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Information

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Agenda

Renewable Energy Advisory Council

Wednesday, August 2, 2017: 9:30 a.m. – 12:50 p.m. (including lunch for RAC members) http://www.energytrust.org/about/public-meetings/renewable-energy-advisory-councilmeetings/ Energy Trust conference room Kilowatt 421 SW Oak St., Suite 300

Portland, Oregon 97204

9:30 Welcome, introductions, announcements

9:35 Small and community-scale wind incentives

 Ill and community-scale wind incentives
Staff are recommending discontinuing incentives for small and communityscale wind except for limited circumstances (see attached memo and come prepared to discuss). Staff will present and seek feedback from the RAC.

9:55 Irrigation modernization program update

- Farmers Conservation Alliance, which operates the Irrigation Modernization effort, will provide an update on the program's accomplishments and future plans and expectations.
- 10:30 Break

10:40 Solar strategy for 2018

- Staff will seek input from RAC members regarding their priorities for Energy Trust's support for the solar market after the December 31, 2017, RETC expiration increases above-market costs for residential solar in 2018. RAC members should come prepared with thoughts about how to prioritize support for residential and non-residential projects, along with any other comments on the topic of the 2018 Solar program and budget.
- To allow time for discussion, lunch will be served at 11:45. Discussion will continue from noon until 12:40.

12:40 Public comment

12:45 Adjourn

<u>Please note that the next RAC meeting is on a Friday: September 15, 2017</u>. You can view this agenda and meeting notes at: <u>http://www.energytrust.org/about/public-meetings/renewable-energy-advisory-council-meetings/.</u> If you have comments on meeting notes, please alert Betsy Kauffman at betsy.kauffman@energytrust.org.

Information and discussion



Proposal to discontinue incentives for small and community-scale wind projects

August 2, 2017

Proposal Summary and Requested Feedback

Energy Trust of Oregon is proposing to discontinue incentives for small and community-scale wind projects except for one limited circumstance: municipally-owned community-scale wind projects.

Energy Trust staff are making this proposal due to a variety of factors affecting the market and overall viability of small wind in Oregon, including: small wind market contraction, lack of uptake on incentives, cost of equipment and maintenance, lack of installers and repair personnel in Oregon, difficulty estimating wind speeds, and equipment reliability and performance. In comparison to solar, small wind projects tend to be costlier and less reliable for the same amount of generation.

For community-scale wind, staff are making this proposal due to lack of incentive uptake and results over time. There is currently only one community-scale municipal project receiving project development assistance from Energy Trust.

Energy Trust staff are looking for feedback from the Renewable Advisory Council on this proposal. Staff are sensitive to a long-held interest to provide support for a broad portfolio of renewable energy technologies, but need to balance that goal against market challenges and ratepayer benefits. We do not anticipate any significant impact in the market based on our proposal.

This memo provides the history of Energy Trust's small and community-scale wind installation incentives, the results that have been achieved over time, the challenges that are the basis for this proposal, and the national context for small wind.

Program History

Historically, small and community-scale wind has represented a small portion of Energy Trust's renewable energy portfolio. Only 44 small wind projects have received an Energy Trust incentive since 2007, the majority in 2010 and 2011, and only seven projects have reached commercial operation since 2012. While we have provided project development assistance for community-scale wind projects over this time, we have not provided an installation incentive on a completed system. Funding provided to small and community-scale wind projects represents 1.6 percent of the total renewable energy incentives Energy Trust provided from 2002 through the end of 2016.

Small Wind

For the purposes of this document, Energy Trust is defining small wind as any non-utility scale style wind turbine (generally less than <500kW). Energy Trust has provided incentive and programmatic support to grid-tied small wind customers since 2007. Programmatic support evolved over time as our understanding of the small wind market grew and to adapt to changing market conditions. From 2007-2016, wind incentives were managed similarly to the solar program, utilizing trade ally contractors to install systems under a standard incentive rate structure, initially determined by the swept area of a wind turbine's rotors.

2007 planning materials document the initial objectives of the program as follows:

- Establish a small wind contractor network able to install systems for Portland General Electric and Pacific Power customers meeting program specifications
- Market to rural landowners, ranchers and farmers
- Provide visibility with installations at two schools and demonstration projects
- Combine a standard incentive with a web-based wind resource assessment (as opposed to more expensive anemometer-based wind estimation)
- Nurture and help grow the non-existent small wind industry in Oregon
- Lower the cost of standard small wind installations

From 2007 through 2011, the small wind program operated with these objectives and 37 turbines were installed. The majority of those were installed in 2010 and 2011 when state and federal incentives for small wind peaked. In 2011 some reports of poor turbine performance were received from past customers and operational issues were identified by staff. In response, direct marketing of our incentive offers to customers stopped while the program was redesigned. In addition, Energy Trust staff worked with the Clean Energy State's Alliance to form the Interstate Turbine Advisory Council¹ (ITAC), an alliance of clean energy programs and utility incentive providers working jointly to tackle the challenges, and promote the potential, of the small and mid-scale wind market.

Staff identified a number of issues to address through the program redesign:

- Incentives based on swept area do not take into account performance, which is largely based on wind resource strength, tower height, and turbine reliability.
- Lack of stability and consistency in the market exists among turbine manufacturers and installers. Several manufacturers and installers went out of business, leaving customers without warranties and technical support.
- Estimated wind speed and average energy output (AEO) were the responsibility of the installer/manufacturer and often were based on inaccurate turbine power curves.
- Most wind speed and production estimates were too high due to a combination of inaccurate wind map data, installer estimate errors, and inaccurate power curves used by manufacturers. In several cases, overly optimistic energy generation estimates produced disappointed customers.

As a result of the review of these issues by staff, Energy Trust made a number of changes to the program structure:

- Transitioned to an estimated average energy output (AEO)-based incentive, which aligned incentives with estimated turbine performance.
- Increased to a 70 ft. minimum tower height and eliminated of the minimum average wind speed (formerly 10 mph), assuming customers would make decisions based on the estimated wind resource and projected production.

¹ http://cesa.org/projects/ITAC/

- Moved to a more accurate, third-party wind speed and AEO estimation to take that responsibility away from the installer/manufacturer, both of whom had an inherent conflict of interest in the results.
- Adopted a certified turbine list and specific business standards to assure customers of both business practice integrity and technical specification of turbines. Widespread adoption of the ITAC turbine list by state energy agencies was intended to leverage certification and incentivize a higher quality of turbines installed nationwide.
- Adopted a graduated incentive schedule of \$5/kWh for estimated AEO up to 9,500 kWh, and \$1.75/kWh AEO over 9,500 kWh, recognizing the efficiencies of scale for larger turbines.
- Implemented a new requirement of mandatory web-based wind monitoring for all systems installed under the new incentive system in order to better track production.

These changes were presented to the RAC in June of 2012². The adoption of the programmatic changes occurred in concert with many other incentive changes and reductions at the state and federal level (elimination of the Oregon Business Energy Tax Credit, changes and the eventual expiration of the federal Production Tax Credit). From 2012 through 2016, only six additional turbines were installed under the new program design.

In 2014, noting the dramatic slow-down in the small wind market, Energy Trust staff once again reviewed the program. Staff reviewed performance goals, and sought to define a future vision for success in the small wind market. It was hoped, at the time, that a leasing option could revitalize the market in Oregon but this never materialized.

In 2016, due to the continued low volume of wind projects seeking incentives, staff decided to transition the management of small wind projects from a standard incentive approach to a custom above-market cost approach to better align with the incentive processes administered by the Other Renewables program, where wind projects are housed. Prior to the change in management approach, three wind project applications were received. One of those projects has since cancelled, one was installed in January 2017, and the last is expected to be installed in September 2017.

There have not been any new wind project applications received since the program change in 2016. Program staff field approximately one to two small wind calls per week, mainly during fall, winter, and spring months and do not dedicate any staffing time to small wind projects beyond reactive responses to customer calls.

Community-Scale Wind

In contrast to small wind, Energy Trust's support of community-scale wind projects has been more limited. In 2005, projecting there would be market opportunity for utility scale turbines to be installed in smaller "community-scale" clusters under 20MW in capacity, Energy Trust and NW SEED produced a Community Wind Guidebook. From 2005-2011 Energy Trust supported an anemometer loan program to help community-scale wind developers get access to wind data at a reduced cost. Energy Trust also began offering project development assistance (PDA) incentives to support projects moving through the development process. The anemometer loan program was discontinued in 2011 due to the availability of more sophisticated wind mapping

² <u>https://www.energytrust.org/wp-content/uploads/2017/03/RACpresentations_12_06_06.pdf</u>

and limited staff availability to manage the administration, maintenance, and loan of Energy Trust's physical equipment. PDA incentives remain available today.

Program Results

Small Wind

The small wind incentive offering has seen low volume since inception. 2010 and 2011 were the high-water-mark years, with 14 and 12 turbines installed respectively, supported by the efforts of 15 trade ally contractors and their employees. The tables below show the program's results by utility and over time.

	Project Count	Annual kWh	Capacity (kW)	Incentive
PGE TOTAL	32	894,486	646	\$ 1,210,171
PAC TOTAL	12	180,270	111	\$ 434,192
GRAND TOTAL	44	1,074,756	758	\$ 1,644,363
Installation year	Project Count	Annual kWh	Capacity (kW)	Incentive
2006	1	5,300	2	\$ 13,150
2007	1	12,746	10	\$ 36,117
2008	2	29,100	15	\$ 29,500
2009	7	146,286	86	\$ 176,715
2010	14	170,920	115	\$ 299,750
2011	12	525,205	413	\$ 648,000
2012	2	31,864	30	\$ 95,157
2013	3	42,774	27	\$ 127,882
2014	1	100,199	50	\$ 170,992
2015	0	-	-	\$-
2016	0	-	-	\$-
2017 ³	1	10,362	10	\$ 47,100
Total	44	1,074,756	758	\$ 1,644,363

In addition, as noted above, Energy Trust was responsible for the formation of the Interstate Turbine Advisory Council, managed by the Clean Energy States Alliance.

The ITAC established a collaborative group of public clean energy programs to evaluate and identify small and mid-sized wind turbines that fit the performance and durability expectations of incentive providers. In addition, ITAC takes advantage of the research and collective expertise with wind energy systems of the participating organizations and pools resources to efficiently engage qualified experts to assist with technical reviews. The primary output of the ITAC is a unified list of wind energy turbines that would potentially be eligible for participating state incentive programs.

Community-Scale Wind

Over time 14 projects utilized PDA incentives, eight had anemometers installed, and another three received both PDA incentives and anemometers. In 2009 one project applied for an installation incentive but then rejected Energy Trust's incentive offer. At present Energy Trust is providing limited PDA incentives to one municipality exploring community wind for resiliency

³ Does not include a 4.2kW installation expected to complete in September 2017.

purposes on the Oregon coast. In total, Energy Trust has provided \$413,000 in anemometer and project development assistance incentives for community-scale wind projects.

One lasting impact of Energy Trust's community wind efforts come from the Community Wind Guidebook, which served as the foundation for a number of guidebooks created by other states.

Challenges and Issues

Small Wind

There are many factors which have led to this proposal to discontinue small wind incentives. At this time, compared to other supported renewable technologies at Energy Trust, these projects have greater risk and cost, and lower reliability for ratepayers and project owners. As noted earlier, there have been only five projects installed in the last five years and the strongest market activity occurred in 2010 and 2011. There is not a functional market for small wind in Oregon at present, and solar is a better financial option for most customers.

Of the 44 projects Energy Trust supported with installation incentives, six are no longer in operation. The remaining 38 systems are believed to be in operation but face challenges over the long-term due to current market conditions:

- 11 turbines are known to have required repairs
- 36 turbines do not have warranties or the warranty is not being honored
- The manufacturers of 25 of the turbines are no longer in business

Some of the challenges associated with small wind have been mentioned above. Below we provide more detail:

Wind speed and generation estimation

Without long-term data, wind speeds are difficult to estimate. We found this to be true with our early installations but do not have enough data from later installations to fully understand if our current methodology has corrected the issue. This factor caused Energy Trust and early project owners to have unrealistic generation expectations, in-turn causing poor financial performance. Our current estimation methodology is the same as is used by NYSERDA (New York State Energy Research and Development Authority, discussed further below). NYSERDA reports +/-20% accuracy in their generation estimates for most installations⁴.

Turbine reliability

With the exception of one 10kW turbine from a specific manufacturer, few small wind turbines have proven themselves to be reliable. Even turbine manufacturers once considered reputable have gone bankrupt, leaving project owners without warranties. A significant number of wind turbines have experienced reliability issues and many have had difficulty getting warranty repairs – either because the manufacturer went out of business or because there are no small wind repair personnel remaining in Oregon. Because there are no turbines being installed, there are no companies around to perform repairs.

Repair costs

When repairs and maintenance are needed, the equipment is high in the air. Repairs typically require a crane, making all work difficult and expensive. In June 2017 a customer reported using a cell phone tower installation company and local machine shops to make \$10,000 in repairs on

⁴ Conversation with Dana Levy, NYSERDA, July 6, 2017

a 20kW turbine installed in 2010. Few other customers have been as resourceful or willing to make further significant investments in their turbines.

Market contraction

As is explored further below, nationally the small wind market has contracted significantly from its peak and significant expansion does not appear likely in the next five years. Few projects are being installed anywhere in the country and many states have eliminated incentives. NYSERDA, with the largest incentive program in the nation, supports 50 installations annually. According to the Pacific Northwest National Lab (PNNL, authors of the annual Distributed Wind Market Report) this is ~25 percent of all installations nationally and no other state comes close⁵.

Total cost of ownership

Compared to solar, small wind is currently not a financially sound investment. A typical 10kW turbine installation costs around \$100,000 and would generate around 10-15,000 kWh annually at a good wind site in the Willamette Valley. By comparison a 10kW solar PV installation in the same area would cost around \$35,000 at current residential solar market prices and generate around 15,000 kWh annually. The PV system also requires less in terms of operations and maintenance than a wind turbine. In order to be financially viable, small wind systems require significantly larger incentives than solar in order to overcome their larger above-market costs.

Community-Scale Wind

Utility scale wind turbines have proven reliability and performance, but community-scale installations of large turbines have never taken off in Oregon as was once thought possible. In Energy Trust's history we have not provided an installation incentive for a community-scale wind project and the development assistance we have provided has not yet resulted in an installation that has moved forward. We do not believe this sub-20MW market is viable in Oregon as a for-profit enterprise. We remain open to the possibility that community-scale wind could make sense for limited, municipal-resiliency purposes.

National Context

Small Wind

To place this proposal in context Energy Trust staff reached out to program staff from the Interstate Turbine Advisory Council (ITAC), Pacific Northwest National Lab (PNNL, authors of the annual Distributed Wind Market Report), to staff from other states either currently or formerly supporting small wind installation incentives, and to an Oregon-based small wind manufacturer.

Pacific Northwest National Lab

PNNL publishes an annual Distributed Wind Market Report tracking the small wind industry in the US. Their 2015 report, the most current available, notes that the small wind market is flat or contracting⁶. The market peaked between 2008 – 2012 with nearly 3 times the amount of capacity that was installed in 2015.

"The U.S. distributed wind market has reached a plateau. U.S. small wind sales and midsize installations have been relatively flat for the past three years. A general downward trend in state and federal incentive funding levels and programs; the relatively low cost of electricity, driven by low natural gas prices; and competition from other technologies,

⁵ Conversation with Alice Orrell, PNNL, July 5, 2017

⁶https://energy.gov/eere/wind/downloads/2015-distributed-wind-market-report

such as solar photovoltaics, are leading to a further market contraction on the supplier side."

"The 4.3 MW of small wind sales recorded in 2015 represent 1,695 units and over \$21 million in investment. This is slightly higher than in 2014 (3.7 MW deployed, about 1,600 units, and an approximately \$20 million investment), but down from 2013 (5.6 MW deployed, about 2,700 units, and an approximately \$36 million investment)."

"The combined value of federal, state, and utility funding awards given for distributed wind projects in 2015 was \$10.9 million, excluding the federal investment tax credit. This reflects a significant decrease from 2012, 2013, and 2014, when funding levels were \$100 million, \$15.4 million, and \$20.4 million, respectively."

"The number of small wind manufacturers has also contracted. A total of 31 companies reported U.S. sales in 2012 compared to 16 in 2013, 11 in 2014, and 10 in 2015."

The chart excerpted below shows part of the challenge for small wind: installed costs for solar PV have dropped significantly over time but installed small wind costs rose before beginning to drop. In 2014 installed costs were ~\$2,000/kW higher than PV.



Alice Orrell at PNNL believes that in order to be successful at incentivizing small wind development a state needs three things:

- 1. High electricity rates
- 2. A good wind resource, and
- 3. A good policy environment (meaning easy interconnection choices, net metering, incentives, tax credits, zoning, etc.).

Alice notes that Oregon does not have high electricity prices and that the wind resource is not well matched to the policy environment because the best wind is outside of the area Energy Trust can serve.

The slide below, excerpted from a distributed wind workshop that PNNL put on for federal agencies in early 2017, shows how Oregon compares to the rest of the nation on these three key factors for a distributed wind market⁷ (greener is better):



Alice further notes that small wind never received the same level of market support from the federal government as solar. She feels there is a chicken and egg issue at work: without incentives the market will not respond, but when there is no market states do not want to provide incentives. She noted that states also do not want to provide incentives where there is not a good wind resource.

Navigant Research: Market Data Small and Medium Wind Turbines

Navigant Research also tracks the small wind market. Compared to PNNL their research is global in nature but their view into the US and North American small wind market is consistent with that of PNNL, showing a market that is small and relatively stagnant.

⁷ <u>http://wind.pnnl.gov/pdf/DW_Workshop_Slides_final_PNNL.pdf</u> - Slide 24

Annual Installed Capacity of Small and Medium Wind Turbine Units by Power Class, United States: 2005-2016⁸



Looking into the future Navigant predicts that growth in the small wind market will largely take place in Asia and, to a lesser extent, Europe. They forecast very small but steady growth over the next ten years in the North American Market.



Small wind forecast (MW): Little growth expected in North American Market9

⁸ <u>https://www.greenbiz.com/article/signs-shift-market-wind</u>

⁹ Executive summary, Navigant Market Data: Small and Medium Wind Turbines | Demand Drivers, Market Trends and Challenges, and Global Market Forecasts: https://www.navigantresearch.com/research/market-data-small-and-medium-wind-turbines

Other state-level incentive programs for small wind

From research and conversations with staff from ITAC and the Minnesota Department of Commerce Energy Trust staff were able to produce the table below showing the current status of state programs providing incentives to support small wind installations.

The list may not include all states which previously incentivized small wind programmatically. Other than Oregon only four East Coast states continue to offer small wind incentives.

State	Small/Distributed Wind Program Status		
California	Program eliminated		
Maryland	Program eliminated		
Massachusetts	Program operating but only for turbines >100 kW		
Minnesota	Program eliminated		
Nevada	Program eliminated		
New Jersey	Program eliminated		
New York	Program operating, incentives available		
Pennsylvania	Program operating, incentives available		
Vermont	Program operating, RFP with other technologies		
Wisconsin	Program eliminated		

New Jersey

New Jersey offered incentives for small wind systems until 2011, when they shut their program down after two separate incidents on different installations, a fire and thrown blades. Following the shut-down, the incidents were thoroughly investigated and, in 2015, the New Jersey Office of Clean Energy (NJOCE) published a full evaluation of their small wind program.¹⁰ After publishing the evaluation New Jersey chose to keep their small wind program shuttered.

New Jersey supported a similar number of installations to Energy Trust and many of their customers' experiences are similar to reports Energy Trust has gotten from Oregon customers. Key excerpts from the evaluation are re-printed below:

"NJOCE has supported the installation of 39 customer-sited wind energy projects throughout New Jersey. These projects have generated significantly less electricity than expected, and customers have undergone extensive challenges related to system O&M. On a fleet-wide basis, these NJOCE wind projects generate approximately 68% of the expected electricity, and this number falls to 45% for the majority of projects with nameplate ratings of 50 kW or less. This low result is partly due to the substantial operational issues exhibited by systems funded under the NJOCE programs. Customer interviews revealed that 60% of funded systems experienced at least some notable downtime, characterized by the system being offline or unavailable despite available wind resource and grid conditions. Downtime was caused by a mix of mechanical and electrical issues that varied widely from site to site for events such as alternator failures, worn bearings, brake failures, and, in one case, fire.

¹⁰<u>http://www.njcleanenergy.com/files/file/Library/NJOCE%20Wind%20Biopower%20Fuel%20Cell%20Eval</u> uation%20Report-03202015.pdf

In addition to these maintenance issues, the available wind resource data to support preinstallation estimates of electrical output are extremely limited. Public or free data sources are outdated or have insufficient resolution to accurately assess site-specific wind resource conditions. The available fee-based wind resource assessment options are prohibitively expensive compared to the cost of typical small-scale wind energy systems.

Based on these findings, we do not recommend that the NJOCE fund further small-scale wind energy projects at this time. Larger wind projects tend to be more cost-effective and are generally developed based on a more thorough understanding of the available wind resource."

"Among smaller projects, with nameplate capacities of 50 kW or less, funded systems are generating less than 50% of the pre-installation estimates. This poor performance appears to be attributable to a combination of equipment failures/downtime and inaccurate pre-installation estimates. In the study sample, 60% of owners' wind energy systems experienced substantive downtime; the average total downtime was 200 days. The frequency of failures varied by wind turbine manufacturer..."

New York

On July 5, 2017 Energy Trust staff spoke with Dana Levy, a program manager with NYSERDA to discuss New York's distributed wind program. As noted earlier, New York has the strongest small wind program in the nation and supports approximately 25 percent of all turbine installations nationally.

Dana reported that the NYSERDA program provides incentives to about 40-60 turbines annually, most are 10kW turbines, and most are installed under a specific installer's leasing program¹¹. He noted that it takes one full time staff member to run the program and questioned whether the labor is justifiable over the long term based on the relatively limited impact and large amounts of incentives that are necessary to sustain installations.

In Dana's view, New York's small wind customers are not installing turbines to save money but to make a visual statement. He is skeptical that better turbines would dramatically increase sales in New York but might make the financial picture "less punishing" to customers. He does not believe that small wind can compete against other options available to customers.

Small Wind Manufacturer

Energy Trust staff spoke to an Oregon-based small wind manufacturer to alert them to this proposal. The manufacturer reported that they are entirely focused on export sales overseas because "there is no market for small wind in Oregon or the US." This manufacturer was not concerned with our proposal to discontinue small wind incentives.

Conclusion and recommendations

Energy Trust has long held the goal of providing support to a broad portfolio of renewable energy technologies and wind is one of the renewable energy technologies under our statutory purview. We don't take unreasonable risks with ratepayer dollars, but we are willing to share some risk with project owners who put their own capital into renewable energy projects that appear viable and meet our organizational above-market cost criteria. Energy Trust has

¹¹ Energy Trust hoped the same company might offer a wind lease in Oregon back in 2014. Energy Trust staff worked in 2014 and 2015 to encourage a leasing model market here but was unsuccessful.

provided just over \$2 million in incentives to small and community-scale wind projects, 1.6 percent of the total renewable energy incentive investments made from 2002 through the end of 2016.

In the case of small wind, the market and technology have not matured as we hoped. We learned from the early installations we supported, and made changes to attempt to incentivize small wind systems with improved performance and reliability. Those efforts had limited success due to market conditions beyond our control. At this time, due to the many challenges described in this paper, we recommend discontinuing incentives for small wind systems.

For community-scale wind projects the situation is somewhat different. While the technology itself is well proven, there is simply not a market for projects such as these in Oregon. At this time, we recommend limiting incentives for community-scale wind to projects under development by or for municipal-ownership purposes.

Energy Trust staff do not anticipate any significant impacts to Oregon's small or community wind markets to occur based on our proposal. In Oregon there are no known contractors actively promoting small wind installations and, as noted above, only two installations have been incentivized since 2015. Likewise, since 2015 we have only provided development assistance incentives to one proposed municipal community wind development, and that would be eligible to continue under this proposal.

Energy Trust is seeking the feedback of the RAC on these recommendations.

If the RAC is supportive of this proposal Energy Trust would move forward in this current quarter by making changes to align our website with our current views on small and community wind. We would provide web visitors with the reasons why Energy Trust does not recommend the installation of small wind turbines at this time and encourage interested individuals and organizations to investigate solar. We estimate these changes will result in a small but measurable reduction in staff time related to responding to small wind phone calls.

If there are significant concerns raised by the RAC, Energy Trust staff will review the concerns and consider changes to this proposal, which would then be brought back to the RAC for further review.