

## *Wind Farm Values and Impacts in Klickitat County*



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## 1.0 Overview

The purpose of this wind farm evaluation was to determine what was being assessed and for how much, whether the assessed value was appropriate, whether all appropriate properties were being assessed, how much was being paid in taxes, and where the tax revenues were being directed. This report addresses those items. Only credible internet references were used in developing the information provided. The data was extracted from the information presented on the Klickitat County Treasurer's website, <http://www.klickitatcountytreasurer.org>

## 2.0 Conclusion and Recommendations

Based on a review of the data provided and the references noted, there are three conclusions:

1. The current wind turbines are undervalued
2. It appears all appropriate properties (e.g. substations, transmission systems, roads) are not being assessed.
3. No changes in valuation have occurred from year to year.

During this review, I noted that, in 2004, the *Klickitat County Energy Overlay FEIS*, page 3-124, Graphic 3-21, *Tax Benefits Associated with Typical Wind Turbine Development*, had used \$ 1 million/Mw in the basis for determining the impact of the wind turbines on tax levies. The Klickitat County Assessor's office started assessing the properties in 2008.

Had the county used \$ 1 million/Mw for all evaluations, the difference in tax collections is estimated to be \$ 6 million between 2008 and 2011. Had \$ 2 million/Mw been used, the difference is estimated to be \$ 23 million. Had the county used the value based on the Tuolomne purchase, the difference would have been approximately \$ 38 million. On an annual basis, undervaluing the wind turbine assets could result in reduced income of \$2.7 to \$17.5 million, depending on whether the valuation is \$1 million/Mw, \$2 million/Mw, or \$2.82 million/Mw. Refer to Section 10.2 for more detail.

Klickitat county wind farms are providing significant economic benefit outside the county. At a cost of 10 cents per kilowatt-hour, the retail value of the net electricity generated by the wind farms in 2011 was approximately \$250 million and the Goldendale generating plant provided an additional \$100 million. Refer to Section 10.3 for more detail.

Based on the data evaluation, two recommendations are made:

1. Use \$2 million/Mw for each of the currently operating previously assessed sites, unless the owners can provide a detailed itemized cost basis. One would expect their depreciation schedules would have some legitimacy.

Alternatively, the county does have the option of using the recent 2009 sale as a basis but should consider the \$2.82 million per Mw to include all properties on the site.

2. In the future, ensure all properties, including substations, roads and transmission lines, are assessed.

### 3.0 Summary

The spreadsheet considered 471 wind generation related properties in Klickitat county that had been valued by the Assessors' Office and included on the Treasurer's website. The properties included 466 wind turbines, 1 substation, and 4 related buildings.

The base valuation for the wind turbines was \$660,000 per Megawatt (Mw). This valuation is low when one considers the recent wind farm sales that occurred in Klickitat county and elsewhere in the United States (See section 4.0). To gain additional insights on wind farm value, the Department of Energy and other relevant reports were referenced. Section 12 provides follow-up comparables data found after the initial April 25, 2011 report was written.

### 4.0 Comparables to determine Fair Market Value

#### 4.1 \$2.82 million/Mw

The Windy Point property, consisting of 62 wind turbines and the M&O building, sold for \$385 million in July 2009 to Tuolumne Wind Project Authority (according to the Modesto Bee, as reported in July 14, 2009 by the Yakima Herald). This price averages \$2.8 million per Mw. By comparison, the county's valuation for the associated properties (wind turbines only) was \$90,865,100, an undervaluation of more than \$294 million.

<http://www.yakima-herald.com/stories/2009/07/14/windy-point-project-sold-to-consortium>

According to Wikipedia, this property also included substations, roads, and transmission lines. If that is the case, the county's valuation did not address these items.

[http://en.wikipedia.org/wiki/Windy\\_Point/Windy\\_Flats](http://en.wikipedia.org/wiki/Windy_Point/Windy_Flats)

#### 4.2 \$2.37 million/mw

The Shepherd's Flat project in Oregon is claimed to be \$2 billion for 845 Mw.

[http://news.yahoo.com/s/afp/20110418/tc\\_afp/usjapanitcompanyenergyinternetgooglege](http://news.yahoo.com/s/afp/20110418/tc_afp/usjapanitcompanyenergyinternetgooglege)

#### 4.3 \$2.21 million/Mw

Bear Creek, PA wind farm was completed in 2006. The project was claimed to be a \$53 million investment with 24 Mw output.

<http://www.highbeam.com/doc/1P2-21061134.html>

#### 4.4 \$ 2.15 million/Mw

*Illinois Wind Farms bought by Irish company.* An Irish company hoping to benefit from the Obama administration's emphasis on renewable energy purchased three Illinois wind farms in Lee and Boone counties near Chicago.

Mainstream Renewable Power bought the farms from local developers for an undisclosed sum. It'll invest \$1.69 billion to finish the projects. Combined, the wind farms could generate 787 megawatts by 2013.

[http://www.huffingtonpost.com/2009/06/15/illinois-wind-farms-bough\\_n\\_215814.html](http://www.huffingtonpost.com/2009/06/15/illinois-wind-farms-bough_n_215814.html)

- 4.5**     \$ 2 million/Mw  
*\$2(B) Turbines Bought for Wind Farm.* Boone Picken's company, Mesa Power, bought close to 670 winds turbines from General Electric. Total output about 1000 Mw. 2008-2009 timeframe.  
<http://www.newschannel10.com/story/8332155/2b-turbines-bought-for-wind-farm?redirected=true>  
[http://www.forbes.com/2009/10/17/boone-pickens-oil-intelligent-investing-wind\\_5.html](http://www.forbes.com/2009/10/17/boone-pickens-oil-intelligent-investing-wind_5.html)
- 4.6**     \$ 2 million/Mw  
Renewable Energy Systems Americas sold a 250 Mw wind-farm project 80 miles east of Denver for \$500 million in June 2011.  
[http://www.denverpost.com/energy/ci\\_15405264](http://www.denverpost.com/energy/ci_15405264)
- 4.7**     \$1.86 million/Mw  
NextEra Energy Resources LLC, a subsidiary of FPL Group, Inc. purchased 3 projects with a combined generation output of 189.5 Mw for approximately \$352 million in December 2009.  
<http://www.bizjournals.com/milwaukee/stories/2009/12/14/daily54.html>
- 4.8**     \$1.67 million/Mw  
Centennial Wind Farm in Oklahoma cost \$200 million and has an output of 120 Mw.  
<http://www.prnewswire.com/news-releases/oge-centennial-wind-farm-to-be-dedicated-for-service-58620112.html>
- 4.9**     \$ 1.54 million/Mw  
*PG&E-related wind farm bought.* In 2003, MDU Resources Group, Inc. of Bismarck, N.D., says its Centennial Power, Inc. subsidiary has bought a 66.6-megawatt wind powered electric generation facility from San Gorgonio Power Corp., an affiliate of PG&E National Energy Group for \$102.5 million cash.  
<http://www.bizjournals.com/sanjose/stories/2003/01/27/daily77.html>
- 4.10**    \$1.27 million/Mw  
E.ON, a German firm, completed the world's largest Roscoe, Texas 785 Mw wind farm. Cost was stated as more than \$1 billion in October 2009.  
<http://www.reuters.com/article/2009/10/01/wind-texas-idUSN3023624320091001>

## **5.0 Additional References Considered**

- 5.1**     *Annual Report on U.S. Wind Power Installation, Cost, and Performance Trends: 2006,* US Department of Energy, Energy Efficiency and Renewable Energy  
<http://www.nrel.gov/docs/fy07osti/41435.pdf>

Page 15, Figures 18 and 19 show the trend in installed costs versus time and project size In 2006, installed costs were about \$1300 to \$1350 per kw (or \$1.3 to 1.35 Million per Mw).

## 5.2 Wind Farms—A Valuation Primer

[http://www.appraisalinstitute.org/taj/downloads/TAJ\\_SneakPreview.pdf](http://www.appraisalinstitute.org/taj/downloads/TAJ_SneakPreview.pdf)

Figure 2 provides a range of values for the various power sources. The wind average is about \$ 2 million per Mw.

## 5.3 How much do wind turbines cost?

<http://www.windustry.org/how-much-do-wind-turbines-cost>

January 15, 2007

The costs for a commercial scale wind turbine in 2007 ranged from \$1.2 million to \$2.6 million, per MW of nameplate capacity installed.

Most of the commercial-scale turbines installed today are 2 MW in size and cost roughly \$3.5 Million installed.

## 6.0 Tax Revenues

The following is a summary of data obtained from the spreadsheet:

- Number of Wind Turbines associated with the project
- Total Megawatts (Mw) associated with the project
- Assessors' Office valuation of the devices associated with the project
- Taxes assessed by Klickitat County for the general fund and all appropriate levies
- Property owner of the non-land Wind Farm properties

Number Wind Turbines	Mw	Valuation	Taxes	Property Owner
133	199.5	\$ 131,670,000	\$ 1,123,958	Big Horn Wind Energy Project LLC
43	98.9	\$ 65,274,000	\$ 399,660	Harvest Wind
25	50	\$ 39,034,200	\$ 361,437	Northwest Wind Partners
89	204.7	\$ 135,102,000	\$ 1,107,034	Summit Power
62	136.6	\$ 90,865,100	\$ 841,364	Tuolumne Wind Project LLC
114	262.2	\$ 173,396,400	\$ 1,585,613	Windy Flats Partners LLC
466	951.9	\$ 635,341,700	\$ 5,419,065	Total

## 7.0 Tax Levy Assignments

For the 471 properties evaluated, the following is the tax breakdown of the levies:

NOTE The values for the taxing districts were the values specified on the treasurer website. The sum of these differs slightly from the total taxes derived by summing the taxes for the 471 properties by \$0.68 due to rounding.

State School	\$1,343,345.13
Bickleton School #203	\$685,343.16
Goldendale School #404	\$472,804.34
Centerville School District #215	\$124,308.10

County Road	\$884,850.10
County General	\$725,821.67
Hospital District #1	\$303,249.23
Fire District #7	\$180,451.06
Fire District #5	\$64,882.88
Fire District #2	\$163,281.54
Fire District #9	\$72,157.51
Library District #1	\$317,670.85
Recreation District	\$79,140.23
Cemetary District #2	\$1,758.99
 Total	 \$ 5,419,064.79

## 8.0 Property Owners and Assessment Summary

### **Big Horn Wind Energy Project LLC**

400 W 15th St Ste 700  
Austin, Texas 78701

133 properties consisting of 133 1.5 Mw GE turbines wind turbines, each valued at \$990000. The \$ 990000 valuation has been in place for 2008, 2009, 2010, and 2011.

<u>Tax district</u>	<u>Valuations</u>
11	133

### **Harvest Wind Project**

701 Winslow Way E Ste B  
Bainbridge Island, Washington 98110

43 properties consisting of 43 Siemens wind turbines at 2.3 Mw, each valued at \$1518000. The \$1518000 valuation has been in place for 2011 only.

<u>Tax district</u>	<u>Valuations</u>
9	3
12	11
31	39

### **Northwest Wind Partners LLC**

700 La Terraza Blvd Ste 200  
Escondido, California 92025-3865

27 properties consisting of 25 wind turbines valued at \$1320000 each, 1 substation valued at \$ 5812300, and 1 O&M building valued at \$ 221900. These valuations have been in place for 2011 only.

<u>Tax district</u>	<u>Valuations</u>
37	27

**Summit Power**

701 Winslow Way E Ste B  
Bainbridge Island, Washington 98110

89 properties consisting of 89 wind turbines, each valued at \$1518000. This valuation has been in place for 2009, 2010, and 2011.

<u>Tax district</u>	<u>Valuations</u>
11	67
12	10
31	12

**Tuolumne Wind Project LLC**

901 N Broadway  
Turlock, California 95380

**Windy Point**

63 properties consisting of 62 wind turbines (42 Siemens 2.3 MW turbines valued at \$1518000 each and 20 RE power 2.0 MW turbines valued at \$ 1320000 each) and 1 M&O Building valued at \$709100. These valuations have been in place for 2010 and 2011.

Sold for \$385 million to the Tuolumne Wind Project Authority – a California joint powers agency formed by the Turlock Irrigation District and the Walnut Energy Center Authority. Equivalent to \$ 2800000/Mwe.

A question to address is whether the county’s valuation should also include the transmission lines and substations sold.

<u>Tax district</u>	<u>Valuations</u>
37	63

**Windy Flats Partners**

12555 High Bluff Dr Ste 385  
San Diego, California 92130

116 properties consisting of 114 Siemens 2.3 MW wind turbines, valued at \$ 1518000 each and 2 M&O Buildings valued at \$ 68200 and \$ 276200. The wind turbine valuations have been in place for 2011 only. The building valuations have been in place for 2010 and 2011.

<u>Tax district</u>	<u>Valuations</u>
6	4
15	43 (including building @ \$276200)
36	8
37	61 (including building @ \$68200)

## New Projects

Two projects do not have taxes or valuations assigned for 2011. These are the Juniper Canyon and Big Horn 2 developments.

Juniper Canyon has 63 wind turbines rated at 2.4 Mw each. Big Horn 2 has 25 wind turbines (25 Gamesa G87 wind turbines with unit capacity of 2 MW each, <http://www.renewable-energy-sources.com/2011/01/03/iberdrola-renovables-signs-long-term-power-purchase-agreement-for-its-new-harvest-wind-farm/>). These devices are all located in Tax District 11. The owner of both of these projects has the same address as Big Horn, that is,

**Big Horn II Wind Energy Project LLC**  
**Juniper Canyon Project Phase 1**  
400 W 15th St Ste 700  
Austin, Texas 78701

## 9.0 Background Information - Levy Breakdown and related Tax Code Areas (TCAs)

### 9.1 Levy Breakdown

<b>TCA</b>	<b>District</b>	<b>Regular</b>	<b>Excess</b>	<b>Levy</b>
6	1-94-F5-L1	6.481657	0.456543	6.9382
9	1-203-L1	5.149493	2.691551	7.841045
11	1-203-F2-L1	5.84462	2.691551	8.536172
12	1-203-F9-L1	5.928749	2.691551	8.6203
15	1-215-H1-F5-C2-L1-R1	6.705839	2.467434	9.173273
31	1-403-F9-L1	5.928749		5.928749
36	1-404-H1-F5-L1-R1	6.678367	2.553637	9.232004
37	1-404-H1-F7-L1-R1	6.705849	2.553637	9.259486

### 9.2 Tax Code Areas (TCAs) of Klickitat County

<u><b>Tax Code Area</b></u>	<u><b>Definition</b></u>
1	Klickitat County
G	City of Goldendale
WS	City of White Salmon
B	City of Bingen
H1	Public Hospital District No. 1 (Klickitat Valley Hospital)
H2	Public Hospital District No. 2 (Skyline Hospital)
L1	Fort Vancouver Regional Library District
C1	Public Cemetery District No. 1 (White Salmon)
C2	Public Cemetery District No. 2 (Centerville)
C3	Public Cemetery District No. 3 (Glenwood)
C4	Public Cemetery District No. 4 (Maryhill)

F1	Fire Protection District No. 1 (Trout Lake)
F2	Fire Protection District No. 2 (Bickleton)
F3	Fire Protection District No. 3 (White Salmon)
F4	Fire Protection District No. 4 (Lyle)
F5	Fire Protection District No. 5 (Centerville)
F6	Fire Protection District No. 6 (Dallesport)
F7	Fire Protection District No. 7 (Goldendale Rural)
F8	Fire Protection District No. 8 (Glenwood)
F9	Fire Protection District No. 9 (Roosevelt)
F10	Fire Protection District No. 10 (Mabton)
F11	Fire Protection District No. 11 (Wishram)
F12	Fire Protection District No. 12 (Klickitat)
F13	Fire Protection District No. 13 (Appleton)
F14	Fire Protection District No. 14 (High Prairie)
P1	Port of Klickitat

<u>Tax Code Area</u>	<u>Definition</u>
94	Wishram School District
116	Prosser School District
203	Bickleton School District
215	Centerville School District
400	Trout Lake School District
401	Glenwood School District
402	Klickitat School District
403	Roosevelt School District
404	Goldendale School District
405	White Salmon School District
406	Lyle School District

## 10.0 Data Tables

### [Section 10 Wind Projects Table.xls](#)

#### 10.1 Wind Projects Table – Worksheet (property data)

This Excel table worksheet lists all wind farm related properties with the associated valuations, taxes, and levy assignments. Line 474 contains the totals for each area.

The table is color code based on owner, turbine or property value and tax code area.

Cells D485:S517 provide summary data.

## 10.2 Wind Projects Table – Worksheet (tax impact)

This Excel table worksheet lists the summary of turbines, Mw, valuation and tax for 2011. The worksheet calculate the potential impact on taxes collected if different valuations had been used, specifically, \$1 million per Mw, \$ 2 million per Mw, and \$2.82 million per Mw (the average for the Tuolomne project sale). The calculation considers only the years the specific wind farm has been valued and taxed. The calculation also uses a tax ratio based on the 2011 tax and valuation. Thus this calculation is considered as a gross estimate since obviously taxes and the levy breakdown for each year would have had to be included to be fully accurate. The worksheet does show the consequences of undervaluing the wind turbines, even compared to the county's original 2004 estimate (\$ 1 million / Mw in the *Klickitat County Energy Overlay FEIS*. (see <http://www.klickitatcounty.org/Planning/ContentROne.asp?fContentIdSelected=2119658607&fCategoryIdSelected=-127564322&fX=X> and <http://www.klickitatcounty.org/Planning/fileshtml/200408-EOZ-EIS/01c-Section3.pdf> (page 3-124).

The right hand columns of the worksheet present differences calculated in tax income to date and on an annual basis.

## 10.3 Wind Projects Table – Worksheet (generation data)

This Excel table worksheet summarizes data obtained from the US Energy Information Administration's *Form EIA-906, EIA-920, and EIA-923 Databases* (see [http://www.eia.doe.gov/cneaf/electricity/page/eia906\\_920.html](http://www.eia.doe.gov/cneaf/electricity/page/eia906_920.html)) for the years 2004-2010 for energy generated by the Goldendale gas plant and the various wind farms. Data includes the megawatt-hours produced with an estimate of the value of that electricity produced.

## 11.0 Comments and Questions

1. The county claims to do reassessments every year. Why weren't the wind farms reassessed in 2009, or subsequently in 2010 and 2011, when it was apparent that the county had grossly underestimated the wind turbine worth after the Windy Point sale?
2. The county documentation in 2004 used a basis of \$1 million per Megawatt. Why wasn't \$1 Million/Mw used 4 years later when the county started assessing the wind farms?.
3. The Big Horn project started supplying the grid in 2006. Why wasn't Big Horn assessed starting in 2007?
4. One can use the internet to determine, to a limited extent, the wind turbine values based on sales. Why didn't the county assessor's office, at the time, perform an assessment to determine a more accurate wind farm worth?
5. A wind farm includes more property than has been assessed. Why didn't the county assessor's office, at the time, determine what elements should be assessed for a more accurate worth?
6. The property on which the wind farms lease land is obviously worth more than the base land worth. Is the county considering this in assessing those properties?

## 12.0 Follow-up Data

The original report will be retained as is. Additional data and background information is being added in section 12. Conclusions stated in Section 2.0 remain the same when data in Section 12 is also taken into account.

### 12.1 \$2.02-3.22 million/Mw

The Electricity and Markets Policy group of the Lawrence Berkeley Laboratory published the report, *Community Wind: Once Again Pushing the Envelope of Project Finance*, Bolinger, M. LBNL-4193E. January 2011 that described financing of 5 projects.

PaTu Wind Farm (Sherman County, OR)	9 Mw	\$ 23.0 M
Coastal Energy Project (Grayland, WA)	6 Mw	\$ 18.8 M
South Dakota Wind Partners (SD)	10.5 Mw	\$ 23.5 M
Ridgeland Power Partners (MN)	25.3 Mw	\$ 51.0 M
Fox Islands (ME)	4.5 Mw	\$14.5 M

These are all recent projects selected to show the various financing methods that can be used to fund wind turbine projects. The Fox Island project is atypical because the turbines are located on an island with subsequent very high construction costs.

<http://eetd.lbl.gov/ea/emp/reports/lbnl-4193e.pdf>  
<http://eetd.lbl.gov/ea/emp/reports/lbnl-4193e-ppt.pdf>

In 2009, the National Renewable Energy Laboratory reported in 2009 *Wind Technologies Market Report* that the Installed wind power project costs in 2009 averaged \$2.12 million/Mw.

[http://www.nrel.gov/analysis/market\\_re\\_data\\_wind\\_2009.html?print](http://www.nrel.gov/analysis/market_re_data_wind_2009.html?print)  
<http://www.nrel.gov/docs/fy10osti/48666.pdf>  
<http://www.nrel.gov/docs/fy10osti/48908.pdf>

### 12.2 \$2.55 million/Mw

The Glacier Hills Wind Park, located in the towns of Randolph and Scott in Columbia County, is designed to generate 162 megawatts (MW) of electricity and will be capable of powering approximately 45,000 average residential homes. The site will consist of 90 wind turbines.

The Glacier Hills Wind Park in Columbia County is now projected to cost a maximum of \$413.5 million, down from a projection of \$525.6 million when We Energies announced the project last year.

<http://www.we-energies.com/environmental/glacierhills.htm>  
<http://www.jsonline.com/business/46770847.html>

### 12.3 **\$2.14 million/Mw**

#### *CPV breaks ground on wind farm*

Woodward, Oklahoma. Competitive Power Ventures (CPV) invited community leaders and other dignitaries to the site which over the next several months will have 66 wind turbines erected along an 8-mile stretch of the Sharon-Shattuck road.

According to Sean Finnerty, CPV senior vice president of renewable development, the turbines will be ... Siemens 2.3 megawatt turbines, meaning Keenan II ... capable of generating a total of 151.8 megawatts of electricity, Finnerty said, noting that energy has already been promised to OG&E through a power sale agreement, Finnerty said.

CPV officials said the project is expected to be completed around the end of the year, to cost around \$325 million, and will incorporate around 250 workers at the peak of construction with 10 to 20 permanent employees who will remain to service and maintain the turbines.

<http://woodwardnews.net/local/x712205833/CPV-breaks-ground-on-wind-farm>

### 12.4 **\$2.11 million/Mw**

#### *Terra-Gen's Landmark Wind Farm Sale-Leaseback*

In 2010, Terra-Gen Power LLC closed a \$1.2 billion financing for four wind power projects with a total of 570 MW of capacity at its Alta Wind Energy Center in Kern County, Calif. The four projects, known as Alta Projects II-V, will use 190 V90-3.0 MW turbines manufactured by Vestas-American Wind Technology Inc. Project construction work began July 27.

<http://www.renewableenergyworld.com/rea/news/article/2010/10/the-deal-terra-gens-landmark-wind-farm-sale-leaseback>

### 12.5 **\$2 million/Mw**

*10 Steps to develop a wind farm*, American Wind Energy Association, March 2009

Wind power development can cost around \$2 million per megawatt (MW) of generating capacity installed. To take advantage of economies of scale, wind power facilities should be in excess of 20 MW. Assuming the average wind turbine is rated at 1.5 megawatts (MW) in capacity, this means the installation of at least 13 turbines and an initial investment of about \$40 million.

[http://www.awea.org/learnabout/publications/upload/Ten\\_Steps.pdf](http://www.awea.org/learnabout/publications/upload/Ten_Steps.pdf)

**12.6 \$1.5 – 2 million/Mw**

*What does it cost to build a wind turbine?*

Capital costs for wind projects are \$1,500 - \$2,000 per kilowatt of nameplate capacity. Approximately 75% of the total cost of energy for a wind turbine is related to upfront costs such as the cost of the turbine, foundation, electrical equipment, grid-connection and so on. Obviously, fluctuating fuel costs have no impact on power generation costs. Thus a wind turbine is capital-intensive compared to conventional fossil fuel fired technologies such as a natural gas power plant, where as much as 40-70% of costs are related to fuel and O&M.

[http://wiki.answers.com/Q/How\\_much\\_does\\_it\\_cost\\_to\\_build\\_a\\_wind\\_farm](http://wiki.answers.com/Q/How_much_does_it_cost_to_build_a_wind_farm)

**12.7 \$1.5 million/Mw**

French Alstom, which bought Ecotecnica, has sold its first wind turbines in the US, while consolidating its presence in solar energy. Each of the two wind farms use Alstom ECO 86 12 wind turbines. Adams and Danielson wind farms in Minnesota will generate up to 40 MW of wind power. Wind energy projects are the result of a contract worth approximately \$60 million, and have started commercial operations on March 9, 2011.

<http://gotpowered.com/2011/alstoms-first-wind-farm-in-the-us/>

**12.8 \$1.47-1.76 million/Mw**

*For sale: Slightly used wind farm*

In 2008, The Sacramento Municipal Utility District was negotiating to sell its wind-power project in Solano County to a private company by the end of the year.

SMUD installed 23 wind turbines in 2003 and 2004, and added 29 larger turbines from May 2006 to December. The project produces up to 102 megawatts, or enough wind power for about 34,000 homes.

SMUD's wind turbines were considered to be worth about \$150 million to \$180 million, based on the cost of building a similar-sized wind farm today, said Case van Dam, the director of the University of California Davis Wind Energy Collaborative.

<http://www.bizjournals.com/sacramento/stories/2008/07/28/story8.html>

**12.9 \$1.44-1.88 million/Mw**

Goldwind expects its 106.5-megawatt project in Illinois to cost between \$150 million and \$200 million. Xinjiang Goldwind Science & Technology Co will sell power to Commonwealth Edison Co from its Illinois project, the first large

US wind farm using Chinese-made turbines. The company, based in Urumqi, Xinjiang Uygur autonomous region, also bought out its development partner, Dublin-based Mainstream Renewable Power, and has full ownership of TianRun Shady Oaks LLC,

<http://www.whatsonningbo.com/tag-US%20wind%20farm.html>

*N.S. wind farm sold for \$121.6m*

News from April 2008. Atlantic Canada's largest wind farm will soon be controlled by an American power giant.

Creststreet Power and Income Fund LP announced Friday it had signed a deal to sell Pubnico Point Wind Farm in Yarmouth County and its Mount Copper Wind Power project in Quebec to an affiliate of FPL Energy of Florida for \$121.6 million.

Power rating for the projects was 30.6 Mw for Pubnico Point and 54 Mw for Mount Copper. Equivalent to \$1.44 million/Mw assuming dollars were US.

<http://www.windaction.org/news/15390>

[http://en.wikipedia.org/wiki/List\\_of\\_wind\\_farms\\_in\\_Canada](http://en.wikipedia.org/wiki/List_of_wind_farms_in_Canada)

#### **12.10 \$1.1 million/Mw**

*Wind Turbine Design Cost and Scaling Model*, L. Fingersh, M. Hand, and A. Laxson, Technical Report NREL/TP-500-40566, December 2006

In 2005, the estimated cost per Mw was \$1.1 million/Mw.

<http://www.nrel.gov/docs/fy07osti/40566.pdf>

#### **12.11 \$1.08 million/Mw**

*Windfall from the Wind Farm Sherman County, Oregon*, Brad Ouderkirk and Meghan Pedden, Renewable Northwest Project, 917 SW Oak, Suite 303, Portland, OR 97205, August 2004 (revised December 2004)

This report, in section V. ECONOMIC IMPACTS, reported:

Northwestern Wind Power invested approximately \$26 million on the Klondike Project, an all inclusive amount that includes siting, permitting, development, tower construction, and electrical work. This equals \$1.083 million per installed megawatt, which is in line with other projects, as reported by studies showing an average of \$1 million per installed megawatt of wind power (Clemmer 2001, Leistriz 2001).

<http://www.rnp.org/sites/default/files/pdfs/Klondike%20Paper.pdf>