Briefing Paper

Renewable Energy Programs

June 8, 2012

Summary

The first part of this paper reviews Energy Trust renewable energy programs, how they are structured, how they have performed, and where they are headed. The second part of the paper reviews the Oregon renewable energy industry, the policy changes that are affecting it, and how these affect Energy Trust's under-20-megawatt market niche.

Table of Contents

1. Energy Trust's Role
   A. Statutory and regulatory framework
   B. Planning framework
   C. Programs
   D. Results
   E. Financial pressures
   F. Where is Energy Trust's renewable program headed?
2. Oregon's Renewable Energy Industry
   A. Oregon Renewable Energy Supply
      1. Generally
      2. Under-20 aMW Resources
      3. Solar
      4. Developers, Installers and Manufacturers
   B. Renewable Energy Demand: State Policy Drivers
   C. Key Issues Facing the Oregon Industry
   D. Barriers and Options in the Under-20 aMW Market
3. Summary

Discussion

1. Energy Trust's Role

A. Statutory and regulatory framework

Energy Trust's role in Oregon's renewable energy industry was defined broadly by SB1149 in 1999 as funding the above-market costs of renewable resources. Energy Trust helped fund utility-scale wind projects and smaller solar, biopower, wind and other projects.

In 2007, the Oregon Renewable Energy Act, SB 838, narrowed Energy Trust's focus to projects of 20 megawatts and less ("<20 MW"). Since 2008, we've been squarely focused on <20 MW resources.

Under Energy Trust's grant agreement with the OPUC, the OPUC establishes minimum "performance measures" for Energy Trust programs. These performance measures vary from

year to year. They changed significantly after 2007, when Energy Trust renewable energy funding was limited to smaller projects. The 2005 performance measures called for an average of 15 aMW; in 2008, it was 3 aMW for < 20 MW resources. With changes to the Oregon energy tax credits and other factors, performance measures need to be re-thought.

Energy Trust renewable energy projects are expected to acquire "renewable energy certificates" (RECs). In the renewable industry, RECs represent the value that a renewable project brings that a non-renewable project doesn't. RECs may be traded in voluntary markets, but are increasingly important in meeting state renewable energy requirements.

B. Planning framework

In 2010, Energy Trust staff, with board and stakeholder support, developed a Renewable Energy Sector strategic plan:

> Vision Statement: Oregonians invest in clean energy project development because they value the environmental and long-term economic benefits derived from small-scale renewable power production and energy savings.
>
> Mission Statement: To catalyze development of small-scale renewable energy systems that utilize Oregon's diverse and abundant resources.

Based on this plan, the 2011 board retreat discussed several future directions for renewable programs:

- Support all five technologies, and not pick "winners" among them
- Increase early support for custom projects (feasibility studies, grant-writing, permitting and interconnection assistance), and rework how we deploy incentives for these projects
- Expand teaming/leveraging opportunities
- Maintain standard incentive programs (solar and wind)
- Revise OPUC performance targets to reflect the effects of Oregon's limited energy tax credit programs.

C. Programs

Energy Trust has used two different program approaches: standardized and custom.

The solar program is largely standardized. It provides a streamlined process for project incentives for residential and commercial solar electric systems. These projects typically range from two kilowatt (kW) residential systems to 200 kW commercial systems. A strong trade ally network delivers these incentives. We support quality installations through our standardized requirements and provide data to inform policy makers of market needs. The solar program uses more than half of our renewable budget (75% PGE, 30% Pacific Power).

In contrast, biopower, geothermal, hydro and wind are custom programs. Energy Trust cost-shares early-stage feasibility studies and development expenses, and negotiates project incentives based on the project's above-market cost. Custom projects are typically less than three megawatts (MW) and may be publicly or privately owned. With the end of the Business Energy Tax Credit for renewable projects, the above-market cost of a single project larger than five MW would consume nearly the entire custom incentive budget.

D. Results

Since 2003, Energy Trust has supported the development of 4,100 projects, a total of 104.5 average megawatts (aMW) across the five technologies: 91 aMW in utility projects and 13.5 aMW in small-scale projects. Of the 13.5 aMW, biopower projects make up 48% and solar and hydro projects are 33% and 18% respectively. Wind and geothermal projects are small (<2%) but growing.

Of the 4,100 total projects, 4,039 have been solar, which has grown at an average rate of 78% per year from 2007 through 2011. The other technologies follow a saw-tooth pattern.

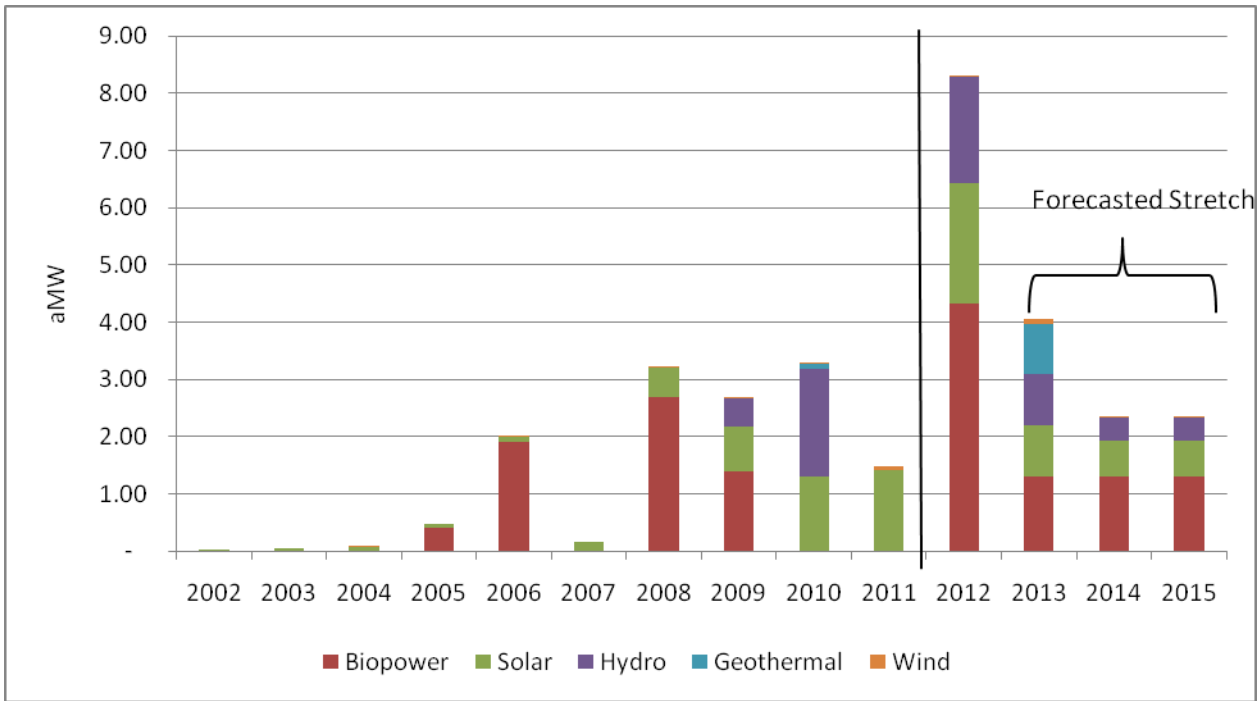

Figure 1: Annual installed generation by technology

This table shows a major growth in biopower and hydropower generation in 2010 and 2012. This largely reflects projects that secured BETC tax credit funding before those credits were significantly scaled back. The drop-off in 2013 and 2014 reflects depletion of carryover funds (as discussed below), a more limited level of generation that Energy Trust can achieve without state tax credits for these projects, and the uncertain state of federal tax incentives.

Much of Energy Trust's renewables work involves early-stage market and project support. Small project owners are often not energy developers by trade. These projects require even more time, effort and knowledge than utility scale projects. Examples of the projects that have resulted from early-stage support include;

- At least six irrigation districts have installed or plan to install new hydro generation; Energy Trust jump-started this market;
- Dairy biogas has grown from a few struggling systems to more than eight;
- Energy Trust provided essential early-stage technical assistance and has committed funding to the first two low temperature geothermal projects in Oregon.

Energy Trust has helped Oregon's solar market grow while reducing cost, improving customer service, and improving installation quality. Energy Trust helped to validate net-metering. Our investment helped make net-metering available for larger-size projects (25kW). Energy Trust has seen project costs increase to peak in 2008 followed by a continuing decline to just about $5.40/W today. Prices increased early in the program as contractors figured out what their markups needed to be to make money and grow their businesses. Initially, there were 12 Energy Trust trade ally installers with no employees working out of their trucks. Then the global silicon shortage drove prices up worldwide through 2008. When global prices started to drop, prices in our market lagged a year. It was the Solarize competition in 2009 that forced prices down in Oregon to match the global trend.

Throughout the program history, our incentives have decreased from $4.25/w to $1.25/w or lower to maximize our budget and leverage other funds available to support projects (state and federal credits). Participation has exploded since 2009 with the development of the Solarize model, continued federal and state incentives and 3rd party financing approaches.

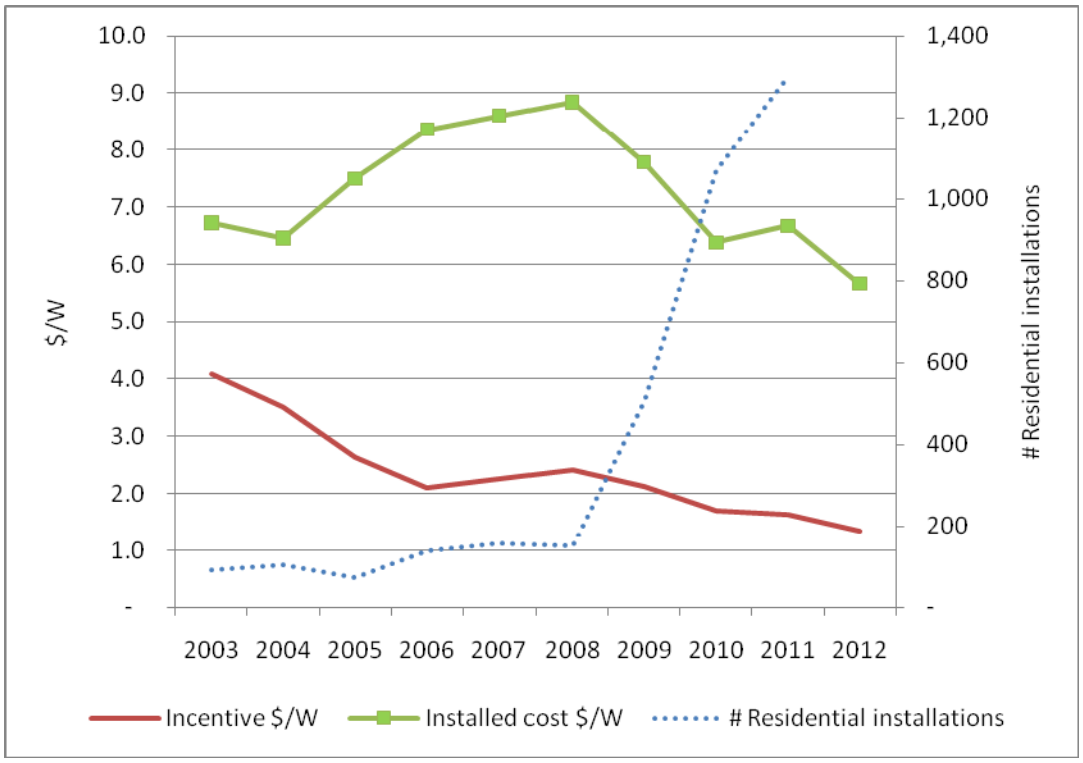

Figure 2: Energy Trust average $/W incentive by year and average installed project cost

While Energy Trust is a relatively small player in the Oregon's renewable energy industry as a whole, its involvement has in some ways been a game-changer. Energy Trust provides stability in a landscape of shifting tax policy, government grants and avoided costs. We make incentives consistently available to help a base of installers grow. We have created application processes that work well for customers, designed the timing of our incentive payments with customers in mind, and worked hard to make projects successful. Our early-stage technical assistance has been particularly well received, and it has resulted in a healthy pipeline of custom projects.

E. Financial pressures

Funding for Energy Trust's renewable programs is fixed at 17.1% of the 3% public purpose charge created through SB1149. Starting in 2010, Oregon reduced business energy tax credits sharply. The cut-backs put a much heavier burden on Energy Trust finances – we have to spend more money for fewer projects.

In 2013, Energy Trust also will lose the large budget surpluses that characterized past renewable energy program budgets. "Carryover" funds gave us flexibility in managing renewable programs between 2008 and 2012. As of 2012, the carryover in Pacific Power territory was fully depleted (because Pacific's rural territory has more renewable opportunities), and we expect to reach that point in PGE territory in 2013. The absence of carryover funds will reduce the PGE budget by 50% compared to 2012, from $16 million to $8 million. The Pacific Power budget will be relatively steady at about $5.7 million. Figure 3 plots our activity budgets by utility:

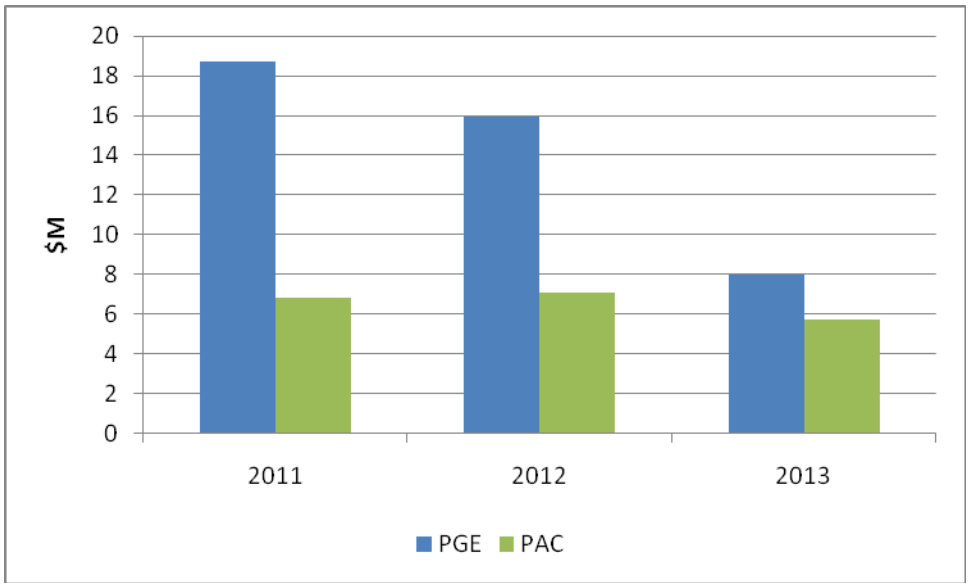

Figure 3: Renewable Activity Budgets by Utility

F. Where is the Renewable Program Headed?

We continue to support all technologies because the prospects for each technology ebb and flow with policies and market influences unique to each resource. We provide incentives for technologies in up-markets (e.g., currently solar, net-metered biopower). For technologies in down markets, we mainly provide early-stage support so they can move forward when conditions improve.

Because the Pacific Power project incentive pipeline (as of January 2012) exceeded the 2012 budget, we adopted a competitive process to award incentives to the best projects. Because the majority of the 2012 Pacific Power budget is now allocated, we're shifting to rebuilding the project pipeline for the next round of competition, likely early 2013.

As we rebuild the pipeline we're still working to complete projects to which we previously committed. The board approved 10 custom projects 2009-2012, totaling ~$15 million in incentive funds. To date, two are complete, five expected to complete in 2012, two in 2013 and one funding agreement has been terminated.

What's in the next phase of projects? The following table shows that what's been successful in the past may not be where projects develop in the near-term future.

Technology	Successes	Challenges	Future Direction
Biopower	▪ Developing biogas market through 3rd party dairy digester development (RES, Farm Power) ▪ Waste water treatment facilities digester installations and capacity additions ▪ Biomass at Rough and Ready (sawmill)	• New co-digestion developer pulling all the pieces together • Co-digestion at wastewater facilities and sorting through the feedstock issues	• Net metered, co-digestion, facilities able to use the biomass collector tax credit • Upgrades to existing facilities to maintain and improve operations
Hydro	▪ Irrigation districts when tax credits and QF rates were favorable (COID, Klamath) ▪ Broke new ground in federal permitting streamlining, education efforts	City of Astoria example of environmental regulation roadblocks	Net metered systems and new technology low head/low flow (NATEL)
Geothermal	Low-temperature, existing-well systems	High-cost, high- risk in early study and drilling	Existing wells, early support to bring projects to investment stage
Small Wind	▪ A small set of qualified installers ▪ National collaboration on turbine standards	Technology performance, difficulty in accurately predicting energy output	Net metered, rural industry
Large Scale Solar	In the past 3 years we've committed to three utility scale custom solar projects, enXco, Baldock and Obsidian, all in PGE territory which will count towards PGE's large-scale mandate.	PGE has achieved its mandate, PAC needs to invest but the market conditions are challenging without BETC and constrained ETO budget for PAC	Future large-scale projects will compete for funds for other custom project incentives.

Solar is a special case. The year started off with a burst of demand, requiring us to shift funds from other accounts to meet residential and commercial solar demand. We have stepped down incentive levels. For the rest of this year, we will focus on reaching a plateau in a market where our incentives still sustain development. Costs are dropping, and we are less instrumental than in the past.

2. Oregon's Renewable Energy Industry

This section first outlines renewable energy ***supply***: resources, transaction types, developers/installers and manufacturers. We then discuss factors influencing ***demand***: policy drivers, regulatory protocols, and market influences. Finally, we describe key issues facing Oregon's renewable energy industry generally, and in the <20 MW market.

A. Oregon Renewable Energy Supply

1. Generally

In 2010, Oregon renewable energy production was ranked 3rd in the nation (behind California and Washington). As of 2011, capital investment in Oregon wind, solar and geothermal projects was $5.4 billion (Renewable Northwest Project (RNP)). Hydropower is a mainstay, but other renewable generation is growing – Oregon large-scale wind exceeded 2,500 MW capacity in 2011. About 10% of Energy Trust utilities' load is met with renewable energy, including hydropower that meets "low-impact" standards. Generation by utility:

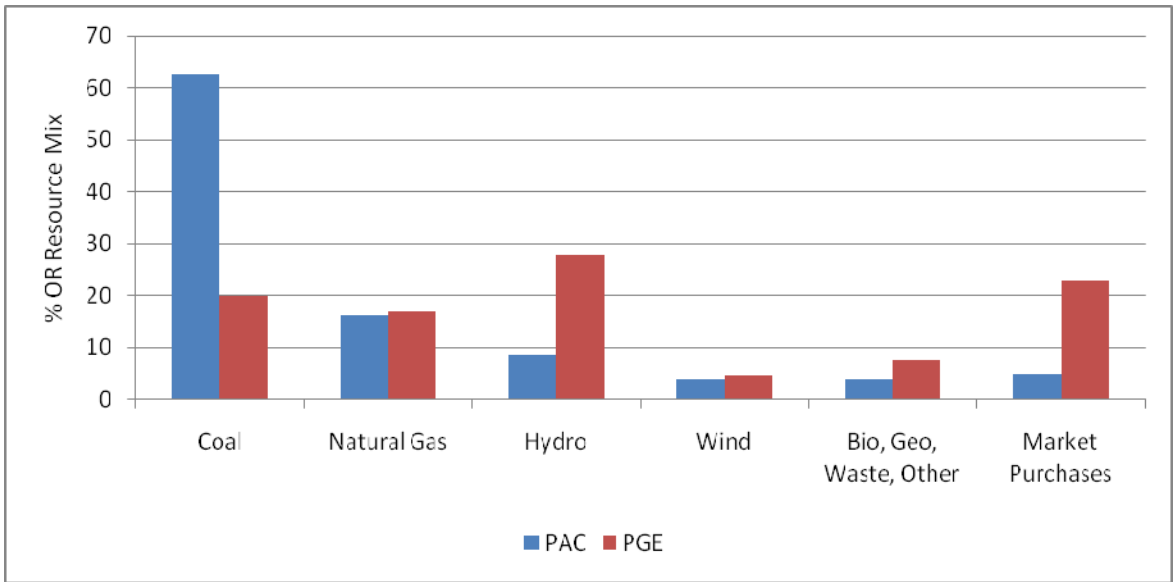

Figure 4: Resource mix to serve load by utility (Source: ODOE website)

We estimate Oregon's installed < 20 MW renewable generation for 2010 not owned and operated by utilities at 123 aMW state-wide, including Energy Trust resources. An additional 70aMW of biomass greater than 20MW is in the "in-between" range of small scale and utility owned resources. The following table breaks down existing <20MW:

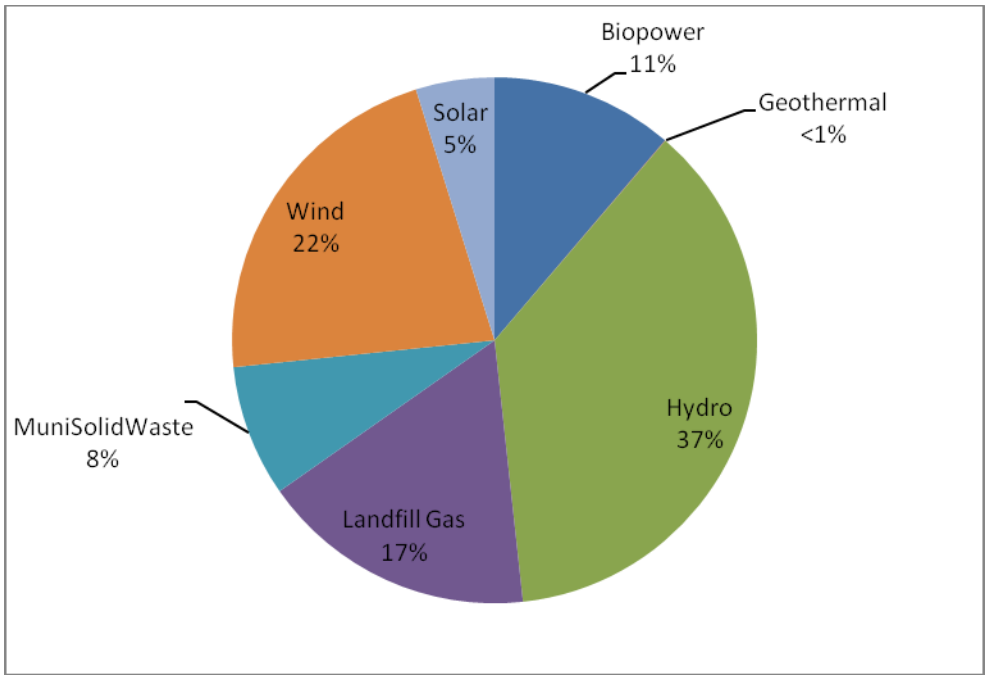

Figure 5: Breakdown of Oregon renewable resources < 20MW by technology

The transactions by which these under-20 MW projects are developed are of several types:

Qualifying facilities. The Public Utility Regulatory Policies Act of 1978 (PURPA) requires utilities to buy power from qualifying facilities ("QFs") under standardized contract terms and avoided cost rates (the incremental cost a utility would have to pay if the utility generated the electricity).[1] In 2010, there were 48 renewable QFs in Oregon, providing just over 70 aMW. Community wind installations in north and northeastern Oregon generated 47% of that total, hydro power 26%, and biopower 21%.

Some QFs are "off-system," located where they cannot connect directly to Pacific Power or PGE control area, and must be conveyed, or "wheeled" via other utility lines to interconnect with Pacific Power or PGE networks, where Pacific Power or PGE buys the energy under standard QF contracts.

The requirement that utilities purchase QF output is powerful. It lets developers know there will be a market for their product and utilities will work with them. The fact that utilities will pay a transparent price is also important, although it may not provide enough cash flow for projects to pencil out.

[1] In a 2005 OPUC Order, 05-584, the Oregon PUC prescribed how PGE and Pacific Power determine avoided-cost rates Consumer-owned utilities (COUs) in Oregon are governed by the federal and state PURPA laws but are not bound to Order 05-584. COUs must purchase power from QFs at their current avoided cost, but this is typically the current Bonneville Power Administration (BPA) rate, which is much lower than the currently filed avoided costs for IOUs. Both parties can agree to have the project wheel to another utility for purchase.

Net-metered systems are very small systems that generate and use power on-site and can exchange power with the utilities at the utility's retail tariff rate. They are typically solar, wind, hydropower, fuel cells or biomass to generate electricity. (Geothermal is currently excluded from net-metering). The OPUC net-metering rules require utilities to use a standard application and agreement, and establish reasonable procedures and timelines for interconnection. Equipment must meet certain standards. These rules make it easy for customers to connect to the grid and offset their own electricity needs.

The number of net-metered installations has grown exponentially over the past couple years due to the explosion in small-scale solar installations. The following graph shows this trend in solar installations.

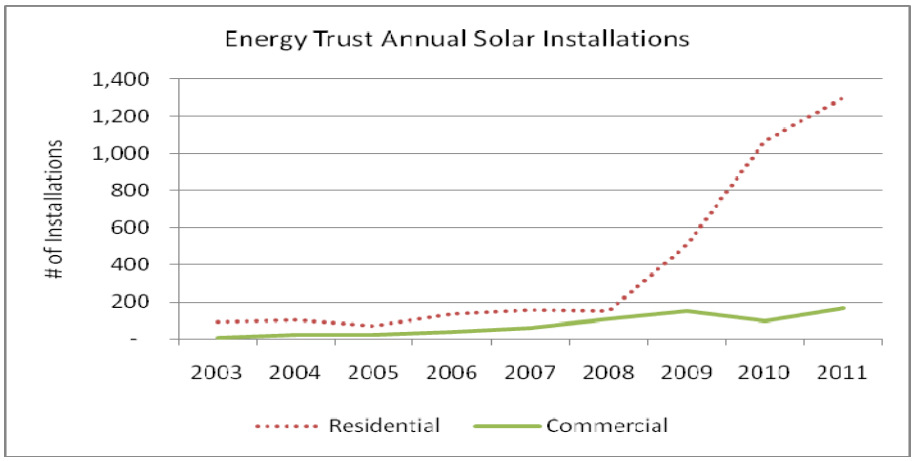

Figure 6: Energy Trust supported annual solar installations

The large growth in 2009 reflects the advent of Solarize programs, continued state and federal tax credits, declining installations costs, and third-party financing models.

Partial requirements projects are projects that use their generation to offset on-site load and also purchase power from the utility. Waste-water treatment plants are examples. If they cannot generate enough to fully meet the process load at all times, they need utility power.

2. Under-20 aMW Resources

Across all technologies, we estimate potential generation of 450-550 MW of < 20 MW projects, which is more than 20 times the amount of small scale installations we have supported to date. The potential varies by technology:

- Solar potential: In theory, solar is virtually limitless. Every roof could be "solarized" with solar panels or roof tiles, countless windows could have sun shades, and many potential sites for stand-alone structures. While costs have come down significantly, the limiting factor is still relatively high cost. There are other limitations such as competing uses of flat, unshaded land. More on solar below.
- Hydropower potential: Our studies suggest an opportunity for about 40 MW of hydropower on irrigation district system canal systems; emerging low-flow technology could add another 20MW. Hydropower in municipal water systems and ranches could

provide another 10MW. All of these in-conduit hydropower systems face tough barriers from environmental regulations, water utility planning cycles, and funding.

- Geothermal potential: There is a rich geothermal resource in southern and central parts of the state. Because drilling new wells is risky, new wells are the province of large-scale developers, and small-scale projects within Energy Trust's scope tend to involve existing wells. Recently US DOE has invested more than $100 million in geothermal funding in Oregon, mostly for efforts to improve the industry's ability to identify and characterize resources. At this point we estimate 40 MW of identified potential in the Energy Trust size range.
- Biogas: Interest continues to grow and Energy Trust is right in the middle of it. A recent study by Climate Trust and Energy Trust estimated 100 MW of new potential at dairies, wastewater treatment plants, and food processing facilities.
- Biomass: Biomass has been part of the Oregon wood products industry for decades. However, over the past 10 years, the emphasis has been on keeping existing systems running. Biomass generation is challenged by competition for feedstock in a bad housing market, low energy prices, uncertain forest product markets, uncertain forest management practices, and high projects capital costs. ODOE, Business Oregon, and Energy Trust have identified 200 MW potential, and are attempting to grow this market. Along with the Governor's biomass initiative, there is potential to turn this industry around when the housing market recovers.
- Wind: We have not done a resource assessment, but estimate a potential of 10 MW of small wind, and an additional 30 MW of community-scale wind. Improved modeling and technology for characterizing wind resources will help focus our efforts.
- Demonstration projects: Energy Trust also supports demonstration projects with promise of being highly replicable in the near term (~ 5yr).
- Other technologies: We have not funded fuel cells or energy storage, e.g., battery applications to pumped storage hydro. Two years ago we considered a wave project. We thought the technology was in too early a stage of development. When it becomes ready for development, it would need to be scaled beyond 20MW to be cost-effective. We continue to monitor the wave industry; the executive director of the Oregon Wave Energy Trust is on the RAC.

3. Solar Market Maturity

The cost of solar has declined significantly in the past 5 years and is forecasted to continue to decline. The following table shows global average installed system prices driven largely by high volumes of installations in Europe. While current prices in the US are higher than these numbers, the downward trend is being seen in Oregon. US prices have always been higher than European prices most likely due to the higher volume and density of installations, the standardization that has occurred in the delivery chain, and the greater customer awareness and shorter payback.

Total Installed PV System Prices and Costs of Electricity (Global Average)

Year	System Price ($/W)	LCOE Range (cents/ kWh)
2007	$7.20	28 - 47
2008	$7.00	27 - 45
2009	$5.12	20 - 34
2010	$4.55	18 - 30
2011	$3.47	14 - 23
2012*	$2.69	11 - 19
2013*	$2.43	10 - 17
2014*	$2.19	9 - 15
2015*	$2.02	8 - 14
2016*	$1.87	7 - 14
2017*	$1.73	7 - 13
2018*	$1.60	6 - 12
2019*	$1.48	6 - 11
2020*	$1.37	6 - 10
2021*	$1.28	5 - 10

*Source: Clean Edge, Inc., 2012. 2007 through 2011 are actual figures and *2012 through 2021 are estimates. Figures calculated using Clean Edge cost projections and the NREL Levelized Cost of Energy (LCOE) Calculator. ASSUMPTIONS: Discount rate: 6%; Capacity factor: 16-26%; O&M cost: $6-$26/kW.*

Additional solar market forces are coming into play. National-scale installers can often buy panels at lower rates and offer attractive deals to homeowners than local installers. Also, a growing number of third-party financing models (63% of Energy Trust projects were third-party in the first quarter of 2012) are increasing competition in the local market. In the last few years, Oregon's Volumetric Incentive Rate (aka feed-in tariff) has added capacity 80% of Energy Trust capacity in 2011 and forecasted to be nearly equivalent to Energy Trust in 2012 (7,800 kW dc).

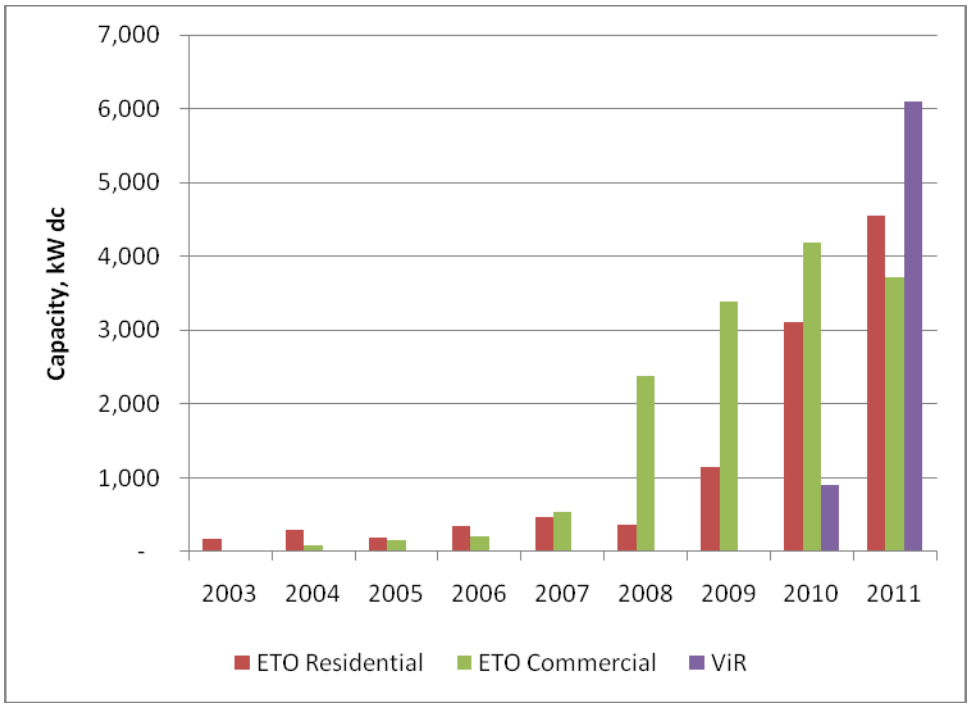

Figure 7. Annual Solar capacity installations

4. Developers, Installers and Manufacturers

Oregon and Portland in particular, is a renewable energy hotspot. Three utilities are headquartered in Portland: PGE, Pacific Power, and Bonneville Power Administration. Oregon adopted a renewable portfolio standard relatively early. Wind turbine manufacturer Vestas, Iberdrola and enXco have US headquarters here.

The silicon forest area near Hillsboro has sprouted a hub of seven solar cell manufacturing plants within the past 5 years, attracted by low power cost, technical resources and local demand for solar panels. This represents 2,100 jobs and $1.7 billion capital investment. Trade conflicts have arisen involving lower-cost of Chinese panels and a protective US tariff.

The residential and commercial scale solar electric market is supported by a network of trade ally installers. Energy Trust was instrumental in creating this network, providing training and technical guidance in permitting requirements. When Oregon required investor-owned utilities to create a Volumetric Incentive Rate pilot (similar to a feed-in tariff), the Energy Trust network made a successful program possible.

B. Renewable Energy Demand: State Policy Drivers

Oregon has a long renewable energy policy record. These policies help the industry weather the ups and downs of federal policy, but have had their own ups and downs. The following quick-reference table is followed by more detailed descriptions of state tax credits and the Oregon Renewable Energy Act.

Timing	Policy/Decision	Description	Influence on renewable industry	Status
1976	Property Tax incentive	Added property value for net metered renewable systems may not be included in property tax assessment	Helps justify projects, removes disincentives	Expires 7/12 – extension unknown
1979	State tax credits (BETC)	35%-50% tax credit, modified over years	Major influence in past 10 years, final BETC projects to be completed in 2012	Now funded at < 1% of prior funding; take the form of grants; they no longer drive investment
1979	SELP	State Energy Loan Program	Several projects ETO received SELP loans, helpful	Not currently as active
1999	SB1149	ETO funds for above-market cost of renewables support	Over 104 aMW installed, solar delivery market developed, niche support for other distributed generation	Extended through 2026 with original funding structure
2005	PURPA, OPUC order in UM 1129	Avoided-cost rate methodology and QF contracts	Streamlines negotiating process for small-scale developers	Current avoided-cost rates too low to float projects. New renewable-only rate is even lower
2007	Oregon Renewable Energy Act (SB 838)	1. Utilities must meet 25% of demand with renewables by 2025 2. Goal: by 2025, meet 8% of demand from community energy projects < 20 MW 3. IOU voluntary green power programs became mandatory	1. Prompted significant large-scale wind growth 2. No driver for community energy development 3. Clear industry signal that Oregonians want green power	1. IOUs expect to meet requirements through 2018 at lower cost than alternative resources 2. No one is responsible for meeting goal, and it is unlikely to be met 3. Green Power supported with RECs from resources in and out of state plus a small portion of grant projects
2007	BPA Tier 2	Consumer-owned utilities subject to renewable requirements lower than IOUs	BPA renewable purchase will drive additional development. No Energy Trust impact yet, but at some point will compete with us for rural projects	Concerns over price increases (Tier 1 low cost hydro system is allocated)

2008	HB 2620	1.5% of the cost of a building funded by the state must be dedicated to solar	With Energy Trust incentive, even more capacity is installed than 1.5% supports	Government has become a key market while non-government commercial projects may stall
2009 / 2010	HB 3039 with HB3690 clarification 1. Solar RECs 2. Large solar capacity mandate 3. Solar volumetric incentive rate	1. Solar RECs count double toward renewable energy requirements 2. 20 MW to be installed by 2020 3. Four-year pilot, through IOUs, similar to feed-in tariff	1. Large PV projects receive 2xRECs 2. Utility RFPs for large-scale solar help this market, but without BETC, there is delay in meeting goals 3. Similar volume of projects as ETO, doubles market activity, reduces cost, evaluation in process	1. Help drive utilities to meet large scale mandate 2. Utility RFPs for large-scale solar help this market, but without BETC, there is delay in meeting goals 3. Similar volume of projects as ETO, doubles market activity, reduces cost, evaluation in process
2007/2011	Various	Biomass collector tax credit extension – sunsets end of 2017	Significant benefit to biomass projects to offset loss of BETC	Continues through 2014

Oregon energy tax credits (BETC) once contributed up to 50% of project cost. They have been replaced by a very limited Renewable Energy Grant program. Grants are issued on a competitive basis and capped at $250,000 per project. The full program is capped at 1% of past BETC levels. In response, the industry is looking for other funding, deferring development, and/or looking to other states. 2012 will be the last year that Energy Trust projects benefit from BETC. It will be a banner year for projects, and the end of an era.

The 2011 board retreat discussed the impacts: a large increase in Energy Trust above-market cost, much more than our renewable budget can absorb. In response, we've started to target even smaller scale projects,

Project Type	Project Size	No BETC AMC (for a single project)	% 2012 Budget ($5.5M PAC, $8.5M PGE)
Hydro	1-2aMW	$6-8M	44-60%
Geothermal	0.1 aMW	$1M	7.50%
Biopower	0.7-1.3aMW	$3-4.5M	22-33%
Wind - Mid	0.04 aMW	$0.5M	4%
Wind - Community	3aMW	$6M	44%

Figure 8. Project impacts of BETC changes

2007 Oregon Renewable Energy Act, SB 838. The 2007 Act requires utilities to meet 25% of retail load with certified renewable energy generation by 2025; set a community energy goal, for the state to generate at least 8% of its electricity from projects less than 20 MW in size by 2025; limited the renewable energy funds that Energy Trust administers to projects of 20 MW and less; and extended the sunset date of the public purpose charge that partially funds Energy Trust to 2026.

The most recent PGE and Pacific Power integrated resource plans indicate that they will meet these requirements through 2018 based on renewable purchases already in place, without adding significant additional renewable resources. They forecast that eligible renewable resources will be less expensive than the proxy plant, a combined-cycle gas turbine.

The table below plots estimated renewable energy supply from PGE and Pacific Power recent IRPs summed and plotted against renewable energy requirements. Supply begins to decline after 2015 due to contracts reaching term. The requirements are met with existing supply through 2019. The community goal compared to Energy Trust projected installations shows a gap that will be filled in part by other programs that aim at the same-size projects: utility large-scale solar projects (mandated to achieve 20 MW by 2020), and the Volumetric Incentive Rate (ViR, aka "Feed in Tariff") pilot for small-scale solar systems. However, the goal is not explicitly linked to these projects, and it is unlikely to be met.

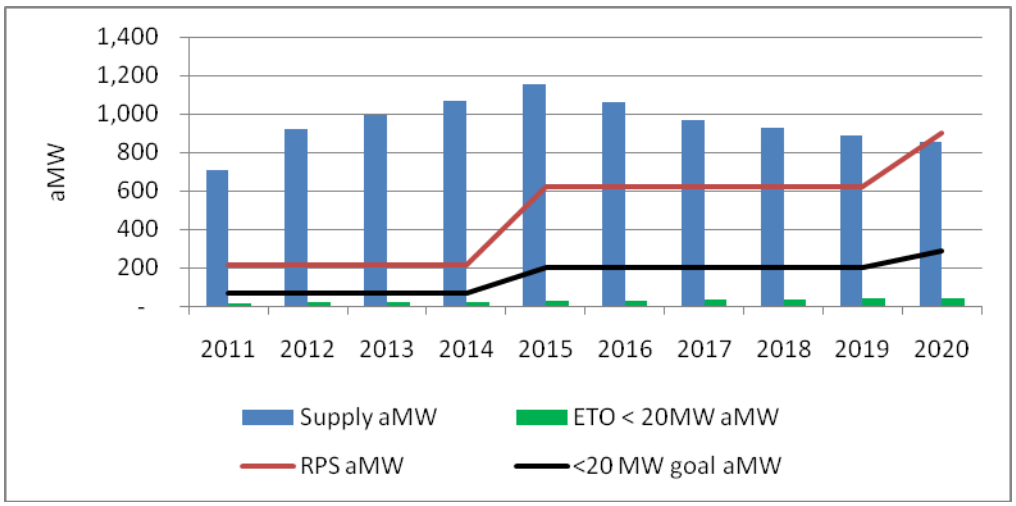

Figure 9. PGE & Pacific Power renewable supply compared to portfolio requirements

The 2007 Act also required investor-owned utilities to establish green power programs for customers who choose to participate. PGE and Pacific Power's programs are consistently ranked within the top 5 programs in the nation. These programs are based primarily on RECs purchasing through the voluntary[2] market. The utilities also develop projects for these programs. Energy Trust has co-funded several.

Of the 12 elements listed in the table above, only a few bright spots remain: Energy Trust funding, 1.5% for solar, the BPA tier-2 requirement, and the biomass collector credit.

[2] "Voluntary market" means RECs offered for sale that are not required to be purchased by state law.

C. Key Issues Facing the Industry in Oregon

Lack of drivers. Utility requirements are forecasted to be met through 2019, and no large-scale renewable investments are currently planned. PGE has nearly met their large-scale solar capacity mandate, and PacifiCorp is not far behind. This has helped depress the REC market in Oregon. Oregon REC prices are low compared to other states (~$2/REC). REC revenues, once thought to be a way to fund projects, are largely a non-factor.

Transmission and integration issues hinder renewable project growth. The BPA system has 4,000 MW of wind on its system. Because much of the wind resource is part of the same weather pattern, output can jump from 0 to 3,000 MW within hours. Integrating this resource with other resources on the grid is a challenge. Although largely a large-scale generation issue, this problem and its solutions (e.g., energy storage and demand management) has implications for the smaller-scale renewable market.

Diminished funding and tax credits undermine the business case for projects. Third-party developers have directed their attention outside of Oregon.

Growing environmental pushback to renewable project development. As renewables have grown more "mainstream," opposition has emerged, based on species impacts, scenic impacts, and other environmental considerations.

Interaction with neighboring states has been positive and negative. A portion of California and Washington renewable requirements can be met with out-of state resources. However, many of California's requirements have already been met, and projects that Energy Trust would support are too small to capture the attention of California utilities. Washington offers a double-REC credit for smaller projects, which may interest Oregon developers in selling power to Washington utilities.

D. Barriers and Options for the < 20 MW Market

1. Barriers

Avoided-cost rates for qualifying facilities continue to decline as gas prices fall: recent avoided-costs are 30% lower than before.

The cost of integrating variable-output resources, even at the < 20 MW scale, reduces the rates utilities pay QFs. Increasingly, QFs are feasible only if they have revenue streams from other business lines (e.g., dairy biopower), or the owners have long payback horizons (irrigation districts).

The growth of net metered systems has brought the region to reaching the limit of 0.5% of load, set several years ago. This limit is under review by the OPUC

Lack of uniformity in interconnection and power-purchase standards make it hard to develop resources that have to deliver power distant loads. Consumer-owned utilities in rural locations are not obligated to purchase QF output and have limited experience in wheeling power to IOUs. The result has been mixed reactions by COUs, unpredictable prices, and added complexity.

The continued complexity of development remains a major barrier. This is largely the reason we've chosen to focus staff energies on early-stage support until economics improve. Third-party developers with knowledge and skills won't develop Oregon projects until the economics improve.

2. Potential responses in the < 20 MW market

Net metering: Expand net-metering to include geothermal; raise the site limit for commercial sites beyond the current two-MW limit; add virtual net metering (ability to attribute generation at one meter to offset load at another); and increase net-metering above 0.5% of utility system load

Create ways to recognize utility value in distributed generation. The Governor's Draft Energy Plan recommends quantifying the value of having generation near load. This value is site-specific, dependent upon the condition and capabilities of the delivery system in that area, but it could help project fundamentals in some cases. Connecting utility distribution planning to distributed generation planning could help identify this value.

Turn the community energy goal into a requirement and identify tools to achieve it

Require green power programs to use new in-state resources, at least in part

Standardize resource interconnection regulation state-wide.

Add funding to state tax credits or grants limiting capacity to 10 or 20 MW

Increase the Public Purpose Charge for small renewable generation projects

3. Summary

The first figure in this paper tells the story of the evolution of Energy Trust projects < 20MW over the past 10 years. It took time to build up the small scale renewables markets to reach the forecasted peak of installations in 2012, building the business case for those projects by leveraging state and federal tax credits and avoided cost rates higher than those available today.

Looking forward we plan to manage our renewable program portfolio budget by continuing to lean towards our strengths;

- Supporting the solar market with installation incentives and a strong network of high quality trade allies
- Focusing on early stage market and project support with rounds of competitive incentive awards for custom renewables (Biopower, hydro, geothermal, wind, large solar).

This means we expect future stretch installed generation goals to be below 2.5aMW/year. We expect that future Energy Trust renewable goals will place greater emphasis on progress indicators. Due to our scale of funding relative to the above market costs of potential resources <20MW, we know that we can't contribute enough to all of the opportunities to fully make the business case but we do see particular market niches where our funding can have most impact and that's where we'll focus.

- Net Metered, co-digestion biopower facilities, able to use the biomass collector tax credit
- Upgrades to existing facilities to maintain and improve operations
- Net metered and new technology low head/low flow hydro systems
- Targeting existing wells and early support for geothermal projects
- Net metered, rural industry sites for small to mid scale wind

- Continued standard incentives and support for new and innovative delivery models for solar

2012-2013 could bring changes to state policies and regulations that improve the investment climate for small scale projects and help us move them further faster. Net metering improvements and specific requirements or benefits for utilities in working with small scale projects could have big impact. As an organization that does not lobby, we need to be largely reactive to policy and market forces around us which can be challenging as we work towards realizing our mission and goals. Energy Trust plans to be available to policy makers and regulators to provide technical support and information based upon our experience in working with these projects.