, and anemometers > 20m shall meet general special land use standards, plus:
 - Property setback
 - Sound pressure level
 - Safety
 - Post-construction permits
 - Pre-application permits
 - Performance security
 - Utilities
 - ...


Sample Zoning for Wind Energy Systems

43

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Setbacks

- Covered in detail by Mary Reilly.




44

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Noise

- Covered in detail by Mary Reilly.



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Utility Grid – Special Use

- Utility Grid WES, On-Site Use > 20m, and anemometers > 20m shall meet general special land use standards, plus:
 - C. Safety
 - D. Post-construction permits
 - E. Pre-application permits
 - F. Performance security
 - G. Utilities

See standards in sample zoning

Sample Zoning for Wind Energy Systems

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Utility Grid – Special Use


- Utility Grid WES shall meet general special land use standards, plus:
 - H. Additional standards for Utility Grid WES:
 - Visual Impact
 - Avian and Wildlife
 - Shadow Flicker
 - Decommissioning
 - Complaint Resolution
 - Electromagnetic Interference

Sample Zoning for Wind Energy Systems

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H.1. Visual Impact - Utility Grid WES

- Finished in a single, non-reflective matte color approved by the Commission
- Shall use similar design, size, operation, and appearance throughout the project.
- Only lettering identifying the manufacturer on the nacelles




Denise Krebs, CreativeCommons

Sample Zoning for Wind Energy Systems

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Avian and Bat Studies

- Covered in detail by Mary Reilly.




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Shadow Flicker

- Covered in detail by Mary Reilly.



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H.4. Decommissioning - Utility WES

Planning Commission approved plan, indicating:

- 1) Anticipated life of the project,
- 2) Estimated decommissioning costs net of salvage value in current dollars,
- 3) Method of ensuring that funds will be available for decommissioning and restoration, and
- 4) Anticipated manner in which the project will be decommissioned and the site restored.

Sample Zoning for Wind Energy Systems

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H.5. Complaint Resolution - Utility WES

- Planning Commission approved process to resolve complaints from nearby residents concerning the construction or operation of the project.

24. Complaint Resolution.

The purpose of this section is to provide the public with a mechanism to file a complaint with the wind energy system owner and the Zoning Administrator and receive a timely response from the wind energy system owner regarding alleged wind energy system ordinance violations. The applicant shall submit procedures which it intends to implement for receiving, acting upon, and resolving complaints or allegations that the wind energy system is not in compliance with this ordinance.

- a. Complaint resolution procedures must be presented at the time of application and must meet the approval of the Planning Commission prior to approval of a special land use. Those procedures, at a minimum, shall:


Mason County Zoning Ordinance

Sample Zoning for Wind Energy Systems

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H.6. EM Interference - Utility WES

- No system shall be installed where its proximity to existing fixed broadcast, retransmission, or reception antennae for radio, television, or wireless phone or other personal communication systems would produce electromagnetic interference with signal transmission or reception...



MSUE: Schneider

Sample Zoning for Wind Energy Systems

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D. Zoning Districts

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Zoning Districts

Add, where appropriate, to each land use district's list of possible special land uses the following:

1. Anemometer Tower over 20m (65.6ft)
2. Utility Grid Wind Energy System
3. On-site Use Wind Energy System over 20 meters (65.6ft)

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E. Site Plan Review

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Site Plan Review - see sample p. 9

Sample zoning assumes:

- Requirement of site plans already exists for certain districts
 - Including requirements for basic information such as property lines, locations of structures, scale, etc.
- All other permits are obtained prior to site plan review
- Ordinance provides an application and site plan fee schedule
 - May want to create an escrow account to cover costs of more detailed reviews

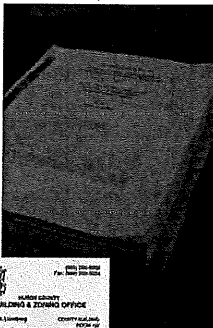
90

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Wind Farm Site Plan Example

Site plan in book form

- Overview
- Construction specs
- Traffic & logistics
- Const. schedule
- O & M plan
- Safety & security
- Ecological
- Shadow study
- Noise study
- FAA & tall structures
- Visual simulation
- Signal interference
- Decommissioning
- Summary



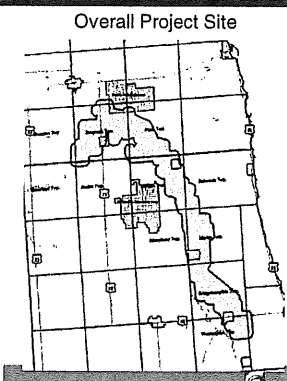
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Overall Project Site

WARD ORDINANCE FACILITIES, TOWNS OF BENONI, MADISON COUNTY, MI
 ACTUAL DISTRICTS, DISTRICTS, ZONING AND CHANGE DISTRICTS
 All Distances in Feet

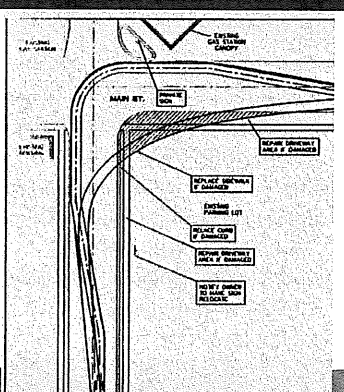
District	Parcel Number	Owner	Address	Distance to
61	261	2615 Perry Road	1227	1227
62	262	2625 Perry Road	1227	1227
63	263	2635 Perry Road	1227	1227
64	264	2645 Perry Road	1227	1227
65	265	2655 Perry Road	1227	1227
66	266	2665 Perry Road	1227	1227
67	267	2675 Perry Road	1227	1227
68	268	2685 Perry Road	1227	1227
69	269	2695 Perry Road	1227	1227
70	270	2705 Perry Road	1227	1227
71	271	2715 Perry Road	1227	1227
72	272	2725 Perry Road	1227	1227
73	273	2735 Perry Road	1227	1227
74	274	2745 Perry Road	1227	1227
75	275	2755 Perry Road	1227	1227
76	276	2765 Perry Road	1227	1227
77	277	2775 Perry Road	1227	1227
78	278	2785 Perry Road	1227	1227
79	279	2795 Perry Road	1227	1227
80	280	2805 Perry Road	1227	1227
81	281	2815 Perry Road	1227	1227
82	282	2825 Perry Road	1227	1227
83	283	2835 Perry Road	1227	1227
84	284	2845 Perry Road	1227	1227
85	285	2855 Perry Road	1227	1227
86	286	2865 Perry Road	1227	1227
87	287	2875 Perry Road	1227	1227
88	288	2885 Perry Road	1227	1227
89	289	2895 Perry Road	1227	1227
90	290	2905 Perry Road	1227	1227
91	291	2915 Perry Road	1227	1227
92	292	2925 Perry Road	1227	1227
93	293	2935 Perry Road	1227	1227
94	294	2945 Perry Road	1227	1227
95	295	2955 Perry Road	1227	1227
96	296	2965 Perry Road	1227	1227
97	297	2975 Perry Road	1227	1227
98	298	2985 Perry Road	1227	1227
99	299	2995 Perry Road	1227	1227
100	300	3005 Perry Road	1227	1227



92

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Temporary Transportation Modifications



93

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F. Property Values

94

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Property Value Concerns for Wind Fall Into Three Potential Categories

- Area Stigma:** Concerns that rural areas will appear more developed. *No one will move here!*
- Scenic Vista Stigma:** Concerns over decrease in quality of scenic vistas from homes. *It will ruin my view!*
- Nuisance Stigma:** Potential health/well-being concerns of nearby residents. *I won't be able to live in my home!*

Each of these effects could impact property values; none are mutually exclusive

Adapted from: Ben Hoen, Lawrence Berkeley National Laboratory, *Residential Property Values And Wind Turbines: A Summary of Findings*. Presentation at Michigan Wind Forum, March 10, 2011

95

Table 11.1: Summary of Existing Literature on Property Values

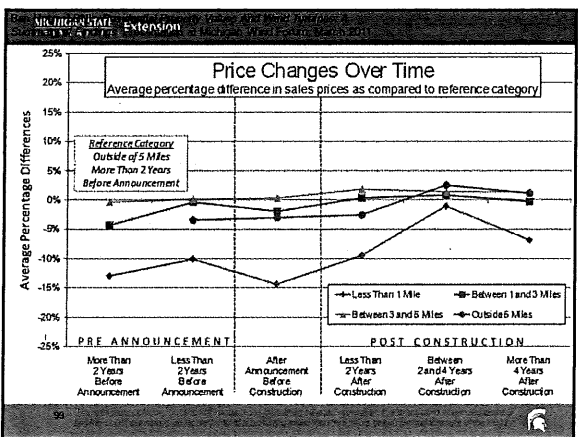
Author(s) (Year)	Year	Number of Transactions	Before/After Construction	Area Study	State Study	National Study
Boylan et al. (2004)	2004	501	Before	-	*	-
Boylan et al. (2008)	2008	50	After	-	*	-
Boylan et al. (2007)	2007	500	Before	-	*	-
Area Studies						
Chen et al. (2002)	2002	13	After	None	None	None
Chen et al. (2004)	2004	62	Before	-	*	*
Goldman (2006)	2006	70	After	None	None	None
Crabtree (2002)	2002	42	After	None	None	None
Leckebusch (2008)	2008	173	Before/After	None	None	None
Transaction Analysis - Single Property						
Leckebusch (2006)	2006	35	After	None	None	- ?
Leckebusch (2007)	2007	1	After	None	None	None
Starr et al. (2009)	2009	21,000	After	None	None	None
Smith (2004)	2004	3	After	None	None	None
Spotts (2007)	2007	187	After	None	None	None
DeLoe (2005)	2005	28	Before/After	None	None	None
Goldman (2006)	2006	4	After	None	None	None
Smith (2007)	2007	254	After	None	None	None
Leckebusch (2008)	2008	2	After	None	None	None
Leckebusch (2009)	2009	103	After	None	None	None
Schulz et al. (2010)	2010	3,330	Before	None	None	None
Transaction Analysis - Tracts/Blocks						
Boylan (2004)	2004	20	After	None	None	- ?
Larson & Martin (2010)	2010	1,970	After	None	None	- ?
Shannon (2010)	2010	2,851	Before	- ?	None	- ?
Shannon (2010)	2010	1,851	After	- ?	None	- ?
Hernandez & Tullis (2011)	2011	8,330	Multiple Before	None	None	None
Hernandez & Tullis (2011)	2011	1,530	Multiple After	None	None	None

Wind Farms in North America. May 2013. Lawrence Berkley National Laboratory. LBNL-6139E

Property Value Effects

- Taken together, previous studies suggest **post construction effects of wind turbines on surrounding home values, if they exist, are often too small for detection** or sporadic, or appearing in some communities for some types of properties but not others.
- In the post-announcement, pre-construction period, analysis has found evidence of potential property value effects, but prices generally return to normal.

Wind Farms in North America. May 2013. Lawrence Berkley National Laboratory. <http://www.escholarship.org/uc/item/0wx8d69c>



Property Value Effects
The most comprehensive study to date*:

- Across all model specifications, we find no statistical evidence that home prices near wind turbines were affected in either the post-construction or post-announcement/preconstruction periods.

Hoen et al. "A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States." August 2013. Lawrence Berkley National Laboratory. <http://emp.lbl.gov/sites/all/files/lbnl-6362e.pdf>

- *Another recent study in NY found significantly reduced property values in two of the three counties studied ("Values in the Wind: A Hedonic Analysis of Wind Power Facilities." Land Economics, Aug. 2012); Questions about methodology have been raised.

G. Economic Impact

Economic Impact - Job creation

- According to the North Carolina Wind Working Group, every 100MW of wind power installed provides 310 FTE manufacturing jobs, 67 contracting and installation jobs, and 9.5 annual jobs in operation and maintenance. http://www.eesi.org/files/green_jobs_factsheet_102208.pdf
- Lake Winds Energy Park (101MW) – require 175,000 hours of work; 80-85 employees in work-years; 15% estimated to be from Mason County
- Employ an estimated 8 to 12 FTE, permanent workers, 60% projected to be residents of Mason County <http://www.lakewindsenergypark.com/Uploadedfiles/LakeWinds/LakeWinds-Impact.pdf>

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Economic Impact - Job creation

- The Cross Winds Energy Park (105MW) is expected to include about 150 construction jobs and up to 12 full-time operator positions.
<http://consumersenergyinyourcommunity.wordpress.com/tag/cross-winds-energy-park/>
- Garden Wind Farm (28MW) 75 jobs for construction; 5-6 FTE, permanent jobs
<http://heritagewindenergy.com/wp-content/uploads/2016/08/Heritage-Garden-Wind-Farm-V5-email.pdf>

103

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H. Planning and Zoning Legal Framework

104

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Planning and Zoning Legal Framework

Regardless of feeling on wind energy:


- Due process must be followed
- All legitimate land uses must be considered
- Must allow for continuation of nonconformities
- Local zoning cannot constitute a 'taking'
- Must provide for equal protection of all

105

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Substantive Due Process Limitations

- Substance of the regulation
- Related to a public purpose
- Least regulation possible
- Supported by a master plan



Michael Grimes

106

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Substantive Due Process

Zoning violates substantive due process if...

- it fails to advance a **reasonable governmental interest** (public health, safety or welfare);
 - Village of Euclid (Ohio) v. Ambler Realty Co.*, 272 U.S. 365 (1926)
- it results in the "purely arbitrary, capricious and unfounded **exclusion of other types of legitimate land use** from the area in question;" or
 - Kropf v. City of Sterling Heights*, 391 Mich. 139 (1974)
- goes beyond what is minimally necessary** to accomplish the public purpose.

107

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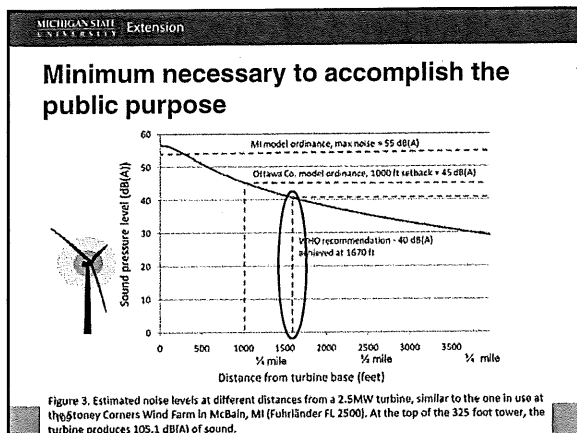
Minimum necessary to accomplish the public purpose

If tower collapse is the concern, wouldn't the minimum necessary be:

"...the height of the tower including the top of the blade in its vertical position...?"

- From the State Sample Zoning for Wind Energy Systems

108



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Demonstrated Need

- A zoning ordinance may not totally exclude a lawful land use where:
 - There is a demonstrated need for the land use in the community or surrounding area;
 - The use is appropriate for the location.
 - *English v. Augusta Twp*, 204 Mich. App. 33 (1994)
- i.e. Must avoid 'exclusionary zoning'

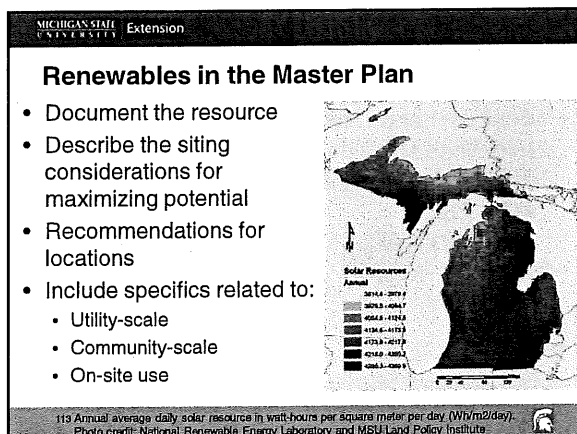
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I. Adopting Local Energy Regulations

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Key Steps Toward Developing Local Wind Energy Regulations

- Amend master plan to add wind policy statements
- Include in descriptions of Future Land Uses where desired
- Where excluded, provide reasons
- Add or update zoning definitions
- Definitions will create categories
- Differ by use, height, or capacity
- Expect to change with technology



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Process: Adopt Zoning Amendment

1. Zoning amendment is initiated (by the legislative body, planning commission or any person)
2. Planning Commission prepares zoning
3. Commission reviews policy, procedure for administration; updates if needed
4. (Optional) planner, attorney review
5. Send notices for public hearing (may include those within 300 feet)
6. Public Hearing
7. (Township) county planning commission review
8. Modify the zoning amendment
9. Commission recommends legislative body adopt amendment
10. (Optional) public hearing by legislative body
11. (Optional) (city, village) hearing for protest petition by legislative body (abutter's challenge)
12. Legislative body adopts amendment (need 2/3 vote if protest petition)
13. Original copy of amendment (and updated zoning ordinance) filed local government clerk; airport manager, county planning if applicable
14. Publish notice of adoption in a (township, county) (Optional) May have petition to bring the ordinance to a popular vote

114 See MSUE "For Adoption of a Zoning Ordinance in Michigan"

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Collaborative Problem Solving

- Government, private interests and the local community work as a team to address issues and identify solutions.
- Includes early engagement of stakeholders in the planning process and constructive exchange of information between project proponents, regulators, and affected stakeholders.

Stafford E., and C. Hartman. 2012. "Resolving Community Concerns over Local Wind Power Development in Utah." *Sustainability: The Journal of Record*, 5(1): 38-43.

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J. Additional Resources

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Resources

- Not all proposed large wind energy farms are controversial and there may be reasons why: Part one | January 21, 2014 | Kurt Schindler
 - http://msue.anr.msu.edu/news/not_all_proposed_large_wind_energy_farms_are_controversial_and_there_may_be
- Strategies to reach consensus on controversial wind energy farms: Part two | January 21, 2014 | Kurt Schindler
 - http://msue.anr.msu.edu/news/strategies_to_reach_consensus_on_controversial_wind_energy_farms_part_two

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Resources

- Planning and zoning for solar energy readiness: A hot proposition | February 11, 2015 | Brad Neumann
 - http://msue.anr.msu.edu/news/planning_and_zoning_for_solar_energy_readiness_a_hot_proposition_part_1%20
- Climate change and local government: Zoning for small wind energy | April 14, 2014 | Brad Neumann
 - http://msue.anr.msu.edu/news/climate_change_and_local_government_zoning_for_small_wind_energy

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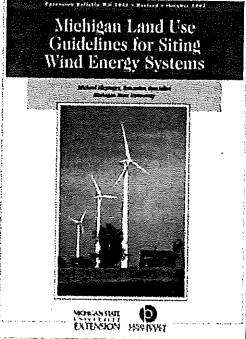
Resources

- MSUE Wind Energy/Alternative Energy resources page:
 - The most widely-accepted research http://msue.anr.msu.edu/topic/planning/zoning/wind_energy_alternative_energy
- MSUE Wind Power page:
 - Anemometer Loan Program
 - Landowner Guidelines for Evaluating Wind Energy Production Contracts
 - Landowner Wind Energy Associations http://msue.anr.msu.edu/program/info/msue_wind_power

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Resources

- Michigan Land Use Guidelines for Siting Wind Energy Systems (WO-1053)
 - Michael Klepinger, former Extension Specialist



http://msue.anr.msu.edu/uploads/resources/pdfs/Michigan_Land_Use_Guidelines_for_Siting_Wind_Energy_Systems.pdf

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Resources

- North Central Regional Center for Rural Development webinar - **Utility Scale Renewable Energy Development - Project Siting & Conflict Resolution** (12/18/2013)
 - By E. Romich & P. Hall (The Ohio State University) & W. Beyea (MSU)
 - http://ncrcrd.msu.edu/ncrcrd/chronological_archive

121

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Resources

- Land Policy Institute's *Perceptions of the Impact of Wind Energy Generation in Coastal Communities*:
 - Community Views
 - Regulation Issues
 - Trust and Fairness Issues
 - Impact Perceptions

For a copy of this report and others from LPI, contact charron@landpolicy.msu.edu

122

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What We Covered

A. Wind Resource Potential	G. Economic Impact (Job Creation)
B. Acceptance Factors	H. Planning and Zoning Legal Framework
C. Sample Zoning	I. Adopting Local Energy Regulations
D. Zoning Districts	J. Additional Resources
E. Site Plan Review	
F. Property Values	

123

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124

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125

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126

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