

The RECs Revolution 1999-2009

How Renewable Energy Certificates Created a New Environmental Marketplace

What is a REC?

A **renewable energy certificate (REC)**, also known as a *green tag* or *tradable renewable certificate*, represents the environmental, social, and other positive attributes of power generated by renewable resources. For example, RECs may represent the emissions avoided by renewable power generation compared with those of conventional sources. RECs also represent the generation characteristics—such as the resource type, facility location, direct emissions and generation date—of one megawatt-hour (MWh) of electricity from a renewable energy generator. RECs can be purchased separately from electricity service. *Source: "Guide to Purchasing Green Power" 2009; U.S. Environmental Protection Agency.*

Introduction:

Introduced into the energy market in starting in 1999-2000, sales of renewable energy certificates (RECs) represent a significant innovation in how renewable energy is developed, purchased and sold in the United States. RECs recognize an additional environmental and social value to renewable generation that goes beyond the value of commodity electricity. They allow for an unbundling of those attributes to create a distinct market value based on buyers' desires for those benefits.

When electrical energy associated with a REC is kept bundled, it is considered renewable electricity. When those renewable attributes are sold separately as RECs, the electricity that was split from the REC is no longer considered "renewable" and cannot be counted as renewable or zero-emissions by whoever buys it. However, when RECs are paired with electricity commodity purchases, the buyer is entitled to a claim for purchasing zero-emissions energy.

RECs transactions now comprise a majority of sales in voluntary markets for renewable energy. Most of the 28 states that have a Renewable Portfolio Standard also allow or require use of RECs to meet delivery requirements.

The independent certification of RECs under the Green-e Energy program beginning in 2002 provided a basis for legitimacy of their use in the green power marketplace and has helped spur tremendous growth.

Despite obvious contributions to markets for renewable energy, the value of RECs continues to be misunderstood by policymakers and maligned by those with an inherent mistrust of market-based mechanisms for providing essential public services or environmental benefits. Other critics try to undermine the environmental benefits of RECs because future climate-change policies may subsume the purchasers' ability to claim greenhouse gas emission reductions under a cap-and-trade program.

The following document traces how RECs came into being and the impact their use has had on the marketplace for renewable energy over the past decade. It also offers a better understanding of how RECs are applied by electricity users to support their commitment

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to sustainability and clean energy by “greening” basic power purchases and offsetting emissions attributed to electricity use.

1. Historic context

Tremendous changes in the electric power industry over the past decade have spurred significant market innovations and a fundamental alteration of both the regulatory structures and the institutions that govern the sale and delivery of power to homes and businesses.

At the same time, public-policy pressures and consumer demand for a cleaner, more healthy environment have combined to promote widespread acceptance of what were formerly considered alternative energy technologies derived from wind, solar, hydroelectric, geothermal and biomass resources. More recently, a tipping point of public response to the potential adverse impacts of global climate change is leading to a fundamental reinvention of the nation’s economic underpinnings to promote green technologies and sustainable energy practices.

Because of the significant, adverse contribution that fossil-fueled power generation makes to the global carbon footprint, a transition to renewable resources is among the most readily available and most effective means to address the climate challenge.

Building upon supports embodied by the federal Public Utilities Regulatory Policy Act of 1979 (PURPA), active markets for utility-scale renewable development found a first foothold among non-utility, wholesale power generators in California and a few other states. Later, competitive retail markets in several regions allowed for a choice of energy suppliers and renewable energy products among households and commercial consumers willing to pay a premium for such products. Subsequent utility adoption of green pricing programs in select jurisdictions also coincided with imposition of regulatory mandates for renewable portfolio standards (RPS) for minimum levels of renewable purchases as part of regulated utilities’ generation mix.

Together, these developments in what have come to be known as “voluntary” and “compliance” markets spurred a substantive demand for renewable energy throughout the United States.

Still, renewables face significant barriers to entry in the marketplace – especially from utilities that continue to hold a monopoly over retail service – but also because of constrained access to the high-voltage transmission system. Even the introduction of third-party grid operators (RTOs and ISOs) that were intended to ensure open-access to transmission and greater reliability of system did not overcome all such barriers.

2. Role of RECs

RECs represent a revolutionary concept in the electric power industry. First and foremost,

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RECs recognize an additional environmental and social value to renewable generation that goes beyond the value of commodity electricity. Secondly, they allow for an unbundling of those attributes to create a distinct market value based on buyers' desires for those benefits.

This is not a foreign concept in the power industry. Power from traditional generating stations (whether fueled by coal, natural gas, nuclear or other resources) is comprised of energy and capacity. The energy, in the form of electrons, is what is delivered over transmission wires to homes, offices and factories in order to create light, heat or other productive output. Capacity is what helps maintain the reliability of the system (or grid), with values attributable to "products" like voltage support, spinning reserve, or blackstart capability.

One of the significant industry innovations of the past decade was the creation of distinct markets for these and other so-called ancillary services.

Renewables, especially from wind and solar projects that do not generate constantly, may not offer the same capacity values sought by grid operators. But they offer something else: environmental benefits – especially a lack of emissions and system diversity – that can be valued apart from the underlying electrons.

Because of the physical nature of the electric grid, the electrons that a consumer actually uses are delivered as a system mix of all generation types in operation at the time within that region or utility territory. Short of installing a solar photovoltaic unit on one's roof or connecting directly to a wind turbine, in virtually all parts of the country, there is no way to avoid consuming energy that is a blend of nuclear, fossil and renewable resources generated at the exact moment of consumption.

However, RECs create and specify a unique claim to ownership of the renewable attributes of generation and can be bought on the basis of specific technology, location or vintage (i.e., Northwest windpower 2008, or New Jersey solar from 1st quarter, 2009). By providing documentation for such purchases from renewable energy generators, RECs allow consumers to prove their claim to these benefits and verify their commitment to clean energy.

More importantly, by separating the environmental attributes of renewables from the underlying electron, RECs break down several previously insurmountable market barriers:

Physical barriers – RECs do not need to be delivered via constrained transmission lines and may originate from anywhere within the interconnected system;

Temporal barriers – Unlike electrons, RECs are not produced and consumed simultaneously, but may be "banked" for use at a later time;

Business relationship barriers – RECs may be purchased from non-utility sellers, even in territories that do not allow for direct-access or retail competition for electric services.

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Financial barriers to new development – By providing a discreet revenue stream for renewable project developers, REC sales bolster their ability to secure financing for new construction.

Just as the move toward competitive wholesale electricity markets introduced new competitors and created new institutions to manage transmission corridors in a non-discriminatory way, the introduction of RECs into the power market has opened new avenues of commerce for electricity providers and created a new class of public-benefit entities, called tracking systems. These tracking systems correspond with regional grid networks to help develop provide a standardized network for the creation, delivery and retirement of RECs.

Despite – or perhaps because of – these obvious contributions to markets for renewable energy, the value of RECs continues to be misunderstood by policymakers and maligned by those with an inherent mistrust of market-based mechanisms for providing essential public services or environmental benefits. They view the use of RECs skeptically, or with outright hostility, as a virtual “scam” to defraud gullible consumers.

Some believe that renewable energy has no real role in curbing carbon emissions – or in providing any other substantive environmental or economic benefits. Some believe that, while there may be environmental or economic benefits, the positives can only be captured by increasing regulatory requirements or by imposing penalties against emission polluters that raise the cost of all power to a level that would encourage more renewables development. Many doubt that RECs have played any role at all in supporting new renewables development – despite ample documentation to the contrary.

This skepticism generally stems from a lack of understanding about how the electricity system functions and a discounting of the value of individual, voluntary actions to address global problems. Nonetheless, as revolutionary as RECs are to the electric power marketplace, they are not so dissimilar from other commonly accepted market abstractions.

Just as a unit of stock in a publicly traded corporation represents a bundle of ownership rights (i.e., proxy voting, profits and dividend distributions), a REC represents ownership of a claim to environmental benefits. Just as a consumer demonstrates brand loyalty via purchases from a specific maker of goods, preferred provider of services or particular retail outlets, RECs allow consumers to affirm their loyalty to environmental products that are in their opinion preferable to fossil-fueled or nuclear energy.

The REC also becomes the best vehicle for ensuring that a willing consumer’s expenditures are dedicated to renewable energy, even if the electrons that are delivered to his or her home or facility reflect “business as usual” utility offerings. This ability to exercise choice is a hallmark of most commercial activity – except under monopoly utility electric service. RECs allow a choice that even restructured power markets generally failed to provide.

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In proscribed instances, this claim also may be applied to the electricity consumer's desire to curb carbon emissions, thereby empowering consumers – whether individuals, corporations, institutions or governmental entities – to take an active role in addressing the climate challenge.

3. Renewables in Deregulated Markets

Swept along by a wave of deregulation of traditional monopoly services (telecommunications, cable TV, interstate natural gas pipelines), the electric utility sector underwent an experiment in restructuring wholesale and retail power delivery beginning with the Public Utilities Regulatory Policies Act of 1979 (PURPA). This federal law, for the first time, mandated competition for wholesale electric generation by a new class of alternative energy producers, especially those employing renewable energy technologies and the cogeneration of electricity and steam.

While leaving implementation up to state-level regulators, Congress also imposed a key economic restraint on the development of these new generation resources—that they should be able to produce electricity at an “avoided cost” calculated at or below the price a utility would otherwise pay to build its own resources or purchase power from some other source. Added to the traditional regulatory requirement demanding that new power be procured on a “least cost” basis, this meant that the new class of non-utility generation needed to meet a stringent cost hurdle, particularly in regions and territories where the system average cost of generation was perceived as low.

California was arguably the state that most embraced the intent of PURPA to spur a new competitive power industry. It was also blessed with the potential to host a wider variety of generation technologies than any other part of the nation. The period 1980 – 1995 saw nearly 10,000 MW non-utility generation installed, with major renewable power generators scattered throughout the state.

Wind farms clustered in the Altamont Pass in Northern California, at Tehachapi Pass east of Bakersfield, and at San Geronio Pass outside of Palm Springs. Solar thermal centered in the Mohave Desert near Daggett and Kramer Junction, while a new generation of large-scale geothermal facilities sprouted near China Lake.

Although relatively successful in establishing a market foothold, renewables developers faced continued challenges to obtaining utility power purchase agreements and transmission interconnection.

Actions by the Federal Energy Regulatory Commission, particularly the adoption of Order 888 requiring open-access transmission, accelerated the pressures on utilities to open their systems to new technologies and competitive forces. When California approved a “retail access” restructuring program beginning in 1998, the early wave of new energy service providers largely began promoting “green power” products to households and small businesses.

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For a host of reasons, the retail access market in California was soon inundated by the Western Power Crisis of 2000-2001, and regulators essentially suspended consumers' ability to buy renewables from competitive suppliers. Nonetheless, there was a parallel growth in utility green pricing programs, and in several states, the imposition of Renewable Portfolio Standards (RPS) that mandates a certain percentage of renewables be delivered by the regulated utilities.

4. Introducing T-RECs

The conceptual development of RECs, also called green tags, occurred in several different places, from California to Massachusetts in the U.S., as well as in Europe. As early as 1995, deliberations into a proposed California renewable portfolio standard included the possibility of separation of environmental attributes for renewable generation. While implementation of RPS in the state was deferred in favor of a deregulated wholesale and retail electric market, there were instances of trading of "green tickets" by the Automated Power Exchange (APX) as early as May 1999. In June 1999, Texas RPS legislation included the concept of RECs trading.

Several other things happened in the late 1990's that resulted in the creation of the REC: interest by Federal agencies and some businesses and industries in purchasing renewable energy; passage of state renewable energy mandates; and the difficulty encountered by project developers in obtaining a power purchase agreements

Following an Executive Order issued in June 1999 by then President Bill Clinton directing Federal agencies to make every effort to procure renewable energy, the U.S. Environmental Protection Agency (EPA) stepped up as an aggressive buyer of green power, soon becoming the first federal agency to buy 100 percent renewable energy for one of its facilities, an EPA laboratory in Richmond, California ("Clinton Issues Energy Use Executive Order," SustainableBusiness.com. June 13, 1999).

The EPA facilities were located throughout the country, and the agency soon found green power was not necessarily available to all of its sites. Some utilities were not willing to allow renewable energy generators to use the utility's transmission and distribution system to move their power (called wheeling) from where it was generated to the facility that wanted to buy it.

Often, the renewable power would have to be "wheeled" across several utility service areas increasing the cost of that power substantially. Since many of the EPA facilities were relatively small, the transaction costs of negotiating the wheeling and purchase agreements were too great to justify.

At this same time a number of large companies were gaining market recognition for purchasing renewable energy rather than conventional power. This recognition by programs -- such as the EPA's Green Power Partnership -- helped increase demand for renewable energy. But as with Federal procurement of renewables, many companies that

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were willing and interested in buying renewable power were unable to do so because it was not offered in their geographic area.

RECs were created to meet all these needs. The concept was to issue a REC for each MWh of renewable power that was generated. It could then be sold along with the power, such as when an electric utility purchased renewable energy to meet their RPS obligations, and the certificate could be offered to regulators as proof of that energy purchase. Or the REC could be sold separately to a Federal agency or private company or individual household that did not have direct access to renewable energy.

The Bonneville Environmental Foundation (BEF) was instrumental in starting the voluntary market for RECs, with the first retail REC agreement documented in 2000 between BEF and EPA Region X.

5. Creating standards for RECs as green power

When the REC, representing the environmental benefits of renewable power generation, is combined with a MWh of conventional power, the purchaser could then claim to have bought electricity that does not emit greenhouse gases or other major pollutants.

However, this is only valid as long as no one else, including the generator of the power from which those environmental attributes were stripped, is claiming the same attributes.

This need for standardized criteria was met by the Center for Resource Solutions' certification of RECs as part of the Green-e program beginning in 2002. Green-e has a well-established Code of Conduct and a thorough set of audit protocols.

Green-e Energy requires participating sellers and marketers to meet strict eligibility requirements and undergo annual audits to ensure that (1) RECs are not being double counted or double sold; (2) the consumer is receiving "fresh" RECs (e.g. RECs created during a specified period of time); and (3) the RECs are of the exact type that the marketer claims to be selling. The audits are undertaken by certified public accountants and follow specific audit protocols, then reviewed by the program administrator to evaluate the results. Audit reports are sent to Green-e for verification review to make sure the participating company met its responsibilities. All participating companies and the results of their annual audit are posted on the Green-e website.

Any seller of Green-e certified products who violates the Green-e protocols is notified by Green-e and their Green-e accreditation may be revoked. Green-e consumer protections are reinforced by consumer fraud law, as detailed in National Association of Attorneys General (NAAG) guidelines (adopted December 1999).

6. RECs as market driver for renewable sales and development

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Until the introduction of RECs into the marketplace, penetration of renewable energy at the retail level was slow and sporadic – confined to those few jurisdictions that allowed for direct-access retail competition.

For example, in 1998, California was the only state that allowed for consumers to buy non-utility renewables power. Initially, there were a dozen marketers selling 15 Green-e certified green power products to 62,444 customers. In all, some 350,000 MWh of certified green power were sold in the state that year.

Those numbers rose to over 150,000 green power customers in 1999, but then trailed off substantially as a result of the wholesale market collapse that sent most of those customers back to monopoly utility service. However, several non-regulated public-power utilities began to introduce green pricing programs.

California's green marketplace was quickly eclipsed by competitive markets in Pennsylvania, New Jersey and particularly Texas, which opened its system to retail competition in 2002. By the end of 2003, Texas reported that 26 renewable energy generators had begun operations, representing nearly 1,186 MW of capacity (of which 1140 MW was from wind generators).

The Texas RECs marketplace in 2003 amounted to 2.95 million MWh. Of this total, 2.4 million MWh was from new renewable energy resources built after 1999. By 2008, the Texas market had blossomed to more than 17 million MWh of renewable energy, with 16.5 million MWh coming from new renewables generation.

In November 2003, the Lawrence Berkeley Laboratory released a review of state programs that encouraged use of RECs, concluding that “TRCs offer a simple, transparent verification tool for renewable energy transactions, facilitate liquidity and depth in renewable energy markets, potentially offer a new revenue stream for renewable energy generators, and can facilitate the purchase of green power by end use customers.”

Although declaring RECs markets “nascent” this report also found, “The sale of TRCs can clearly provide a new revenue stream for renewable energy project owners, improving project economics.”

One measure of how the use of RECs has spurred the overall marketplace for renewables comes in the documentation of growth in the Green-e Energy market for certified power sales from 1997 through 2008. As can be seen, the RECs represent the majority of transactions in this voluntary market – roughly 85 percent of all certified volumes (see figure 1)*

Green-e certification represents roughly three-quarters of the total voluntary marketplace for renewable energy. Green-e Energy certified a total of 17.4 million MWh (unduplicated) in 2008, up from 12 million MWh during 2007. RECs sold in wholesale markets amounted to 12.8 million MWh.

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How this market demand translates into new capacity for renewables can be ascertained by the recent finding from NREL, "At the end of 2007, sales of renewable energy in voluntary markets represented a generating capacity equivalent of about 5,100 MW, with about 4,300 MW of that from "new" renewable energy sources. Since 2000, the amount of renewable energy capacity serving green power markets has increased more than 30-fold." <http://www.nrel.gov/docs/fy09osti/44094.pdf>

5. Critical issues for RECs:

The criticisms of RECs range from very fundamental challenges to their legitimacy as a market mechanism representing renewable energy to ideological arguments against their use as "carbon offsets" as part of the nation's attempts to address global climate change.

Some critics are trying to turn back the clock on a decade of effort to incorporate RECs into the renewable energy marketplace as more than just electron tracking mechanisms.

The fact is that RECs are defined almost universally as embodying the environmental attributes of renewable generation, thus undermining any notion that RECs are not a legitimate representation of environmental attributes of renewable generation that can be unbundled and sold separately from their underlying electrons. Such an argument stands in opposition to both common practice among various tracking systems established to facilitate power markets and, in some cases, statutory or regulatory language that clearly defines what a REC is.

Critics also argue that because the state-level definitions vary somewhat and no governmental body has standardized them, there can be no equivalence among RECs.

This ignores the fact that the marketplace is the appropriate mechanism to distinguish among RECs, and if a New Jersey solar REC is more valuable to buyers, they will pay more. If a California REC is defined as embodying all environmental attributes, including carbon reductions, the marketplace will put a premium on that, and buyers should be entitled to that claim.

In today's voluntary markets, the environmental claim goes to the person paying for it, not to the utility. That's how it should be.

Another argument is that it is too difficult to ensure that the RECs and emission reductions associated with them are not being double-counted or claimed by other grid-connected entities.

Despite varied state-level definitions of RECs (largely created to define resource eligibility for meeting RPS requirements) the broad definition of RECs is sufficient to allow trading and equivalence. The energy marketplace has evolved to resolve seams/consistency issues, absent a national tracking system with a standard set of rules and definitions.

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Certainly, it doesn't make sense to define away retroactively a decade of market activity. Green power consumers and large buyers of renewable energy make their purchases *because* they represent zero-emissions energy and a preferable environmental character that is part of the individual's/company's/agency's overall sustainability efforts.

If these purchasers also want to make carbon/GHG-reduction claims, the Green-e Climate protocol for renewable energy offers a valid, rigorous and appropriate methodology to quantify the renewable energy's contribution to reducing GHG.

Definitions: At its most basic, a REC is “a tradable instrument that represents all of the renewable attributes associated with one (1) MWh of production from a certified renewable generator,” according to the definition used by the Electric Reliability Council of Texas (ERCOT). A more detailed definition has been written into California law and regulatory policy, in the context of the potential use of RECs for compliance with utility RPS programs. In an August 2008 decision, for example, the California Public Utilities Committee found, “*A REC includes all renewable and environmental attributes associated with the production of electricity from the eligible renewable energy resource, including any avoided emissions of pollutants to the air, soil or water; any avoided emissions of [GHGs]; and the reporting rights to these avoided emissions...*”

An analysis recently issued by the Environmental Tracking Network of North America (ETNNA) found that most tracking systems were originally established to support environmental disclosure requirements, or to facilitate renewable portfolio standard (RPS) compliance. “As a result, depending upon when the system was designed, the definition of what environmental attributes are associated with a REC for the purpose of participating in the tracking system has sometimes been confused with individual state definitions of renewable energy credits that are eligible for specific RPS programs. Some state RPS programs define which attributes are required to be contained in their RECs, while other state policies are silent or very general regarding specific environmental attribute requirements.”

ETNNA goes on to find, “The majority of the existing tracking systems are very close to a common definition of what is included in RECs they issue and track. Moreover, not only are these definitions compatible, but they also accommodate the most comprehensive state RPS REC definitions” as long as they are backed up by a process for verification.

So it is clear that RECs are widely recognized in law and practice as embodying the environmental attributes of clean generation, and therefore may be used to legitimately represent a purchaser's claim on those attributes.

Double Counting: There continue to lingering doubts about the ability to ensure that RECs are claimed by more than one party. However, the very existence of tracking systems provides evidence that protective mechanisms can be established to validate the REC and prove its chain of custody from generation to eventual retirement. Each REC has a unique identification number that can only be in one account at any point in time.

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In addition, the third-party certification provided by Green-e Energy employs the fundamental tenet that RECs may not be double-sold or double-counted in the marketplace, particularly that the same REC may not be used for compliance with a state RPS program as well as for a voluntary green purchase.

Tracking Sales and Retirement: Most RECs are created by a regional tracking system. These tracking systems include:

- New England Generation Information System (NE/GIS),
- Pennsylvania, New Jersey and Maryland Generation Attribute Tracking System (PJM/GATS),
- Energy Reliability Council of Texas (ERCOT),
- Midwest Regional Tracking System (M-RETS)
- Western Renewable Energy Generation Information System (WREGIS).
- APX Company has launched a 'default' tracking system/registry for projects located in a region not covered by the existing tracking systems.

All of these tracking systems, with the exception of APX, are associated with a regional electricity reliability council and have on-going relationships with the electric utilities, balancing authorities and transmission system operators in their region.

The tracking systems regularly receive electronic information regarding the net energy output of each renewable energy project registered in their system. These data are reported by independent qualified reporting agencies that meet the tracking system's specifications. For each MWh of net generation reported to the tracking system, the system electronically creates a REC with a unique identification number to make sure it is not double counted. According to regional tracking system participation rules, a generator can only be registered with one tracking system to avoid double counting of their energy output. However, non-generator account holders can have accounts in as many tracking systems as are desirable for their business.

When a claim is made using a REC, that REC is then retired. A utility RPS account that is used to prove utility compliance with the mandate is a type of retirement account. Once RECs are deposited in that account they cannot be taken out or reused for some other purpose. The same is true for RECs sold to end-use customers, who then can claim they purchased renewable power.

The RECs can change hands a number of times as long as none of the intermediaries make a claim using the REC. But once a claim is made against the REC, that REC's identification number is retired, and it can not be used again.