

RENEWABLE ENERGY CERTIFICATES: AN ATTRACTIVE MEANS FOR CORPORATE CUSTOMERS TO PURCHASE RENEWABLE ENERGY

INSTALLMENT 5

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I. THE GROWING INTEREST IN RENEWABLE ENERGY CERTIFICATES

In the spring of 2003, commercial interior fabrics manufacturer Interface Fabrics Group announced that it would purchase renewable energy certificates (RECs) to reduce the environmental impact of the electricity the company uses. Soon thereafter, The Tower Companies, a major property developer and manager in the Washington, D.C. metro area, purchased RECs for 13 of its office buildings and apartment complexes. In September, nine members of the Green Power Market Development Group completed the nation's largest aggregate corporate purchase of RECs, buying certificates equivalent to over 250,000 megawatt-hours (250 million kilowatt-hours) per year, an amount equivalent

to the annual electricity consumption of 22,000 homes. These companies are not alone (*Box 1*).

RECs have attracted the attention of companies ranging from major manufacturers to commercial property managers. But what are they?

Many corporate energy and environmental managers may be familiar with "traditional" forms of renewable energy products, including **on-site renewable generation**—such as installing solar photovoltaic systems—and **green power**—purchasing both electricity and the environmental attributes associated with renewable

Summary

Renewable energy certificates (RECs) are a renewable energy product that companies can purchase to reduce the environmental impact of their business activities. A REC represents the environmental attributes—for example, avoided CO₂ emissions—that are created when electricity is generated using renewable resources instead of using fossil fuel sources such as coal, oil, and natural gas. RECs can be sold separately from their associated electricity and thus enable customers to purchase the environmental attributes of renewable power generation independently of their retail power

supply. Purchasing RECs, therefore, can be an effective means for a company to "green" the electricity it consumes.

RECs can provide many business benefits to companies. For example, they can help firms reduce corporate greenhouse gas emissions, meet renewable energy targets, strengthen stakeholder relations, and differentiate products and brands. Since RECs can be sold independently from their associated electricity, they offer several advantages relative to traditional green power products, including:

- Lower cost
- Wider selection of suppliers
- Greater variety of renewable resource options
- Simplified transactions
- Easier ability to interact directly with renewable energy projects.

The emergence of RECs is an important development, but the market is still in its early stages of evolution. Going forward, market participants and policymakers can address several challenges and can take actions to accelerate REC market development in order to advance a clean energy future.



Box 1**Examples of Corporations Purchasing RECs**

In the 18 months since January 2002, numerous corporations in the U.S. representing a variety of industries have started buying RECs. Some of these companies include:

- Alcoa Inc.
- BP (USA)
- Cargill Dow LLC
- Delphi Corporation
- DuPont
- Flying J
- Herman Miller, Inc.
- Interface
- Johnson & Johnson
- Kinko's Inc.
- Lowe's Home Improvement
- Nike
- Patagonia
- Pitney Bowes
- Staples
- The Coca Cola Company
- The Tower Companies
- West Linn Paper Company
- White Wave, Inc.

power generation. A **REC** is a relatively novel, third type of renewable energy product that is gaining in interest and use.

This installment of WRI's *Corporate Guide to Green Power Markets* provides an introduction to RECs for corporate energy users. In particular, this publication:

- Defines RECs, their business benefits, and their similarities to other renewable energy products
- Outlines several advantages RECs provide relative to green power
- Shares strategies for purchasing certificates based on experiences of Green Power Market Development Group partners and other companies

- Makes recommendations to market participants and policymakers for addressing challenges and accelerating REC market development.

II. WHAT IS A RENEWABLE ENERGY CERTIFICATE (REC)?

Renewable power facilities¹ create more than just electricity. For each megawatt-hour² (MWh) of power from renewable resources in the U.S., there is one less MWh of power generated from conventional sources, most of which burn fossil fuels.³ When displacing⁴ electricity generated from fossil fuels, renewable power plants reduce the emissions of carbon dioxide (CO₂), particulate matter, and other pollutants that fossil-fired plants would have emitted. Renewable power facilities thus create two distinct “products” (*Figure 1*):

- Commodity electricity
- A set of environmental attributes, most notably avoided emissions.

These environmental attributes can be packaged together into a product called a **renewable energy certificate** or **REC**.⁵ One REC represents the environmental attributes generally associated with one MWh of electricity from renewable resources.⁶ In addition to these environmental attributes, each REC denotes the fuel source, location of generation, year of generation (also called “vintage”), and other non-power characteristics of a MWh from renewable resources.

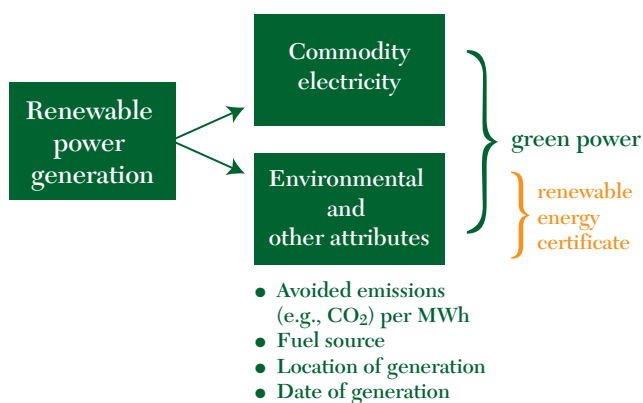
RECs allow the environmental and other attributes of renewable power generation to be sold separately (that is, “unbundled”) from electricity. In contrast, in the case of green power RECs and electricity are sold together (*Figure 1*). Unbundling electricity and environmental attributes enables each to go to the entity that values it most. It also allows customers to claim title to environmental attributes regardless of location and independently of their retail electricity provider.⁷ Therefore, buying RECs is an efficient means for customers to “green” their commodity electricity supply.

When RECs are sold separately, the electricity generated at the same time as the RECs is sold as commodity



Figure 1

What Is a Renewable Energy Certificate (REC)?



electricity (also called “generic” or “null” electricity), and no claims about this power being “green” or having environmental benefits can be made. In other words, the “greenness” or environmental attributes of renewable electricity reside in the RECs and not in the electricity. Thus, only the REC purchaser can claim the environmental and other non-power attributes associated with electricity from a renewable power facility.

III. WHAT DO RECS PROVIDE?

RECs provide many benefits to companies. They can help corporations reduce their greenhouse gas emissions, meet renewable energy targets, strengthen stakeholder relations, and differentiate products and brands.⁸

Reduce corporate greenhouse gas emissions

Of particular interest to many companies are the greenhouse gas (GHG) benefits of buying RECs. Among the environmental attributes represented by a REC are the associated avoided CO₂ emissions when 1 MWh of electricity from a renewable power facility displaces 1 MWh of power from fossil fuels in the plant’s wholesale market or power pool. By purchasing a REC, a company can claim these avoided emissions to help it meet its own voluntary corporate GHG emissions goals or meet targets established in voluntary GHG emissions reduction programs such as the U.S. EPA’s Climate Leaders

Initiative or WWF’s Climate Savers Program.⁹ When applying these reduced CO₂ emissions against total corporate GHG emissions, the buyer must retire the REC; that is, the REC cannot be sold again to another entity. Johnson & Johnson, for instance, is buying and retiring RECs to help the company meet its voluntary corporate GHG emissions reduction targets.

To be in a position to fully utilize RECs as emissions offsets, companies that purchase RECs should ensure that a credible method has been used to quantify the associated CO₂ reductions and demonstrate additionality. The resulting information can then be included in the purchasing organization’s GHG emissions inventory¹⁰ as a *purchased project reduction* or *credit* as recommended by the Greenhouse Gas Protocol Initiative.¹¹

Meet renewable energy targets

When a company purchases 1,000 MWh of RECs, it is effectively “greening” 1,000 MWh of the electricity it consumes. As a result, RECs are a means by which companies with renewable energy targets can meet their goals. For example, DuPont has set a target of sourcing 10 percent of its energy from renewable resources by 2010. RECs are playing a role in the company’s overall strategy for achieving this goal.

Strengthen customer and other stakeholder relations

Buying RECs can strengthen a company’s relationships with customers, local communities, shareholders, and employees. For instance, REC purchases are a way to demonstrate corporate leadership in environmental performance. RECs can appeal to environmentally concerned customer segments and can help establish a company as a responsible neighbor in local communities. Such purchases can signal to shareholders that the company is taking steps to manage its GHG risks. In addition, REC purchases can communicate and substantiate corporate environmental values that may be important to current and prospective employees and other stakeholders. Each of these benefits can have an impact on overall corporate performance.



Differentiate products and brands

Purchasing RECs can help a company differentiate its products or services in a competitive marketplace. Interface Fabrics Group, for example, is using its recent RECs purchase to differentiate its Terratex® brand of commercial interior fabrics from those of competitors.

The benefits of RECs are not just for corporate energy users. As Box 2 discusses, RECs are being used by many others to meet a variety of needs.

IV. GREEN POWER AND RECS: MORE SIMILAR THAN DIFFERENT

Electricity is a pure commodity and flows without regard to how it was generated. Therefore, whether one buys green power or buys RECs (while purchasing commodity electricity in a separate transaction) the outcomes are very similar, for instance:

- A renewable power facility is generating and delivering electricity to the wholesale power market (*Figure 2, A*).
- The end customer does not physically receive electricity specifically generated from the renewable power facility. Electricity from renewable and conventional generation facilities is mixed together in the wholesale power market (*Figure 2, B*). Therefore, all customers in that market receive the same mix of power, whether they are purchasing green power, RECs, or just commodity electricity.¹²
- The reliability and quality of the electricity an end customer receives are the same.
- The renewable attributes are not necessarily generated at the same time as the customer uses electricity. Since renewable attributes are independent of the electricity, they are balanced over an extended period of time, usually a year.
- Companies can “green” their electricity supply and claim title to the environmental attributes of renewable power generation. These attributes are earmarked to those customers buying RECs with electricity—that is, green power—or buying RECs independently.

Box 2

Uses and Benefits of RECs Beyond Corporate Energy Users

Apart from corporate energy users, RECs are used by many other firms and organizations. Examples include:

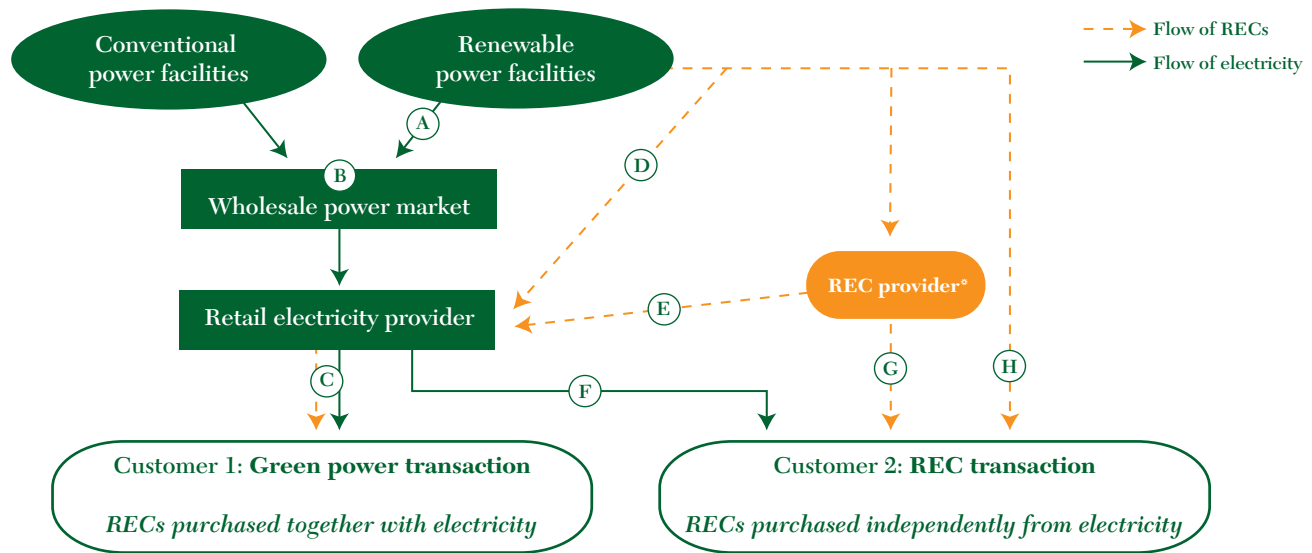
- **Renewable power facilities** generate and sell RECs as a revenue stream in addition to the revenue from selling commodity electricity. The revenue from certificates typically covers at least the incremental cost of renewable power generation over conventional power generation. The sale of RECs to marketers or directly to customers provides the additional cash flow required for the renewable energy project to be financially viable over its lifetime (*see Section VI for more details*).
- **Retail electricity providers** purchase RECs directly from renewable power facilities or from REC providers, such as marketers or brokers, to meet regulatory compliance or voluntary market demands. First, some state governments mandate that a minimum percentage of a retail electricity provider’s delivered power in that state come from qualified renewable resources. Some of these states—such as Maine and Texas—allow the electricity providers the option to purchase RECs to meet these requirements (*see Section VI for more details*). Second, retail electricity providers are able to purchase RECs, “bundle” them with electricity, and sell the combination as green power to end customers.
- **Non-industrial customers**—including private citizens, government facilities, universities, and other institutions—buy RECs for many of the same reasons that attract corporations. For example, Pennsylvania State University purchases 17,600 MWh of wind-generated RECs annually in order to reflect staff and student commitment to reducing the university’s environmental impact. In 2003, the World Resources Institute purchased RECs from wind and other renewable resources to help it meet its climate commitment of emitting zero net greenhouse gas (GHG) emissions annually. The retired RECs offset a significant portion of the GHG emissions associated with WRI’s electricity consumption and employee travel. In 2003, WRI also used RECs to offset the estimated GHG emissions from energy use and travel for two major WRI conferences.

The primary difference between green power and RECs concerns the customer’s contract path for obtaining the environmental attributes of renewable generation. In a green power transaction, the customer buys *both* RECs and electricity from its retail electricity provider (*Figure 2, C*). Retail electricity providers typically source RECs either directly from renewable power facilities (*Figure 2, D*) or from REC providers (*Figure 2, E*).



Figure 2

Green Power vs. REC Transactions



* REC providers include retail and wholesale REC marketers and REC brokers. Renewable power facilities also can provide RECs directly to customers as Figure 2 illustrates.

In a REC transaction, the customer continues to buy commodity electricity from its retail electricity provider (Figure 2, F) but purchases RECs from a different provider. In other words, electricity and the environmental attributes of renewable generation are purchased separately, from two different providers in two different transactions. The customer can buy certificates from REC providers (Figure 2, G) or directly from renewable power facilities (Figure 2, H).

V. ADVANTAGES OF RECS

RECs can offer customers several advantages relative to green power primarily because they can be sold separately from electricity and can be purchased from any source in the country. These advantages include:

- **Lower cost:** In many situations, REC prices are lower than the typical premium per MWh that a retail electric supplier charges for green power. For instance, REC prices can be 80 to 90 percent less than the median premium per MWh for green power in regulated electricity markets (~\$25.00/MWh) and

55 to 80 percent less than the median green power premium in deregulated electricity markets (~\$11.50/MWh).¹³ This is because the unbundled nature of RECs breaks down geographic boundaries and thus provides access to lower cost renewable resources.

- **Wider selection of suppliers:** RECs provide customers with a wider selection of suppliers than green power. In states with regulated electricity markets a firm only has one potential green power provider, its utility. In some states with deregulated electricity markets, there may be more than one supplier of green power. For instance, as of mid-2003, Maryland has two retail electricity providers offering green power.¹⁴ However, no matter in which state a company is located, it can choose from among more than a dozen retail and wholesale REC marketers or can approach a number of REC brokers.

In some areas of the country, RECs are the *only* retail renewable energy product available to customers because there are no green power suppliers. For instance, in some states such as Arkansas, Kansas, and Nevada, no utility offers a green pricing pro-



gram.¹⁵ Similarly, RECs may be the only renewable energy product available to tenants of facilities where electricity procurement is controlled by others. In such situations, tenants are unable to purchase their own green power. RECs, however, can circumvent this constraint.

- **Greater variety of renewable resource options:** Because RECs have no geographic constraints, they can provide companies with the option to buy a renewable energy product from any type of renewable resource. Some retail electricity providers may be limited to offering green power from a select number of local renewable resources. For instance, utilities in the Southeast are unlikely to be able to provide geothermal-generated green power given the lack of significant geothermal resources in the region. Through RECs, however, a company with operations in the Southeast would be able to access a geothermal-based renewable energy product.

In addition, RECs allow customers to purchase the environmental attributes from several resources and multiple renewable facilities at the same time. For example, in one transaction Delphi Corporation was able to access certificates from electricity generation projects using wind in the Great Plains and landfill gas in the Southeast.

- **Simplified transactions:** Since a firm's retail electric supply arrangements are independent of RECs, purchasing certificates is a relatively simple and straightforward transaction. The customer does not need to change its electricity contracts or switch electricity providers. A customer can buy RECs at any time, regardless of whether or not its electricity contract is up for renewal. Consequently, buying RECs does not change the reliability, quality, or terms of service for electricity.

RECs also enable a company to acquire a renewable energy product for multiple facilities at the same time. For instance, instead of negotiating green power contracts for one facility at a time, Alcoa was able to buy RECs for numerous facilities through one contract. Such transactional simplicity can lead to lower administrative costs relative to purchasing green power.

- **Easier ability to interact directly with renewable energy projects:** Very few customers have the commercial or regulatory infrastructure to permit them to engage in wholesale power transactions. RECs, however, provide a conduit for firms to interact directly with renewable power generators. Buying RECs directly from renewable energy projects may also lower costs. In addition, it enables a more direct linkage to a specific renewable energy project which could increase the marketing or stakeholder-relation benefits renewable energy provides and enhance the sense of project ownership/sponsorship.

VI. REC MARKETS AND PRICING

Currently in the United States, RECs are being sold in two markets: the regulatory compliance market and the voluntary market.

- **Regulatory compliance market:** As of June 2003, 15 U.S. states¹⁶ have implemented legislation establishing that a certain percent of the electricity delivered to a retail electricity provider's customers in the state must be produced from renewable energy sources. These targets are binding in the 12 states with renewable portfolio standards (RPS). Most states require the RPS to be satisfied by green power from generation facilities that are located in the state or that deliver power into the regional power pool. Several states with RPS—such as Connecticut, Massachusetts, Maine, and Texas—allow electricity providers to purchase RECs generated in-state or in the power pool to meet these requirements.¹⁷
- **Voluntary market:** In contrast, most companies as well as households, governments, universities, and other institutions purchase RECs in the voluntary market. Buyers in any state can access the voluntary market and purchase certificates from a variety of sources. For instance, they can choose from among more than a dozen retail REC marketers.¹⁸ To avoid some transaction charges, they can purchase certificates from a REC wholesaler or approach a broker (*Box 3*). Alternatively, they can purchase directly from a renewable power generator.¹⁹ The voluntary



market co-exists with the compliance market in states with renewable portfolio standards.

To understand REC pricing, it is important to recognize that a renewable power plant can have two products and two revenue streams: One from selling electricity and the other from selling RECs. Because the cost of power generation from renewable resources is typically greater than the cost of generation from fossil fuels, the revenue from the sale of commodity electricity alone can be insufficient to make a renewable energy project financially viable. Additional revenue from selling RECs (or from selling power at a premium to market) is typically required.

Although the market will ultimately determine the price of certificates, the price typically will be equal to *at least* the difference between the market price for commodity power and the revenue required per MWh for the renewable power project to be economically viable for its owners. By helping to make renewable energy projects financially viable, the revenue stream from RECs plays an important role in spurring the development of new renewable power generation (Box 4).

REC prices can vary significantly. Several factors contribute to the wide range of REC prices observed in the marketplace:

- **Economic differences between renewable resources.** To a degree, a REC's price will reflect the economics of the type of renewable technology that created the certificate. For instance, the cost of generating 1 MWh of electricity from landfill gas generally is less than that from wind. Likewise, 1 MWh of electricity from a wind turbine typically costs less than that from a solar photovoltaic system. Consequently, landfill gas RECs generally are less expensive than those from wind resources and the latter are typically less expensive than those from solar resources.
- **Location of generation.** Even with the same type of underlying fuel resource, REC prices will reflect how

Box 3

REC Marketers and Brokers

REC marketers sell certificates at retail to corporations, governments, academic institutions, households, and other customers. REC brokers structure transactions directly between interested REC buyers and generators. Buyers and sellers can contact brokers with bids and offers for their specific REC needs. For a current list of major U.S. retail marketers, wholesale marketers, and brokers, visit www.eere.energy.gov/greenpower/certificates.shtml#gcerts.

the economics of renewable facilities vary by geographic region. For example, certificates from wind projects in regions with excellent wind resources—such as the Great Plains—generally will be less expensive than RECs from a region where wind is less abundant such as the Southeast.

- **Impact of regulatory compliance markets.** In states with renewable portfolio standards, compliance market demand for RECs may compete with voluntary market demand. A constraint in the supply of renewable generation that is eligible to satisfy a state's RPS could drive up REC prices in both the compliance and voluntary markets. Similarly, if the supply of eligible renewable generation is sufficient in a state with a RPS, then voluntary market prices of RECs from facilities in that state could be low. Prices for RECs generated by certain technologies also may be impacted if state regulations set targets for certain types of renewable generation—for example, that 60 percent of renewable generation must be from solar resources.
- **Purchase volume.** Since part of the total cost of a transaction is fixed, the larger the total purchase volume, the lower the unit price typically becomes. In addition, prices per REC often decline with longer-term contracts.
- **Level of market development.** The REC market is in its early stages of development and price transparency is just beginning to emerge.



How REC Markets Stimulate the Development of Additional Renewable Power Generation

One question that prospective corporate buyers of RECs sometimes pose is “Will my company’s purchase of RECs help stimulate the development of *additional* renewable power generation?” By helping to make renewable energy projects financially viable, purchasing RECs *can* spur the development of additional renewable power generation whether RECs are bought from projects under development or from projects that are already in operation.

- Purchasing RECs from projects under development:** In some situations, customers can sign long term contracts to buy RECs from a renewable power generation project while it is still in the planning phase. Most renewable energy generation projects require revenue streams from both the facility’s electricity and its RECs in order to be financially viable. Therefore, the revenue commitment of the contracted REC purchase helps underpin the ability of the project to obtain financing and to be built.¹
- Purchasing RECs from facilities already in operation:** Many of the RECs that customers can buy originate from renewable power facilities that are already in operation.² Purchasing these RECs can stimulate market development and construction of additional green power generation facilities in at least two ways. First, some REC providers *reinvest the profits* from REC sales into renewable generation facilities that are under development.³ Second, purchases of RECs from existing facilities improve overall *investor confidence* in the renewable energy sector as the financial strength of projects is improved and the market opportunities for future projects become more apparent.

Notes

- In order for the project to be built, developers typically must also have a long term power purchase agreement for the electricity that will be generated.
- Buyers of RECs from facilities already in operation can request certificates that are generated by recently built or “new” facilities. For a frequently referenced definition of “new” vs. “old” renewable facilities, see http://www.green-e.org/pdf/trc_standard.pdf.
- For examples, visit <http://www.b-e-f.org/accomplishments/index.shtm>.

VII. PURCHASING RECS

Buying RECs involves many of the same steps as procuring other goods and services. A company identifies prospective providers and approaches them to ascertain product options. This can be done by sending a request for proposal (RFP) to REC marketers, contacting a REC broker, or directly engaging renewable

power generators. The firm then evaluates options, conducts negotiations, makes the purchase, and monitors delivery performance. Experiences of Green Power Market Development Group partners highlight several important insights and lessons learned for each stage of the REC purchasing process.

Identifying and evaluating REC options

The first step in the process of identifying and evaluating REC options is to determine the business rationale for a REC purchase. Is it to reduce GHG emissions, to strengthen customer relations, to help differentiate products in the marketplace, or to achieve some other business goal? Being clear from the outset within the organization about the business case will enable the REC selection parameters to be more clearly defined. After identifying the business case for a RECs purchase, Green Power Market Development Group partner companies typically have taken several factors into consideration:

- Location of the renewable power facility:** Companies will need to determine whether or not the location of the renewable facility that is generating the RECs is an important buying parameter. Some companies specifically seek to purchase RECs that come from a facility located in the same state or region as the firm’s operations. These companies may want to demonstrate support for local resources, businesses, jobs, and communities or may want to address regional air quality issues such as urban air pollution. For example, when identifying and evaluating REC options for its Virginia, North Carolina, and South Carolina branches, Kinko’s pursued RECs from renewable power facilities located in the Southeast. Some companies may not have a specific geographic preference but may be more interested in RECs from areas outside the firm’s region for several reasons. First, sourcing RECs nationally increases the likelihood of finding the lowest cost products since the number of options will be greater. Second, RECs generated from sources across the U.S. may be attractive to a company that has national brand name recognition or operations throughout the country. Third, because the impact of GHG emissions is



global, buying local RECs may be less relevant for companies whose business case for buying certificates is to reduce corporate GHG emissions. In fact, in some cases these firms may prefer non-local RECs. The amount of CO₂ emissions per MWh that a renewable power plant avoids varies between regional power generation pools given their different fuel mixes. Purchasing RECs from regions where the avoided CO₂ emissions are higher provides greater climate benefits.

- **Type of renewable resource:** Some firms may have a preference for the types of renewable resource they wish to support. Some may specifically choose wind or solar RECs since these resources have zero emissions²⁰ and may provide more marketing value to buyers given the favorable perceptions the general public has of these two renewables.²¹ Other firms seek RECs from renewable resources that are affiliated with their core business. For instance, a life sciences firm or a natural resources-based company may prefer RECs from biomass power facilities. Other companies purchase RECs from a mix of resources—for example, 50 percent wind, 25 percent biomass, and 25 percent landfill gas—in order to support a variety of renewable technologies.
- **Volume:** Companies use various approaches for determining the number of RECs to purchase annually. Some firms purchase RECs based on a percentage of electricity consumption for a given set of facilities or to offset a percentage of its GHG emissions. Other firms may purchase a fixed number of RECs based on a set amount of budgeted funds available. As with other goods and services, suppliers typically provide a discount for larger volumes and longer terms.
- **Vintage:** Companies that want to use RECs as an emissions offset and record them in their corporate GHG emissions inventory may find it important to request RECs that are generated in specific years.
- **Contract duration:** Companies can sign contracts for RECs that range from one to five or more years. Shorter-term contracts also are available for firms that want to buy RECs to reduce the environmental impact of specific corporate events such as conferences.

- **Price:** Each of the factors outlined above will be evaluated against price, and trade-offs may have to be made. For instance, a corporation that sets out to purchase locally sourced RECs may have to decide whether or not a wind REC that is generated locally is worth a \$10/MWh (1.0 cent/kWh) premium over one that is generated in another state or region.
- **Certification:** One important issue that companies often raise when considering RECs is “How can one be certain that the certificates a company purchases actually have been generated and that they have not been sold to another buyer?” This is a legitimate risk in the nascent REC market and one that every prospective REC buyer can mitigate.

One counter-measure is to purchase RECs that have been certified by auditing programs such as Green-e® (administered by the Center for Resource Solutions) or the EcoPowerSM certification program (administered by the Environmental Resources Trust). For example, suppliers of Green-e® certified RECs (called “Tradable Renewable Certificates” or “TRCs”) are required to undergo an annual independent audit to verify that the power and its associated RECs were produced by the purported renewable generation facility, delivered in the amount specified, and not “double sold” or claimed by more than one party.²² Buying certified RECs not only can help ensure product integrity but also can provide marketing benefits that companies such as Interface have captured (*Box 5*).

It is important to explicitly consider most of these factors when approaching providers in order to ensure they prepare offers that are tailored to the company’s needs and that are readily comparable.

Conducting REC transactions

As with other purchased goods and services, corporate customers should ensure that standard contract provisions are provided. For instance, firms should request suppliers to clearly define the terms and schedule for delivery and payment, since these can impact net prices. For example, paying in the third quarter of each year for RECs produced in the fourth quarter of the previous year should command a discount. Specific



language should address how an event of non-performance by one or both parties would be handled. In addition, it is important for customers to ensure that the contract with the REC provider includes explicit provisions regarding the transfer of ownership of the underlying environmental attributes.

Companies that purchase RECs separately from electricity receive two different invoices, one from the retail electricity provider for electricity and one from the REC provider for the certificates. Buyers should request that at least once a year the REC provider deliver a certificate that identifies the location (at least the regional power pool) of the renewable power facility that generated the RECs, the number of RECs provided, the period of generation, and the renewable fuel source. This is automatically done for Green-e® certified RECs.

Funding REC purchases

Companies use a variety of strategies for funding REC purchases. Some firms use a portion of the savings achieved from energy efficiency initiatives to pay for RECs. In competitive electricity markets, some companies have chosen to use savings realized when switching retail electricity providers or when other regulated charges have been eliminated or reduced. Stranded cost or transition recovery fees are a prime example of a regulatory fee paid by nearly all customers for a period of time in states where electricity is deregulated. In some cases, these fees can exceed \$20/MWh (2 cents/kWh) and once removed provide an excellent source of funds to help purchase RECs.

The department or budget within a company or business unit that pays for RECs can vary. The facilities or energy procurement budget is the most common option.

Box 5

Interface Fabrics Group: Using Certified RECs for Product Differentiation

By Shannon Cox, Environmental Specialist, Interface Fabrics Group

Interface Fabrics Group (IFG), a division of Interface, Inc., manufactures panel and upholstery fabrics for commercial interiors. Several years ago, the company launched Terratex®, a new line of environmentally conscious commercial fabrics that meet the following criteria:

- Made from 100 percent renewable or recycled material (e.g., soda bottles)
- Manufactured using increasingly sustainable processes
- Made to meet or exceed industry standards for quality and performance
- Designed to be recycled or composted at the end of its useful life.

Last year the company began investigating ways to manufacture the fabric using green power. IFG was determined to strengthen the product line's environmental image and further differentiate it

from competitors. However, the company could not find an attractive retail green power product for its Maine and Massachusetts production facilities. To overcome this obstacle, IFG turned to RECs.

In March of 2003, IFG announced that it would annually purchase 2,500 wind-generated RECs for five years. This number of certificates is equivalent to the amount of electricity used to manufacture one million yards of Terratex® annually. To maximize its ability to leverage the RECs for product differentiation, IFG ensured that the certificates were certified by the Green-e® program.¹ This program guarantees that RECs meet strict environmental standards and the program conducts annual audits to ensure that providers have not double-sold certificates. One advantage of buying this type of REC is the ability for

the purchaser to use the Green-e® logo. IFG therefore can market Terratex® with the statement:

"One hundred percent of the electricity used to make select patterns of Terratex® is matched with RECs."

Early indications are that this strategy is having success. Terratex® fabric carrying the Green-e® logo has generated both new business and significant interest among IFG's key customers.

1. Green-e® is the nation's first voluntary certification and verification program for renewable electricity products. Since 1997, Green-e® has been a nationally recognized certification program to help consumers identify green power and RECs that meet strict environmental and consumer protection standards. Green-e® is a program of the Center for Resource Solutions (<http://www.resource-solutions.org>), a national nonprofit organization that encourages sustainable growth and promotes the use of clean energy.



Alternatively, some companies purchase RECs through their environmental affairs or marketing departments.

VIII. CHALLENGES AND RECOMMENDATIONS FOR CONTINUED REC MARKET DEVELOPMENT

The REC marketplace is in its early stages of development and several challenges remain. WRI and partners in the Green Power Market Development Group (Box 6) have identified several actions that market participants and policymakers could take to address these challenges:

1. Develop a national REC tracking and registration system

Challenge: As discussed in Section VII, there is a risk that RECs can be “double sold” or claimed by more than one buyer.

Recommendation: Prospective REC buyers can mitigate this risk by purchasing RECs that have been certified by auditing programs. In addition, market participants can minimize this risk by developing a nationally coordinated system of databases for tracking and registering certificate generation, sales, and ownership. Such a system would reduce verification costs, facilitate REC transactions, and thereby create a more fungible product.²³

2. Develop standard commercial terms and agreements for REC transactions

Challenge: Given that RECs are an emerging market and a relatively intangible product, commercial terms and agreements can vary widely between REC providers. This could lead to delays in transactions and uncertainty on the part of companies about the product’s integrity.

Recommendation: Market participants should develop a set of standard and commonly accepted commercial terms, definitions, and other provisions that satisfy the needs of corporate buyers, improve transactional efficiency, and ensure product integrity.

Box 6

The Green Power Market Development Group

Convened in 2000 by the World Resources Institute, the Green Power Market Development Group is a unique commercial and industrial partnership dedicated to building corporate markets for green power. The Group is transforming energy markets to enable corporate buyers to diversify their energy portfolios and reduce their impact on climate change. The Group seeks to develop 1,000 MW of new, cost-competitive green power by 2010—enough energy to power 750,000 homes. Group partners include Alcoa Inc., Cargill Dow LLC, Delphi Corporation, The Dow Chemical Company, DuPont, General Motors, Kinko’s, IBM, Interface, Johnson & Johnson, Pitney Bowes, and Staples.

More information about the Group and its activities can be found on its website, <http://www.thegreenpowergroup.org>. The website provides publications, background information on various green power technologies, and an on-line green power marketplace. The website also contains the Green Power Analysis Tool, a Microsoft Excel-based tool designed to help managers evaluate green power projects from an integrated financial and environmental perspective. Previous installments of the *Corporate Guide to Green Power Markets* can be accessed at <http://www.thegreenpowergroup.org/publications.html>.

3. Establish clear rules regarding ownership of environmental attributes

Challenge: If the avoided emissions associated with a renewable energy resource are not clearly assigned to a REC and to its buyer, then one or more parties (power purchaser, generator, REC provider, or others) may attempt to claim the benefits. However, this would lead to “double counting” of reduced emissions, which should be prevented. Two or more market participants should not be able to claim ownership to the same avoided emissions.²⁴

Recommendation: As GHG emissions trading programs develop, designers should ensure that the market “rules” guarantee that the purchaser of a REC has sole title to the environmental attributes represented by the certificate and that generators cannot claim title to these attributes once they sell the REC.



4. Develop a standard accounting protocol for calculating avoided emissions for RECs

Challenge: Currently, REC suppliers are using widely differing methodologies and data to answer the key question of “What are the avoided emissions of a given renewable power generation facility?” The differences rest largely along the following three dimensions:

- *Geographic scale.* A first step in addressing the question is to identify the geographic scale of the impacted conventional power plants. Some REC providers refer to the *state* in which the renewable power facility is located. Some suppliers base their calculations on the *power pool* into which the renewable power plant delivers its electricity.²⁵ Other REC providers use an emissions factor for the entire *United States*.
- *Type of emissions.* A second step in answering the question is to identify within a given geographic area which power plants are affected when a renewable power facility operates. Some REC providers use a system *average emissions factor*, implying that all generators within a selected geography are impacted by a MWh of renewable power. Other providers use a *marginal emissions factor*, implying that each MWh of renewable power displaces the generation (and thus emissions) of the last plant to be dispatched to meet the power needs of customers.
- *Temporal scale:* Some REC providers use historical emissions data for a given geographic scale. However, this data may be one or two years old relative to the date a REC is generated. Other providers use models to estimate the emissions avoided in the same year as the REC is generated.

The various methodologies yield widely disparate avoided emission estimates. This lack of consistency can lead to uncertainty about the amount of reduced emissions (e.g., CO₂) represented by a REC. As a result, companies that purchase certificates as an emissions offset may find it difficult to incorporate the offset in its emissions inventory, determine the cost of the offset

(dollars per metric ton of avoided CO₂), and thus understand how the cost compares to other offset or reduction opportunities.

Recommendation: If RECs are to play a significant role in emissions markets or in internal corporate emissions reduction programs, then a commonly accepted methodology for estimating the amount of avoided emissions represented by each REC should be developed. Such a methodology should be consistent with existing and emerging corporate emissions accounting approaches such as the GHG Protocol Initiative. As part of its current effort to establish an accounting protocol for corporate project-based emissions reductions, the Initiative is developing guidance that will inform a REC accounting methodology.

Beyond these challenges, there are several opportunities that policymakers and market participants could pursue to accelerate REC market development and further increase the attractiveness of RECs to corporate customers:

5. Ensure a role for RECs in emissions markets

The business case for corporations to buy RECs would be strengthened if regulatory agencies were to formally recognize the avoided emissions represented by certificates. Specifically, purchasers of RECs would realize additional value if they could use these avoided emissions as a credit against their emissions footprint.

One promising opportunity for incorporating RECs into emissions reduction initiatives rests in future greenhouse gas emissions markets. As GHG markets develop for the United States as a whole, for a region, or for selected states, RECs purchased by companies should be formally recognized as a GHG emissions offset capable of helping buyers meet their GHG emissions targets. In a GHG emissions market, RECs could become an attractive mechanism to offset emissions, particularly by displacing CO₂ emissions at relatively low cost. For instance, Group partners have found that some RECs may cost under \$3.00 per metric ton of carbon dioxide equivalent (CO₂e).



6. Incorporate the long-term fuel cost benefit of renewable generation into RECs

Largely for reasons of simplicity and the fact that the REC market is still in its early stages of development, the pricing structure for RECs has typically been a simple fixed price per MWh. However, a market opportunity exists for RECs to capture the underlying financial benefit provided by the stable and relatively fixed long-term cost of electricity from renewable resources. A more sophisticated REC product structured as a long-term financial instrument could provide large REC purchasers the ability to fix or “hedge” a portion of their electricity cost. Such a product would be attractive to some corporate customers since it would provide price stability and could create a net financial benefit during the contractual period.²⁶

A power generation project requires a level of margin certainty to be financed and developed. A long-term power purchase agreement (PPA) with a utility or other entity licensed and capable of managing physical wholesale power transactions is the typical revenue assurance sought by lending institutions. Some wholesale electric markets such as the PJM²⁷ market in the mid-Atlantic region, however, have the hourly price liquidity and transparency required to settle a power purchase financially through a contract for differences (CFD).

CFDs are financial instruments and do not involve physical power transactions. A corporate customer can enter into a long-term CFD with a renewable power generator that covers both the associated electricity and the RECs. In a CFD, the customer provides a generator with a revenue guarantee for the electricity and RECs it will generate (for example, \$40/MWh). The generator sells all of the commodity electricity it generates to the wholesale market every hour. If the market price for power exceeds the guaranteed revenue, then the customer receives the difference. If the market price is below the guaranteed revenue, then the customer pays the difference. Thus, the net cost of the RECs (which

were not sold with the power) to the customer would vary with the price spread between the guaranteed price and the actual market price of electricity. As the renewable generation project becomes ever more competitive with electricity market prices that are largely influenced by generally rising fossil fuel costs, the net price of the REC would drop and could turn into a net financial benefit to the buyer. The key prerequisite for this type of REC transaction is the ability of the customer to make a long-term financial commitment with a generator.²⁸

The above recommendations for stimulating the development of REC (and thus renewable energy) markets are additional to more general but no less important policies that would improve the direct near-term cost competitiveness of renewable energy. For example, tax incentives such as renewable energy production tax credits (PTCs) should be renewed, made more readily transferable, extended to cover a longer project implementation window, and expanded to cover a wider set of renewable technologies.²⁹

IX. CONCLUSION

RECs are becoming an increasingly attractive renewable energy product for companies interested in reducing the environmental impact of their business activities. RECs provide many of the same business benefits that green power and on-site renewable energy generation provide, including reduced corporate GHG emissions and strengthened stakeholder relations. In addition, RECs can offer advantages relative to green power in terms of lower cost, wider selection of suppliers, greater variety of resource options, simpler transactions, and an easier avenue for interacting directly with renewable energy projects. Because of these advantages, RECs can help in the development of corporate markets for green power. Going forward, the actions identified and discussed in this installment would further enhance the ability of RECs to advance a clean energy future.



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NOTES

1. Power generation units that use renewable resources—wind, solar, biomass, landfill gas, geothermal, or low-impact hydro resources—as fuel.
2. One megawatt-hour is equivalent to 1,000 kilowatt-hours.
3. The majority of electricity (over 70 percent) produced in the United States is generated by burning fossil fuels. In 2000, 52 percent of U.S. net electricity generation was from coal and 19 percent was from natural gas and petroleum. Twenty percent was from nuclear power stations, 7 percent was from hydroelectric installations, and 2 percent was from non-hydroelectric renewable generators such as wind or biomass. Source: Energy Information Administration. 2003. *Energy in the United States: 1635-2000*. Online at: <http://www.eia.doe.gov/emeu/aer/eh/elec.html> (August 10, 2003).
4. Renewable power facilities can displace electricity generated by conventional power plants in two ways. First, a renewable power plant can cause an existing conventional plant that operates “on the margin”—that is, the last plant dispatched to meet the last unit of power demanded by end users—to reduce its output. Second, a new renewable power plant can delay or make unnecessary the construction of a new conventional power plant. The avoided emissions reflect those that the delayed or canceled new power plant(s) would have emitted.
5. RECs have several alternative names including “green tags,” “green certificates,” “green tickets,” and “tradable renewable certificates” or “TRCs.” The name used may differ among REC providers.
6. RECs are not used to represent the environmental attributes of conventional “zero emission” power sources — such as nuclear or large hydropower — or the environmental benefits of efficiency improvements in consumption, conventional power generation, transmission or distribution.
7. Also commonly called a “load-serving entity” (“LSE”) or “electric generation supplier” (“EGS”) in some states.
8. For more discussion on the business case for corporate use of renewable energy, see D. Austin and C. Hanson. 2002. *Introducing Green Power for Corporate Markets: Business Case, Challenges, and Steps Forward*, World Resources Institute. The publication is available online at: <http://www.thegreenpowergroup.org/publications.html>.
9. The role RECs will be able to play under future mandatory greenhouse gas emissions regulations or markets is still undetermined and will be the purview of regulation and market designers. Recommendations such as formally recognizing a role for RECs in greenhouse gas emissions markets and establishing clear rules regarding ownership of the environmental attributes associated with RECs are outlined in Section VIII of this installment.
10. A GHG emissions inventory is a detailed list of a company's greenhouse gas emissions. For a more complete description of a GHG emissions inventory and how one is developed, visit the Greenhouse Gas Protocol Initiative website at <http://www.ghgprotocol.org>. For more details on how to account for the emissions impact of RECs and a variety of other green power projects, see C. Hanson and J. Ranganathan. 2003. *Corporate Greenhouse Gas Emissions Inventories: Accounting for the Climate Benefits of Green Power*, World Resources Institute. The publication is available online at: <http://www.thegreenpowergroup.org/publications.html>.



11. The Greenhouse Gas Protocol Initiative (<http://www.ghgprotocol.org>), a joint project of the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD), is a multi-stakeholder project that aims to develop internationally accepted guidelines for measuring, recording, and reporting corporate GHG emissions and performance.
12. However, in some situations, industrial customers may be able to physically receive electricity directly from a renewable power plant and avoid having the electricity mixed with that from conventional power plants. For instance, some industrial customers can have facilities directly interconnect with a renewable power plant. Corporate energy users also can receive electricity directly from on-site renewable power generators (for example, rooftop solar photovoltaic systems or on-site biomass power plants).
13. Data on green power premiums are from the U.S. Department of Energy. 2003. *Summary of Green Pricing Programs* and from the U.S. Department of Energy. 2003. *Competitive Electricity Markets*. Both online at: <http://www.eere.energy.gov/greenpower/>. In both markets, the median premium is similar to the average premium.
14. As of July, 2003. National Renewable Energy Laboratory. 2003. *Retail Green Power Product Offerings*. Online at: http://www.eere.energy.gov/greenpower/mkt_summ.shtml (August 29, 2003).
15. As of February, 2003. National Renewable Energy Laboratory. 2003. *Utility Green Pricing Activities*. Online at: http://www.eere.energy.gov/greenpower/pricing_map.html (June 4, 2003).
16. As of February 2003, 12 states have renewable portfolio standards: AZ, CA, CT, IA, MA, ME, NJ, NM, NV, PA, TX, and WI. Three states have renewable energy goals that are not binding: IL, HI, and MN. Several other states such as NY are considering RPS rules. Source: L. Frantzis, "The State of Renewable Energy in America." Paper presented at the Second Annual American Council on Renewable Energy Conference, Washington, DC, July 8-9, 2003.
17. For more information on the role RECs can play in selected state RPS markets, visit <http://www.evomarkets.com/rec/index.php?xp1=3&mk=0>.
18. As of August, 2003.
19. Wholesalers or power generators may differ from REC retailers in terms of the level of marketing support provided, the breadth of products offered, and other factors that may be important to corporate customers.
20. All electricity generation from renewable resources has zero net emissions of CO₂. Biomass and landfill gas power generators emit some NO_x, particulates and other pollutants, but typically at levels below regional power pool average or marginal emission rates. While hydropower facilities have no emissions while in operation, they do have other impacts (e.g., obstruction of fish migration routes) that can impact ecosystems.
21. Wind and solar are the two power sources that the general public perceives most favorably. See K. Winneg, M. J. Herrmann, A. Levy, and B. Roe. 1998. *Consumer Knowledge, Practices, and Attitudes: Electric Utility Deregulation and Consumer Choice*, Chilton Research Services and the U.S. Food and Drug Administration.
22. Currently, audits typically do not cover the estimated avoided CO₂ or other emissions in part because a standard methodology for estimating avoided emissions has not been established and officially recognized. The need for such an accounting protocol is discussed in Section VIII.
23. A national system has not yet been developed in the United States, but progress is being made in some areas of the country. Two regional power generation and renewable energy certificate registry systems currently are in operation: The Texas Renewable Credit Program and the New England Power Pool Generation Information System. In the mid-Atlantic region, the PJM Interconnection is working on developing a Generation Attributes Tracking System. The Western power pool, as well, is evaluating options for developing a regional REC tracking system. For more information on work being done in this area, visit <http://www.resource-solutions.org/TRCs.htm>.
24. For more details about double counting, see C. Hanson and J. Ranganathan. 2003. *Corporate Greenhouse Gas Emissions Inventories: Accounting for the Climate Benefits of Green Power*, World Resources Institute. The publication is available online at: <http://www.thegreenpowergroup.org/publications.html>.
25. Many power pools encompass multiple states or parts of multiple states. For instance, the New England Independent System Operator includes CT, MA, ME, NH, RI, and VT.
26. For more details on the value of renewable energy products as a "hedge" against fluctuating fossil-based electricity prices, see D. Austin and C. Hanson. 2002. *Introducing Green Power for Corporate Markets: Business Case, Challenges, and Steps Forward*, World Resources Institute. The publication is available online at: <http://www.thegreenpowergroup.org/publications.html>.
27. The PJM wholesale electricity market covers the states of Pennsylvania, New Jersey, Maryland, and Delaware. For information about the expansion of PJM, visit <http://www.pjm.com>.
28. For more information about a contract for differences, see S. Y. Atcha and Vince T. Van Son. 2002. *Opportunities with Landfill Gas*, World Resources Institute. This publication is available online at: <http://www.thegreenpowergroup.org/publications.html>.
29. For more information about policy actions that would strengthen corporate markets for green power, visit <http://www.thegreenpowergroup.org/policy.html>.



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