

SMALL WIND TECHNOLOGY

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Small Wind Turbine less than 15kW

Designed to Generate Residential Electricity
1-15kW

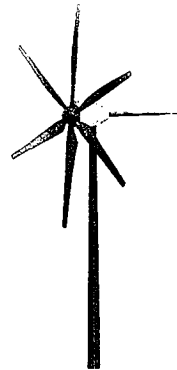
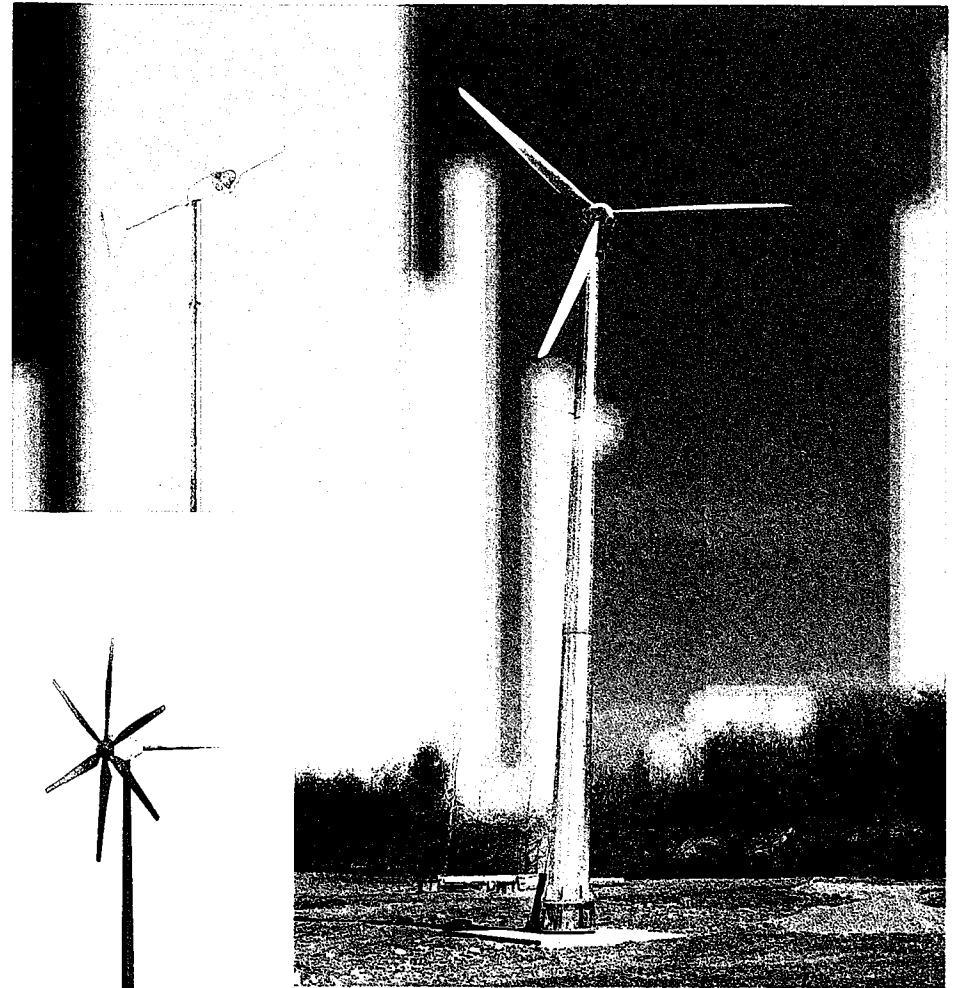
For Home Ownership

Low Visual Impact

Small footprint

No wildlife impact

No Shadow Flicker Impact

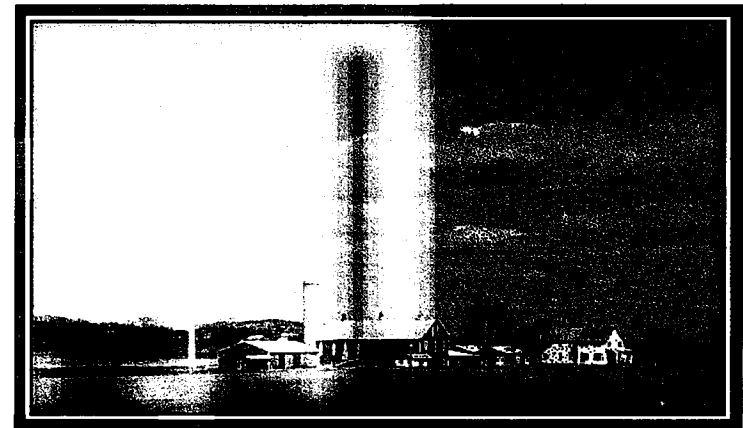
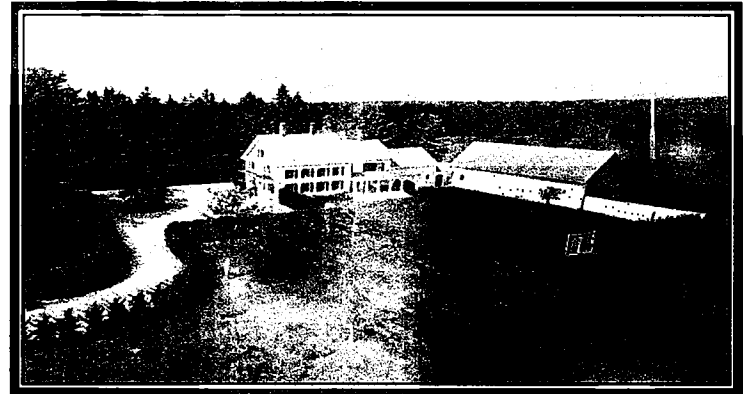


THE VERMONT ENERGY PROGRAMS

THE BEST IN THE USA

Net Metering
Group Metering
Standard Offer

Make your own electricity
Form a group and share a wind turbine
Make Cash from your wind turbine



- Reduce one billion dollars of fossil fuel energy revenues leaving Vermont yearly.
- Stimulate the local economy by making your own distributive energy.
- Address climate change by reducing Vermont's carbon footprint.
- Avoid the cost of additional transmission line infrastructure.

- Make a diversified energy Portfolio... Not just solar PV
- Things Change..... Peak load moving into evening hours.
- Small wind complements Solar PV. Make energy at night.
- Vermont 40% cloud cover. Can't farm under a solar PV Array

Small Wind Turbines Are Not Large Wind Turbines

They have less visual impact

They make less noise than Large Wind Turbines.

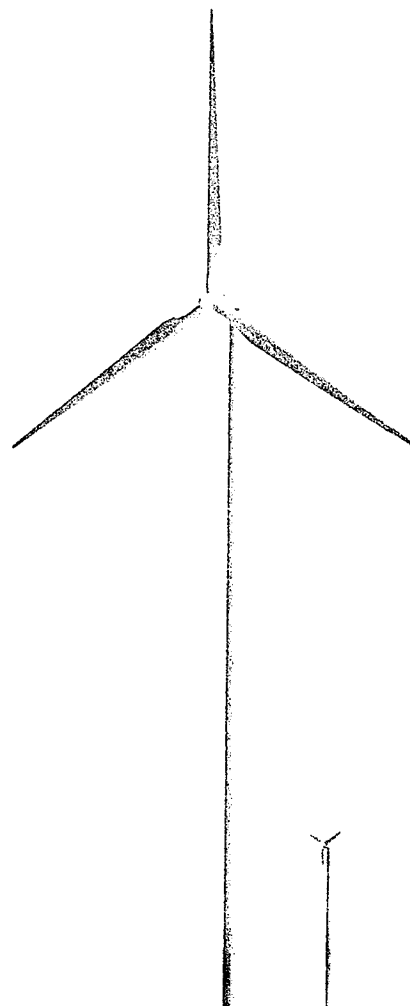
They do not make low frequency and infrasound

They are on shorter towers and have a smaller diameter.

They do not have negative shadow flicker impact.

They do not impact wildlife.

Small Wind benefits the local economy better



Small Wind Turbines Should not be regulated the same as Large Wind Turbines.

In Vermont, the cost of a CPG permit exceeds the cost of a small turbine under 15kW

Incentives for small wind turbines are disappearing

INCENTIVES, GRANTS, REBATES

Before 2013:

1. ITC Federal Tax Rebate: 30%
2. CEDF Incentive 30% approximate
3. Sound regulation None
4. Shadow flicker None
5. Setback Rule None

2018

Zero
Zero
42 dBA Rule 5.700
shadow flicker analysis required.
2 times the top of the blade.

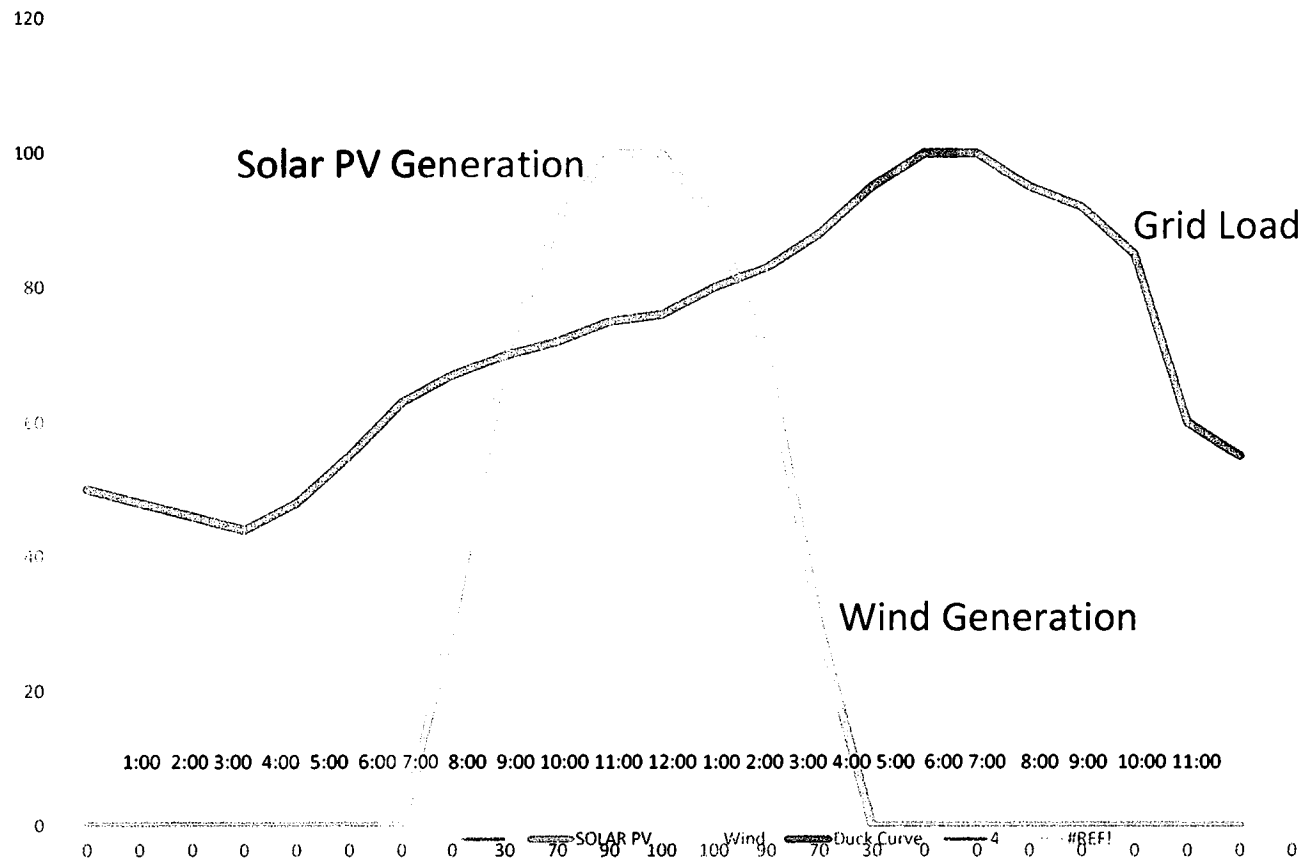
Before 2013: (under 15 kW)

144 small wind turbines permitted

2013-2018: (under 15 kW)

7 small wind turbines permitted

Solar PV Peak Load - Wind Peak Load - Grid Load



CPG Application Time frame

1-15kW Small Wind CPG

45 day Notice	45 days
30 day CPG	30 days
PUC review	30 days
Request for more Info	60 days
Hearing	180 days
Total	345 days
Cost	\$13,000-\$33,000

1-15kW Solar Registration

One Page registration	10 days
Cost:	\$0

CPG Application 45 Day Notice

Rule 5.100 45 day notice (Certified mail)

- a. To all adjoining neighbors
- b. Public Utility Commission
- c. Public Service Department
- d. ANR
- e. Local planning commission
- f. Local select Board
- g. Regional Planning commission
- h. Div. for Historical Preservation
- i. Vermont Agency of Agricultural Food and Markets
- j. Utility Company

CPG Requirements:

Perform the following

\$1200 ANR wetland delineation

\$1200 ANR Vernal pool delineation

ANR fish and wildlife inspection

\$3000 Sound Analysis (Less than 42 dBA max sound)

\$1500 Shadow Flicker Analysis

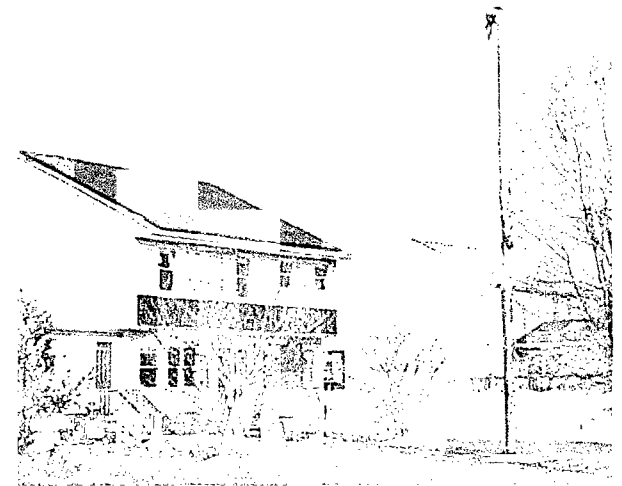
\$3000 Visual Impact analysis

\$3500 Plot plan with drainage plan, calculated permeable and disturbed vegetation areas

Elevation drawings

Road design plan with gravel cross section

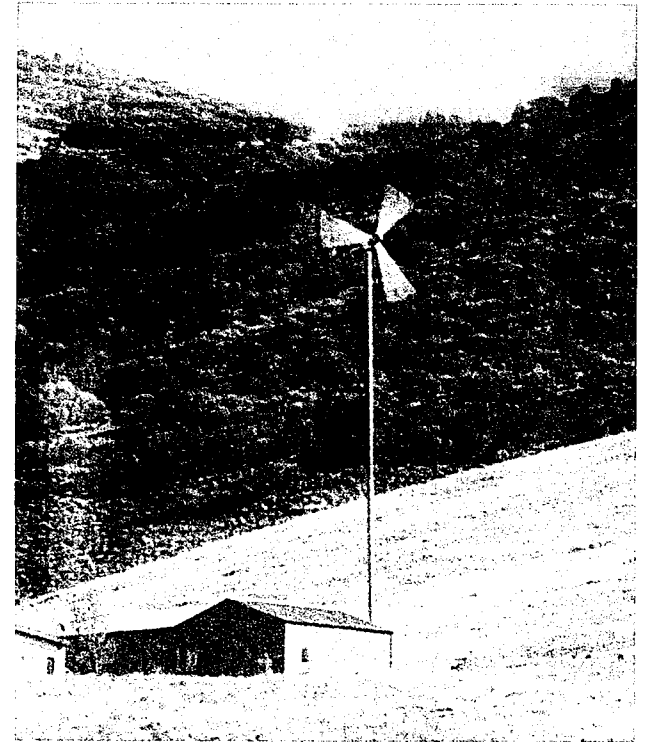
Provide comments and mitigation from and to all parties



CPG Application 30 Days

CPG Application (Certified Mail)

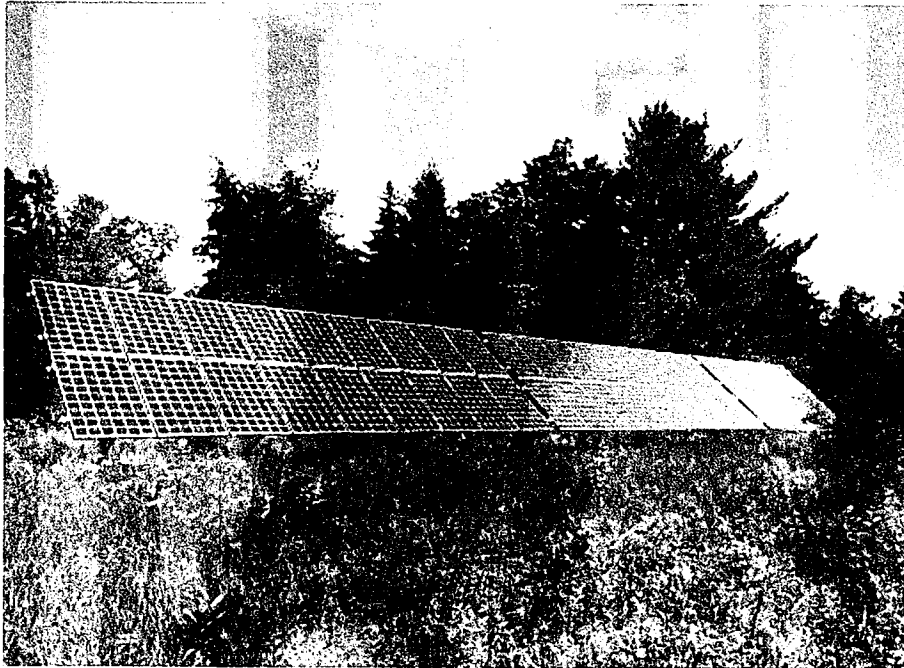
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FOOTPRINT 15kW

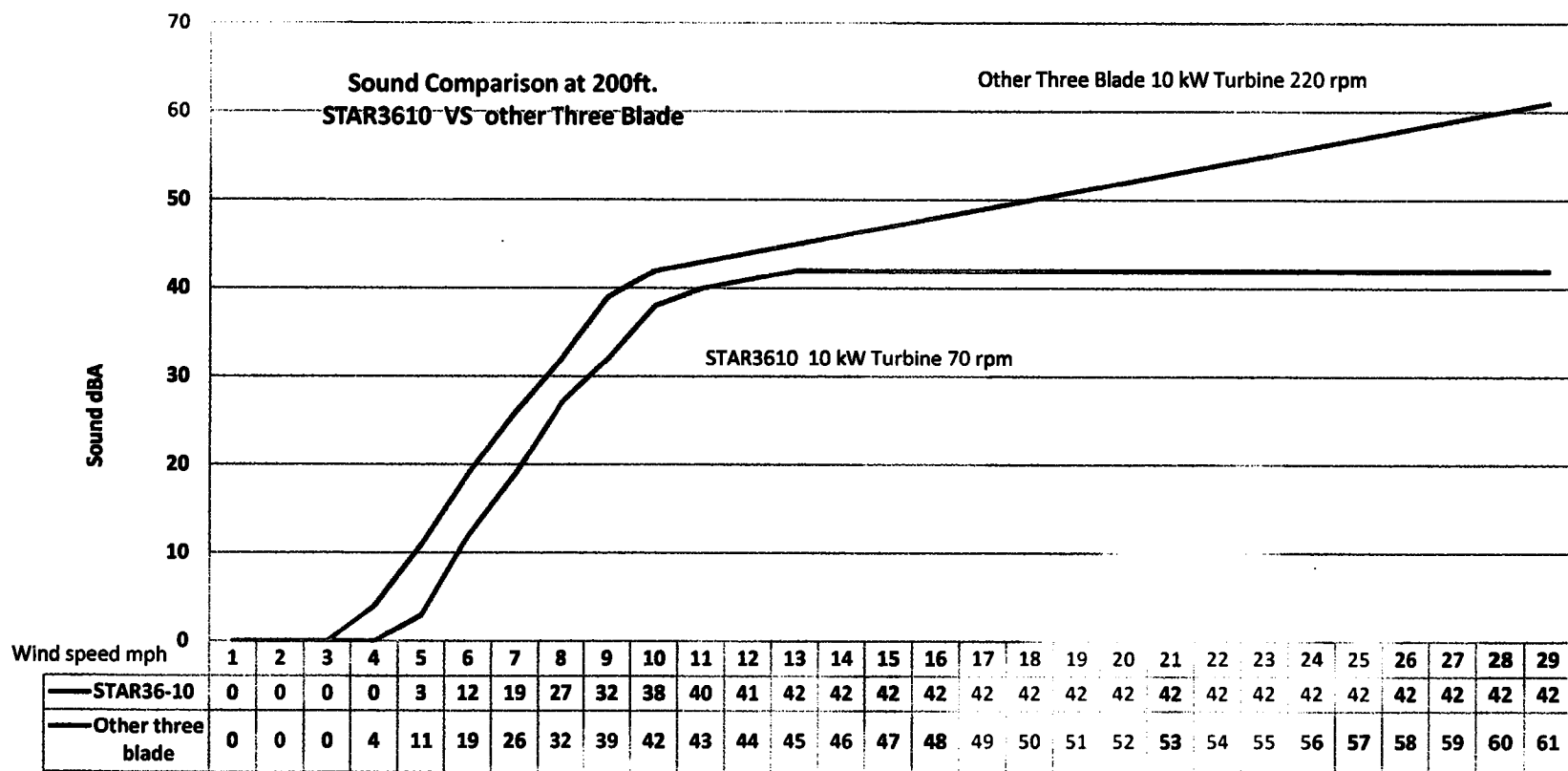
Solar Vs Wind Turbine

15 kW small wind has no more impact to wildlife than a 15 kW solar array

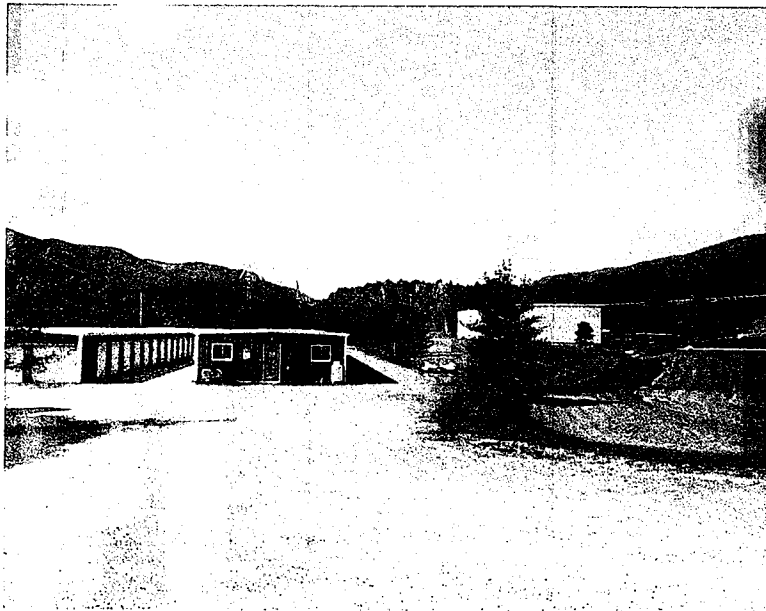


12' x 12' concrete pad
100-130 ft. tall

Low Sound Technology



Visual Impact



VIEW# 1

From Tennis Ave in front of Safe Place Ltd. And CSK Bld.

Siting a Wind Turbine on Your Property

Putting Two Good Things Together: Small Wind Technology & Vermont's Scenic Landscape

Small Wind Turbines

Small wind turbines are designed to be used on individual farms, businesses, and homes. They are typically 10 to 20 feet tall and have a rotor diameter of 10 to 20 feet. They are designed to be used in areas with average wind speeds of 7 to 12 mph. They are a good choice for areas with good wind resources and where the owner is willing to accept the visual impact of the turbine. They are also a good choice for areas where the owner is willing to accept the noise and vibration of the turbine.

The Benefits of Small Wind Turbines

- Provide a source of renewable energy
- Reduce dependence on fossil fuels
- Provide a source of energy that is not subject to market fluctuations
- Provide a source of energy that is not subject to price fluctuations
- Provide a source of energy that is not subject to supply and demand fluctuations

Wind Power: A Vermont Story

Vermont is a leader in the use of wind power. The state has a long history of using wind power for electricity generation. In the 1970s, the state began to use wind power for residential and commercial power. Today, wind power is a major source of electricity in Vermont. The state has a number of wind farms, and the use of wind power is growing rapidly. Wind power is a clean, renewable source of energy that is becoming increasingly important in Vermont's energy mix.

An example of a property that is denied a CPG. The Sound Ordinance is met but the setback rule is exceeded.

Wind Turbine Height	125 ft.
Setback	250 ft.
Property Width	310 ft.
Property	14 Acres
Sound Setback	
35 dBA	1300 ft.
42 dBA	650 ft.
45 dBA	430 ft.



Need a workgroup to discuss what how to fast track 1-15kW small wind turbines . Similar to 10 day registration for solar PV

Per 5.100

- a. Eliminate the 45 day notice for turbines below 15 kW.
- b. Simplify the plot plan requirement. 1.1 x top of blade setback.
- c. No shadow flicker analysis
- d. Provide a simple sound analysis or a pre-approved list of turbines and their setback from residences.
- e. No ANR approval
- f. No Historic Preservation approval
- g. No Agency of Agriculture Food and Market Approval
- h. CPG approval should be 30 days automatic unless there is notification from the PUC



SIMPLIFIED PROCESS

Engineering Terms


For Projects:

- 10 kW or less on single-phase radial service w/inverter
- 25 kW or less on three-phase radial service w/inverter
- 15 kW or less on spot network w/inverter *may apply*
- Inverters must be IEEE 1547 compliant and tested at a national lab

Translation

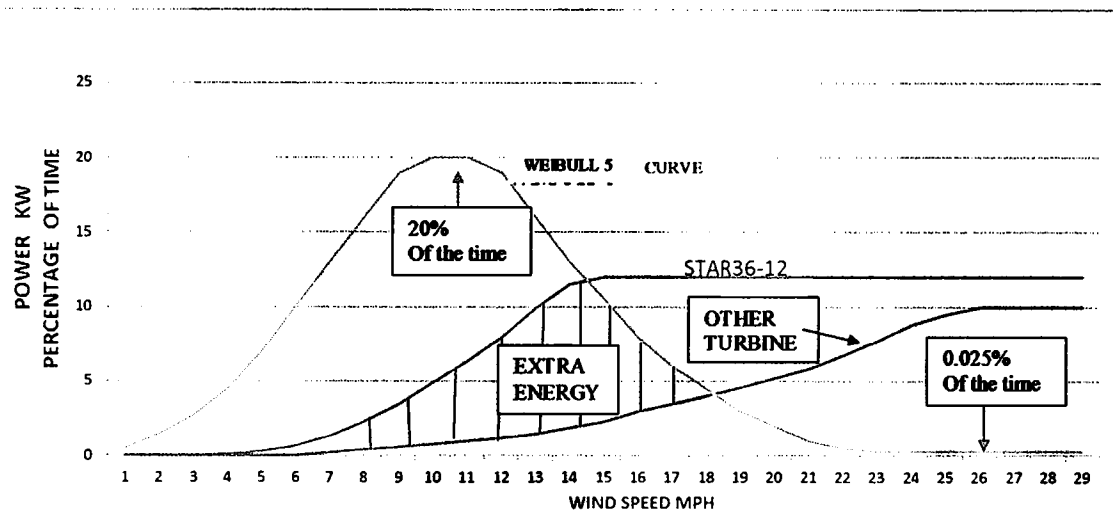
- Applies to small projects (e.g. residential) with approved equipment

Very Quick Process... Normally

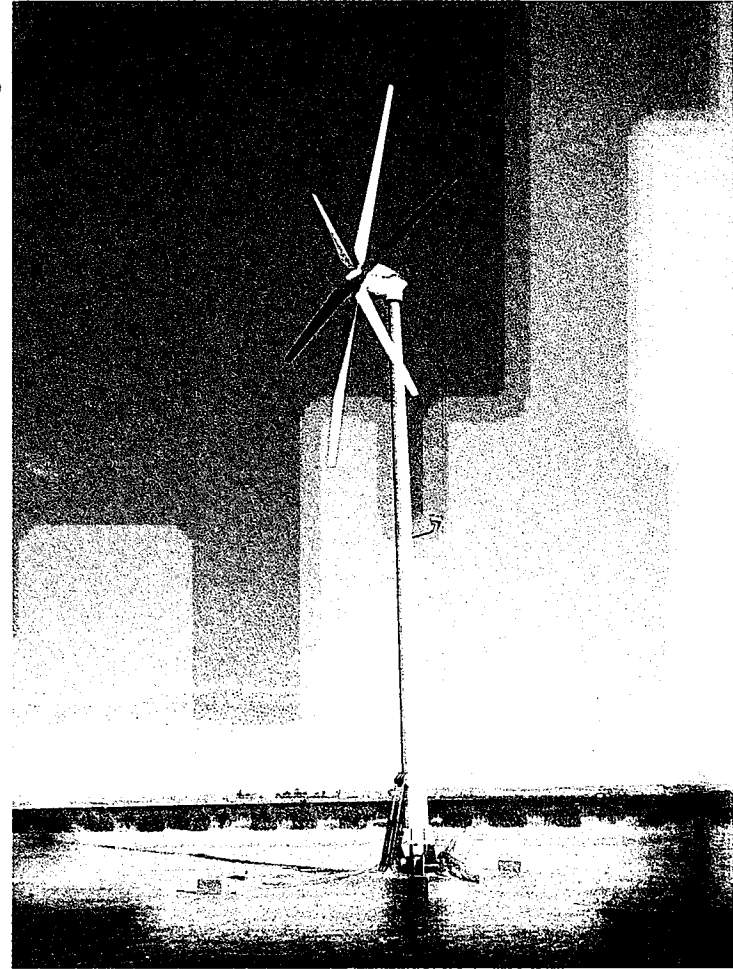
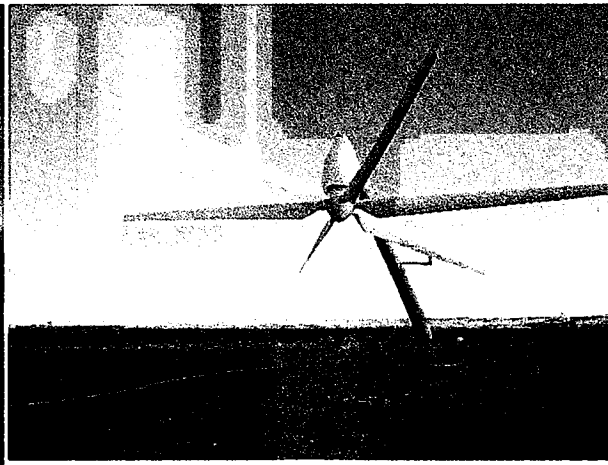
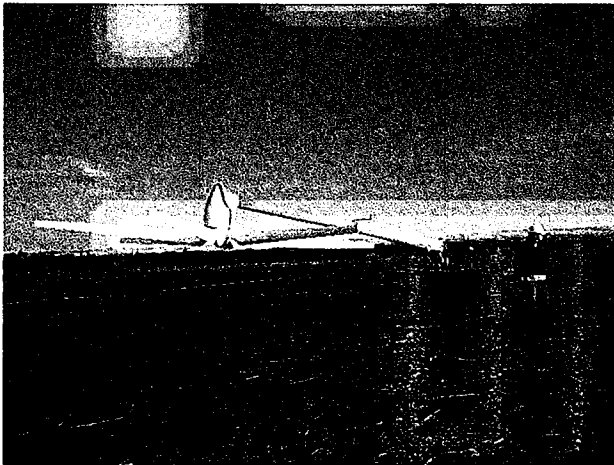
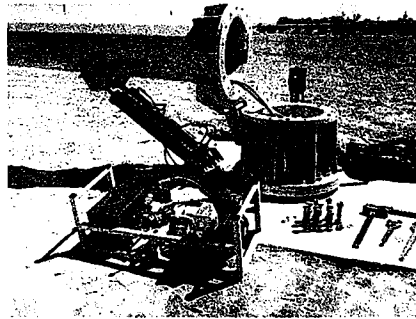
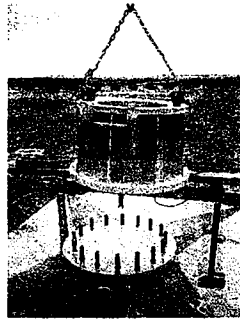
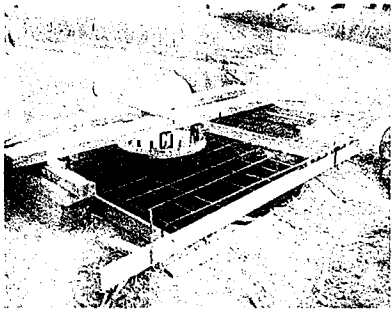
Review Process	Simplified
Eligible Facilities	Listed Small Inverter
Acknowledge receipt of Application	(3 days)
Review Application for completeness	10 days
Complete Review of all screens	10 days
Complete Supplemental Review (if needed)	
Complete Standard Process Initial Review	
Send Follow-on Studies Cost/Agreement	
Complete Impact Study (if needed)	
Complete Detailed Study (if needed)	
Send Executable Agreement (Note 3)	Done
Total Maximum Days (Note 4)	15 days
Notice/ Witness Test	≤ 1 day with 10 day notice or by mutual agreement

Outline
Background
Basics
D.P.U. 11-75

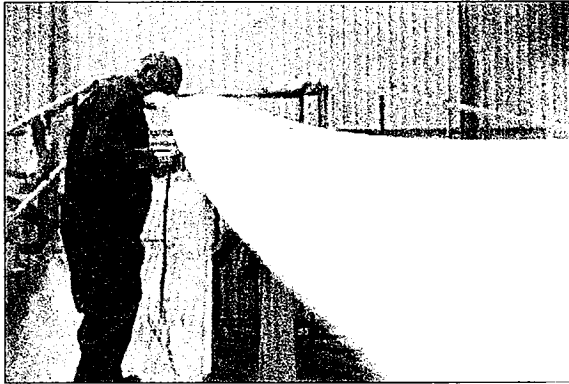
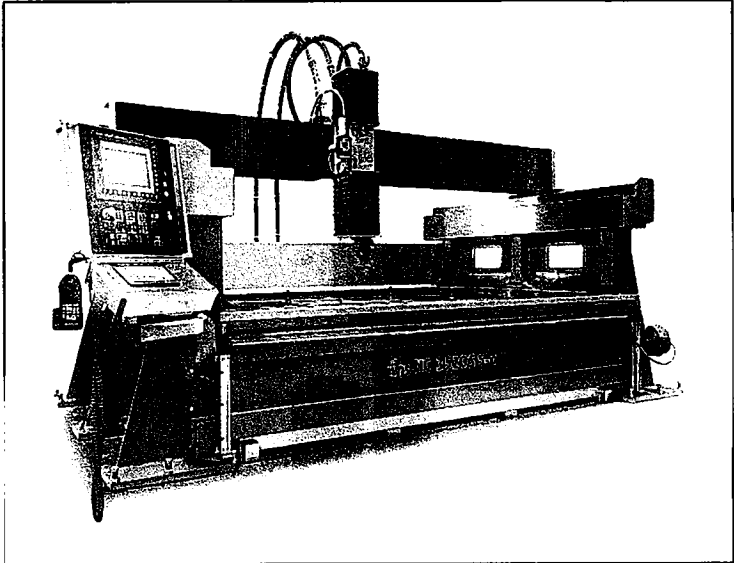
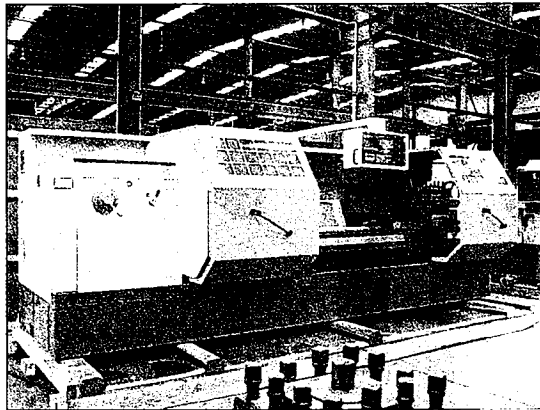
Low Wind Performance Low RPM Generator



Hydraulically Lifting Towers



Made In Vermont





Thank
You