

# Understanding the Environmental Impacts of Electricity: Product Labeling and Certification

L.A. Bird



**NREL**

**National Renewable Energy Laboratory**

1617 Cole Boulevard  
Golden, Colorado 80401-3393

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## **Abstract**

Electricity consumers are increasingly gaining the ability to choose among power options from either their current electric utilities or from alternative power providers. In order to help consumers make informed decisions about their electricity purchases and to compare alternatives, many states are requiring electricity providers to disclose information regarding the fuel sources used to generate electricity and their associated environmental impacts. Like nutrition labels, environmental disclosure labels present the content or sources of electricity and are typically included with electricity bills and in product offers. These labels allow consumers to compare the environmental impacts of standard and cleaner power options, which are typically available. In fact, more than one-third of electricity customers have access to green power—power generated from renewable sources such as solar, wind, hydro, geothermal, and biomass—directly through a power supplier. And green energy certificates, which represent the environmental attributes of renewable resources, are available nationally—even where the actual resource does not exist. Some products are certified by environmental organizations that verify the sources of power and ensure that environmental benefits are accrued. This paper discusses clean, green power options available to power purchasers and the tools and information that can be used to make more sustainable power purchase decisions.

## **Introduction**

Nationally, most of our electricity is generated from coal (52%), nuclear (20%), and natural gas (16%), with the remainder supplied from hydro (7%), oil (3%), and other renewable sources (2%) [1]. The environmental implications of our nation's fuel mix are considerable. According to the U.S. Environmental Protection Agency (EPA), the fuel sources currently used to produce electricity are responsible for emitting about two-thirds of the sulfur dioxide, one-third of the mercury, and one-quarter of the nitrogen oxides emitted in the United States [2]. In addition, fossil-based energy sources contribute significantly to emissions of fine particulate matter and carbon dioxide, a leading greenhouse gas. (The sources used to generate electricity vary considerably by region; thus, specific data is necessary to determine the environmental impacts of power purchases in a particular location.)

Many consumers now have the power to reduce their environmental footprint by reducing their use of fossil-based fuels. With the movement toward competition in the electric utility industry, they can choose their suppliers and purchase power generated from cleaner resources. But with more options to choose from, consumers must fully understand the environmental implications of their power purchase options.

## **Evaluating Electricity Products—Disclosure and Labeling**

In an effort to enable consumers to make informed decisions when choosing electricity suppliers, many states have adopted policies requiring retail power providers to clearly divulge information about the sources of their electricity and the environmental characteristics of these sources. Using this information, consumers can assess the environmental implications of their electricity consumption and determine whether cleaner alternatives are available.

There are now about 20 states that require power suppliers to disclose environmental information on marketing materials and in product offers. Some states, such as California, require disclosure of only the fuel mix (see Figure 1); while other states, such as Texas, also require data on environmental impacts, such as air pollutant emissions and nuclear waste (see Figure 2). Most, but not all, states require electricity providers to use a standard format, allowing consumers to easily compare a variety of product offers. A few require suppliers to make this information easily accessible on a single Internet site. Table 1 lists states with environmental disclosure policies, including how and when this data must be presented [3].

There are a few things to consider when using this data. First, is the information provided for a specific product or the company's entire resource mix? Are the fuel mix and emissions compared to the regional or state average? Is information supplied for all of the major environmental impacts? Is data available for both default suppliers and new market entrants to allow comparison? Does the supplier disclose its actual

mix or the system mix? Some states allow suppliers to present the average system mix if they are not making specific claims about their resource mix. Finally, if the product is supplied from renewable sources, are the specific types of resources specified? If all of these questions are not answered, the information may not be presenting a clear picture of the environmental impacts to enable you to compare products on an equal basis.

### **Green Power—A Cleaner Alternative**

If your standard power mix is heavily dependent on fossil fuels and nuclear, you may be interested in pursuing a cleaner alternative. Depending on your location, you may be able to select a “green power” product or choose one with environmentally preferred characteristics. “Green power” generally refers to electricity supplied in whole or in part from renewable energy sources, such as wind and solar power, geothermal, hydropower, and biomass. By choosing to purchase green power, you can support the development of renewable energy sources, which can reduce the burning of fossil fuels, such as coal, oil, and natural gas. Greater reliance on renewable sources also provides economic benefits and can improve our national energy security.

More than one-third of retail customers in the United States have the option to purchase green power directly from an electricity supplier. Green power is now available in states with retail electricity competition, including Connecticut, Maryland, New Jersey, Pennsylvania, Texas, Virginia, and other New England states. It is also likely to be available soon in New York. Even in states without electricity market competition, green power may be offered by incumbent, regulated utilities. Currently, more than 90 utilities in 30 states offer green power options to their customers. In most cases, these programs are open to commercial and industrial customers as well as residential customers [4].

### **Certified Green Power Products—Ensuring Quality**

Some green power products are certified by independent organizations. Certification programs can help ensure that 1) the power you are purchasing is actually delivered to the grid from the specified sources, and 2) the product will result in substantial environmental benefits. Most certification groups serve as third-party auditors who verify that green power marketers provide power from the appropriate sources in the appropriate quantities to their customers. They typically also set stringent standards for product content.

*Green-e* is the leading national certification and verification program for environmentally preferred electricity products offered in competitive power markets. It is administered by the Center for Resource Solutions, a non-profit environmental organization based in San Francisco. To be eligible for *Green-e* certification, at least half of an electricity product's energy supply must come from renewable resources such as wind, solar, geothermal, biomass, or small hydro. The product must also contain a percentage of recently developed (new) renewable resources. Any non-renewable portion of the product must be as clean or cleaner and must not contain more nuclear energy than the traditional power mix. In addition, certified suppliers must disclose their power sources to customers and agree to an annual third-party audit to verify their marketing claims. The *Green-e* program has a number of regional advisory committees that set specific regional standards with respect to issues such as eligible renewable resources and new renewable energy content. Regional advisory committees have been created in California, the Midatlantic, New England, New York, Ohio, and Texas. Nationally, *Green-e* certifies more than 20 retail and wholesale green power products in California, Connecticut, New Jersey, and Pennsylvania. Commercial and industrial customers purchasing *Green-e* certified products are able to use the *Green-e* logo in advertising in accordance with the program's secondary-use standards [5].

The Center for Resource Solutions also administers a national *Green Pricing Accreditation Program* for green power programs offered by utilities in non-competitive markets. The program is designed to recognize utility programs that use "best practices" in offering green electricity options to customers. Utility green pricing programs can become accredited if they meet or exceed stringent standards regarding renewable resource content, product pricing, marketing activities, and information disclosure. Accredited utilities are also required to undergo an annual, independent verification process to document their green power deliveries. To date, green pricing accreditation standards are in place in Colorado, Wisconsin, Iowa

and the service territory of the Tennessee Valley Authority (TVA), while standards are under development in Florida, Georgia, Minnesota, North Carolina, North Dakota and South Carolina. Accredited utilities and commercial and industrial customers purchasing green power through accredited utility programs are able to use the *Green-e* logo [6].

*Renew 2000* is a certification program available for green power products offered in the Pacific Northwest. Green power products are eligible for certification under the program if they meet certain criteria regarding resource content, including newly developed renewables, program design, fuel mix disclosure, and marketing. The product standards were developed by a regional coalition of environmental groups, utilities, and governments [7].

Although not a certification program per se, another tool available for evaluating the environmental impact of electricity products is the *Power Scorecard*, a Web-based information tool created by a coalition of environmental groups that lets consumers compare the environmental impacts of green power and conventional power products. The *Power Scorecard* rates electricity products on a scale from "excellent" to "unacceptable" using two measures: 1) the environmental impact on air, land and water, and 2) the amount of energy generated from recently developed renewable, low-impact sources. It was developed jointly by Environmental Defense, the Izaak Walton League of America, the Natural Resources Defense Council, the Northwest Energy Coalition, and the Union of Concerned Scientists, with technical support from the Pace Law School Energy Project [8].

### **Another Alternative—Green Energy Certificates**

Whether or not green power is available through your local utility or a competitive electricity marketer, another option is to purchase green energy certificates. Also known as green tags, renewable energy certificates, or tradable renewable certificates—green energy certificates represent the environmental attributes of power generated from renewable electric plants. A number of organizations offer green energy certificates separate from electricity service (i.e., customers do not need to switch electricity suppliers in order to purchase these certificates) [9].

For example, PG&E Corporation offers businesses and others the opportunity to purchase wind energy certificates representing the air emissions avoided with each megawatt-hour of power supplied from its 11.5-MW wind project in Madison County, New York. One of the company's larger customers is Kinko's, which purchases wind certificates for up to 50% of the energy used by its retail operations in New York.

Another example is the Oregon-based non-profit Bonneville Environmental Foundation (BEF), which markets green energy certificates generated from renewable resources in the Pacific Northwest in cooperation with the Bonneville Power Administration. The Foundation uses revenues from the sales of certificates to expand a fund earmarked for renewable resource development in the Pacific Northwest. BEF supplies green certificates to a number of companies including Xantrex Technology, a leading supplier of inverters for renewable energy systems, Batdorf & Bronson Coffee Roasters of Olympia, and Global Energy Concepts, a Kirkland-based renewable-energy consulting firm.

Purchasing green energy certificates can be advantageous for a number of reasons. First, there is no need to change electricity suppliers. Second, a single purchase can be used to supply green power to facilities in different locations, which can reduce transaction costs for companies with multiple facilities. In addition, it may be possible to lower costs by supporting renewable projects developed in areas with the best resources, rather than purchasing from local projects that are less efficient. Finally, green certificates are readily available today, whereas renewable energy facilities may not be available in many areas to supply green power locally.

Despite the significant advantages of purchasing green energy certificates, there are some concerns. First, green certificate suppliers are not necessarily energy suppliers and may not fall under the jurisdiction of a utility regulatory commission. Further, they are not necessarily licensed suppliers and, without a license to revoke, it may be more difficult to take disciplinary action against them. Double counting is also a real concern. It is important to ensure that green energy certificates represent the energy generated from a

particular facility at a particular time and that they are not sold twice. Contracts should specify that the energy must be sold only once. It may also be prudent to contract with a third-party auditor to verify the source of the certificates.

Some environmental organizations are beginning to play a role in certifying and verifying green certificate products. For example, Environmental Resources Trust, a non-profit, environmental organization, certified the first wholesale green certificate product offered in Illinois by ComEd. The group also announced plans to team with Sterling Planet, a retail green energy certificate supplier, to verify a portion of the company's supply.

In addition, the *Green-e* program is in the process of developing standards for certifying certificate-based green power products. The standards, which are being developed with the assistance of a national advisory committee, address issues such as disclosure, double counting, and new renewables content. Green-e expects to issue final certification standards for certificate-based products in early 2002.

### **Summary**

With a greater degree of choice now available in electricity markets, consumers have the opportunity to improve their environmental footprint and purchase electricity from cleaner, renewable sources. There are a number of tools available to help evaluate these products. First, many states are requiring electricity suppliers to disclose information about their resource mix and the environmental impacts associated with it. This information can serve as a starting point for evaluating alternatives. In addition, certification programs, such as *Green-e*, are available to help evaluate green power products offered in the marketplace. Another option, and one that may be particularly appealing to large corporations, is green energy certificates. Overall, no matter what the status of electricity restructuring in your state, cleaner power products exist and there are a variety of tools available to help understand and evaluate the environmental implications of available options.

### **Acknowledgments**

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### **Tables and Figures**

Table 1: Environmental Disclosure Requirements for Electricity Suppliers by State

Figure 1: California Power Content Label

Figure 2: Texas Electricity Facts Label

Figure 3: Green-e Logo

## Endnotes

[1] Energy Information Administration, *Electric Power Annual 2000: Volume 1*. Table 6. Net Generation by Energy Source and Sector, 2000 and 1999. August 2001.  
<http://www.eia.doe.gov/cneaf/electricity/epav1/generation.html>

[2] U.S. EPA, *National Air Pollutant Emission Trends, 1900-1998* (EPA-454/R-00-002), March 2000, Figures 2-2, 2-4, [www.epa.gov/ttn/chieftrends/trends98/trends98.pdf](http://www.epa.gov/ttn/chieftrends/trends98/trends98.pdf); and U.S. EPA, *1996 National Toxics Inventory*, September 2000, [www.epa.gov/ttn/chieftni](http://www.epa.gov/ttn/chieftni).

[3] L. Bird and D. Lackaff. Summary of State Environmental Disclosure Policies, National Renewable Energy Laboratory, October 2001 <http://www.eren.doe.gov/greenpower/disclosetxt.shtml>

[4] B. Swezey and L. Bird, Green Power Marketing in the United States: A Status Report, NREL/TP-620-28738. Golden: CO: National Renewable Energy Laboratory, August 2000.

[5] For more information on the Green-e certification program, see <http://www.green-e.org>.

[6] For more information on the Green Pricing Accreditation Program, see <http://www.resource-solutions.org/CRSprograms/greenpricing.html>.

[7] For more information on the Renew 2000, see <http://www.cleanenergyguide.org>.

[8] For more information on the Power Scorecard, see <http://www.powerscorecard.org>.

[9] For more information on green certificates see Starrs, T. "Green Tags: A New Way to Support Renewable Energy," *Solar Today*, July/August 2001.

**Table 1. Environmental Disclosure Requirements for Electricity Suppliers by State – October 2001**

State	Disclosure Requirement	Frequency	Method of Distribution	Effective Date
<b>Full Disclosure Requirements</b>				
Arkansas	Standards to be set for disclosure of environmental impacts	TBD	TBD	TBD
California	Fuel mix required in standard format.	Quarterly	Bill insert, offers, and written promotional materials	1999
Colorado	Fuel mix. Standard format is suggested.	Twice annually	Bill insert or mailing	1999
Connecticut	Fuel mix and air emissions	TBD	TBD	TBD
Delaware	Fuel mix	Quarterly	Bill insert or mailing, offers, marketing materials	1999
Florida	Fuel mix	Quarterly	On bill or bill insert	1999
Illinois	Fuel mix and CO <sub>2</sub> ; NO <sub>x</sub> ; SO <sub>2</sub> ; high- and low-level nuclear waste in standard format.	Quarterly	Bill insert	1998
Maine	Fuel mix and CO <sub>2</sub> NO <sub>x</sub> ; SO <sub>2</sub> emissions in format similar to sample	Quarterly	Bill insert or mailing and prior to initiation of service.	1999
Maryland	Fuel mix and CO <sub>2</sub> ; NO <sub>x</sub> ; SO <sub>2</sub> emissions in standard format	Twice annually	Bill insert or mailing and with contracts	2000
Massachusetts	Fuel mix and CO <sub>2</sub> ; NO <sub>x</sub> ; SO <sub>2</sub> emissions in standard format	Quarterly	Bill insert and prior to initiation of service.	1998
Michigan	Fuel mix and SO <sub>2</sub> ; CO <sub>2</sub> ; NO <sub>x</sub> ; high-level nuclear waste emissions in standard format	Twice annually	Bills and on Commission web site	(2002)
Minnesota	Fuel mix, air pollutant emissions, and nuclear waste emissions in standard brochure	Twice annually	Web, phone referral on bill, full info on bill insert	(2002)
New Jersey	Fuel mix, energy efficiency, and CO <sub>2</sub> ; SO <sub>2</sub> ; NO <sub>x</sub> emissions in standard format	Twice annually	Mailings, direct mail marketing, solicitations, contracts	1999
New Mexico	Fuel mix and associated emissions, standard format required under proposed rules	TBD, proposed annually	TBD	TBD
New York	Fuel mix and CO <sub>2</sub> ; SO <sub>2</sub> ; NO <sub>x</sub> emissions in standard format	Twice annually	Bill insert and prior to offers	(2002)
Ohio	Fuel mix, CO <sub>2</sub> ; SO <sub>2</sub> ; NO <sub>x</sub> emissions and high- and low-level radioactive waste in standard format	Annually plus quarterly comparisons	Bill insert or mailing, and contracts	2001
Oregon	Fuel mix and CO <sub>2</sub> ; SO <sub>2</sub> ; NO <sub>x</sub> ; spent nuclear fuel emissions in standard format	Quarterly	On bill or insert, marketing, contracts, URL on bill	2000
Texas	Fuel mix and CO <sub>2</sub> ; SO <sub>2</sub> ; NO <sub>x</sub> ; Particulates; nuclear waste emissions in standard format	Twice annually	Bill insert or mailing, solicitations, web site	(2002)
Washington	Fuel mix in standard format	Twice annually (plus two referrals)	Bill insert or mailing, solicitations	2001
<b>Partial Disclosure Requirements<sup>1</sup></b>				
Arizona	Fuel mix and emissions to extent reasonably known	Upon request and in marketing	Upon request	2000
District of Columbia	Fuel mix	Twice annually to Commission	Supplied only to the Commission	2001
Pennsylvania	Fuel mix and energy efficiency	Upon request	Supply to Commission annually	1998
Virginia	Fuel mix and emissions to the extent feasible	Annually to extent feasible	“Reported to customers.”	(2002)
<b>Proposed Disclosure Requirements</b>				
Montana	Fuel mix and CO <sub>2</sub> ; SO <sub>2</sub> ; NO <sub>x</sub> , spent nuclear waste, hydro	Twice annually	Product offers, contracts, ads	TBD
West Virginia	Fuel mix and CO <sub>2</sub> ; SO <sub>2</sub> ; NO <sub>x</sub> and high-level and low-level nuclear waste	Supplied to Commission quarterly	Solicitations Posted on company web site	TBD

<sup>1</sup> The term *partial disclosure requirements* refers to policies that are not mandatory, do not apply to all retail electricity suppliers, or do not result in direct disclosure to consumers.

Figure 1: California Fuel Source Disclosure Label

<b>POWER CONTENT LABEL</b>		
<b>ENERGY RESOURCES</b>	<b>PRODUCT A* (projected)</b>	<b>1998 CA POWER MD** (for comparison)</b>
<b>Eligible Renewable</b>	<b>55%</b>	<b>11%</b>
-Biomass & waste	-	2%
-Geothermal	-	5%
-Small hydroelectric	-	2%
-Solar	-	<1%
-Wind	-	1%
<b>Coal</b>	<b>10%</b>	<b>20%</b>
<b>Large Hydroelectric</b>	<b>11%</b>	<b>22%</b>
<b>Natural Gas</b>	<b>16%</b>	<b>31%</b>
<b>Nuclear</b>	<b>8%</b>	<b>16%</b>
<b>Other</b>	<b>&lt;1%</b>	<b>&lt;1%</b>
<b>TOTAL</b>	<b>100%</b>	<b>100%</b>

\* 50% of **Product A** is specifically purchased from individual suppliers.

\*\*Percentages are estimated annually by the California Energy Commission based on the electricity sold to California consumers during the previous year.

For specific information about this electricity product, contact **Company Name**. For general information about the Power Content Label, contact the California Energy Commission at 1-800-555-7794 or [www.energy.ca.gov/consumer](http://www.energy.ca.gov/consumer)

Figure 2: Texas Electricity Facts Label  
<http://www.powertochoose.org/residential/downloads/factslabel.pdf>

Electricity Facts			
[Name of REP], [Name of Product] [Service area (if applicable)] [Date]			
<b>Electricity price</b>	Average monthly use:	500kWh    1,000kWh    1,500 kWh	
	<b>Average price per kilowatt-hour:</b>	[x.x]¢    [x.x]¢    [x.x]¢	
<p>This price disclosure is an example based on [criteria used to construct the example] – your average price for electric service will vary according to [relevant variation]. See the Terms of Service document for actual prices.</p> <p>[If applicable] Price fixed for [xx] months.            [If applicable] On-peak [season or time]: [xxx]            [If applicable] Average on-peak price per kilowatt-hour: [x.x]¢            [If applicable] Average off-peak price per kilowatt-hour: [x.x]¢</p>			
<b>Contract</b>	Minimum term: [xx] months.	Penalty for early cancellation: \$[xx]	
See Terms of Service statement for a full listing of fees, deposit policy, and other terms.			
<b>Sources of power generation</b>		<i>This product</i>	<i>Texas (for comparison)</i>
	Coal and lignite	[xx]%	[xx]%
	Natural gas	[xx]%	[xx]%
	Nuclear	[xx]%	[xx]%
	Renewable energy	[xx]%	[xx]%
	Other	[xx]%	[xx]%
	<b>Total</b>	<b>100%</b>	<b>100%</b>
<b>Emissions and waste per kWh generated</b>	Carbon dioxide		
	Nitrogen oxides	112	
	Particulates	56	
	Sulfur dioxide	23	
	Nuclear waste	10	
		<i>Better than Texas average</i>	<i>Worse than Texas average</i>
(Indexed values: 100=Texas average)			

Figure 3: Green-e Certification Program Logo



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