ENERGY TRUST OF OREGON
REC REPORT

March 23, 2015

Patrick Nye
Senior Consultant
Bonneville Environmental Foundation
pnye@b-e-f.org
503.709.3975

Table of Contents

Introduction

The following report has been developed in order to inform the Board of Directors and staff of Energy Trust of Oregon (Energy Trust) on the state of the market for Renewable Energy Certificates (RECs). The information presented is intended to guide Energy Trust as it conducts a periodic review of its RECs policy concerning both the portfolio it currently owns and future RECs contractually committed to Energy Trust from renewable energy projects receiving incentives.

Energy Trust manages a very large portfolio of RECs – to date, it has provided incentives to over 7,000 individual renewable energy projects, which currently includes ownership rights and control to an estimated 2.4 million RECs for 2015 through 2030. It has never sold its RECs as other renewable energy project owners often do, but is mindful to ensure there is a measurable return on environmental value to the Oregon ratepayers responsible for funding these renewable energy projects through mandated fees assessed on their individual electricity bills.

While it does not currently sell RECs, managing Energy Trust's REC portfolio does require administrative time and other resources, making policy decisions important from a staffing and budget perspective.

In order to best inform Energy Trust when considering the direction of future policies, this report details:

- What a REC is and how RECs are utilized.
- REC standards, markets, and the value for RECs – compliance and voluntary.
- How RECs are used by Oregon Investor Owned Utilities.
- Intersections with alternative environmental commodities.
- Details of the Energy Trust REC portfolio.
- How some similar organizations manage their RECs.

A great deal has changed since Energy Trust first developed its REC policy in 2004 and there have been recent shifts since its last review in 2011. While market sales have grown exponentially over the past 10 – 15 years and continue to do so, supply has outpaced demand in most instances. Except for a few distinct circumstances, REC market value has experienced decreases of close to 90% over that time. The REC market is currently showing signs of improvement in value and key factors, such as renewable energy-related legislation, could drive demand and value back up towards historical levels. There are many variables affecting the markets for RECs that lead to a great deal of speculation, making this an important topic for Energy Trust to revisit.

Executive Summary

A REC is a tradable commodity that represents the benefits derived from the electricity produced by 1 megawatt-hour (MWh) of renewable energy.

There are two markets for RECs: compliance and voluntary. Compliance markets are driven by requirements to procure RECs, usually through state or local laws. Oregon's renewable portfolio standard (RPS) is such a law, requiring the state's three largest utilities to reach a level of 15% renewable energy by 2015, 20% by 2020, and 25% by 2025. PGE currently has enough RECs to meet its RPS obligations through 2020. Pacific Power is supplied through 2024. Both utilities will need to acquire additional RECs to meet their obligations beyond then.

Voluntary REC transactions include households, businesses, and others who choose to purchase RECs, usually to make green claims, such as a business claiming to be "green-powered" because it has purchased RECs equivalent to its electricity use. Once a REC has been used to make a claim, it is "retired" and cannot be used again.

In the U.S, renewable energy is not defined or governed by any one entity. This results in ambiguity and debate over what qualifies as renewable energy, how transactions and reporting are managed, and how public claims around the benefits are made. The Center for Resource Solutions manages the Green-e National Standard for Renewable Electricity which is widely used in the voluntary market. The Green-e standard specifies a list of technologies it considers renewable and includes requirements for the age of the renewable facility and the shelf-life of the REC. Although the Green-e standard is commonly used, not all entities use all of it and compliance markets often have different standards and rules.

PGE and Pacific Power are mandated to offer a voluntary renewable power option enabling customers to "green" their power supply by having the utilities purchase RECs on their behalf. RECs can also be purchased voluntarily from marketers and brokers that operate nationally.

Originally, RECs were tracked and accounted for through contracts and legal attestations. Today, renewable energy facilities and purchasers use third-party registries that operate similarly to bank accounts. RECs can be transferred from a renewable energy producer's account into the account of a purchaser. Registries correlate to specific regions of the nation. The registry used by Oregon and other western states is the Western Renewable Energy Generation Information System (WREGIS).

REC prices are fairly consistent between the voluntary and compliance markets, though the utility green power programs are more expensive. Wholesale REC prices have dropped from highs of around $10-$20 per REC in 2001 to around $1 in 2014 as supply has significantly outpaced demand. Most transactions are short-term, spanning 1-3 years. Low prices and short-transaction terms mean that REC values are not driving renewable energy development.

By incentivizing the development of new renewable energy projects, Energy Trust contributes to the growth of Oregon's REC supply. As of the end of 2014, Energy Trust had provided incentives to over 7,000 individual renewable energy projects which

includes ownership rights to an estimated 2.4 million RECs from 2015 through 2030. The OPUC considers RECs to be one of the valuable results and proof of Energy Trust's participation in projects, as well as an important way to provide value back to ratepayers. Energy Trust's REC policy, which reflects those considerations, has changed several times since it was developed in 2003, from requiring Energy Trust to take title to all RECs from a project, to taking RECs in proportion to the amount of the above-market cost covered by the incentive, to the current policy of considering the market value of a REC in determining how many RECs to take. The policy has sometimes prevented Energy Trust from working with customers that wish to retain RECs.

Another change that has been made to the policy relates to Energy Trust selling RECs, which the policy originally allowed. To avoid having to account for the RECs as an asset, the policy was revised to say that Energy Trust does not intend to sell its RECs.

The focus of REC value was then shifted towards helping utilities meet their RPS requirements. Energy Trust has master agreements with PGE and Pacific Power that specify allowable uses for RECs that are transferred to them, including RPS compliance and several other uses that are considered to benefit ratepayers, including selling RECs. The RECs from Energy Trust represent a small percentage of the utilities' RPS obligations, ranging from 2.3% to 5.1% depending on the utility and the year.

All but about 100 of the projects Energy Trust has funded are solar installations on homes and businesses funded through the standard solar program. The RECs from these projects represent less than half of Energy Trust's holdings and bring some specific challenges, mainly managing rights to environmental claims.

Getting solar projects into WREGIS is also a challenge as it is not cost-effective to register the projects individually as happens with larger projects. Since 2010 Energy Trust has worked with ODOE and the utilities on a system for using estimated generation from projects to create RECs in WREGIS. It is expected that the system may be ready by the beginning of 2016.

RECs from larger custom projects are managed differently from standard solar projects. Early on, Energy Trust required custom project owners to provide attestations of REC production. These attestations cannot be used in either the compliance or voluntary REC markets. The projects must be registered in WREGIS in order for the RECs to be counted on a going-forward basis, requiring contracts to be renegotiated and potential changes and costs associated with project metering. For new projects Energy Trust requires RECs to be managed in WREGIS, which can also add to project costs. Working with the utilities, Energy Trust offers two paths for projects to get into WREGIS, one where the project is responsible, the other where the utilities register projects in their own accounts, but only if the project gives all of its RECs to the utility for an extended period of time.

There are several organizations similar to Energy Trust in other parts of the country that also have REC holdings from projects that have received incentives, but handle their RECs differently from Energy Trust. Their management systems range from selling RECs to keeping all RECs and using them for RPS compliance.

Renewable Energy Certificates

A Renewable Energy Certificate (REC) is a transferable commodity that represents the legal property rights to the measured environmental, economic, and social benefits derived from electricity produced by renewable sources such as wind or solar energy. RECs are measured in terms of their energy value and each REC equals 1 megawatt-hour of grid-tied renewable energy production.

RECs may also be referred to as Energy Credits, Green Tags, or Tradable Renewable Energy Credits (T-RECs). RECs from solar energy are sometimes referred to specifically as SRECs as a subcategory of RECs – *solar energy is the only REC with an additional technology-specific designation*. RECs are also considered to be the equivalent of utility "Green Power" and many Green Power programs now use RECs as the supply for their household and business Green Power subscribers.

Renewable energy is commonly referred to as Green Power primarily due to the fact that the electricity produced from renewable energy sources results in no, or very low, greenhouse gas (GHG) emissions primarily measured as carbon dioxide (CO_2) emissions. The additional criterion for energy to be considered renewable is that the electricity production shall not result in other negative environmental impacts. For example, nuclear energy produces electricity with low GHG emissions, however it is not considered to be renewable energy due to the environmental risks and impacts associated with byproducts of nuclear reactions and water use required for cooling. *(Sources of electricity considered eligible and ineligible renewable energy are covered in further detail later in the section titled Eligible Resources.)*

Considering the descriptor "green power" is useful in understanding how RECs work. Simplified, Green Power represents electricity (power) bundled together with environmental benefits of producing energy with low or no negative impacts (green). When a household buys Green Power, they are purchasing electricity produced from a renewable resource that provides some measureable environmental benefit over purchasing "generic electricity" largely produced through burning fossil fuels. Most Green Power purchasers consider their electricity to be delivered to their location from a facility such as a wind facility rather than from a power plant burning coal or natural gas to produce electricity.

While it is accurate to say the household Green Power purchaser is supporting renewable electricity, it is not technically accurate to say their home is "Green Powered." Most consumers receive electricity from a power grid comprised of a mixture of electrons produced from many power production facilities feeding into the grid (electricity transmission system) and traveling out to end-users simultaneously on a constant basis. Once mixed, it's impossible to distinguish the specific source of the electricity. As a result, the Green Power purchaser may be paying a premium for wind energy, but there is no guarantee that the electrons from the wind facility will physically travel through the power grid to their home, and not a neighboring home that doesn't purchase Green Power. More accurately, the Green Power purchaser is paying to change the makeup of the entire power grid – they are supporting an addition of new renewable energy electrons to the existing power mix in place of fossil fuel-generated electrons, and "greening" the grid for all power users.

The key limitation of this more-traditional utility, grid-delivered, Green Power is that the energy consumer must be physically connected to the same power grid as the renewable energy resource they wish to support. Traditional direct-delivered Green Power must prove that it is possible for the renewable energy electrons to travel from the production facility, through the grid, and to the end-user (even though electrons do not follow a specific pathway once discharged into the grid). This can prohibit energy consumers from supporting renewable energy and in some cases leave them without any opportunity to support Green Power. For instance a small municipal utility may have a customer who wishes to purchase wind power, however it would be too costly for the utility to develop its own renewable energy project or contract for wind energy specifically to serve this one customer. The result is that the utility has inadvertently become a barrier between willing buyers and interested sellers of renewable energy.

RECs offer an alternative simply by taking this concept of Green Power and distinguishing the environmental benefits of renewable energy (what makes it distinct from other forms of electricity) from the physical electrons entering the grid mix. This is achieved through disaggregating the two. Treating each as a distinct product addresses the primary intent of Green Power purchasers – that their dollars go towards the environmental benefits that occur from adding clean sources of energy to the grid. In this regard it's more important to follow the path of the money from the Green Power purchaser to the renewable energy producer rather than the electrons, and RECs provide the mechanism to accomplish this.

Through RECs, electrons from a renewable energy source are recognized as "generic" or "null" power when they are mixed with other sources of energy on the grid, and their environmental attributes are captured separately as a certificate. These certificates may be traded contractually, as one might trade stock or bond certificates, free of any physical limitations in delivering electrons, as proof their dollars paid for the benefits of displacing fossil-fuel energy with renewable energy. This includes the legal right for the purchaser to make claims regarding their direct support of these environmental benefits – *their dollars purchased the REC, so they get to claim the benefits provided by the REC*.

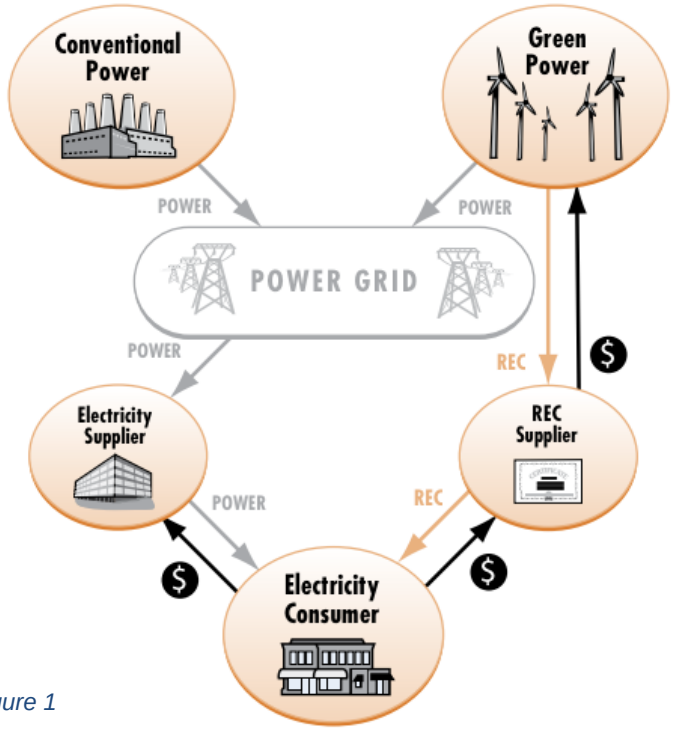

Figure 1

RECs have existed as a trading mechanism for a longer period, but became a prominent component of the market for renewable energy around 2000 with significant growth since that time. According to National Renewable Energy Laboratory (NREL)'s most recent published data, approximately 31 million RECs (31 million MWh) were transacted in the U.S. during 2012.[1]

[1] National Renewable Energy Laboratory: Status and Trends in the U.S. Voluntary Green Power Market (2012 Data): http://www.nrel.gov/docs/fy14osti/60210.pdf

Bundling and Un-Bundling

Disaggregation of electrons from environmental attributes is also known as *Un-Bundling* and it simply means accounting for RECs (green) and electricity (power) separately as two products rather than one. Rather than selling output as delivered Green Power subject to limitations of their local power grid and electric utilities, renewable energy producers can sell both the electricity and RECs produced separately to different purchasers. This offers a much broader geographic market for sales of renewable energy and allows direct access to all purchasers.

Alternatively, the action of purchasing RECs to match with one's electricity use is known as *Bundling*. When an end-use customers purchases RECs to "green" their electricity use, they are matching a REC with the electrons they have received through the grid – in essence they are putting the two products of *generic electricity* and *environmental attributes* back together at the opposite end of the system from the power generation source in order to achieve the equivalent of Green Power – as if the renewable energy facility delivered its electrons directly to their location.

Bundling allows end-users to match their electricity with environmental attributes from any location. As an example a household in Delaware could purchase RECs from a wind facility in Oregon in order to match the electricity they receive through their local power grid even though their grid is not directly connected to Oregon. The action of receiving local electricity and purchasing RECs from any location to match (*Bundle*) is considered equivalent to purchasing direct Green Power from a wind facility in Delaware.

While end-users of electricity who purchase and match usage with RECs are *Bundling*, the term is more commonly used to describe larger-scale sales and transfer of electricity and RECs by utilities, power brokers/marketers, and power generation facilities. As an example, the State of California has set specific targets for renewable energy within the statewide energy mix including the electricity it imports from other states. Traditionally this would mean a renewable energy generator would be required to send its electrons through the power grid to California. For a wind facility in Washington State this could mean having to contract with numerous individual utilities over a transmission path between Washington and California for the right to transmit their electrons through each local power grid until reaching their final destination in California.

At the same time, let's say there's a natural gas electricity facility located at the border in Southern Oregon that has traditionally sold its power into California, and is now at risk of not being eligible for future sales because it is not a renewable energy producer.

This natural gas facility could purchase RECs from that same wind facility in Washington, *Bundle* those with the electrons it produces in Southern Oregon and send that directly into California while bypassing all of the utilities (from Washington down to Southern Oregon) otherwise required to transmit the wind energy from Washington along the way.

Using our example, this would meet the renewable energy requirements for California. The natural gas facility in Southern Oregon would have the ability to continue to deliver

its electrons to California, and the wind facility in Washington would have sold its RECs (receiving a premium for these environmental benefits) and now has generic electricity to sell into its local power grid without requiring any further premium. *The rules of importing renewable electricity into California are more complicated than this illustration, however the State does recognize and allow specific volumes from categories of renewable energy delivered: directly from a renewable energy facility, through Bundling, and as Unbundled RECs without any associated electrons.*

As previously noted, many utilities utilize RECs in order to fulfill subscriptions to Green Power customers within their service territories – this is also largely achieved through Bundling. Rather than incurring the costs and risks associated with developing their own renewable energy facilities or entering into long commitments for purchasing the entire output from such facilities, utilities often purchase bulk volumes of RECs from renewable energy producers and Bundle them with their existing electricity mix. This Bundle of electrons and environmental attributes is delivered as Green Power to the participating subscriber within the utility's service territory.

Common with our other examples, utilities Bundling RECs for their Green Power programs allows greater flexibility in the renewable energy they supply. The available variety of technologies and locations of renewable energy resources is much greater with RECs, and transaction efficiency and supplier competition make them more cost effective.

REC Claims & Retirement

As mentioned, a REC represents 1 megawatt-hour (MWh) of renewable energy entering the power grid. This means that any eligible renewable energy resource can produce a REC each time it generates/delivers 1MWh of electricity to the grid measured by an energy meter.

Once produced, RECs may be transacted and transferred between parties up until the point any public claims have been made utilizing the specific REC. Generally this is a claim made by the owner that they have used the REC to offset or mitigate the impacts of their own energy use.

A typical use of RECs by a household would be to purchase and retire enough RECs to match their electricity use for a year. As an example, a household that consumes 12,000 kilowatt-hours (12 MWh) of power annually would purchase 12 RECs (equivalent to 12 MWh) in order to balance or offset the impacts of their electricity use. At the end of the year, these 12 RECs would be retired in the name of offsetting ("greening") the household's energy use for the year.

Once a public claim has been made, the corresponding RECs are considered retired and are no longer available to be used against any additional impacts beyond those they have already been attributed to. Claiming a REC against multiple impacts is considered "double-counting" and constitutes fraud.

Other buyers of RECs such as companies or government entities do the same in terms of the transaction – it's simply at a larger scale. As an example, the U.S. Environmental Protection Agency hosts a recognition program for renewable energy purchases called

the Green Power Partnership[2] that includes REC purchasers such as Intel Corporation (at over 3 million RECs annually), Kohl's Department Stores (at 1.5 million), and Port of Portland (at 75,000) – each purchasing RECs in order to voluntarily mitigate the impacts of the electricity used in their annual operations.

As demonstrated by the Green Power Partnership, RECs have become an attractive option to corporate purchasers of renewable energy due to their relative low cost and efficiency of the transaction. For instance Whole Foods Market purchases RECs on behalf of the electricity used at all of its 370 U.S. stores[3] through one supplier rather than managing contracts with hundreds of utility Green Power programs across the U.S. The REC market allows a simple transaction to cover the entire organization, provides more choice of projects to support, greater price competition, and reduces the admin required to manage what would otherwise be a very large portfolio for Whole Foods Market.

A common example of a claims made by corporate REC purchasers is when a company such as Staples advertises that its stores are "Green Powered" for branding and Corporate Social Responsibility (CSR) purposes. Staples purchases RECs in order to offset the energy used at all of its stores, which allows them to make such claims. Using the Staples example regarding the limitations on renewable energy claims, purchasing RECs in 2014 allows them to make a claim of "greening" energy use at stores for 2014. If they wish to make the claim again in 2015, they have to purchase RECs again in 2015.

Both the U.S. Environmental Protection Agency (EPA)[4] and Federal Trade Commission (FTC)[5] offer guidance on making public claims related to purchase and use of RECs. Such resources help guide the entity making claims around their commitment to renewable energy as well as protecting consumers from false or misleading information.

Standards

In the U.S, renewable energy is not defined or governed by any one entity. This results in ambiguity and debate over what qualifies as renewable energy, how transactions and reporting are managed, and how public claims around the benefits are made.

The Center for Resources Solutions[6] (CRS) and its Green-e Energy[7] program provide the leading voluntary standard and certification for Renewable Energy in the U.S.

---

[2] U.S. Environmental Protection Agency's Green Power Partnership: http://www.epa.gov/greenpower/index.htm

[3] Whole Foods Stores: http://media.wholefoodsmarket.com/faq/

[4] U.S. EPA Making Environmental Claims: http://www.epa.gov/greenpower/buygp/claims.htm

[5] FTC Guides for the use of Environmental Marketing Claims ("Green Guides"): http://www.ftc.gov/policy/federal-register-notices/guides-use-environmental-marketing-claims-green-guides

[6] Center for Resource Solutions - http://www.resource-solutions.org/index.php

[7] Green-e - http://www.green-e.org/getcert_re.shtml

Green-e Energy serves as consumer protection to end-use purchasers of renewable energy. Simplified, Green-e is a voluntary compliance standard, with corresponding certification that requires participating renewable energy producers and providers to prove they have met the intent of the end-use purchaser of the renewable energy (whether it's delivered as Green Power or RECs). Along with its code of conduct and standards, Green-e requires its participants to perform an annual third-party audit of transactions in order to prove they have met the intent of renewable energy consumers.

Eligible Resources

As cited earlier, there is potential for ambiguity when defining what should qualify as renewable energy or not. Most REC and Green Power programs follow the voluntary code of conduct developed by the Green-e program called the Green-e National Standard for Renewable Electricity.[8]

This National Standard recognizes the following sources of electricity production as renewable energy:

- Solar Electric
- Wind
- Geothermal
- Some specific qualifying Hydropower (generally small-scale facilities that do not introduce new impoundments of water).
- Qualifying solid, liquid, and gaseous forms of Biomass from the following fuels: Wood Waste/Forestry-Derived fuels, Agricultural Crop Residue, Animal and other Organic Waste, Energy Crops, Landfill Gas and Wastewater Methane.
- Qualifying Biodiesel.
- Qualifying Fuel Cells.

Sources of energy that would not qualify as renewable under Green-e include those generated with use of fossil fuels, nuclear energy, large-scale hydroelectric and unsustainable biomass. Ocean-related technologies such as tidal and wave power are also not currently recognized as eligible resources, however the National Standard is reviewing these technologies now for possible inclusion in its next update.

The U.S. EPA and its Green Power Partnership follow these same general criteria for eligible sources of Green Power. Alternatively, some entities follow a more broad definition of sources and include large-scale hydroelectric power, municipal waste, general wood waste and other sources that may be found to have other negative environmental impacts while reducing GHG emissions.

While the type of electricity production technology being used must meet the prevailing eligibility requirements, there are no size restrictions to qualify a renewable energy facility. Where RECs are concerned, a 500 mega-watt wind energy facility will produce the same quality of environmental benefit as a 1-kilowatt grid-tied solar array located on someone's home. The wind facility may produce hundreds of thousands of RECs

[8] Green-e National Standard for Renewable Electricity: http://www.green-e.org/docs/energy/Appendix%20D_Green-e%20Energy%20National%20Standard.pdf

annually compared to 2 – 5 RECs from the household, but generation from both facilities result in the same type of reduction in electricity otherwise produced from fossil fuels and the corresponding reduction in GHG emissions.

Size of the renewable energy facility only becomes a factor in three instances: 1) preference of the renewable energy purchaser, 2) specific requirements of a renewable energy mandate, or 3) the administrative burden and any costs associated with tracking/selling/ transferring the renewable energy – *facilities producing large volumes have lower incremental per-REC cost impacts compared to smaller projects.*

New Renewables

The Green-e Energy National Standard, which is a voluntary standard, also requires the renewable energy facility be "new" which means the facility cannot have been placed into operation over 14 years from the date of the vintage Green Power or REC being sold. For example, a REC produced in 2014 must be produced from facility built after 1999. This limitation does not signify that renewable energy facilities stop producing clean energy after 14 years of operations, rather it is a mechanism to ensure continued investment into developing newer sources of renewable energy and expanding the percentage of the grid mix met with clean energy.

The intent of the New designation is to stimulate further development of additional sources of renewable energy rather than funding facilities indefinitely after they have arguably paid for themselves.

Shelf Life of a REC

Similar to the question of what qualifies as an eligible renewable energy facility, there has also been debate around the lifespan of a REC. While the environmental benefits that result from renewable energy commemorate a specific event in time and do not reduce or change based on future events, allowing RECs to accrue indefinitely without expiration risks over-supplying the market and can provide a disincentive for expansion of additional renewable energy resources.

In response, the Green-e Energy Standard has set criteria for expiration of un-used RECs (those that have not been used to make claims). Specifically the intent is that RECs be generated within the same year (a.k.a. Vintage) as the impacts they are being used to mitigate. Simply if one is offsetting their electricity use in 2014, they would purchase RECs generated during 2014.

However, in order to prevent RECs produced December 31st from immediately expiring, Green-e allows a buffer of time on either side before expiration.

The specific timeframe for Green-e Vintages allows RECs produced during the last two calendar quarters of the previous year, those produced during the entire current year, or those produced in the first quarter of the following year all to count towards impacts made during the current year. As an example, one could mitigate their electricity use from 2014 with RECs produced from Q3 or Q4 of 2013, Q1 – Q4 of 2014, or Q1 of 2015. The inclusion of Q1 of the following year is to address any shortfall in REC production that may occur during the previous year.

Any RECs from a Vintage older than these would be considered expired, and in effect automatically retired in the eyes of the Green-e Energy program.

Again it's worth noting these are the voluntary standards prescribed by Green-e and may not be the protocol used by other entities. As an example, rather than deeming RECs as expired or active, some mandatory renewable energy compliance programs allow "Banking" of RECs in order to meet future compliance requirements. The State of Oregon is such an example and under the rules of a statewide renewable energy compliance requirement utilities may purchase RECs in advance of future impacts without risk of the REC expiring before it has been used.

Registries

Since RECs are transacted separately from electricity generation, outside of the power grid, it is important to maintain seamless tracking and accounting in order to prevent double-counting/claiming of any individual REC. Originally this was accomplished through contracts and legal attestations declaring a transfer of rights to the RECs that could be traced from producer to the end-use customer. However this did not provide much public transparency or oversight into transactions *– for REC sales by entities that were not Green-e Energy certified, this meant there wasn't even a requirement for audit or third-party review.*

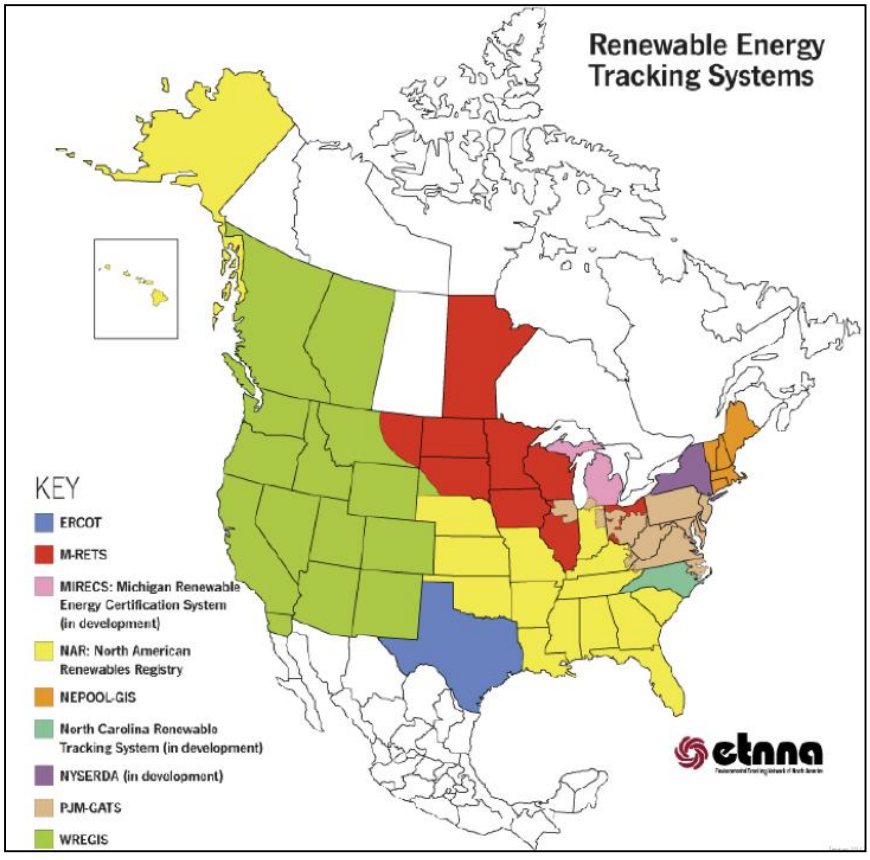

Figure 2

Today transactions are much more automated and transparent with the majority of renewable energy producers utilizing third-party Registries that correlate to the specific geographic grid region where the renewable energy production facility is located.

Registries work similarly to bank accounts or stock accounts. A renewable energy producer, such as a wind energy facility located in Condon, Oregon, will have an account related to its grid region - specifically the Western Electricity Coordinating Council (WECC) grid region in this example. They will document and report their annual production of RECs to the Western Renewable Energy Generation Information System (WREGIS) registry of the WECC grid, which will then issue the commensurate volume of

RECs into the wind facility's account, complete with a serial numbers assigned to each REC produced. At this stage the RECs are considered Active and available to be claimed or transferred to another party.

When these RECs are purchased by an entity such as Oregon State University in order to offset campus electricity use, the purchased RECs will move from the Condon wind facility's account over to OSU's registry account. Condon's account is reduced by the amount transferred and OSU now has these RECs as Active in their account. At this stage OSU could continue the chain of transaction and sell/deliver these RECs to yet another entity's registry account. However more likely in this case, OSU will claim the RECs against campus electricity use and retire the RECs within their registry account.

Retirements occur within a sub-account of the primary account holder and retiring removes RECs from circulation permanently and cannot be undone by an account holder.

Using our example of OSU, once they make a public claim around their purchase of RECs, the RECs must be retired on the registry based on their claim. If OSU posts a blog on its website stating the campus is "green powered" during 2014, this constitutes a public claim and must be backed by a commensurate retirement of RECs they've purchased within their Registry account.

Our simplified example uses one renewable energy producer and one end-use customer transacting through a Registry. Actual REC transactions usually include a greater number of transfers among Registry accounts before reaching the end-user and involve brokers and marketers in between.

Regardless of the number of transfers that take place, the Registry provides tracking for each REC and follows a chain of custody throughout the life of the REC from generation to retirement. Registries are maintained by third-parties and can provide transparency for renewable energy transactions.

Registry account holders usually include renewable energy generators, brokers/marketers, utilities and some large private entities. It's uncommon for most end-users, such as OSU from our example, to hold an account within the registry. Rather they work with a renewable energy marketer that purchases and retires RECs on their behalf using a master account within the Registry to aggregate REC transactions and retirements to serve multiple end-use customers.

Small renewable energy production facilities may also use a separate entity to manage their RECs including use of the third-party's existing Registry account rather than maintaining their own. This does not mean RECs are mixed with other projects on a Registry. Each generation source has its own profile and can be distinguished from the next, however the project may be managed by a middle-person hosting a portfolio of projects in order to reduce the administrative burden to each individual project.

Participation in WREGIS is relatively simple and requires establishing an account and agreeing to terms of use. Specific reporting requirements vary by the type and size of entity. Small generators follow a protocol for self-reporting while larger entities require use of a third-party Qualified Reporting Entity (QRE). QREs must be approved by WREGIS and entities eligible to become a QRE within WREGIS include: Balancing

Authorities, Load Serving Entities, Generator Aggregators, Meter Readers, and Independent Third Parties.[9]

WREGIS includes a set of costs to account holders including annual fees and volume-based transaction fees.

The following table highlights costs[10] for WREGIS:

WREGIS Fees				
Account Category	Annual	Issuance Per-REC	Transfer Per-REC	Retire/Reserve/Export Per-REC
Generator – Micro <30kW	$200	0	0	0
Generator – Small ≥30kW <1MW	$250	0	0	0
Generator – Medium ≥1MW <10MW	$850	0	0	0
Generator – Large ≥10MW	$1,500	$0.005	$0.005	$0.01
Load Serving Entity	$1,500	$0.005	$0.005	$0.01
Retail Marketer	$1,500	$0.005	$0.005	$0.01
Wholesale Marketer	$1,500	$0.005	$0.005	$0.01
Utility Aggregator	$1,500	$0.005	$0.005	$0.01
Generator Aggregator	$1,500	$0.005	$0.005	$0.01
Other	$1,500	$0.005	$0.005	$0.01

Figure 3

While relatively low in cost, expenses related to WREGIS may be prohibitive to smaller generators based on the modest volume of RECs produced annually and their market value. For example a small Oregon 20kW solar array performing at 20% capacity may produce approximately 35 RECs annually. Under WREGIS, this is considered a micro project and requires a registration fee of $200 annually. This means the 35 RECs would need to sell at $5.70 each in order to break even on costs and this does not include any potential admin or management costs. Given current market conditions with pricing often hovering closer to $1, a micro project such as this example would have little financial upside from selling its RECs.

Aggregation of multiple projects through a broker or other entity may offer some advantage, however most potential aggregators seek large REC volumes in order for the transaction to be worthwhile as they are adding costs for representing the project and its RECs. In general small projects are precluded from the REC market due to the transaction costs.

Market Categories for Renewable Energy

Renewable energy, including RECs and its other forms, can be split into two distinct categories of use – Voluntary or Compliance (a.k.a. the Voluntary and Compliance Markets.)

[9] WREGIS QREs - http://www.wecc.biz/WREGIS/Documents/WREGIS%20QRE%20Interface%20Control%20Document.pdf.

[10] WREGIS Fees - http://www.wecc.biz/WREGIS/Documents/WREGIS%20Fee%20Matrix%20and%20Definitions.pdf

Voluntary transactions include the households purchasing Green Power and examples of corporate REC buyers previously discussed.

Compliance purchasers are those entities that are mandated to purchase some form of renewable energy through state or local laws, or similar conditions. A common example of compliance is when a state issues a Renewable Portfolio Standard (RPS). Typically this means utilities serving within the state must achieve a specific percentage of renewable energy resources within the energy mix provided to consumers by a specific date. As an example, the State of Washington passed an RPS in 2006 that requires its serving utilities to provide 15% renewable energy within their portfolio of electricity by 2020.[11] Washington is just one example, there are currently 30 active RPS mandates in states across the U.S.[12]

While the majority of Voluntary renewable energy programs follow the universal standards of Green-e Energy, protocols of Compliance are much more individualized based on local compliance rules. Examples of differences include:

- The State of California set a renewable energy compliance goal of 33% of the State's annual mix by 2020. It allows a limited number of unbundled RECs to meet the goal - beginning at 25% of the total goal (25% of the 33%) and declining to 10% over time.[13] RECs must be generated from within the WECC power grid and must be registered with the WREGIS tracking system.

- The State of Washington only allows RECs sourced from within the Pacific Northwest (*as defined by the Pacific Northwest Electric Power Planning and Conservation Act*) and they must be generated from within the same calendar year or up to one-year prior as they are being claimed.

For renewable energy producers, both voluntary and compliance markets represent opportunities to sell their output, and selling a portion of the facility's RECs to one category does not generally preclude the facility from selling the balance to the other market. The key is proper accounting and tracking in order to avoid any double-selling/counting of the same REC.

Compliance markets usually require greater geographic constraints on eligible RECs while Voluntary sales do not. The result can be an artificially imposed cap on the resources available to meet Compliance, driving up demand and price for specific categories of RECs. For instance, New Jersey has set an RPS target requiring 4.1% of its energy to come from solar energy produced within the state. This places more demand on a limited supply of eligible sources and currently means a REC produced

---

[11] Washington Incentives/Policies for renewables & Efficiency:
http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=WA15R

[12] Database of State Incentives for Renewables and Efficiency (DSIRE) RPS Data:
http://www.dsireusa.org/rpsdata/
index.cfm

[13] Renewable Energy World:
http://www.renewableenergyworld.com/rea/blog/post/print/2013/05/green-e-recs-edge-up-to-compliance-value

from a solar facility in New Jersey is worth over $150.^{00} per REC, compared to an identical solar REC produced outside the geographic scope of eligibility worth under $4.^{00} per REC based on recent broker transaction data.

Who Sells RECs

Entities serving the voluntary and compliance markets through sales of RECs include three general categories:

1. Project Owners/Developers – These include renewable energy generators of all types and sizes selling their RECs from the point of origin.

2. Brokers and Marketers – This group would be considered agents or resellers linking the renewable energy facility to the end-user for a fee – usually a percent markup on the sale of the RECs. From experience, the distinction between these two is that Marketers tend to be more hands-on in developing long-term customer relationships and stay engaged as a resource to the customer after the sale, whereas brokers tend to focus exclusively on the deal and move on once a transaction is completed. *According to the U.S. EPA's Green Power Locator tool, there are over 90 REC marketers/wholesalers currently operating in the U.S.*[14]

3. Utilities – As previously noted, many electric utilities utilize RECs for their voluntary Green Power programs purchasing from projects, brokers or marketers and delivering a bundled product for sale to their Green Power customers.

Individual REC transactions may include any number of these entities within the chain of custody. For example an owner of a wind project may contract with a broker to sell its RECs. The broker may sell these RECs to a marketer and in turn, the marketer will sell the RECs to a utility that will then bundle the RECs with electricity and sell them as Green Power to their voluntary customers. While it may seem to be an inefficient process with extra steps, each party brings its own skills and expertise to their stage of the transaction and the entities at the beginning of the chain rarely wish to deal directly with those at the end – *it's uncommon for an end-use REC customer to have direct access to a renewable energy production facility without making a commitment to purchase very large volumes of RECs.*

RECs in Oregon

Similar to many states across the U.S, Oregon supports both a voluntary and compliance market for RECs. Active parties include: local and outside renewable energy generators, marketers, brokers and electric utility Green Power providers.

In terms of the Compliance Market, Oregon has two general mandates placed on its key investor-owned electric utility providers (IOUs) – Portland General Electric (PGE) and Pacific Power.

[14] U.S. EPA Green Power Locator - http://www.epa.gov/greenpower/pubs/gplocator.htm

Compliance Category 1 - Oregon Renewable Energy Standard

In 2007 Oregon enacted a Renewable Energy Standard (RES or more commonly referred to as a Renewable Portfolio Standard – RPS) through Senate Bill 838[15] aimed at increasing the overall percentage of renewable energy present in the base mix of electricity. This is in addition to voluntary additions of renewable energy from Utility Green Power customers. Specifically the rule requires Oregon's three largest electricity providers (PGE, Pacific Power and Eugene Water and Electric Board), to reach a level of 5% renewable energy in 2011, with increases to 15% in 2015, 20% in 2020 and 25% in 2025. All other electric utilities in the state, depending on size, have standards of 5% or 10% by 2025.

To illustrate the potential size of this requirement, Oregon Public Utilities Commission reports that PGE delivered 17,673,447 MWh of electricity to its customers during 2013.[16] Supplying 25% from renewable energy resources would equal 4,418,361 MWh annually. Assuming an average production capacity factor of 25% for wind energy production, PGE would require roughly 69% of all of the annual wind energy currently produced in Oregon[17] to meet this threshold.

Using the same calculations for Pacific Power, at 13,089,969 MWh for 2013, would require approximately 47% of Oregon's total annual wind energy production. *(In terms of the size of Oregon's production - according to the American Wind Energy Association, Oregon ranks 5th in the U.S. for total wind generation.)*

While this illustrates a significant responsibility for Oregon IOUs, the law ramps the percentage up over time rather than requiring a complete change to 25% renewables all at once, utilities may purchase renewable energy beyond the state's borders, and Oregon's RPS allows a fair amount of flexibility in terms of eligible RECs.

Oregon's RPS also includes further flexibility in the form of cost-containment measures designed to protect consumers against significant rate increases resulting from utility compliance. These include an Alternative Compliance Payment option and Cost Cap.[15]

The Compliance Payment Option allows utilities to pay a set amount per MWh into a fund that can be used only for acquiring renewable energy resources in the future, or for energy efficiency and conservation programs in lieu of purchasing RECs. This mechanism allows utilities to pay into the fund in the event prices for compliance (REC prices) reach levels deemed too costly and sets an effective cap on the cost of complying with the RPS on a per MWh basis.

This provision is characterized as a safety-measure and not intended to act as a strategy for achieving compliance. In fact it may be viewed as a penalty due to the wide differential between the cost of alternative payment and most other means to achieve

---

[15] Oregon RPS - http://www.oregon.gov/energy/RENEW/Pages/RPS_home.aspx

[16] 2013 MWh Sales to Ultimate Customers Oregon - http://www.puc.state.or.us/docs/statbook2013.pdf

[17] American Wind Energy Association - http://www.awea.org/Resources/state.aspx?ItemNumber=5189

compliance. As an example, in Order No. 09-200, issued on June 12, 2009, The Public Utilities Commission of Oregon set the alternative minimum compliance payment at $50/MWh for the year 2011.[18] This rate significantly exceeds the current cost difference between RPS compliant resources and non-renewable generation alternatives, or the price of unbundled RECs *(by as much as 50 times the cost for unbundled RECs)*. The economic incentive to utilities is to achieve compliance through other means.

The Cost Cap offers further protection and specifies that Oregon's utilities may not comply with the RPS to the extent that the incremental costs of compliance exceed 4% of a utility's annual revenue requirement in a compliance year. This is measured as the costs of unbundled RECs and alternative compliance payments compared against fossil-fuel power costs.

Oregon's Department of Energy reports that as of 2012, the incremental cost of compliance for all Oregon utilities has been well below the 4% cost cap[15] and that the Alternative Compliance Payment option has not been utilized.

Eligible Resources for Oregon RPS

As noted earlier under eligible resources, State RPS compliance programs often set their own parameters regarding sources of renewable energy that count towards the requirement that do not necessarily match voluntary standards such as those prescribed by Green-e Energy. Specifically Oregon distinguishes between two classes of renewable energy, facilities placed into operation before January 1, 1995 and facilities that became operational after. (*By comparison, Green-e would not recognize a facility that went online prior to 1997 for its standard.)*

Compliance Facility Age

Resources online prior to 1995 focus on low-impact hydropower and allow up to 90 average megawatts (aMW) per utility, per compliance year of low-impact certified hydropower, capped at 50 aMW owned by an Oregon utility and 40 aMW not owned by a utility but located in Oregon.[19]

Post January 1, 1995 eligible resources include:

- Hydropower, if located outside of certain state, federal, or NW Power & Conservation Council protected water areas.

- Wind, Solar Photovoltaic and Electricity from Solar Thermal, Wave, Tidal, Ocean Thermal, and Geothermal.

- Biomass and biomass byproducts; including but not limited to organic waste, spent pulping liquor, woody debris or hardwoods as defined by harvesting criteria, agricultural wastes, dedicated energy crops and biogas from digesters, organic matter, wastewater, and landfill gas. Under certain conditions, municipal

[18] PGE 2011 RPS Implementation Plan: http://www.oregon.gov/energy/RENEW/RPS/docs/PGE_2011_RPS_Implementation_Plan_update.pdf

[19] Summary of Oregon's Renewable Portfolio Standard - http://www.oregon.gov/energy/RENEW/docs/RPS_Long_Summary_January%202014.pdf

solid waste may qualify. The burning of biomass treated with chemical preservatives disqualifies any biomass resource.

- Electricity from hydrogen derived from any of the above resources.

Eligible Compliance Facilities

Oregon relies on a list of approved facilities within WREGIS and maintains a directory sheet of current projects online at the Oregon.gov website.[20] Approved renewable energy production technologies on the list include: wind, biogas, geothermal, solar, biomass, hydroelectric and efficiency improvements at existing hydro plants.

The geographic scope of projects is limited to within WREGIS and the current list of eligible projects includes locations such as: British Columbia, California, Idaho, Montana, New Mexico, Oregon, Utah, Wyoming, and Washington. As highlighted in their most recent annual report,[21] WREGIS reports a total capacity of 38,475 MW from approved renewable energy generating facilities. For scale, even operating at a relatively low performance capacity factor average of 25%, one would expect close to 84,000,000 MWhs of renewable energy produced annually within the WECC grid region.

However in terms of Oregon RPS requirements, there are competing interests for resources within the WECC including voluntary REC and Green Power purchasers, as well as a number of other states with RPS-driven needs to acquire specific percentages of their future energy mix from renewables as listed in the following table:[17]

State	2015	2020	2025 & Forward
Arizona	5%	10%	15%
California	27%	33%	33%
Colorado	20%	30%	30%
Montana	15%	15%	15%
Nevada	20%	22%	25%
New Mexico	15%	20%	20%
Oregon	15%	20%	25%
Utah			20%
Washington	8%	15%	15%

Figure 4

Vintage

While the allowed facility age may be 1995, the vintage of the renewable energy production must be more recent. The earliest production vintage for RECs from eligible facilities under Oregon's RPS is August 2012. However, direct generation (bundled renewable energy) from these same eligible sources can be sourced from vintages as early as January 2007. Oregon also designates an "Eligible-Thru" date within the list of eligible facilities in order to provide periodic review for projects to ensure they demonstrate compliance with the RPS. As an example, the Grace Hydroelectric Facility located in Idaho may deliver output for Oregon RPS compliance until January of 2015 at which point it must pass review for continued participation as a compliance project. Roughly a quarter of the current WREGIS projects on the approved RPS list, mainly hydro, include an Eligible-Thru expiration date while the rest do not include such limitations.

[20] List of Oregon Approved Facilities - http://www.oregon.gov/ENERGY/RENEW/Pages/RPS_home.aspx

[21] WREGIS Annual Report 2011 - https://www.wecc.biz/Administrative/2011%20WREGIS%20Annual%20Report.pdf

Oregon RPS Reliance on RECs for Tracking

Oregon RPS compliance requires proof of generation of the qualifying electricity in the form of a REC issued and tracked by the WREGIS system.

Oregon's RPS recognizes two types of RECs – Bundled and Unbundled. The State defines that initially, all RECs are "bundled" together with their associated electricity that is produced at the renewable electricity generation facility. When both a REC and the electricity associated with that REC is acquired together, one has acquired a "Bundled" REC.

A generator or REC owner may decide to "unbundle" the REC from the electricity associated with that REC by using or selling the two components separately. In doing so the purchaser of the power loses the ability to claim that the power is renewable energy. The "unbundled" REC may be used by its new owner to comply with the RPS.

To meet an RPS target obligated utilities must permanently retire the number of RECs equivalent to the target load percentages.

Oregon has also set specific limitations on Unbundled RECs. Large utilities, such as PGE or Pacific Power, may use up to 50% Unbundled RECs to meet targets until 2020, and then no more than 20% from Unbundled sources going forward. RECs from facilities developed under the Federal Public Utility Regulatory Policies Act (PURPA) in Oregon are exempt from this limit.[15] The RECs from the custom projects that Energy Trust funds fit into this category.

It's also important to note that Oregon's RPS rules differ from voluntary standards in terms of defining the useful life of a REC and when it must be used. Unlike the annual expiration of RECs under the Green-e Energy Standard, Oregon's RPS allows RECs produced after August 2012 to apply towards any compliance year. For instance, this means a utility could purchase RECs from 2012 and then claim and retire those RECs towards compliance in 2013, or 2014, or 2015 and so on.

This flexibility in REC vintages is referred to as "Banking" and means REC generation facilities and purchasers are less constrained in terms of available supply. Oregon allows RECs to be banked indefinitely and used in future years. One requirement called the "first in first out" principle[15] specifies that older RECs owned by the utility must be used towards RPS compliance before their newer ones, but there are few other restrictions placed on their REC expiration flexibility.

The policy to allow Banking is not without some controversy. In one instance allowing utilities to Bank RECs means they are incentivized to reach goals earlier and perhaps take advantage of lower-cost RECs (resulting in savings to ratepayers) that might otherwise expire if subject to voluntary purchasers and standards. On the other hand, Banking may weaken the intended economic signal to developers of new renewable energy projects to invest in new projects within the region. If Oregon utilities can meet terms of compliance through older low-cost RECs from existing facilities, they are much less likely to invest capital in a new project or be willing to pay higher premiums associated with RECs to be produced in the future (*which may reduce the economic benefits of expanding development of renewable energy within Oregon*). Banking may also result in utilities waiting to make REC purchases until the RECs have effectively expired under terms of the Green-e Energy program or other RPS programs operating

within WREGIS. Oregon may be the only venue remaining for RECs that are otherwise unsold to the voluntary or competing RPS programs. This may be a cost advantage to the Oregon utilities for meeting RPS requirements, but it may also further weaken the financial signal to renewable energy developers.

Current RPS Oregon IOU Compliance Status

As of the most recent reports to the Public Utilities Commission of Oregon by PGE[22] and Pacific Power[23] for 2013 power sales *(reported May 2014),* the two utilities are meeting compliance requirements without use of cost containment measures. Both have been able to use banked resources or spot-purchases (buying RECs within the same compliance year they are used) and are actively banking additional resources towards future compliance needs.

The availability of eligible RECs for spot-purchases, and the fact that both utilities occasionally sell excess supply back to the general market, supports the conclusion that the market holds enough eligible supply for Oregon utilities to meet current obligations without increased financial burden to ratepayers.

There are many variables that may influence broader competing compliance needs across the WECC, and the ability of Oregon's IOUs to meet mandatory goals. Although previous utility updates forecasted large shortfalls in eligible supply, currently they do not anticipate a deficiency for the next five years – *projections are 2020 for PGE[24] and 2024 for Pacific Power.[25]*

Avoided Cost for Qualified Renewable Facilities

In 2011, Oregon's PUC also introduced a separate incentive to renewable projects through Order Number 11-505.[26] The Order requires Oregon IOUs to purchase power from qualifying renewable energy facilities at a rate equal to the avoided cost of new renewables, during periods of renewable resource deficiency, versus the traditional avoided cost rate of generic power. While this represents potential for higher value per MWh generated by the renewable energy project during a utility's deficiency period, the price includes both electricity and the RECs – *utilities retain the rights to any RECs produced from the project receiving this higher avoided cost of new renewables rate to use towards their RPS compliance.*

---

[22] PGE 2013 Renewable Portfolio Standard Compliance Report: http://www.oregon.gov/energy/RENEW/RPS/docs/PGE%202013%20RPS%20Compliance%20Report.pdf

[23] Pacific Power's Renewable Portfolio Standard Oregon Compliance Report for 2013: http://www.oregon.gov/energy/RENEW/RPS/docs/Pacific%20Power%202013%20RPS%20Compliance%20Report.pdf

[24] PGE – UM 1610 Application to Update Schedule 201 Qualifying Facility Information. http://edocs.puc.state.or.us/efdocs/HAD/um1610had13208.pdf

[25] Pacific Power – Oregon Renewable Portfolio Standard Compliance Report 2013 http://edocs.puc.state.or.us/efdocs/HAA/um1700haa10149.pdf

[26] Avoided Cost Rate for New Renewables Order #11-505 - http://apps.puc.state.or.us/orders/2011ords/11-505.pdf

In practice, utility deficiency does not occur until the later years of a project's power purchase agreement, limiting the benefit of the higher power rate. In addition, in cases where multiple funders (such as Energy Trust) are involved in a project and have claim to a portion of the project's RECs, it can be difficult to track and manage REC ownership around this new renewables rate.

RPS Solar Carve-Out

Oregon's RPS also seeks to incentivize small photovoltaic solar energy facilities in order to demonstrate the use and effectiveness of volumetric incentive rates (aka Feed-in Tariffs) and payments for electricity delivered from solar photovoltaic energy systems. This is accomplished through the Solar Capacity Standard.[27]

In 2009, Oregon passed The Volumetric Incentive Rate (ORS 757.365, OAR 860-084-0100) program for small solar energy systems aimed at enrolling up to 25 MW of eligible solar facilities through production-based incentives. The program is administered by Oregon's investor-owned utilities (IOUs), with oversight from the Oregon Public Utilities Commission (PUC). Incentives are aimed at serving the development of new facilities no greater than 500 kW in AC nameplate capacity through March 31, 2015 when enrollment closes.

A separate provision of the statute established a solar photovoltaic capacity standard for Oregon's IOUs (ORS 757.370). Under this standard, individual solar photovoltaic systems used to comply must have a nameplate generating capacity greater than or equal to 500 kilowatts and less than or equal to 5 megawatts as measured on the AC side of the system's inverter.[28] The Oregon PUC adopted rules requiring Oregon's IOUs to meet specific solar RPS targets by 2020 (OAR 860-084-0020). Specifically, the standard requires that by January 1, 2020, each IOU must own or contract to purchase the capacity and output of qualifying solar photovoltaic systems to meet and maintain the following minimum solar photovoltaic capacity standards:

- PGE 10.9 MW
- Pacific Power 8.7 MW
- Idaho Power Company 0.5 MW

Qualifying solar systems online before January 2016 and located in Oregon earn double credit towards the RPS. As an example, if PGE or Pacific Power retires one REC from a solar facility located in Oregon that went online during 2014, the utility is awarded credit for having retired 2 RECs towards its compliance obligation for the year.

Solar capacity compliance reports are not due until 2020, however according to the Oregon Department of Energy, the following progress is known regarding specific utility commitments to solar projects[19]:

---

[27] Oregon Solar Capacity Standard - http://www.oregon.gov/energy/RENEW/RPS/Pages/RPS-Solar-Capacity-Standard.aspx

[28] Solar Photovoltaic Capacity Standard - http://arcweb.sos.state.or.us/pages/rules/oars_800/oar_860/860_084.html

Portland General Electric

- ProLogis PDX Park 4 (518 kW)
- Yamhill Solar (1.04 MW)
- Bellevue Solar (1.56 MW)
- Baldock Solar (1.75 MW)
- Outback Solar (4.95 MW)

(Total 9.81 MW – 90% of their goal)

Pacific Power

- Black Cap (2 MW)

(Total 2MW – 23% of their goal)

Compliance Category 2 - Oregon Utility Green Power Option

Since 2002, under terms of Oregon Law (ORS 757.603(2)) PGE and Pacific Power must offer at least one power option with significant new renewable resources available to residential and small business customers.[29] This rule acts as a hybrid of compliance and voluntary renewable energy – the utility is mandated to offer customers a Green Power option, however customer participation is voluntary and there are no specific targets or thresholds such as those within the Oregon RPS. Utilities are simply obligated to offer an option.

While represented and managed by the utilities, the purchase and sale of renewable energy under the Utility Green Power option is not eligible to count towards the Renewable Portfolio Standard. All rights to the environmental benefits transfer from the utilities to the program participants.

Oregon IOU Green Power programs are regulated by the Oregon Public Utilities Commission, and both PGE[30] & Pacific Power[31] report that they do not earn revenue from voluntary Green Power sales in excess of what is required to cover program costs.

Oregon IOU green power offerings include PGE's Green Power Oregon program and Pacific Power's Blue Sky program. While the Utility Green Power Option Law does not specify a volume of renewable energy to be transacted by the utilities and represents a voluntary option, as of the end of 2013 PGE ranked #1 and Pacific Power ranked #3 in the nation for Green Power program participation[32], collectively serving close to 200,000 customers with 1.7 million megawatt-hours of renewable energy (delivered through RECs) annually.

---

[29] Oregon Utility Green Power Options: http://www.oregon.gov/ENERGY/RENEW/Pages/Programs.aspx

[30] PGE –GreenPowerOregon: https://www.portlandgeneral.com/our_company/pge_glance/docs/renewable_res.pdf

[31] BlueSky – FAQ: https://www.pacificpower.net/env/bsre/faq.html

[32] Top 10 Utility Green Power Programs - http://apps3.eere.energy.gov/greenpower/markets/pricing.shtml?page=3

PGE

PGE utilizes Green Mountain Energy for REC marketing and supply services for its Green Power program. Green Mountain is under contract with PGE through 2016 and is considered a REC Marketer in this role. However, they also operate as a direct-source utility provider in some areas of the U.S. Green Mountain Energy's headquarters are in Austin, Texas and it is a subsidiary of NRG Energy. Through its program, PGE currently offers customers two distinct Green Power offerings along with a Habitat contribution[27] option outlined as follows:

Green Source – 100% of monthly electricity usage is offset with RECs sourced from within the WECC region, sold at $0.008 per kWh or $8 per REC.

Clean Wind – RECs sourced from 100% wind energy from within the WECC grid region, sold in blocks (increments) of 200 kWh at $2.50 per block or $10 per REC.

Habitat Support – An additional monthly fee of $2.50 may be added to either option for a local fish habitat restoration program administered by The Nature Conservancy.

PGE Clean Wind is also used as a distinct program for business Green Power customers (Schedule 83 customers) and large volume purchasers may receive discounts below the $2.50/200 kWh block rate as well as special advertising and marketing recognition for their purchase of Clean Wind.

In recognition of its Green Power customers and communities served by the utility, PGE has supported the installation of small (typically demonstration-scale) solar arrays at 16 Oregon schools and community buildings since 2006.[33] The program was facilitated through the Bonneville Environmental Foundation's Solar 4R Schools program and includes matching on-site solar resources with in-classroom activity kits and renewable energy curriculum.

Pacific Power

Pacific Power offers its Oregon customers the Blue Sky program. Since 2004, the program has been served by the REC Marketer 3Degrees.[34] Previously, Pacific Power had worked with Green Mountain Energy.

Similar to PGE, Blue Sky Oregon includes two green power options to customers along with a Habitat option[35] as follows:

Blue Sky Block – Wind RECs sourced from within the WECC region sold in 100 kWh blocks at a rate of $1.95 per block or $19.50 per REC equivalent. This option also funds new, community-based renewable energy projects in Oregon.

---

[33] Solar4RSchools – Portland General Electric: http://www.solar4rschools.org/partners/portland-general-electric

[34] 3Degrees Utility Programs - http://www.3degreesinc.com/products/utility-partnership-services/utility-programs

[35] Pacific Power Blue Sky Options Oregon - https://www.pacificpower.net/env/bsre/bso.html

Blue Sky Usage – A Blend of renewable energy sources from the Pacific Northwest most likely to include 70% wind, 25% biomass, and 5% geothermal energy. Blue Sky Usage is designed to match monthly electricity usage and costs $0.0105 additional per kWh or $10.50 per REC equivalent. (*Pacific Northwest is defined as Oregon, Washington & Idaho, but with the option to add a minority of resources from the greater Western Region at Pacific Powers discretion in order to maintain price stability.)*

Blue Sky Habitat – The same Green Power as Blue Sky Usage with an additional $2.50 per monthly donation to Oregon non-profit – The Freshwater Trust.

Large businesses served by Pacific Power have the additional option to participate in the Blue Sky Quantity Savings program. For a minimum commitment of 101 Blue Sky blocks (100 kWh per block) per month for 12 months, pricing is discounted to $1.94 - $0.70 per block depending on total volume purchased. In REC equivalents this is a minimum purchase of 121.2 RECs annually at a price range of $19.40 to $7 per REC.

Through its Blue Sky program, Pacific Power also hosts a Community Project Fund[36] designed to help support the development of community-based, non-residential, renewable energy projects. To date, the program lists 67 projects including solar, wind, geothermal, hydropower and wave-energy research, located across Oregon, Washington and Northern California. Projects are selected and awarded grant funding on an annual basis to help cover the capital costs of installing qualifying, new renewable energy systems within the Pacific Power service area.

In terms of renewable energy standards, Pacific Power's Blue Sky program is certified by Green-e Energy and as of June 2014, PGE has applied for its Green Source and Clean Wind to also become Green-e Energy certified.

Self-Direct

Another renewable energy option available to very large electricity users is known as Self-Direct.[37] This means that the customer may direct a portion of the mandatory Public Purpose[38] fees it pays into the Oregon Department of Energy towards purchasing renewable energy on its own behalf.

This is important in that it reduces the portion of Oregon Public Purpose fees designated for renewables that would otherwise have been managed by Energy Trust on behalf of all IOU customers. As long as the Self-Direct customer spends an amount equal to the fee in support of renewable energy, it may receive the direct benefits of renewable energy versus the aggregated benefits shared by all Oregon IUO customers through Energy Trust investments.

---

[36] Blue Sky Dollars at Work in the Community: https://www.pacificpower.net/env/bsre/cpf/cfr.html

[37] ODOE Self-Direction of the Public Purpose Charge: http://www.oregon.gov/energy/cons/pages/sb1149/business/self-direct.aspx

[38] Public Purpose Charges for PGE & Pacific Power: http://www.oregon.gov/energy/cons/pages/sb1149/business/ppcinvest.aspx

Self-Direct customers typically opt to purchase RECs with their Public Purpose dollars in order to make direct environmental claims on behalf of their business. A handful of Oregon companies currently utilize this option and PGE advertises Self-Direct as a strategy to purchase Green Power from its Clean Wind program.[39]

Broader Voluntary REC Market

In addition to the Green Power programs offered for voluntary purchase to Oregon customers from utilities, RECs may also be purchased in Oregon from Marketers/Brokers that operate nationally.

As mentioned previously, there are approximately 90 organizations actively marketing/brokering RECs,[40] however most transactions in Oregon happen among 7 key REC providers including:

- 3Degrees
- Bonneville Environmental Foundation
- Element Markets
- Native Energy
- NextEra
- Renewable Choice Energy
- Sterling Planet

Based on the most recent study published by National Renewable Energy Laboratory (NREL) using 2012 data, the voluntary green power market exceeds 48 million MWh in purchases annually from approximately 1.9 million participating customers. Based on MWh volume, voluntary RECs represent 64% of total green power sales.[41]

When initially recognized by voluntary purchasers in 2001, RECs supported premiums between $10 - $20 per MWh ($0.01 - $0.02 per kWh) above the market price of commodity electricity. In 2009 the average dropped to around $5 per MWh, and by 2012 further declined to $1 per MWh.[41]

In 2014, REC pricing remains low. Recent transaction reports from Skystream Markets and Karbone Brokerage Group show voluntary REC sales ranging from $0.80 - $1.35 per MWh.

While intersections with RPS requirements have had some impact on REC pricing, the effect is largely regional to the specific compliance program and has not resulted in meaningful price increases for voluntary transactions. Rather when a local RPS shifts pricing upwards, most voluntary buyers opt to relax geographic preferences for REC

[39] PGE Clean Wind Self-Direct:
http://www.portlandgeneral.com/business/medium_large/renewable_energy/clean_wind.aspx

[40] National Commercial &/or Wholesale REC Marketers:
http://apps3.eere.energy.gov/greenpower/buying/buying_power.shtml?state=OR&print

[41] NREL - Status and Trends in the U.S. Voluntary Green Power Market (2012 Data)
http://www.nrel.gov/docs/fy14osti/60210.pdf

production facilities and support low cost options available outside of their region. In general this has resulted in large volumes of wind RECs produced throughout the center portion of the U.S. (in states without significant renewable energy compliance demands) being sold to entities located near the East and West Coasts where voluntary and compliance purchasers are more likely to compete for available local REC supply.

Typical voluntary REC transactions range from 1 year to 5 years in duration as reported by NREL[42] in 2012. However from experience, the current trend is for contracts to cover 1 to 3 years total.

Prior to 2009, experienced purchasers were moving towards 5-year terms and longer based on an assumed advantage of locking-in at current rates as prices were poised to climb. This was largely driven in anticipation of an RPS at the Federal level that seemed likely to pass and drive up demand for RECs to meet compliance.

Increased prices and scarcity, however, did not occur and many long-term REC purchase contracts were at costs well above their value in the market, highlighting the risks and potential volatility in environmental commodities.

While purchase volumes have steadily increased, today REC prices remain low and the broader market continues to be oversupplied. Regional compliance programs have only signaled a modest increase in price and demand in localized areas. In general, voluntary REC purchasers do not find an advantage in making long-term commitments while REC producers hesitate to enter multi-year agreements due to speculation around future price increases. One to three-year purchase terms are likely to remain the norm for the foreseeable future.

Another category of voluntary REC purchaser includes entities that have invested in on-site solar generation that sell the solar RECs produced by their facility for a premium and then replace them with lower-cost RECs produced from wind energy or other sources. This allows the entity with solar to take advantage of premiums available for solar REC sales while also reinstating their ability to make public claims around being “green powered.”

Energy Trust staff report that they have been approached by several non-solar projects with REC obligations to Energy Trust requesting to make similar arrangements – where the projects RECs would be used or sold by the owner and replacement RECs, from an alternative project, would be given to Energy Trust. At present Energy Trust’s REC policy, as detailed later, does not allow for this type of trade and Energy Trust has not accepted replacement RECs.

In the past, this kind of REC arbitrage represented a meaningful advantage as solar RECs were generally sold at close to 10 times the price of other categories of RECs. However, this gap has diminished over the past few years and in some cases solar RECs are at parity with other technologies in the $1.^{00} per REC range.

[42] NREL – Status and Trends in the U.S. Voluntary Green Power Market (2012 Data) Contract Length by Type of Procurement: http://www.nrel.gov/docs/fy14osti/60210.pdf

Depending on prevailing RPS rules including geographic compliance boundaries and specific technology requirements (such as solar), it's possible this trend of swapping RECs from one project for another in order to gain a premium will be employed again as a strategy to increase a project's financial return.

An additional shift in the voluntary REC market, and one occurring within Oregon due to growth from the tech sector, has been large purchasers such as internet data centers moving away from REC marketers and utility Green Power programs in favor of investing in regional renewable energy facilities outright. This is also a variation from traditional on-site renewables such as rooftop solar. In this instance, proximity of the project to the purchaser is not a requirement. The purchaser will acquire a renewable energy project, sell the power to an adjacent utility and then use the RECs for its own use.

The Apple data center located in Prineville, Oregon is one example where a corporation is purchasing renewable power generating projects in their vicinity and using the RECs produced to offset a portion of their energy use at the facility. Traditionally, Apple would likely have purchased RECs to offset impacts of electricity use as Intel and other similar companies do.

This approach reduces opportunities for third-party REC/Green Power transactions, however it may be a stronger signal to renewable energy project developers. Corporations investing in renewable projects to own power and RECs outright, represent a growth market for developers and can reduce transaction costs compared with unbundling power and RECs and selling production to multiple entities.

At present, Energy Trust's REC policy precludes participation in projects that use the RECs themselves.

Complements and Competition among Compliance and Voluntary REC Markets

With the rise of both RPS programs and voluntary purchases, the markets for renewable energy naturally experience some overlap with potential for both positive and negative outcomes. Past speculation suggested that one market would preclude the need for the other – specifically that an RPS would erase the need for a voluntary market. Currently the opposite seems to be true with both markets supporting continued annual growth in volume of renewable energy purchases.

In terms of positive results, requiring utilities to provide customers with a specific percentage of renewable energy within the grid mix lowers the amount of renewable energy a voluntary buyer would need to purchase in order to become "100% green powered." For instance if PGE provides 25% of its base energy mix from renewables, voluntary purchasers would only need to acquire RECs equal to 75% of their electricity use in order to reach 100% renewable energy.

A strong amount of RPS and voluntary buyers can also result in new renewable energy development within a region by demonstrating enough consistent demand to attract prospective developers.

The potential for negative implications are most likely where compliance and voluntary markets might compete. An example of potential competition may even occur within an individual utility. For instance both PGE and Pacific Power have top-ranking voluntary Green Power programs supplied with RECs sourced primarily from the Pacific Northwest and greater WECC grid area. Through the Oregon RPS, these utilities now have requirements to purchase renewable energy from within the same territory for their general energy mix. The result is that the utilities' voluntary programs have become a source of competing demand for the same pool of renewable energy available to meet compliance. With enough voluntary demand, this could increase costs and reduce supply to meet RPS, or this could increase prices to voluntary buyers and even cause them to support alternative projects outside of the region without demand competition. Our example compounds as other states within the same territory (the WECC in this example) also add compliance requirements and increase demand for a limited pool of resources.

It's important to note that this competition between compliance and voluntary programs has not occurred in Oregon or the greater WECC territory to date. Most renewable energy projects continue to struggle to sell inventories of RECs for anything above a fraction of the investments made in their respective project. The dynamic between these two markets for RECs is currently just something for utilities offering both to remain mindful of.

Ultimately the increased demand from both markets should stabilize with additional development and more renewable energy projects coming online, however there is always a lag in timing between demand and supply matching. This tends to swing the overall market for RECs both up and down in terms of supply and cost and results in uncertainty among all active parties from developers to end-use purchasers.

Rather than focus on new project development, most renewable energy compliance programs simply tend to compete for RECs available to voluntary programs, resulting in a variety of outcomes. A notable example occurred when the State of California adopted an RPS. In 2007, one of the affected utilities, Pacific Gas and Electric (PG&E), opted to offer customers Carbon Offsets from forestry[43] in part to prevent selling renewable energy resources to its traditional voluntary Green Power customers that the utility might need for RPS compliance. PG&E now offers a Green Power option to customers supplied by RECs, but their early action to shift voluntary offerings away from renewables illustrates the potential impacts of compliance and voluntary markets intersecting.

Carbon Market

In addition to the compliance and voluntary markets for RECs and Green Power, renewable energy also factors into the markets for greenhouse gas reduction – commonly referred to as the carbon markets.

As with RECs, the carbon markets also utilize a certificate product generically referred to as a Carbon Offset, with several specific names depending on the certification being used including: Carbon Credits, Verified Carbon Units (VCUs), Verified Emissions

[43] More on PG&E's "Green Option" from Greenwire: http://climateprotection.org/more-on-pges-green-option-from-greenwire/

Reductions (VERs), Climate Reserve Tonnes (CRTs), and so on. These are effectively the same and each unit represents 1 metric tonne of greenhouse gas (GHG) reduction or avoidance. Unlike RECs, Offsets can be generated from a wide variety of project technologies including: forest conservation, energy efficiency, methane and refrigerant capture/destruction, transportation efficiencies, and many others, including renewable energy.

Both RECs and Carbon Offsets are generally purchased to mitigate the impacts of one's activities that result in GHG emissions such as a company's annual energy or fuel use. This mitigation is commonly referred to as the action of "offsetting." In considering RECs and Carbon Offsets it is important to keep in mind that both are certificate products that may be used to "offset" GHG emissions as an action, but each different, specific products. Distilled – RECs are not Carbon Offsets, but both products may be used to offset one's environmental impacts. Further, a renewable energy facility may elect to produce either product in accordance with the specific protocols of each.

It's important to note that a renewable energy generation facility may not sell the same GHG reduction as both a REC and Carbon Offset – they must be committed as one or the other. One potentially confusing exception to this "either REC or Carbon Offset" categorization occurs with methane gas projects such as dairy digesters or landfill gas facilities. These projects are capable of producing two distinct measurable environmental benefits – a Carbon Offset when methane gas is collected and burned, and a REC if the burning methane is used to power a generator to produce electricity that displaces fossil fuel power generators on the grid. The key with these methane gas projects is many are not used to produce electricity and only produce a Carbon Offset. However if they do generate electricity, they are not counting the same environmental benefit twice. Rather they produce two distinct benefits.

The eligibility of renewable energy as a source of Carbon Offsets is important when considering the REC and Green Power markets. Like these markets, Carbon Offsets may also be used for both compliance and voluntary purchases.

Many voluntary purchasers of Carbon Offsets were once REC purchasers and used RECs to offset the GHG impacts of all of their activities such as natural gas use for heating, utility electricity use, transportation fuels from driving and flying. Now many of these purchasers split their purchases according to specific Scopes[44] of emissions. RECs are used for Scope 2-indirect emissions from utility electricity use and Carbon Offsets are used for Scope 1-direct emissions (such as heating fuel) and Scope 3-other indirect emissions including transportation. In general this shift has been the result of Green Power/REC critics questioning the additionality and credibility of renewable energy use as an instrument to reduce GHG emissions. The compromise between the two seems to be using renewable energy in the form of RECs or Green Power to offset electricity impacts and using Carbon Offsets for anything else. The result has been some loss of REC/Green Power purchases to the carbon market.

[44] Cool Climate Network, University of California, Berkley: http://coolclimate.berkeley.edu/node/405

There has also been some loss of renewable energy generators to the carbon market. Through its work on the Chevrolet Carbon Reduction Initiative,[45] REC marketer Bonneville Environmental Foundation has transacted with four U.S. wind energy facilities for their supply of certified Carbon Offsets equaling approximately 5 million MWhs of renewable energy. Some of these facilities had historically produced and sold RECs, but shifted to Carbon Offsets due to the increasing demand and higher premiums for Offsets over RECs.

In terms of pricing for Carbon Offsets, there is a wide range from under $1.^{00}$ to over $30.^{00}$ per Offset depending on the technology and whether it meets a compliance standard such as California's Global Warming Solutions Act (AB32)[46] or is used exclusively for voluntary purchases.

For the wind energy facilities mentioned, premiums for producing Carbon Offsets in lieu of RECs has resulted in price premiums 3-5 times higher than prevailing prices for RECs. However, converting from RECs to Carbon Offsets may only be a feasible option to large renewable energy producers due to the increased rigor and costs for certification as well as the added administrative burden required with tracking and reporting Offsets.

Unlike RECs, Carbon Offsets require much deeper accounting for certification including third-party project validation and ongoing annual third-party verification in order to achieve issuance of certified Offsets. Certified Offsets are transacted through Carbon Registries that, like those for RECs, include account subscription and transaction costs. For most renewable energy projects the cost of certification is too high to consider shifting to Carbon Offsets. For instance it is virtually unheard of for a solar facility to produce Carbon Offsets – there's no question that solar reduces GHG emissions, however the cost and burden of Carbon Offset certification is simply too expensive and cumbersome for such projects to consider.

The trend of larger renewable energy facilities shifting to Carbon Offsets is relatively new and it is too soon to tell whether this will have much impact on the supply of available RECs. Carbon markets may complement the renewable energy markets and drive deeper reductions in GHG emissions overall through expanding sales opportunities and project development, or in some cases these markets may simply compete for a limited pool of purchasers of environmental commodities.

Small Renewable Energy Projects

Environmental benefits from small-scale renewable energy projects may not generate financial opportunities commensurate with larger-scale resources (such as those from selling within Carbon Offset markets or generating WREGIS-qualified RECs), however, there have been a number of strategies introduced to incentivize such resources.

The most significant demonstrations of supporting small-scale renewable energy projects tend to focus on photovoltaic solar energy. Compliance programs such as those noted earlier in New Jersey and within Oregon's RPS drive new development specifically

[45] Chevrolet Carbon Reduction Initiative: http://www.b-e-f.org/partner/chevy-carbon-reduction-initiative/

[46] California Air Resources Board: http://www.arb.ca.gov/cc/ab32/ab32.htm

targeting solar. For example, New Jersey's favorable net-metering laws and RPS "solar carve-out" have made the state second only to California in terms of installed solar capacity – over 1.3 million kW from over 29,000 projects to date.[47]

While most RPS's do not support the same aggressive levels as New Jersey, a growing number of states are incorporating a solar carve-out into their RPS policies. For example, New Mexico, Arizona, Maryland, Colorado and the District of Columbia have set standards of 2% or greater. Sixteen states employ a specific solar set-aside (specific kW or MW target for installed solar capacity versus percentage of the power mix) and several offer credit multipliers for solar or distributed generation. Nevada, Oregon and Delaware have both a solar set-aside and a credit multiplier.[48]

Note – according to the Database of State Incentives for Renewables and Efficiency, credit multipliers have not been as effective in stimulating solar deployment as a specific solar requirement and both New Mexico and Maryland removed their initial solar multiplier provisions in favor of solar carve-outs.

On the voluntary side, a growing approach to supporting small-scale renewable energy is known as Shared or Community Solar where multiple entities participate together in the investment and benefits of developing a solar energy facility.

Community Solar projects are often located on public land or property with multiple owners, and expand the opportunity to support solar to a much broader audience. For instance Community Solar can be an option to renters, homeowners subject to local restrictions, or for residents at locations that have shading or poor solar orientation.

Community Solar is generally accomplished through three models including:[49]

- *Utility-Sponsored Model*, where a utility owns and operates a project open to voluntary ratepayer participation.
- *Special Purpose Entity (SPE) Model*, where individual investors join in a business enterprise to develop a community solar project.
- *Non-Profit "Buy a Brick" Model*, where donors contribute to a community installation owned by a charitable non-profit corporation.

The table from NREL on the following page highlights the key differences among these models:

[47] New Jersey Solar Installation Update: http://www.njcleanenergy.com/renewable-energy/project-activity-reports/installation-summary-by-technology/solar-installation-projects

[48] Solar Carve-Outs in Renewable Portfolio Standards: http://www.dsireusa.org/Solar/Solarpolicyguide/?Id=21

[49] NREL – A Guide to Community Solar: http://www.nrel.gov/docs/fy11osti/49930.pdf

	Utility	Special Purpose Entity	Non-profit
Electricity from Solar System	• Participant receives an estimated or actual kWh credit for their portion of project (virtual net metering) • Participant receives a monetary credit for the value of production for their portion of the project	• SPE sells the electricity to the utility (PPA) • SPE sells the electricity to the system host (SSA) • SPE assigns kWh to utility accounts per agreement with utility (virtual net metering) • Electricity from the system is netted against SPE members' group bill	• Non-profit owner uses on-site and net-meters • Non-profit owner assigns to utility accounts per agreement with utility (virtual net metering) • Electricity from the system is netted against a group bill
Renewable Energy Credits	• Assigned to participants • Retired on participants' behalf • Retained by the utility	• Rights to RECs sold up-front • RECs sold on an on-going basis • Retained for participants	• Rights to RECs sold up-front • RECs sold on an on-going basis • Retained for non-profit
Federal Tax Credits and Deductions	• Neither the commercial ITC nor the residential renewable energy tax credit is available to participants • If the utility has a tax appetite, it may use the commercial ITC • Normalization accounting rules will impact the value of the ITC for regulated utilities	• SPE can pass benefits of Commercial ITC through to participants • Only of use if participants have a tax appetite for passive income offsets	• Project donors can deduct the donation on their taxes • Non-profits are not eligible for federal tax credits
Accelerated Depreciation (MACRS)	• Not available to participants • An investor-owned utility may be able to use MACRS, provided they own the system • To qualify for MACRS, regulated utilities must use normalization accounting	• SPE passes depreciation benefits through to the participants, subject to passive activity rules	• Not useful to non-profits
State and Utility Rebates and Incentives	• Utility may qualify and use rebates/incentives to buy down the project costs;, benefits are indirectly passed on to participants	• SPE may qualify and use rebates/incentives to buy down the project costs or pass through to partici-pants	• Nonprofit may qualify and use rebates/incentives to buy down the project costs

Figure 5

According to the Solar Energy Industry Association (SEIA), there are currently 52 shared renewable energy projects in 17 individual states across the U.S. They also report that at least 10 states have recognized the benefits of shared renewables by encouraging their growth through policy and programs.[50]

While the Shared Renewable project approach is expected to grow, there are potential challenges around tracking and managing project benefits and obligations. For instance it is

[50] SEIA Shared Renewables/Community Solar: http://www.seia.org/policy/distributed-solar/shared-renewablescommunity-solar

common for utility projects to require Group-Billing where the project relies on a single point of contact to act as the representative and manage collection of payments from participants as well as disbursement of project benefits to the members. This administrative burden may prohibit development of some projects.

A potential alternative is use of Virtual Net-Metering. This is where, similar to Group Billing, energy generated by a renewable system is used to offset load at multiple retail electric accounts within a utility's service territory. However, under Virtual Net-Metering, the system is more automated and credits appear on each individual customer's bill the same as they would under traditional net metering rather than relying on a project representative for disbursement. Virtual Net-Metering is not available in Oregon at present.

Community Solar may also be subject to securities compliance. Projects can be structured to create ownership models that monetize financial incentives, capitalize on favorable government and utility policies, and expand ownership opportunities that involve the issuance of shares and potential for monetary gain. If so, the project may inadvertently be offering securities and become subject to Federal and State securities laws, including the administrative burden and costs of compliance.

However some states are proactively addressing these potential circumstances and creating rules that facilitate cooperative renewable energy models. Oregon's SB1520[51], subject to rules of Director of Department of Consumer and Business Services, allows renewable energy cooperative corporations to be created and capitalized without the requirement of securities registration. Within Oregon and across the U.S. as other states follow suite, community renewable energy projects, namely Community Solar, will likely become more common project strategies.

Energy Trust is currently considering such mechanisms in order to foster additional sources of financing for small-scale renewable energy projects. While it may be favorable for getting new projects in the ground, this could represent more sources of conflict around Energy Trust's current approach to RECs. Community projects may be driven in part by the environmental benefits they generate. If Energy Trust incentives require taking a majority of these benefits, in the form of RECs, its participation may not be welcomed. By definition cooperatives represent a number of individual parties who may not all agree on the disposition of their project's RECs.

Energy Trust of Oregon and Renewable Energy Certificates

Through its work supporting and incentivizing the development of new renewable energy resources, Energy Trust contributes to the growth of the REC supply produced within Oregon.

Energy Trust and the Oregon Public Utility Commission (OPUC) recognized early that the measurable environmental benefits (as captured in RECs) are one of the many valuable results of investing in renewable energy resources.

[51] Oregon Renewable Energy Cooperative Bill SB1520
https://olis.leg.state.or.us/liz/2014R1/Downloads/MeasureDocument/SB1520

Though 1999's SB1149 does not mention RECs, the subsequent emergence of a REC market led to Energy Trust's early decision to ask for ownership of a project's RECs. At the time, the OPUC considered RECs to be the "proof" of Energy Trust's participation in a project and an important way to provide value back to ratepayers. The principle underlying this view is that those who pay for the above-market costs (Oregon ratepayers, through Energy Trust) make the renewable resource possible and are entitled to the associated benefits, including RECs. Those who pay market rates for energy pay for undifferentiated resources that do not include the environmental attributes represented by RECs.

When Energy Trust originally encountered RECs, it considered whether they should be counted as potential project revenue in determining above-market costs. Energy Trust concluded that the value of RECs was then nominal or unascertainable and, because Energy Trust incentives invariably exceeded this value, Energy Trust should take title to *all* RECs if it provides *any* incentive. Most developers found this approach satisfactory first, because above-market costs were usually higher than REC market values, so it was to developers' advantage to cede RECs to Energy Trust. Second, because Energy Trust calculated the above-market costs associated with the entire life of the project, its funding represented an offer to buy RECs for as much as 20 years in the future. Most REC buyers at that time would only buy RECs 12 to 24 months in the future.

In 2004, following discussions with its Renewable Energy Advisory Council (RAC), the OPUC, and its board members, Energy Trust established a written REC policy which gave the flexibility to negotiate for less than 100% of a project's RECs. Under the written policy, the REC amount is calculated according to the percentage of a project's above-market costs being paid for with ratepayer funds.

The policy also gave parameters regarding Energy Trust's use of RECs, which could include REC sales. Proceeds from sales were envisioned to be reinvested into additional energy projects. At the time, it was believed that Energy Trust's REC holdings could be so significant as to upset the emerging market if too many were sold at once. In response, the policy limited the amount of RECs that could be sold in any one year.

Subsequent years saw the passage of renewable portfolio standards (RPSs) in California, Oregon and elsewhere, and speculation about the future value of RECs limited Energy Trust's ability to make investments as project owners believed they might be able to cash in on high REC prices.

In 2007, the Energy Trust board amended its REC policy to account for "compliance markets" that were emerging in response to the development of RPSs:

- In principle, the "minimum ownership of green tags should reflect the market value of the [RECs] and the relative above-market support provided by Energy Trust."
- Steps in determining ownership:
    - "Energy Trust will ascertain market values and forward price curves for relevant types of" RECs
    - "If Energy Trust's above-market incentive exceeds the referent [REC] market value, Energy Trust will take title to all" RECs
    - "If Energy Trust's above-market incentive is less than the referent value, Energy Trust will negotiate for enough [RECs] to fairly recognize that

> Energy Trust provides an assured revenue stream that reduces the project's market risk."

Oregon's 2007 RPS legislation also changed how Energy Trust operated, removing the ability to provide incentives to projects larger than 20 megawatts in capacity. Prior to that legislative change, Energy Trust had provided incentives for three utility-owned, large scale wind farms.

After the passage of the RPS, Oregon selected WREGIS to track RECs for RPS compliance purposes. Around the same time, Energy Trust's financial auditor began requiring that Energy Trust note the value of its REC holdings on its financial statements. A few years later the auditor advised that the organization could have to record unrealized gains and/or losses on its income statement as a result of price changes in the REC market. Energy Trust management worried that this could represent a significant amount of work and potentially make Energy Trust's balance sheet look larger, or subject to greater market risk, than it was in reality – and all to support the option for selling RECs, which Energy Trust had never executed.

The auditor proposed that Energy Trust revise its policy to say that it does not intend to sell RECs to avoid having to report their value. The board followed this advice and in 2011 eliminated the policy language governing the sale of RECs (*none have ever been sold prior to or since this decision*).

Following that policy change, the focus of REC value for ratepayers was shifted towards furthering "the goals of Energy Trust, state policies and regulatory requirements." Providing RECs to the utilities for RPS compliance was one of the expected goals.

After WREGIS was selected and once the utilities began ramping up RPS compliance efforts, Energy Trust's staff began working with the utilities, and the Oregon Department of Energy (ODOE) to develop procedures for delivering Energy Trust's RECs to PGE and Pacific Power. A variety of delivery methods were explored due to the range of technologies and project sizes to which Energy Trust provides incentive funds. These methods are discussed further below.

Looking back, the projections of high returns from future REC sales envisioned in 2004 when Energy Trust was challenged by projects opting to retain RECs rather than utilize their incentives did not occur. REC markets have been oversupplied compared to demand and the price has decreased dramatically.

One would assume this to result in projects completely willing to trade a portion of their relatively low-value RECs for Energy Trust incentives. However a new source of competition has emerged in terms of retaining the rights to RECs – especially with the medium-to-small size projects that Energy Trust now focuses on due to policy changes in 2007. The current conflict is that projects wish to retain their RECs in order to claim the environmental benefits against their own impacts. Rather than sell their RECs, they wish to use them.

As example, a small business or municipality with sustainability goals that has invested in on-site solar might choose to retain the ability to make claims and "show-off" the benefits of being "solar-powered," through keeping 100% of their RECs over transferring some in return for modest incentives. Similar to its early policy, requiring transfer of any

RECs may preclude Energy Trust from participating in some new renewable energy projects.

Energy Trust's Current REC Policy

The most recent version of Energy Trust's REC policy,[52] last amended in May 2011, retains the basic features of the 2007 policy changes:

Principles

- RECs generated by renewable energy are one of the multiple values for Oregonians provided through investing in renewable resources.
- RECs are for the long-term benefit of customers of Pacific Power and Portland General Electric.
- The disposition (retention, transfer or sale) of RECs will coordinate with and further the goals of Energy Trust, state policies and regulatory requirements.
- The minimum ownership of RECs should reflect the market value of the [RECs] and the relative above-market support provided by Energy Trust.

Policies

Ownership

- Energy Trust's minimum share of a project's RECs will be determined as follows:
    - Energy Trust will ascertain market values and forward price curves for relevant types of RECs, and update them periodically. Energy Trust will consult with PGE, Pacific Power and the OPUC staff before publicly announcing referent prices. Energy Trust will announce such prices unless it creates competitive concerns.
    - If Energy Trust's above-market incentive exceeds the referent REC market value, Energy Trust will take title to all RECs.
    - If Energy Trust's above-market incentive is less than the referent value, Energy Trust will negotiate for enough RECs to fairly recognize that Energy Trust provides an assured revenue stream that reduces the project's market risk.
    - In no case will Energy Trust accept fewer RECs than Energy Trust incentive could buy on the referent RECs market.
    - Energy Trust will negotiate either a reduction in Energy Trust incentive or retain additional RECs if the above steps would accord the project

[52] Energy Trust - 4.15.000-P Renewable Energy Certificate (REC) Policy: http://energytrust.org/library/policies/4.15.000.pdf

owner/developer a higher-than-reasonable rate of return.

- Energy Trust's ownership of the RECs should be flexible over time, while reinforcing incentives for long-term project performance.

- A developer or project owner could propose to retain RECs to market them in the near-term, provided this lowers Energy Trust's funding.

- Up-front retention of RECs by a developer or project owner must include contractual assurances that future RECs will revert to Energy Trust.

Sources of Energy Trust's REC Production

When Energy Trust funds a renewable energy project, it invests in the above market costs of the project (over the cost of non-renewable power). In exchange, Energy Trust retains a portion of the RECs produced by the project based on the percentage its contribution equals.

As an example, when Energy Trust offers a $1 per-Watt incentive for photovoltaic solar projects and the $1/Watt contribution equals 75% of a project's above market cost, then Energy Trust receives 75% of the total RECs to be produced by the project over a contractual term (generally 20 years). Typically this means splitting the full annual production based on a number of years such as leaving all RECs generated from the first 5 years with the project and the Energy Trust retaining all RECs produced from years 6 through 20 (75% of the RECs based on a 20-year life).

The 5/15 split is fairly standard for small-scale Energy Trust photovoltaic projects. Larger-scale renewables or alternative technologies are considered custom and negotiated based on the specific finances of the project.

Portfolio

As of the end of 2014, Energy Trust had provided incentives to over 7,000 individual renewable energy projects, which includes ownership rights to an estimated 2.4 million RECs from 2015 through 2030.

Energy Trust Projects Funded Through December 31, 2014	
Technology	**Number**
Solar	7,135
Small Wind	40
Biogas	9
Hydroelectric	12
Geothermal	2
Wood Waste to Energy	2

Figure 6

Yearly REC ownership is most easily understood when broken down by utility and three categories related to REC administration:

- Standard Solar - projects funded through Energy Trust's solar program which are expected to be managed in WREGIS as a large group,
- Custom - biomass, biogas, hydro, geothermal, and utility scale solar projects, which are managed individually in WREGIS, and
- No Path – for the few projects that currently do not have a cost-effective pathway for registering and tracking their RECs in WREGIS.

The two charts that follow show Energy Trust's REC ownership from its current portfolio of projects installed by December 31, 2014.

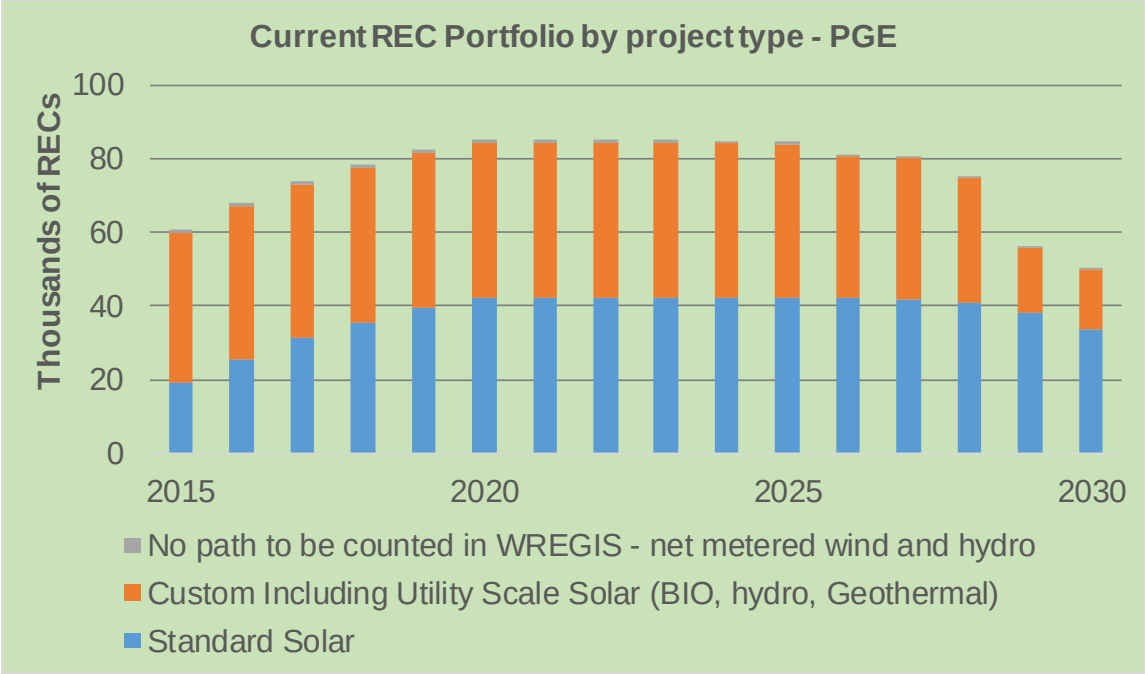

Figure 7

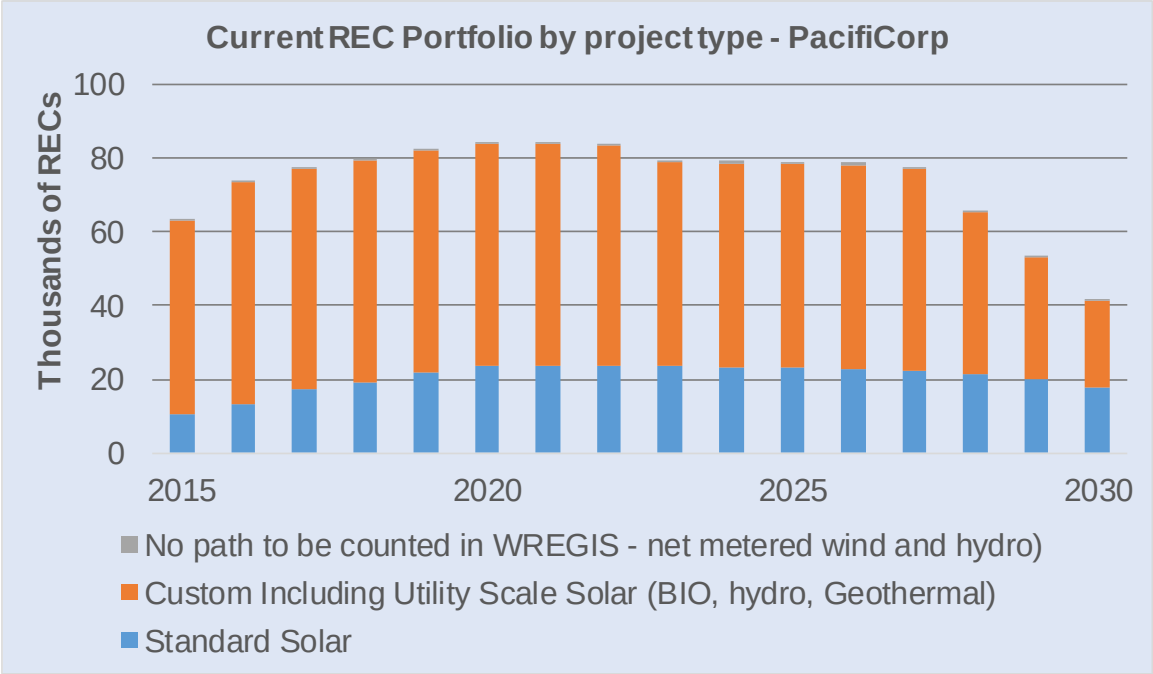

Figure 8

The charts show REC ownership from the current portfolio of projects ranging from ~65,000 to ~85,000 annually between each utility, with PGE's ownership more skewed to Standard Solar and Pacific Power's more heavily weighted to Custom projects. Looking at a few years individually highlights how the total portfolio changes over time.

Total RECs, both utilities		**2015**	**2020**	**2025**
Standard Solar	Number of RECs	29,952	65,890	65,335
	% of RECs by year	24.1%	38.9%	39.9%
Custom Projects	Number of RECs	93,174	102,206	97,216
	% of RECs by year	74.8%	60.3%	59.4%
No Path	Number of RECs	1,386	1,422	1,234
	% of RECs by year	1.1%	0.8%	0.8%
Total	Number of RECs	124,512	169,518	163,785
Expected REC Holdings from current contracts.				

Figure 9

In general, the portfolio shifts more towards solar over time and then stabilizes. This is due to the fact that RECs are not acquired from Standard Solar projects until the sixth year of operation, as described above. Additionally, the number of RECs that cannot be cost-effectively registered in WREGIS is a very small percentage of the total portfolio.

Staff estimated how project acquisition in future years would impact the growth of Energy Trust's REC portfolio over the 2015-2030 time period. The estimates utilize the 2015-2019 Strategic Plan to project solar and non-solar project acquisition, which

averages 17,520MWh of new generation annually. The graph below shows the impact of growth on the portfolio.

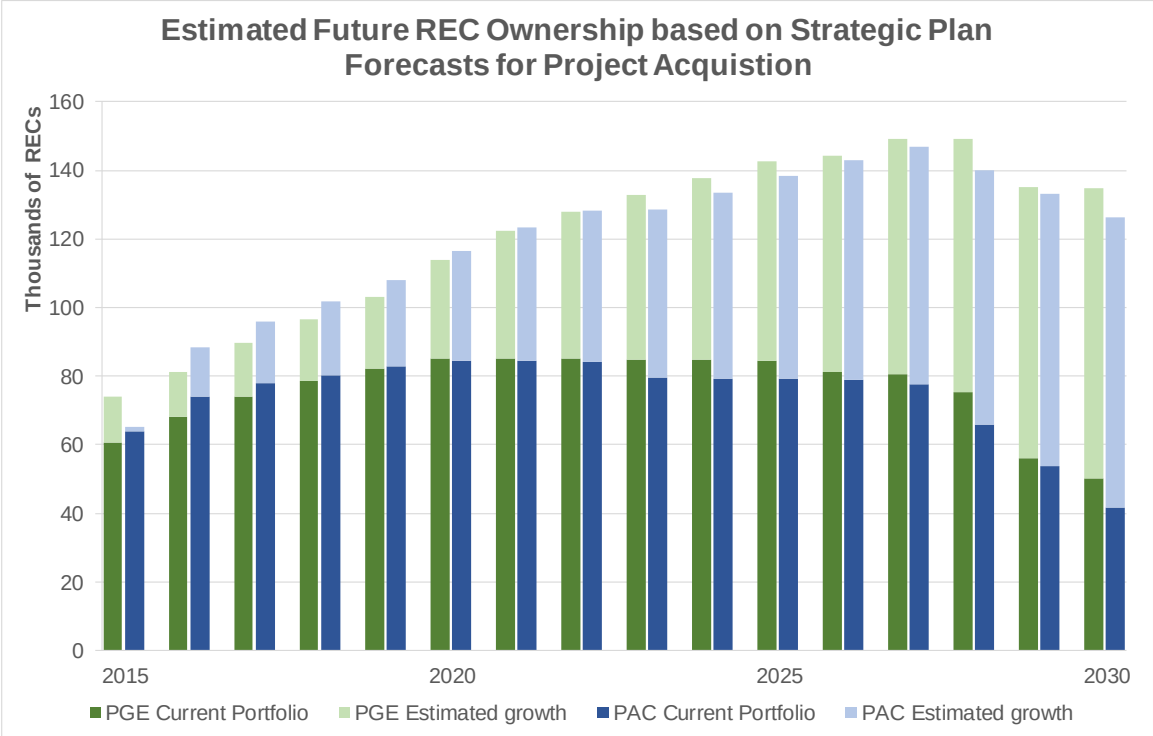

Figure 10

Current Uses of Energy Trust RECs

Energy Trust holds master agreements with both utilities specifying the terms of use for the RECs it transfer to each utility. The agreements broadly allow the utilities to utilize any RECs transferred to them to provide benefits to Oregon ratepayers. There are four uses outlined by the agreements:

1) RPS compliance
2) Meeting other governmental mandates that may arise
3) Meeting the energy needs of ratepayers
4) Sales, with proceeds being reinvested in the development or acquisition of additional renewable energy projects or utilize to reduce rates for ratepayers.

There does not currently appear to be a formal reporting or tracking requirement regarding the specific disposition of RECs that have been received from Energy Trust.

It's worth noting that Energy Trust is not aware of any case where PGE or Pacific Power has sold any RECs received from Energy Trust projects. However it is possible and in the event RECs are sold, it may be challenging to prove they have directly benefited Oregon IOU ratepayers.

Depending on one's view of these utility transfers, an argument could be made that Energy Trust is acting counter to its original policy and engaging in the equivalent of

selling its RECs, though indirectly and perhaps at lower upside than might be gained as a direct seller in the market.

The master agreements also deal with the issue raised earlier of over-allocating RECs between utility programs such as Blue Sky and Energy Trust. Recall that Blue Sky acquires RECs in proportion to the percentage that their grants represent to total project costs. For example if they provide $30,000 for a $100,000 project they will ask for 30% of the RECs. If Energy Trust also provides an incentive and requests 75% of the RECs there are not enough for both organizations.

The master agreements provide leeway in this circumstance, allowing Energy Trust to reduce its share so that not more than 100% of the project's RECs are allocated. The agreements essentially allow the utilities' green power programs to be considered as an additional value to ratepayers. While solving an allocation conflict, this favors the utilities in a way that is not accessible to other Energy Trust participants and may unintentionally be acting counter to an intent of Oregon's voluntary utility green power options. Oregon's voluntary green power programs typically draw a line between costs and benefits assigned to general ratepayers versus green power participants, so that one group does not unintentionally pay to benefit the other. While the master agreement leeway resolves the issue of over-allocation, Energy Trust accepting fewer RECs than it typically would in other instances favors the Blue Sky contribution and could be viewed as shorting Public Purpose ratepayers in favor of voluntary green power participants.

Energy Trust Contribution to Utility RPS Requirements

To put the size of the portfolio into context staff compared the total expected annual REC ownership (current portfolio minus "no path" projects plus expected growth) to the expected RPS obligations the utilities will face between 2015-2030. The RPS amounts were estimated based on energy use estimates provided by the Oregon Department of Energy. As RPS requirements go up Energy Trust's contribution becomes a smaller percentage of the overall total. For PGE this ranges from a high of 3.4% in 2019 down to 2.3% in 2030. For Pacific Power, the range goes from a high of 5.1% in 2019 down to 3% in 2030.

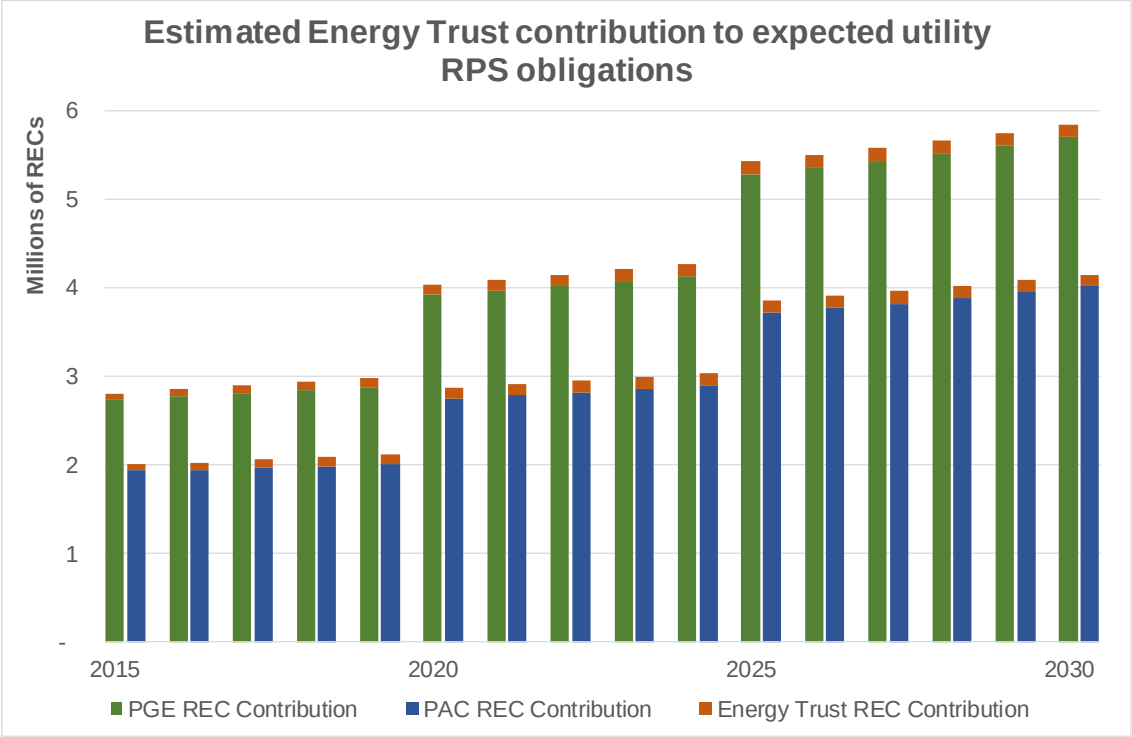

Figure 11

It is also important to note that prior to 2008, when Oregon's RPS legislation precluded Energy Trust from providing incentive to projects larger than 20MW in capacity, Energy Trust provided funding for three utility scale wind projects. PGE's Biglow Canyon wind farm has an expected production of approximately 410,000 RECs annually. Pacific Power's Goodnoe and Combine Hills wind farms have expected productions of approximately 263,000 and 125,000 RECs, respectively. Combined, the expected annual 800,000 RECs produced by these three projects dwarf the RECs acquired from all the smaller projects Energy Trust now supports. RECs from these three facilities are registered and tracked in WREGIS by the two utilities and are not included in the bar graphs above.

While Energy Trust's REC portfolio is sizeable, it does not account for a large percentage of the renewable energy required by the utilities.

REC Allocation Between PGE and Pacific Power

From 2015 through 2030 the current REC portfolio is expected to deliver over 1.21 million RECs to PGE and 1.18 million RECs to Pacific Power, very close to a 50/50 split. While this split seems equitable on its face, it is possible that Pacific Power rate-payers have an advantage in terms of their Public Purpose dollars acting as a potential hedge against utility price increases when measured as a percentage of total rate payers.

Overall, there are approximately 20% more ratepayers in PGE's service territory – averaging 833,129[53] customer accounts compared with 562,072[54] customers served by Pacific Power in Oregon. As a result, PGE customers provide a larger budget for Energy Trust renewable energy projects and support a larger number of them.

The difference between PGE and Pacific Power in terms of the volume of transferrable RECs stems from the types and sizes of renewable energy projects developed/supported. Pacific Power operates in more rural areas of Oregon where larger renewable energy projects, producing bigger volumes of RECs, are more feasible. Projects within PGE's territory tend to be smaller-scale and face more challenges in terms of costs and WREGIS integration.

Due to the geography of the service territory and corresponding transfers of Energy Trust RECs from larger projects than are possible within PGE territory. PGE ratepayers may support more renewable energy within Oregon, but Pacific Power customers could realize more direct financial benefit, as expressed in deeper insulation against potential future RPS compliance-related rate increases or more new renewables developed by the utility in their communities.

Challenges with RECs from Standard Solar Projects

The vast majority of Energy Trust projects are small-scale photovoltaic solar installations, primarily located at residential households or small businesses. In terms of typical REC portfolios within the market, this is an unusually large number of projects producing very small volumes individually. Without project aggregation (and a degree of automation for reporting/metering), most active REC market participants (brokers, marketers and utilities) would not include such projects in their portfolios due to the high levels of transaction and administrative costs associated with managing small projects.

As a category, these smaller projects can also be challenging from the perspective of successfully managing rights to environmental claims from the RECs produced. The fundamental tradeoff of transferring one's RECs is that any claims around being "Green Powered" are transferred with the REC to the new owner. The original owner must discontinue making any such claims themselves or risk "double-counting" a single environmental benefit and invalidating the environmental value of the transferred RECs.

Though not usually intentional, many small projects do not appreciate the distinction of transferring all rights to claims along with their RECs and will continue to describe themselves as "solar powered" or etc. and assume the financial contribution gained from selling/transferring their RECs is simply an incentive rather than a transactional payment for ownership rights.

At present Energy Trust does not take any steps outside of contractual language to minimize these potential misunderstandings. This could be a source of risk as Energy Trust staff work to have these RECs accrue in WREGIS (as discussed later). It also may

[53] Portland General Electric Quick Facts - https://www.portlandgeneral.com/our_company/pge_glance/quick_facts.aspx

[54] Pacific Power Quick Facts - https://www.pacificpower.net/about/cf/qf.html

present a risk for Energy Trust's reputation if small project owners did not understand that their contract took away their rights to make claims about their greenness. Both the Oregon Department of Energy and Green-e have raised the question of whether Energy Trust should take additional steps to notify project owners when their REC ownership period ends.

The level of financial contribution from the RECs versus other project investments may further confuse boundaries of claims. For instance an individual who has paid high up-front costs of installing a solar array at their home or business may feel they have "made possible the benefits from the solar being generated" or that "their dollars really made the project happen," compared with a relatively small contribution from a REC purchaser who now owns all such claims from the project in the case of a REC sale.

As an example, a 3.25kW residential solar system installed in 2014 cost $14,600. Energy Trust paid an incentive of $3,100. The owner paid $11,500 up front but the Oregon residential energy tax credit will return $6,000 to the owner over 4 years, leaving $5,500 in total costs paid by the owner. While Energy Trust's incentive represents 21% of the project's total cost, the share of RECs owned is 75%.

This can become even more confusing if other funders participating in a project also require REC delivery but calculate their share of RECs differently than Energy Trust. For example, Pacific Power's Blue Sky program provides competitive grant funding for small renewable projects and asks for an amount of RECs equal to the percentage of the project's total cost paid for by its grant. In some cases the total amount of RECs requested by Energy Trust and Blue Sky can exceed the total available. This particular issue is discussed in more depth later.

It may also be especially challenging to convey this transfer of claiming rights with the RECs when solar panels are publically visible at a location. When seeing a solar array, most people would assume the location to be solar powered and not know (in the event of a REC sale) that the environmental benefits produced belong to another entity. No solar project would advertise their location as "not solar powered" to dissuade the public from its assumptions, which may support an *implied* claim of being solar powered. At a minimum, the project should be up-front about the disposition of their RECs (their solar energy) when asked publically, when cited in sustainability reporting and marketing materials, or in applying to local "green-related" recognition programs such as the Oregon Governor's Sustainability Awards for businesses and other comparable initiatives.

To help address some of these issues, the Green-e Energy program offers specific guidance for solar claims through its *Best Practices in Public Claims for Solar Photovoltaic Systems*[55] resource. While they do not consider RECs or the corresponding claims from smaller projects to be different in quality or associated benefits from those produced by larger-scale projects, Green-e is focusing more attention on policing claims around small projects than in the past.

[55] Best Practices in Public Claims for Solar Photovoltaic Systems - http://www.green-e.org/docs/energy/Solar%20FAQ%20and%20Claims.pdf

At a minimum, this smaller class of projects requires extra attention and a more-complex portfolio management process compared to larger, more-industrial, renewable energy facilities with more experience in REC claims.

Challenges with Custom Projects and WREGIS Cost Allocation

Another key consideration within its REC portfolio is that Energy Trust does not always own the entire output from the projects it supports. In many cases the project owner or developer retains some portion of the RECs – either split according to specific production years or on a percentage basis where annual production is divided between the project owner and Energy Trust. These arrangements bring into question which entity should bear the burden of WREGIS registration and ongoing reporting.

Ownership also concerns utilities that might accept RECs from Energy Trust towards RPS compliance. When utilities deal with projects that include multiple outside parties splitting ownership, they feel the increased complexity and administrative burden may not be equal to the value they receive – even when the RECs are offered at no cost to the utility from Energy Trust.[51]

Utilities must also be mindful of showing special treatment to a particular set of customer-owned projects over another. For instance they cannot cover the costs required for metering and verifying one project's RECs for WREGIS registration while requiring other customers to cover these costs themselves.

For projects where the total generated RECs are divided among multiple project participants, Energy Trust may not be alone in terms of the preference to comply with WREGIS. Most volume REC purchasers, such as marketers, brokers and utilities, now require use of a registry for all transactions. Projects splitting RECs with Energy Trust that wish to sell their portion on the market, should reasonably be expected share in the burden and expense of the registry.

The Evolution of Energy Trust's Operation and Management of its REC Portfolio for Custom Projects

Energy Trust's management of its REC portfolio for custom projects has evolved over time as the REC markets changed and regulatory requirements were implemented. Energy Trust utilized a number of different contractual requirements in order to obligate RECs from projects to reflect the requirements of the REC policy and fit with changing market and regulatory needs.

Prior to the RPS and the adoption of WREGIS, for most larger-scale, non-solar projects (hydro, biomass, etc.) and a few early third-party commercial solar projects, Energy Trust followed the industry standard of requiring annual paper attestations – documentation citing that Energy Trust owned specific RECs produced by the project.

Attestations were contractually required to be delivered to Energy Trust annually, with each project documenting the transfer of the specific volume of RECs produced over the previous year. Energy Trust staff did not always follow-up on attestation delivery, however, and delivery records are inconsistent between projects. The attestations that were delivered have been held on file.

Energy Trust has not attempted to transfer or formally retire any of the RECs delivered via attestation. Based on conversations with WREGIS staff, Energy Trust considers the RECs that were delivered by attestation to be unobtainable and effectively expired. As most contract periods last 15-20 years, some RECs are still delivered by attestation each year.

After the passage of the RPS in 2007 and the adoption of WREGIS as the designated tracking tool for RECs, Energy Trust staff began exploring how to utilize WREGIS for the RECs it owns. Working with the utilities, a framework was agreed upon to facilitate REC delivery for larger projects in WREGIS. Two pathways were identified: one for projects where the owner is willing to transfer ownership of 100% of the RECs to Energy Trust for a substantial number of years (Pathway A) and one for projects where the owner requires retention of a certain percentage of RECs each year (Pathway B).

As described earlier, in order to be eligible for Oregon's RPS, projects providing RECs must be registered within the WREGIS tracking system. This requirement includes both the fees of holding and operating an account, as well as the costs of tracking and reporting annual REC generation.

Reporting annual generation may be accomplished through use of a Qualified Reporting Entity (QRE), by the generating unit itself ("self-reporting", though this is only available for projects up to 360kW in capacity), or through a third-party meter reader.[56] In an early study of the WREGIS system Energy Trust estimated reporting costs at approximately $60 to over $700 per project annually depending on the method of reporting and project size.[51]

Once projects report generation and RECs are issued, depending on the size of the renewable energy facility, WREGIS also requires per-REC transaction fees for transferring ownership and/or retiring RECs.

For Pathway A both PGE and Pacific Power have agreed to register generating units in their WREGIS accounts. Under this arrangement the utilities forgo monthly QRE fees and both Energy Trust and the project owner avoid WREGIS account expenses and administration. This requires a project owner to complete and sign a "WREGIS Notice of Assignment of Registration Rights" granting this registration permission to the utility. In addition to the notice, the project has to provide a copy of its Energy Trust incentive agreement, as well as utility interconnection and power purchase agreements to WREGIS.

For Pathway B project owners must register the project in WREGIS themselves, manage generation reporting, and make annual RECs transfers to the utility.

Once these pathways were identified, Energy Trust changed its contractual language and approach for larger projects to attempt to standardize their use.

---

[56] Energy Trust Renewable Energy Certificate Holdings Issues and Costs related to Renewable Energy Standard Compliance: http://energytrust.org/library/meetings/rac/REC__WREGIS_discussion_and__proposals_051211_final0.pdf

In 2014 Energy Trust and Pacific Power successfully registered the Klamath Irrigation District's C-Drop Hydroelectric project in WREGIS utilizing Pathway A. Energy Trust staff are now working with Pacific Power on three additional similar projects.

Energy Trust staff plan to work with projects still delivering RECs via attestation to see if their contracts could be re-negotiated to allow future RECs to accrue via the two identified pathways. This work has not yet begun and will require renegotiating approximately ten contracts representing 40,000 RECs annually.

While these pathways are optimized for the least cost and administration from Energy Trust's perspective they are not without challenges from the project owner's perspective, especially for project owners who want some portion of RECs to make green claims. But for Energy Trust, projects that wished to retain a portion of their RECs could do so and make claims without utilizing WREGIS. Now, retaining RECs will require a project to utilize WREGIS, at a cost determined by the project's size.

There can be additional costs for Energy Trust as well. Larger projects where energy is mainly used on site, such as waste water treatment plants (WWTPs), may require additional metering infrastructure to meet WREGIS standards, adding to above market costs.

About a dozen projects are already listed in WREGIS because they are large enough to be financially worthwhile or the project owner may have other generating units already on the registry which absorb the costs to register. RECs from those projects are transferred directly to the utilities in order to offer benefit to Oregon ratepayers. As of the writing of this document, 14 projects were transferring RECs via WREGIS, accounting for approximately 40,000 RECs annually. Eight of these projects are large-scale solar, accounting for approximately 22,000 RECs annually.

"No Path" Projects
Unfortunately, approximately 40 small-scale, non-solar projects still don't fit well into Pathway A or B. These are the "No Path" projects shown in the portfolio composition graphs. Small wind and hydro projects under 100kW, many of which are net-metered, are not easy to fit into either Pathway A or B. The utilities are not interested in Pathway A because the transactional costs involved in registering the project outweigh the value of the RECs. In addition, net-metered projects may require additional meter reading – at a cost which also outstrips the REC value. Pathway B is a difficult sell to the project owner because it requires ongoing annual payments to WREGIS and would also incur a management cost for Energy Trust to follow up with owners who forget to transfer their RECs. These projects account for approximately 1,100 RECs annually.

Operation and Management of Energy Trust's Standard Solar REC Portfolio

Contracts for small scale residential and commercial solar projects have consistently required that project owners cooperate with Energy Trust "to register or otherwise perfect Energy Trust's rights" to RECs. The period of Energy Trust's REC ownership has changed over time, however, as shown in the chart below.

Year	Residential Solar	Commercial Solar
2004	10 years after signing	10 years after signing
2005	10 years after signing	10 years after signing
2006	years 6-20	years 3-20
2007	years 6-20	years 3-20
2008	years 6-20	years 3-20
2009	years 6-20	years 6-20
2010	years 6-20	years 6-20
2011	years 6-20	years 6-20
2012	years 6-20	years 6-20
2013	years 6-20	years 6-20
2014	years 6-20	years 6-20

Figure 12

Energy Trust's REC ownership from the earliest solar projects has already ended or will end soon for projects installed before 2006. RECs from projects installed after 2006 are still owned by Energy Trust for quite some time. Note that on a percentage basis the amount of RECs owned jumped from 50% to 75% for residential projects and from 50% to 90% and then back to 75% for commercial projects.

The methodology for delivering Standard Solar RECs to PGE and Pacific Power is quite different from the larger scale projects and is discussed further below.

Small Projects in WREGIS and Implications for Standard Solar

In order to help ease the process for smaller projects, WREGIS does offer some alternatives to its standard single project approach including: Aggregation, and Self-Reporting. Energy Trust explored these options in the past[51], but without finding a meaningful reduction of costs and administrative burden.

- Aggregation still requires each project to be registered individually within WREGIS and then placed into aggregated groups, and includes administrative impacts to Energy Trust.

- Self-Reporting allows smaller projects to avoid costly meters or third-party QRE services, however Energy Trust would have to manage the process of soliciting and receiving generation reports from each individual projects for each year of their REC production.

While existing pathways have not solved the challenges for this category, an area of promise for counting small projects towards Oregon's RPS has been explored in discussions between Energy Trust and WREGIS regarding the development of a "Deemed Method." The premise to the approach is based on random sampling a small number of projects in order to statistically calculate production estimates across the larger population projects. This approach is commonly used in Carbon Offset certification protocols, such as GHG reductions from forestry, whereas RECs traditionally follow strict measurement of each site's specific metered data.

In terms of reliability, aggregate solar generation is very predictable – especially when projects are located in a similar geographic region with common weather conditions and solar exposure.

As proposed, RECs from Deemed Generation would be limited to use for Oregon RPS compliance purposes only to prevent co-mingling with other RECs held to a different standard of generation reporting.

This WREGIS Deemed Method was first mentioned in the last report Energy Trust staff made on work related to the REC policy and is currently still being considered. Energy Trust, Oregon IOUs, WREGIS and Oregon Department of Energy each support the concept as an option for small projects going forward. However working through the details for successful execution has been a relatively low priority for all parties to date. The parties met in early 2015 and are pushing forward with a solution. Under the best-case scenario, vintage 2015 RECs from Standard Solar projects might be able to start being counted in WREGIS at the beginning of 2016.

Acquisition of RECs by Organizations Similar to Energy Trust

While there are no organizations established in the same way or that operate exactly as Energy Trust does, there are a handful of similar entities that also manage a portfolio of renewable energy projects and that also own RECs based on their participation with the projects. It is important to note that most of these organizations have RPS requirements they must meet. The following highlights some of these organizations and how they treat RECs:

Clean Energy Finance and Investment Authority (CEFIA)

From their site, CEFIA[57] was created by the State of Connecticut Legislature as a part of Public Act 11-80 in order to invest resources in an array of enterprises, initiatives and projects aimed to attract and deploy capital to finance the clean energy goals of Connecticut, develop and implement strategies that lower the cost of clean energy to make it more accessible and affordable to consumers and reduce reliance on grants, rebates and other subsidies and move toward innovative low-cost financing of clean energy deployment. Similar to Energy Trust they are funded in part through a surcharge on residential and commercial electric bills. They also receive proceeds from sales of Regional Greenhouse Gas Initiative (RGGI)[58] Allowances, Federal funds and grants, as well as private capital in the form of contracts that include outside investors.

Like Energy Trust, CEFIA supports residential-scale solar through and investment program called Residential Solar Investment Program (RSIP)[59] that includes a combination of financing and incentive programs. For their participation in such projects,

[57] About CEFIA – http://www.ctcleanenergy.com/Default.aspx?tabid=62

[58] RGGI - https://www.rggi.org/rggi

[59] RSIP - http://www.ctcleanenergy.com/YourHome/ResidentialSolarInvestmentProgram/tabid/616/Default.aspx

CEFIA retains the RECs produced by these resources and then sells them through REC Brokers they have been deemed qualified to represent CEFIA. Through memos shared with Energy Trust, the current size of CEFIA's REC portfolio projected through 2019 and based on projects installed from 2012 – 2014 is approximately 150,000 RECs.

It's worth noting that their decision to sell RECs may be based on Connecticut's aggressive RPS goals which results in consistently high pricing for qualifying RECs – recent trades reported through Karbone Brokerage[60] range from $22 to $53 per REC depending on the specific compliance class – the CEFIA RECs qualify as Class 1 under the RPS and pricing trends towards the high end of the range.

In terms of managing their portfolio, CEFIA's policy[61] to sell RECs is guided by close observation of the markets, broker relationships, and a minimum semi-annual assessment of current and future market valuations and demand. Sales are both "spot" – *transacting for RECs that have been generated and are currently available*, as well as "future" where RECs projected to be produced in future years are sold in advance of their generation. Each approach requires regular attention, and selling future production requires periodic portfolio evaluation based on production, potential changes in market price or demand, and the reliability of the contractual purchasers. Combined, these elements makeup a risk profile that must be actively managed by CEFIA.

Sacramento Municipal Utility District (SMUD)

SMUD[62] is the serving electric utility for Sacramento, California and surrounding region. California is an RPS state and through utilities, also supports mandatory solar incentive payments to eligible systems. SMUD, as a California utility, is required to meet requirements of the state's RPS.

SMUD's policy is to take title to the RECs associated with any renewable energy capacity for which all ratepayers have supplied direct subsidies. Their rationale is that nonparticipants in solar incentive programs are entitled to some benefit in exchange for the surcharge they pay to help buy-down system costs for participants in our solar incentive programs. Currently SMUD keeps the RECs produced by all PV systems.

New York State Energy Research and Development Authority (NYSERDA)

From its site, NYSERDA[63] is a government research public benefit corporation, offering objective information and analysis, innovative programs, technical expertise, and funding to help New Yorkers increase energy efficiency, save money, use renewable energy,

[60] Karbone Brokerage - http://www.karbone.com/services/brokerage/

[61] Draft Guidelines and Procedures for CEFIA Management of Class I REC Asset Portfolio - http://www.ctcleanenergy.com/Portals/0/board-materials/4_CEFIA_Draft%20Guidelines%20for%20REC%20Asset%20Management_Memo_120413.pdf

[62] SMUD - https://www.smud.org/en/index.htm

[63] NYSERDA - https://www.nyserda.ny.gov/About

and reduce reliance on fossil fuels. NYSERDA is primarily funded by state electricity ratepayers through a system benefits charge established in 1996. NYSERDA is responsible for administering New York's RPS and establishes contracts to procure RECs to meets RPS requirements.

Along with its many programs, NYSERDA operates a solar power initiative called NY-Sun[64] that includes incentives and financing to help pay for the installation of solar electric systems and educational programs to benefit NY electricity consumers.

NY-Sun follows a standard provision for all renewable energy projects which reserves the rights to the renewable attributes, such as RECs, for all projects that receive incentives. These environmental attributes are tracked and reported towards meeting New York's statewide RPS goal.

Xcel Energy & State of Minnesota's "Made in Minnesota" Solar Energy Production Incentive Account & Renewable Development Fund

Xcel Energy[65] is an investor-owned utility holding company based in Minneapolis, Minnesota. It consists of four subsidiaries: Northern States Power-Minnesota, Northern States Power-Wisconsin, Public Service Company of Colorado, and Southwestern Public Service Co. In Minnesota, Xcel is responsible for meeting the requirements of the state's RPS.

Xcel Energy's Renewable Development Fund (RDF)[66] is the result of nuclear energy mitigation compliance and was created in 1999 pursuant to the 1994 Radioactive Waste Management Facility Authorization Law (Minn. Stat. § 116C.779). Originally, Xcel Energy was required to donate to the fund $500,000 annually for each dry cask containing spent nuclear fuel being stored at the Prairie Island nuclear power plant, amounting to about $9 million annually. Subsequent legislation, enacted in May 2003, extended nuclear-waste storage at Xcel Energy's Prairie Island plant and increased the amount Xcel must pay toward the development of renewable-energy resources to $16 million annually for as long as the utility's Prairie Island nuclear plant is in operation and $7.5 million for each year the plant is not in operation.

The RDF makes a $12 million/year payment to the State of Minnesota's *Made in Minnesota Solar Energy Production Incentive*[67] which is a $15 million/year Legislative program funded in part by the RDF.

The incentive is a 10-year, $150-million program available to customers of Minnesota's electric investor-owned utilities who install solar photovoltaic or solar thermal systems using solar modules or collectors certified as *Made in Minnesota*.

---

[64] NYSERDA NY-Sun - http://ny-sun.ny.gov/About/About-NY-Sun

[65] Xcel Energy - http://www.xcelenergy.com/
[66] XCEL RDF - http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=MN09R

[67] Made in Minnesota Solar Energy Incentive http://www.mn.gov/commerce/energy/topics/resources/energy-legislation-initiatives/made-in-minnesota/

Projects that receive such incentives or direct grants from Xcel Energy through the RDF are to assign any renewable energy attributes that may be generated to Xcel Energy (excluding any federal or state tax credits that may be entitled to the developer). Although this is primarily aimed at capturing rights to the RECs, the condition is very inclusive and would also apply to any attribute of the renewable energy project, such as Carbon Offsets or other measurable benefits.

A second legislative program in Minnesota called *Solar Rewards*[68] and funded from the RDF had ended. The program is currently up for renewal and review by the Minnesota Public Utilities Commission. The program offered performance based incentives and rebates for installation of photovoltaic (PV) solar panels that are not included in the *Made in Minnesota* program. As currently envisioned, and as with the *Made in Minnesota* incentive, *Solar Rewards* participants must also agree to assign the RECs produced by their system to Xcel Energy for the term of the 10-year contract.

[68] Solar Rewards - http://www.mnseia.org/programs/xcel-solar-rewards