

## Planning for Renewable Energy In Your Community

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## THE ENERGY REVOLUTION

- Wind
- Solar
- Geothermal
- Biomass
- Waste to Energy recycling
- Expansion/adaptation of existing sources
- Adaptation/expansion of The Grid
- What's next?

## The Opportunity

- 40% of US total end-use energy demand, over 2/3 electricity demand is for buildings
- 40% of US carbon emissions produced by buildings – solar and wind produce none
- Building energy use can be met with alternative energy sources, reduced energy use

(Source: American Planning Association, Zoning Practice April 2010)

## Ohio is a Leader

- Third in states for solar capacity in MW by 2025 (behind NJ and MD)
- Third most aggressive renewable energy policy in the US (behind CA and IL)
- Nearly 551,000 workers in Ohio could see new job opportunities/wage increases from the growth of environmentally friendly industries

(Source: Ohio Department of Development, InterPV, May 2009)

## Ohio's AEPS (Advanced Energy Portfolio Standard)

- Senate Bill 221
- Signed into law on 1 May 2008
- By 2025, requires 25% of all electricity sold to be from Advanced Energy Sources
- At least 12.5% must come from Renewable Sources: Wind, Solar, Biomass
- At least 50% must be generated in Ohio
- Gradual Ramp-up begins in 2009 with annual benchmarks
- 3<sup>rd</sup> most aggressive RPS with regard to wind
  - 6,000 – 7,000 MW of wind by 2025

## Energy facilities are not new to local communities...



How can we work together to ensure our future:  
Progressive infrastructure,  
AND Quality of life?



## Watts, Kilowatts, Megawatts

- One MegaWatt (MW) = 1,000 Kilowatts (kW)
- One Kilowatt (kW) = 1,000 Watts (W)
- One residential home uses about 9000 kilowatt-hours per year, about 4 kW needed to serve daily

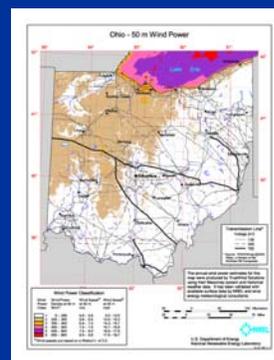
## Energy Facility Scale

- Utility Scale – 5-50 MW or greater
- Commercial Scale – About 1-2 MW
- Residential Scale – About 4 kW
- Includes total of all facilities on a site
- Local communities can regulate residential and commercial scale sites; OPSB regulates utility scale sites (see further)

## Issues for Local Communities

- Zoning issues: height, spacing, uses/compatibility
- Health/safety: building code issues, structural integrity
- Storm Water impacts: storage, impervious surface, compaction, on-site storage of materials (biomass)
- Nuisance: noise, dust, smells, air quality
- Access: traffic, easements, utilities
- Aesthetic Issues: design, color, community character
- Ownership/maintenance over time

## MAJOR UTILITY FACILITIES



Wind power  
In Ohio



### Wind Energy: >5 MW

- 75-300 feet high
- Wisconsin, 129 MW farm
- Colorado, 300'



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### Utility Scale Solar

- DeSoto Florida, 25 MW, 180 acres
- New 10.8 MW, 83 ac proposed for Ohio (Sandusky) – and several more

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### Biomass – Ethanol

- Owego, NY (wood)
- Fostoria, OH (corn)



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### Biomass – Pellets

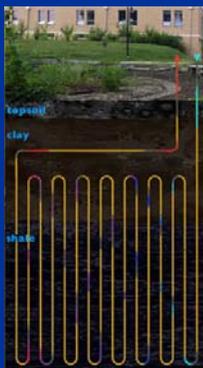
- Florida plant: trees, grass, sawdust
- California wood chip plant



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### Geothermal Energy



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### Geothermal – Utility Scale



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### Methane

- Columbus landfill generation, gas-fired turbines



### Waste to Energy

- Worcester, MA: 2000 tons of garbage a day
- Austin Texas: sewage waste, composting, methane



Expansion and adaptation  
Of the "grid"  
(electric and gas)  
To accommodate new  
needs and technologies



## Who Regulates Major Utility Facilities? Ohio Power Siting Board

- Wind > 5 MW
- Other facilities >50 MW
- Electric Transmission lines > 125 kV
- Gas/natural gas transmission lines 125 lbs/square inch
- Grants certificate of environmental compatibility and public need before construction can begin

## OPSB: The Siting Process

- Pre-application conference
- Public information meeting
- Application – 60 days
- Staff Report
- Public hearings
- Board Decision – 8 statutory criteria
- Rehearings and Appeals

## Major Utility Facilities: Issues

- Protection of sensitive uses (historic, scenic)
- Wind – can protect open space
- Access/use of roads
- Aesthetics – buffer or barrier wall
- Storm water management
- Noise, nuisance, smell – conflicts with residential uses

## Major Utility Facilities: What Communities Should Do

- Know your rights and responsibilities under OPSB regulation – wind: HB 562
- Greatest Influence: Land Use and Siting
- Develop relationships with developers: know what's coming
- Do your own planning: know what you want (location, setbacks, aesthetics)
- Attend OPSB meetings and testify, provide written comments
- Facilitate community outreach and citizen education – host public meetings
- Stay informed about new technologies and plans

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## COMMERCIAL SCALE FACILITIES



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### Wind, Commercial scale

- 18 kW, Columbus farm
- 8 kW, CSU building-top
- (2) 300 ft = (15) 75 ft = under 5 MW

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### Solar panels, commercial scale

- Detroit-Edison, Ann Arbor: 55 kW
- University of Texas, 7 kW
- Oberlin College, 160 kW (4682 sf)
- height not usually an issue

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### Geothermal – commercial scale

- Below-grade wellhead, Woodward Opera, Mt. Vernon (open loop, water)
- 4H Center, OSU campus (closed loop, glycol)
- Wellhead, University of Idaho, space heating



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### Commercial Biomass pellet mill, 55 kW

- indoor or outdoor

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**Pulling it all together – Melink Corporation, Milford, OH**

- 31,000 sf building
- 27 geothermal wells
- solar panels, screening, daylighting
- wind turbine
- sensor-driven lighting – water conservation - composting



**Oberlin College Lewis Center**



- Up to 113% energy coverage
- 160 kw solar panels – building and parking lot cover
- Geothermal heat system (closed loop) – radiant floor heating
- 50-60% heat recovery from exhaust
- Passive energy use reduction – windows, low use lighting, insulation, daylighting
- Living machine for wastewater – recycled water to toilets/landscape
- Low water use landscape – native plants

**RESIDENTIAL FACILITIES**



**Residential/small scale wind**



- wind turbine, Bowling Green, 2.4 kW
- Aermotor water pump, used mostly in farm applications, some electrical generation

**Solar, Photovoltaic (PV)**



- Maine, 4.25 kW
- Deer Valley Homes, Monclova, 1.8 kW, solar shingle
- "net metering"

### Solar, Hot Water

- can supply about 70% of hot water energy needs
- used for hot water, space heating, pool heating



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### Geothermal, residential



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### Biomass pellets

- Residential burner
- Small pellet mill



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### Residential Corn Burner

- Bowling Green



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## Commercial/Residential Facilities: General Issues

- Uses, conflicts with adjacent uses
- Weigh size, space, etc. vs. loss of the business
- Structural integrity/building code adaptation
- Design and aesthetics
- Homeowners Associations: prohibitions, maintenance
- Trees/ development –legal right to solar access
- Address noise, dust, smells, traffic within reasonable levels for each industry

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## Issues - Wind

- Coordinate with FAA requirements
- Setbacks - one parcel only – 1.1x height setback
- Structural integrity – torque worse than fall
- Noise - improving technology - setbacks help
- Ice throw – weight falls down rather than out – setbacks help also
- “Flicker” – setbacks help – improving technology
- Birds – no indication of worse than windows/predators – bats may be a bigger issue, research continues
- Maintenance and dismantling

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## Issues - Solar

- Avoiding clutter in residential areas – roof only?
- Rights to solar access (trees)
- Allow equal use by all home orientations
- Height above roof
- Ground mounted: (commercial) – screening, setbacks

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## Issues – Geothermal

- Closed vs. open loop systems
- Ground source heat systems in public waters
- Setbacks/water drawdown
- No encroachment on public ROWs and easements
- Mechanical equipment: screening

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## Issues - Biomass

- Pellet/briquette creation vs. use
- Outdoor storage and storm water protection
- Screening/aesthetics for storage
- 75% biomass produced onsite – agricultural use
- Air quality/noise – production/processing/use
- Sale of materials?

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## What Should Communities Do?

- Know the law
- Update zoning and building codes
- Consider waiving fees, and other incentives – at least, be consistent
- Train staff on new technologies
- Plan ahead so you know what you want
- Develop relationships, know what's coming
- Educate the public – identify model projects
- Facilitate dialogue between property owners
- Be aware of related issues: storage, dismantling, maintenance, ownership

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## Funding

- Best Resource: Green Energy Ohio  
[www.greenergyohio.org](http://www.greenergyohio.org), look under “resources”
- Ohio HB 1 – allows municipalities/townships to set up SIDs to facilitate financing assistance to property owners for solar energy (via assessment)
- ARRA – ongoing proposals –  
[www.recovery.ohio.gov](http://www.recovery.ohio.gov)

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## Zoning for Renewable Energy

(Thanks to Kris Hopkins, Cuyahoga County Planning, for this material)

**GOAL: Develop regulations that enable renewable energy projects to proceed without undue delay**

“The lack of a clear understanding or awareness on the part of local governments about the impacts of distributed renewable energy systems, and the appropriate mechanisms for evaluating them, results in a large disparity in permitting requirements across jurisdictions and inhibits the use of these technologies from becoming more widespread.”

Source: *Taking the Red Tape out of Green Power*

## General Recommendations

- Avoid disincentives: fees, conditional uses, prohibited locations
- Be consistent: fees, fencing requirements, removal bonds, sign/voltage notices
- Coordinate with FAA requirements
- Avoid “blend in with the environment”
- Update list of permitted uses
- Consider renewable energy overlay zones

## Enact Appropriate Standards

- Different standards needed for different scales and industries
- Respond to fears about rare/historical issues (such as avian impacts, interference radio signals, ice throw)
- Adopt appropriate design guidelines and performance standards to mitigate potential impacts
- Preapprove certain types of small wind turbine models (and others)
- Ensure local inspectors have necessary training to properly evaluate proposed installations.

## Small Wind: Land Use Designation

Designation	Application
<b>Accessory Uses</b> (in association with principal use)	Requires Small wind to be associated with a principal use on the site, ensures it is secondary to principal use
<b>Permitted by Right</b>	Small systems in rural areas with sufficient setbacks
<b>Conditional Use</b>	Commercial-scale, urban locations
<b>Overlay Zone</b>	Permit by right in O Zone, conditional use outside O Zone, used where Overlay Zone area does not correspond to Use district boundaries

\* Logan, Union, Champaign County RPC model exempts small wind for agricultural uses

## Conditional Use

- Use rigorous conditional use process only in areas where potential for impacts are greatest
- Requires Public Hearing
- Creates opportunity for neighbors to comment
- Appropriate for commercial-scale and in denser settings that require careful attention to potential negative impacts on neighbors

## Economically Viable

- If you’re going to permit alternative energy systems, make sure the regulations allow systems that are economically viable.
- Tall towers enable turbines to access faster and better quality winds.
- Typical zoning obstacles:
  - Excessive setback requirements
  - Onerous height restrictions

## Protect Against Potential Nuisance Impacts

- Noise
- Safety Concerns
- Aesthetics

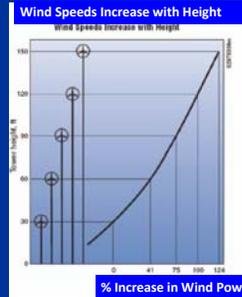
Do not compromise function

- Visibility / height most contentious
- Need to be above surrounding obstructions
- No evidence that property values decline with turbines visible to neighboring properties

## Small Wind Regulations Design and Performance Standards

Community	Designation	Max Ht	Setback	Sound	Min. Lot Size
LUC OH Model	Permitted Use	125 ft	1.1 times turbine Ht	Will match PUCO rules	None
Franklin Co OH	Conditional Use	200 ft	1.1 times turbine Ht	55 dBA at nearest PL	None
Hamilton Co OH		100 ft		62 dBA between 10 pm & 7 am	
AWEA Model	Accessory Use when in compliance with standards	None – instead regulated by setback	Equal to Turbine Ht, closer with permission from neighbor	Not to exceed "nuisance level"	None
Ohio > 5MW (for Comparison)	NA	None	1.1 times turbine Ht & 750 ft from dwellings		None

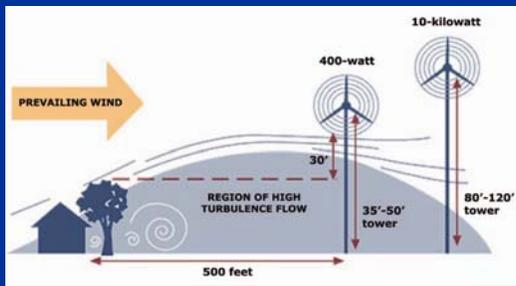
## Determining the Right Height to Permit



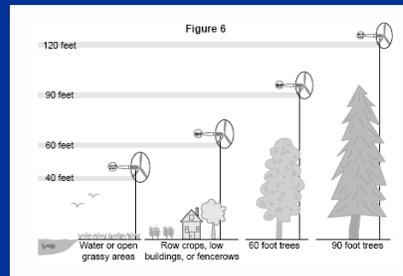
Small increases in wind speed result in exponentially more energy the turbine can generate.

In the Public Interest, American Wind Energy

## Determining the Right Height to Permit



## Determining the Right Height to Permit



Source: Site Analysis for Wind Generators, Mick Sagrillo Jun/Aul 1994 HomePower Magazine [http://www.homepower.com/article/?file=HP41\\_pg60\\_Sagrillo](http://www.homepower.com/article/?file=HP41_pg60_Sagrillo)

## Determining the Right Height to Permit

- Comparison of Tower Height compared to Energy Output for a 10kW residential-scale turbine

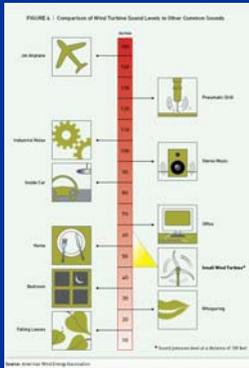
Tower Height (Ht) (feet)	Wind Speed (mph)	kWh/ year	System Cost	Incremental Cost from 60 ft Ht	Incremental energy output from 60 ft Ht	Incremental energy + incremental cost = ROI*
60	7.3	2,709	\$48,665	---	---	---
80	9.3	6,136	\$49,841	2.4% (\$1,176)	226%	226% + 2.4% = 94 to 1 ROI
100	10.7	9,338	\$51,346	5.5% (\$2,681)	344%	344% + 5.5% = 63 to 1 ROI

\* = Return on Investment

Source: Mick Sagrillo, AWEA Wind letter, January 2006.

## Setbacks

- Needed for safety and noise
- Safety – properly installed wind turbines designed to not fall down
- Require small wind systems to shut down automatically during power outage
- Ice throw – typically weights down blades - ice drops from blade, not thrown



## Sound

- Sound impacts of small wind – negligible – sound only from blades moving through air
- Setbacks and taller towers add distance between dwellings & turbine
- Utility-scale – noise created from connection to high speed transmission lines

## Visual Impact

### Matter of Perception

- Visual blight that impacts character of surrounding community
- Symbol of progress and environmental responsibility

## Conduct site plan review

### Elements to be included on site plan:

- Location and approximate height of all existing buildings, roads, and overhead utility lines on site and within 500 ft, (specifying distance from facility to each structure)
- Existing tree cover, including average height on and within 500 ft
- Location of proposed tower, foundations and other components

## Conduct site plan review

### Other Documents required:

- Foundation blueprints – prepared by PE
- Tower blueprints – prepared by PE
- Diagram of electrical components and interconnection methods
- Maintenance plan

## Resources

- **Taking the Red Tape out of Green Power: How to Overcome Permitting Obstacles to Small Scale Distributed Renewable Energy**, Network for New Energy Choices, 2008.
- **In the Public Interest: How and Why to Permit Small Wind Systems**, A Guide for State and Local Governments, American Wind Energy Association, 2008.



## Solar Energy: Recommendations

- Most ordinances regulate as an accessory use
- Most codes don't allow freestanding in residential areas (roof is better)
- Allow all orientations
- Be aware of solar access (trees/buildings)
- Most codes: 5 feet above roof
- Commercial – ground mounted: screening, setbacks
- Allow on legally nonconforming structures

## Geothermal Energy - Recommendations

- Be aware of ground source heat systems in public waters
- Be aware of water drawdown – setbacks
- Most codes: side and rear yard only
- No encroachment on public ROWs and easements
- Mechanical equipment: screening

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## Example Codes

- Logan-Union-Champaign Regional Planning Commission: Small Wind
- Woodbury, Minnesota: Combined wind, solar, geothermal
- American Wind Energy Association: Wind
- Santa Monica, CA: solar
- Fort Collins, CO: solar

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## More Resources

- Green Energy Ohio  
[greenenergyohio.org](http://greenenergyohio.org)
- Ohio Wind Working Group  
[ohiowind.org](http://ohiowind.org)
- Ohio Public Utilities Commission ( and Ohio Power Siting Board)  
[pucso.ohio.gov](http://pucso.ohio.gov)
- American Wind Energy Association  
[awea.org](http://awea.org)

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## Questions?

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