Shaping the Future of Business On Long Island
Solar and Wind Energy
Wednesday, May 11, 2011
NYS Small Business Development Center

Small Wind Technology

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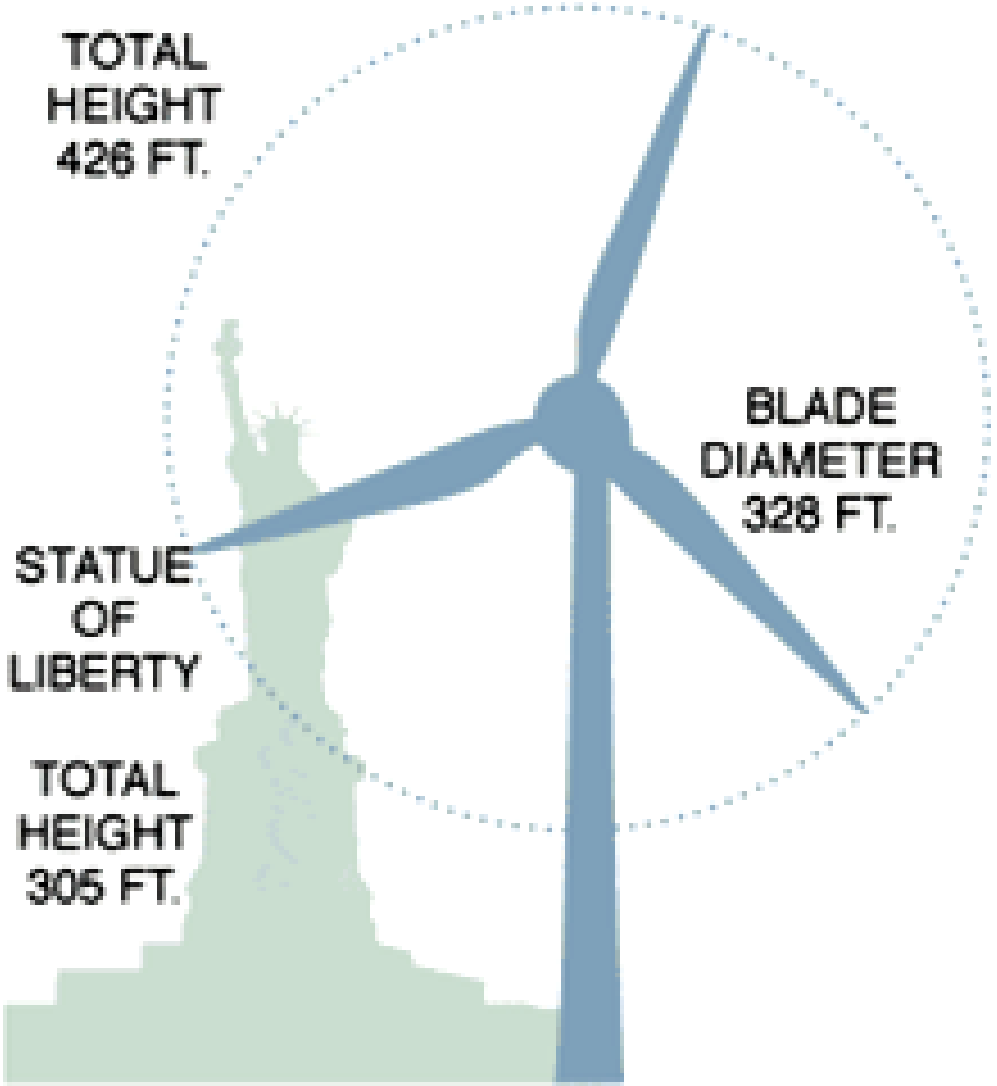
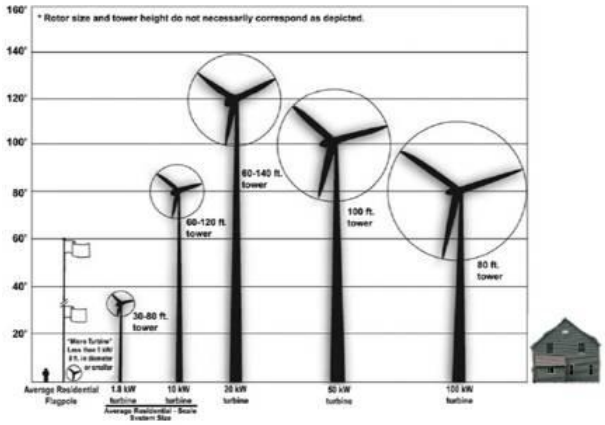
Small v. Utility Scale Turbines





Small Wind Energy Systems

- Typically less than 100 kW capacity
- Rotors diameter 23 inches to 21 feet
- 65 to 120 foot towers
- Suitable for rural farms or residences
- Can operate in areas with Class 2 - 3 wind resources (9.8 – 14.3 mph)

Source: AWEA Permitting Small Wind Turbines Handbook

Small Turbines – Big Myths

Small Wind Turbines

- *"Are Noisy"*
- *"Kill Lots of Birds"*
- *"Will Fall Over"*
- *"Are Ugly But Can Be Screened by Trees"*
- *"Mount on Roofs"*
- *"Power All of Your Home"*

Wind Acceptance & Issues

- **Aesthetic/Nuisance**
  (view, noise, flicker, vibration?)
- **Land Use**
  (open space/vistas, preserved farmland, wetlands, waterfront?)
- **Frequent Flyers** (birds, bats, blades, ice?)
- **Safety** (failing towers, climbers, electrical ?)

Visual Impact

- Depends on height, topography, and direction
- Consistent with rural/agricultural land use features
- Comparable to utility poles, water towers, cellular phone towers
- Weigh property rights and contribution to electricity supply against aesthetic concerns

Tower Types

Lattice

Guyed

Monopole

Tilt-down tower simplifies maintenance access

Some Turbine Models

Bergey BWC Excel

Endurance Windpower S-250

Wind Turbine Ind. Jacobs

Skystream 3.7

Bergey BWC XL.1

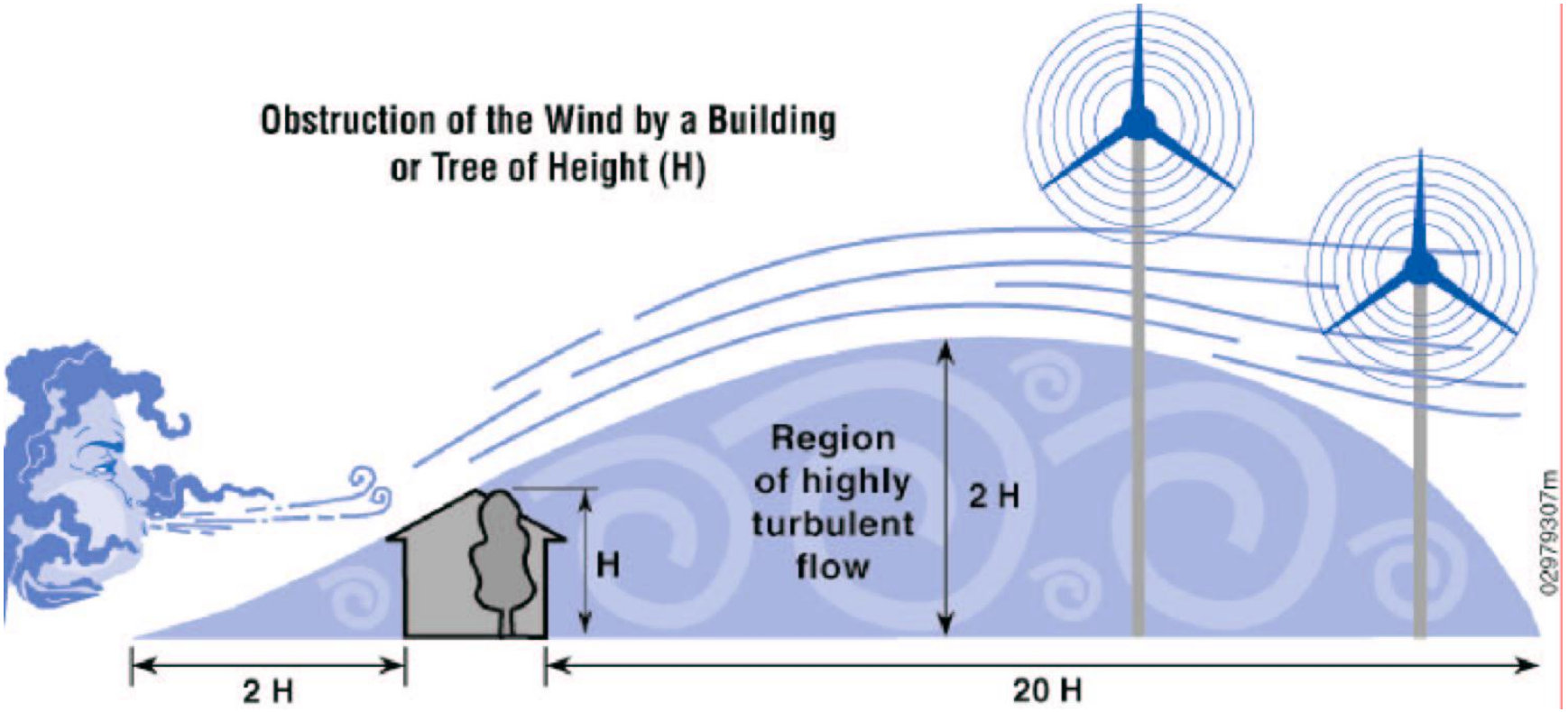
Eoltec Scirocco E 5.6-6

Entegrity EW50

Southwest Whisper 500

See LIpower.org/pdfs/cei/wind/wind-approved.pdf

Wind: Quantity & Quality

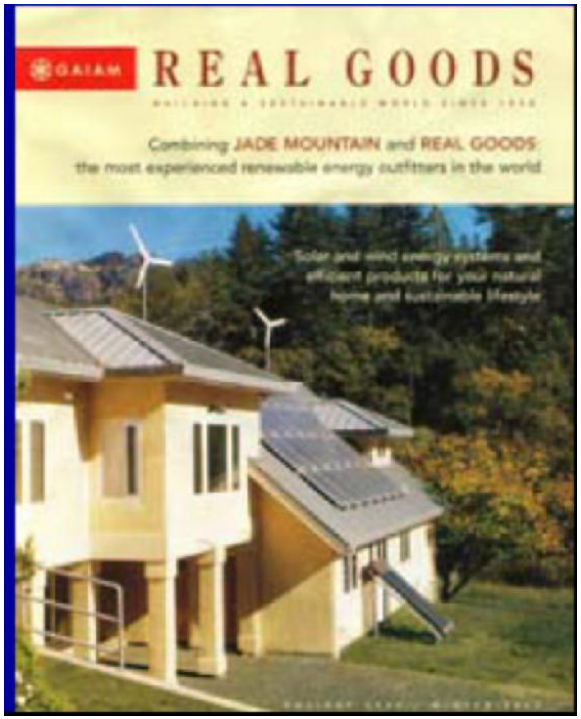


Source: National Renewable Energy Laboratory (NREL)

What Works

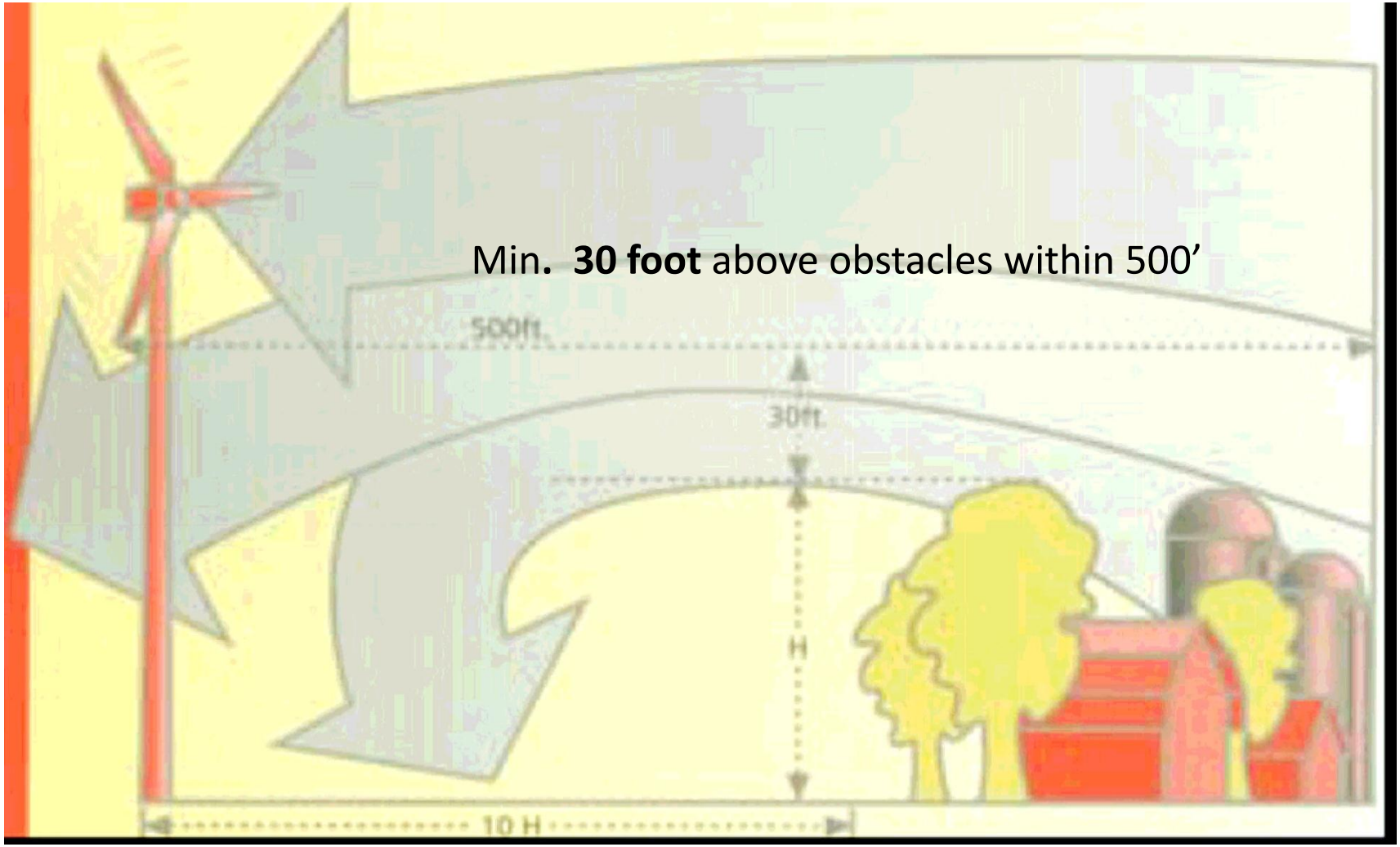
Images courtesy of NYSERDA and Megan Amsler (Cape & Island Self Reliance)

What Does **Not** Work



Images courtesy of Megan Amsler (Cape & Island Self Reliance) and Mick Sagrillo

Rule of Thumb for Tower Height



Slide courtesy of Mick Sagrillo

Noise?

Noise

Modern small wind turbines are typically quieter than most external air conditioners.

Source: In the Public Interest, How and Why to Permit for Small Wind Systems - A Guide for State and Local Governments

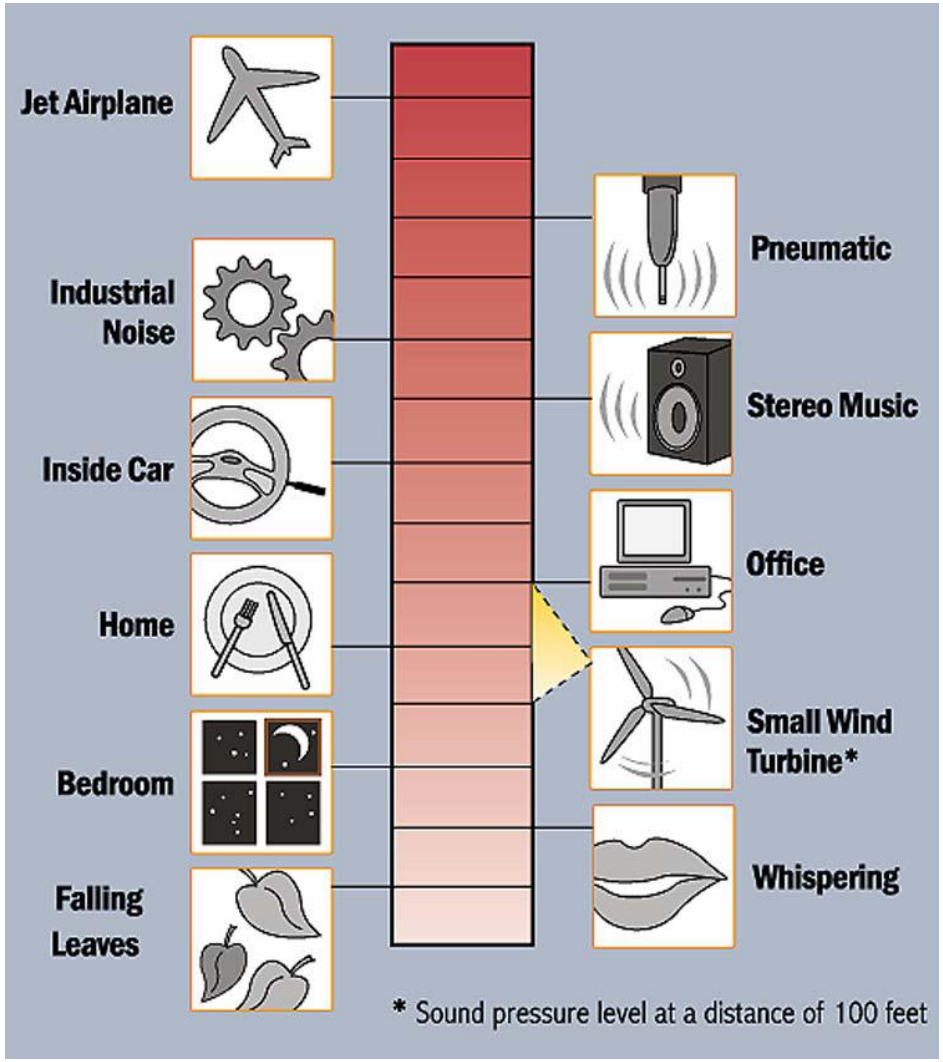
Noise

A clasp hitting a flagpole is far more distinguishable than any sound a small wind turbine makes

Source: In the Public Interest, How and Why to Permit for Small Wind Systems - A Guide for State and Local Governments

Sound or Noise?

- Background noise usually masks wind turbine noise
- Noise reading taken 25 ft from a turbine drops by factor of **four** at 50 ft (by factor of 16 at 1000 ft)



Source: AWEA Permitting Small Wind Turbines Handbook

Sound Study – 10 kW Bergey Wind Generator

Location:	Suisun, CA - Ledgewood Creek Vineyard (July 9, 2001)
Wind Speed:	19 to 24 mph
Wind System:	Bergey 10 kW Excel-S wind generator - 80' tower
Distances:	Sound measured downwind at 20', 50', 100', 150' & 200'
Investigator:	Bernard L. Krause, Ph.D., President, Wild Sanctuary, Inc.

Results:

Distance	Wind Turbine "on"	Wind Turbine "off"
20 ft.	50.1 dBA	45.7 dBA
50 ft.	49.3 dBA	45.8 dBA
100 ft.	46.9 dBA	48.1 dBA
150 ft.	44.2 dBA	44.4 dBA
200 ft.	44.1 dBA	44.3 dBA

Source: AWEA Permitting Small Wind Turbines Handbook

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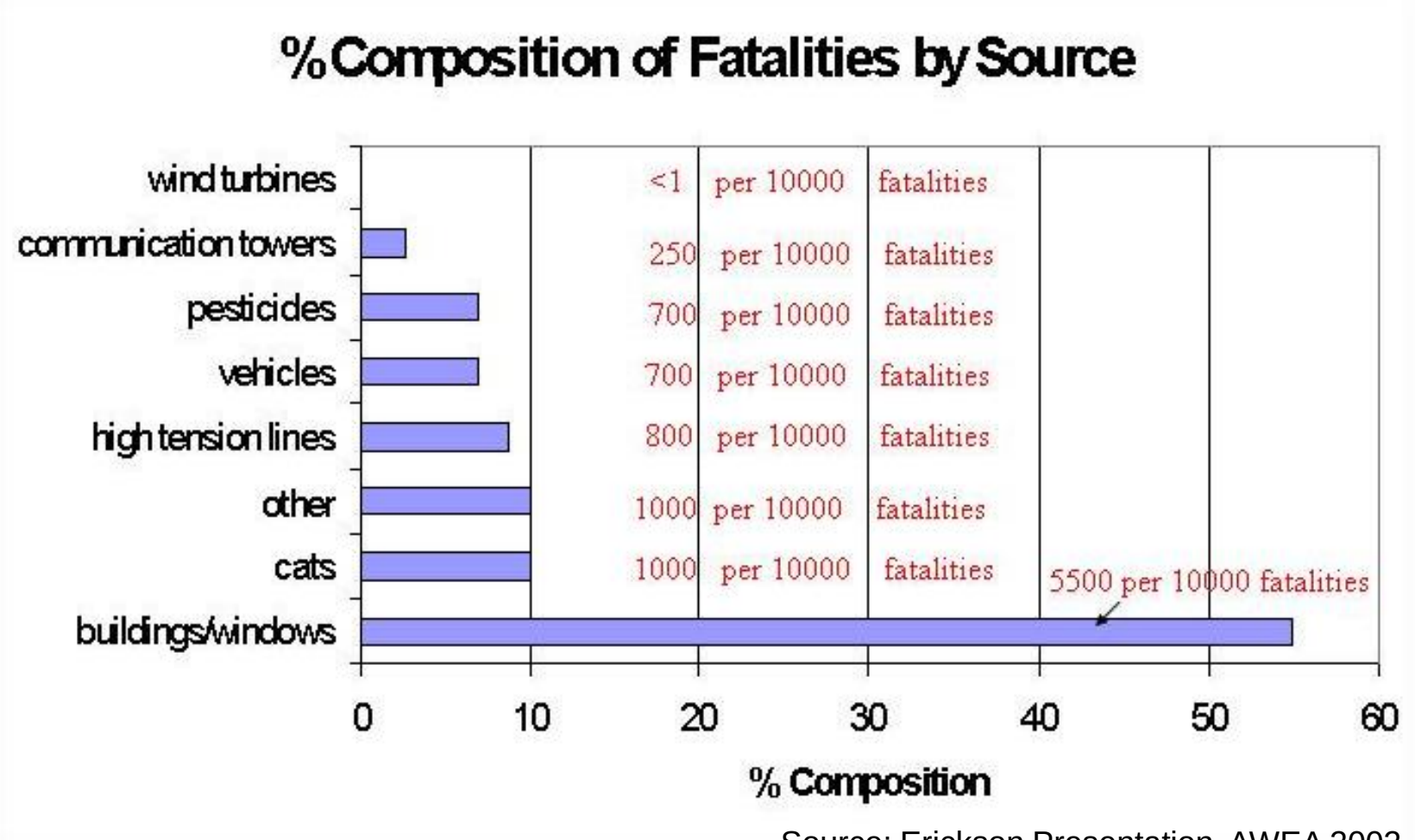
Birds

- Statistically, a sliding-glass door is a greater threat to birds than a small unlighted wind turbine

Source: AWEA Permitting Small Wind Turbines Handbook

Wind Turbines & Bird Fatalities



Source: Erickson Presentation, AWEA 2002

Wind Acceptance & Issues

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Falling Towers?

Climbers?

- Remove climbing foot rungs on the lower 12 feet of a freestanding tower
- For lattice or guyed towers, fasten sheets of metal to the lower part of the tower to cover all hand and foot-holds
- Display "Danger-High Voltage“ signs to the sides of the tower

Source: In the Public Interest, How and Why to Permit for Small Wind Systems - A Guide for State and Local Governments

Non-Issues/Red Herrings

i. Shadow "Flicker"

ii. Fences/Attractive Nuisance

iii. Birds

iv. "Icing"

v. Electrical Signal Interference

vi. Lightning Strikes

vii. Stray Voltage

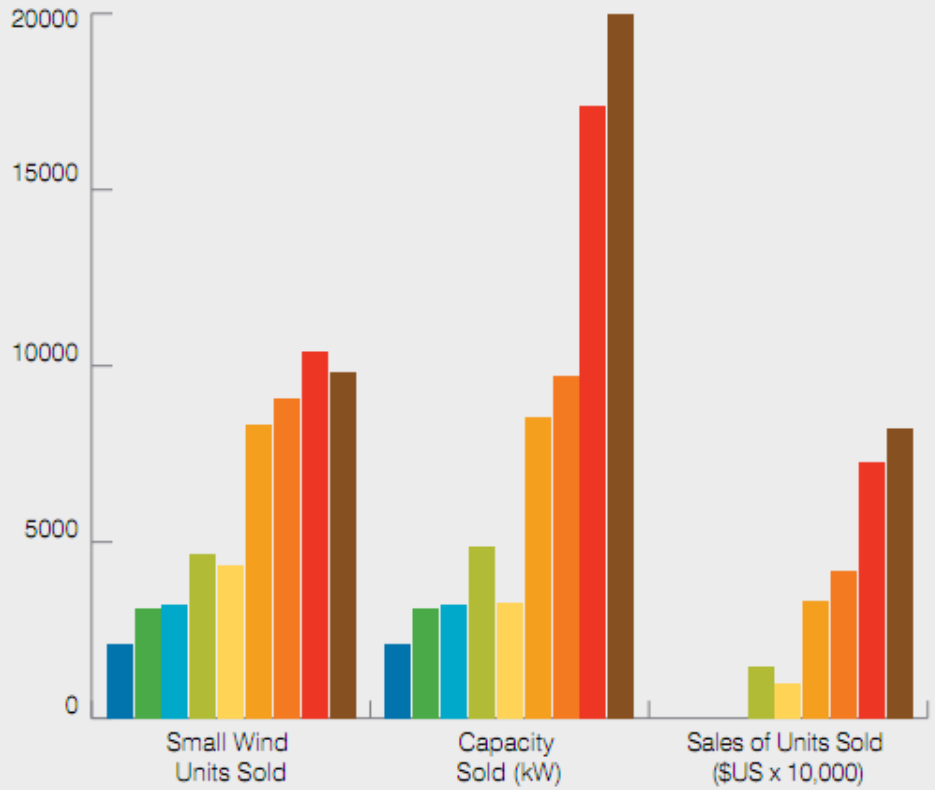
Source: In the Public Interest, How and Why to Permit for Small Wind Systems - A Guide for State and Local Governments

LI Towns with Wind Codes

- Town of Islip
- Town of Riverhead
- Town of Southampton
- Town of Southold
- Town of East Hampton (requiring Town Board vote)

Growth of U.S. Small Wind Market

Fig. 3: GROWTH OF U.S. SMALL WIND MARKET



Year	Units	kW	Sales $US
2001	2,100	2,100	(not avail.)
2002	3,100	3,100	(not avail.)
2003	3,200	3,200	(not avail.)
2004	4,671	4,878	$1,489
2005	4,324	3,285	$990
2006	8,329	8,565	$3,320
2007	9,092	9,737	$4,197
2008	10,386	17,374	$7,266
2009	9,800	20,300	$8,240

http://www.awea.org/documents/2010_AWEA_Small_Wind_Turbine_Global_Market_Study.pdf

“The Sunmill”

Courtesy: Sunergy Europe

Thank You

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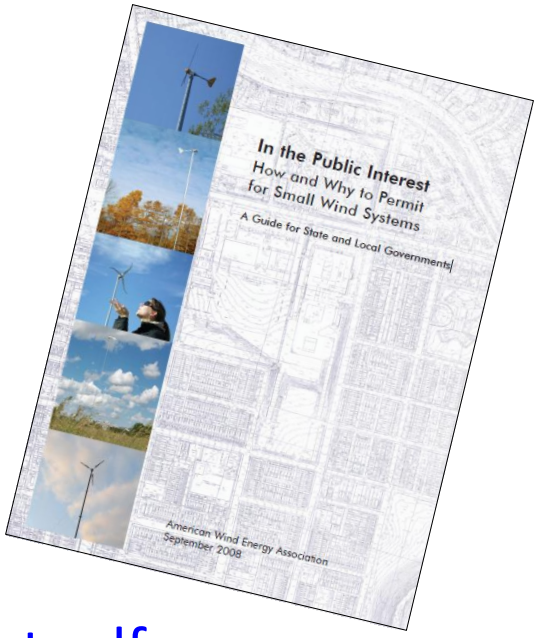
Additional Slides

Best Practices & Resources

AWEA **Guide for State and Local Governments**

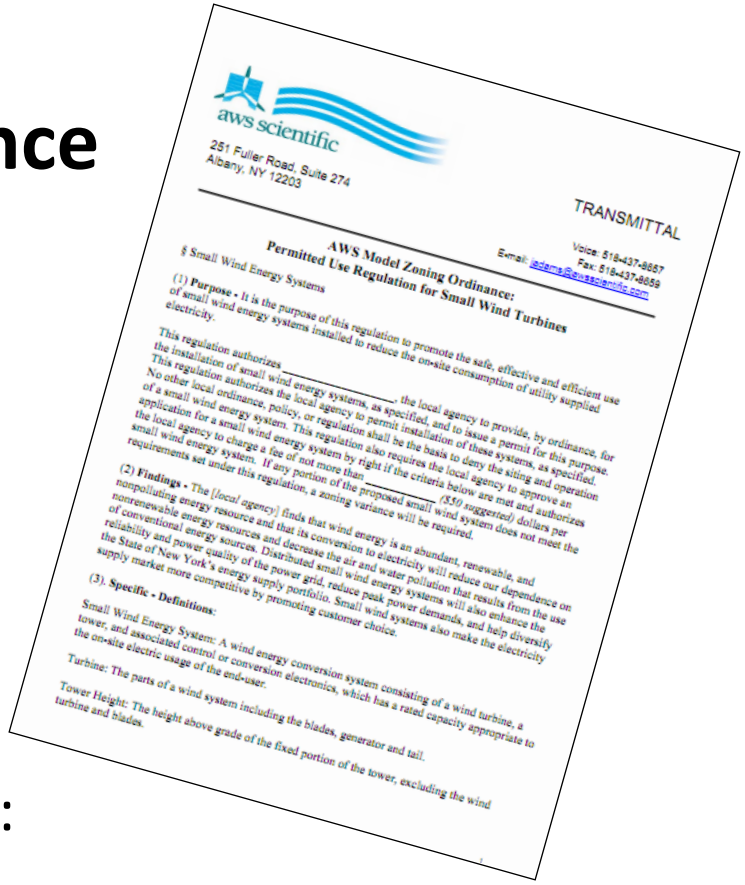
– "In the Public Interest: How and Why to Permit for Small Wind Systems"



www.awea.org/documents/InThePublicInterest.pdf

Best Practices & Resources

- AWS **Model Zoning Ordinance**
  Permitted Use Regulation
  for Small Wind Turbines



aws scientific
251 Fuller Road, Suite 274
Albany, NY 12203

TRANSMITTAL

AWS Model Zoning Ordinance:
Permitted Use Regulation for Small Wind Turbines

§ Small Wind Energy Systems

(1) **Purpose -** It is the purpose of this regulation to promote the safe, effective and efficient use of small wind energy systems installed to reduce the on-site consumption of utility supplied electricity.

This regulation authorizes _____, the local agency to provide, by ordinance, for the installation of small wind energy systems, as specified, and to issue a permit for this purpose. This regulation authorizes the local agency to permit installation of these systems, as specified. No other local ordinance, policy, or regulation shall be the basis to deny the siting and operation of a small wind energy system. This regulation also requires the local agency to approve an application for a small wind energy system by right if the criteria below are met and authorizes the local agency to charge a fee of not more than _____ ($50 suggested) dollars per small wind energy system. If any portion of the proposed small wind system does not meet the requirements set under this regulation, a zoning variance will be required.

(2) **Findings -** The [*local agency*] finds that wind energy is an abundant, renewable, and nonpolluting energy resource and that its conversion to electricity will reduce our dependence on nonrenewable energy resources and decrease the air and water pollution that results from the use of conventional energy sources. Distributed small wind energy systems will also enhance the reliability and power quality of the power grid, reduce peak power demands, and help diversify the State of New York's energy supply portfolio. Small wind systems also make the electricity supply market more competitive by promoting customer choice.

(3). **Specific - Definitions**:

Small Wind Energy System: A wind energy conversion system consisting of a wind turbine, a tower, and associated control or conversion electronics, which has a rated capacity appropriate to the on-site electric usage of the end-user.

Turbine: The parts of a wind system including the blades, generator and tail.

Tower Height: The height above grade of the fixed portion of the tower, excluding the wind turbine and blades.

From NYSERDA PowerNaturally website:

www.powernaturally.org/publications/AWS_Small_Wind_Zoning.pdf

AWS **Model Zoning Ordinance**

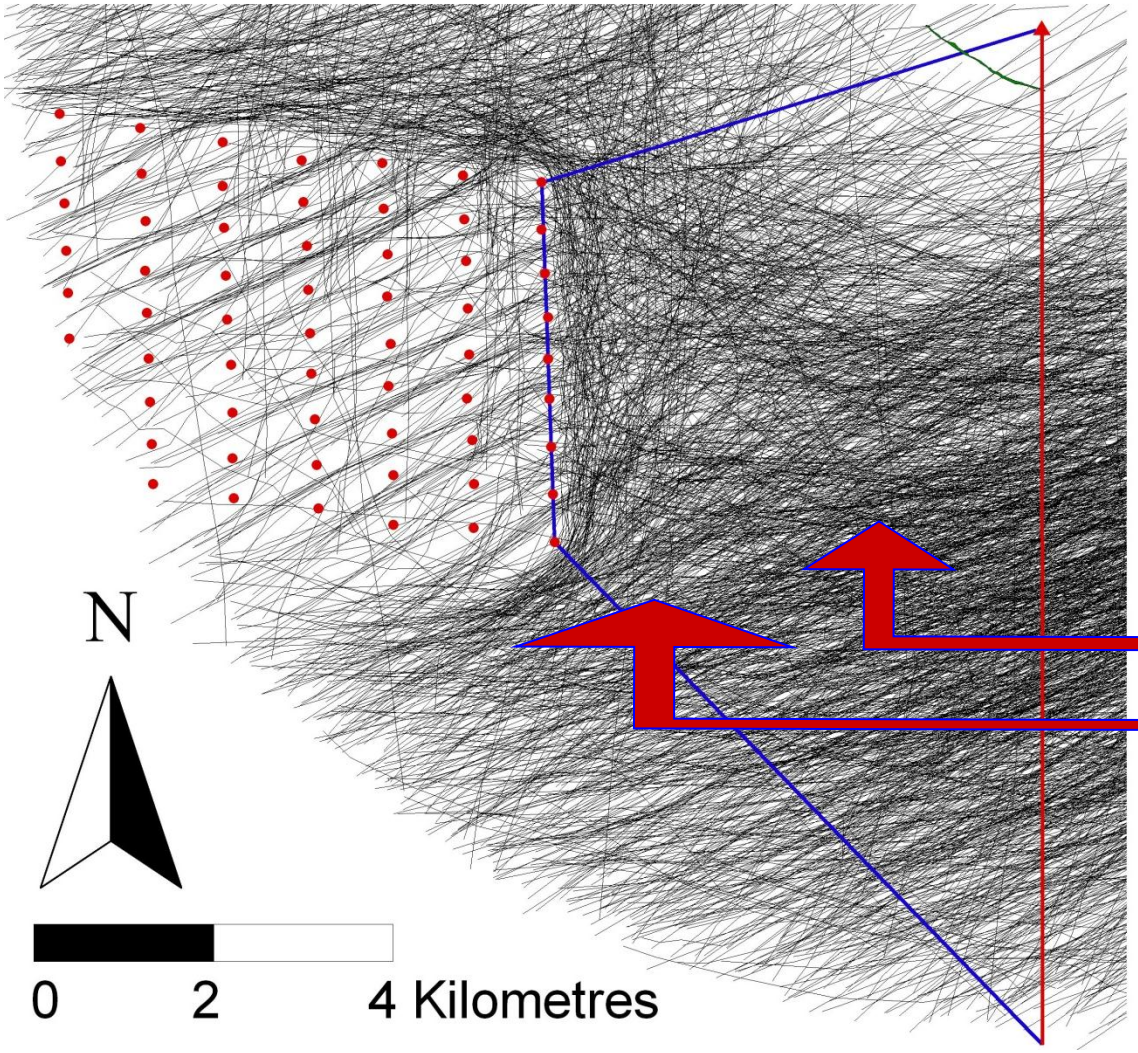
Permitted Use Regulation for Small Wind Turbines

A. **Notice to property owners** within 200 feet
B. **Tower heights <140 feet** on 1 to 5 acres (no limit > 5 acres)
C. **Setbacks = height of the system**
D. Building permit application & line drawing
E. **60 decibels** (dBA) max. at closest neighboring inhabited dwelling

Other Resources

- U.S. DoE database of 79 local/state wind ordinances
  www.windpoweringamerica.gov/policy/ordinances.asp
- NYSERDA Wind Energy Toolkit
  www.powernaturally.org/programs/wind/Wind%20Energy%20Toolkit.pdf
- NYSERDA Wind Energy - Model Ordinance Options
  www.powernaturally.org/programs/wind/toolkit/2_windenergymodel.pdf
- Policies to Promote Small Wind Turbines - A Policy Menu for State and Local Governments (AWEA)
  www.awea.org/documents/Policies_to_Promote_Small_Wind_Turbines.pdf
- Maine Model Wind Energy Facility Ordinance
  www.maine.gov/spo/landuse/docs/ModelWindEnergyFacilityOrdinance.pdf

Horns Rev Radar Study



Operation (2003):

Response distance:

day = c. 3000m

night = c. 1000m

FAA Rules

- **Federal Aviation Administration does not require lighting on towers less than 200 feet tall**
- **Approval only needed for structures more than 200 feet tall or within 10,000-20,000 feet of runways**

Source: AWEA Permitting Small Wind Turbines Handbook

Other Siting Issues

Property Values

- Surrounding property values have **not** been shown to be affected negatively

Electronic Interference

- Small wind turbines do **not** interrupt telecommunications or radio wave transmissions

Frequently Asked Questions

- **TV Interference?** No issue with fiberglass or wood blades
- **Noise?** < 30 mph, soft “swoosh” sound
- **Impact on Birds?** Bird kills are rare, use common sense
- **FAA Regulations?** Contact FAA if within ~3 miles
- **Lightning?** Avoidable with grounding & surge suppressors
- **Ice?** Blades with ice usually don’t spin! Ice typically accumulates at base of tower.
- **Permits?** Check with your town and installer on local laws.
- **Installers?** Visit RenewableEnergyLI.org/windworks.cfm

*Some FAQs courtesy of Trudy Forsyth, NREL

Comparing Small Wind Ordinances

2 Model Ordinances

- AWEA Model
- AWS Model (NYSERDA website)

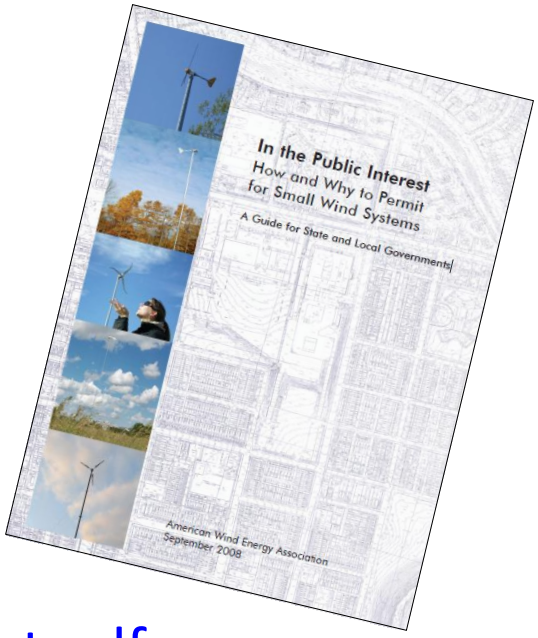
4 Long Island Town Ordinances

- Islip (residential & industrial)
- Riverhead (agricultural)
- Southampton (residential)
- Southold (agricultural)

American Wind Energy Association

AWEA **Guide for State and Local Governments**

– "In the Public Interest: How and Why to Permit for Small Wind Systems"



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Comparing Ordinances by Type

Comparison of Small Wind Ordinances (Model & LI Towns)	AWEA Model	AWS Model	Islip	Riverhead	Southampton	Southold
Type	_					
Permitted Use Permit	No	Yes	No	Yes	No	Yes
Special/Conditional Use Permit	Yes, if not standard	No	No	No	No	No
Accessory Use Permit	Yes	No	Yes	No	Yes	No
Overlay Zone	No	No	No	No	No	No

Comparing Ordinances by …

	AWEA Model	AWS Model	Islip	Riverhead	Southampton	Southold
Zoning Issues						
Zoning Limitation	No	No (if structures allowed)	Resi/Industrial Use; Ind. District	Ag	>R-40 (0.92 acre) & industrial	Ag
Variance required	No	No	No	No	No	No
Public Hearing	No	No, except Variance	No	No	No	No
Definition						
Small Wind Generator	<=100kW	kW appropriate for usage	Not defined	<=110% of demand	<=peak load	<=25kW
Fees						
Building Permit		$50 (suggested)	$15 resi/ $500 industrial	$250		$250

Comparing Ordinances by Standards

Standards	AWEA Model	AWS Model	Islip	Riverhead	Southampton	Southold
Setbacks	1x Total Height	1x Total Height, 10 ft for guy wires	1x Total Height Rear/Side (prohib. Front Yard)	Total Height + 10 ft, 10 ft for guy wires	1x Total Height, 10 ft for guy wires. Prohibited in Req. Yard.	Total Height + 10 ft but min. 100 ft. 300 ft from resi prop. Line. 10 ft for guy wires
Tower Height max.	FAA limits	140 ft; no limit >5 acres	45 ft/42% lot width(70ft/50% industrial use, 156 ft industrial district)	120 ft		120 ft
Lot Size Restrictions	No	>=1 acre	No	>= 7 acres	>=0.92 acres	>= 7 acres
Sound	<=Nuisance dBA	<=60 dBA @ nearest dwelling	<=55 dBA (60 industrial)	<=60 dBA		<=60 dBA
Equipment Approval	State or SWC	No	Yes, NYS & industry cert.			SWC or NYSERDA
Engineered Drawings	Yes	Yes	Yes	Yes	Yes	Yes
Wet Stamped	No	No	Yes(?)	No	Yes(?)	No
Soil Studies on standard soil	Only >20kW	No	No	No	No	No
FAA compliance	Yes	Yes	Yes	Yes	Yes	Yes
NEC compliance drawing	Yes	Yes	Yes	Yes (local code)	No	Yes
Utility Notification required	Yes	Yes	No	Yes	No	Yes
Neighbor Notification required	No	Yes if <200 ft	No	No	No	No
Insurance (>Homeowners policy)	No	No	No	No	No	No
Abandonment Condition	Yes	No	Yes	Yes	No	Yes
Large Sign Prohibition	Yes	No	No	Yes	No	Yes
Illumination (except FAA)	No	No	No	No	No	No
Unauthorized Climbing Prevention	Yes	No	Yes	Yes	Yes	Yes

Thank You

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