

# Citizens Task Force on Wind Power – Maine

## *Putting Maine’s Wind Power Goals into Perspective*

### Summary

In a very hurried legislative session in 2008, the Maine legislature passed the expedited wind law, with virtually no debate and very little understanding of what the legislation contained. The result is that vast areas of Maine are being transformed today by grossly out of scale and totally unnecessary industrialization in the form of massive turbines and massive transmission, but very little benefit is resulting.

This document examines the primary reason NRCM has backed industrial wind’s proliferation in areas it would otherwise fight to protect – **CO2 displacement**, and attempts to put this in proper perspective. We are not at this time arguing for or against anthropogenic global warming, but are simply demonstrating that NRCM’s rush to see Maine’s cherished landscape littered with 460’ tall wind turbines is wholly ill conceived when one weighs potential benefits against costs.

### Mandated Wind Power Goals Since 2008

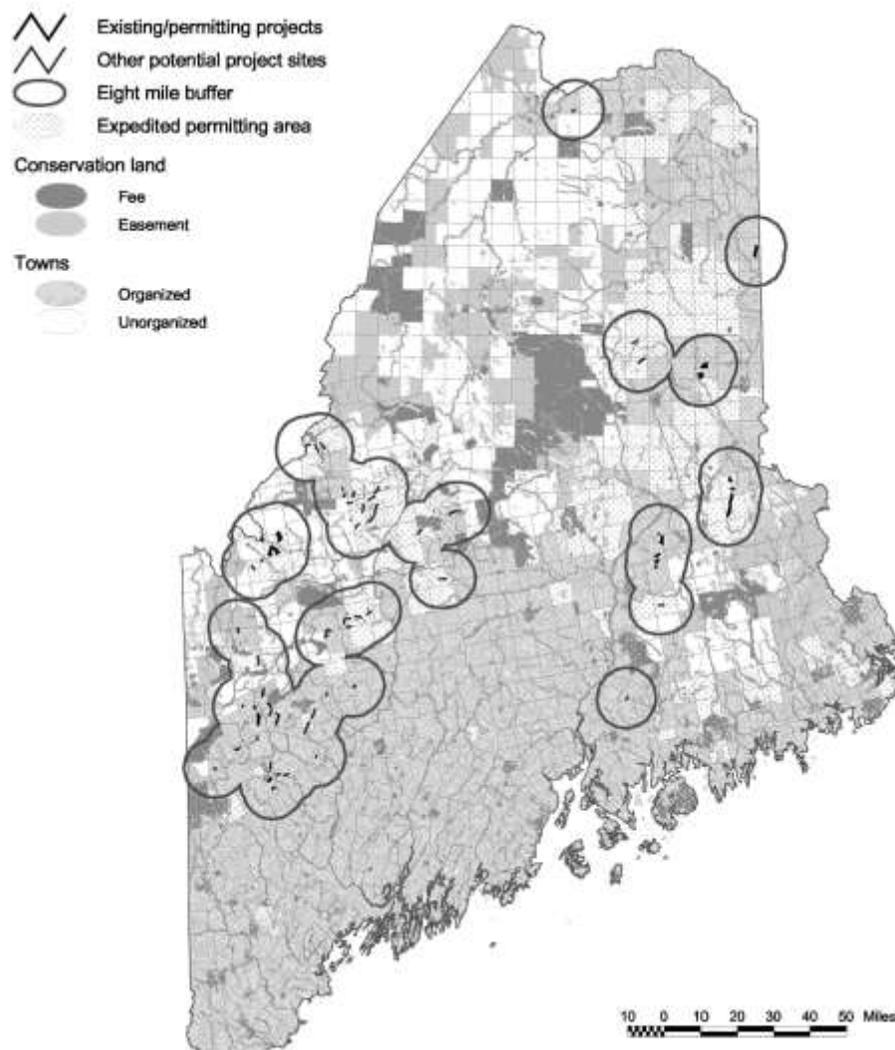
- 2700 nameplate megawatts
  - Equal to 1,800 1.5 MW Turbines
  - 360 miles long at 1/5 of a mile spacing
  - 389’ tall
  - Clearing / Roads equal to thousands of acres
  - Extremely costly and unsightly transmission
  - Herbicides / Siltation
  - Wildlife habitat fragmentation
  - Health effects (sleep disturbance, anxiety, cognitive dysfunction in children) from noise universally observed
  - The tranquility Mainers have sought in remote places has been destroyed; lives turned upside down; dreams shattered
  - Financial devastation to the families living closest to where industrial wind turbines are built - those whose property has been accosted by the turbines cannot live where they are (health and annoyance) but also cannot sell to afford to move away

*“Once the committee passed the wind energy bill on to the full House and Senate, lawmakers there didn’t even debate it. They passed it unanimously and with no discussion. House Majority Leader Hannah Pingree, a Democrat from North Haven, says legislators probably didn’t know how many turbines would be constructed in Maine if the law’s goals were met – the number is likely to be at least 1,000 and perhaps as high as 2,000”. – Maine Center for Public Interest Reporting, August 2010*

# Citizens Task Force on Wind Power – Maine

## *Putting Maine’s Wind Power Goals into Perspective*

### The Map – and it is going to get far worse



*“Maine has more stars than any state east of the Mississippi according to the "World Wide Atlas of Night Sky Brightness." As a result, Maine is increasingly recognized as one of the last places in the U.S. to "still have stars". The state's investments in the capabilities of the Island Astronomy Institute has enabled Maine to emerge as a national leader in the promotion and protection of its newly recognized natural resource”.. – Island Astronomy Institute*  
**(Before the state becomes covered with night flashing wind turbines)**  
<http://www.prweb.com/releases/2011/9/prweb8778366.htm>

- Outlined areas based on accepted impact zones of eight miles; turbines visible at significantly greater distances given mountaintop and ridge top locations
- Viewshed footprint estimated to be 35% of Maine’s area

# Citizens Task Force on Wind Power – Maine

## *Putting Maine’s Wind Power Goals into Perspective*

- Taller turbines will exacerbate footprint
- MANY more projects planned than those shown on map

### Effect on Carbon

- To demonstrate the effect on CO2 levels, we will use NRCM’s “CO2 emissions avoided” data from seven wind farms
- These data will serve as a basis for projecting the emissions avoided at the 2,700 MW goal
- Source URL: [http://www.nrcm.org/maine\\_wind\\_projects.asp](http://www.nrcm.org/maine_wind_projects.asp)

### CO2 Emissions Avoided Projection

- 2,700 MW goal will avoid 3.7 million tons of CO2 emissions annually.
- 763,262 acres of Pine-Fir forest would be required to capture this same amount.

Project	MW	CO2 Tons/Yr	Carbon Equiv Pine Fir Forest Acres
Stetson Ridge	57	90,000	18,556
Beaver Ridge	5	4,425	912
Kibby Mountain	132	201,470	41,539
Oakfield	51	56,000	11,546
Rollins	60	76,000	15,670
Record Hill	55	62,000	12,783
Vinalhaven	5	9,183	1,893
	364	499,078	102,899
2700 MW Projection	2,700	3,701,952	763,262
Index to 7 project base	7.42	7.42	7.42

Source: [http://www.nrcm.org/maine\\_wind\\_projects.asp](http://www.nrcm.org/maine_wind_projects.asp)

In other words, the 2,700 statewide MW envisioned by Maine’s wind law are 7.42 times the MW in our 364 MW sample. Thus, so would be the tons of CO2 avoided and so would be the equivalent number of Pine-Fir forest acres that would perform the same amount of **annual CO2 sequestration** as the turbines – based on a simple straight line projection.

## Citizens Task Force on Wind Power – Maine

### *Putting Maine's Wind Power Goals into Perspective*

Note: See appendix for other similar NRCM figures published recently.

#### How Much is 3.7 Million Tons of CO<sub>2</sub>?

- 3.7 million tons of CO<sub>2</sub> displaced per year – that's a lot!
- But since we normally don't think of air or its gaseous components weighing anything, maybe it just *sounds like* a lot
- So how much *is* 3.7 million tons of CO<sub>2</sub>; how can we put such an abstract number into perspective?

#### Use the Maine Woods as a Point of Reference

- 3.7 million tons of CO<sub>2</sub> avoided represents the carbon capture work of 763,262 acres of forest
- Maine has 17.7 million forested acres \*
- Thus, the CO<sub>2</sub> capture of 360 miles of wind turbines will do the same CO<sub>2</sub> work as only 4.3% of the Maine Woods ( $763,262/17,700,000 = 4.3\%$ ) *Note: New NRCM figures indicate only 3.9%.*
- **Result: Major environmental degradation for very minor CO<sub>2</sub> reduction**

\*<http://www.stateforesters.org/files/2006%20State%20Forestry%20Statistics-Web-Final.pdf>

#### But Actually Even Less Than 4.3%

- Must lower the CO<sub>2</sub> avoided due to:
  - Electricity used by the wind farms from the outside grid\*\*
  - Fossil fuel that would have to be burned to compensate for the line loss given the above average distances between the turbines and the theoretical point of electricity usage in southern New England
  - Any difference between the NRCM emissions calculation and actual emissions avoided based on Maine's actual fuel mix, e.g., hydro and natural gas may have less CO<sub>2</sub> emissions than an NRCM generic factor that may include coal. (NRCM often makes the misleading claim we burn large amounts of coal in Maine when in fact it's less than 2% of the state's electricity production!)
  - The lost forest carbon capture due to the clearing of forests for turbines, roads and transmission lines (*And all the CO<sub>2</sub> from manufacturing and transporting turbines, etc.*)

## Citizens Task Force on Wind Power – Maine

### *Putting Maine's Wind Power Goals into Perspective*

- Fossil fuel combusted for spinning reserve, operating very inefficiently due to skittering -- and incompatibility with the grid; there is no grid-scale electricity storage

\*\*<http://www.aweo.org/windconsumption.html>

#### **Grid Incompatibility**

- The grid must line up in advance sufficient electricity to meet demand, which can be forecasted quite accurately the day before based on weather forecasts, historical usage, etc.
- Additionally, it must line up added standby electricity in case demand exceeds expectations.
- In lining up this electricity, the sources must be reliable and predictable – and wind thus cannot be included and is not included.
- To ensure adequate supply in Maine, natural gas-made electricity is often lined up in the day ahead electricity market.
- Thus, when wind simply “happens” the next day, it is always an added and unnecessary layer over and above what has been already lined up. Until we can store it, this will be the case.
- Ratepayers are forced to pay for this wind electricity, and because in doing so they are buying more than what is needed, they are wasting their money – this simple reality is what causes wind power to be so incredibly expensive.
- Attempts can be made to cut back certain types of natural gas generators (see next section on “skitter”), but the practical reality is that the grid keeper basically just ignores wind’s contribution.
- The one place where it is not ignored is on our electric bills.
- But because of this incompatibility with the grid, claims about displacement of fossil fuel and CO2 emissions in Maine are patently false.

#### **Skitter**

- Because supply must always be matched perfectly to demand, any deviation--any skitter--from demand requirements, must be in-filled instantly with something else--some other supply. This is often natural gas--operating highly inefficiently to balance the wind fluctuations. Any CO2 that wind might save on the front end by displacing, in many cases, natural gas, is subverting on the back end by the way the gas units must be ramped up and back to follow the wind flux--much like a car in stop and go traffic. Any "power" that wind produces is a function of the cube of the wind speed along a narrow wind speed range (9-33MPH). Small changes in the wind speed, up or back, produce substantial changes in the wind output. This basic physical fact is always at work subverting the continuous need of the grid to balance demand with a perfect match of supply.

# Citizens Task Force on Wind Power – Maine

## *Putting Maine’s Wind Power Goals into Perspective*

### Validity of Pine-Fir Forest?

- The NRCM figures are based on a Pine-Fir forest (Western Douglas Fir, not our Balsam Fir)
- Maine has a good mix of hardwoods which may have enhanced carbon capture
- Due to harvesting and regeneration cycles, it is conceivable that the Maine Woods sequester at an above average rate, e.g., does an old growth Douglas Fir forest have stalled growth and lower sequestration?
  - Note: “Carbon accumulation in forests and soils eventually reaches a saturation point, beyond which additional sequestration is no longer possible”. --  
<http://www.epa.gov/sequestration/faq.html>

### CO2 and Global Cooling

- Forests cool the planet via CO2 capture, but also via evapotranspiration
  - The shade of a tree is cool, but the tree itself does not heat up from the sunlight it has blocked – this is due to evaporation
- Affirmed in September 2011 by the Carnegie Institute of Science’s Global Ecology Department  
[http://carnegiescience.edu/news/water\\_evaporated\\_trees\\_cools\\_global\\_climate](http://carnegiescience.edu/news/water_evaporated_trees_cools_global_climate)
- Since turbines cool due to CO2 avoidance alone but The Maine Woods cool through CO2 capture **and** evaporation, turbines do the **total cooling work** of far less than the aforementioned 4.3% of the Maine Woods , a number that we already know needs to be revised downward on the basis of CO2 alone

### Summary of the NRCM-based CO2 Math and Necessary Adjustments

- Factoring in everything, it is estimated that the 360 miles of turbines likely perform the cooling work of somewhere around 1% of the Maine Woods.
  - We started off showing this figure could be 4.3% maximum, (3.9% with new NRCM figures) but then we showed a large number of very significant factors that would substantially reduce this
  - 1% is likely a pretty good estimate

# Citizens Task Force on Wind Power – Maine

## *Putting Maine's Wind Power Goals into Perspective*

### Maine is an Exemplary Carbon Citizen

The following chart looks at the amount of CO2 emissions by state based on electricity production as well as each state's forested square miles. It then computes CO2 produced per square mile. Maine's CO2 per square mile of forest ranks number three in the nation, behind Vermont and Idaho. This is a function of two things – our relatively low population density that results in low absolute CO2 emissions and our 90% forest cover, **number one in the nation**. *The average % forest coverage of land in the world is 29.6% according to the United Nations' "State of the World's Forests". Maine's 90% is three times the world average.*

<http://www.fao.org/DOCREP/005/Y7581E/y7581e16.htm#TopOfPage>

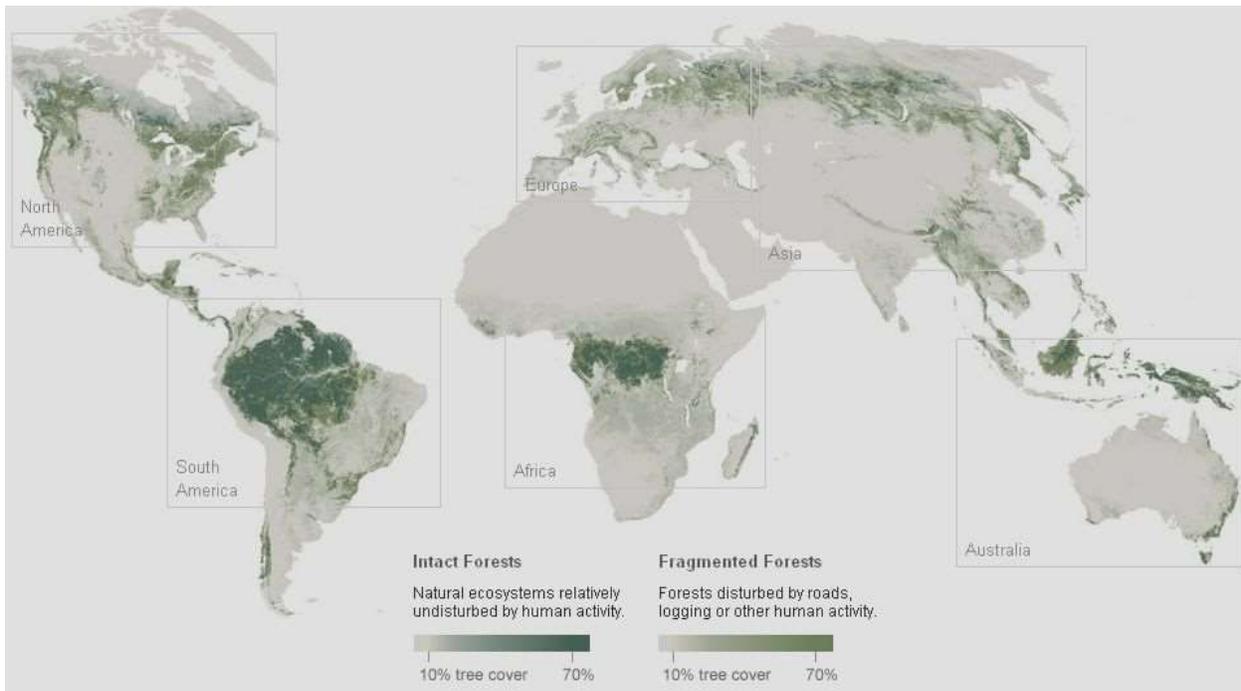
	State	Electrical 2008 est CO2 (MT)	Forested (Sq Mi)	% Forested	CO2/Forested Sq Mi
Best 10 States	VT	7,098	7,188	78%	1
	ID	1,014,966	40,156	49%	25
	ME	5,312,800	27,656	90%	192
	OR	10,793,283	47,656	50%	226
	WA	13,622,035	33,281	50%	409
	MT	20,225,552	35,000	24%	578
	MS	25,878,510	31,094	66%	832
	NH	6,777,318	7,344	82%	923
	AR	30,468,105	29,375	56%	1,037
	NM	30,663,903	26,094	22%	1,175
Worst 10 States	NJ	20,072,127	2,969	40%	6,761
	MD	29,120,746	4,063	42%	7,168
	IA	45,834,877	4,688	8%	9,778
	OH	128,758,069	12,344	30%	10,431
	DE	6,589,379	625	32%	10,543
	NE	22,303,933	2,031	3%	10,980
	KS	37,065,160	3,281	4%	11,296
	TX	252,055,209	18,594	7%	13,556
	IN	124,295,100	7,188	20%	17,293
	ND	32,917,730	1,094	2%	30,096

[http://tonto.eia.doe.gov/state/state\\_energy\\_rankings.cfm?keyid=86&orderid=1](http://tonto.eia.doe.gov/state/state_energy_rankings.cfm?keyid=86&orderid=1)

<http://www.stateforesters.org/files/2006%20State%20Forestry%20Statistics-Web-Final.pdf>

# Citizens Task Force on Wind Power – Maine

## *Putting Maine's Wind Power Goals into Perspective*

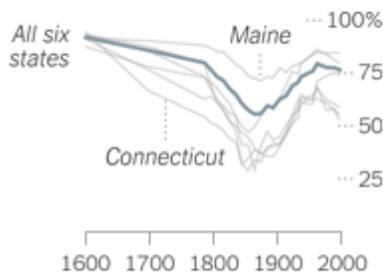


Source: NY Times, 9/30/11

### A CARBON SPONGE

New England forests were cut down for farming in the 18th and 19th centuries, but then regrew when fields were abandoned. The region is now one of the most important for carbon storage on the planet.

Forest cover in New England



*CTFWP note: Consciously chosen changes in cultural practices (forest based industries) make Maine the third best "carbon citizen" in the United States. The centrally produced one size fits all 20% renewable energy mandate seen across many states is completely insensitive to regional variations.*

Source: NY Times, 9/30/11

<http://www.nytimes.com/interactive/2011/10/01/science/earth/forests.html?ref=earth>

## Citizens Task Force on Wind Power – Maine

### *Putting Maine's Wind Power Goals into Perspective*

#### **Wind Sprawl in Maine and CO2 - A Good Tradeoff?**

- Major environmental degradation, effect on wildlife and human health
- Wholly minor effect on CO2
- Not a good tradeoff – in fact a very bad deal for Maine

#### **What Might We Do In Maine?**

- Oldest housing stock in the nation in a cool climate – weatherization and efficiency
- Reject the cookie cutter renewables goals that may make sense for a high CO2 emitting low forest cover state
- Investigate minor adjustments in forestry practice to optimize the Maine Woods' carbon capture as practical and desirable

# Citizens Task Force on Wind Power – Maine

## *Putting Maine’s Wind Power Goals into Perspective*

### APPENDIX: NRCM’s new CO2 figures

NRCM recently changed the CO2 figures it posts, that are the basis for this document. The changes are overall minor. Unlike the original NRCM figures used throughout this document, they no longer are accompanied by annual forest CO2 sequestration equivalent acres. This is why we stuck with NRCM’s original CO2 figures in arriving at the aforementioned calculation of 4.3%. That said, the following uses the new NRCM figures and the EPA’s carbon equivalency calculator. Because NRCM no longer posts CO2 figures for the Oakfield wind plant, the following calculation does not include Oakfield:

<b>Project</b>	<b>MW</b>	<b>CO2 Tons/Yr</b>	<b>Carbon Equiv Pine Fir Forest Acres*</b>
Stetson Ridge	57	81,588	15,782
Beaver Ridge	4.5	6,025	1,165
Kibby Mountain	132	172,074	33,284
Rollins	60	80,976	15,663
Record Hill	50.6	62,660	12,120
Vinalhaven	4.5	5,591	1,081
	308.6	408,914	79,095
2700 MW Projection	2,700	3,577,666	692,017
Index to 6 project base	8.7	8.7	8.7
The 692,017 acres of Pine or Fir forest acres represents 3.9% of Maine's 17.7 million forested acres. (Actually less than the 4.3% we used).			
* Using the EPA's carbon equivalency calculator on 9/7/11 (Carbon sequestered annually by acres of pine or fir forests)			
<a href="http://www.epa.gov/cleanenergy/energy-resources/calculator.html">http://www.epa.gov/cleanenergy/energy-resources/calculator.html</a>			
Source: <a href="http://www.nrcm.org/maine_wind_projects.asp">http://www.nrcm.org/maine_wind_projects.asp</a>			

# Citizens Task Force on Wind Power – Maine

## *Putting Maine’s Wind Power Goals into Perspective*

### Appendix: Screenshots of original NRCM data used throughout this document.

#### Stetson

**Estimated Emissions Avoided:**

- CO2 (tons/year): 90,000
- NOx Emissions: 73 tons
- SO2 Emissions: 200 tons

**CO2 Equivalents\*\***

- CO2 emissions from burning 426 railcars’ worth of coal
- CO2 emissions from 189,876 barrels of oil consumed
- Carbon sequestered annually by 18,556 acres of pine or fir forests
- CO2 emissions from 9,267,494 gallons of gasoline consumed

 [Maine businesses benefitting from the Stetson wind project](#)

 [NRCM's Stetson Ridge testimony filed with LURC](#)

Learn more about the [Stetson Ridge](#) project.

#### Beaver Ridge

**Estimated Emissions Avoided:**

- CO2 (tons/year): 4425
- NOx (tons/year): 6.5
- SOx (tons/year): 12.5

**CO2 Equivalents\*\***

- CO2 emissions from burning 21 railcars’ worth of coal
- CO2 emissions from 9,336 barrels of oil consumed
- Carbon sequestered annually by 912 acres of pine or fir forests
- CO2 emissions from 455,652 gallons of gasoline consumed

[project](#)

[Read n stories](#)

 [Doi Revise Permit Freedo](#)

*“Using wind energy doesn’t lower dependence on imported foreign oil. That’s because the majority of imported oil in Maine is used for heating and transportation”. – as reported by the Maine Center for Public Interest Reporting, August 2010*

#### Kibby

**Estimated Emissions Avoided:**

- CO2 (tons/year): 201,470
- NOx (tons/year): 99
- SOx (tons/year): 358

**CO2 Equivalents\*\***

- CO2 emissions from burning 954 railcars’ worth of coal
- CO2 emissions from 425,048 barrels of oil consumed
- Carbon sequestered annually by 41,539 acres of pine or fir forests
- CO2 emissions from 20,745,800 gallons of gasoline consumed



[Read rel stories.](#)

 [Read Kibby Mc project a](#)

 [Read about Kil](#)

# Citizens Task Force on Wind Power – Maine

## *Putting Maine’s Wind Power Goals into Perspective*

### Oakfield

**Estimated Emissions Avoided:**

- CO2 (tons/year): 56,000
- NOx (tons/year): 58
- SO2 (tons/year): 159

**CO2 Equivalents\*\*:**

- CO2 emissions from burning 265 railcars’ worth of coal
- CO2 emissions from 118,145 barrels of oil consumed
- Carbon sequestered annually by 11,546 acres of pine or fir forests
- CO2 emissions from 5,766,441 gallons of gasoline consumed

[View the](#)

[View the com application](#)

[Learn more a Oakfield proj](#)

[Read related stories.](#)

### Rollins

**Estimated Emissions Avoided:**

- CO2 (tons/year): 76,000
- NOx (tons/year): 80
- SOx (tons/year): 200

**CO2 Equivalents\*\***

- CO2 emissions from burning 360 railcars’ worth of coal
- CO2 emissions from 160,340 barrels of oil consumed
- Carbon sequestered annually by 15,670 acres of pine or fir forests
- CO2 emissions from 7,825,884 gallons of gasoline consumed

[View the](#)

[Rollins Wir](#)

[Read relat stories.](#)

### Record Hill

The Record Hill wind project is proposed for Roxbury in Western Maine. If approved, this project is expected to generate enough electricity annually as all residential consumption in Oxford County.

**Estimated Emissions Avoided:**

- CO2 (tons/year): 62,000

**CO2 Equivalents\*\***

- CO2 emissions from burning 294 railcars’ worth of coal
- CO2 emissions from 130,803 barrels of oil consumed
- Carbon sequestered annually by 12,783 acres of pine or fir forests
- CO2 emissions from 6,384,274 gallons of gasoline consumed

*“And switching our dependence from foreign oil to Maine-produced electricity isn’t likely to happen very soon, says Bartlett. “Right now, people can’t switch to electric cars and heating – if they did, we’d be in trouble.” – State Senator Phil Bartlett as reported by the Maine Center for Public Interest Reporting, August 2010*

# Citizens Task Force on Wind Power – Maine

## *Putting Maine’s Wind Power Goals into Perspective*

### Vinalhaven

located on the island of Vinalhaven and will produce enough power to meet the needs of the residents of Vinalhaven and North Haven.

#### **Estimated Emissions Avoided:**

- CO2 (tons/year): 9,183
- NOx (tons/year): 5
- SO2 (tons/year): 14

#### **CO2 Equivalents\*\*:**

- CO2 emissions from burning 43 railcars’ worth of coal
  - CO2 emissions from 19,374 barrels of oil consumed
  - Carbon sequestered annually by 1,893 acres of pine or fir forests
  - CO2 emissions from 945,630 gallons of gasoline consumed
- 

*“Because it takes remarkably little effort to maintain a turbine, there are few permanent jobs created by a wind power project” - State Senator Peter Mills, as reported by the Maine Center for Public Interest Reporting, August 2010*

***“In wildness is the preservation of the world”.***

***- Henry David Thoreau***

***Recommended reading*** from the highly esteemed Maine Center for Public Interest Reporting – *“A Critical Look at Maine’s Wind Act”.*

*This three part series was published in August 2010 and is a must read if you are still believing wind industry propoganda such as the idea that wind power will get us off foreign oil.*

<http://pinetreewatchdog.org/2010/08/09/wind-power-bandwagon-hits-bumps-in-the-road-3/>

<http://pinetreewatchdog.org/2010/08/11/wind-swept-task-force-set-the-rules/>

<http://pinetreewatchdog.org/2010/08/12/flaws-in-bill-like-skating-with-dull-skates/>

<http://www.windtaskforce.org>

September 2011