

Shanghai: Developing a Green Electricity Scheme



September 2006



Energy Sector Management Assistance Program (ESMAP)

Energy Sector Management Assistance Program (ESMAP)

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ESMAP
c/o Energy and Water Department
The World Bank Group
1818 H Street, NW
Washington, D.C. 20433, U.S.A.
Tel.: 202.458.2321
Fax: 202.522.3018

Shanghai: Developing a Green Electricity Scheme

Prepared by:

Noureddine Berrah

Lead Energy Specialist
Infrastructure Sector Unit
East Asia and Pacific Region
The World Bank

Enno Heijndermans

Renewable Energy Specialist
Asia Alternative Energy Program (ASTAE)
The World Bank

Mark D. Crowdis

President
Think Energy, Inc.
United States

Prepared for:

The Shanghai Economic Commission (SHEC)
The Shanghai Municipal Electric Power Company (SMEPC)
The Shanghai Energy Conservation Supervision Center (SECSC)
The World Bank

Sponsored by:

Asia Alternative Energy Program (ASTAE)
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Preface

In June 2003, the Mayor of Shanghai, Mr Tang Dengjie, instructed the Shanghai Economic Commission (SHEC) to design a practical green electricity scheme for Shanghai and to submit a proposal to the Municipal Government for introducing and operating this green electricity scheme. To assist in the design, Mr Le Jingpeng, Vice-Director of SHEC, sought the assistance of the World Bank. The SHEC entrusted the Shanghai Energy Conservation Supervision Center (SECSC) with designing the Shanghai Green Electricity Scheme and appointed SECSC as the counterpart for assistance from the Bank. The Energy Foundation and the World Wildlife Fund (WWF) provided additional assistance. The deadline for submitting the draft design and an implementation plan to the SHEC was May 1, 2004.

To oversee the work progress, a Steering Group has been established, comprising representatives of SHEC, Shanghai Reform and Development Commission (SHRDC), Shanghai Municipal Electric Power Company (SMEPC), and SECSC:

- (a) Le Jingpeng, Vice-Chairman, SHEC (Team Leader)
- (b) Shuai Junyi, General Manager, SMEPC (Deputy Team Leader)
- (c) Xia Meixing, Division Chief of Energy, SHRDC (Deputy Team Leader)
- (d) Chen Jinhai, Division Chief of Energy Conservation and Environment Protection, SHEC (Deputy Team Leader)
- (e) He Changqun, Division Chief of Electric Power, SHEC (Deputy Team Leader)
- (f) Zhen Long, Deputy Division Chief of Electric Power, SHEC (Member)
- (g) Zhang Kaili, Deputy Manager of Marketing Department, SMEPC (Member)
- (h) Che Shenggang, manager of planning department, SMEPC (Member)
- (i) Chen Zhengqian, Senior Engineer of Energy Conservation and Environment Protection Division, SHEC (Member)
- (j) Zhang Lihong, Engineer of Urban Development Division, SHRDC (Member)
- (k) Chen Rumei, Director, SECSC (Member)
- (l) Lou Zhenfei, Deputy Director, SECSC (Member)

The World Bank Energy Sector Management Assistance Program (ESMAP) and the Asia Alternative Energy Program (ASTAE) provided the financial resources to cover the cost of the requested assistance, which included providing access to international experience and expertise.

The World Bank support consisted of the following inputs:

- (a) Report: Shanghai Green Electricity Sales and Marketing Plan, April 2004
- (b) Report: Green Electricity Scheme for Shanghai. Options and Recommendations. April 2004
- (c) Report: Green Electricity Product Design. International Experience. March 2004
- (d) Report: Verifying Green Power Schemes. Recommendations on a Green Power Verification Scheme for the Municipality of Shanghai. May 2004
- (e) Policy Study Tour to Finland, Sweden and Germany for seven senior Government Officials
- (f) Implementation Training in Finland, the Netherlands and Canada for 6 staff members of SECSC and SMEPC
- (g) Participation of Chen Rumei in the International Conference for Renewable Energies in Bonn
- (h) Support for Developing and Operating the Green Electricity Website
- (i) Support for Writing Articles, Press Briefs and Promotion Materials
- (j) Support for Production of Awareness Creation, Marketing and Promotion Materials

This report documents the experience of developing a green electricity scheme in a city in a developing country, and is intended to be a resource when replicating this effort in another city or country. It consists of two parts. In Part 1, the general characteristics of both the framework for green electricity products and the general characteristics of green electricity products are presented. In Part 2, the culminating framework and product characteristics for Shanghai are presented. We now look forward to the successful implementation of the Shanghai Green Electricity Scheme and hope that it will be a shining example for others to follow.

Acknowledgment

The World Bank team consisted of Messrs and Mmes Noureddine Berrah (Task Manager), Enno Heijndermans, Li Jingjing, and Mark Crowdis (consultants). The Bank team highly commends the Shanghai Energy Conservation Supervision Center for their dedication and hard work. In particular, the team would like to acknowledge the leadership of Ms Chen Rumei and the work of her staff, Messrs and Mmes Lou Zhenfei, Wu Mei, Zhu Hai and Zhu Wei. Further, in particular, acknowledgments are due to Le Jingpeng and Chen Jinhai of the Shanghai Economic Commission for their support and availability to discuss the development of the Shanghai Green Electricity Scheme on many occasions, and the Shanghai Municipal Government for its vision. Finally, the financial support from ESMAP and ASTAE is gratefully acknowledged.

Junhui Wu
Sector Manager
Energy and Mining Development Sector Unit
East Asia and Pacific Region

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List of Acronyms and Abbreviations

ASTAE	Asia Alternative Energy Program
CBF	Chesapeake Bay Foundation
CO ₂	Carbon Dioxide
ECP	Environmental Choice Program
ESMAP	Energy Sector Management Assistance Program
Green-e	The Green-e Renewable Energy Certification Program
kW	Kilowatt
kWh	Kilowatt-hour
LIHI	Low Impact Hydropower Institute
MW	Megawatt
MWh	Megawatt-hour
NGO	Non-Governmental Organization
NGPASP	National Green Power Accreditation Steering Group
NO _x	Nitrogen Oxides
PES	Pepco Energy Services
PV	Photovoltaic(s)
REC	Renewable Electricity Certificate or Credit
RPS	Renewable Portfolio Standard
SDRC	Shanghai Development and Reform Commission
SECSC	Shanghai Energy Conservation Supervision Center
SEDA	New South Wales Government's Sustainable Energy Development Authority
SHEC	Shanghai Economic Commission

SMEPC	Shanghai Municipal Electric Power Company
SMUD	Sacramento Municipal Utility District
SO _x	Sulfur Oxides
TRC	Tradable Renewable Certificate
TVA	Tennessee Valley Authority
TWh	Terrawatt-hour
WWF	World Wildlife Foundation

List of Currency Equivalents

1 Australian Dollar	=	0.777 US Dollar	1 US Dollar	=	1.267 Australian Dollar
1 Canadian Dollar	=	0.799 US Dollar	1 US Dollar	=	1.252 Canadian Dollar
1 Chinese Yuan	=	0.121 US Dollar	1 US Dollar	=	8.277 Chinese Yuan
1 Euro	=	1.291 US Dollar	1 US Dollar	=	0.774 Euro

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This report is the final report of the Green Electricity Scheme for Shanghai project, implemented with financial support from ESMAP and ASTAE. The project was initiated as one of the ASTAE “Flagship” projects proposed in the ASTAE 2004-2006 Business Plan. Flagship projects are stand alone technical assistance activities aimed at new, promising and highly replicable approaches to promoting sustainable energy in client countries. Flagship projects are not directly related to project identification or development and emphasize testing new approaches with the potential to become a new component in future World Bank or Global Environment Facility (GEF) projects.

This report has been prepared by Nouredine Berrah of the Infrastructure Sector Unit of the East Asia and Pacific Region, Enno Heijndermans, ASTAE Program-Based Consultants and Mark D Crowdis of Think Energy of the USA. The comments of the peer reviewers — Xiaodong Wang (Energy Unit of the Africa Region), Peter Johansen (Infrastructure and Energy Services Department of Europe and Central Asia Region) and Grayson Heffner (consultant) are gratefully acknowledged. Special thanks are also due to Ms Marjorie Ayara and Ms Ananda Swaroop of ESMAP, World Bank, for coordinating the publication of this report.

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- (a) Chen Rumei, Director, SECSC
- (b) Lou Zhenfei, SECSC
- (c) Wu Mei, SECSC
- (d) Zhu Hai, SECSC
- (e) Zhu Wei, SECSC
- (f) Li Jingjing, consultant
- (g) Veit Bürger, Öko Institut
- (h) Rebecca Kary, Alpha-Omega Services

Executive Summary

Green electricity is a product containing renewable electricity which consumers voluntarily choose to purchase, usually for a premium, because it is better for the environment, the economy and national security, and they are willing to pay to advance their values. The first green electricity schemes were developed in the late 1980s. Since then, they have grown in number and size and are now operational in many developed countries around the world.

To protect consumers, governments have developed standards and specifications that green electricity products must meet. Non-Governmental Organizations (NGOs) have taken on this responsibility in countries where governments did not. The set of standards form a framework under which green electricity products can be developed. Several frameworks that are in use around the world include some of the following specifications:

- Eligible RE sources
- Location of production—domestic or imported
- Age of the production facility
- Minimum content of 'new' renewable electricity
- The 'one-for-one' requirement — the requirement that for each kilowatt-hour (kWh) of renewable electricity sold in a green electricity product, 1 kWh of renewable electricity is produced or purchased by the vendor
- Settlement period
- Method of balancing
- Additionality — the stipulation that only renewable electricity beyond any legal requirement can be included in green electricity products
- Minimum RE requirements for green electricity products
- Requirements for product disclosure to consumers
- Emission benefits included in renewable electricity
- Product name
- Use of framework name and logo
- Requirements for verification and certification

Products developed under these frameworks, in turn, have several of the following characteristics:

- Target customers
- Product name and logo
- Product type
- Renewable electricity sources used
- Amount of renewable electricity
- Pricing
- Invoicing
- Term — length of contract and rules for renewal and withdrawal
- Consumer value
- Labeling

The framework operators — a government body or NGO — verify whether the green electricity product meets the framework standards and specifications. If it does, the product can be certified or labeled. Verification is repeated normally on an annual basis to make sure that the product still meets the framework conditions. Through this process, consumers are assured that the green electricity products are indeed contributing to more renewable electricity development and a better environment.

In August 2003, the Shanghai Economic Commission (SHEC) requested World Bank assistance to develop a green electricity scheme for the municipality. The World Bank agreed to provide the requested assistance, and mobilized funds from ESMAP and Asia Alternative Energy Program (ASTAE). The World Bank would provide information and expertise on the international experience in developing and operating green electricity schemes. The World Bank is particularly interested in green electricity because it requires consumer involvement and participation, and because it unambiguously demonstrates the consumer's willingness to pay for a cleaner environment.

With assistance from the World Bank and others, Shanghai obtained a good understanding of the concept of green electricity and the international experience in developing and implementing green electricity schemes. Based on this experience — and considering the specific situation in Shanghai — a team of national experts designed a preliminary green electricity framework for Shanghai and a green electricity product to be marketed in the pilot phase. This was specified in a formal Government decree, the draft of which was submitted to the Municipal Government on April 30, 2004, and which was ultimately approved on June 14, 2005. In the pilot phase, the market and consumer response will be tested, and the specifications of other framework characteristics will be studied. The preliminary framework is still not very specific, but the green electricity product that will be offered has been specified in detail.

The Shanghai Municipal Electric Power Company (SMEPC) markets the green electricity product. The product is called Jade Electricity, and it has its own logo. The product is offered to households and large non-household consumers. Green electricity is offered in blocks of 6,000 kWh for large non-household consumers and in blocks of 12 kWh to households. Consumers need to buy a minimum of a certain number of blocks

depending on the consumer category. For instance, households need to buy a minimum of 10 blocks per year, whereas large non-household consumers using more than 50,000 Megawatt-hour (MWh) per year need to buy a minimum of 100 blocks per year. In the pilot phase, Jade Electricity will contain only wind and photovoltaic (PV) electricity generated in Shanghai. The incremental cost of Jade Electricity is 0.53 Yuan per kWh. This includes only the incremental cost of renewable electricity. As an in-kind contribution to introducing Jade Electricity, SMEPC does not require compensation for the cost of operating the scheme and marketing Jade Electricity. Consumers of Jade Electricity are billed in 12 equal monthly amounts. The additional cost is added to their electricity bill. Consumers can choose between subscription periods of one, two and three years. Jade Electricity consumers receive a certificate of participation. In addition, a list of Jade Electricity consumers is published and updated at regular intervals. Large Jade Electricity consumers can apply for the right to use the Jade Electricity logo for their promotional activities.

At the launch of the scheme on June 14, 2005, 14 large electricity consuming companies and institutions signed one to three year contracts to buy annually 6.54 Gigawatt-hour (GWh) renewable electricity in total. This was almost the total renewable electricity production in the Shanghai municipality at that time. With the completion of the Chong Ming and Nan Hui wind farms, renewable electricity production will increase to 53 GWh per year. Marketing of this production as green electricity will start in 2006.

The success of marketing Jade Electricity will help speed up the existing renewable electricity capacity implementation plans in Shanghai.

Introduction

Shanghai has adopted an ambitious plan to improve the municipal environment. To fulfill the city's commitment to improving the environment and to creating a 'Better City, Better Life', Shanghai will launch a new round of citywide redevelopment plan aimed at providing a better urban environment for its citizens. To promote the image of Shanghai as an environmentally conscious and responsible city, the Municipal Government also wants to develop its Renewable Energy (RE) resources. The development of clean, renewable electricity supply is important, partly because electricity production has such high visibility but mostly because renewable generation provides a logical solution to a set of problems related to the production and consumption of electricity from non-renewable sources in China. Electricity production causes poor air quality on a daily basis, and consumption continues to outstrip demand in Shanghai, causing scheduled brownouts during the peak season. Producing electricity from clean, renewable resources will contribute to reducing the emission of pollutants and help meet growing consumer demand.

To promote the production of renewable electricity, a number of options are available. These options can be divided into approaches that support the supply side and approaches that support the demand side of the RE market. Options to promote the supply side include incentives to develop renewable electricity production capacity, using mechanisms such as subsidies and tax incentives. Options to promote the demand side include legal obligations, such as those specified in the Renewable Energy Law, and voluntary measures, such as the introduction of a green electricity scheme.

The Shanghai Municipal Government (SMG) has decided to introduce a voluntary green electricity scheme, which will promote the development of renewable electricity production facilities by creating consumer demand. In addition to help protect the municipal environment, increasing renewable electricity production will stimulate the economy by creating jobs and new markets for manufacturers in Shanghai.

SMG opted for a voluntary demand-side approach because this will engage electricity consumers, including both households and large non-residential consumers. The active engagement of electricity consumers will create awareness regarding the environmental impacts of electricity production and will promote citizen responsibility concerning issues. If this market-oriented model is successful, it may be used in the future to address other challenges in Shanghai and China at large.

In June 2003, Mr Tang Dengjie, Deputy Mayor of Shanghai, instructed SHEC to design a practical green electricity plan for Shanghai. The design of this plan had to be submitted to SMG for approval before May 1, 2004. The SHEC delegated the task of designing a green electricity scheme to the Shanghai Energy Conservation Supervision Center (SECSC) and SMEPC. SMEPC agreed to implement the green electricity plan with the assistance of SECSC. SHEC asked the World Bank to assist SECSC and SMEPC in designing the green electricity plan and to support SMEPC in implementing it.

The World Bank agreed to provide the requested assistance in two phases. In the first phase, the World Bank would assist SECSC and SMEPC in designing the green electricity plan, while in phase two, assistance would be provided to SMEPC to implement the plan once the design has been approved by SMG.

Although international experience has shown that green electricity is normally only a small share of electricity sales and consumption, the World Bank considers green electricity important because of the engagement of electricity consumers. Internationally, green electricity clearly demonstrates the willingness of citizens to pay for a cleaner environment and their appreciation of the social, economic and image benefits of renewable electricity production and use. Because of the poor air quality in Shanghai, the market response may be greater than in any other place. Another reason that the World Bank strongly supports this initiative is that Shanghai would be the first city in a developing country to adopt this market approach to cover the cost of renewable electricity production. An indication of how important the World Bank considers green electricity is that it buys green electricity from a US supplier for its own use in Washington.

The particular assistance SHEC requested from the World Bank was recommendations based on its access to international experience with developing and implementing green electricity schemes. To provide this input, the World Bank hired consultants to provide the international experience on specific topics related to green electricity. The input was provided in the form of expert advice and reports. It was used to prepare the 'Implementation Plan for the Shanghai Green Electricity Scheme' and to draft a decree establishing the green electricity scheme. Both were submitted to SMG on April 30, 2004.

This report documents the results of phase one of the World Bank support: drafting the decree and preparing the implementation plan and the initial results after its launch. The report is comprised of two parts. Part 1 presents a summary of international experience, including a description of the green electricity concept and the market penetration in different countries, the characteristics of frameworks under which renewable electricity products are developed, and the characteristics of products developed under these frameworks. Different options for verifying and certifying frameworks are discussed on the basis of case studies. Finally, the required institutional framework and options for awareness creation and marketing are discussed. Part 2 covers the application of this experience in Shanghai. It provides a description of the scope of green electricity in Shanghai and the pilot green electricity product specified in the draft decree. It also describes the emerging Shanghai framework for green electricity products. At the end of Part 2, the report addresses the remaining issues concerning the development of the framework and the product. In addition, recommendations are provided for further development and the next steps.



Part 1.

Green Electricity Concept and
International Experience

1. The Concept of Green Electricity

The environmental impacts resulting from electricity generation and use present not only a significant environmental problem, but also an opportunity to develop a more sustainable power sector. The power sectors in the world's industrial nations are responsible for emitting a significant amount of the world's sulfur dioxide, carbon dioxide and nitrogen oxide. These emissions contribute to acid rain, asthma and other respiratory diseases, regional haze, smog and global climate change.

To reduce the environmental impact of producing and using electricity, a number of options are available:

- improving energy efficiency;
- switching to cleaner fuels;
- flue gas cleaning; and
- producing electricity from low or no-emission renewable resources such as wind, solar, low impact or small hydropower, biomass and geothermal.

International experience indicates that wind and solar power are the Renewable Energy (RE) sources most attractive to consumers. The vast majority of the world's electricity is generated from fossil fuels such as natural gas, oil, coal, or petroleum coke or other petroleum-based fuels. These fuels are finite in nature, and emit harmful pollutants. Another huge problem is that their prices are volatile, which contributes to economic instability.

RE can be viewed as a control technology for virtually all pollutants. Rather than installing controls for each pollutant, the use of RE simultaneously reduces emissions of sulfur dioxide, nitrogen oxides, particulates, toxics and greenhouse gases, and avoids the problems related to solid waste disposal and water use that are associated with electricity generation from non-renewable sources.

Except in a few niche applications, renewable electricity is more expensive than electricity generated from fossil fuels. There are several reasons for this. First of all, the technologies for producing electricity from renewable resources have both a short history of commercialization, and they lack the long history of development and price supports that fossil fuels have enjoyed. Only recently has RE been developed on a commercial basis and scale. Second, the cost of environmental damage is usually not reflected in fossil fuel price and is not accounted for in energy economic models — or it is simply assumed to be zero.

The price of electricity generated from RE sources, however, has seen significant decreases and, in some markets, is rapidly becoming more competitive with electricity generated from conventional sources. As the RE market develops and more renewable electricity generation technologies are installed, economies of scale will continue to bring prices down. Governments around the world have begun to introduce policies to accelerate this process, through both incentives and mandates. Incentives include tax credits, buy-down programs to decrease the cost to consumers for installation and accelerated depreciation. Another increasingly popular method employed by government entities is the use of mandates — creating markets for RE by introducing a legal obligation to develop, sell or buy RE. Under a legal obligation, the incremental cost of RE is passed onto all end-users. One should note that it is possible to protect certain categories of end-users, such as the poor or selected industries, if increased tariffs are considered undesirable for these end-user groups.

A third method for promoting the development of RE is for utilities or other vendors to introduce a green electricity program. *Green electricity is a product that consumers voluntarily choose to purchase, usually at a premium, because using it is better for the environment, the economy and national security, and they are willing to pay to advance their values.* Under this type of program, utilities purchase or generate electricity from renewable resources. They, then, offer this electricity as a distinct product — or products — to consumers, who have the option to purchase some or all of their electricity from green sources. A voluntary green electricity program can be implemented instead of a legal obligation, or it can be in addition to a legal obligation. Governments have been supportive of green electricity programs because they contribute to the development of renewable electricity without increasing prices to consumers who are not willing to pay. Utilities have also been supportive for similar reasons as well as because renewable resources have costs not subject to the volatility of fossil fuel prices, which provides some price stability.

Essentially, three types of green electricity programs exist: contribution-based, capacity-based and energy-based (NREL 2001). In a contribution-based program, electricity consumers contribute voluntarily to a fund from which renewable electricity projects are financed. There is no relation between the contribution and the electricity generated from renewable resources or renewable electricity generating capacity installed.

In a capacity-based program, electricity consumers pay extra for the installation of a certain renewable electricity-generating capacity. There is a direct link between the contribution and the additional renewable electricity-generating capacity installed. For instance, in the United States, utilities offer to install an additional 100-watt PV capacity for consumers for a monthly premium of US\$6.

In an energy-based program, electricity consumers pay a certain premium for any kWh of renewable electricity they agree to purchase. The agreed amount can be a fixed percentage of electricity consumption or a fixed amount per month. The energy-based green electricity programs are, by far, the most popular among electricity consumers and vendors — this is the reason for SMG opting for an energy-based green electricity program. For this reason, the discussion in the remainder of the report will be limited to energy-based green electricity programs.

2. Green Electricity Market

Market Penetration

The first green electricity schemes were developed in the late 1980s. Since then, they have grown in number and size and are now operational in various countries around the world. The level of development and activity varies widely. Table 1.1 provides data on the market penetration of a number of selected countries with green electricity schemes.

Table 1.1: Selected Countries with Green Electricity Schemes

<i>Country</i>	<i>Start</i>	<i>Estimated Number of Consumers</i>	<i>Estimated Annual Green Electricity Sales</i>	<i>Share of Annual Total Electricity Consumption (%)</i>	<i>Estimated Number of Vendors or Utilities</i>
Australia	Mid-1990s	End 2003: 92,000 (residential 88,000, industrial 4,000)	2002/2003: 422 GWh	0.2	2003:12 under the Green Power Program
Netherlands	1995	End 2003: 2.4 million	End 2003: 7 TWh	7	2003: 25
United States	Mid-1990s	Total 2003: 267,000 (residential 260,000; non-residential 7,000)	Total 2003: 1.3 TWh (residential 0.4 TWh; non-residential 0.9 TWh)	0.03	2003: approximately 500; Green-e certified: 102

The total number of green electricity consumers in Europe is estimated at 4 million (Greenprices July 2004 estimate).

Market Conditions

Green electricity schemes are now operational in many countries in the world, including Australia, Canada, many countries in Europe, Japan and in the USA. Green electricity schemes have been successfully introduced and operated in both liberalized markets, where consumers can choose their electricity providers, and in

markets with a retail monopoly. In markets with a retail monopoly, utilities have offered green electricity products to show that they care about the environment and provide consumers the opportunity to opt for a more environmentally friendly product. In some cases, this may have been encouraged by the knowledge that introduction of retail competition was just a matter of time. In a liberalized market with retail competition, utilities may offer one or more green electricity products to keep existing consumers and attract others. Offering green electricity products may help to give utilities an environmental-friendly image, which may attract consumers, and this aspect is important.

The fact that green electricity schemes are operational all over the world indicates that everywhere electricity consumers can be found who are willing to pay more for electricity produced from environmental-friendly renewable resources. The key to success is the ability to find these consumers and offer them an appealing product. Starting small with the intention to expand the green electricity scheme if demand grows, offers the opportunity to find these consumers while minimizing the risk of introducing a green electricity scheme.

The ability to increase the number of green electricity consumers depends on a number of factors, including:

- the green electricity product offered;
- marketing efforts; and
- price of the green electricity product.

A number of countries have introduced financial incentives to reduce the incremental price of green electricity. These financial incentives can be production- or consumption-based. Production-based financial incentives reduce the production cost of renewable electricity and, therewith, consumers incremental price of green electricity. An example of this approach are the production subsidies provided by many states in the USA from the System Benefits Charge, collected from all electricity consumers' through a surcharge on the electricity price. Consumption-based financial incentives directly reduce the incremental price to consumers by, for instance, reducing the tax on renewable electricity. This approach was used in the Netherlands in the late 1990s when renewable electricity was exempted from the so-called Regulatory Energy Tax. The incentive was big enough to allow green electricity, consisting of 100 percent renewable electricity, to be sold at the same price as ordinary or grey electricity. An undesirable side effect was that this did not lead to increased renewable electricity production in the Netherlands, but mainly increased import of renewable electricity with an associated flow of tax money abroad. In 2003, the consumption-based incentive was replaced by a production-based incentive, in which production of renewable electricity in the Netherlands was subsidized from the environment-quality of electricity production charge, which is €52 per year for each connection (2005 and 2006). The subsidy is sufficient for many utilities to continue offering green electricity at the same price as grey electricity.

Target Consumers

Target consumers can be divided in two main groups: residential and non-residential consumers. A green electricity scheme can specifically target residential consumers, non-residential consumers or both. In general, non-residential consumers make larger green electricity sales than residential consumers. The marketing cost, however, of green electricity to non-residential consumers tends to be higher than to residential consumers. Still, on a kWh basis, the marketing cost to non-residential consumers will be lower. Selling green electricity to large non-residential consumers also has a secondary marketing value. The promotion of large consumers of their purchasing green electricity can raise public awareness on green electricity, legitimize the choice by others and encourage residential and other non-residential consumers to buy green power.

3. Framework

Green electricity consumers buy green electricity on a voluntary basis, making a conscious choice to contribute to improving the environment. It is purely a market-based transaction. However, to protect and provide assurances to consumers, legal and regulatory frameworks have been established to manage the market. Frameworks can be established by the government — through law or regulation — or by NGOs by certifying or labeling green electricity products (see Annex 1 for terms and definitions). The extent of the framework varies among participants and locations, but usually includes standards on all or most of the following:

- Eligible RE sources
- Location of production — domestic or imported
- Age of the production facility
- Minimum content of ‘new’ renewable electricity
- The one-for-one requirement — the requirement that for each kWh of renewable electricity sold in a green electricity product, 1 kWh renewable electricity is produced or purchased by the vendor
- Settlement period
- Method of balancing
- Additionality — the stipulation that only renewable electricity beyond any legal requirement can be included in green electricity products
- Minimum RE requirements for green electricity products
- Requirements for product disclosure to consumers
- Emission benefits included in renewable electricity
- Product name
- Use of framework name and logo
- Requirements for verification and certification

Eligible renewable energy sources

Specifying the eligible energy sources is important to maintain the positive environmental image of green electricity. By specifying the eligible sources, undesirable or controversial resources can be excluded because they are socially or environmentally unacceptable. For example, technologies that deal with the combustion of municipal solid waste are particularly controversial when considered as RE. In addition, large-scale

hydropower projects are not accepted by many consumers or regulators because of their perceived significant environmental impacts outside of considerations involving energy. RE sources can also be excluded because they are not available in that specific country — an example is geothermal power in the Netherlands.

Table 1.2 provides eligible RE sources specified by two governments — Australia and the Netherlands — and by two NGOs — Green-e (The Green-e Renewable Energy Certification Program) and Eugene.

Table 1.2: Eligible RE Sources

	<i>Australia</i>	<i>Netherlands</i>	<i>Green-e</i>	<i>Eugene</i>
Wind	Y	Y	Y	Y
PV	Y	Y	Y	Y
Hydro	Y	Y <15 MW	Y <30 MW ^a	Y
Geothermal	Y	N	Y	Y
Wave and tidal	Y	N	Y	N
Biomass-fueled power stations	Y	Y	Y	Y
Energy crops	Y	Y	Y	Y
Clean wood and agricultural wastes	Y	Y	Y	Y
Landfill gas	Y	Y	Y	N
Municipal solid waste incineration	N	Y	N	N
Municipal solid waste gasification or pyrolysis	Y	Y	N	N
Sewage gas	Y	Y	N	Y

Y: eligible; N: not eligible.

a. Green-e also allows hydropower facilities certified by the Low Impact Hydropower Institute (LIHI, www.lowimpacthydro.org.)

Note: Green-e is a non-governmental green electricity certification program based in the United States. For more information, see www.green-e.org. Eugene is a European initiative to harmonize the European Green Electricity Labels. It is managed by the World Wildlife Fund (WWF) and the Öko-Institut in Germany. For more information, see www.eugenestandard.org.

Location of production

The framework can specify whether renewable electricity must be produced locally — and what is defined as local — or whether imports are allowed. When the intention is to stimulate domestic production, the framework can specify that only locally produced renewable electricity can be used in green electricity products. However, if the potential for domestic renewable electricity production is limited, imports will be needed as demand grows. For instance, the OK Power framework in Germany specifically allows imports.

Age of the production facility

Consumers buy renewable electricity because they want to contribute to a cleaner environment. When renewable electricity is sold only from existing production facilities that have been in use for many years or decades, no additional environmental benefit is provided by the purchase of green power. Many of the green electricity frameworks, therefore, specify that the renewable electricity production facilities cannot be older than a certain age. Typically, the generation built after a certain year is considered 'new' generation. This specification provides consumers with assurances that participation in the green electricity scheme will result in the development of additional renewable electricity capacity and production. In several places around the world, renewable resources that were put into use since 1997 are considered 'new'.

Minimum content of 'new' renewable electricity

Some frameworks allow some 'old' renewable electricity to be included in green electricity products. The reason for this might be that insufficient 'new' renewable electricity is produced or that some transition period must be allowed. If 'old' renewable electricity is included, its share is normally limited by specifying the minimum amount of 'new' renewable electricity in green electricity. Further, the minimum amount of 'new' renewable electricity is often increased over time to slowly phase out any 'old' renewable electricity and to encourage the construction of 'new' facilities. When old facilities are rehabilitated, only electricity generated from the incremental production capacity or the electricity generated above a certain amount¹ is considered new.

An example of this requirement is that the Australian Government's green power program specifies that 80 percent of renewable electricity must come from generators that first sold electricity after January 1, 1997.

The one-for-one requirement

In order to establish and maintain consumer trust in green electricity products, frameworks normally require that for each kilowatt-hour of renewable electricity in a green electricity product sold to a consumer, the vendor has also generated or purchased 1 kWh of renewable electricity.² An independent party normally verifies this requirement. In the Netherlands, the Government guarantees that this requirement is met for all green electricity products sold in the country. The Government of Australia guarantees that this is true for all products certified by the Green Power Accreditation Program. In the United States, the Green-e program verifies that Green-e-certified products have fulfilled this requirement. Vendors offering green electricity under these frameworks assure consumers that they meet the one-for-one requirement and that this is guaranteed and controlled by the framework (by the Government in the case of the Netherlands and Australia and by Green-e in the case of United States).

¹ The amount is based on production in previous years, for instance, the average of the last three years before rehabilitation.

² One thousand kWh of a green electricity product containing 60 percent renewable electricity requires the production of 600 kWh of renewable electricity.

Settlement period

One element of the one-for-one requirement is that an additional specification is required to stipulate the settlement period, or the time frame in which the requirement must be met. At the end of the settlement period, accounts are examined, and the surplus or deficit is determined. For many programs, the settlement period is one calendar year ending on December 31. However, shorter or longer periods can be specified, depending upon the degree of flexibility that authorities wish to offer vendors of RE. Longer settlement periods may reduce confidence in the scheme because it takes longer to demonstrate how any deficit will be compensated.

Method of balancing

The amount of renewable electricity bought, generated and sold during the settlement period — assumed to be a calendar year — will normally fluctuate. This fluctuation will make it virtually impossible to sell exactly the same amount as is purchased and generated. Thus, at the end of the year, one among the two possible circumstances may exist:

- (a) Less is sold than is generated and purchased—a positive balance or surplus.
- (b) More is sold than is generated and purchased—a negative balance or deficit.

In order to meet the requirements and bring the accounts into balance, the framework allows several options. When there is a positive balance, part of the surplus in year N can be transferred to year N+1. The maximum transferable amount can be specified as a percentage of renewable electricity sales in year N. When there is a negative balance, three options are available:

- (b)(1) The deficit must be balanced through the purchase of green certificates.
- (b)(2) The full deficit of year N must be carried forward to year N+1 and added to the renewable electricity consumption of year N+1.
- (b)(3) The full deficit of year N must be carried forward to year N+1 and be bought or generated within a certain period (three or four months).

Options (b)(2) and (b)(3) are very similar. The only difference is that in option (b)(2), a full year is allowed in which to make up for the deficit, whereas in option (b)(3), the previous year's deficit needs to be compensated in the first three or four months of the following year.

The additional renewable electricity required in year N+1 can be obtained by increasing one's own renewable electricity production, purchase of renewable electricity from others, or purchase of renewable electricity attributes, either using a formal green certificate system or through separate contracts with parties selling the renewable electricity attributes.

Additionality

As described earlier in this section, a number of governments have introduced a legal obligation to produce, sell or buy renewable electricity in order to promote the development and growth of renewable electricity markets. The two best known examples are the Renewable Portfolio Standard (RPS) and the Feed-in-Law. Under an RPS, the obligation holder is required by law to produce, sell or buy a certain percentage of renewable electricity. Under a feed-in system, the utility is required by law to buy renewable electricity at a specified tariff.

In countries where these policies are in place, voluntary green electricity consumers want to be sure that their contribution leads to the development of additional renewable electricity generation. Under an RPS, consumers want to be sure that their contribution is not used to meet the legal obligation. Under a Feed-in-Law, consumers want to be sure that their contribution is not used to reduce the cost for the utility or increase the profit of the producers. *Therefore, the condition of additionality is important.* It stipulates that the renewable electricity used in green electricity products must be additional to any legal obligation concerning the production, consumption or purchase of electricity. Most frameworks have this additionality requirement.

In the case of a Feed-in-Law, only renewable electricity can be included in green electricity for which the received tariff is insufficient to cover the incremental cost, regardless of whether this is the normal tariff or a feed-in-tariff.

Minimum renewable energy requirements for green electricity products

To ensure that the product is indeed better for the environment than other electricity products, some frameworks specify a required minimum content of renewable electricity. There is often some flexibility, which allows utilities and vendors to offer multiple green power products with varying amounts of RE. For example, a minimum requirement may be 50 percent, where a seller may create a product that is five percent solar and 45 percent wind, and the rest is either an undifferentiated system mix or from some non-renewable source. The non-renewable electricity portion may also be required to have cleaner emissions than the average emissions from the power plant in the power pool, state or country.

Requirements for product disclosure to consumers

Transparency is an important aspect of any green electricity plan. This means that consumers must not only receive the information required to make an informed decision to buy green electricity, but that they must at least be annually assured of the content in their product. To achieve this, frameworks often specify which

information on the green electricity product needs to be provided to the consumers. This can include the following:

- (a) Amount of renewable electricity in the product.
- (b) Sources of renewable electricity production (fuels, technologies and location).
- (c) Pricing.
- (d) Method of invoicing.
- (e) Term — length of contract and rules for renewal and withdrawal.

Common practice around the world is to seek disclosure of this information for each green electricity product.

Emission benefits included in renewable electricity

When consumers purchase a green power product, they may wonder about the exact nature of the product, as well as the ownership and trading rights. In the sale of conventional electricity, the consumer buys electricity to run a facility. In the case of green power, consumers may also be able to own the environmental attributes of the less or non-polluting energy.

When separating the components of renewable electricity into physical electricity and the attribute, the attribute will represent all the environmental benefits of renewable electricity. (The concept of separation of renewable electricity into physical electricity and the attribute is presented in Annex 2.) The attribute can be further separated into specific environmental benefits, which can be sold, traded or retired separately. Separated environmental benefits could include CO₂, NO₂, SO₂, and others. Consumers may own all, some or none of these benefits. To avoid confusion, double-counting and misuse, some frameworks specify which benefits are included in green electricity. Frameworks may also specify whether emission benefits can or cannot be separated.

Product name

Some frameworks provide requirements that products which are developed under the framework have a clear and identifiable name that is specific to the product sold and/or indicative of an environmental-friendly program or product. The degree to which the product name requirements are specified varies considerably among frameworks.

Use of framework name and logo

If the framework is successful, vendors who are selling RE under the framework, as well as entities who are purchasing RE under the framework, will be interested in using the framework's name and logo to promote

their official environmental concern and to associate their product and organization with a well known and trusted name and source.

Guidelines have often been developed in advance to adoption of the framework to regulate how consumers and vendors may use the framework's name and logo. This is necessary to protect the integrity and identity of the framework, to prevent the misuse of the framework name or logo or both and to provide a means to discipline organizations that misuse the framework's name and logo. These guidelines should specify the types of statements that can be made concerning a retail product or purchase, and where and in what context vendors and purchasers can use the logo.

For example, the Green-e program allows consumers to make statements about their Green-e certification and to use the Green-e logo. Green-e has developed a set of rules and signs an agreement with an interested party before it can use the Green-e name or logo.

Requirements for verification and certification

A common requirement of green electricity frameworks around the world is that an independent verification of green electricity products exists to ensure that the products are meeting the requirements set forth under the framework. Such information as the amount of renewable electricity purchased and sold, and the renewable electricity generation sources, along with supporting evidence, must be made available to the independent verification body to perform this check. Further discussion in Chapter 5 deals specifically with verification and certification.

Summary of framework standards

The different frameworks used in countries around the world or in particular programs tend to differ with respect to the details of what is required and what is permitted in a green electricity scheme. However, the similarities are greater in what general requirements are specified under each framework. This is true for two reasons. The first is that a certain number of core concerns are essential to the effective implementation of a green electricity plan and, regardless of the program or country, these items must be addressed. Second, the field of RE represents a new and untested market in most places. When a new initiative is engaged, it is common practice for those designing and managing the initiative to study the successes and failures of preceding initiatives, and to adopt successful ideas and practices to their local conditions.

For example, this report presents the results of the review carried out during the preparation of the green electricity framework for the Shanghai Municipality. Table 1.3 provides a detailed summary of the Australian Green Power framework standards. Additional framework standards are provided in Annex 3.

Table 1.3: Summary of Australian Green Power Framework Standards

**Green Power
Australia**

Framework Name and Logo**Green Power**

In 1997, the Sustainable Energy Development Authority (SEDA) in New South Wales established the Green Power Accreditation Program to certify green electricity products. The program was developed in consultation with several stakeholders, including the electricity industry and a variety of NGOs. The intent behind establishing the program was to promote the installation of new renewable electricity generation by increasing consumer demand and confidence in green power products. In May 2000, the program was expanded across all of Australia and was renamed the National Green Power Accreditation Program (NGPAP). The National Green Power Accreditation Steering Group (NGPASG) was established to manage the program, and SEDA was appointed Project Manager. SEDA administers the program on behalf of the NGPASG, which is formally supervising the program. NGPASG comprise representatives from state government agencies from across Australia, including representatives from New South Wales, Victoria and Queensland.

Eligible RE Sources

In Australia, *green electricity* and *renewable electricity* are synonymous. Only renewable electricity from renewable electricity generators approved by the Green Power Project Manager can be used in green electricity under the Green Power program. All renewable electricity projects are individually assessed. The following RE sources can be included: PV, solar thermal electric systems, wind, hydro, biomass-fueled power stations, geothermal, wave and tidal power stations. Explicitly excluded are: use of unsustainable grown biomass, wastes (including municipal solid wastes); hydro projects requiring new dam construction that results in large-scale flooding of ecosystems; and hydro projects, which involve major diversion of rivers and do not adequately allow for environmental flows.

Location of Production (domestic or imported)

This is not specified, but since only renewable electricity from approved generators can be used in green electricity sold under the Green Power program, it is assumed that only domestically produced renewable electricity can be used.

Age of the Production Facility

Green electricity is considered to be generated from a new facility if the facility has been commissioned or first sold energy (whichever is earlier) after January 1, 1997. This rule also applies to an increase of generator capacity.

Minimum Content of 'New' Renewable Electricity

Vendors must source a minimum level of 80 percent of total accredited Green Power generation sold through their Green Power Products from 'new' Green Power generation.

One-for-one

Vendors must prove that within the settlement period, they bought the same or more renewable electricity certificates as renewable electricity included in their green electricity products.

Settlement Period

One year from January 1 through December 31.

Balancing

It should be noted that Australia has a system of green certificates which can be used for balancing. Vendors are required to transfer the required number of green certificates within eight weeks of the end of the settlement period. It is considered a serious breach of accreditation if demand is not met during the settlement period (if there is a deficit). Vendors can, at most, carry over to the next settlement period a surplus of 5 percent. If in year N, 5,000 certificates are required, at the most 250 surplus certificates can be carried over to year N+1. Additional surplus certificates will become invalid.

Additionality

Required

Minimum RE Requirement

Vendors are allowed to blend green electricity with 'non-green' electricity. There is no minimum amount of renewable electricity specified.

However, the minimum amount of renewable electricity is one of the criteria for licensing consumers to use the Green Power logo. The share depends on total electricity consumption. Details are given in the table.

<i>Annual Electricity Consumption</i>	<i>Minimum Share Renewable Electricity</i>
> 40 GWh	2.5%
>20 GWh	5%
> 4 GWh	10%
>750 MWh	25%
> 160 MWh	50%
< 160 MWh	75%

Requirement for Product Disclosure

Vendors need to provide all consumers, during consumers subscription and agreement fulfillment period, with contract pricing and terms and conditions written in clear, simple and easily understandable terms; and make the following information available to new and potential consumers at their request:

- Generator names and types for each Green Power Product;
 - Historical percentage of energy by type of generation for each Green Power Product;
 - Historical percentage of new generation (by energy) for each Green Power Product;
 - The typical energy price range for each generation type.
-

Emission Benefits

This is arranged by the green certificate system.

Product Name

The Green Power program accredits products and not vendors. For each product, the vendor needs to make a separate application. The application requires specifying the Green Power Product name. No further requirements are specified.

Use of Framework Name and Logo

To build recognition, four logos have been developed. These are logos for: Green Power Product; Consumers; Green Power Generators and Green Power Events. Detailed procedures are established for licensing the use of the different logos. This includes qualification criteria, application forms and licensing agreements.

Requirements for Verification and Certification

Vendors need to submit each year four quarterly reports using a standard format. The quarterly reports need to be submitted within one month of the end of the quarter. As part of a biannual compliance review, marketing materials are to be submitted by vendors with their June Quarterly report and as part of the December Annual Audit process. The Annual Technical Report is to be provided to the Project Manager within three months of the end of the settlement period. Also, for this report, a standard format has been developed.

Note: This summary is based on the Green Power Accreditation Document, Version 3.1, August 2003.

4. Product Characteristics

Green electricity products can be developed under the established market framework. If the market framework is restrictive, very similar products will emerge. A market framework that provides more flexibility will lead to a wider range of products and greater competition. This can mean greater sales and greater installation of RE systems. The most important characteristics of green electricity products are as follows:

- Target consumers;
- Product name and logo;
- Product type;
- Renewable electricity sources used;
- Amount of renewable electricity;
- Pricing;
- Invoicing;
- Term — length of contract and rules for renewal and withdrawal;
- Consumer value; and
- Labeling.

Each of these characteristics is discussed in details below. Table 1.4 provides as an illustration the product characteristics of a specific green electricity product. Additional product characteristic summaries incorporating the characteristics described below are presented in Annex 4.

Designing a green electricity product requires consideration of the above characteristics. Vendors typically have taken one of two different approaches: (a) conducting a detailed market survey to design and launch the product on a large scale; or (b) designing a product based on existing knowledge of the market, starting marketing on a small scale to test the product in the market, next modifying, if required, and launching the marketing of the product on a large scale. The first approach is faster, whereas the second approach has lower risk.

Target Consumers

Green electricity products are designed with target consumers in mind, the two main categories of which are households and non-residential consumers (commercial, industrial, educational and Government). Some companies target residential consumers, while others focus on a specific segment of the non-residential consumer market, such as colleges and universities or large industrial users with high credit ratings.

For example, Austin Energy, based in the United States, allows large energy consumers to enter into fixed five-year contracts that allow for price predictability. In the Netherlands, Nuon offers non-household consumers two products: Greenstep and Greenpower. Households can choose between Nuon Groenstroom and Natuurstroom. Customizing renewable electricity products to meet the needs of large, non-residential consumers encourages the development of renewable electricity products that meet the needs of both the renewable electricity vendor and the purchaser. This ‘tailoring’ of green electricity products is not practical for small residential sales.

Product Name and Logo

The product name and logo can strongly support the sale of a product when properly designed, tested and selected. The product name and logo can be designed to appeal to different audiences, values or tastes. The language and imagery chosen will reflect the particular value that is expected to be most appealing to consumers. These items can embody green values characterized by the non-polluting nature of wind and solar PV technologies. For example, Community Energy and Minnesota Power in the United States uses wind turbines in their logos, while TXU of Australia uses an image of the sun.

The product name and logo can appeal to other values as well. Similar to the green values that can be chosen are names and logos that embody the idea of conservation. For example, rather than emphasizing on clean air, the name and logo can focus on preserving natural resources for future generations. The Tennessee Valley Authority (TVA) and Alliant Energy used variations on this theme in designing their logos.

It is important to correctly identify the values of the target consumers in the design of the logo. In addition, it is helpful to test different logos with a sample of the target audience to collect feedback and make the appropriate alterations.

If suppliers offer more than one green electricity product, it is preferable to have different names and logos to make them easily recognizable and to avoid confusion. Some companies, however, choose to provide different products under the same logo with differentiated names. Some suppliers do not have a product logo; rather, they use only the framework logo to promote their product — for instance, the Australian Green Power or Green-e logo.

Nuon of the Netherlands offers two products for households: Natuurstroom (mainly wind) and Groenstroom (mainly biomass). Only the first product has its own product logo. Origin Energy of Australia offers four products: Green Earth (20 percent wind, 80 percent hydro); Green Earth Extra (50 percent wind, 50 percent hydro); Green Earth Wind (100 percent wind); and Green Earth Solar (100 percent solar). Origin Energy does not have a separate logo for its products, although its products are certified under the Green Power Program. Origin Energy also offers Blue Wind Energy, which is a 100 percent wind green electricity product. This product has its own logo, but is not Green Power certified.

Product Type

Vendors offer two main types of green electricity products: delivered electricity products and attribute-based products.³ Delivered electricity products include both the physical electricity and the attribute. In attribute-based green electricity products, only the attribute is sold. Buying a 1 kWh renewable electricity attribute and from another vendor (the utility) 1 kWh of normal electricity is the same as buying 1 kWh of 100 percent renewable electricity as delivered energy. Attribute-based products offer the opportunity to sell green electricity independently from the utility delivering the physical electricity. At present, the delivered electricity-type green electricity products are most common.

For delivered electricity product types, many different agreements can be made with the green electricity consumers concerning the amount of renewable electricity purchased. Following are the four basic agreements:

- Percentage of electricity to be used (100 percent or less).
- Fixed amount or block of electricity.
- Percentage increase in electricity bill.
- Fixed increase in electricity bill.

Green electricity consumers can agree to buy a certain percentage of their electricity consumption as renewable electricity. To achieve this, vendors normally offer a green electricity product that contains the agreed amount of renewable electricity, while the balance comes from other sources. Consumers switch from their gray product completely to the green electricity product. The price of the green electricity product is normally higher than that of gray electricity because it includes the incremental cost of the renewable electricity. Consumers can normally choose from among a limited number of products with different percentages of renewable electricity, including the special case of a 100 percent renewable electricity product.

In a fixed amount or block type product, electricity consumers agree to purchase a specific amount of renewable electricity, normally in monthly equal amounts. For the agreed amount of renewable electricity,

³ The concept of separating renewable electricity into the physical electricity and the environmental attribute is presented in Annex 2.

a premium needs to be paid, which includes the incremental cost of renewable electricity. To avoid very small transactions, the vendor can establish a minimum amount that needs to be purchased.

Consumers can also agree to increase their electricity bill with a fixed percentage. The increase will be used to purchase renewable electricity by covering the cost of the attribute. The vendor will inform consumers on a monthly or annual basis how much renewable electricity was purchased with the incremental payment. This type of product should not be confused with the contribution-type green electricity programs discussed in Chapter 1. In contribution-type green electricity programs, there is no relation between the contribution and renewable electricity generation. In an energy-based green electricity program, the increase of electricity bill is used to cover the incremental cost of renewable electricity. There is, thus, a direct relation between the increase in the electricity bill and the renewable electricity generated. Instead of increasing the electricity bill with a fixed percentage, it is also possible to increase the electricity supply with a fixed monthly amount.

The percentage-type product is, by far, the most common, followed by block-type products. The other products are not very common. For attribute-type products, options (b) and (d) are most suitable because they do not require information on electricity consumption.

Renewable Electricity Sources Used

Renewable electricity sources are an extremely important aspect to consider when designing a RE product. This includes renewable electricity technologies, the age of the production facilities ('old' versus 'new'), and the location of production (local versus imported). In deciding these aspects, the vendor must consider the following questions:

- What will the target consumer find most attractive?
- What does the framework allow?
- What makes business sense?

A variety of RE resources can be used to produce renewable electricity. Not all renewable electricity technologies are equally valued. Solar and wind are perceived most favorably by most consumers, but their generation costs are often above market for wind and can be very high for solar. Other technologies, such as biomass and biogas, can allow for less expensive RE production, but they have drawbacks as well. Biomass and biogas are not emission-free, and their use might be controversial if possibly polluting waste materials are used (chemically treated wood or methane from landfills). Even small hydropower can be controversial if the systems do not allow the passage of migrating fish or if they result in large losses of habitat because of the size of the impoundment. In the Netherlands, Nuon offers two green electricity products to households. One is considered "dark green", because it contains no biomass or biogas — just wind, PV and small-scale hydropower, some of the cleanest technologies available. Although this product is more expensive, it attracts consumers because of the environmental attributes it embodies. The other product is considered lighter green, but attracts consumers for its lower price.

The location and age of the generating facility can also help or hurt in the marketing of a product. New energy sources can be used to promote local benefits such as increased employment, new investment and cleaner air. Therefore, Green Power Products that include electricity from new and locally sourced generation plants are likely to be met with greater acceptance. In addition, consumers will be able to see and visit the production units which makes green electricity more tangible and acceptable. For example, one of the most successful programs in the United States is Green Choice, provided by Austin Energy of Texas. The company acquires RE that is produced only in its home state. Eighty-one percent of the Green Power Austin Energy uses comes from new wind energy generated by 61 wind turbines located in West Texas, and 18 percent of the Green Power is supplied by a biogas plant near San Antonio, Texas. An additional 28 small solar panel installations in Austin supply Green Power to the utility. This is not the only element that contributes to Austin Energy's success, but it is an important part of the overall package they offer to their consumers.

Finally, doing market research with consumers will ultimately help the vendor choose which resources to utilize.

Amount of Renewable Electricity

After determining the eligible generation sources (technology, location and age), a decision needs to be made on the percentage content of renewable electricity to be included in the green electricity product. A product does not need to be 100 percent renewable electricity, and, in fact, many successful products contain a smaller percentage of renewable electricity to keep incremental costs low and prices affordable. A variety of products may be offered to consumers with different proportions of renewable electricity. This allows consumers to choose how much renewable electricity they wish to purchase. This type of choice is made even clearer with products that offer RE in blocks, a structure that is more common in the United States. Consumers simply choose the number of blocks they purchase. *Programs offering consumers a choice have proved to be more successful than programs that offer fewer choices to consumers.*

For example, at the moment, Pepco Energy Services offers five green electricity products in the Mid-Atlantic region. Initially, Pepco Energy Services offered only one product: PowerChoice® 100 percent Renewable Electricity. The available amount was sold to 2,000 consumers. To reduce the incremental cost, Pepco Energy Services began offering PowerChoice® 51 percent Renewable Electricity, which became more popular and reduced the demand for the 100 percent renewable electricity product. Later, Pepco Energy Services also introduced PowerChoice® 10 percent Renewable Electricity to increase the amount of renewable electricity sold and to provide consumers with more choice. To increase consumer choice further, Pepco Energy Services now also offers NewWind Energy 51 percent™ and NewWind Energy 100 percent™. In the Washington, D.C., area, the cost varies from US\$0.0836 for 10 percent Renewable Electricity to US\$0.1017 for NewWind Energy 100 percent™ per kWh for residential and small business consumers (March 2005).

Pricing

The most common pricing mechanism

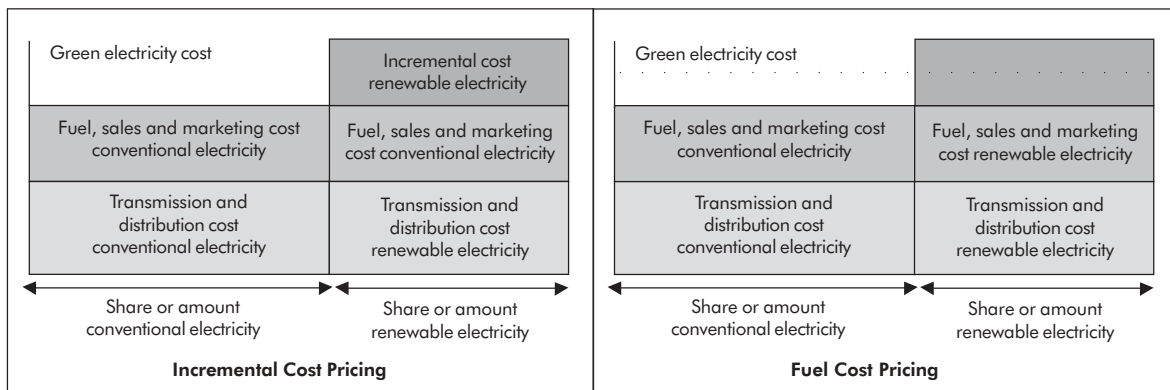
The price of a green electricity product includes the cost of delivering the product, along with a profit margin. The ability of a vendor of green electricity to operate profitably depends on the market. In some cases where competition is limited, profit margins have been substantial. In other markets, intense competition has resulted in competitively priced green electricity products and substantial consumer choice.

The cost of delivering electricity comprises the cost of generation, transmission, distribution, sales and marketing. Assuming that the cost of transmission and distribution of renewable and conventional electricity are the same (which is roughly correct), the difference in the cost of delivering conventional and renewable electricity is the difference in generation or 'fuel cost' and the cost of selling and marketing. This difference is the incremental cost of renewable electricity. The cost of delivering a green electricity product that comprises some share or amount of renewable electricity and conventional electricity can be calculated in two different ways (see Figure 1.1):

- The cost of transmission and distribution, and the fuel, sales and marketing cost of conventional electricity for the full delivered amount plus the incremental cost of the RE share or amount (incremental cost pricing); or
- The cost of transmission and distribution for the full amount plus the fuel, sales and marketing cost of the conventional share or amount plus the fuel, sales and marketing cost of the renewable electricity share or amount (fuel cost pricing).

The first is the most common pricing mechanism.

Figure 1.1: Green Electricity Pricing Mechanisms



Vendors offering a block-type product normally quote the premium for a specific block size. For instance, Nova Scotia Power of Canada offers monthly blocks of 125 kWh of wind electricity at a premium of Can\$5.00 per block. ActewAGL of Australia offers Greenchoice 5, which consists of a daily block of 5 kWh at a premium of Aus\$0.25 (ActewAGL also offers Greenchoice 10 and 15). TVA of the United States offers monthly blocks of 150 kWh at a premium of US\$4.00 per block under the Green Switch program.

Vendors of products with a specified percentage of renewable electricity (percentage-type products) normally offer the products at a premium per kWh. This requires averaging the premium of the renewable electricity share over the total. Examples are AGL of Australia, which offers AGL Green Energy™ 10 percent at a premium over the normal tariff of Aus\$0.0066 per kilowatt-hour, 25 percent at Aus\$0.0143 per kWh, and 50 percent at Aus\$0.0275 per kWh, and Alliant Energy of the United States, which offers Second Nature™ 25 percent at a premium of US\$0.005 per kWh and 50 percent at a premium of US\$0.01 per kWh.

As an incentive for consumers to enter into longer-term contracts or to buy larger quantities, premiums can be made dependent on the length of the contract or the amount contracted. This can be done for both block- and percentage-type products.

A drawback of the first pricing mechanism is that if the incremental cost of renewable electricity is not readjusted at regular intervals, the consumers will pay too much for their green electricity during periods when the cost of conventional electricity increases, and will pay too little with decreasing costs in conventional electricity. In particular, consumers buying a 100 percent renewable electricity product would feel wronged if the price of electricity increased along with increases in the fuel costs for conventional electricity.

Alternative pricing mechanisms

There are a number of alternative pricing mechanisms, two of which are described here.

Green Choice®, the green electricity program of Austin Energy of the United States, offers consumers the possibility to buy up to 100 percent of their electricity consumption from new wind projects. Austin Energy offers its consumers a 10-year contract to fix the fuel charge for the green electricity portion at US\$0.033 per kWh, whereas the fuel charge for the conventional part will fluctuate. At the moment, the fuel price of the conventional portion is US\$0.028 per kWh, whereas the non-fuel portion is US\$0.063 per kWh (excluding tax and with a consumption of 1,000 kWh per month). This pricing mechanism may provide green electricity consumers with savings when the renewable electricity fuel charge is lower than the conventional electricity fuel charge. This has been the case in the past and is likely to be the case in the future. This pricing mechanism can be applied to both block- and percentage-type products.

The Sacramento Municipal Utility District (SMUD) of the United States offers residential consumers Greenergy® 50 percent, a 50 percent renewable electricity product, and Greenergy® 100 percent, a 100 percent renewable electricity product, at respective premiums of US\$3.00 and US\$6.00 per month, independent of electricity consumption. This is based on average consumption of SMUD residential consumers of 748 kWh per month. Although this pricing mechanism is very simple, it means that consumers who consume little pay more for their share of green electricity than consumers who consume more.

Invoicing

The cost of green electricity can be included on a monthly utility bill or a separate bill that comes monthly, quarterly or annually. By far, the most common and most convenient method for household consumers is to include the costs on the regular monthly bill. Typically, it is only with non-utility-based programs that a separate bill is used. Community Energy in the United States, which is not tied to any single utility and instead sells renewable electricity attributes throughout the country, uses such a system. Utilities, by contrast, are able to integrate green electricity charges in their billing statements, which show the green electricity purchase as one part of the total monthly charges.

Term

The terms of a sale involve the length of the contract between the green electricity vendor and the consumer and the ability of a consumer to withdraw from the plan. The terms can drastically impact the time and money needed to implement sales and marketing efforts, and they can affect the cost of selling and administering a product. Many of the plans, currently in effect, have no contract term and allow consumers the option of entering or exiting the program at any time. This adds to the element of choice that consumers prefer.

Some green electricity vendors use a different approach and enter into contracts ranging from one to 20 years with their consumers. Some of these approaches have been very successful because long-term contracts can include financial incentives for consumers. Some consumers prefer the financial benefit over the ability to quickly exit the program. This holds especially true for commercial and industrial consumers. The result has been that companies using longer-term contracts with consumers are able to garner more consumers, sell more MWh, and keep administrative and sales costs low, because both the vendor and the consumer benefit from the stability provided by the contract. Concurrently, these long-term contracts can provide for lower financing costs and greater stability for new RE projects as well. As noted in the section on pricing, it is possible to link financial incentives to the terms of a contract.

Another possibility is requiring a minimum initial subscription period of three, six, 12 or 24 months for residential consumers. After the initial subscription period, two options for continuation are available:

- The subscription becomes open-ended. The contract can be ended any time (the most common practice worldwide); and
- Automatic extension by a certain period (for instance, a year) if no written notice to end participation is received.

Consumer Value

Consumers of green electricity are able to realize a number of benefits from their purchases. First of all, the value of this product can be found in the tangible benefit of a cleaner environment, both locally and globally. A related benefit is an increased sense of satisfaction among consumers, both with the electricity they buy and the utility they buy it from. Many consumers will take advantage of the opportunity, if offered, to make a positive change that can be felt in their own communities and in the larger global environment, as long as the effort is not too complicated or too expensive.

For large energy users, such as commercial and industrial institutions, Green Power also provides public relations benefits. Public opinion tends to overwhelmingly support clean renewable power, and businesses can capitalize on this by publicizing their purchases of green electricity to consumers, investors, employees, government agencies including regulators, and organizations around the world. Several companies have implemented successful marketing strategies based on their purchase of Green Power. A good example is British Telecommunication (BT), which, in 2004, proudly announced its decision to purchase from Npower annually 0.4 Terawatt-hour (TWh) green electricity, produced from a range of sources including wind and hydro. This covers about 20 percent of BT's annual electricity consumption. Rabobank of the Netherlands committed to use from 2005 onwards 100 percent wind electricity produced from wind farms it green-financed to cover its annual electricity demand of 180 GWh. Both press releases can be found on the companies' Internet sites.

A final benefit to consumers, and one that has been referred to often in this report, is the direct financial incentive that can be offered in the form of price stability or even price reductions. This is the most significant direct benefit that consumers can receive from green electricity, and it is one that all consumers wish to take advantage of whenever possible. For example, in the UK, cost savings are possible by switching from conventional electricity to green electricity as green electricity is exempted from the Climate Change Levy introduced in April 2001. In the Netherlands, green electricity from Oxxio, mainly from hydro, is cheaper than gray electricity from all but one supplier. Consumers of Austin Energy's GreenChoice now pay less for green electricity than what others pay for gray electricity. GreenChoice consumers pay a fixed-price green rate of currently 3.5 US cents per kWh, which substitutes the utility's fluctuating fuel charge which is at present 3.634 US cents per kWh. The program has become so popular that the city has been forced to implement a lottery for its consumers 'to win entry' into the program. The price advantage of using green electricity is even greater for Xcel Energy's Windsource consumers in Colorado who pay 0.66 US cents less for wind electricity than for regular electricity because of an increase in the utility's energy cost adjustment. Since the announcement, Xcel has sold out its remaining available wind electricity and has prepared a waiting list for new program sign-ups.

To increase consumer value, vendors help the users profile themselves as environmental consumers. This can be done in many ways. To increase consumer value for household consumers, the vendor can provide them with information related to the green electricity scheme. This can be in the form of a newsletter describing the renewable electricity projects that supply renewable electricity for the green electricity products they use or in the form of stickers to show participation. Increasing consumer value for large non-household consumers can be done by advertising their participation in newsletters and on product websites. Establishing a list of the largest top 25 commercial consumers increases the consumer value for those companies and may encourage others to get on the list. To increase consumer value for its large consumers, Nuon of the Netherlands offers the possibility of establishing a 2 kWp PV unit at the consumer's location when they sign a long-term green electricity contract. This attractively styled unit is paid for and owned by Nuon. Although it supplies electricity to the grid, it is placed at the consumer's location to visibly profile the environmental consciousness of the consumer.

Labeling

A final product characteristic is whether or not the product has a label, such as Green-e, Eugene, Environmental Choice or Australia Green Power. Having a label will increase consumer confidence in the product and assure that the contribution is used for its intended purpose. It is important to note that the above are some of the oldest and most respected labeling programs. With the development of the green electricity market, additional labeling programs are being introduced.

Summary of Product Characteristics

An example of how the above characteristics are specified for a particular green electricity product is given in Table 1.4. The example used is Natuurstroom offered by Nuon of the Netherlands. Additional examples are given in Annex 4.

Table 1.4: Product Characteristics of Natuurstroom offered by Nuon of the Netherlands

Vendor: Nuon (Netherlands)

Target Consumers

Households and large commercial consumers.

Product Name and Logo

Natuurstroom: Schone Stroom uit Zon, Wind en Water

Green electricity (nature electricity): Clean electricity from sun, wind and water.

**Product Type**

Delivered electricity type, 100 percent green electricity product.

Content

100 percent renewable electricity from PV, wind and small hydro. Only from systems constructed after 1995.

The share of the different sources varies, but is reported annually in audited accounts.

In 2001: PV 2 percent; wind 52 percent; and small hydro 46 percent

In 2002: PV 0.2 percent; wind 74.3 percent; and small hydro 25.5 percent

Also the share of renewable electricity produced in the Netherlands (as opposed to renewable electricity produced abroad) varies. In the annual audited account, Nuon provides details on the origin of the renewable electricity.

Amount of Renewable Electricity

100 percent

Pricing

For Natuurstroom consumers pay €0.02 more than for gray (or ordinary) electricity. With the average electricity consumption in the Netherlands, this comes to about €5 per month. The cost of gray electricity for a connection of 3*25 Amperes is €0.1697/kWh. The monthly connection fee is €9.87. All prices include 19 percent VAT. Thus, Natuurstroom is 12 percent more expensive per kWh.

Invoicing

Consumers receive one monthly bill showing all details like cost of electricity, transmission, carbon tax and VAT. Also, the connection cost is specified as cost for supply, transmission network and VAT.

Term

The minimum subscription period is 12 months. After that, consumers can stop at any time. The government requires that for supply of green electricity there should be a contract between the vendor and the consumer.

Consumer Value

Nuon sends a quarterly newsletter to its Natuurstroom consumers (Natuurstroom). Nuon also experimented with allowing consumers who meet certain requirements to use the Natuurstroom Logo on their products. This was discontinued as it proved too hard to establish the recognition of the logo.

Labeling

Natuurstroom of Nuon has no eco-label.

In the Netherlands, the Government guarantees that suppliers do not sell more green electricity than they produce or buy. In order to do this, the Government established a Green Certificate system, implemented by the independent network operator. After verifying that a certain amount of renewable electricity is produced from eligible resources, Green Certificates are issued. To obtain exemption from paying carbon tax on renewable electricity sold, a vendor needs to redeem, on an annual basis, Green Certificates in the same amount as the renewable electricity in the green electricity products sold. The independent network operator needs to certify that the required certificates have been redeemed (declare certificates used after which they cannot be used again). In this way, consumers can be sure that the same amount of green electricity is produced as sold.



Green Energy
Guaranteed Green

Market Penetration

At the end of 2001, Nuon had 225,520 Natuurstroom consumers (225,012 domestic and 497 corporate). Total Natuurstroom sales were 535 GWh of which 430 GWh was to domestic consumers and 105 GWh was to corporate consumers. The average Natuurstroom consumption of domestic consumers was thus 1,900 kWh/year, while corporate consumers used on average 21,000 kWh. In 2002, Nuon introduced another green electricity product (see below). This had an impact on the growth of the number of Natuurstroom consumers. At the end of 2002, Nuon had 217,127 Natuurstroom consumers (217,127 domestic and 498 corporate), but the total consumption increased to 812 GWh.

5. Verification and Certification System

Verification is the process of assessing whether or not a green electricity product, vendor or renewable electricity production facility is conforming to a certain standard or certain specifications. If this is the case, the product, vendor or facility can be certified. Certification provides assurance that a green electricity product, vendor or renewable electricity production facility meets the standard or specifications.

An effective certification program is essential to the success of a green electricity market. Such programs are in use in all markets where RE programs have been successful. Certification programs are designed to guarantee that the purchase of green electricity and the subsequent charges to consumers are matched by the green power generation of eligible plants. *A certification program plays a central role in facilitating consumer confidence in green electricity products.*

In general, a certification program is composed of five elements:

- A standard;
- Disclosure of information;
- Regular audits;
- Verification or conformity assessment; and
- Certification or labeling.

These five elements work together to create an effective program to ensure consumer confidence and to allow vendors to market their products as being of the highest quality.

Certification programs are typically, but not always, created by a broad set of stakeholders. Stakeholders in this process are the vendors, environmental NGOs, government agencies, green electricity vendors, RE generators, utilities, public utility commissions, consumer protection organizations and industry associations.

In most cases, products — not vendors — are certified. In some cases, for instance, in the Australian Green Power Program, vendors can use only renewable electricity from producers certified by the program. These programs have a different set of standards for products and green electricity generators. Below, the focus is on certification of green electricity products.

The Standard

The standard refers to the specifications a product must meet in order to get and remain certified. This is the same as the framework standards discussed in Chapter 3.

It is important that the standard used by a certification program be accessible to the public. This will increase public trust in both the certification program and the products that are certified under this program.

The different certification standards around the world have a great deal of overlap. Table 1.5 demonstrates this by comparing the key elements of the framework standards in Europe, the United States and Australia.

Table 1.5: Certification Standards

<i>Standard Elements</i>	<i>Eugene Standard, Europe</i>	<i>Green-e Standard, United States</i>	<i>Green Power Standard, Australia</i>
Eligible Renewable Energy Sources	Green electricity must come only from one or more of the following eligible sources: solar, wind, geothermal, solar electric, hydropower, biomass, natural gas-fired cogeneration. Hydropower plants may be eligible if they operate in such a way as to protect the environment.	In general, the following sources of RE generation are eligible under the Green-e standard: geothermal, wind, small & low impact hydropower (< 30 MW), solar electric, biomass, negawatts, ocean-based resources, and fuel cells powered by renewable resources. The product may not include any specific purchases of nuclear power in the non-renewable portion of the product.	The following RE sources can be included: PV, solar thermal electric systems, wind, hydro, biomass fueled power stations, geothermal, wave and tidal power stations. Explicitly excluded are: unsustainably grown biomass, wastes (including municipal solid wastes); hydro projects requiring new dam construction that results in large-scale flooding of ecosystems; and hydro projects, which involve major diversion of rivers and do not adequately allow for environmental flows.
Location of Production (domestic or imported)	Imports of green electricity are allowed only if the imported electricity is generated from eligible sources and meets the standards defined in both the exporting and importing country.	Electricity sold to a consumer must be generated in or wheeled into the power pool of the consumer being served. RE attributes can be combined with system power to serve green electricity consumers. The RE attributes and system power must come from within the power pool of the consumer being served.	This is not specified, but since only renewable electricity from approved generators can be used in green electricity sold under the Green Power program, it is assumed that only domestically produced renewable electricity can be used.

Standard Elements	Eugene Standard, Europe	Green-e Standard, United States	Green Power Standard, Australia
Minimum Content of 'New' Renewable Electricity	<p>For green electricity products with a fixed new renewables content, two classes are distinguished; 'gold' and 'silver.'</p> <p>For the silver class a minimum of 10 percent needs to come from new plants. For the gold class, this minimum is 30 percent.</p>	<p>The new renewable requirement starts at 5 percent of the total product content in the first year of implementation, increasing to 10 percent in the following year. This is a strict minimum requirement. Green-e has a goal of increasing the percentage further to 25 percent in 5 percent increments each year.</p>	<p>Vendors must source a minimum level of 80 percent of total accredited Green Power generation sold through their Green Power Products from 'new' Green Power generation</p>
Balancing	<p>At the end of each year, a remaining difference between demand and supply of power from eligible sources within the range of +/- 10 percent of the supplier's Green Power sales is allowed, but has to be brought forward to the following year.</p>	<p>In general, vendors need to balance the accounts within four months after the end of the calendar year.</p>	<p>It should be noted that Australia has a system of Green Certificates which can be used for balancing. Vendors are required to transfer the required number of Green Certificates within eight weeks of the end of the settlement period. Vendors can carry over only a 5 percent excess to the next settlement period.</p>
Additionality	<p>The Green Power offering must contribute to increased green electricity generation over and above current government requirements and renewable legislations such as renewables' obligations, incentive tariff schemes and (re) licensing requirements for plants. However, Eugene will allow renewables obligations for electricity suppliers to be included in green electricity products up to the percentage of the obligation, if the obligation has to be met by purchasing a certain share of renewable power. For instance, if the obligation is set at 5 percent of the supplied electricity, only 5 percent of the green electricity product sales can be satisfied with renewable electricity purchased to meet the governmental obligation.</p>	<p>Green-e allows a percentage of a product's renewables content to be satisfied by renewable portfolio standard (RPS) state-mandated renewables up to the percentage RPS requirement as it is applied to a retail product. The Green-e new renewable requirement must be met entirely by renewable generation over and above anything required by state or federal RPS requirements. For example, in Texas, the Green-e new renewable requirement is 50. The product mix must include the 50 percent Green-e new renewable requirement plus the state-mandated RPS requirement. If the product is comprised of 100 percent new renewables, it satisfies both the Green-e and state-mandated RPS requirements.</p>	<p>Renewable electricity in green electricity products must be in addition to the RPS requirement.</p>

<i>Standard Elements</i>	<i>Eugene Standard, Europe</i>	<i>Green-e Standard, United States</i>	<i>Green Power Standard, Australia</i>
Requirements for Product Disclosure	<p>Consumers should be provided with all information regarding the sources, the production and the environmental benefits of the green energy supply. The Eugene Standard requires green energy suppliers to provide prospective disclosure and historic disclosure, where data are available. Information should be disclosed in all green energy marketing materials and in consumer bills, at least once a year. Disclosure should include the following information:</p> <ul style="list-style-type: none"> • Name of the product; • Supplier contact information; • Type of green energy product (supply offerings or fund model); • Share of different green energy sources; and • Annual volume of labeled green energy. 	<p>The information at a minimum must include:</p> <ul style="list-style-type: none"> • Name of the Company whom the consumer is contracting; • Company consumer contact information, including consumer service number, company billing address and e-mail or website, if available; • Duration of the contract (contract length in months); • The proposed rate structure, including fixed and variable charges and taxes; • Price volatility or other price, environmental, or availability risk associated with the product; • A prospective fuel source disclosure statement indicating the percentage of the energy portfolio; • The obligations/charges associated with terminating the contract; and • Billing information. 	<p>Vendors need to provide all consumers, during the consumers subscription and agreement fulfillment period, with contract pricing and terms and conditions written in clear, simple and easily understandable terms; and make the following information available to new and potential consumers at their request:</p> <ul style="list-style-type: none"> • Generator names and types for each Green Power product; • Historical percentage of energy by type of generation for each Green Power product; • Historical percentage of new generation (by energy) for each Green Power product; and • The typical energy price range for each generation type.
Requirements for Verification and Certification	<p>Suppliers must conduct a verification process each year to substantiate their claims about green electricity purchases and sales. The supplier must employ an independent certified public accountant to conduct this verification. The results of the verification must be submitted to the national labeling body not later than three months after the end of the calendar year.</p>	<p>All products that are Green-e certified undergo an annual verification procedure. Green-e provides vendors with template documents and verification protocol in December of the year for which the verification will take place. Vendors must first submit preliminary, unaudited figures to Green-e. Then, vendors hire a certified auditor to conduct a process audit and submit documents supporting sales and purchases information to Green-e. Green-e staff then review the auditor reports to ensure that there are no discrepancies. Green-e publishes an annual report on its website that details the results of this verification process.</p>	<p>Vendors need to submit, each year, four quarterly reports using a standard format. The quarterly reports need to be submitted within one month of the end of the quarter. As part of a biannual compliance review, marketing materials are to be submitted by vendors with their June Quarterly report and as part of the December Annual Audit process. The Annual Technical Report is to be provided to the Project Manager within three months of the end of the settlement period. Also, for this report a standard format has been developed.</p>

Disclosure of Information

Certification involves the process by which a green electricity vendor engages in an agreement to provide information to the certification body. This disclosure process is very similar around the world, requiring vendors of green electricity to make available to certification bodies certain information about the company, the product, the origins of the renewable electricity and the way in which the product will be sold to other

parties, among other elements. This process is intended to demonstrate that the company and its products are reliable and are not making any false claims.

Regular Audits

The certification body normally requires annual audited accounts to provide more confidence in the information provided by the vendor, who bears the cost of the audit. The vendor can select a suitable auditor for this purpose. The certification body can require that the vendor use an auditor accredited by the certification body or can specify the type of auditors that can be used (for example, environmental auditors). The auditing body needs to be an *independent* third party. Independent means that the party conducting the audit must not have any commercial interest in the trade of green electricity products and must have no ties with the vendor and generators or any other players involved in the labeling process. The audit typically includes a review of the green electricity contracts with generators and consumers, as well as an assessment of the volumes purchased and delivered. This information and supporting documents are then submitted to the certification body for review.

Verification or Conformity Assessment

Verification is the process of reviewing documentation and information provided by the green electricity vendor, including the audited accounts, to ensure that the vendor has met the requirements set out in the standard. The certification body carries out the verification. *This is the core of the consumer trust issue.*

The certification body will identify discrepancies between what a green electricity vendor is marketing and actually purchasing to meet consumer needs. Although many programs have an annual review, they also may employ more detailed unannounced investigations. For example, in the case of the OK Power Label in Germany, the certification body may also perform random checks at the premises of the green electricity vendors and, if applicable and necessary, random checks of the renewable electricity generators and the energy traders involved.

For virtually all programs, it is considered a serious infringement if the total volume of acquired green electricity is less than the total sales volume in the settlement period. This area is one of the most important elements of a verification program. For example, the Green-e program in the United States is a voluntary program. All products that are Green-e-certified undergo an annual verification procedure. Green-e provides vendors with template documents and verification protocol in December of the year for which the verification will take place. Vendors must first submit preliminary, unaudited figures to Green-e. Vendors then hire a certified auditor to conduct a process audit and submit documents that support sales and purchase information to Green-e. Green-e staff then review the auditor reports to ensure that there are no discrepancies. Green-e publishes an annual report on its website that details the results of this verification process. If a vendor is not meeting the requirements of the standard, Green-e will decertify the vendor's product, and the vendor will be required to notify its consumers of the decision.

Under the requirements for the Eugene program in Europe, any deficit, including the transfer of a negative or positive balance from the preceding calendar year, must not exceed 10 percent of the volume of green electricity sold. The shortage has to be fully carried forward to the following year and eventually accounted for. The strictness of the follow-up actions depends on whether the program is voluntary or required.

Certification or Labeling

When the verification process concludes that a product meets the framework standards, the product can be certified or labeled. A certificate or label for a green electricity product from the certification organization illustrates a vendor's commitment to environmental excellence. It is intended to increase consumer confidence. A label confirms for the consumer that the product meets the minimum requirements set by the certification program.

In Australia, the certification of products, monitoring and verification, and product content disclosure is required of all green power products. This is done through the Green Power Accreditation Program, which is administered by the Government-run SEDA. In the United States, many products are voluntarily certified by and labeled with the Green-e standard, an independent program that is the most credible and widely used certification body in the country. In Switzerland, stakeholders developed a two-tiered labeling system. The first level, 'naturemade basic', applies to conventional hydropower plants, distinguishing them from nuclear and fossil-fueled power plants. The second level, 'naturemade star', applies to technologies that are perceived to be more environmentally-friendly, such as wind and solar. In addition, in order to protect the 'new' renewables from the cost competition of older, large hydropower plants, a promotion model has been set up. Any vendor who uses either of the 'naturemade' labels must guarantee that at least 5 percent of its sale of certified electricity is covered by 'naturemade star' products. This institutes a strong incentive to actively promote new renewables.

For green electricity products, certification labels are generally displayed on websites, bills, brochures and other marketing materials. In addition, in the United States, the Green-e program allows end-use consumers, who purchase large quantities of green electricity, to display the Green-e logo on their marketing materials to illustrate their social consciousness and responsibility towards their consumers. Green-e is also launching another initiative to promote green power and help green power consumers increase their sales. The program encourages end-use consumers to display the Green-e logo on consumer products, which demonstrates that the particular product was manufactured using at least 50 percent Green-e-certified green electricity.

Labeling can be a very effective means of communicating the ways in which companies are engaged in socially responsible practices. However, this is only useful if the label is recognized as a quality mark. Organizations that issue labels must make sure that their label is recognized for its quality. This will require a substantial amount of marketing, awareness creation and advertising. If the label is not recognized, this may discourage vendors from using it.

Certification Bodies

There are three types of certification bodies — governments, NGOs or the individual green electricity vendors (self-certification). Each type of certification has different benefits and disadvantages, which are discussed in more details below.

- (a) **Certification by Government:** The main benefit of certification by government, if fully trusted by the people, is to give consumers an immediate sense of familiarity and trust in the program. Certification by government also ensures a unified certification system, which is simpler for the people to understand. By contrast, if people trust in the government is low, the opposite will be true. In addition, certification by government may increase bureaucratic barriers. The best-known governmental certification programs are the National Green Power Accreditation Program in Australia and the Groencertificatenbeheer (Green Certificate Management Company) in the Netherlands. In both cases, the government guarantees that for each kWh of renewable electricity in green electricity, 1 kWh of renewable electricity is generated. In the Netherlands, the network operator, by law, is entrusted with developing and implementing a green certificate system for this purpose. This system has been operational since July 2001.
- (b) **Certification by NGO:** Some green electricity certification programs are initiated and operated by NGOs. NGOs are, in some cases, perceived to be more independent and impartial than other certifying bodies. They can engage many stakeholders in the process of designing a certification program. They may, however, face recognition and funding problems, especially in the start-up phase. A certification program is most effective when it is well known by the general people. Gaining prominence will require extensive marketing at substantial cost. To operate a certification system on a sustainable basis, the certification must generate a stable income stream. This can comprise a standard fee per year for each product certified or a fee per MWh certified product sold, or both. The OK Power Label program in Germany and the Green-e Renewable Energy Certification program in the United States are both examples of NGO-administered programs.
- (c) **Self-Certification:** Self-certification means that a green electricity vendor hires an independent auditor to review their green power acquisitions and sales to demonstrate to consumers that they are meeting their obligations. Self-certification may be an attractive option to some green power vendors because it means not working with a third party and, hence, avoiding any fees or requirements associated with third-party verification. However, there is a risk that self-certification would be perceived as less reliable than third party verification through either a government or an NGO. Green electricity products that are self-certified are not required to adhere to a standard set by a third party organization or a set of stakeholders. Nor are they bound by third party disclosure requirements. Therefore, consumers may have less confidence in the product they are receiving. In addition, self-certification makes it more difficult for consumers to compare available Green Power products. However, green electricity vendors who clearly communicate their standard, and publicly share the results of the audit may be successful: (i) Greenpeace Energy in Germany and Luxembourg have also been successful and now have more than 20,000 consumers; and (ii) Nuon in the Netherlands adopted for one of its products (Natuurstrom) a self-certification process involving a formal audit by PriceWaterhouseCoopers and verification by World Wildlife Foundation (WWF) Netherlands. The self-certification provides confidence that the product indeed is what Nuon claims it to be.

Key Elements that Ensure a Successful Certification Process

A number of important criteria are essential to develop suitable auditing, verification and certification procedures to ensure a successful program. The most successful processes have adhered to the following criteria:

- Adequate checks and balances must be in place to ensure a high level of reliability and credibility, and to minimize the risk of error and fraud;
- The procedures must be manageable and easy to comprehend;
- They must be transparent with respect to standards and procedures;
- They must be flexible to allow for further development at a later date;
- They must be generally acceptable to environmental stakeholders and consumer groups;
- They must be implementable within six months; and
- They can assure a high level of reliability at low cost.

6. Awareness Creation and Marketing

The green electricity market is still very much in the early stages of development. Green electricity is still a relatively new product and is not yet widely known. A number of governments, NGOs and companies have been promoting green electricity for some years to increase the market, and success is beginning to show. To develop the market further, and increase the number of green electricity consumers, continued promotion and marketing are required.

When surveyed, respondents will usually state that they would prefer to obtain their electricity from environmental-friendly sources. However, the lack of availability of green electricity products or the lack of knowledge on how to obtain the products, usually means that consumers' preferences are not matched by sales. Green electricity vendors can sign up consumers by creating awareness of the green electricity products offered. Some of the methods and ideas that Green Power providers have used to launch and sell their products are discussed below. They cover the following areas:

- Vision and themes;
- Benefits and assurances to consumers;
- Preparation;
- Launching of the program;
- Direct sales; and
- Ally sales.

Vision and Themes: The work done in this area should match up with the background research done in creating a product name and logo, as described in Chapter 4.2. The product should instil in buyers the sense that they are taking bold steps, leading an innovative energy transformation, contributing to a cleaner environment and providing greater opportunities for their children. Consumers should feel proud about buying green electricity, and potential consumers must want to share this good feeling.

The product must be portrayed as having both short-term and long-term benefits. Some of the short-term benefits may include positive publicity and improved public image. The long-term benefits should include cleaner air, less pollution, improved public health, economic development, lower electricity rates and less dependence on import of fossil fuels.

Benefits and Assurances to Consumers: Successful green electricity programs provide assurances to consumers, promote consumer actions and show that the program benefits the society in general, and the local community in particular:

- To provide assurance, green electricity products can be certified. Vendors often highlight independent verification, promising to keep records on sales, purchases and the generation of green electricity, and promising to audit these records annually by an independent third party.
- For commercial consumers, programs can promote purchase of the green electricity product. They provide access to the program logo for use on consumers' websites and marketing materials. Programs can also offer promotional incentives by providing window stickers to consumers and publishing lists of consumer on its website, along with other unique means of illustrating consumers' important contributions to the development of RE.
- Different programs promote the fact that a certain portion of their RE supply comes from local sources, and that as the program expands, new facilities will be constructed locally, which will lead to investments in the local community and the creation of new jobs.
- For all green electricity products sold under a program, the proceeds of the sales can be used for buying green electricity and operating the scheme.

Preparation: To successfully launch a product, certain marketing materials are important for the success of a program. The first two of these items is the product name and logo, and these items are given careful consideration and are market-tested so as to ensure that they attract consumers. These two items, while being important, do not constitute the full range of marketing materials needed.

Third, a website is an essential item, which all programs must have to be successful. Websites have simple navigation with clear and concise explanations of the program and product, along with enticements to purchase RE. The pages of the website are often decorated with attractive photographs of RE systems, happy children and wise elders. They also feature pictures of endorsers and their quotations, symbols of successful business and illustrations of cleaner air. Annex 5 provides a sample green electricity website to illustrate the important elements that should be included on a website, along with an effective method for organizing the website.

In addition to websites, a number of other materials help the marketing effort: brochures, letterhead, posters, PowerPoint sales presentation, residential and small consumer sign-up forms, newspaper advertisements, sales presentations, window stickers, thank-you-for-purchasing cards (for residential and small organization consumers), thank-you-for-purchasing letter template (for large energy users) and draft press release for large energy user purchases.

It is also a common practice to test the program and the marketing materials. This review can drastically improve the products and materials, especially when conducted by a professional market research firm. The research firm can test general interests and knowledge, as well as specific program materials, including the product name, the logo and people's willingness to pay a premium for green electricity.

Launching of the Program: Companies prefer to make a concerted effort at publicizing a Green Power program at its inception, when interest and excitement are likely to be high. Some of the most successful ways of doing this include media outreach, newspaper advertisements, promotional e-mails to targeted, interested parties and, in the case of utilities, notices that appear either with the monthly bill or in a separate mailing.

Direct Sales: The first step in selling green electricity is to determine who will be responsible for marketing the product. Green electricity programs tend to fare better when sales representatives are tasked with the Green Power program as their sole responsibility. Maintaining a sales team dedicated only to the RE program leads to greater success. Sales representatives will gain expertise and experience with RE technologies and markets, which will help them develop more effective and successful sales techniques that will result in a greater number of sales.

The second step is to provide training to the sales team in selling green electricity. Most people are unfamiliar with standard sales practices and, especially, sales of green electricity to commercial and industrial consumers. As a result of this, many green electricity programs fail to achieve successful market penetration.

The third step is to design a marketing strategy. This may be different for households and for commercial and industrial consumers. The marketing strategies that are used include (a) door-to-door; (b) telemarketing; (c) direct mail; and (d) other. Door-to-door and telemarketing have proved to be most effective.

The fourth step is the actual marketing. Some vendors outsource 'marketing to households' to residential and small commercial consumers. The marketing company contracted is normally paid on a performance basis (the number of subscribers). A cost of US\$30-125 per consumer is not uncommon. Some vendors attract consumers with a welcoming present of a similar value when they sign up. For instance, Essent of the Netherlands established a cooperative agreement with an electronics chain. When signing up for green electricity from Essent, consumers received a €50 discount on electrical appliances. Other welcoming presents include subscriptions to magazines, gift certificates and various discounts.

Sales staff usually follow a simple methodology which comprises six steps for marketing green electricity to commercial and industrial consumers. They:

- Develop a list of organizations to target, including contact information for the head of that organization;
- Send a letter to the head of the organization;
- Call the prospect with the intent of setting up a sales meeting;

- Meet once or several times with the prospect;
- Follow up on the meeting by telephone; and
- Sign up the consumer.

When starting a green electricity marketing campaign for commercial and industrial consumers, it is important for the sales team to first target likely consumers in order to create momentum in the sales efforts. Once some large organizations start purchasing green electricity (five or so), sales representatives can refer to this list of consumers, thereby easing the sales process with other consumers. During and after the meeting with the prospect, the salesperson should try to identify the next steps. Usually, an organization will need to engage in a number of internal meetings to discuss this product offering. To follow up on the meeting, the salesperson should make periodic calls and offer support as needed. It is not unusual for three meetings to be held before a consumer signs up. It is of great benefit for members of the sales team to keep a log of successes, failures and other notes. This will be used to create a 'lessons-learned-document' to enhance the sales efforts of all involved.

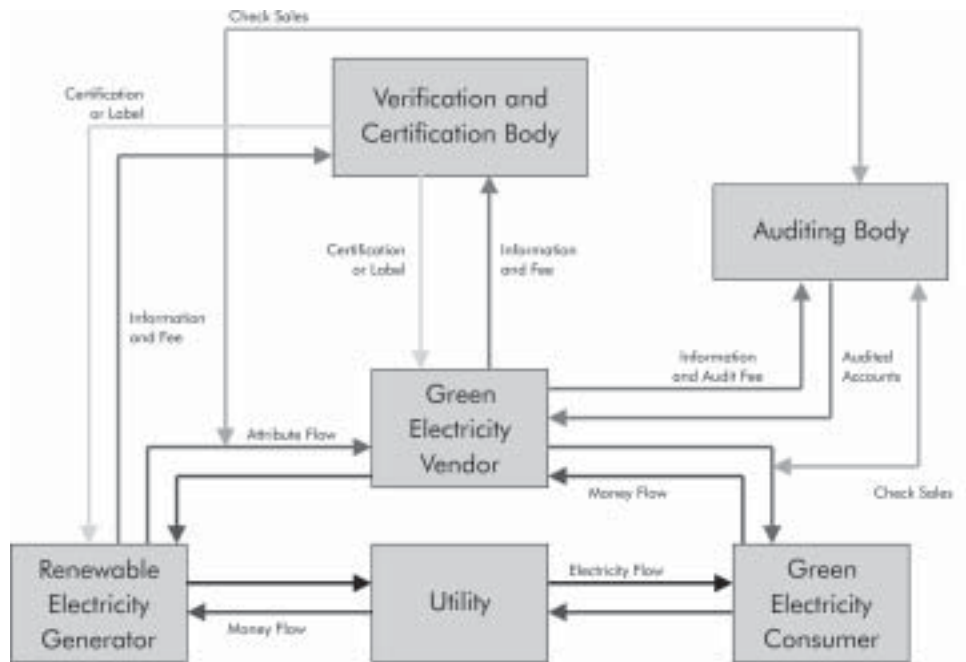
Ally Sales: One way to increase green electricity sales is to enlist the help of 'allies' to sell the product. Potential allies may include organizations that are supportive of the product offering, such as environmental NGOs, associations and governmental organizations that may wish to promote the sale of green electricity. The role of the allies is to publicize and introduce potential consumers to the idea and the product. These groups would announce the Green Power offering on their websites, at conferences, in their newsletters, and in other promotion materials. Examples of sales allies are international WWF and the US Chesapeake Bay Foundation (CBF). WWF promotes switching to green electricity on its website under its Power Switch Campaign. This includes promotion of green electricity in general and promotion of specific vendors (Ecotricity in the United Kingdom, Electra Norte in Spain, the Pembina Institute in Canada and Oekostrom in Austria). In turn, these vendors support WWF. CBF is an ally of Pepco Energy Services (PES) and promotes green electricity from PES on its website by offering a 5 percent discount on the green electricity cost. In turn, PES raises money for CBF and gives green electricity consumers a free membership in CBF.

7. Institutional Structure

An essential element in creating a framework for a RE market is to identify who will complete each of the tasks necessary to ensure successful implementation. For the purposes of this report, we will refer to this element as the 'Institutional Structure'. The institutional structure is based on the market's location and size, the jurisdiction of legal bodies, the type of product being sold, the type of vendor selling the product (that is, whether it is a regulated utility or some other entity), and the level of participation by the people and NGOs. The institutional structure may not always be designed in a single instance upon the introduction of RE products in the market. Instead, laws, regulations, organizations, relationships and roles can develop over time.

A strong institutional structure should aim at achieving the right balance between consumer protection and facilitating growth of the renewable electricity market. This is a difficult and complex task that has, by no means, been perfected because every market is in some way unique. Different sorts of structures exist, which are based on the type of product offered and the legal and regulatory rules of a region. In addition, many participants are involved in the sale of green electricity. Nonetheless, it is possible to describe a general institutional structure for marketing green electricity. Figure 1.2 provides a schematic presentation of the general institutional structure. In the schematic presentation, the regulation of the utility are not included, because this need not influence the green electricity institutional structure. This is true for both regulated and deregulated markets.

Figure 1.2: Schematic Presentation of the Institutional Structure of a Green Electricity Scheme



Any specific institutional structure can be created from the general institutional structure by combining or deleting tasks and responsibilities. For instance, the general institutional structure applies to a non-utility-based program in which the utility sells physical electricity and the green electricity vendor sells attributes. When the utility is also the green electricity vendor, and the tasks and responsibilities of both parties are combined, the structure for a utility-based program is obtained. If the certification body does not certify generators, there is no connection between the two.



Part 2.
Jade Electricity

8. The Shanghai Green Electricity Scheme

World Bank assistance to introduce the concept of green electricity dates back to 2001. The activity was proposed to be included in the China Renewable Energy Scale-up Program (CRESP). During the project identification phase of CRESP, the World Bank — together with the Energy Foundation (EF) and the WWF — financed the CPPCC/SNISD⁴ Green Electricity Workshop held in Shanghai and Beijing (September 24 and 25, 2001, respectively).

Mr Tang Dengjie, the deputy mayor of Shanghai, adopted the idea and agreed to fully support a green electricity scheme. In June 2003, he instructed the SEC to design a green electricity scheme and submit a proposal for the introduction, development, and operation of the scheme to the Municipal Government.

Invited by the SEC, a World Bank mission visited Shanghai on July 14, 2003, to discuss the issues and options concerning the introduction of a green electricity scheme in Shanghai. The discussion was based on a presentation by the mission, 'Options for Developing a Green Electricity Scheme'. In a letter dated August 29, 2003, Mr Le Jingpeng, Vice-Director of SHEC, sought World Bank support to assist SECSC in designing a practical green electricity scheme for Shanghai.

The World Bank agreed to support Shanghai, and mobilized funds from ESMAP and the ASTAE. It was agreed that the World Bank would provide information and expertise on the international experience in developing and operating green electricity schemes. This was provided in the form of expert advice, documentation and reports prepared to support the development and introduction of a green electricity scheme in Shanghai.

The reports which were prepared as part of the support provided by the World Bank included the following:

- Green Electricity Product Design and International Experience. March 2004.
- Shanghai Green Electricity Sales and Marketing Plan. April 1, 2004.
- Green Electricity Scheme for Shanghai. Options and Recommendations. April 2004.

⁴ China People's Political Consultative Conference and South-North Institute for Sustainable Development.

- Shanghai Jade Electricity Program. Product Certification Document. April 2004.
- Overview of International Practices in Verifying Green Power Schemes — Recommendations on a Green Power Verification scheme for the Municipality of Shanghai. May 2004.

Based on these reports, other documents, expert advice and consultations with stakeholders (households and Chief Executive Officers (CEOs) of large companies located in Shanghai), SECSC and SMEPC prepared, on behalf of the SEC and with the guidance of a Green Electricity Steering Committee (GESC), a draft decree and implementation plan in support of the decree. The GESC decided that the decree would be for a pilot phase to test the marketing of green electricity in Shanghai. Based on the results of the pilot phase, the final green electricity scheme for Shanghai would be designed. This may require revision of the decree for the pilot phase. The formulation of the decree and the implementation plan for the pilot phase were financially supported by: SHEC, SMEPC, SECSC, EF, WWF and the World Bank. The decree and implementation plan were submitted to SMG for approval on April 30, 2004.

The GESC comprised members from different government organizations, including the following:

- Le Jingpeng, vice-chairman, SHEC (team leader);
- Shuai Junyi, general manager, SMEPC (deputy team leader);
- Xia Meixing, division chief of energy, SAARC Human Resource Development Center (SHRDC) (deputy team leader);
- Chen Jinhai, division chief of energy conservation and environment protection, SHEC (deputy team leader);
- He Changqun, division chief of electric power, SHEC (deputy team leader);
- Zhen Long, deputy division chief of electric power, SHEC (member);
- Zhang Kaili, deputy manager of marketing department, SMEPC (member);
- Che Shenggang, manager of planning department, SMEPC (member);
- Chen Zhengqian, senior engineer of energy conservation and environment protection division, SHEC (member);
- Zhang Lihong, engineer of urban development division, SHRDC (member);
- Chen Rumei, director, SECSC (member); and
- Lou Zhenfei, deputy director, SECSC (member).

The World Bank also supported implementation of the scheme by financing and organizing an implementation training course and a green electricity policy study tour. The implementation training was for staff of SECSC and SMEPC who visited Finland, the Netherlands and Canada. The Green Electricity Policy Study Tour was for senior staff of the SEC, the Shanghai Municipal Development and Reform Commission (SMDRC), the Shanghai Municipal Bureau of Finance (SMBF), SMEPC and SECSC. The policy study tour visited Finland, Sweden and Germany. Both activities took place in July 2004.

Other activities to prepare for implementation include the development and maintenance of the green electricity website (<http://www.sh-greenpower.org>), the development of promotional materials and support for awareness creation activities.

The Shanghai Green Electricity Scheme was formally approved by SMG on June 14, 2005. At the launch of the scheme, 14 large electricity-consuming industries and institutions signed one-to- three year contracts to buy 6.54 GWh green electricity in total annually. The incremental cost of the green electricity was fixed at Yuan 0.53 per kWh.

This part of the report describes how the international experiences on green electricity frameworks and green electricity product design have been applied in designing the Shanghai Green Electricity Scheme. This is done by presenting the World Bank recommendations for each element of the framework and product design and by discussing the approach adopted by Shanghai as specified in the draft decree for the pilot phase. Before that, the rationale for a green electricity scheme for Shanghai and the design principles are discussed.

The green electricity product offered by SMEPC in the pilot phase is called Jade Electricity.

9. Rationale for a Green Electricity Product in Shanghai

Before SMG decided to support the development of a green electricity offering in the territory, it evaluated the potential of RE supply in the area. The renewable electricity generating capacity of Shanghai was very small at that time. Renewable electricity was only generated by the Feng Xian county wind farm, which also has a 10 kWp grid-connected PV system. The Feng Xian county wind farm, which started operation in August 2003, has four 850 kilowatt (kW) wind turbines. Under the World Bank/GEF Renewable Energy Development Project, two other wind farms have been developed: the Chong Ming and Nan Hui wind farms. The Chong Ming wind farm will comprise five 1.5 MW wind turbines, while the Nan Hui wind farm includes nine 1.5 MW wind turbines. These two wind farms have started operation in 2005. SMEPC intends to develop additional wind farms in the Shanghai municipality by 2010 with a total capacity of 300 MW.

Assuming an average capacity factor for all wind farms of 25 percent, the annual electricity generation of these wind farms can be estimated⁵ (see Table 2.1).

Table 2.1: Annual Renewable Electricity Generation in Shanghai

	Capacity (MW)	Renewable Electricity Generation (GWh/year)
Existing Capacity (Feng Xian county, Chong Ming and Nan Hui wind farms)	24.4	53.4
Planned Capacity (RE Development Plan by 2010)	300.0	657.0
Total	324.4	710.4

To place these numbers in a context, the total electricity consumption in Shanghai in 2002, 2003 and 2004 was, respectively, 61.2 TWh, 74.6 TWh, and 81.0 TWh and the projected consumption for 2010 is 131.2

⁵ The annual renewable electricity generation from the grid-connected PV system (10 MWh) is negligible compared to that of the wind farms.

TWh. The projected consumption is based on an average annual increase from 2002 of 10 percent. The incredible growth in electricity usage is considered a reasonable estimate, considering the double-digit growth in both the economy and electricity demand during the past few years. The renewable electricity that can be generated from the existing capacity and capacity under construction is 0.087 percent of the total electricity consumed in Shanghai in 2002.⁶ The total renewable electricity that can be generated from the anticipated installed renewable electricity capacity by 2010 is expected to be 0.54 percent of the total electricity consumption of Shanghai in 2010.

The annual renewable electricity generation can, in a similar way, also be compared to other electricity consumption figures, such as industrial and household electricity consumption. These comparisons are given in Table 2.2.

The number of commercial, industrial or household consumers who will be required to absorb all renewable electricity is given in Table 2.3. This is done for green electricity products containing different amounts of renewable electricity (100 percent, 20 percent, 10 percent and 5 percent).⁷

Table 2.2: Renewable Electricity Production Compared to Electricity Consumption⁸

	<i>Annual Renewable Electricity Generation from Existing Capacity as Percentage of Electricity Consumption</i>	<i>Annual Renewable Electricity in 2002 (%) Generation by 2010 as Percentage of Electricity Consumption in 2010 (%)</i>
Total Electricity Consumption	0.09	0.54
Commercial Electricity Consumption	0.10	0.60
Industrial Electricity Consumption	0.13	0.80
Tertiary (shops, hotels, etc.) Electricity Consumption	0.43	2.67
Household Electricity Consumption	0.86	5.34

⁶ This is 0.072 percent of 2003 electricity consumption and 0.066 percent of 2004 electricity consumption.

⁷ The numbers are obtained by dividing the total amount of renewable electricity available by average renewable electricity consumption (average electricity consumption multiplied by renewable electricity share) of each consumer class.

⁸ 2002 electricity consumption in Shanghai: commercial 55.0 TWh, Industry 41.4 TWh, Tertiary 12.4 TWh and Households 6.2 TWh. The 2010 consumption is estimated assuming an average annual increase of 10 percent.

Renewable electricity currently costs more than conventional or gray electricity. Consumers will need to pay a premium for green electricity compared to the cost of conventional electricity. The incremental cost includes the incremental electricity cost, the cost of marketing green electricity and the cost of operating the green electricity scheme. At the time of making the analysis, these costs were not known, and had to be estimated. According to SMEPC, the incremental cost of renewable electricity from the Feng Xian county wind farm was expected to be Yuan 0.48 per kWh.⁹ The incremental cost of the Chong Ming and Nan Hui wind farms was expected to be Yuan 0.369 per kWh. This was calculated based on the feasibility study approved by the Shanghai Development and Reform Commission (SDRC) and using the same assumption for the average cost of conventional electricity. The actual incremental cost of both will be determined after one full year of operation. For estimating the increase in cost in the analysis below, an incremental cost of Yuan 0.39 per kWh was used. Table 2.4 gives the cost increase for different renewable electricity products for three consumers groups. *From this table, it is clear that a 100 percent renewable electricity product is currently extremely challenging for Shanghai. The cost increase for a 5 percent product, by contrast, is very modest.*

The product offered could also be one with a fixed percentage increase of the electricity bill. The increase will be used to cover the incremental cost of renewable electricity. This will transfer a certain amount of conventional electricity into renewable electricity.¹⁰ In that case, consumers should periodically be informed on how much renewable electricity was bought with the increase of the electricity bill. This can be monthly or annually. In Table 2.5, the estimated renewable electricity amount is calculated for different contributions.

⁹ From the feasibility study, using an average electricity cost for conventional electricity of Yuan 0.31 per kilowatt-hour. One US\$ is Yuan 8.28 (April 2005).

¹⁰ This is based on the concept that renewable electricity can be separated into conventional electricity and the attribute (1 kWh renewable electricity = 1 kWh conventional electricity + 1 kWh attribute). The cost of the attribute is the incremental cost.

Table 2.3: Number of Average Consumers Required to Sell All Renewable Electricity

	<i>Number of Average Consumers Required to Sell all Renewable Electricity from Existing capacity in 2002</i>	<i>% of Total # of Consumer Class</i>	<i>Number of Average Consumers Required to Sell all Renewable Electricity Generated in 2010¹¹</i>	<i>% of Total # of Consumer Class</i>
100% Renewable Electricity Product				
Industrial	23	0.2	169	0.8
Top 100 industries	2	2.0	8	8.0
Top 10 industries	1	10.0	2	20.0
Five-star hotels	4	2.0	23	—
Top 20 departmental stores	4	20.0	22	—
Households	39,500	0.8	295,000	6.1
20% Renewable Electricity Product				
Industrial	114	0.6	844	3.9
Top 100 industries	6	6.0	36	36.0
Top 10 industries	2	20.0	8	80.0
Five-star hotels	18	90.0	113	—
Top 20 departmental stores	17	85.0	108	—
Households	197,500	4.1	1,475,000	30.6
10% Renewable Electricity Product				
Industrial	228	1.2	1,687	7.8
Top 100 industries	11	11.0	71	71.0
Top 10 industries	3	30.0	15	—
Five-star hotels	35	—	226	—
Top 20 departmental stores	34	—	216	—
Households	395,000	8.2	2,950,000	61.2
5% Renewable Electricity Product				
Industrial	456	2.5	3,373	15.6
Top 100 Industries	22	22.0	142	—
Top 10 Industries	5	50.0	29	—
Five-star hotels	70	—	452	—
Top 20 departmental stores	67	—	432	—
Households	790,000	16.4	5,900,000	—

Note: More than 100 percent

¹¹ Average energy consumption, number of industries, number of five-star hotels and number of households in 2010 estimated.

Table 2.4: Estimated Cost Increase (in %) for Different Renewable Electricity Products (percent)

<i>Renewable Electricity Content of Product (%)</i>	<i>Cost Increase Commercial Consumers (%)</i>	<i>Cost Increase Industrial</i>	<i>Cost Increase Households (%) Consumers (%)</i>
100	46.4	49.4	63.9
20	9.3	9.9	12.8
10	4.6	4.9	6.4
5	2.3	2.5	3.2

Table 2.5: Estimated Renewable Electricity Amounts for Different Contributions (percent)

<i>Bill Increase (%)</i>	<i>Renewable Electricity Share Commercial Consumers (%)</i>	<i>Renewable Electricity Share Industrial Consumers (%)</i>	<i>Renewable Electricity Share Households (%)</i>
2	4.3	4.1	3.1
5	10.8	10.1	7.8
8	17.2	16.2	12.5
10	21.5	20.3	15.6

In the future, the incremental cost of renewable electricity will further decrease. In that case, the cost increase for the different products will decline. When it reaches zero, renewable electricity will be financially competitive with conventional or gray electricity.

For a system based on a fixed percentage increase of the electricity bill, the amount of renewable electricity purchased will increase as the incremental cost of renewable electricity decreases.

Based on this information, SHEC concluded that introducing a green electricity scheme for Shanghai was feasible. Since the amount of renewable electricity that will be generated in 2010 is still only a fraction of the electricity consumption, it should be possible to sell all renewable electricity production up to 2010. The additional cost for buying green electricity was also considered very reasonable.

10. Design Principles

SMG established a number of design principles for developing the Shanghai Green Electricity Scheme. These design principles have a direct impact on the framework and products designed under this framework. The design principles established by SMG are listed below:

- **Comprehensive:** The effort to design, market and sell green electricity products should be *comprehensive* and reflect SMG's efforts to promote RE and improve the environment. The Shanghai Green Electricity Scheme should not be limited to only marketing electricity from wind farms. The scheme should allow other RE technologies to be included in the future, although, initially, wind and PV may be the only technologies available.
- **Market-based:** The scheme should be *market-based*. This includes the following three elements:
 - **Voluntary** — The purchase of green electricity products is *voluntary* (success will depend on strong support from SMG, along with intensive awareness creation and marketing campaigns).
 - **Full Cost Recovery** — Revenue generated from the sales of green electricity will cover full generation and administrative costs (green electricity products should be sold at reasonable market rates that allow vendors to cover their costs and make a reasonable profit).
 - **Based on International Best Practices** — The design of the scheme and products should be based on international best practices and should take into account the specific characteristics of Shanghai's power sector.
- **Utility-based and Initially Implemented by the SMEPC:** The Shanghai Green Electricity Scheme will be utility-based and, in the pilot phase, the sales of green electricity will be implemented by SMEPC, the only electricity utility in Shanghai. The scheme should, however, be designed to allow for the participation of other vendors if or when the Chinese Government decides to further power sector reform in the Shanghai Municipality and/or the East China Region.
- **Energy-based Products:** Only energy-based green electricity products will be initially allowable under the Shanghai Green Electricity framework.
- **Transparent:** The sales of products need to be transparent with clear fiduciary responsibilities in order to earn the full trust of the citizens, consumers, government and other interested parties, including local, national and international NGOs. Consumers should receive the information required to make an informed decision to purchase.
- **Inclusiv:** The Green Electricity Scheme must be inclusive and appealing to the whole society. Municipality citizens, businesses, government entities and all other parties that care about their environment, should be able to participate.

11. Framework for Green Electricity in Shanghai

The World Bank recommended that SHEC first establish a green electricity framework for Shanghai under which green electricity products can be developed and design for marketing in the pilot phase one green electricity product that meets the framework requirements. This approach would establish general principles, such that all green electricity products sold in Shanghai should meet the recommended criteria and would allow parties other than SMEPC to sell green electricity products after the pilot phase, once this would be possible. The SEC decided to take a different approach to design first a green electricity product to be marketed in the pilot phase (Jade Electricity). Based on experience with marketing this product, one or more green electricity products could be designed. A framework would only be developed when required, for instance, when different parties are able and allowed to sell green electricity products in Shanghai. For this reason, the draft green electricity decree mainly specifies Jade Electricity product characteristics and the institutional arrangement for the pilot phase. Although the draft decree did not attempt to specify the framework characteristics, some of these characteristics become apparent from product and other specifications in the decree.

In Chapter 3 of Part 1, the general elements of frameworks for green electricity products are discussed. In this chapter, recommendations for specifying each element for the Shanghai Green Electricity framework are provided, taking into consideration the tight schedule given by SMG. After that, it is discussed to what extent and how each element is actually specified in the decree and where relevant recommendations are provided for modifications in a future revision of the decree. The full translation of the draft decree is provided in Annex 6.

Eligible Renewable Energy Sources

To specify in the framework for Shanghai what electricity sources are considered renewable, four options were identified:

- (a) Specification of all eligible renewable electricity resources. This would require a thorough investigation of available technologies and their impact, and an extensive stakeholder consultation to assess preferences and which resources should be excluded.

- (b) Not specifying any eligible renewable electricity resources, but specifying which government organization has the delegated authority to specify eligible renewable electricity resources. This would provide more time to undertake the investigation and stakeholder consultation, while, at the same time, not holding up the preparation and approval of the decree.
- (c) Specifying some available and non-controversial renewable electricity resources as eligible (for instance, wind and PV) and specifying which government organization has the delegated authority to specify additional eligible renewable electricity resources after thorough investigation and stakeholder consultation.
- (d) Specifying some available and non-controversial renewable electricity resources as eligible (for instance, wind and PV) and adding additional eligible renewable electricity resources by revision of the decree.

The World Bank recommended that Shanghai adopt option (c). This would provide sufficient basis for designing the green electricity product in the pilot phase (which most likely would only use wind and PV, the only resources Shanghai has at the moment), would not hold up the process of designing the framework and green electricity product¹² and would not require revision of the decree to add additional resources.

The approach adopted by Shanghai was to provide a very broad and general definition of eligible resources, without much details. The decree specifies (in Article 2) that green electricity is electricity generated from renewable resources, such as wind solar, and other. No further details are provided. From this, it is clear that wind and solar (including PV) are considered renewable resources, but no details are provided on the other resources. For instance, it is not clear which hydro resources are considered renewable (below which are capacity or only 'low impact' hydro) and whether, for instance, waste incineration or landfill gas is considered renewable. The decree also does not specify which government organization has the authority to decide on these issues.

For the pilot phase, this is not expected to be a problem, but before allowing additional products to be prepared under the framework, addressing this issue is proposed by revising the decree, by specifying clearly which resources are eligible and by designating a government body to add additional resources.

Location of Production (domestic or imported)

In specifying the location of production, four options were identified for Shanghai:

- (a) Specify that green electricity products sold in the Shanghai Municipality can use only renewable electricity generated in the Shanghai Municipality.
- (b) Specify from which locations outside Shanghai renewable electricity can be imported to be used in green electricity products sold in Shanghai (for instance, neighboring provinces, Western provinces,

¹² The deadline for submitting the draft decree to SHEC was May 1, 2004.

or facilities feeding into the same grid system). And specify if this needs to be associated with the import of the physical electricity or if imports can be separate from the physical electricity (by imports of the attribute).

- (c) Specify that green electricity products sold in the Shanghai Municipality can use renewable electricity generated in the Shanghai Municipality, and specify which government organization has the delegated authority to specify additional locations of production after thorough investigation and stakeholder consultation.
- (d) Specify that green electricity products sold in the Shanghai Municipality can use only renewable electricity generated in the Shanghai Municipality. Additional locations of production can be added through revision of the decree.

For options (b), (c) and (d), the framework could also specify the maximum amount of renewable electricity in a green electricity product that can come from outside the municipality.

To make the concept of green electricity more tangible, renewable electricity, in green electricity products sold in the Shanghai municipality, should initially, preferably, be generated within the municipal boundaries. Even if this means that the incremental price of green electricity consumers need to pay is higher. By producing renewable electricity within the municipal boundaries, green electricity consumers can see and easily understand for what purpose their incremental payment is used. However, when insufficient renewable electricity generation within the municipality starts to hamper growth of the Green Electricity Scheme, temporary or permanent imports of renewable electricity from outside the municipality should be considered. A thorough stakeholder consultation is recommended to assess whether this would be acceptable to existing consumers and to assess consumer preference for the location of generation of the imported renewable electricity. This does not automatically need to be from where the incremental cost of renewable electricity is lowest. Allowing imports provides additional flexibility when renewable electricity generation from within the municipality is constrained. Based on these considerations, the World Bank recommended option (c). This option does not delay the approval of the decree because, at this stage, a detailed study and stakeholder consultation are not required, but it provides the required flexibility in case the demand exceeds the renewable electricity production in the municipality. Specifying a maximum amount is not recommended. This can be left to the market to decide. The amount of imported electricity should, however, be included in the product information to consumers.

In the decree, no restrictions are included on the location of production. This means that, in principle renewable electricity from outside Shanghai could be used. In the pilot phase, this will not be a problem, but before allowing additional products to be prepared under the framework, it is proposed to address this issue by revising the decree by specifying eligible locations.

Age of the Production Facilities

The age of the production facilities for Shanghai is not a relevant issue, because all its renewable electricity production facilities are new. When imports of renewable electricity become necessary and are allowed,

Shanghai may want to limit or exclude renewable electricity from old production facilities. In that case, Shanghai will need to define what it considers 'old' and 'new'. The oldest production facility in Shanghai is the Feng Xian County Wind farm, which started production in August 2003. The World Bank recommended that Shanghai specify that the renewable electricity in green electricity products sold in Shanghai be generated only from facilities that started production no earlier than August 2003.

The decree does not specifically exclude 'old' production facilities, nor does it define what is considered 'old'. Because initially only renewable electricity produced in Shanghai will be included in Jade Electricity, this is not a problem. However, to avoid possible future problems with the import of renewable electricity, a revision of the decree is recommended that specifies that green electricity sold in Shanghai include renewable electricity only from plants that started operation in August 2003 or later.

Minimum Content of 'New' Renewable Electricity

Two options are identified to specify the minimum content of 'new' renewable electricity:

- (a) Specify that only renewable electricity from new facilities can be used in green electricity sold in Shanghai, with new facilities being defined as facilities that started production in August 2003 or later.
- (b) Specify the minimum content of new renewable electricity, and increase this amount over time to reach 100 percent.

The World Bank recommended option (a). This option simplifies the framework and avoids the need to increase the minimum content of new renewable electricity over time. By specifying suitable eligible locations of renewable electricity production, sufficient new renewable electricity will be available for import.

The decree does not include a requirement for the minimum content of new renewable electricity. At the moment, this is not an issue. In the initial stage, only renewable electricity produced in Shanghai will be used for green electricity sold in Shanghai. All renewable electricity will, therefore, be new. However, when imports are required to meet demand, this may become an issue. Specifying option (a) in a future revision of the decree is recommended.

One-for-one

The requirement that for each kWh of renewable electricity in a green electricity product, 1 kWh of renewable electricity must be generated or bought can be considered a universal framework characteristic. The World Bank recommended that the Shanghai Green Electricity framework adopt this requirement.

The one-for-one requirement is included in the decree. The requirement to balance the renewable electricity bought and the green electricity sold is mentioned in the decree in Articles 6, 10, 14, 15 and 16.

Settlement Period

The World Bank recommended a settlement period of one year, either the calendar year or a clearly specified financial year. One year is considered most appropriate. This would be in line with international practice. Shorter periods unnecessarily increase the administrative burden, while longer periods provide insufficient confidence to consumers because it takes longer to demonstrate how any deficit would be handled.

The Shanghai green electricity decree adopted a one-year settlement period (Article 6) without specifying when the settlement period would begin and end. To avoid carrying over an ever-increasing deficit, the decree also specifies that a full balance must be obtained over a three-year period.

Specifying when the period would begin and end is recommended in a future revision of the decree, as well as providing more details on rules for obtaining a full balance over a three-year period.

Balancing

A number of ways are available to balance the sales of renewable electricity in green electricity products and the amount of renewable electricity generated and bought. The most common ones are as follows:

For a surplus:

- (a) The full surplus of year N can be transferred to year N+1.
- (b) The surplus of year N can be transferred to year N+1 to the maximum of x percent of renewable electricity sales in year N.

For a deficit:

- (a) The full deficit of year N must be balanced through the purchase of Green Certificates.
- (b) The full deficit of year N must be carried forward to year N+1 and will be added to the renewable electricity consumption of year N+1.
- (c) The full deficit of year N must be carried forward to year N+1 and needs to be bought or generated within y months.

For Shanghai, the World Bank recommended option (a) for balancing a surplus and option (b) for balancing a deficit. These options are the simplest. Option (a) for treatment of a deficit is not possible, because a system of Green Certificates does not yet exist in China.

Article 6 specifies that a surplus can be carried over to the next year while a deficit needs to be made up in the next year. No details are provided on how to maintain a full balance over a three year period.

For purpose of balancing, SMEPC indicated their intention to limit green electricity sales in the first year to approximately the expected renewable electricity production of the Feng Xian county wind farm (7.4 GWh per year). This can be increased to 53.4 GWh per year after commissioning of the Chong Ming and Nan Hui wind farms. This is a very conservative approach with a likely surplus each year. On the other hand, it gives consumers assurance that no more renewable electricity is sold than generated.

Additionality

The additionality requirement (renewable electricity used in green electricity must be additional to any legal obligation on electricity production, consumption or purchase) can also be considered a universal framework characteristic. It provides consumers the confidence that they contribute to renewable electricity production beyond what would happen in any case based on the legal obligation. The World Bank recommended including this requirement in the Green Electricity framework for Shanghai. This issue has become relevant with the passing of the China Renewable Energy Law, which includes a Feed-in-Law (see Chapter 12). This would mean that only renewable electricity can be used for which no feed-in tariff is paid or for which the feed-in tariff is insufficient to make the project financially viable.

The Shanghai Green Electricity decree does not specify that renewable electricity in green electricity needs to be additional to any legal obligation. The implementation plan supporting the decree mentions that a green electricity scheme is a way to prepare for any legal obligation that will be specified in the Renewable Energy Law presently under preparation. This indicates that the renewable electricity in green electricity would be counted to meet any obligation specified in the law. This is not advisable because this will reduce consumers' interest in and support for green electricity. Consumers do not want to pay a premium for something the utility or municipality is legally obliged to do.

Including the 'additionality requirement' in a future revision of the decree is recommended.

One should note that it is possible to have a legal obligation, a green electricity scheme, or both. The approaches are complimentary and can be used together without any problem. In fact, many countries with a legal obligation also have a green electricity scheme (Australia, Germany, the United Kingdom, the United States and others). Many market experts believe these two different approaches for development of RE are not only complimentary, but they help spur greater development of RE assets.

Minimum Renewable Electricity Requirement for Green Electricity Products

To ensure that green electricity products indeed contribute to a cleaner environment, some frameworks specify a minimum renewable electricity requirement. The World Bank also recommended specifying, in the Green Electricity framework for Shanghai, a minimum renewable electricity requirement. For percentage-based products, this can be a minimum share of renewable electricity in the product. For instance, Green-e requires at least 50 percent renewable electricity. For block-based products, this can be a minimum amount of renewable electricity purchased. To make sure that, in particular, large consumers do not claim to be environmentally conscious while only buying a tiny amount of renewable electricity, it is recommended to include a requirement to buy a minimum amount of renewable electricity when participating in the Shanghai Green Electricity Scheme. Since Shanghai adopted a block-based product for the pilot phase, this would mean specifying a minimum amount of renewable electricity.

In the decree, green electricity is synonymous with renewable electricity (Article 2). Jade Electricity comprises, therefore, 100 percent renewable electricity. The Jade Electricity pilot program, however, requires different consumer groups to buy a minimum number of blocks of Jade Electricity (Article 8). The consumer groups are categorized according to annual electricity consumption.

If under the Shanghai Green Electricity framework percentage-based products are also allowed, this would require adding a minimum percentage of renewable electricity in a percentage-based green electricity product. Generalizing the minimum renewable electricity requirement for green electricity products is recommended in a future revision of the decree.

Requirements for Product Disclosure to Consumers

To provide sufficient information for consumers to make an informed decision whether or not to buy green electricity, vendors should at least provide the following information for each product:

- Nature of the product (percentage or block-type product);
- Amount of renewable electricity in the product (percentage in a percentage-type product and amount in a block-type product);
- Source of renewable electricity production (technologies, share of each technology, location, maximum share imported);
- Cost or incremental cost of the product;
- Invoicing (monthly or other, included in electricity bill or separate); and
- Term of the contract (minimum duration and extension procedures).

The World Bank recommended including in the Shanghai Green Electricity decree specifications of minimum information that needs to be provided to potential consumers. In the decree, no requirement for product

information disclosure to consumers is included. Specifying in details the requirements for product disclosure in a future revision of the decree is recommended.

Emission Benefits Included in Renewable Electricity

Internationally, only a very few green electricity frameworks specify which environmental benefits must be included in green electricity and whether environmental benefits can be separated. Not specifying this would, therefore, be in line with international practices. To avoid potential problems with this in the future, the World Bank recommends specifying that all environmental benefits of renewable electricity be included in the renewable electricity in green electricity products.

The Shanghai Green Electricity decree does not specify which emission benefits are included in Jade Electricity. To avoid any potential problem in the future, Shanghai may want to specify in a future revision of the decree that all environmental benefits of renewable electricity must be included in the renewable electricity in green electricity products.

Product Name

The World Bank recommended that the Shanghai Green Electricity framework specify that each green electricity product developed under the framework have a unique name and that vendors be encouraged to develop attractive product logos to promote the product and increase product recognition.

In the draft decree, there are no requirements on green electricity product names and logos. However, in line with the World Bank recommendation, the product developed by SMEPC for marketing in the pilot phase is called Jade Electricity and has an attractive product logo. When more companies can sell green electricity in Shanghai, the framework should specify the above requirement for product names and encourage the use of a product logo.

Use of Framework Name and Logo

The use of the framework name and logo is, in particular, relevant if it is allowed to sell products not meeting the framework requirements. In that case, the framework name and logo can be used to inform consumers that a certain product meets the framework requirements, while others do not. For instance, in the United States, green electricity products certified by Green-e are sold alongside uncertified green electricity products. To distinguish certified from uncertified products, certified products use the Green-e name and logo to show that the product meets the Green-e framework requirements. The Australian Green Power logo is used in the same way. By contrast, in the Netherlands, the Government guarantees that every green electricity product sold there is green. Since every product sold must comply with this, there is no point mentioning this specifically and displaying the logo because this counts for every product sold in the country.

The World Bank recommends that Shanghai adopt the second option — that only green electricity products meeting the framework requirements can be sold in Shanghai. This is considered most appropriate because it simplifies the green electricity concept, limits consumer information and education requirements and fits in both regulated and deregulated markets. This means that meeting the framework requirements is not a means to distinguish different green electricity products. Although the framework name and logo cannot be used to distinguish green electricity products, it is recommended that the framework still include specification of the use of the framework name and logo to protect against misuse.

The draft decree does not clearly specify the framework, and there is no separate framework name or logo. It also does not contain any specification on the use of the framework name and logo. Addressing this in a future revision of the decree is recommended. The decree mentions in Article 12 the use of the Green Electricity Logo. It is assumed that this refers to the product logo of the product marketed in the pilot phase.

Addressing the above issues in a future revision of the decree is recommended. The decree should (i) clearly specify the framework; (ii) use a separate name for the framework to distinguish it from green electricity products; (iii) specify the use of a framework logo; (iv) specify clear rules for using the framework name and logo; and (v) specify that only green electricity products meeting the framework specifications can be sold in Shanghai.

Requirements for Verification and Certification

The World Bank recommends clearly specifying in the decree the requirements for verification and certification. This includes requirements for the following:

- Disclosure of information;
- Auditing;
- Verification of conformity assessment; and
- Certification or labeling.

Under disclosure of information, it is recommended that the decree specify what information needs to be provided, and when. This should include information on the vendor, the products and, for each product, the renewable electricity account, origin of the renewable electricity and other information required to judge whether each product meets the framework requirements. Under auditing, the decree should specify that vendors need to submit annual accounts audited by independent qualified auditors and that SMG can, if deemed required, commission a qualified auditor to independently audit the accounts. The decree should also specify who will conduct the verification or conformity assessment and actions when it is found that the product or accounts do not meet the framework specifications. Finally, the decree should specify certification requirements. This includes specification of who or what needs to be certified and how. Certification of products, vendors and renewable electricity generators are possible.

The draft decree specifies in Article 9 the responsibilities of SMEPC. With respect to disclosure of information, the decree specifies that SMEPC must submit annual green electricity plans, and quarterly and audited annual reports to the regulator. These reports will include information on the purchase and sales of green electricity, including both volumes (kWh) and cash flow. The reports will also include a list of green electricity consumers and the amount purchased by each consumer. With respect to auditing, the decree specifies that, when considered necessary, an independent party can be entrusted to audit the records of SMEPC. SMEPC must accept audits by appointed qualified auditors. With respect to certification, the decree mentions in Article 15 that only renewable electricity from approved or certified production facilities can be used. No further details are provided. It is recommended that the requirements for verification and certification are specified in more detail in a future revision of the decree.

Framework Summary

Table 2.6 summarizes which general features of green electricity frameworks are covered by the draft decree and how.

Table 2.6: Summary of Framework Characteristics Covered by the Draft Decree

Shanghai Green Electricity Scheme Shanghai, China

Framework Name and Logo

The decree does not provide a clear name or logo for the scheme. The product sold in the pilot phase has, however, a clear name and logo.

Eligible RE Sources

Wind, solar, biomass and others. The green electricity regulator must approve renewable electricity production facilities producing renewable electricity included in green electricity products sold in Shanghai.

Location of Production (domestic or imported)

Not specified.

Age of the Production Facilities

Not specified.

Minimum Content of 'New' Renewable Electricity

Not specified.

One-for-one

Balancing required.

Settlement Period

One Year. No start or end date specified.

Balancing

Balancing required. Surplus of one year can be carried over to the next. A deficit needs to be added to sales in next year.

Additionality

Not specified.

Minimum RE Requirement

Not specified. However, Jade Electricity consumers consuming 2,000 MWh per year must buy at least 10 blocks or 60,000 kWh per year. This is at least 3 percent renewable electricity, consumers consuming 2,000 < Q 5,000 MWh/year must buy at least 20 blocks or 120,000 kWh per year, this is at least 2.4 percent. Consumers consuming 5,000 < Q 20,000 MWh/year must buy at least 50 blocks or 300,000 kWh per year, this is at least 1.5 percent, and; consumers consuming 20,000 < Q 50,000 MWh/year must at least buy 80 blocks or 480,000 kWh, which is at least 0.96 percent.

Requirement for Product Disclosure

Not specified.

Emission Benefits

Not specified.

Product Name

Not specified.

Use of Framework Name and Logo

Not specified. No framework name or logo yet. Only name and logo of product sold in pilot phase (Jade Electricity).

Requirements for Verification and Certification

Renewable electricity producers can apply for approval by regulator.

SMEPC needs to keep detailed quarterly and audited annual accounts on green electricity purchases and Jade Electricity sales. This includes quantities and values. SMEPC also needs to provide information on green electricity consumers (names and amount purchased). The annual accounts of SMEPC will be audited by an independent auditor.

12. The Shanghai Green Electricity Scheme in the Context of the Renewable Energy Law

The development of the Shanghai Green Electricity Scheme and the Renewable Energy Law of China (REL) (see the Box on pg 75) were initiated approximately at the same time in late 2003. As the design of the Shanghai Green Electricity Scheme had to be submitted to SMG before May 1, 2004, and the Renewable Energy Law took shape after that, the Renewable Energy Law was not used as a framework condition when designing the Shanghai Green Electricity Scheme. The Renewable Energy Law was approved by the Standing Committee of the National People's Congress on February 28, 2005, and became effective on January 1, 2006. On June 14, 2005, SMG approved the Shanghai Green Electricity Scheme after assuring itself that there was no conflict between the Green Electricity Scheme and Renewable Energy Law. The Shanghai Green Electricity Scheme became operational immediately after approval.

If the Shanghai Green Electricity Scheme had unambiguously adopted the additionality requirement (see Section 10.8) the situation would have been fairly simple. The Green Electricity Scheme would have been perfectly complementary to the Renewable Energy Law, regardless of the kind of legal obligation. As general production of renewable electricity is more expensive than the production of conventional electricity, the additional payment of green electricity consumers is used to cover this difference. If through a legal obligation, electricity already contains some amount of renewable electricity, consumers are only prepared to pay more for the renewable electricity in excess of the legal obligation. In other words, the renewable electricity used in green electricity needs to be in addition to any legal obligation. This additionality requirement is a common international practice. What the additionality requirement would mean for the three main legal obligation options used internationally is discussed below.

One of the legal obligation options is the RPS. An RPS requires the obligation holder to produce, transmit, distribute or consume electricity, of which a certain share comes from specified renewable resources. The incremental cost is, in general, distributed to the overall electricity consumers. In case of an RPS, the additionality requirement means that only renewable electricity in excess of the mandatory share can be sold as green electricity. For instance, if the RPS would require a minimum share of five percent renewable electricity, the amount exceeding 5 percent could be marketed as green electricity. In fact 'ordinary' electricity would now be electricity with at least 5 percent renewable electricity. The incremental cost of the renewable electricity in excess to the legal obligation is covered by the green electricity consumers.

Another legal obligation option is the Feed-in-Tariff system which requires of the obligation holder to provide specified renewable electricity producers and pay the mandatory feed-in-tariff. The feed-in-tariff is typically sufficiently high to make development and operation of renewable electricity plants financially attractive. The incremental cost is, in general, distributed to the overall electricity consumers. If the green electricity scheme adopted the additionality requirement, renewable electricity, for which the feed-in-tariff is paid, cannot be used in green electricity products. Only renewable electricity, for which no feed-in-tariff has been paid or for which the feed-in-tariff is insufficient to make development and operation financially attractive, can be sold as green electricity. Examples of the first are renewable electricity technologies for which no feed-in-tariff has been established. Examples of the second are specific projects or technologies for which more than the feed-in-tariff has to be paid. In that case, only the amount in excess of the feed-in-tariff can be recovered from the additional payments by green electricity consumers.

The third legal obligation option is the obligation to organize bidding for renewable electricity supply as under the UK Non Fossil Fuel Obligation (NFFO). In a mandatory bidding, the obligation holder is required to organize bidding for specified renewable electricity supplies, connect the winning bidders' projects and pay the winning bid price. The incremental cost can be distributed to the overall electricity consumers or, as in the case of NFFO, be paid from a fund. When adopting the additionality principle, renewable electricity produced from projects supported through the mandatory bidding process cannot be sold as green electricity. Renewable electricity from other projects can be sold as green electricity, whereby green electricity consumers' additional payments are used to cover the incremental cost. The bidding for concessions, as prevalent in China, is similar to this option. Electricity from these concessions cannot be used in green electricity.

As Shanghai did not unambiguously adopt the additionality requirement, renewable electricity in the Shanghai Green Electricity Scheme may be counted against meeting the legal obligation of an RPS, be it from projects that are financially viable when receiving the feed-in-tariff, or from winning bid projects. Green electricity consumers are, in this case, paying for something that is required by law to be paid for by all electricity consumers by incorporating the incremental cost in the tariff. This will make the green electricity scheme much less attractive. It is recommended to adopt the additionality principle in a future revision of the Shanghai Green Electricity Scheme.

The REL was approved on February 28, 2005, and became effective on January 1, 2006. It has eight Chapters and 33 Articles.

The objectives of the Renewable Energy Law are (Article 1):

- Promotion of the development and utilization of RE;
- Improvement of the energy infrastructure;
- Diversification of energy supply;
- Safeguarding the energy security;
- Protection of the environment; and
- Realization of sustainable development.

The REL adopted the feed-in-tariff system as the Mandated Market Policy (Articles 14 and 29) and paid the feed-in-tariff established by the energy authorities of the State Council (Article 19). The incremental cost will be distributed to the overall electricity consumers by incorporating it in the tariff using a cost-sharing method developed by the price authorities of the State Council (Articles 20 and 21). For the construction of renewable electricity projects, administrative permits need to be obtained. If for one location there is more than one applicant, a bidding process will be organized to determine who will get the permit (Article 13). In this case, the feed-in-tariff will be the winning bid price if it does not exceed the tariff of similar projects (Article 19).

In early January 2006, National Development and Reform Commission China (NDRC) prepared two regulations under the Renewable Energy Law: Provisional Administrative Measures on Pricing and Cost Sharing for Renewable Energy Power Generation (2006/7); and Relevant Regulation on the Administration of Power Generation from RE (2006/13).

The first regulation stipulates in Article 6 that the feed-in-tariff for all wind projects will be determined through bidding. For biomass (Article 7), the feed-in-tariff will be 0.25 Yuan/kWh over the standard regional tariff for coal-fueled power plants with flue gas desulfurization for 15 years after start of electricity production. Articles 12 to 19 provide the incremental cost-sharing mechanism, and formulas to calculate the incremental cost for each province. Finally, it is interesting to note that Article 11 encourages consumers to buy green electricity.

The second regulation provides details on administrative responsibilities. Among others, it stipulates in Article 6 that wind power projects of 50 MW and above require approval by NDRC. Projects below this size can be approved by provincial governments. Although the law appears to make a clear choice for the feed-in-tariff system, Article 14 puts an obligation on the power companies to generate a mandatory share of total electricity production from renewable resources. This, in effect, introduces an RPS. Details on the renewable electricity share will be provided in one of the additional regulations which are expected to be issued over time.

13. Jade Electricity

In Chapter 4 of Part 1, green electricity product characteristics were discussed. In this chapter, recommendations are provided for specifying these product characteristics for the product marketed in the pilot phase. After that, the actual product characteristics are provided and, where relevant, recommendations for modification of these product characteristics are discussed.

The product offered in the pilot phase is called Jade Electricity.

Target Consumers

Target consumers can be households, large non-residential consumers (commercial, industrial, government), or both. The World Bank recommended, in line with the Design Principles, offering Jade Electricity to both commercial consumers and households. Although it would be easier to offer Jade electricity to only commercial consumers, it would be a missed opportunity if households were excluded. By including households, interest in buying green electricity by households can be tested, and awareness creation among, and marketing to, households can be initiated. Including households will require setting up the sales system to include both large non-residential and household consumers. Including both is in line with the Design Principles, which requires the scheme to be 'inclusive'.

The decree specifies that Jade Electricity be offered to both large electricity consumers, including entities such as industry, business and governmental organizations, and households (Article 3, 5, 7 and 8). It is expected, however, that initially non-residential consumers will purchase the bulk of available Jade Electricity, while residential sales will be small.

Product Name and Logo

A product name and logo can strongly support the sale of a product when properly designed. The World Bank recommended marketing a green electricity product in the pilot phase with a clearly identifiable name and with its own product logo. The name should appeal to consumers and convey the message that this new product fits well in the traditional Chinese culture.

For the product offered in the pilot phase, the name Jade Electricity was chosen. The logo developed for this product is presented in Figure 1.1.

Figure 2.1: The Jade Electricity Product Logo



The name and logo are intended to present the following:

- Jade in Chinese literature represents 'green' and 'clean'.
- Jade can be crystal clear, which represents that the Shanghai Green Electricity Scheme is highly transparent.
- The dragon represents China.

Product Types

The two main product types are delivered electricity products and attribute-based products. These main product types can be subdivided into these categories (i) percentage of electricity-use products; (ii) fixed amount of block products; (iii) percentage increase of electricity bill products; and (iv) fixed increase of electricity bill products. The World Bank recommended initially offering only delivered electricity products because they are easier for consumers to understand. Attribute-based products require the understanding of the concept of separating renewable electricity into physical electricity and the attribute. The World Bank

further recommended offering green electricity products containing a certain percentage of renewable electricity. In that case, green electricity is a mixture of renewable and conventional electricity. Consumers would switch from buying conventional electricity to buying green electricity. The advantages of a percentage-based product are that consumers buy only one product and that the share of renewable electricity is clearly specified. Further, consumers only see the incremental cost of total electricity consumption and not the incremental cost of 1 kWh renewable electricity. For the other product options, the incremental cost of renewable electricity needs to be provided.

Jade Electricity is a delivered electricity-based product that is offered in blocks of 100 percent renewable electricity. This is also the reason that in the draft decree, green electricity is a synonym for renewable electricity. Consumers will, in general, purchase two products. They buy a predetermined amount or blocks of green electricity (Jade Electricity), and the balance of their consumption is ordinary electricity. The product is a delivered electricity-based product because the product is associated with delivering the physical electricity. Consumers buy Jade Electricity from the same vendor from whom they buy their normal electricity.

The decree specifies that the block size for large non-residential consumers is 6,000 kWh, and for households, it is 12 kWh. Different consumers groups are required to buy a minimum number of blocks per year in order to participate (Article 8). Details are provided in Table 2.7.

Table 2.7: Minimum Number of Blocks by Consumer Group

<i>Annual Electricity Consumption (MWh/year)</i>	<i>Minimum Number of Blocks</i>	<i>Minimum Amount of Renewable Electricity (kWh)</i>
<i>Large Non-household Consumers</i>		
□ 2,000	10	60,000
> 2,000 and □ 5,000	20	120,000
> 5,000 and □ 20,000	50	300,000
> 20,000 and < 50,000	80	480,000
□ 50,000	100	600,000
<i>Households</i>		
All Households	10	120

Renewable Electricity Source Used

With respect to the renewable electricity source used, one needs to consider the renewable electricity technology and the location and age of the generation facilities. In line with the framework specifications, the World Bank recommended including in the pilot phase only electricity generated from PV and wind from new facilities in the Shanghai municipality. Other sources should be included only after extensive stakeholder consultation.

Jade Electricity will comprise electricity generated by wind, solar and other unspecified resources (Article 2). Article 1 specifies that the objective of the Shanghai Green Electricity Scheme, among others, is to accelerate the development of renewable electricity in Shanghai. This objective can be achieved only if renewable electricity produced in Shanghai is used in Jade Electricity. Because Shanghai produces at present only renewable electricity from wind and PV, it is likely that Jade Electricity will contain only electricity from these two technologies.

Amount of Renewable Electricity

The amount of renewable electricity depends mainly on the incremental cost of renewable electricity. If the incremental cost is low, consumers will want the maximum amount. When the incremental cost is high, consumers will want a smaller share. Based on the analysis in Chapter 9, the World Bank recommended offering green electricity products, including renewable electricity equivalent to 5 percent, 10 percent and 25 percent of the total electricity consumption, irrespective of the product type. This will prevent exploitation by polluting industries who claim to be environmental-friendly while they buy only a very small amount of renewable electricity. This would also enable recognition of consumers buying large shares of renewable electricity.

As mentioned above, Shanghai decided to offer blocks of renewable electricity. In the decree for the pilot phase, green electricity is synonymous with renewable electricity (Article 2). Green electricity consists, therefore, of 100 percent renewable electricity. Because of the product type selected (a renewable electricity block system), no fixed percentage of electricity consumption comes from renewable resources. There is, however, a requirement for different consumer groups to buy a minimum number of blocks of green electricity. The consumer groups are categorized according to the annual electricity consumption. From this, it is possible to calculate for each consumer group the minimum share of renewable electricity as a percentage of the total electricity consumption. The result is given in Table 2.8.

Table 2.8: Minimum Amount of Renewable Electricity

<i>Annual Electricity Consumption (MWh/year)</i>	<i>Minimum Amount of Renewable Electricity (kWh)</i>	<i>Minimum Share (%)</i>
<i>Large Non-household Consumers</i>		
□ 2,000	60,000	3
> 2,000 and □ 5,000	120,000	2.4
> 5,000 and □ 20,000	300,000	1.5
> 20,000 and < 50,000	480,000	0.96
□ 50,000	600,000	—
<i>Households</i>		
All households	120	—

Note : no minimum share can be calculated.

Pricing

The two main pricing options for the renewable electricity share of electricity consumption are incremental cost pricing and fuel cost pricing (see Section 4.6). For reasons of simplicity, the World Bank recommends incremental cost pricing with reassessment of the incremental cost at regular intervals. For a percentage of electricity consumption-type products, the incremental cost of renewable electricity would be averaged over the total electricity consumption. For a block-type product, the incremental cost per kWh of renewable electricity needs to be provided.

The pricing mechanism adopted for Jade Electricity is that of the existing tariff plus a changing premium. This premium will be calculated on an annual basis. The premium of Jade Electricity (in Yuan per kWh) is the total annual incremental cost divided by total annual renewable electricity production. The incremental cost can be, and most likely is, different for each production facility. It is calculated as the difference between the average grid-connected cost of renewable electricity and the cost of electricity, excluding transmission and distribution, for the whole municipality (Article 5). The price of Jade Electricity is subject to approval by SMG pricing authorities. The purchase of Jade Electricity will not affect the current end-users' tariffs.

For the first year, the approved premium for Jade Electricity is 0.53 Yuan per kWh. This will make Jade Electricity about twice as expensive as ordinary electricity. As Jade Electricity is only a small share of the total electricity consumption, the overall increase in the cost of electricity is still very low.

It should be noted that the cost of Jade Electricity does not include compensation to SMEPC for operating and marketing Jade Electricity nor for verification and certification. SMEPC considers the operating and marketing cost as an 'in kind' contribution to introducing green electricity, while the cost for verification and certification is borne by SMG. Based on international experience and experience during preparation of the Jade Electricity scheme, expenditure of 5 percent of total incremental revenues for operating, marketing, verification and certification is considered reasonable. In the first few years, this could be higher, while in the later years, when sales have increased and valuable lessons have been learned, this can be lower. It is estimated that of the amount, 75 percent would be for operation and marketing while 25 percent would be for verification and certification.

Windfall Profits

Before even considering the introduction of a green electricity scheme in Shanghai, SMEPC agreed to buy the renewable electricity produced by the Feng Xian county, Chong Ming and Nan Hui wind farms at cost price, plus a reasonable premium (initially the feasibility study cost price plus premium and after 18 months the actual cost price plus premium, all approved by SMG pricing authorities). The incremental renewable electricity cost would be transferred to all electricity consumers. This would lead to a minute increase in the electricity tariffs, which also need to be approved by SMG pricing authorities. With the introduction of the Green Electricity Scheme, green electricity consumers want an assurance that the incremental payments are not used to generate windfall profits for the renewable electricity producers or SMEPC.

Payments by SMEPC to the wind farm companies are not affected by the introduction of the Green Electricity Scheme and remains the same even in the absence of it. Therefore, there will be no windfall profits for the wind farm companies. Also, SMEPC will not generate windfall profits as incremental payments from the Green Electricity Scheme will reduce the incremental renewable electricity cost and reduce, therewith, the amount that needs to be transferred to all electricity consumers. All this is reviewed by the municipal pricing authorities. Since SMEPC is indirectly the shareholder of all existing wind farm companies in the Shanghai Municipality, and is interested to indirectly participate in future wind farm companies, SMEPC has more interest in purchasing additional renewable electricity than in reducing the incremental renewable electricity cost transfer to all consumers.

In the absence of a green electricity scheme, SMEPC would continue to buy increasing amounts of renewable electricity. The introduction of the Green Electricity Scheme will, however, substantially accelerate this process and will lead to far greater amount of renewable electricity consumption than would have taken place in the absence of the scheme.

Invoicing

The World Bank recommended following international practices and including the cost of green electricity in the monthly bill. For a percentage of electricity consumption-type products, the monthly green electricity consumption is a fixed percentage of the total monthly electricity consumption. For a block-type product, this would be the same amount each month, one-12th of the annual subscribed amount.

Article 9 of the decree specifies that the annual contracted amount of renewable electricity will be paid in 12 equal monthly installments. This will be paid through the existing billing system.

Term

The longer the term, the more certainty the contracts provide for the vendor. The World Bank recommended offering terms of at least one year, but preferably longer. Further, the World Bank recommended specifying that contracts would be automatically extended for one year if no written notice were received to end participation within two months of the end of the contract period. This will greatly help in planning and reducing marketing and administration cost.

When subscribing to buy Jade Electricity, consumers have the choice of three subscription periods: (i) one year; (ii) two years; and (iii) three years (Article 9). The start of the term is not specified, indicating that a term can start at any time. The draft decree does not specify an automatic renewal if Jade Electricity consumers do not terminate their subscription before the end of the contract period.

When preparing the standard contracts, it is recommended again to consider the automatic renewal of the contract, either with another year or making it open-ended.

Consumer Value

To increase consumer value, the World Bank recommended developing incentive packages for both large non-household consumers and households. These packages could comprise promotion material (such as posters and stickers), certificates, a list of the largest consumers (both in absolute numbers and in percentage of electricity consumption), awards, use of the product logo and other such things. The World Bank supported SECSC to start preparing materials to enhance consumer value.

The consumer value created for Jade Electricity is specified in Chapter 3 of the draft decree. Jade Electricity consumers will receive a certificate of participation. In addition, a list of Jade Electricity consumers will be published and updated at regular intervals (Article 11). Large consumers of Jade Electricity who consume more than 1 MWh of Jade Electricity, which exceeds 10 percent of the total electricity consumption, and

those who have signed a supply contract for at least two years, can apply for the right to use the Jade Electricity Logo for their promotional activities (Article 12). Once their application is formally approved, high-volume consumers can use the Jade Electricity Logo for promotional purposes.

Continuing the development and implementation of new ideas to increase consumer value is recommended. This will support the marketing of green electricity and attract new consumers.

Labeling

The main purpose of labeling is to assure consumers by a third party that the green electricity product is as genuine as claimed by the vendor, and that no more renewable electricity is sold than generated or bought. Labeling will help to increase consumer confidence in the product if done by a renowned institution. The World Bank recommended providing a similar assurance either through labeling or otherwise.


Jade Electricity has no quality label. However, the product is defined in some details in the decree for the pilot phase, and SMG assures that more renewable electricity is not sold than what is generated or bought, and that the incremental cost is used for its intended purpose. This is done through SHRDC, SHEC and SECSC, which will review the green electricity accounts of SMEPC and, if necessary, audit the accounts.

In marketing Jade Electricity, it is recommended to specify clearly which guarantees are provided by SMG in order to increase consumer confidence. By doing this, other third party labeling will not be required for Jade Electricity. When more green electricity products are offered in Shanghai, this issue may be reconsidered.

Jade Electricity Product Characteristics Summary

The summary sheet of Jade Electricity is given in Table 2.9.

Table 2.9: Summary of Jade Electricity Characteristics

Vendor: Shanghai Municipal Electric Power Company (SMEPC)		
Target Consumers		
Households and large non-residential consumers.		
Product Name and Logo		
Jade Electricity.		
Product Types		
Delivered Electricity, Block-type Product.		
<i>Annual Electricity Consumption (MWh/year)</i>	<i>Minimum Number of Blocks per year</i>	<i>Minimum Amount of Renewable Electricity (kWh/year)</i>
<i>Large Non-household Consumers (block size 6,000 kWh)</i>		
□ 2,000	10	60,000
> 2,000 and □ 5,000	20	120,000
> 5,000 and □ 20,000	50	300,000
> 20,000 and < 50,000	80	480,000
□ 50,000	100	600,000
<i>Households (Block Size 12 kWh)</i>		
All Households	10	120
Content		
Wind and PV, possibly others. All renewable electricity produced within the Shanghai municipality.		

Amount of Renewable Electricity

Blocks of 100 percent renewable electricity. Overall minimum share renewable electricity is given in the table.

<i>Annual Electricity Consumption (MWh/year)</i>	<i>Minimum Amount of Renewable Electricity (kWh)</i>	<i>Minimum Share (%)</i>
<i>Large Non-household Consumers</i>		
□ 2,000	60,000	3
> 2,000 and □ 5,000	120,000	2.4
> 5,000 and □ 20,000	300,000	1.5
> 20,000 and < 50,000	480,000	0.96
□ 50,000	600,000	-
<i>Households</i>		
All Households	120	-

Pricing

Existing tariff plus a changing premium. The premium will be approved by SMG annually. The premium is the difference between the average grid-connected tariff of renewable electricity and the average grid-connected tariff for the whole municipality.

Invoicing

The contracted amount will be charged in 12 equal monthly intervals through the existing billing system of the local utility.

Term

Consumers can choose between a term of one, two or three years.

Consumer Value

Jade Electricity consumers will receive a certificate of participation. In addition, a list of Jade Electricity consumers will be published and updated at regular intervals. Large consumers of Jade Electricity who consume more than 1 MWh of Jade Electricity, comprising more than 10 percent of total electricity consumption, and have signed a supply contract for at least two years, can apply for the right to use the Jade Electricity Logo for their promotional activities. Once their application is formally approved, large consumers can use the Jade Electricity Logo for promotional purposes.

Labeling

Jade Electricity has no quality label. SMG reviews Jade Electricity accounts and commissions independent audits when required.

14. Implementation Procedures

The draft decree not only specifies the product characteristics, but it also specifies the implementation procedures. In this chapter, the implementation procedures, as specified in the draft decree, are discussed. In Chapter 15, recommendations for improvements are discussed.

Objectives

The objective of introducing a green electricity scheme in Shanghai is according to the draft decree (Article 1) to (i) accelerate the development of renewable electricity resources; (ii) improve the energy infrastructure; (iii) engage in environmental protection and sustainable development; and (iv) involve society in the development of renewable electricity production.

Responsibilities of Parties Involved

The roles and responsibilities of the different parties involved are specified in Articles 4, 14, 15, 16, and 17 of the draft decree. In general, SHEC and SMDRC are responsible for management and monitoring of the Jade Electricity pilot. SMDRC is, in particular, responsible for preparing the annual plan, regulation and execution of the Jade Electricity tariff and will audit SMEPC. SHEC is responsible for overall supervision and monitoring. SHEC and SMDRC have the authority to decide how the provisions in the decree should be interpreted if anything is unclear or if there are conflicts among the parties involved.

In the pilot phase, SECSC will act as the Jade Electricity regulatory body or management office (Articles 4 and 16). Its responsibilities include the following:

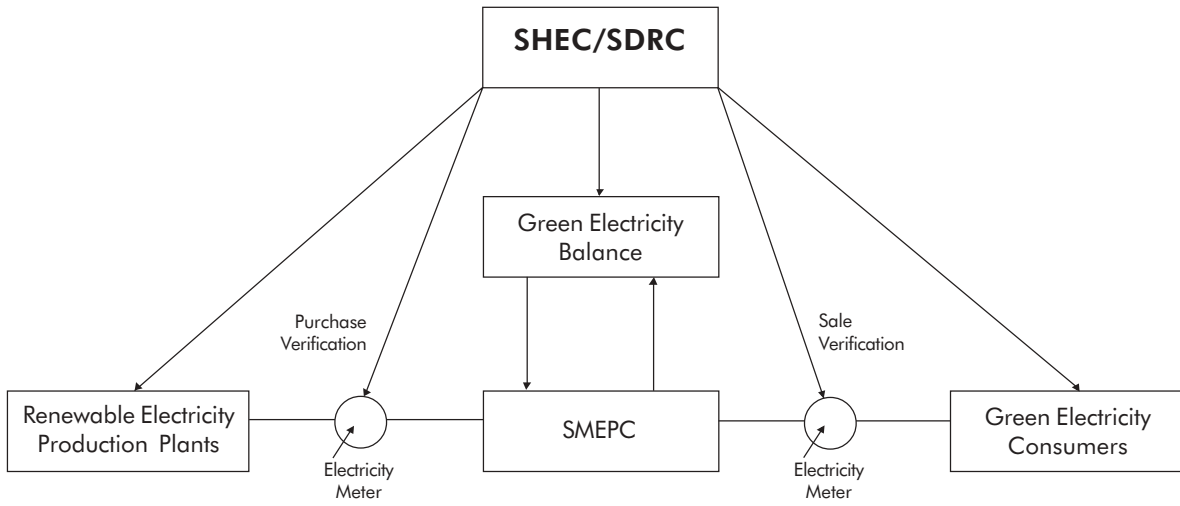
- Certification of producers (including developing certification standards and certification procedures).
- Certification of consumers to allow the use of the Jade Electricity Logo for their promotional campaigns (criteria are specified in the draft decree; however, specific procedures still need to be developed).
- Review and approval of the quarterly and annual Jade Electricity Accounts from SMEPC.
- Publication of relevant (non-confidential) information on renewable electricity purchases and Jade Electricity sales and Jade Electricity consumers to increase transparency.

- Assistance to SMEPC in promoting Jade Electricity.
- Monitoring of the green electricity purchases and Jade Electricity sales.
- Reporting to SHEC, SMDRC and other relevant organizations.
- Identification of and the proposal of improvements to the Jade Electricity pilot project.
- Authorize eligible consumers and producers to use the Jade Electricity Logo.
- Taking action against unauthorized use of the Jade Electricity Logo.

SMEPC will sell Jade Electricity. The draft decree specifies in Articles 10 and 14 the responsibilities of SMEPC, including the following:

- Development of the annual green electricity purchase and sales plans and execution of this plan.
- Increase of the market, as far as the supply of renewable electricity allows, by signing up new consumers.
- Maintenance of separate and accurate accounts of purchases of renewable electricity and sales of Jade Electricity.
- Continuous improvement of services to Jade Electricity consumers, including the provision of good information and ease of subscribing.
- Preparation of quarterly and audited annual accounts on the purchase of renewable electricity and sales of Jade Electricity (both in quantity and value), including a list of consumers and the purchase by each consumer.
- Balancing of renewable electricity purchases and Jade Electricity sales.
- Acceptance of supervision and guidance from the Jade Electricity regulatory body and cooperation with the auditing institutions, which are authorized by the Jade Electricity regulatory body.
- Modification of the billing system to show on the bill of Jade Electricity consumers relevant information related to their purchase of Jade Electricity, as specified in Article 16.

Based on the information provided in the draft decree, the institutional framework for the Jade Electricity pilot project can be schematically presented as in Figure 2.2. The schematic presentation does not include the roles of SHEC or SMDRC.

Figure 2.2: The Institutional Framework for the Jade Electricity Pilot

Other Specifications

The draft decree provides details on a number of other aspects relevant to implementing the Jade Electricity pilot. These aspects are briefly discussed below.

Subscription: Consumers can apply for participation by phone, mail, online or by visiting the local business branches of SMEPC. For application by phone, consumers can use SMEPC’s Toll-Free Service Line (95598). Applying online is possible on the Shanghai Green Electricity website and the SMEPC website.

Large energy buyers (non-residential) will become Jade Electricity consumers after signing an agreement with SMEPC. Individual consumers (households) will be able to become Jade Electricity consumers by signing up on the Internet or signing a sign-up form produced by SMEPC. They will receive a letter to confirm their subscription.

Balancing: SMEPC is required to balance the purchase of renewable electricity and sales of Jade Electricity. The settlement period is one year (Article 9). The deficit of one year must be carried forward to the next year. Any surplus can also be carried forward. To avoid an ever-increasing deficit, a full balance must be maintained over a three-year period. Based on the decree, it is not clear how that will happen.

Certification of Consumers: Qualifying Jade Electricity consumers can apply for the right to use the Jade Electricity Logo for their promotional activities. Only large non-household consumers purchasing at least 1 MWh Jade Electricity per year and having supply contracts of two years or more will qualify (Article 12).

Certification of Producers: Only renewable electricity from certified producers can be used in Jade Electricity. Renewable electricity producers who want to supply electricity, to be included in Jade Electricity, can apply for certification. Based on the decree, it is not clear what the standards are for certification and the certification procedures, or who will manage the certification. It is assumed that this is the role and responsibility of SECSC.

One can certify generation plants and/or products. The two approaches to certification are different. They are not clear in the decree and must be given further consideration.

Consumer Value: Jade Electricity consumers will receive a certificate of participation (Article 11). Also, a list of consumers will be issued and updated at regular intervals. SECSC will issue the certificate and publish the list of consumers.

15. Recommendations

Table 2.10 provides recommendations for specifying the different framework elements for a green electricity scheme for Shanghai. These recommendations summarize the recommendations made in Chapter 10. Table 2.11 provides recommendations for clarifications required for the green electricity decree. These recommendations can be taken into consideration during implementation of the decree.

Table 2.10: Recommendations on the Framework

<i>Issue</i>	<i>Recommendation</i>
Eligible Renewable Electricity Resources	<p>In specifying eligible renewable electricity in a general framework for green electricity products for Shanghai, a balance should be kept between not including controversial resources and maintaining enough flexibility to allow the utility to develop an affordable and effective program. If controversial sources are used in green electricity products, it might undermine the environmentally sustainable image of green electricity. On the other hand, by being too restrictive, one may hamper the growth of the green electricity concept and the sales of the products. At present, wind and PV electricity is generated in Shanghai. There are plans to construct four municipal solid waste incineration plants and one biogas plant using chicken waste wind and PV are not controversial, but the other two are controversial sources of renewable electricity generation. Wind and PV can be approved without a problem. A decision to approve other resources should be subject to confirmation of consumer acceptance and market experts. Consumer acceptance can be assessed through a survey. Market experts may be part of the multistakeholder process suggested previously.</p> <p>If there is insufficient time to carry out the extensive stakeholder consultation, it is recommended to specify in the framework the available eligible non-controversial renewable electricity resources and to specify which government organization has the delegated authority to specify additional eligible renewable electricity resources after thorough investigation and stakeholder consultation.</p>
Location of Production (domestic or imported)	<p>In the draft decree, no restrictions are included on importing renewable electricity. This leaves the possibility open to import renewable electricity when the demand exceeds the amount of renewable electricity produced in Shanghai. This may be necessary because the current and possible renewable electricity potential for Shanghai is considered to be small. However, imports will result in less economic development in Shanghai due to RE plant construction and maintenance, and may enable air quality benefits outside of Shanghai. Imports can only be allowed after suitable rules and procedures have been established for this. A suitable party, such as the multistakeholder group, should be given the responsibility to develop these rules and procedures.</p>

If there is insufficient time for extensive stakeholder consultation, it is recommended to specify in the framework that in green electricity products sold in Shanghai, renewable electricity generated in the Shanghai Municipality can be used, and which government organization has the delegated authority to specify additional locations of production after thorough investigation and stakeholder consultation.

To maintain flexibility, it is recommended not to specify the maximum share of renewable electricity that can come from generation facilities outside the municipality, but leave this to the market. In the requirements for product disclosure to consumers, the framework should require to disclose the share of renewable electricity that is produced outside the municipality.

Age of the Production Facilities	The issue of age of the renewable electricity production facilities is not relevant for renewable electricity produced within the Shanghai Municipality as the 'oldest' production facility started production in August 2003. However, if imports of renewable electricity becomes necessary, Shanghai may want to limit or exclude electricity from 'old' production facilities. In that case, Shanghai needs to define 'old' and 'new'. It is recommended that Shanghai specifies that production units established before August 2003 (the month in which the Feng Xian County wind farm started production) are considered old.
Minimum Content 'New' Renewable Electricity	This aspect is only relevant when renewable electricity is imported. To avoid problems in the future, it is recommended to specify that only new renewable electricity can be used in green electricity products sold in Shanghai. This means that only renewable electricity from production facilities, which started production after August 2003, can be used.
One-for-one Requirement	As the requirement that not more renewable electricity can be sold than generated or bought (the one-for-one requirement) is considered a universal framework characteristic, it is recommended to adopt this requirement as a framework characteristic.
Settlement Period	Based on international practice and experience, a settlement period of one year is recommended. Shorter periods unnecessarily increase the administrative burden, while longer periods provide insufficient confidence to consumers. It is recommended to also specify the start and end date of the settlement period. This could be January 1 to December 31 or the start and end date of the fiscal year used by the vendor. The decree specifies a settlement period of one year. Over a period of three years, a full balance needs to be maintained. The decree does not provide details as to how this must be done. It is recommended to specify this in a future revision of the decree.
Balancing	The balancing rules are specified in the decree. Any surplus can be carried forward to the next year. Any deficit can be carried forward in full to the next year and should be added to the sales of that year. The recommended balance is given below.

Renewable Electricity Balance Year X+1

<i>Bought and Generated</i>	<i>Sold</i>
Surplus Year X	Deficit Year X
Bought and Generated Year X + 1	Sold in Year X + 1
Deficit Year X + 1	Surplus Year X + 1
Total	Total

Additionality	<p>Additionality (renewable electricity used in green electricity must be additional to any legal obligation on electricity production, consumption or purchase) is also considered a universal framework characteristic. It is, therefore, recommended to adopt this requirement as a framework characteristic for green electricity products sold in Shanghai.</p> <p>This requirement is necessary to maintain consumer confidence in the scheme.</p>
Minimum Renewable Electricity Requirement for Green Electricity Products	<p>It is recommended to include a provision in the framework to ensure that green electricity consumers buy a reasonable minimum amount of green electricity. This is required to ensure that in particular, large consumers do not market themselves as environmental-friendly because they use green electricity, while only an extremely small fraction of their electricity consumption comes from renewable resources. Establishing a minimum amount of renewable electricity is very easy for a percentage of electricity consumption-type products. The framework can specify that this type of green electricity products must at least contain a certain amount of renewable electricity. For Shanghai, at present, 5 or 10 percent appears to be a reasonable minimum amount. For block-type products, this is more difficult, but it is possible to specify the minimum number of blocks by electricity consumption categories. This is the approach adopted for Jade Electricity. Frameworks which allow both percentage of electricity consumption-type products and block-type products can specify both.</p> <p>For instance, the Green-e framework requires for percentage of electricity consumption-type products, a minimum amount of renewable electricity of 50 percent and for block-type products, a minimum amount of renewable electricity of 150 or 200 kWh, depending on the state.</p>
Requirements for Product Disclosure to Consumers	<p>It is recommended to specify in the framework clearly the minimum information that needs to be provided to (potential) green electricity consumers. This should include at least:</p> <ul style="list-style-type: none"> • Nature of the product (percentage or block-type product) • Amount of renewable electricity in the product • Sources of renewable electricity production (technologies, share of each technology, share imported renewable electricity) • Pricing • Invoicing • Term
Emission Benefits Included in Renewable Electricity	<p>It is recommended to specify in the decree that all environmental benefits of renewable electricity used in green electricity, are included in the product and the consumer owns them once they have made a purchase.</p>
Product Name	<p>The framework should require that all green electricity products from one supplier have different names. This is required so that the consumer can clearly differentiate between the different products.</p> <p>Product logos are not required, but are recommended. This could be separate logos for each product of one supplier or one logo for all products of one supplier.</p>
Use of Framework Name and Logo	<p>The use of the program name and logo may be of interest for green electricity sellers, renewable electricity producers and green electricity consumers. To protect the reputation of the program, clear and strict rules for using the program name and logo need to be established. A very good example in this respect is the Australia Green Power program.</p>

Requirements for Verification and Certification	The framework should include detailed requirements for verification and certification. This will include requirements for disclosure of information, auditing, verification and certification. The framework should also clearly specify what will be verified and certified. This can include: (i) producers; (ii) sellers; (iii) products; (iv) consumers.
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Table 2.11: Recommendations for Clarification of the Draft Decree

<i>Issue</i>	<i>Recommendation</i>
Renewable Electricity Sources Used (product)	Article 2. It should be made clear to the consumers that in the pilot phase, Jade Electricity will only include electricity produced in Shanghai from wind and PV. If renewable electricity produced in Shanghai from other sources is used, consumers will be informed well in advance. If demand exceeds supply, renewable electricity from outside Shanghai may be imported. This will only be from sources starting production after August 2003 and from appropriate locations. Imports will be limited to the extend possible to make sure that the environmental benefits associated with renewable electricity production are obtained within the Shanghai Municipality. The consumers will be informed well in advance as regards importing renewable electricity.
Term (product)	Article 8. Not only the subscription duration should be clear to consumers, but also if subscription can start at any time, or if it starts, as for instance on the first of the month. It should also be clear to consumers what will happen at the end of the term. Will the subscription automatically end, and does the subscription have to be renewed if the consumer wants to continue participation? Or, will the subscription be automatically renewed if subscription is not cancelled, for instance, at least three months before the end of the term? In that case, is the subscription automatically renewed for one year or will the subscription become open-ended, with possible cancellation of the subscription at any time? It is recommended to adopt automatic extension of the subscription for one year if the subscription is not cancelled at least three months before the end of the subscription period. This will provide security on future demand, on which basis, future planning can be based.
Consumer Value	Articles 11 and 12. The draft decree is not clear as to which organization will issue the certificate of participation to Jade Electricity consumers, and, who will publish the list of Jade Electricity consumers. Normally, it would be the seller who issues the certificate. It can, however, also be done by an overseeing body. In this case, this would be the Jade Electricity pilot regulator — SECSC. This needs to be clarified.
Settlement Period	Article 10. A settlement period of three years is very long. This will not give consumers assurance that SMEPC will actually balance the purchase and sales until three years after the start of the pilot. A settlement period of one year provides more confidence. At the end of each year, a balance needs to be prepared and any surplus or deficit becomes apparent. Another way to approach this is to develop an agreement with SMEPC that if they reach a certain amount of megawatt-hours sold, they will build new renewable generation within a certain amount of time.
Balancing	Article 10. The draft decree does not specify how a balance after three years will be achieved. In addition, a three-year life of a renewable electricity product is somewhat unusual based on international best practices. There will always be a surplus or deficit. This needs further clarification.

Certification of Producers	Article 15. For certification of renewable electricity producers, criteria and clear certification procedures needs to be established. Clarification is needed on which organization will prepare the criteria and procedures. This could be the Jade Electricity pilot regulator — SECSC.
Regulator	Articles 4, 9.6 and 18. The draft decree is not consistent with respect to the role of SECSC. Is SECSC the Jade Electricity pilot regulator? The responsibilities of the Jade Electricity pilot regulator should be specified more clearly.
Tariff Approval	Articles 5 and 17. Based on the draft decree, it is not clear which department of SMG will approve the price of Jade Electricity. From the decree, it is also not clear for which period the tariff can be approved. Article 17. SHDRC is responsible for regulating the Jade Electricity tariff. When necessary, it can assign an auditor to audit the accounts from SMEPC. It is not clear if this is a different auditor than the auditor who audits the Jade Electricity accounts from SMEPC. This needs to be clarified.
Annual Plan	Article 9.1 specifies that SMEPC needs to prepare an annual green electricity purchase and sales plan. The decree does not specify to as to the plan should be submitted to whom, who will review it and who will approve it. It would be useful if these details are provided. It is now assumed that SECSC will review the plan and approve it on behalf of SHEC.
Quarterly and Annual Reports	Article 9.3. SMEPC is required to produce quarterly and annual reports. It is not clear to whom and by when, these reports need to be submitted. It is also not clear who will review and approve these reports. It makes sense that the body engaged in certification and verification should do this. This needs to be clarified.
Audited Accounts	Article 9.4. Although not explicitly mentioned, it appears that at least the annual accounts from SMEPC needs to be audited. If this is correct, the question is who will arrange and pay for the audit. In addition, which person or organization will be qualified to do the audit is another unanswered question. The above issues needs to be specified.
Approving use of the Jade Electricity Logo	Article 14. Large consumers fulfilling the criteria specified in Article 13 (consumption of at least 1 MWh/year Jade Electricity and a subscription period of at least two years) can apply for approval of using the Jade Electricity Logo for promotional purposes. From the draft decree it is not clear to whom they should submit the application, who approves and what are the rules. One of the actors could be authorized to do this. This could, for instance, be the Jade Electricity pilot regulator. In addition, 1 MWh is an extremely small amount of electricity which will cost large energy users next to nothing. This could result in reducing the value of the Logo and brand. This detail needs further consideration. The minimum amount could be raised to 1,000 MWh/year. Further clarification is required.
Transparency	Article 16. From the draft decree, it is not clear who will publish relevant information on the Jade Electricity pilot to inform the general people and consumers of Jade Electricity. Further clarification is needed.

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Annex 1

Terms and Definitions

Accreditation — Procedure by which an authoritative body gives formal recognition that a body or person is competent to carry out specific tasks.

Allocation of Emission Benefits — A green electricity product can be sold as a ‘bundled’ product, in which the energy and the green attributes of that product are sold as one unit, or as a tradable renewable certificate, which represents only the environmental attributes of the green electricity product. The ‘allocation of emission benefits’ will determine who owns those positive environmental attributes.

Biomass — Plant material, vegetation or agricultural wastes such as wood, crops, crop residues, industrial and municipal organic waste, food processing waste and animal waste used as a fuel source to generate electricity.

‘Bundled’ Renewable Electricity Product — A product where the energy commodity and green attributes, or characteristics, are matched together and sold as one unit.

‘Certificate-based’ Renewable Electricity Product — A product where the green attributes, or characteristics, are sold independently from the energy commodity. See also Tradable Renewable Certificates.

Certification — Process of providing assurance that a product conforms to a standard or specification or that a person is competent to perform a certain task.

Certification Mark — Protected mark, applied or issued under the rules of a certification system, indicating that confidence is provided that the relevant product, process or service is in conformity with a specific standard or other normative document.

Conformity Assessment — Process to verify that a particular product meets a given level of quality or safety, and provide the user with explicit or implicit information about its characteristics, the consistency of those characteristics and/or performance of the product.

Consumer Value — Consumer value is all the benefits that a consumer can garner from the purchase of RE. These ‘values’ may include anything from public relations to financial benefits.

Content — The actual generation mix that will compose the green electricity product (solar, hydro, wind, landfill gas, biogas, geothermal, etc.). Also includes the location of the generation (local, regional, national, or international) and the age of the product (according to Green-e standards, a product is considered new if it has come online since 1997).

Contract for Differences — A green electricity product structure in which the consumer pays the difference between the costs of the renewable resource and the average wholesale cost of electricity. If the price of the renewable product is higher than the average wholesale cost of electricity, the consumer will pay that difference. Conversely, if the cost of the renewable product is lower than the average wholesale cost, the consumer would receive a credit on their bill for that difference.

Consumer Charge — The fee paid to receive service from a vendor.

Demand-side Management — This term refers to energy conservation and efficiency programs developed for and used by residential and business consumers to reduce their use of electric energy.

Deregulation — In the electric industry, ‘deregulation’ (also called ‘restructuring’) describes the transition from utilities playing a monopolistic role (controlling all aspects of electricity supply and delivery), to a state in which other companies can participate in the market by generating and supplying electricity to end-use consumers. After a region’s electric industry is restructured, electric services are separated into generation, transmission and distribution. Typically, the consumer has the ability to choose the generation provider of their electric service. Whether the consumer chooses a competitive supplier or not, the current electric utility will continue to be responsible for the delivery of electricity.

Disclosure — A requirement placed on energy suppliers to provide information to consumers on their prices, terms of service, power sources, air emissions and other product features.

Distribution — The process of delivering electricity from the electric distribution system to a consumer’s home or business over local electric lines.

Distribution Company — The company that provides transmission and distribution services. It is the distribution company that is responsible for maintaining local power lines and restoring power during outages.

Divestiture — A process of removing a utility function, such as distribution or generation, from other utility functions by selling the ownership of assets related to that function. This is most commonly used in reference to a utility’s sale of generating facilities.

Electric Grid — The network of power shared throughout a region. Generators from all over the region feed power into this grid and energy is drawn out on as an needed basis. Since electricity is based on a regional mix, the electricity that is actually delivered to your home is determined by which power generators are located closest to you.

Energy Conservation — Reducing the amount of energy used, or using energy more wisely.

Energy Efficiency — Using advanced and state-of-the-art technologies to provide better quality energy services with less energy, allowing users to get the most productivity from every unit of energy. Getting the desired energy services — comfortable homes, profitable businesses, convenient transportation — with less energy use, less air pollution and lower total cost.

Energy Suppliers — Companies that sell energy to consumers in a competitive market. They may generate the power themselves or resell power generated by someone else. They may also be referred to as competitive energy suppliers, energy service providers, generation companies, power vendors and power brokers.

Fixed Price Product — A green electricity product structure in which the generation portion of the consumer's costs are indexed to the costs of the renewable resource.

Fossil Fuel — Electric generation resources using natural gas, oil, coal, or petroleum coke or other petroleum-based fuels.

Generation or 'Supply' — The power that is generated to meet your electricity needs. Power can be generated from resources such as coal or oil burning or from renewable resources such as wind and solar.

Generation Company — A company that owns and/or operates and maintains power generation plants. May also be referred to as a power company.

Gray Electricity — Energy that is produced from non-renewable resources such as coal, oil and uranium.

Green Attributes — The environmental characteristics of a RE resource. In some areas, for every unit of energy that is generated, there is a corresponding certificate that describes the characteristics of the power source, such as emissions data and when the facility began operating. For RE resources, these attributes hold extra value.

Green-e — The Green-e program was established by the Non-profit Center for Resource Solutions to provide information and an objective standard for consumers to compare electricity products, and to verify that consumers get what they pay for. Green-e is a voluntary certification program available throughout the United States.

Green Electricity — Energy that is produced from naturally replenishing or infinite sources such as the sun, wind and water are considered renewable resources. Green electricity generation has a lower impact on the environment than fossil fuel and nuclear power facilities because they emit little or no emissions, they do not need to be mined or extracted and do not produce harmful radioactive waste. Also called renewable electricity.

Green Electricity Product — Electricity generated by renewable fuels and sold as a differentiated electricity product to end-users who are willing to pay a premium for this product as opposed to conventional or gray electricity. The term product refers to the characteristics, such as structure, pricing, generation source and term of contract for electricity generated by renewable resources.

Green Tag — See Tradable Renewable Certificates.

Hydropower — Hydroelectric (or hydropower) plants capture the kinetic energy of falling water to generate electricity. A turbine and a generator convert the energy from the water to mechanical, and then electrical energy. The turbines and generators are installed either in or adjacent to dams, or use pipelines (penstocks) to carry the pressured water below the dam or diversion structure to the powerhouse. Hydropower projects are generally operated in a run-of-river, peaking or storage mode.

Independent System Operator (ISO) — The organization responsible for matching the electricity dispatched within the regional electric grid to the consumer demand for electricity, to ensure consumers receive uninterrupted power. Several ISOs operate on a regional basis throughout the United States.

Invoicing — The method through which the consumer will be charged for the green electricity, whether this charge will appear on their current utility bill or a separate bill. Also, how often the consumer will be charged.

Kilowatt (kW) — A measure of power. One kilowatt is equal to 1,000 watts, the equivalent of 10x100-watt light bulbs.

Kilowatt-hour (kWh) — A measure of electricity consumption. One kilowatt-hour is equivalent to 1,000 watts running for one hour or a 100-watt light bulb running for 10 hours.

Landfill Gas — Landfill gas is created when waste in a landfill decomposes under anaerobic — or oxygen free — conditions. Because landfill gas is about 50 percent methane, it can be used as a source of energy similar to natural gas (which is about 90 percent methane). Since landfill gas is generated continuously, it provides a reliable fuel for a range of energy applications, including heating and electric power generation.

Low Impact Hydropower — The term ‘low impact hydropower’ was a term created by the Low Impact Hydropower Institute in the United States. The Institute found that considering ‘small’ hydropower as renewable, and larger systems as not, was illogical. A small dam can be operated in a way which decimates the river ecosystem, while larger dams may be operated in a way that better supports the need of the river ecology. Therefore, the Institute has created a standard and now certifies well managed dams. The certification criteria includes eight areas: river flow, water quality, fish passage and protection and watershed protection, threatened and endangered species protection, cultural resource protection, recreation and facilities recommended for removal.

Market Framework — A market framework is the rules by which products can be sold, competition is fair and consumers are protected. These rules can be created and enforced by governmental or non-governmental bodies.

Municipal Utility — A utility owned and operated by a city or town for its residents, which is exempt from the usual regulation by public utility commissions. Municipalities may choose to participate in the retail electric market or not.

Null electricity — A vernacular term used to describe the electrical energy associated with a MWh that has been stripped of its renewable attributes or Tradeable Renewable Certificates (TRCs), meaning that the TRCs have been unbundled from the underlying electricity and are sold or used independently of the electrical energy.

Pilot — A program that is the first-of-its-kind in a particular region which is designed to serve as a tentative model for future development.

Power Broker — An entity who acts as an intermediary for the sale of power.

Power Vendor — An entity who buys and sells power generated by others.

Premium — The difference between the average wholesale cost of electricity and a green electricity product as a result of the higher cost associated with green energy technologies.

Pricing — The structure which will determine what fees a vendor will charge for the green electricity product (tariff plus fixed premium, tariff plus a changing premium, fixed price product, donation plan or contract for differences).

Product Name — The actual brand designation given to the green electricity product to distinguish it from the standard electricity offering.

Public Benefits Charge — See RE and Energy Efficiency Charges.

Public Utilities Commission — The state agency with responsibility for regulating public utilities. The Commission regulates the rates charged by the electric distribution companies to deliver electricity to its consumers' homes or businesses. The Commission also monitors the electric industry to ensure safe, reliable service and provide consumer protection.

Renewable Electricity — See Green Electricity.

Renewable Electricity Certificate or Credit (REC) — See Tradable Renewable Certificates.

RE and Energy Efficiency Charges — Fees that pay for programs to help lower electricity bills and reduce the environmental impacts of energy use. Also known as system benefits charges and public benefits charges.

Restructuring — Sometimes called 'deregulation,' this describes the transition from a situation in which utilities play a monopolistic role (controlling all aspects of electricity supply and delivery), to a state in which other companies can participate in the market for generating and supplying electricity. After a region's electric industry is restructured, electric services are separated into generation, transmission and distribution. The consumer has the ability to choose the generation provider of its electric service. Whether the consumer chooses a competitive supplier or not, the current electric utility will continue to be responsible for the delivery of electricity.

Small Hydroelectric — Electricity produced from the movement of water, such as the flow of rivers. 'Small' hydroelectric facilities are those which are under 30 MW in size. Small hydroelectric facilities are generally considered to have lower environmental impacts than their larger counterparts.

Solar Photovoltaic — Solar Electric or Photovoltaic Systems convert some of the energy in sunlight directly into electricity. Photovoltaic (PV) cells are made primarily of silicon, the second most abundant element in the earth's crust, and the same semiconductor material used for computers. When the silicon is combined with one or more other materials, it exhibits unique electrical properties in the presence of sunlight. Electrons are excited by the light and move through the silicon. This is known as the PV effect and results in direct current (DC) electricity.

Standard — A prescribed set of rules, conditions or requirements concerning definitions of terms; classification of components; specification of materials, performance or operations; delineation of procedures; or measurement of quantity and quality in describing materials, products, systems, services or practices.

Stranded Costs — Costs resulting from financial obligations that a utility would not be able to recover in a competitive market.

System Benefits Charge — See RE and Energy Efficiency Charges.

Tariff — The tariff is the detailed description, usually approved by a regulatory body, of the exact charges to a consumer for electricity services.

Tariff Plus Changing Premium — A green electricity price structure in which a contract is structured that allows the premium to be reduced based on the length of the contract or the amount purchased. This can also be seasonally adjusted. The premium can be charged on a per kWh basis, or it can be applied to a bill for a 'block' of green electricity. The base price for the electricity remains unchanged except through the regular process of updating tariffs.

Tariff Plus Fixed Premium — A green electricity price structure in which a fixed premium is added to the price of electricity from traditional sources. The premium can be charged on a per kWh basis, or it can be applied to a bill for a 'block' of green electricity. The base price remains unchanged, except through the regular process of updating tariffs for price changes.

Term — The length of the contract in months or years.

Tidal Energy — Tidal energy is produced from the ebb and flow of the tide. There are many types of tidal energy technologies. Generally, the potential energy in daily tides is captured by a turbine to drive generators to produce electricity.

Tradable Renewable Certificates (TRCs) — Documentation created when a RE facility generates electricity. Each unique certificate represents all of the environmental attributes or benefits of a specific quantity of renewable generation, namely the benefits that everyone receives when conventional fuels, such as coal, nuclear, oil or gas, are displaced. A consumer usually purchases certificates from someone other than their electricity provider. The price paid when a consumer purchases TRCs is the benefit of displacing other non-renewable sources from the regional or national electric grid. Also called Green Tags, Renewable Electricity Credits or Certificates (RECs), and Tradable Renewable Electricity Certificates (T-RECs).

Transmission — The transport of electricity from the electricity generating facilities across high voltage lines to the local network of lower voltage electricity distribution wires.

Unbundling¹³ — (1) The separation of electric service into its components — generation, transmission and distribution. These components can be listed as line items on an electric bill or can be split into separate bills, one for generation and one for the delivery of electricity. (2) An unbundled transaction is one where the renewable certificates may be sold separately from the associated commodity electricity.

Verification¹⁴ — A process for establishing that the primary attributes of an eligible renewable power resource were produced from the designated resource during the designated time period. Verification may be by contract provision enforcement, by registration and audit or by another standardized method.

Wave Energy — Wave energy is produced by the movement of ocean waves. There are a variety of wave energy systems under development, ranging from small-scale shoreline to large-scale offshore systems. The wave energy systems at the shoreline typically are oscillating water column devices while offshore the devices are floating and held in place by different types of moorings.

Wind Energy — Wind energy comes from moving air which is converted to electric power to create electricity. As air flows past the rotors of a wind turbine, the rotor spins and drives the shaft of an electric generator. Wind turbines with small rotors are often used for battery charging while larger rotors are used to generate large amounts of electricity that can be used locally or fed into the regional grid.

¹³ *Regulator's Handbook on Tradable Renewable Certificates*, Center for Resource Solutions, May 2003 (<http://www.resource-solutions.org/RegulatorHandbook.htm>).

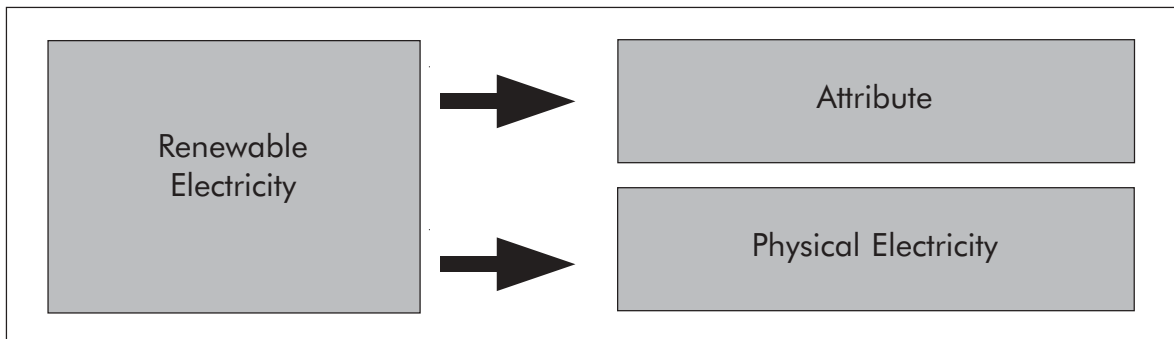
¹⁴ *Regulator's Handbook on Tradable Renewable Certificates*, Center for Resource Solutions, May 2003 (<http://www.resource-solutions.org/RegulatorHandbook.htm>).

Annex 2

Separation of Renewable Electricity in Physical Electricity and the Attribute

Renewable electricity is thought to consist of physical electricity (the electrons) and the attribute. One kWh of physical electricity is the same regardless of the generation technology. The attribute contains the environmental, social and/or economic benefits associated with displacing electricity generated from traditional sources, such as coal, oil, nuclear and gas. The attribute represents the ‘goodness’ of renewable electricity. The physical electricity is renewable electricity that has been stripped of its benefits. This is also referred to as null electricity. By separating renewable electricity into the physical or null electricity and the attribute, the two commodities can be traded separately (see Figure 1). The attribute can be captured in a Tradable Renewable Certificate (TRC).¹⁵ Each kWh of renewable electricity can thus be separated into 1 kWh physical electricity and 1 kWh attribute or TRC.

Figure 1: Separation of Renewable Electricity into Physical Electricity and the Attribute



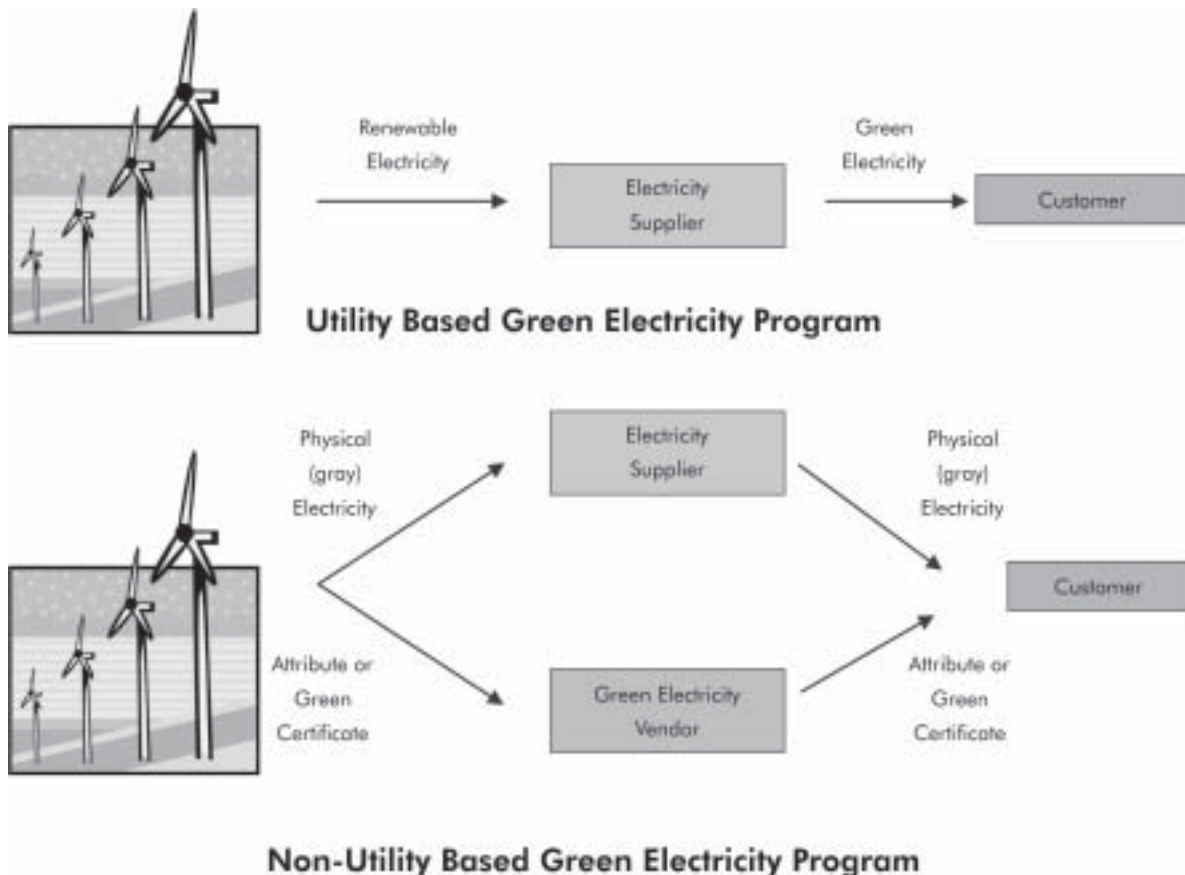
At any one point of time, only one entity can claim the attributes (TRC) from a specific output of generation. TRCs represent all of the benefits of RE — not just the environmental — even though there is not currently a market for most of these benefits. Individual attributes (NO₂, CO₂, SO₂ particulates, mercury) can be disaggregated from the TRC and sold separately. The attributes of a particular TRC are a function of the characteristics of the generating facility at the time the associated power was generated. Time of generation, geographic location of the facility, type of technology and fuel all affect the type and quantity of the environmental, economic and social impacts represented by the TRC.

¹⁵ TRCs are also commonly referred to as Renewable Electricity Certificates or Credits (RECs), Green Tags, Green Certificates or Tradable Renewable Electricity Certificates (T-RECs).

TRCs are an important vehicle for the development of RE resources. They can be used in many different contexts for different purposes. However, this sometimes creates confusion for those unfamiliar with the full range of their use. TRCs are generally sold separately from their associated energy in wholesale markets. In retail markets, they may be sold separately as an independent 'product' or may be combined with electrical energy at the point of sale to create a renewable electricity offering. In several US states, Europe and Australia, TRCs are used as an accounting tool to measure and track renewable generation. In such an application, a TRC is created for every unit of renewable electricity output, usually denominated in MWh, and no more than one TRC can be created for any given MWh. TRCs are used in both retail and wholesale electricity markets by environmental and utility regulators to demonstrate compliance with state mandates and other energy programs, and in pollution trading markets. New uses are being developed for TRCs as electricity markets evolve and as savvy businesses create new ways to sell and finance renewable projects. For this reason, TRCs represent an exciting and dynamic regulatory challenge.

Through the use of TRCs in the marketplace, end-use consumers interested in purchasing renewable electricity and utilities and vendors offering renewable electricity products have several options, which are illustrated in Figure 2.

Figure 2: Green Electricity Supplied as Delivered Electricity or Based on Supplying the Attribute or TRC



TRC-based electricity products are different from standard renewable electricity products, because with certificates, vendors are not restricted by the physical transmission of electricity. TRCs from outside the consumer's control area may be combined at the point of sale with in-pool electricity to create a TRC-based renewable electricity product without having to wheel the energy from where the RE facility is actually located. Some states or programs may restrict this practice. Generally speaking, TRCs make it feasible for consumers to support renewable power located at greater distances than with traditional electricity supplies because TRCs have no inherent geographical boundaries. Under such circumstances, the RE and the financial support for RE are the same as regular renewable power sales, except that the renewable generating facility, that is being supported, may be located in a different control area, across the country, or even outside the country.

When TRCs are sourced from generation within the consumer's control area, they result in the same local air quality benefits as delivered energy products.¹⁶ When TRCs are sourced from outside of the consumer's control area, however, they result in global benefits¹⁷ similar to those of delivered energy, but produce local environmental benefits in the control area where the generation occurs.

TRCs are an exciting new tool that can provide a wonderful benefit for the further development of RE generating facilities if they are applied in a thoughtful and responsible manner. Consumers must have confidence in the integrity of product claims, and developers and purchasers must have a platform for transparent and fluid transactions. Because of the less tangible nature of TRCs, the risk of double-counting may be greater than for regular power sales, unless their sale and use is closely monitored. Because of a general lack of regulation and, the fact that a physical commodity is not being delivered, there is potential for misleading product claims.

¹⁶ The term 'local' has no universal definition, and it is incumbent upon regulators to define it. It should also be noted that TRCs have no inherent geographical boundary, but regulators may impose a geographical boundary on TRCs or TRC markets.

¹⁷ By global benefits, we primarily mean global greenhouse gas reduction.

Annex 3

Framework Standards

This Annex presents four green electricity framework standards. Under these frameworks, green electricity products can be developed. Summaries of the following framework standards are included:

- Green-e
- Eugene
- Environmental Choice
- OK Power

Green-e, United States

Green-e United States

Framework Name and Logo

The RE Law of China

Green-e

The Green-e Renewable Energy Certification Program was developed collaboratively by a group of environmentalists, consumer advocates, electric companies and the non-profit organization – Center for Resource Solutions (CRS) in 1997 to help build consumer confidence in ‘green’ electricity. Since its inception, regional standards, a national TRC standard and a national utility green pricing standard has been created. The description of the standard below includes most of the elements commonly held amongst all standards.

Eligible RE Sources

In general, the following sources of RE generation are eligible under the Green-e standard. There are slight variations from region to region.

1. Geothermal
2. Wind
3. Small & Low Impact Hydropower:
 - The output is equal to or less than 30 MW; or
 - The facility is certified by the Low Impact Hydropower Institute (LIHI)
4. Solar Electric
5. Biomass:

Solid, liquid and gaseous forms of biomass are eligible including:

 - All woody waste including mill residues;
 - All agricultural crops or waste;
 - All animal and other organic waste;
 - All energy crops; and
 - Landfill gas.

Cofiring of landfill methane or other eligible biogas with natural gas either piped directly to a natural gas facility or commingled in a natural gas pipeline is permitted if the following conditions are met:

- the landfill gas or eligible biogas is separately metered, and;
- contracts are in place to allow CRS to verify that the landfill gas or eligible biogas was converted to electricity.

Only the amount of energy generated from the landfill methane or eligible biogas may count towards the 50 percent renewable criteria. Landfill methane and eligible biogas are the only renewable resources that can be co-fired and still count towards the renewable percentage of a Green-e product. Regional exclusions and specifications are listed below.

6. Negawatts:

In Pennsylvania only, negawatts that meet the guidelines of the Negawatts Program as developed by CRS and the Pennsylvania Advisory Committee, may be counted towards the renewable portion of a Green-e product.
7. Ocean-based Resources:

Green-e will consider adopting ocean-based resources and will review these technologies as they mature and as practical application reaches near term.
8. Fuel Cells Powered by Renewable Resources:

Fuel cells powered by any of the above eligible renewable resources are eligible.

The total emissions rate per kWh for SO₂, NO_x and CO₂ from the non-renewable portion of the eligible product may not exceed the average state or regional power emissions rates. Rates are calculated from EPA EGRID data,

unless the regional system administrator, Public Utility Commission (PUC) or other authority makes more up to date information available. If the system power is comprised of the local distribution utility mix, it is considered the average system mix.

The product may not include any specific purchases of nuclear power in the non-renewable portion of the product other than what is contained in any system power purchased for the product.

Location of Production (domestic or imported)

Green-e generally relies upon power pool boundaries where it is practical to define the geographic boundaries for sourcing eligible electricity and attributes sold in an electricity product in a given region. When power pool boundaries are not clearly defined, state boundaries may also serve to define the geographic boundary for sourcing eligible electricity and attributes. Electricity sold to a consumer must be generated in or wheeled into the power pool or defined geographic sourcing boundary of the consumer being served. RE attributes can be combined with system power to serve green electricity consumers. The RE attributes and system power must come from within the power pool or defined geographic boundary of the consumer being served.

Age of the Production Facility

An eligible new renewable generation facility must either be:

1. Placed in operation (generating electricity) on or after January 1, 1997;
2. Repowered on or after January 1, 1997, so that 80 percent of the fair market value of the project derives from new generation equipment installed as part of the repowering;
3. A separable improvement to or enhancement of an existing operating facility which at was first placed in operation prior to January 1, 1997, so that the proposed incremental generation is contractually available for sale and metered separately from the existing generation at the facility; or
4. A separately metered landfill gas resource which was not being used to generate electricity prior to January 1, 1997.

Any enhancement of fuel source that increases generation at an existing facility, without the construction of a new or repowered, separately metered generating unit, is not eligible to participate, with the exception of new landfill gas resources identified in (4) above. An eligible 'new renewable' must qualify as an 'eligible renewable resource' as described in the Green-e Code of Conduct. Hydropower facilities may not contribute towards achievement of the new renewable requirement at this time.

Minimum Content of 'New' Renewable Electricity

The new renewable requirement will begin after:

- The first day of January following the approval of a Green-e Standard; or
- The first day of January at least six months after the opening of a retail electricity market.

The new renewable requirement starts at 5 percent of the total product content in the first year of implementation, increasing to 10 percent in the following year. This is a strict minimum requirement. Green-e has a goal of increasing the percentage further to 25 percent in 5 percent increments each year.

One-for-one

Required.

Settlement Period

January 1 to December 31.

Balancing

No details provided.

Additionality

Green-e allows a percentage of a product's renewables content to be satisfied by RPS state-mandated renewables up to the percentage RPS requirement as it is applied to a retail product. For example, if the RPS is set at 5 percent (either company-based or product-based), only 5 percent of the Green-e product can be satisfied with renewable power purchased to meet a mandated RPS requirement. Any remaining renewable power needed to fulfill Green-e requirements or product claims cannot be satisfied with renewables used to meet any RPS requirement. The Green-e new renewable requirement must be met entirely by renewable generation over and above anything required by state or federal RPS requirements. For example, in Texas, the Green-e new renewable requirement is 50. The product mix must include the 50 percent Green-e new renewable requirement plus the state-mandated RPS requirement. If the product is comprised of 100 percent new renewables, it satisfies both the Green-e and state-mandated RPS requirements.

Minimum RE Requirement

In New England, New York, California, Ohio and the Mid Atlantic, retail electricity offerings or 'electricity products' that serve 100 percent of a consumer's load must contain at least 50 percent RE based on the product supply mix and meet the New Renewable Energy Content requirements (see III below). Electricity products sold as block products must contain a minimum of 150 kWh/month of new renewable resources. In Texas, retail electricity offerings that serve 100 percent of a consumer's load must contain at least 50 percent new renewable electricity plus any state mandated RPS renewable amount. Electricity products sold as block products must be 100 percent new renewable in a minimum size of 200 kWh/month. Block product certification is only available for blocks sold to commercial consumers.

Requirement for Product Disclosure

The information at a minimum must include:

- Name of the Company and/or joint venture partners with whom the consumer is contracting (if a subsidiary or joint venture, list the name of parent company).
 - Company consumer contact information, including consumer service number, company billing address and E-mail or Website, if available.
 - Duration of the contract (contract length in months).
 - The proposed rate structure, including fixed and variable charges and taxes.
 - Price volatility or other price, environmental or availability risk associated with the product.
 - A prospective fuel source disclosure statement indicating the percentage of the energy portfolio which will be contributed by various resources in the prescribed format.
 - The obligations/charges associated with terminating the contract or changing from the current portfolio.
 - Information on how the consumer will be billed.
-

Emission Benefits

No specification.

Product Name

No specification.

Use of Framework Name and Logo

Green-e suppliers are eligible to use the Green-e logo on their marketing materials to promote the fact that they are voluntarily certified and undergo an annual process audit and verification. Vendors must follow the Consumer Disclosure and Code of Conduct requirements to continue to have a certified product. In addition, marketing materials for all suppliers of Green-e-certified products are reviewed on a biannual basis.

Electricity providers selling Green-e-certified electricity are required to abide by the Green-e Code of Conduct, which is the governing document of the Green-e program. The Code of Conduct ensures that participating vendors abide by the consumer protection and environmental standards established by the Center for Resource Solutions. Signatories of the Code of Conduct pledge to abide by the standard and cooperate with the Green Power Board, to ensure that these standards are effective in providing consumers information about environmentally superior services in the RE market. Specifically, electricity providers must:

- Make full disclosure of the percentage and type of renewable resources in their electricity product;
- Present product pricing and contract terms in a standardized format for easy comparison;
- Submit their marketing materials for review twice a year so that Green-e can ensure that they are not making false or misleading claims; and
- Undergo an annual independent process audit to verify product content claims and ensure that enough renewable power has been purchased to meet consumer demand.

Requirements for Verification and Certification

Green-e certifies three types of electricity products — competitive electricity products, utility green pricing products sold in monopoly markets and TRC products. To get certified, interested parties sign a contract with Green-e to follow the requirements set out in the standard, which defines the requirements for the product and the Code of Conduct, which provides ethical guidelines for participation in the program.

All products that are Green-e-certified undergo an annual verification procedure. Green-e provides vendors with template documents and verification protocol in December of the year for which the verification will take place. Vendors must first submit preliminary, unaudited figures to Green-e. Then, vendors hire a certified auditor to conduct a process audit and submit documents supporting sales and purchases information to Green-e. The Green-e staff, then, review the auditor reports to ensure that there are no discrepancies. Green-e publishes an annual report on its Website that details the results of this verification process.

Eugene, Europe

Eugene Europe

Framework Name and Logo

Eugene



Eugene (European Green Electricity Network) is an independent network bringing together non-profit organizations, such as national labeling bodies, experts from environmental and consumer organizations and research institutes. Eugene has been established in order to start the development and promotion of a harmonized green electricity standard across Europe based on a common European standard for Green Electricity (the 'EUGENE standard'). The intention of the standard was to use it as a common reference, against which national labels can be accredited.

Eligible RE Sources

Green electricity must come only from one or more of the following eligible sources; solar, wind, geothermal, solar electric, hydropower, biomass, natural gas-fired cogeneration. Hydropower plants may be eligible if they operate in such a way as to protect the environment.

The hydropower plant must fulfill basic ecological requirements at local scale, so that the 'river system' principal ecological functions are preserved. The power plant may be required to invest a fixed payment per kWh of green electricity sold for restoring, protecting or upgrading the environment in the catchment area used by the plant in question. New or expanded hydropower plants can only be labeled as green if the hydropower facility leads to a substantial improvement of the local and regional ecological quality (in excess of legal compliance).

Biomass sources may include: dedicated energy crops, where crops are grown for energy, residual straw from agriculture, forestry and arboricultural materials (wood from existing plantations, natural and semi-natural woodland and urban forestry); biomass residues from landscape and park management; urban waste wood collected separately (unpainted, untreated or unpressurized wood, not containing plastics or metals); vegetable processing biomass residues from food industry; woody waste products of the wood industry (e.g., sawdust); and sewage gas. Electricity from all forms of thermochemical processing of unseparated urban solid wastes and sewage sludge is not eligible. Dedicated energy crops in new generating stations shall come from FSC- (Forest Stewardship Council) certified sources. A generation station is 'new' if it has entered operation after January 1, 2001. For existing generation stations using wood (from dedicated energy crops and forestry and arboricultural material), the plant will have to draw an action plan to ensure that the wood used will be purchased from FSC-certified sources within a period of four years. For biofuels such as straw, and their equivalent, which are cultivated on agricultural land, cultivation should be carried out with the goal to reduce water and pesticides used, and taking into consideration national best practices. Cofiring of coal with biomass is permitted only if the biomass energy input is separately accounted for. Only the amount of energy generated from the biomass energy input is eligible for the label.

Natural gas-fired CHP is eligible up to a maximum limit of 50 percent. Only that part of the electricity generated from natural gas-fueled cogeneration is eligible, which is related to maximum heat production ('back pressure' operation). If cogeneration plants can operate in condensing mode, only that part of their generation is eligible, which corresponds to the power-to-heat ratio of 'back pressure' operation. The cogeneration plant shall have an energy conversion efficiency of at least 85 percent over the average of the year. The eligible cogeneration plant must meet specified air emission quality criteria.

Location of Production (domestic or imported)

Imports of green electricity are allowed only if the imported electricity is generated from eligible sources and meets the standards defined in both the exporting and importing country.

Age of the Production Facility

A production facility is considered new if it entered operation on or after January 1 of the year in which liberalization of the wholesale electricity market, in the respective country, came into force. For countries with no liberalization of the electricity market, the year 1999 is used instead of the year of liberalization.

Minimum Content of 'New' Renewable Electricity

For green electricity products with a fixed 'new renewable' content, two classes are distinguished; 'gold' and 'silver.' For the silver class a minimum of 10 percent needs to come from new plants. For the gold class, this minimum is 30 percent.

One-for-one

Required.

Settlement Period

One year from January 1 to December 31.

Balancing

At the end of each year, a remaining difference between demand and supply of power from eligible sources within the range of +/- 10 percent of the suppliers Green Power sales is allowed, but has to be brought forward to the following year.

Additionality

The Green Power offering must contribute to increased green electricity generation, over and above current Government requirements and renewable legislation such as renewables' obligations, incentive tariff schemes and (re) licensing requirements for plants. However, Eugene will allow renewables obligations for electricity suppliers to be included in green electricity products up to the percentage of the obligation, if the obligation has to be met by purchasing a certain share of renewable power. For instance, if the obligation is set at 5 percent of the supplied electricity, only 5 percent of the green electricity product sales can be satisfied with renewable electricity purchased to meet the governmental obligation. The environmental additionality requirements may not be fulfilled through the obligation part of the product.

Minimum RE Requirement

Only minimum amount new renewables is specified. This is 10 percent for the silver class and 30 percent for the gold class.

Requirement for Product Disclosure

Consumers should be provided with all information regarding the sources, the production and the environmental benefits of the green energy supply. The Eugene Standard requires green energy suppliers to provide prospective disclosure and historic disclosure, where data are available. Information should be disclosed in all green energy marketing materials and in consumer bills, at least once a year.

Disclosure should include the following information:

- Name of the product
 - Supplier contact information
 - Type of green energy product (supply offerings or fund model)
 - Share of different green energy sources
 - Annual volume of labeled green energy
-

Emission Benefits

Not specified.

Product Name

Not specified.

Use of Framework Name and Logo

Not specified.

Requirements for Verification and Certification

The suppliers must conduct a verification process each year to substantiate their claims about green electricity purchases and sales. The supplier must employ an independent, certified public accountant, normally accredited to the national label, to conduct this verification. The results of the verification must be submitted to the national labeling body not later than three months after the end of the calendar year.

The verification must guarantee the following items: 1) the power supplier purchased enough electricity in quantity and type to meet its consumer demand for each product; 2) the product contains enough new green electricity to meet the environmental additionality requirements; 3) the verification process uses company contracts, invoices, billing statements and certificates of origin generated within the regional power pool and for a system recognized by Eugene.

Environmental Choice

Environmental Choice Canada

Framework Name and Logo

Environmental Choice
Electricity — Renewable Low-Impact



The Environmental Choice Program is designed to support a continuing effort to improve and/or maintain environmental quality by reducing energy and materials consumption and by minimizing the impact of pollution generated by the production, use and disposal of goods and services available to Canadians.

Eligible RE Sources

Electricity from RE sources which are apt to impose relatively low impacts on the environment and produce potential benefits including, inter alia, low net greenhouse gas emissions, limited or no depletion of non-renewable resources, reduced emissions of other pollutants and reduced impacts on aquatic, riparian and terrestrial ecosystems and species. The following generating technologies are specifically recognized:

1. Alternative-use electricity;
2. Biogas-fueled electricity;
3. Biomass-fueled electricity;
4. Solar-powered electricity;
5. Water-powered electricity; and
6. Wind power electricity

Generation facilities must be certified.

Location of Production (domestic or imported)

Not specified.

Age of the Production Facilities

Three types of electricity are distinguished:

Type I Electricity: Environmental Choice Program (ECP)-certified electricity from generating facilities that started generating electricity prior to January 1, 1991;

Type II Electricity: ECP-certified electricity from generating facilities that started operation between January 1, 1991, and March 31, 2001;

Type III Electricity: ECP-certified electricity from generating facilities that began generating electricity on or after April 1, 2001.

Minimum Content of 'New' Renewable Electricity

At least 50 percent of the electricity marketed must come from facilities that started electricity generation after January 1, 1991.

One-for-one

Through a verification process, reconciliation measures will be implemented to ensure that sales levels of complying product do not exceed production/supply levels.

Settlement Period

Not specified.

Balancing

Not specified.

Additionality

Prior to being sold to the end-user, the environmental benefits or the electricity that generated them must not be used to meet either regulatory or non-regulatory requirements/mandates (emission control programs, renewable portfolio standard, air emission regulation limits for the generation facility, fulfilling procurement policies or calculating another company's or institution's portfolio mix).

Minimum RE Requirement

50 percent.

Requirement for Product Disclosure

Not specified.

Emission Benefits

The renewable low-impact electricity must have attached all of the relevant environmental benefits associated with its generation to the full extent possible based on current regulatory and legal requirements. In other words, the renewable low-impact electricity must include all of the environmental benefits associated with the offsetting of the same quantity of null electricity from the grid (see Annex 1 and 2 for definition of null electricity).

Product Name

No specification.

Use of Framework Name and Logo

The Environmental Choice logo can be used by generators, vendors and users when they are licensed to do so. Only those components of a multisourced power product that fully satisfy all pertinent ECP certification and licensing criteria are allowed to be identified as 'ECP-certified' and to carry the logo.

A criteria statement must appear with the EcoLogo whenever the EcoLogo is used in association with the electricity during sales and related transactions. The criteria statement must also appear with the EcoLogo in other promotional activities and materials. The exact wording of the criteria statement is left to the discretion of the licensee, but must contain at least the following information:

- For generators, identification of the amount of ECP-certified electricity generated and/or marketed (in kWh or MWh)
- For vendors, identification of the amount of ECP-certified electricity received from generators and/or supplied to users as either percentages of larger multisourced power products or in quantitative units (kWh or MWh); and
- For users, identification of the amounts ECP-certified electricity purchased/used as either percentage of larger multisourced power products or in quantitative units (kWh or MWh).

All licensees must comply with the ECP Guide to proper use of the EcoLogo regarding the format and usage of the EcoLogo. Any accompanying advertisement must conform with the relevant requirements stipulated in the criteria document, the license agreement and the ECP Guide to Proper Use of the EcoLogo.

Requirements for Verification and Certification

To verify a claim that a product meets the criteria listed in this document, the ECP and its agents will require access, as is its normal practice, to relevant quality control and production records and the right of access to production facilities on an unannounced basis.

OK Power, Germany

OK Power Germany

Framework Name and Logo

OK Power



The German OK Power label is operated by the registered association EnergieVision E.V, a non-profit cooperation between the research institute Öko-Institut, WWF Germany, and one of the federal consumer agencies (Verbraucherzentrale Nordrhein-Westfalen).

Eligible RE Sources

For award of the OK Power label, the following energy sources and technologies are generally eligible:

- Solar PV,
- Wind power (onshore, offshore),
- Geothermal energy,
- Hydroelectric power stations (primarily from recommissioned or upgraded plants, as impacts on natural systems will be relatively minor; electricity from new plants is limited to run-of-river hydro plants),
- Biomass-fueled power stations (incl. biogas),
- Natural gas-fired CHP.

Approval for hydropower, biomass and CHP are subject to detailed technology specific criteria which are illustrated in the criteria document. If electricity is offered from a mix of RE and cogeneration plants, the share of electricity from gas-fired cogeneration plants may not exceed 50 percent. Electricity from waste is not eligible.

Location of Production (domestic or imported)

Import from outside Germany is allowed.

Age of the Production Facility

A plant is considered new when it has started operation not later than six years before the respective settlement period. For instance, in 2004, all plants that started operation after 01.01.1998 were considered new.

Minimum Content of 'New' Renewable Electricity

At least 33 percent of the electricity supplied must be generated from 'new' RES installations, which are out of the scope of the feed-in-law. For the time being, this includes large hydro installations > 5 MW, large biomass plants > 20 MW and biomass cofiring in fossil fuel power plants. This also includes electricity imports of RES installations provided they are not subject to equivalent funding through a public support scheme similar to the feed-in-law. A rule on the proportion counting as new plants also applies for major reinvestments in existing facilities, such as for rehabilitation and capacity upgrades involving turbine improvements, etc., as well as for high maintenance outlays: such plants correspond to a new plant in the ratio of the reinvested amount to a capital investment in a comparable new plant. In total, 66 percent has to be derived from eligible installations which are not older than 12 years.

One-for-one

The OK Power labeling scheme allows electricity suppliers two options to prove green electricity acquisitions. The tracking mechanism predominantly has to ensure that the environmental benefit (or environmental attributes) of each kWh concerned have been transferred to the respective electricity supplier, and won't be "used" by a third party apart from the labeled supplier (exclusion of double counting).

The two eligible tracking methods are as follows:

- Contract-based tracking: In this option, electricity contracts provide evidence that green electricity (or at least the corresponding green attributes)¹⁸ have been transferred to the respective supplier.
- Acquisition of Green Power attributes through the RECS system¹⁹: For the use of RECS certificates, the same rules and criteria apply as for green electricity purchases. As these criteria currently cannot be verified solely based on the information content of a RECS certificate, the identification of the respective RES device which is represented by a RECS certificate is required. The respective plant must provide all additional information required for the auditing process. Only those certificates are accepted which have been issued for RES-E that has been generated within the labeling period.

Settlement Period

One calendar year.

Balancing

All plant-specific data sheets are aggregated and result in the overall product balance. The product balance comprises a review of the electricity balance, which involves the compilation of all purchased and sold electricity volumes in the respective settlement period. As supply and demand never exactly match (deviations can only be determined after actual consumption figures have been determined due to meter readings of each consumer) flexibility rules have been established as follows:

- Negative balance: Where the green electricity volume which a supplier has sold during a calendar year exceeds the volume he has generated or purchased in the respective year, the shortage (including the transfer of a negative/positive balance from the preceding calendar year) must not exceed 20 percent related to the sold electricity volume. The shortage has to be fully carried forward to the following year.
- Positive balance: Where the electricity volume which a supplier has sold during a calendar year falls below the volume he has generated or purchased in the respective year (including the transfer of a negative/positive balance from the preceding calendar year), he is allowed to transfer a volume of maximum 25 percent related to the sold electricity volume to the following year. All surplus acquisition which exceeds the 25 percent level 'expires.'

Additionality

EnergieVision awards the OK Power label to green electricity products which create a minimum environmental additionality. In this regard, electricity has to be derived from RE sources beyond already installed generation capacities and, over and above, the effects of existing public support schemes such as the feed-in-law.

Minimum RE Requirement

66 percent.

¹⁸ Contract-based tracking doesn't require that each electricity contract is followed by physical electricity delivery. Many market players conclude so called swap contracts. A swap contract involves two vice versa electricity contracts which cover an identical electricity volume and load schedule. As a consequence, swap contracts do not result in any physical delivery but are rather limited to the transfer of electricity attributes (such as green attributes).

¹⁹ The Renewable Energy Certificate System (RECS, www.recs.org) is an open pan-European initiative of energy companies, environmental organizations, trade associations and governmental agencies which has established the organizational, technical and procedural framework for the pan-European trade in Green Certificates.

Requirement for Product Disclosure

Not explicitly mentioned.

Emission Benefits

Not explicitly mentioned.

Product Name

Not specified.

Use of Framework Name and Logo

Once a supplier concludes a labeling agreement contract with EnergieVision, it is eligible to begin using the EnergieVision OK Power label on its marketing materials. As EnergieVision is responsible for all aspects concerning the communication of the label and its procedures, it has established several provisions designed to protect the integrity of the label, including a helpdesk for consumers, suppliers and generators, the publication of the label criteria and the verification as to whether all marketing materials used by electricity suppliers complies with the communication rules laid down in the criteria document.

Requirements for Verification and Certification

EnergieVision certifies products not companies.

The labeling process of the OK Power label is comprised of the following four main procedures:

- The product pre-audit at the beginning of a calendar year (carried out by an auditing body),
- The mid-year balance (submitted by electricity suppliers),
- The final annual audit at the end of the calendar year (carried out by an auditing body); and
- The verification of both audits (carried out by EnergieVision).

Suppliers are responsible for choosing and negotiating a contract with an independent auditor. The cost of the audits is borne by the supplier. Auditing cost are negotiated between the supplier and the auditing body. This role of the auditing body is usually assigned to competent institutions such as the Technische Überwachungsverein (TÜV), Ecophys or other independent organization or experts. Auditing bodies are not required to become formally accredited for the labeling scheme, but should provide experience in environmental auditing. In addition, the auditing body must not have any commercial interest in the trade of green electricity products and must be independent from electricity suppliers and generators and all other players involved in the labeling process. EnergieVision provides the auditing bodies trainings in the form of regular workshops.

Under this program, RES generators are not required to apply for an approval to participate in the labeling scheme. Rather, it is the responsibility of the auditing bodies to collect all plant-specific data and information that they need within a product audit.

The auditor evaluates whether the certified product complies with the ecological minimum standards laid down in the criteria document (comprising the electricity balance, ecological eligibility, environmental additionality) via a desktop document review at the premises of green power suppliers. This evaluation is based on standardized data sheets (Excel templates) provided to all auditors by EnergieVision. The audit may also include onsite plant inspections where necessary.

EnergieVision plays the role of a verification body (or labeling body). In this regard, EnergieVision is the main contractual partner of the electricity supplier regarding the labeling process. EnergieVision is responsible for assisting the auditing bodies to correctly apply the label criteria and has to ensure sound verification of all auditing reports. In the context of verification, EnergieVision is also responsible to perform random checks in the premises of Green Power suppliers.

Under the OK Power labeling scheme, auditing bodies inspect, verify and evaluate the following topics. This applies to both audits (product pre-audit, final annual audit) which have to be carried out for each labeled product in each settlement period.

1. Plant-specific aspects:

Both types of audits comprise the following topics which need to be inspected for each RES or CHP installation which is contributing to a labeled Green Power product:

- Identification of the plant and the plant operator (name, address, contact); assessment of date of first operation.
- Verification of the ecological eligibility of the respective plant.
- Assessment of all required plant-specific technological data (e.g., capacity, expected (pre-audit) or actual (final audit) net generation volume, grid connection, meter number).
- Eligibility for public support: Verification as to whether the respective power plant is eligible for public support schemes (such as the EEG) and whether, and to which extent, it has been supported under such a scheme.
- Verification of all contracts and licenses required to prove compliance.

2. Product electricity balance (including flexibility mechanism):

As companies are allowed to directly use the OK Power label once they have signed the labeling contract with EnergieVision, a product pre-audit is essential. The product pre-audit is conducted within three months after the labeling contract has been signed. For the pre-audit an electricity supplier must specify how he is intending to structure the product portfolio in order to comply with the criteria. The auditor checks whether the intended portfolio will be in line with the label volumes that have been purchased and sold in the first six months of the respective year. Moreover, suppliers are obliged to indicate whether there is any indication that they won't be able to comply with the labeling criteria at the end of the year. The mid-year balance has to be informally submitted in writing.

Final product audits have to be carried out for all labeled products at the end of the calendar year. As the balancing and settlement procedures of electricity companies, who provide a series of necessary data, require a fair amount of time at the end of a balancing year, the final annual audit report has to be submitted to EnergieVision within six months after each settlement period. The final annual audit is based on standardized data sheets provided by EnergieVision.

Within the verification process, EnergieVision is rechecking the respective audit reports. Wherever open questions and inconsistencies occur, this is discussed between EnergieVision, the responsible auditing body and/or directly with the respective electricity supplier. Verification includes physical random checks in the premises of the supplier and (if applicable and necessary) those of renewable power generators and energy traders involved.

In order to enhance market transparency, EnergieVision has adopted a couple of regulations. In addition to some communication requirements put on the electricity suppliers, EnergieVision publishes a list of all products which have been labeled by the OK Power label. This list includes the following information:

- Product name, contact details of the respective supplier.
- Information about the fuel mix used to generate the respective product.
- A disclosure statement that lists all RES/CHP devices from which the electricity in the product supplied will be generated or which will be funded in the scope of a fund offering (prospective disclosure which is subject to the product pre-audit).

Although electricity suppliers may completely change their product portfolios during the year, the pre-audit indicates whether a supplier understands and will be able to follow the criteria. The pre-audit is to be based on standardized data sheets provided by EnergieVision.

Electricity suppliers must submit a mid-year balance within six weeks after the end of the first half of each calendar year. The mid-year balance submission includes data on green electricity.

Annex 4

Product Examples

This Annex presents examples of a variety of green electricity products. For each product, the main characteristics as discussed in Part 1, 4 are described. Information on the following electricity products is presented below:

1. Alliant Energy Second Nature
2. Austin Energy Green Choice
3. Community Energy
4. Country Green
5. Enco Ecostrroom
6. Essent Groen Stroom
7. Essent GroenZakelijk
8. Minnesota Power Wind Sense
9. Nevada Power GreenPower
10. Nuon GreenStep and Nuon Greenpower
11. Nuon Groenstroom
12. Pepco Energy Services Power Choice
13. Portland General Electric Green Source
14. Tennessee Valley Authority Green Power Switch
15. TXU Green Energy Eco-Friendly

Alliant Energy Second Nature

Vendor: Alliant Energy (United States)

Target Consumers

Residential, small business and commercial/industrial electricity users in Iowa and Minnesota.

Product Name and Logo

Second Nature



Product Type

Delivered electricity-type product with fixed contribution from which renewable electricity is bought. Consumers choose a monthly dollar amount that they are willing to pay for RE. Each dollar contributed represents approximately 50 kWh of RE. This displaces electricity generated by other methods, including coal and natural gas.

Content

Product content includes a mix of new renewable fuels provided in the same region of the country. It utilizes wind power from wind farms in Wilmont Hills, Minnesota and Hancock County, Iowa, and biomass energy from a landfill in Mayville, Wisconsin.

Amount of Renewable Electricity

Commercial consumers choose a monthly dollar contribution. To calculate the amount of RE the contribution supports, Second Nature advises consumers to divide the dollar amount by 0.02. For example, a US\$50 monthly contribution supports 2,500 kWh of Green Power per month, or 30,000 kWh per year.

Pricing

Approximately, 80 percent of participation fees goes towards the purchase of RE itself. A portion is earmarked to educate and inform the people about the importance of RE sources. Any remaining revenue is reinvested in future development of additional renewable resources or facilities. Based on the above numbers the incremental price of renewable electricity is US\$0.016 per kWh.

Invoicing

This is added to the consumer's energy bills as a non-metered item.

Term

Consumers are under no obligation to commit for any length of time. They may enter and exit the program at any time.

Consumer Value

Consumer values primarily include, but are not limited to: public relations and meeting personal/corporate environmental goals.

Labeling

Alliant Energy does not certify its product, nor provide product content disclosure in accordance with Green-e standards.

Market Penetration

Second Nature consumers purchased more than 28 million kWh of RE at the end of 2003. Enrollment is at 9,519 participants, which represents about 1.2 percent of their consumers who are offered this product.

Austin Energy Green Choice

Vendor: Austin Energy (United States)

Target Consumers

This program is available to residential, small business and corporate consumers.

Product Name and Logo

The Austin Energy product is called GreenChoice. There is no separate logo for this product.

Product Type

Delivered electricity-type product. GreenChoice is the most successful utility-sponsored Green Power program in the nation. It is a voluntary program that allows consumers to help preserve and enhance local quality of life. The Green Power that flows into the Austin Energy system reduces pollution. It also reduces reliance on fuels that have volatile pricing, such as natural gas.

Content

The Green Power which Austin Energy uses for its Green Choice program are new, renewable local sources. The majority comes from new wind energy generated by 61 wind turbines located on King Mountain in West Texas. These turbines, supplying 81 percent of Austin's Green Power, have been operating since the summer of 2001. The next largest portion (18 percent) is supplied by the Tessman Landfill Biogas Project near San Antonio. There are also currently 28 small solar panel installations in Austin, five of which feed electricity directly into Austin Energy's electric grid. The largest projects produce only 111 kW each, making solar power a very small part of the mix (1 percent).

Amount of Renewable Electricity

Fixed share.

Pricing

Austin Energy's Green Choice is a fixed price product. Austin Energy has entered into 10-year contracts for fixed price electricity from new wind projects. The price for that electricity for new subscribers will remain fixed until 2013. The portion of a consumer's bill that reflects the fuel charge becomes a 'Green Power' charge, instead of paying the standard fuel charge of about US\$0.028 per kWh of electricity used, consumers pay the Green Power charge of US\$0.033 per kWh. This product also offers a financial incentive to consumers, as it provides a hedge against rising fuel cost in the future. Because the price of RE sources is fixed, program participants may actually pay less for power than non-participants in the future, as the price for fossil fuels increases.

Invoicing

GreenChoice consumers have the normal fuel charge on their bills replaced by a Green Power charge.

Term

Business consumers can choose a 5- or 10-year term. Twenty year contracts are available for wind, and could possibly be extended on consumer request.

Consumer Value

Austin Energy offers consumers excellent public relations, environmental benefits and a financial hedge against rising electricity prices.

Labeling

Austin Energy does not certify its product, nor provide product content disclosure in accordance with Green-e standards. Austin Energy purchases TRCs for all green energy purchased through their GreenChoice program. Austin Energy retains control of these TRCs on behalf of the consumer. At the end of the year, a number of TRCs equal to the amount purchased by consumers is retired from the account. To date, the amount purchased by Austin Energy has equaled the amount sold to consumers. If, in the future, this is not the case and there is an excess of TRCs, these could be retained by Austin Energy to be sold in the following year. TRCs have a lifetime of three years.

Market Penetration

GreenChoice had 360 million kWh in subscriptions at the end of 2003. The program has 502 business participants and 7,023 residential participants.

Community Energy

Vendor: Community Energy (United States)

Target Consumers

Residential and commercial consumers.

Product Name and Logo

Community Energy does not have a separate logo for its product.

Product Type

NewWind Energy is a non-utility-based, wind-generated electricity certificate product delivered to the grid supplying a consumer's account with pollution-free electricity through the use of state-of-the-art windmills. The price charged for NewWind Energy makes up the difference between the cost of dirtier, conventional electricity generation and the higher cost of wind power. NewWind Energy is all Green-e-certified. Households can buy NewWind electricity in blocks of 100 kWh per month, with a minimum purchase of two blocks per month.

Content

NewWind Energy is generated at wind farms across the northeastern United States. Community Energy's entire product is composed of NewWind Energy that has come online after 1997. Combined, these wind farms produce 191 MW of electricity. They include a 24 MW facility in Somerset and Mill Run, Pennsylvania; a 30 MW facility in Madison County, New York; a 66 MW facility in Tucker and Preston Counties, WV; a 6.6 MW facility in Wyoming County, New York; and a 64.5 MW facility in Wayne County, Pennsylvania.

Amount of Renewable Electricity

Typically two blocks of 100 kWh per month, about 30 percent of an average household electricity consumption, comes from renewable resources (wind).

Pricing

Community Energy both sells their TRCs directly to consumers, and they also work with several utilities in the northeastern United States to offer a product through them. However, the most widely distributed product they offer is called 100 percent NewWind Energy, which is sold in blocks of 100 kWh for US\$2.50. There is a two-block minimum purchase for this option. The cost is in addition to a consumer's regular electric bill, and is paid monthly by credit card. Six blocks support 100 percent wind power for a home using 600 kWh per month. For large consumers, Community Energy has employed a contract for differences mechanism.

Invoicing

If TRCs are purchased directly from Community Energy, the billing is entirely separate from a consumer's current utility bill and that bill will not be affected in any way. If a consumer purchases NewWind Energy through one of Community Energy's utility partners, the additional cost of the wind power will be added to the consumer's current utility bill.

Term

Community Energy offers several options. Commercial consumers may purchase RE for 1-, 2-, 3-, 5-, and 10-year terms.

Consumer Value

They offer consumers public relations and financial hedges against rising electricity prices.

Labeling

Community Energy certifies products, engages in monitoring and verification and discloses product content in accordance with Green-e Standards. Community Energy's NewWind Energy is a certificate-based program, therefore, the consumers own the rights to all environmental attributes for the certificates they purchase. Community Energy's product is Green-e certified, and so they have strict policies regarding tracking the certificates. However, these cannot be resold by the consumer. At the end of the year, any certificates, not sold, are donated to schools or other institutions.

Market Penetration

Community Energy currently has 20,000 residential consumers and over 100 commercial consumers.

Country Green

Vendor: Country Energy (Australia)

Target Consumers

Residential, small business and commercial consumers.

Product Name and Logo

Country Green does not have a separate logo for its product.

Product Type

Delivered electricity-based product-type with blocks of renewable electricity from the regulated utility.

Content

Country Energy obtains Green Power from hydroelectric plants, wind farms, biomass plants and solar farms. Country Energy purchases hydroelectricity from the Burrendong Dam in Wellington, the Burrinjuck Dam in Yass, the Copeton Dam in Inverell, the Nymbodia River in Grafton, the Oaky Dam in Armidale and the Chichester Dam in Dungog. Country Energy purchases its biomass energy from the Broadwater Sugar Mill in Ballina. It purchases wind energy from farms at Blayney and Crookwell, solar from farms at Queanbeyan and Western Plains Zoo in Dubbo. It also purchases solar energy from rooftop solar systems in Bathurst, Orange, Parkes and Cobar.

Amount of Renewable Electricity

Residential and small business consumers buy blocks of 6,950 kWh per week. Large users can negotiate for varying amounts.

Pricing

The product is priced as follows US\$1.50 per week.

Invoicing

Consumers are charged through their electric utility bill.

Term

Residential consumers may quit at anytime.

Consumer Value

Country Energy includes a greenhouse gas emission graph on all energy users bills. When a consumer buys Country Green, the greenhouse graph shows them with little or no greenhouse gas emissions, which immediately reinforces one of the values of their purchase. Consumers also receive a 'Welcome Kit' and a quarterly newsletter by E-mail.

Labeling

Certification of products, monitoring and verification, and product content disclosure is required of all products in Australia from the Government-run Sustainable Energy Development Authority (SEDA), the Green Power Accreditation Program.

Market Penetration

Country Energy does not disclose the number of consumers it has acquired, but does disclose an estimation of all consumers who have switched to a green electricity product in Australia comprising approximately 100,000 households and 5,000 businesses.

Eneco Ecoström

Vendor: Eneco (Netherlands)

Target Consumers

In particular, intended for households and small commercial consumers.

Product Name and Logo

Eneco Ecoström (Ecological Electricity).



Product Type

Delivered electricity type 100 percent renewable electricity product.

Content

Wind, small hydro, biomass and solar. No details on share of different technologies, location of production or age of the production facilities.

Amount of Renewable Electricity

100 percent.

Pricing

Same price as gray electricity. This is possible in the Netherlands because of the energy tax difference between electricity from renewable resources and electricity from fossil fuels.

Invoicing

One monthly bill.

Term

Minimum contract period of 12 months which is automatically extended for one year if consumers do not, in writing, request to end the contract.

Consumer Value

As of July 1, 2001, green electricity consumers could choose their electricity supplier. To attract consumers, Eneco offered consumers who choose Eneco, a €50 discount on electronic equipment at one chain in the Netherlands. Other suppliers has similar initiatives. Eneco has a quarterly magazine for all its consumers. The major part of the articles are on RE or energy efficiency. It also includes discount coupons for a number of activities (concerts, museums, etc.). Eneco consumers also get Air Miles on their electricity bills. Eneco explicitly promises consumers that the electricity for Ecoström is generated from renewable resources, and that not more will be sold as generated or sold. This is checked by the Government.

In the Netherlands, the Government guarantees that suppliers do not sell more green electricity than that they produce or buy. In order to do this, the Government established a Green Certificate system, implemented by the independent network operator. After verification that a certain amount of renewable electricity is produced from eligible resources, Green Certificates are issued. A vendor needs to supply on an annual basis Green Certificates in the same amount as the renewable electricity in the green electricity products sold. These certificates are then redeemed (declared used and cannot be used again). In this way, consumers can be sure that the same amount of green electricity is produced as sold.



Green Energy
Guaranteed Green

Labeling

Ecostrroom of Eneco has no quality label.

Market Penetration

Eneco claims to have at present 275,000 Ecostrroom consumers.

Essent Groene Stroom

Vendor: Essent (Netherlands)

Target Consumers

Households and small businesses.

Product Name and Logo

Essent Groene Stroom (Green Electricity).



Product Type

Delivered electricity-type, 100 percent green electricity product.

Content

Biomass (70 percent), wind (25 percent), small hydro (5 percent) and Solar (fraction). Hundred percent produced in the Netherlands (because demand exceeds supply, Essent recently started to import certificates from abroad to cover demand).

Amount of Renewable Electricity

100 percent.

Pricing

Same price as gray electricity.

Invoicing

One monthly bill.

Term

Consumers enter into a contract with a minimum duration of 12 months.

Consumer Value

Essent initiated a Good Resolutions contest for 2004. The best 10 submissions are published on the Essent Website.

Labeling

Essent Groene Stroom has no label.

Market Penetration

Essent claims to have 750,000 Groene Stroom consumers.

Essent Groen Zakelijk

Vendor: Essent (Netherlands)

Target Consumers

Large commercial consumers.

Product Name and Logo

Essent Groen Zakelijk (Green Electricity for Businesses). The product has no separate logo.

Product Type

Delivered electricity-type product. On an annual basis, first 50,000 kWh renewable electricity, the balance gray electricity.

Content

No information.

Amount of Renewable Electricity

Fifty thousand kWh/year or more renewable electricity. The share of renewable electricity of the total electricity consumption depends on the total electricity consumption.

Pricing

On an annual basis, first 50,000 kWh renewable electricity at no extra cost. For each kWh renewable electricity in addition, the incremental cost is €0.005/kWh.

Invoicing

Same as for 100 percent gray electricity.

Term

Consumers enter into a contract with a minimum duration of 12 months after which the contract is open-ended and can be stopped at any time.

Consumer Value

Consumers get a certificate to show their green image. When buying 100 percent renewable electricity, consumers receive a promotion package to profile their green image even further.

Labeling

Essent Groen Zakelijk has no quality label.

Market Penetration

No information available on number of consumers or sales.

Minnesota Power Wind Sense

Vendor: Minnesota Power (United States)

Target Consumers

Residential and small commercial consumers.

Product Name and Logo

WindSense



Product Type

Delivered electricity-type product. WindSense is a voluntary, utility-based program offering consumers of Minnesota Power the opportunity to purchase green electricity by subscribing to blocks of wind energy for a small surcharge.

Content

Green energy provided through this product is new wind power produced locally. Minnesota Power has contracted to purchase half of the output of the Chandler Hills Wind farm in southwestern Minnesota for 15 years. This wind farm comprise three 660 kWh windmill turbines. They are owned by Great River Energy.

Amount of Renewable Electricity

Minimum 100 kWh/month and a maximum of 2,000 kWh/month (if this does not exceed the monthly electricity consumption). As this is a block-based system, the share of renewable electricity of the total electricity consumption depends on the total electricity consumption.

Pricing

WindSense provides RE at a fixed premium, with Green Power sold in blocks. Each block consists of 100 kWh and costs US\$2.50. Minnesota Power does not yet offer a very large amount of RE to its consumers, so it takes the rare step of limiting sales. They wish to make this program available to as many consumers as possible, so they limit the number of blocks a consumer can buy to the kWh of their average monthly bill, up to a maximum of 20 blocks.

Invoicing

Consumers' bills will include a line item showing US\$2.50 times the number of blocks they have agreed to purchase.

Term

Consumers must commit to their subscription level for at least one year, and will be able to continue monthly thereafter until they change or terminate their subscription.

Consumer Value

Consumer values primarily include, but are not limited to: public relations and meeting personal/corporate environmental goals.

Labeling

Minnesota Power does not certify its product, nor provide product content disclosure in accordance with the Green-e standards. Minnesota currently has no program for transfer of emission credits. They purchase energy from the wind farm and all attributes of that energy are bundled with the energy.

Market Penetration

As of the end of 2003, 1,218 consumers were purchasing the WindSense product. This represents 1.13 percent of the consumers who are eligible to purchase this product.

Nevada Power Green Power

Vendor: Nevada Power (United States)

Target Consumers

Residential consumers.

Product Name and Logo

Nevada Power's RE program is called Green Power. It does not have a separate logo.

Product Type

A contribution-type program where contribution is not directly related to renewable electricity production. Nevada Power does not sell a product. It simply provides a mechanism to collect voluntary donations to support new renewable generation in Nevada. The program is actually administered by the Desert Research Institute Foundation, the fundraising and public outreach arm of the Desert Research Institute (DRI). Nevada Power supports the efforts of the Foundation by collecting voluntary contributions for the Green Power program through consumers' monthly electricity bills. The DRI Foundation is a recognized non-profit organization, and so all contributions are tax-deductible. This program is targeted at residential consumers.

Content

Nevada Power does not sell green electricity directly to consumers. Instead, it allows consumers to make tax-deductible donations which are invested in the construction of solar electric generation in southern Nevada.

Amount of Renewable Electricity

Not applicable (see above).

Pricing

Consumers may designate a one-time contribution amount, or specify an amount to be added every month to their bill.

Invoicing

Consumers can donate one-time through their energy bill or designate an amount to be added monthly to their bill.

Term

Consumers can choose to either make a one-time or monthly contribution. If the consumer chooses to make a monthly donation, there is a minimum six-month commitment required. After six months, the consumer can participate on a month-to-month basis.

Consumer Value

Consumer values primarily include, but are not limited to: tax benefits, public relations and meeting personal/corporate environmental goals.

Labeling

Nevada Power does not certify its product, nor provides product content disclosure in accordance with Green-e standards.

Market Penetration

Since inception in 1998, Nevada Power's Green Power program has received roughly 500 donations from consumers, totaling approximately US\$125,000. Of these 500, about 400 are monthly donations of about US\$5–7, which are received through the Nevada Power billing process. Utilizing these funds, Nevada Power has completed solar projects at three K–12 schools around the state, with a total of 5.2 kW. A fourth display is being constructed in Reno, Nevada, at Traner Middle School. It will be completed in March 2004. Discussions are under way with the Clark County School District to identify southern Nevada's fifth display site.

Nuon GreenStep and Nuon Greenpower

Vendor: Nuon (Netherlands)

Target Consumers

Large non-household consumers.

Product Name and Logo

Nuon GreenStep and Nuon Greenpower. These products do not have a logo.

Product Type

Delivered electricity-type products. Nuon GreenStep: Large non-household consumers, first 100,000 kWh renewable electricity. Nuon Greenpower: Large non-household consumers, more than 100,000 kWh renewable electricity.

Content

Nuon GreenStep: 50 percent small hydro and 50 percent biomass. Nuon Greenpower: Hundred percent small hydro.

Amount of Renewable Electricity

Nuon GreenStep 100,000 kWh/year, Nuon Greenpower more than 100,000 kWh/year. Share of renewable electricity of the total electricity consumption depends on the total electricity consumption and, in the case of Greenpower, on amount contracted renewable electricity.

Pricing

Nuon GreenStep: Same price as gray electricity (€0.0635/kWh peak and €0.0304 off peak). Nuon Greenpower: For amount over first 100,000 kWh, the incremental cost is €0.004/kWh.

Invoicing

Consumers receive one bill.

Term

Companies enter into a contract. Minimum duration 24 months. After that, participation can be ended at any time.

Consumer Value

As with all green electricity products in the Netherlands, the Government guarantees that suppliers do not sell more green electricity than that they produce or buy.

Labeling

Nuon GreenStep and Nuon Greenpower do not have a label.

Market Penetration

Nuon GreenStep was introduced in 2002 while Nuon Greenpower was in 2001 already in the market. The sales of Nuon Greenpower in 2001 was 12.57 GWh. In 2002, sales of both products together totaled 70.99 GWh, while at the end of 2002, Nuon had 350 consumers using one of the two products.

Nuon Groenstroom

Vendor: Nuon (Netherlands)

Target Consumers

Households.

Product Name and Logo

Nuon Groenstroom (Green Electricity). This product has no logo.

Product Type

Delivered electricity-type 100 percent green electricity product.

Content

Mainly biomass with some wind and small hydro. Ninety percent is produced in the Netherlands.

Amount of Renewable Electricity

Hundred percent of electricity consumption.

Pricing

The price for Nuon Groenstroom is the same as for gray electricity. This is possible as green electricity has a lower Carbon Tax than gray electricity.

Invoicing

Consumers receive one monthly bill showing all details like cost of electricity, transmission, Carbon Tax and VAT. Also, the connection cost is specified as cost for supply, transmission network and VAT.

Term

Minimum subscription period is 12 months. After that, consumers can stop at any time. For supply of green electricity, Government rules require that there exist a contract between the vendor and the consumer.

Allocation of Emission Benefits

There is no indication that not all benefits from the renewable electricity used in Nuon Groenstroom are included in the product.

Consumer Value

As with all green electricity products in the Netherlands, the Government guarantees that suppliers do not sell more green electricity than that they produce or buy.

Labeling

Nuon Groenstroom does not have a label.

Market Penetration

Nuon Groenstroom was introduced in 2002. At the end of 2002, Nuon had 240,000 Groenstroom consumers, who consumed 310 GWh in 2002.

Pepco Energy Services PowerChoice

Vendor: Pepco Energy Services (United States)

Target Consumers

Residential and small businesses.

Product Name and Logo

PowerChoice



Product Type

Delivered electricity-type product. Pepco Energy Services, based in the Washington, DC area, supplies several utilities in the mid-Atlantic region with a product called PowerChoice. This product is available to consumers as either 10 percent, 51 percent or 100 percent renewable.

Content

Pepco uses new captured methane gas and solid waste biomass, produced at plants in the mid-Atlantic region, to generate the portion of the product that consists of green electricity.

Amount of Renewable Electricity

10, 51 or 100 percent of electricity consumption.

Pricing

Pepco Energy Services offers a fixed price product whereby consumers pay a certain cost per kWh for Green Power. The rate remains stable for one year and, then, it may change. The rate one pays depends upon how much of one's electricity usage is provided by Green Power (see below).

10 percent Green Electricity	US\$0.0747/kWh
51 percent Green Electricity	US\$0.0771/kWh
100 percent Green Electricity	US\$0.0807/kWh

Invoicing

Green Power charges are included in the consumer's current electricity bill.

Term

Consumers can sign up for one-to three-year terms, locking in a fixed price.

Consumer Value

Consumer values primarily include, but are not limited to: Financial hedge against rising electricity prices, public relations and meeting personal/corporate environmental goals.

Labeling

Pepco Energy Services certifies products, engages in monitoring and verification and discloses product content in accordance with Green-e Standards.

Market Penetration

Information regarding Pepco Energy Services market penetration is not publicly available. Nonetheless, they have engaged in many contracts that equate to more than 60,000 MWh in renewable electricity sales.

Portland General Electric Green Source

Vendor: Portland General Electric (United States)

Target Consumers

Commercial and residential consumers.

Product Name and Logo

Green Source. Portland General Electric does not have a separate logo for its product.

Product Type

Delivered electricity-type product. Green Source allows consumers to purchase 100 percent of their electricity from renewable sources, 50 percent of which are new wind sources. A fixed per kWh premium is added to the consumers' current electric bill. Funds from this product are utilized to develop new RE, including new wind and solar, in the Pacific Northwest.

Content

The supply mix for this product comprise of 50 percent new, local wind energy, 25 percent geothermal energy and 25 percent low-impact hydropower.

Amount of Renewable Electricity

Hundred percent renewable electricity.

Pricing

A premium of an additional US\$0.008/kWh is added on to the regular bill.

Invoicing

Consumers receive one utility bill. The premium is added onto this bill.

Term

Consumers are under no obligation to commit for any length of time. They may enter and exit the program at any time.

Consumer Value

Consumer values primarily include, but are not limited to: Public relations and meeting personal/corporate environmental goals. Portland General Electric passes all environmental attributes associated with a product on to their consumers in the form of TRC attestations. These are not available to be resold by the consumer.

Labeling

Portland General Electric uses outsourced vendors to deliver RE to consumers. Both of these companies, Green Mountain Energy Company and 3 Phases certify products, engage in monitoring and verification and disclose product content in accordance with Green-e Standards.

Market Penetration

Portland General's green electricity programs include about 4 percent of total consumers, which is about 27,000 residential and small business participants. It sells about 58 million kWh per year of green electricity.

Tennessee Valley Authority Green Power Switch

Tennessee Valley Authority

Target Consumers

Residential, commercial and industrial consumers.

Product Name and Logo



Product Type

Delivered electricity-type product. Green Power Switch is a voluntary green electricity program that allows consumers to help develop clean energy in the Tennessee Valley by purchasing 150 kWh blocks of RE. Green Power Switch is marketed to residential, commercial and industrial consumers.

Content

For the past four years, the wind turbines built in southeastern US are supplying the fuel to provide the Green Power, solar generation sites, which are located in the service areas of participating public power companies and methane gas, which comes from a plant in Memphis, TN, where a methane waste by-product from the city's wastewater treatment plant is used for cofiring. The fuel mix for Tennessee Valley Authority (TVA) is roughly 80 percent methane, while the remaining 20 percent comes from wind and solar power.

Amount of Renewable Electricity

Blocks of 150 kWh/month. Small businesses are required to buy a minimum of five blocks (750 kWh) per month.

Pricing

Green Power Switch is sold to consumers in 150 kWh blocks at a rate of US\$4.00 per unit. Commercial and industrial consumers are encouraged to purchase a number of blocks equal to the amount of electricity they consume (a minimum of five blocks is requested for small businesses with no limit on the high end).

Invoicing

Each block adds US\$4.00 to the consumer's monthly utility bill. No additional or separate bill is used.

Term

Consumers are under no obligation to commit for any length of time. They may enter and exit the program at any time, and they may buy as many blocks as they wish.

Consumer Value

Consumer values primarily include, but are not limited to: Public relations and meeting personal/corporate environmental goals.

Labeling

The TVA certifies products, engages in monitoring and verification and discloses product content in accordance with Green-e Standards.

Market Penetration

TVA has 7,500 residential participants and 350 business participants. This is no more than .5 percent participation on the residential side. TVA is one of the larger programs in the country in terms of kWh sold per year, which is more than 36 million.

TXU Green Energy Eco-Friendly

TXU — Green Energy (Australia)

Target Consumers

Small and medium businesses and residential consumers.

Product Name and Logo

The TXU — Green Energy product is called Eco-Friendly. There is no separate logo for this product.

Product Type

Delivered electricity-type product. TXU Eco-Friendly allows the consumer to choose how much green energy to purchase. The amount will be matched with energy from renewable sources and delivered to the electricity grid on behalf of the consumer.

Content

TXU Eco-Friendly is sourced from wind power, landfill biogas and hydroelectric power.

Amount of Renewable Electricity

A certain share of the total electricity consumption.

Pricing

Consumers can choose how much of their electricity they want to from green sources and the product is priced accordingly.

2.5 percent	US\$0.0005 per kWh (business only option)
5 percent	US\$0.001 per kWh (business only option)
10 percent	US\$0.002 per kWh (business only option)
25 percent	US\$0.005 per kWh (available to commercial and residential consumers)
50 percent	US\$0.01 per kWh (available to commercial and residential consumers)
75 percent	US\$0.015 per kWh (available to commercial and residential consumers)
100 percent	US\$0.02 per kWh (available to commercial and residential consumers)

Invoicing

Included in monthly electric bill.

Term

Consumers are under no obligation to commit for any length of time.

Consumer Value

Consumers' values primary include, but are not limited to: Public relations and meeting personal/corporate environmental goals.

Labeling

Certification of products, monitoring and verification and product content disclosure is required of all products in Australia from the Government-run SEDA, the Green Power Accreditation Program.

Market Penetration

TXU provides four different green electricity products for consumers. Sale of all these products in 2004 have resulted in 2,456 residential and 57 commercial consumers. During the first half of 2004, gross annual sales amounted to 18,456 MWh.

Annex 5

Sample Green Electricity Home Page

Website Theme

Welcome, take action today that can improve Shanghai for you, your family and China.

Green Electricity Information

What is green electricity?

Develop a concise, clear description augmented by a variety of attractive pictures.

Why green electricity?

Describe the benefits of green electricity.

Why now?

Create a sense of urgency for the economic, social and environmental development of Shanghai.

Product Information

Check out the product

Include a concise description of the product for all consumers. Users will be able to navigate through options for the specific levels of consumers.

Residential

Provide a detailed description of the product for residential users (including RE generation sources, make-up of product by percent, location, age of generation sources and cost of product), along with the benefits the consumer will realize through their purchase, and provide terms and conditions of enrollment. The consumer can navigate to a third page with a sign-up form.

Small organization

Provide a detailed description of the small organization product (including RE generation sources, make-up of product by percent, location, age of generation sources and cost of product), along with the benefits to the consumer, and provide terms and conditions of enrollment. The consumer can navigate to a third page with a sign-up form.

Large energy user

Provide a detailed description of the large energy user product (including RE generation sources, make-up of product by percent, location, age of generation sources and cost of product), along with the benefits to the consumer, and provide terms and conditions of enrollment. The consumer can navigate to a third page with a sign-up form and a contact to call for more information.

Encourage friends and family to sign up and get an Energy Saver bonus

Talk about the importance of sharing smart ideas. If a consumer signs up for green electricity through your recommendation, you get a free Energy Saver light bulb while supplies last.

Program Information

Endorsers and users

List the influential people who are endorsing the product with photographs and quotes. This section will also include profiles of consumers and their reasons for purchasing green electricity.

Promise to our consumers

Describe how the team will work for the consumers.

Product certification

Describe why you can trust what you are getting and how it is measured and verified.

Frequently asked questions

Include the FAQ document.

About us

List all the key people and organizations involved.

Contact us

Provide a mailing address, E-mail address and telephone number for people and companies to contact.

Annex 6: Draft Decree for the Pilot Phase

Provisions of the Municipality of Shanghai on the Pilot for Purchase and Sales of Green Electricity

Chapter 1. Preface

Article 1

For speeding up green electricity development in Shanghai; improving the energy structure; accelerating environment protection and sustainable development, as well as for building a favorable atmosphere of society's concern for green electricity development, this provision is made according to relevant provisions of 'The Energy Conservation Law of People's Republic of China', China Medium and Long Term Energy Conservation Plan and the local situation.

Article 2

Green Electricity in the pilot provisions refers to electric power generated by such RE resources as per relevant laws and regulations like wind power, solar energy, etc.

Article 3

Municipality of Shanghai encourages green electricity development as well as encourages enterprises (all legal entities) to purchase green electricity voluntarily.

Article 4

Shanghai Economic Commission (SEC) and Shanghai Development and Reform Commission (SDRC) are responsible for the monitoring and management of green electricity purchase and sales.

Shanghai Energy Conservation Supervision Center (SECSC) acts as the day-to-day regulatory body for green electricity purchase and sales.

Shanghai Municipal Electricity Power Company (SMEPC) and Congming Electricity Power Company (hereinafter as utilities) are the companies who are in charge of green electricity sales and relevant operation.

Chapter 2. Purchase and Sales of Green Electricity

Article 5

The cost of enterprises (entities) and individual consumers for purchasing green electricity is the unit price times the amount of green electricity. The unit price of green electricity (RMB fen by per kilowatt hour) for the green electricity consumers is set by the difference between the average grid-connected tariff for green electricity and the average grid-connected tariff in the whole municipality. The unit price of green electricity should be approved and execute by the main price authority of the Municipality Government annually. The price authority will publicize the unit price and total amounts to the society. The purchase amounts are applied by consumers voluntarily, according to the procedure.

Article 6

SDRC will arrange green electricity annual guide plan. The purchase and sales of green electricity will be carried on the guide plan, and utilities will balance the purchase and sales. If the annual purchase volume from green electricity producer exceeds the sale volume, the differentials can still be sold in the coming year; if there is the status of vice versa, the differentials shall be deducted in the coming year. By means of increasing or decreasing the sale volume of the green electricity, a balanced cycle of green electricity purchase and sale is to be maintained within a three-year cycle.

Article 7

Consumers can make applications through phone call (SMEPC Toll-free Service Line 95598) and mails, and they can also log onto Shanghai Green Electricity Website, SMEPC Website, or they can go to the local business branches of SMEPC.

Enterprises (entities) consumers will only become green electricity consumers upon the signing of the agreement with SMEPC.

Individual consumers will automatically become green electricity consumers upon the receiving of the confirmation letter which is post-paid.

Article 8 the rule of purchase & sales quota

The unit quota for the enterprise (entities) consumers is set at 6,000 kWh, and the minimum subscription shares are varied in accordance with the volume consumed one year prior which are as following:

- When annual volume of electricity consumption is equal or less than 2 GWh, minimum subscription shares should be 10 quotas;
- When annual volume of electricity consumption is above 2 GWh and less than 5 GWh, minimum subscription shares should be 20 quotas;
- When annual volume of electricity consumption is above 5 GWh and less than 20 GWh, minimum subscription shares should be 50 quotas;
- When annual volume of electricity consumption is above 20 GWh and less than 50 GWh, minimum subscription shares should be 80 quotas;
- When annual volume of electricity consumption is above 50 GWh and above, minimum subscription shares should be 100 quotas;

The minimum annual subscription shares for the residential household are 10 quotas which is defined as 12 kWh for the one quota.

Article 9

The subscription duration has three options: One year, two years and three years. The annual green electricity subscribed will be paid evenly in 12 months of the year which shall be made through the existing bill and collated channel.

Article 10 Implementation

The utilities develop the annual green electricity purchase, sale plans, execute the plan and sign up the consumers.

The utilities produce and report the quarterly and annually statistics for the purchase, sale and consumer list of the green electricity and submit to SDRC and SEC .

SECSC audits of purchase, sale, accounting and the consumer list.

Chapter 3. Incentives to Green Electricity Consumers

Article 11

SECSC publishes the consumers list to the society regularly and award honorary certificates to the green electricity consumers.

Article 12

Green electricity consumers with the right to the usage of the Green Electricity Logo, who sign a green electricity purchase contract with at least a two-year term and purchase green electricity in a volume exceeding 1MWh/year and in a percentage exceeding 10 percent of electricity consumption of last year. SECSC will issue the right to the eligible green electricity consumers on behalf of SDRC and SEC.

The eligible green electricity consumers can use the green electricity logo during the contract period.

Article 13

The top green electricity consumers will be awarded with honorary certificates and awards medal by SDRC and SEC.

Chapter 4. Regulatory Management for Green Electricity

Article 14

The utilities set up green electricity account book. In addition to the regular items on the monthly utility bill, a new item of the green electricity purchase is added to the bill of those consumers who have brought green electricity. To publicize relevant data concerning the production and sale of green electricity on a certain period basis;

Article 15

SDRC is responsible for the regular supervision of the annual plan and the tariff execution and usage for green electricity, when it's necessary, the auditing agency is assigned to do the routine audition.

Article 16

The responsibility of SECSC is to master the information of green electricity purchase and sales; reports to relevant Government organizations and proposes the improving measurements and suggestions; assist the sales entity to make and implement the business plan for green electricity to issue the right to use green electricity logo and to deter those behaviors that illegally use green electricity logo.

Chapter 5. Attached Articles

Article 17

SEC and SDRC are responsible for the interpretation of the provisions according to their working functions.

Article 18

The provisions will be piloting since the Municipal Government approval.

List of Technical Paper Series

Region/Country	Activity/Report Title	Date	Number
SUB-SAHARAN AFRICA (AFR)			
Africa	Power Trade in Nile Basin Initiative Phase II (CD Only): <i>Part I: Minutes of the High-level Power Experts Meeting; and Part II: Minutes of the First Meeting of the Nile Basin Ministers Responsible for Electricity</i>	04/05	067/05
Cameroon	Decentralized Rural Electrification Project in Cameroon	01/05	087/05
Chad	Revenue Management Seminar. Oslo, June 25-26, 2003. (CD Only)	06/05	075/05
Côte d'Ivoire	Workshop on Rural Energy and Sustainable Development, January 30-31, 2002. (French Only)	04/05	068/05
Ethiopia	Phase-Out of Leaded Gasoline in Oil Importing Countries of Sub-Saharan Africa: The Case of Ethiopia - Action Plan.	12/03	038/03
	Sub-Saharan Petroleum Products Transportation Corridor: Analysis and Case Studies	03/03	033/03
	Phase-Out of Leaded Gasoline in Sub-Saharan Africa Energy and Poverty: How can Modern Energy Services Contribute to Poverty Reduction	04/02	028/02
		03/03	032/03
East Africa	Sub-Regional Conference on the Phase-Out Leaded Gasoline in East Africa. June 5-7, 2002.	11/03	044/03
Ghana	Poverty and Social Impact Analysis of Electricity Tariffs	12/05	088/05
	Women Enterprise Study: Developing a Model for Mainstreaming Gender into Modern Energy Service Delivery	03/06	096/06
	Ghana: Sector Reform and the Pattern of the Poor Energy Use and Supply	03/06	097/06
Kenya	Field Performance Evaluation of Amorphous Silicon (a-Si) Photovoltaic Systems in Kenya: Methods and Measurement in Support of a Sustainable Commercial Solar Energy Industry	08/00	005/00
	The Kenya Portable Battery Pack Experience: Test Marketing an Alternative for Low-Income Rural Household Electrification	12/01	05/01
Malawi	Rural Energy and Institutional Development	04/05	069/05
Mali	Phase-Out of Leaded Gasoline in Oil Importing Countries of Sub-Saharan Africa: The Case of Mali - Action Plan. (French)	12/03	041/03
Mauritania	Phase-Out of Leaded Gasoline in Oil Importing Countries of Sub-Saharan Africa: The Case of Mauritania - Action Plan. (French)	12/03	040/03
Nigeria	Phase-Out of Leaded Gasoline in Nigeria	11/02	029/02
	Nigerian LP Gas Sector Improvement Study	03/04	056/04
	Taxation and State Participation in Nigeria's Oil and Gas Sector	08/04	057/04

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Regional	Second Steering Committee: The Road Ahead. Clean Air Initiative in Sub-Saharan African Cities. Paris, March 13-14, 2003	12/03	045/03
Regional	Lead Elimination from Gasoline in Sub-Saharan Africa. Sub-Regional Conference of the West-Africa Group. Dakar, Senegal March 26-27, 2002. (French Only)	12/03	046/03
	1998-2002 Progress Report. The World Bank Clean Air Initiative in Sub-Saharan African Cities. Working Paper #10 (Clean Air Initiative/ESMAP)	02/02	048/04
	Landfill Gas Capture Opportunity in Sub-Saharan Africa	06/05	074/05
	The Evolution of Enterprise Reform in Africa: From State-owned Enterprises to Private Participation in Infrastructure — and Back?	11/05	084/05
Senegal	Regional Conference on the Phase-Out of Leaded Gasoline in Sub-Saharan Africa	03/02	022/02
	Elimination du Plomb dans l'Essence en Afrique Sub-Saharienne Conference Sous Regionales du Groupe Afrique de l'Quest. Dakar, Senegal. March 26-27, 2002.	12/03	046/03
	Alleviating Fuel Adulteration Practices in the Downstream Oil Sector in Senegal	09/05	079/05
South Africa	South Africa Workshop: People's Power Workshop	12/04	064/04
Swaziland	Solar Electrification Program 2001-2010: Phase 1: 2001-2002 (Solar Energy in the Pilot Area)	12/01	019/01
Tanzania	Mini Hydropower Development Case Studies on the Malagarasi, Muhuwesi, and Kikuletwa Rivers Volumes I, II, and III	04/02	024/02
	Phase-Out of Leaded Gasoline in Oil Importing Countries of Sub-Saharan Africa: The Case of Tanzania — Action Plan.	12/03	039/03
Uganda	Report on the Uganda Power Sector Reform and Regulation Strategy Workshop	08/00	004/00
WEST AFRICA (AFR)			
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EAST ASIA AND PACIFIC (EAP)			
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	TA For Capacity Building of the Electricity Authority	09/05	076/05
China	Assessing Markets for Renewable Energy in Rural Areas of Northwestern China	08/00	003/00
	Technology Assessment of Clean Coal Technologies for China Volume I — Electric Power Production	05/01	011/01
	Technology Assessment of Clean Coal Technologies for China Volume II — Environmental and Energy Efficiency Improvements for Non-Power uses of Coal	05/01	011/01
	Technology Assessment of Clean Coal Technologies for China Volume III — Environmental Compliance in the Energy Sector: Methodological Approach and Least-Cost Strategies	12/01	011/01
Philippines	Rural Electrification Regulation Framework. (CD Only)	10/05	080/05
Thailand	DSM in Thailand: A Case Study	10/00	008/00
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Vietnam	Options for Renewable Energy in Vietnam	07/00	001/00
	Renewable Energy Action Plan	03/02	021/02
	Vietnam's Petroleum Sector: Technical Assistance for the Revision	03/04	053/04

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SOUTH ASIA (SAS)			
Bangladesh	Workshop on Bangladesh Power Sector Reform	12/01	018/01
	Integrating Gender in Energy Provision: The Case of Bangladesh	04/04	054/04
	Opportunities for Women in Renewable Energy Technology Use in Bangladesh, Phase I	04/04	055/04
EUROPE AND CENTRAL ASIA (ECA)			
Russia	Russia Pipeline Oil Spill Study	03/03	034/03
Uzbekistan	Energy Efficiency in Urban Water Utilities in Central Asia	10/05	082/05
MIDDLE EASTERN AND NORTH AFRICA REGION (MENA)			
Regional	Roundtable on Opportunities and Challenges in the Water, Sanitation and Power Sectors in the Middle East and North Africa Region Summary Proceedings, May 26-28, 2003. Beit Mary, Lebanon. (CD)	02/04	049/04
Morocco	Amélioration de l'Efficacité Energie: Environnement de la Zone Industrielle de Sidi Bernoussi, Casablanca	12/05	085/05
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	How do Peri-Urban Poor meet their Energy Needs: A Case Study of Caju Shantytown, Rio de Janeiro	02/06	094/06
Bolivia	Country Program Phase II: Rural Energy and Energy Efficiency Report on Operational Activities	05/05	072/05
Chile	Desafíos de la Electrificación Rural	10/05	082/05
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	Stimulating the Picohydropower Market for Low-Income Households in Ecuador	12/05	090/05
Guatemala	Evaluation of Improved Stove Programs: Final Report of Project Case Studies	12/04	060/04
Honduras	Remote Energy Systems and Rural Connectivity: Technical Assistance to the Aldeas Solares Program of Honduras	12/05	092/05
Mexico	Energy Policies and the Mexican Economy	01/04	047/04
	Technical Assistance for Long-Term Program for Renewable Energy Development	02/06	093/06
Nicaragua	Aid-Memoir from the Rural Electrification Workshop (Spanish Only)	03/03	030/04
	Sustainable Charcoal Production in the Chinandega Region	04/05	071/05
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	Regional Electricity Markets Interconnections — Phase II Proposals to Facilitate Increased Energy Exchanges in South America	04/02	016/01
	Population, Energy and Environment Program (PEA) Comparative Analysis on the Distribution of Oil Rents (English and Spanish)	02/02	020/02
	Estudio Comparativo sobre la Distribución de la Renta Petrolera	03/02	023/02
	Estudio de Casos: Bolivia, Colombia, Ecuador y Perú	03/02	023/02
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	Bank Experience in Non-Energy Projects with Rural Electrification Components: A Review of Integration Issues in LCR	02/04	052/04
	Supporting Gender and Sustainable Energy Initiatives in Central America	12/04	061/04
	Energy from Landfill Gas for the LCR Region: Best Practice and Social Issues. (CD Only)	01/05	065/05
	Study on Investment and Private Sector Participation in Power Distribution in Latin America and the Caribbean Region	12/05	089/05
GLOBAL			
	Impact of Power Sector Reform on the Poor: A Review of Issues and the Literature	07/00	002/00
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	Cross-Border Oil and Gas Pipelines: Problems and Prospects	06/03	035/03
	Monitoring and Evaluation in Rural Electrification Projects: A Demand-Oriented Approach	07/03	037/03
	Household Energy Use in Developing Countries: A Multicountry Study	10/03	042/03
	Knowledge Exchange: Online Consultation and Project Profile from South Asia Practitioners Workshop. Colombo, Sri Lanka, June 2-4, 2003	12/03	043/03
	Energy & Environmental Health: A Literature Review and Recommendations	03/04	050/04
	Petroleum Revenue Management Workshop	03/04	051/04
	Operating Utility DSM Programs in a Restructuring Electricity Sector	12/05	058/04
	Evaluation of ESMAP Regional Power Trade Portfolio (TAG Report)	12/04	059/04
	Gender in Sustainable Energy Regional Workshop Series: Meso-American Network on Gender in Sustainable Energy (GENES) Winrock and ESMAP	12/04	062/04
	Women in Mining Voices for a Change Conference. (CD Only)	12/04	063/04
	Renewable Energy Potential in Selected Countries: Volume I: North Africa, Central Europe, and the Former Soviet Union, Volume II: Latin America	04/05	070/05
	Renewable Energy Toolkit Needs Assessment	08/05	077/05
	Portable Solar Photovoltaic Lanterns: Performance and Certification Specification and Type Approval	08/05	078/05
	Crude Oil Prices Differentials and Differences in Oil Qualities: A Statistical Analysis	10/05	081/05
	Operating Utility DSM Programs in a Restructuring Electricity Sector	12/05	086/05
	Sector Reform and the Poor: Energy Use and Supply in Four Countries: Botswana, Ghana, Honduras, and Senegal	03/06	095/06



Energy Sector Management Assistance Program (ESMAP)
1818 H Street, NW
Washington, DC 20433 USA
Tel: 1.202.458.2321
Fax: 1.202.522.3018
Internet: www.worldbank.org/esmap
E-mail: esmap@worldbank.org