



Energy-policy Framework Conditions for Electricity Markets and Renewable Energies

23 Country Analyses Chapter Caribbean States

Eschborn, September 2007

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New Edition of the TERNA Country Survey

Since the first edition of the TERNA country survey appeared in 1999, there has been a distinct heightening of public and political awareness of the consequences of climate change and of energy provision as a key factor in sustainable development. In Germany and other industrialised countries, a political tailwind, effective promotion mechanisms and rising energy prices have created the conditions for a dynamic market in which renewable forms of energy are exhibiting high growth rates within the energy mix. In 2006, global new investment in renewables amounted to US\$ 70.9 billion – an increase of 43 % over 2005.

Strong economic development in many emerging countries has triggered rapidly rising demand for energy and competition on the international oil market. Against the background of the rising cost of fossil fuels, supply risks and damage to the environment, the significance of renewable energy as a means of generating electricity is growing – also in developing and emerging countries: according to analyses conducted by the Renewable Energy Policy Network for the 21st Century (REN21), 39 countries have set expansion targets for renewable energy sources and introduced promotion mechanisms, nine of which are developing or emerging countries. Of total new investment in renewable energy around the world, US\$ 15 billion was invested in developing and emerging countries. Nevertheless, the majority of countries still have a long road ahead of them before they overcome existing barriers to the successful introduction of renewable forms of energy.

The German and European market acts as the driving force for the wind energy industry and provides an indispensable background of experience. However, growth in the industry is also increasingly apparent in developing and emerging countries. It is the successes in countries such as India, China and Brazil which encourage commitment beyond the borders of industrialised nations. In those three countries there is a growing proportion of local content in the systems and equipment they produce – and not only for supply to their own domestic markets.

A number of other countries though, too, are erecting their first wind farms, thereby establishing the basis for gaining experience to be utilised in future markets.

To help interested players gain access to the new markets, this survey provides detailed descriptions of the framework conditions for electricity markets and renewable energy in 23 developing and emerging countries.

Latin America	Africa/Middle East	Asia
Argentina	Egypt	Bangladesh
Brazil	Ethiopia	China
Caribbean States	Jordan	India
Chile	Morocco	Indonesia
Colombia	Namibia	Pakistan
Costa Rica	South Africa	Philippines
Dominican Republic	Tunisia	Viet Nam
Mexico		
Nicaragua		

This latest country survey and the previous editions are available on our homepage: www.gtz.de/wind. For the first time, the publication is also available on CD-ROM. For information on how to obtain this, again, go to the homepage.

Our grateful thanks go to a large number of GTZ staff members and other experts in the field for their help in putting this information together.

Eschborn, September 2007

Legal Information

1. The data used in this study is based on both publicly accessible sources of information (publications, specialist articles, internet sites, conference papers etc.) and non-public papers (for example internal expert reports from promoting institutions), as well as personal interviews with experts (for example officials at energy ministries in the investigated countries and project staff at promoting institutions). Although all information has been checked as far as possible, errors cannot be ruled out. Neither the GTZ nor the authors can therefore provide any guarantee of the accuracy of the data included in this study; no liability can be accepted for any loss or damage resulting from use of the data included in the study.
2. The sole authorised user of this study for all forms of use is the GTZ. Duplication or reproduction of all or part of the study (including transfer to data storage media) and distribution for non-commercial purposes is permitted, provided the GTZ and the TERNA Wind Energy Programme are named as the source. Other uses, including duplication, reproduction or distribution of all or part of the study for commercial purposes, require the prior written consent of the GTZ.

The TERNA Wind Energy Programme

There is great potential for generating electricity from renewable energy sources in many developing and emerging countries. Obstacles to the exploitation of such sources include a lack of knowledge of framework conditions in the energy industry and insufficient transparency with regard to the prior experience and interests of national actors.

The purpose of the TERNA (Technical Expertise for Renewable Energy Application) wind energy programme, implemented by GTZ on behalf of the Federal German Ministry for Economic Cooperation and Development (BMZ), is to assist partners in developing and emerging countries in planning and developing wind power projects. Since 1988 the TERNA programme has pursued the twin goals of laying the foundations for sound investment decisions while at the same time enabling partners to assess wind energy potentials, plan wind energy projects and improve energy-policy frameworks for renewable forms of energy.

The TERNA wind energy programme's partners are institutions in developing and emerging countries that are interested in commercial exploitation of wind power. These include, for example, ministries or government institutions which have the mandate to develop BOT/BOO projects, state-owned or private energy supply companies (utilities) and private enterprises (independent power producers).

TERNA offers its partners expertise and experience. In order to initiate wind power projects, favourable sites must be identified and their wind energy potential ascertained. To do this, wind measurements are normally taken over a period of at least twelve months and wind reports are drawn up. If promising wind speeds are found, the next step is to conduct project studies investigating the technical design and economic feasibility. TERNA also provides advice to partners on matters of finance, thus closing the gap between potential investors and offers of funding from national and international donors.

If required, CDM baseline studies can be prepared and advice can be offered to potential operators on setting up an efficient operator structure. In order to ensure as much transfer of know-how as possible, efforts are made to ensure cooperation between international and local experts, for example when preparing the studies.

In successful cases, TERNA initiates investment-ready wind farm projects by this method. TERNA itself is not involved in financing. In addition to the activities that are tied to specific locations, TERNA advises its partners on how to establish suitable framework conditions for the promotion of renewable energy sources.

Up until 2007, TERNA has been active in over ten countries around the world.

Further information on GTZ's TERNA wind energy programme, the application procedure etc. is available at www.gtz.de/wind or directly from:

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Caribbean States

9.1.1 Energy sector in the selected Caribbean states – a summary

The Caribbean states presented below comprise the four Windward Island states of Barbados, Grenada, Saint Lucia and Saint Vincent & the Grenadines (SVG), and the island of Dominica, in the Leeward Islands. While Barbados is situated some 100 miles (160 km) to the east of the Antilles arc and can be described as a relatively dry, low, limestone island, the other islands all have volcanic origins and are accordingly characterised by distinctive, partly steep and craggy, mountainous landscapes and rather high precipitation (>2000 mm per annum). With the exception of Grenada, they all have substantial geothermal potential. All of these islands are exposed to north-easterly trade winds and therefore possess correspondingly good wind power potential.

Another common attribute of all the islands (excepting Dominica) is that they are each supplied with electricity from a national power utility company with a monopoly on power generation, transmission, distribution and sale. In Dominica, the energy sector was (partially) liberalized in 2007, but that of the other countries is still in transition. Sometime within the next few years, reforms are expected to open up the electricity market, primarily for investments by independent power producers. Thanks to high electricity tariffs coupled with improving framework conditions, the wind power and solar energy sectors are the most attractive on all of the islands, and the same applies to geothermal and hydro-electric power on several of them.

The following table surveys the basic energy sector data for the selected OECS (Organisation of Eastern Caribbean States) members and Barbados.

Electricity sector					
	Barbados	Dominica	Grenada	St. Lucia	SVG
Population (approx.)	280,000	74,000	100,000	160,000	118,000
Area [km ²]	432	750	344	616	389
Utility	BL&P	DOMLEC	GRENLEC	LUCELEC	VINLEC
Universal license until	2028	2015 (new, from 2007)	2073	2045	2033
Installed capacity [MW]	239.1	23.5	45.1	65.8	39.98
Installed RE capacity [MW]	2 kW (PV)	7.6 (hydropower)	15 kW (PV) 80 kW (wind)	none	5.7 (hydropower)
Peak load [MW]	154.2	14.4	24.0	49.2	20.6
RE share	0% (15%*)	35-40%	0%	0%	19-27%
Electrification level	100%	99%	99.5%	99%	99%
2005 sales volume [GWh]	885.0	67.8	131.6	323.6	103.7
Electricity tariffs [US\$/kWh]	0.24 (2006)	0.37 (2006)	0.30 (2006)	0.26 (2006)	0.28 (2004)

Electricity sector					
	Barbados	Dominica	Grenada	St. Lucia	SVG
Current RE policy					
National energy policy	draft stage	processing stage	none	draft stage	draft stage
National energy action plan	none	draft not yet adopted	draft not yet adopted	adopted by cabinet	draft not yet adopted
RE targets	2012: 10% of national consumption, 2026: 20% of national consumption	2008: 48% of installed generating capacity 2015: 65-70% of installed capacity	none	2007: 10% of peak load	none
IPPs allowed	no	yes	with sublicence from utility	with sublicence from utility	with sublicence from utility
Autonomous generation allowed	with sublicence from utility	yes, up to 20 kW unlicensed	yes, net metering up to 10 kW	yes, but only off-grid	yes, but only off-grid
Injection by IPP regulated by law	no	yes	only net metering up to 10 kW and subject to unit verification	no	no
Utility's position on RE injection	own generation preferred	regulated by new law	own generation and net metering	own generation preferred	generation and willingness to purchase
Incentive mechanisms for solar water heaters	income tax relief, import-tax exemption	no tax on imported equipment and components	tax exemption for hotels importing equipment and components	income tax relief, import tax exemption	case by case decisions (approval required)

* Thanks to the use of solar water heaters, renewable energy sources contribute approx. 15% of all power used.

Tab. 1: Survey of the energy sector situation in the selected Caribbean states¹

More than 90% of power supplies in the region are dependent on imported fossil fuels. Most Caribbean islands with the exception of Trinidad and Tobago have little or no oil, natural gas or coal resources. As a consequence, some countries, Grenada for example, have to spend as much as half of their export revenues on imported fossil fuels. Within the framework of the 2005 PetroCaribe Alliance, Venezuela supplies crude oil and petroleum products on concessional terms. The majority of Caribbean states have already joined the alliance, although St. Lucia and Barbados are yet to do so.

Most of the Caribbean states' economies rely mainly on income from tourism and agricultural exports, in addition to private transfers from workers in foreign employment. Only on the larger islands, such as Jamaica and Trinidad & Tobago, are there any energy-intensive industries to speak of.

During the period of rising oil prices in 2005/2006, the already comparatively high electricity tariffs escalated to levels between 0.24 US\$/kWh (Barbados) and 0.37 US\$/kWh (Dominica).² Those rates are among the highest in the world; they include the usual Caribbean fuel surcharges that are added to the base tariffs.

1 Thomas Scheutzlich: German Contribution to the (CREDP/GTZ), paper presented at the Caribbean Environmental Forum (CEF-3), Antigua, 5-9 June 2006.

2 At 0.04 US\$/kWh, electricity tariffs on Trinidad and Tobago are very low, thanks mainly to indigenous oil and natural gas resources.

9.1.2 Status of renewable energy sources in the selected Caribbean states – a summary

Despite considerable potential for wind and solar energy and, to a lesser degree, hydropower, geothermal and biomass resources, renewable energy still only accounts for about 3% of all electricity generated in the CARICOM³ region.

The main reason for such an exceptionally low level of renewable energy utilisation is the unfavourable political and legal context, which imposes a whole range of barriers – such as the monopolies enjoyed by national power utility companies in all the countries examined, a lack of incentives for RE utilisation and, conversely, a lack of sanctions for non-utilisation (which explains the absence of investment by IPPs) but also the utilities' lack of awareness of RE technologies, and their resultant lack of planning and maintenance capacities for RE systems.

The steep oil price rises of 2005/2006 had very serious consequences, primarily for electricity consumers, since any increase in the price of oil is usually passed directly on to them via the fuel surcharge, but also for the governments, which are having to contend with hugely greater outflows of foreign exchange to pay for imported oil. Increasing pressure from governments and consumers alike led to the national power utilities opening themselves up to the application of RE technologies and development of their potential, and they are now pressing ahead with RE projects to differing degrees of intensity and at various rates.

Since most of the countries have sufficient generating capacities in place to avoid bottlenecks, the more pressing problem is their desire, or indeed need, to reduce the high prime costs of power generation. Hence, RE technologies are regarded mainly as 'fuel savers' and only secondarily as a means of creating new generating capacity.

Regional programmes for the development of renewable energies

The problematic situation outlined above was the point of departure for the Caribbean Renewable Energy Development Programme (CREDP), which since 2003 has received from GEF/UNDP and the Government of the Federal Republic of Germany (BMZ) funding to the amount of approx. US\$ 7 million and is now being coordinated by the CARICOM Secretariat in Guyana. The objective of the project, in which 11 of the 15 CARICOM member countries are participating, is to eliminate the aforementioned barriers. The present phase of the programme is concentrating on the provision of advisory services to the governments of the OECS states (Organisation of Eastern Caribbean States) in their efforts to create advantageous and secure regulatory frameworks, and to identify concrete RE projects and help bring them to a state of investment maturity.

CAWEI⁴ is a regional initiative that was originated by the CREDP/GTZ project and co-financed by the EU Energy Initiative (EU EI/PDF⁵), and which is now being coordinated by CARILEC.⁶ Its objective is to bundle and to dispose by joint international tendering as many Caribbean wind farms as possible in order to minimise, through economies of scale, the cost to the suppliers for transactions, maintenance and repair.

CAWEI also provides a platform for the exchange of expertise and experience among power providers who are already operating or planning wind farms. Just recently, tendering documents for regional-scale competitive bidding on three wind farms were drawn up via CAWEI and are presently being discussed by the participating power utilities. The documents afford special treatment to such factors as the Caribbean Basin's specific situation (small, often weak isolated grids; low capacities; hurricanes; seawater erosion; etc.).

3 The Caribbean Community (CARICOM) has 15 member states.

4 CAWEI – Caribbean Wind Energy Initiative.

5 PDF – Partnership Dialogue Facility, a promotion instrument of the EU Energy Initiative (EU EI).

6 CARILEC – Caribbean Electric Utility Services Corporation, based in St. Lucia.

Above and beyond that, power providers in other Caribbean countries, for example Jamaica, Cuba, Dominica, Grenada, St. Kitts & Nevis, Anguilla, Montserrat, Guyana and Surinam, are also expressing interest in the installation of (additional) wind farms. In principle, the planners of such wind energy projects can count on future support from CAWEI.

UNEP/OAS (Organization of American States) is also providing assistance to a regional programme devoted to the development of geothermal energy in Dominica, St. Lucia and St. Kitts & Nevis.

The latest developments in the use of renewable energy resources in the five countries that are the subject of this study are summed up in the following sections.

Hydropower

Few Caribbean states⁷ have much hydropower potential. In fact, of the countries under discussion, only Dominica and SVG have any significant potential at all.

The first hydroelectric plant in Dominica was installed in 1952, and by the 1960s the country was meeting roughly 90% of its energy requirements with hydroelectricity. However, as time passed, the increasing use of diesel fuel, coupled with dry season water shortages, ageing equipment and technical problems, caused that percentage to drop drastically. The installed capacity (6 MW) is not available all year round, but decreases to about 3.6 MW during the dry season.

The downslide was particularly noticeable in 2001, when numerous new diesel generators were installed to cover rapidly rising demand and grid expansion.⁸

Dominica presently has three hydropower plants with a total cascaded output of 7.6 MW, only 6 MW of which, however, is technically available. They were constructed between 1965 and 1988.

In 2005 CREDP/GTZ conducted a feasibility study on the rehabilitation and expansion of power-generating capacities at the Old Trafalgar and Padu power stations in Dominica. The study established the fact that such a project would be both technically and economically feasible and viable. However, the owner of the plants (Dominica Electricity Services, Ltd. – DOMLEC) has not yet acted on the suggestion.

Due to the 2006 amendment of the Electricity Supply Act (ESA), more independent and autonomous power producers can be expected to emerge in the future. For example, the operators of a tourist resort on the east coast have expressed interest in generating their own electricity from hydropower, as have a number of industrial enterprises, and a number of independent power producers would like to engage in the commercial operation of hydropower plants.

One concrete project for which CREDP/GTZ is presently conducting a feasibility study for the Dominica Water and Sewerage Company (DOWASCO) – the ‘Newtown’ project – would be able to utilise an existing potable water conduit for generating approximately 150 kW output. The commercial feasibility is outstanding, and DOWASCO is expected to implement the project.

CREDP/GTZ’s conservative estimate of Dominica’s untapped hydropower potential is put at roughly 5 to 10 MW.

St. Vincent has approx. 5.2 MW installed capacity in the form of hydropower plants that provide between 19% and 27% of the country’s electricity (albeit with major dependence on annual precipitation levels). Many years ago, in the early 1970s, hydropower still accounted for 80% of all electricity produced in St. Vincent. The plants, all of them run-of-river facilities, are located at South Rivers on the east coast (0.9 MW), Cumberland on the west coast (3.7MW) and Richmond, also on the west coast (1.2 MW).

7 Outside of St. Vincent and Dominica, substantial hydropower potentials can also be found in Guyana, Surinam, Belize, Cuba and Jamaica.

8 Vidal, 2004.

CREDP/GTZ also conducted a feasibility study for St. Vincent in 2005. The results documented the technical and commercial feasibility of rehabilitating and optimising the Richmond and South Rivers hydropower stations, and in 2006 the VINLEC supervisory board agreed to launch the project. A project prequalification programme published by VINLEC expires at the end of April 2007.

St. Vincent's available but as yet untapped hydropower potential ranges somewhere between 5 MW and 8 MW.

With its Millet River Dam, St. Lucia has a small hydroelectric reserve capacity of some 150 kW. A feasibility study on the utilisation of excess flow and of the minimum ecological flow established the technical and commercial viability of such a project. The study was forwarded to the St. Lucia Water and Sewerage Company (WASCO), but no decision has yet been taken. This would be a strictly 'fuel-saver' type of project that could help WASCO reduce their pumping station operating costs.

In Grenada, possible hydropower potentials were studied in the 1980s, but nothing beyond about 500 kW was discovered.

Wind energy

Wind energy is an RE technology that nearly all Caribbean states can make use of, although site-dependent differences in yield must be anticipated.

While wind farms have been in operation in Curaçao (Netherlands Antilles) and Guadeloupe since the 1990s, it was not until mid-2004 that the first wind farm was commissioned in the Anglophone Caribbean (Wigton Wind Farm in Jamaica, 20 MW). There was also a 250-kW turbine in Montserrat (a British overseas territory) until it was destroyed by a volcanic eruption.

In the eastern Caribbean, regional and international organisations (CDB, OECS, OAS⁹) have been conducting and supporting wind measurements and site searches since the 1980s. However, many of the originally identified locations have since been built on and are therefore no longer available. The technically useful wind potential is practically only limited by the permissible penetration rate for the existing isolated grid and by the number of sites that are both suitable and available. Especially on small islands, a lack of the latter often poses a nearly insurmountable barrier.

There are presently three wind farm projects in planning: the Lamberts plant on Barbados, with approx. 11 MW; the 12 MW Sugar Mill project on St. Lucia; and the 7 MW Ribishi Point project on St. Vincent. Hoping to attract the attention of the international wind industry, the three power providers Barbados Light & Power (BL&P), LUCELEC and VINLEC have pooled their efforts in a Caribbean Wind Energy Initiative (CAWEI) designed to achieve a 'critical mass' for joint international tendering on wind farms with a total output of 30 MW.

Barbados has made the most progress toward actually building a wind farm that can produce between 26 and 30 GWh annually. An environmental impact assessment was commenced in 2006 and is already completed.¹⁰

In Dominica and Grenada, the respective utilities DOMLEC and GRENLEC are in the process of searching out locations and gathering anemometric data, which, when they are finished, should enable implementation of small wind farms in the capacity range of 5-8 MW.

On Grenada, in March 2007, an 80-kW wind turbine was erected on the premises of a holiday resort near Paradise Bay on the east coast. As of May 2007, the new plant is to join a diesel generator in supplying electricity to the complex. GRENLEC has promised to purchase any surplus output.

9 CDB – Caribbean Development Bank, OECS – Organisation of Eastern Caribbean States, OAS – Organisation of American States.

10 The last public hearing on the matter took place in Barbados on 24 February 2007.

Biomass

In Barbados, bagasse is the main source of biomass. It is used for cogenerating purposes in sugar factories, but only on a seasonal basis. The possibility of producing ethanol from bagasse has also been investigated. The government commissioned a feasibility study on the development of power generating capacities based on bagasse, the goal being to secure an additional 30 MW of electricity for the public grid.

Biofuels

Biofuels for power generation and the transport sector are a topic of growing relevance in the Caribbean, too. On St. Vincent, for example, the possibility of cooperating with Guyana to cultivate jatropha (Barbados nut/physic nut/purging nut) in Guyana is under consideration as a biofuel material that could be jointly processed and marketed.¹¹

Solar energy

Given grid coverage of nearly 100%, the use of solar energy to generate electricity presently (still) amounts to little more than a niche technology in the countries under discussion.

As is typical of Caribbean islands, Barbados enjoys an insolation rate of the order of 5.6 kWh/m²d. Various photovoltaic systems have been installed in Barbados, the largest of which is a 17.3 kW system located at Harrison's Cave near the centre of the island.

An interesting approach has been adopted in Grenada, where the private-sector company GRENSOL sells and installs photovoltaic systems and recently entered into an agreement with the power utility GRENLEC to inject power from systems with ratings up to 10 kW into the local grid in a net-metering arrangement. Three such systems were installed in 2006 (3.3 kW_p, 2.3 kW_p and 1.3 kW_p), and two additional systems are planned for the first half of 2007.

Barbados is the Caribbean country with the largest number of installed solar water heaters (SWH), and it even ranks high globally in the use of this technology. An estimated 35,000 systems were in operation in 2005 (NREL, 2005), saving the country some US\$ 6.5 million annually on oil imports. Three local companies build the SWHs, which are now considered standard equipment for all new buildings on the island.

Additional solar applications include: (I) solar distillation projects, primarily among educational institutions, where solar-powered stills are used for producing distilled water; and (II) solar drying of harvest crops.

A market study on solar water heating practice that CREDP/GTZ conducted on the islands of Dominica, St. Lucia and St. Vincent revealed substantial latent demand for solar water heaters, particularly in the hotel and tourism sector.

Geothermal energy

Due to pronounced volcanic activity in the area, Dominica has major geothermal potential. Several different studies conducted in recent years have identified some promising locations, particularly in the southern part of the island, for example around Wotten Waven, Boiling Lake and Soufrière. A study carried out by Electricité de France (EdF) in the 1980s indicates sufficient potential for plants with ratings as high as 100 MW, mainly in the southern part of the island, and other studies estimate the theoretically available potential as even higher (300 MW). If those resources were to be developed, Dominica could install undersea cables and export energy to other islands, particularly to Guadeloupe and Martinique.

The OAS and other partners are promoting and exploring Dominica's geothermal resources by way of the Eastern Caribbean Geothermal Development Project (Geo-Caraïbes), which was launched in 2005. This regional initiative also involves St. Lucia and St. Kitts and is being financed by the Global Environment Facility (GEF). Its objective is to create an amenable context for the commercial exploitation of geothermal energy in the eastern Caribbean area. It addresses technical aspects (e.g. quantification of potentials), the legal framework (e.g. legislative and policy reforms and strengthening of local institutions) and financial considerations (e.g. launching of a venture capital fund for geothermal drilling).

Thanks to high levels of volcanic activity, geothermal energy probably constitutes one of the most important renewable sources of energy on St. Lucia, where a number of exploration programmes have been conducted over the past two decades. The findings confirmed the existence of geothermal resources that could become a substantial component of the island's overall blend of power-generation energy sources. Despite the findings, however, no plans have yet been drawn up to further investigate the potentials. On the other hand, the government and a Canadian IPP by the name of Unified Network of the Eastern Caribbean (UNEC) signed a letter of intent in 2004 to partner in the development of geothermal springs, especially in the vicinity of Soufriere.

Future projects in the region

CREDP has a portfolio of some 23 projects that have already passed their first project triage and are slated for implementation within the next few years. Seven of the projects (three wind power projects and four hydropower projects) are being processed by CREDP/GTZ.

In the wind power sector, still-cautious utility companies could take the lead in accelerating some additional projects. This refers in particular to DOMLEC (Dominica), GRENLEC (Grenada), NEVLEC (Nevis) and ANGLEC (Anguilla). Jamaica is planning to expand the existing Wigton Wind Farm by an additional ~15 MW.

In Dominica, a local investor group has requested help from CREDP/GTZ for identifying a suitable site and planning a hydropower project.

The Government of Barbados Millennium Project has seized upon existing plans for establishing a Centre of Excellence for renewable energies. The centre is to serve research, development, training and information-dissemination purposes for all branches of the renewable energy sector.

Further information on the activities of the entire CREDP programme, including the part financed by GEF-UNDP, is available at www.caricom.org.

9.1.3 Information Sources – General

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9.2.1 Electricity market

Contrary to the other Caribbean islands (apart from Trinidad), Barbados possesses a limited amount of petroleum resources that serve along with imported fossil fuels to cover the country's energy requirements, including power generation. In 2005, imported oil cost the country some 140 million euros (BD\$ 350 million), a sum that was substantially larger than in the preceding years. Thanks to the extensive use of solar water heaters instead of the otherwise customary electric models, renewable energies are now contributing approximately 15% of the overall energy supply.

Installed capacity

The total installed electricity generating capacity in 2005 amounted to 239.1 MW, with peak load reaching 154.2 MW. In May of 2005, two older-model generating facilities with a capacity of roughly 31 MW were replaced with a pair of new generators rated at 30 MW each. This yielded a 14% net increase in overall output. The new generators are more efficient and run on low-grade heavy fuel oil. As such, they have helped dampen the effects of increasing oil prices.

Power generation

Most of the generators used for producing electricity are diesel-electric units that run on heavy fuel oil. Some gas turbines are kept in reserve for peak loads and emergencies. In 2005 BL&P generated 953.4 GWh of electricity. That was 6.4% more than the year before and, hence, higher than the average increase of 4.1% per year over the past five years.

Power consumption

In 2005, all consumers together paid US\$ 172 million for 885 GWh of electricity. Household power consumption rose by 6.5 % over 2004 to 294 GWh (Fig. 1), and similar growth (6.4%) was registered in the industrial/commercial sector, where 591 GWh was consumed.¹² Other major users include the public sector and the hotel branch, each of which accounts for around 15 % of total consumption.¹³

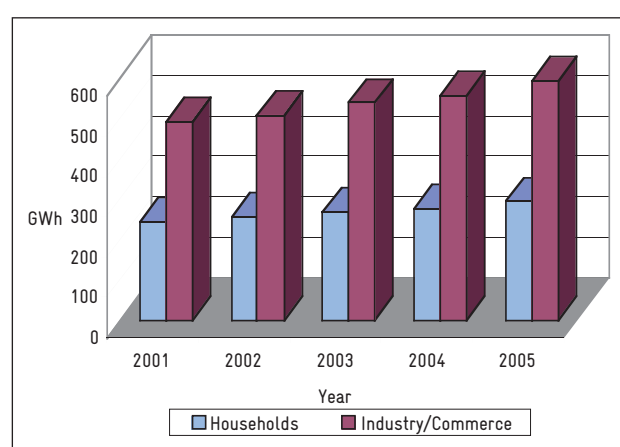


Fig. 1: Power consumption according to sector in Barbados; GWh; 2001-2005

Electricity prices

Due to the global rise in the cost of crude oil between 2004 and 2006, the cost of fuel now accounts for more than 45 % of total expenditures at the Barbados Light & Power Company. In 2005, electricity tariffs had to be ratcheted up some 31 % between January and December due to the increasing surcharge on fuel. In October and November 2006 the adjustments amounted to 94.2 and 89.4 US\$/MWh respectively.¹⁴

The household electricity tariff comprises a monthly fixed charge¹⁵ of US\$ 1.52 and the following tariff classes:

Monthly consumption rate	Basic charge (US-ct/kWh)
First 100 kWh	8.93
Next 900 kWh	9.95
Over 1000 kWh	10.96

Tab. 2: Electricity tariffs in Barbados, in US-ct/kWh

The fuel surcharge is added to the basic charges. Small-scale commercial users have a similar tariff structure; they pay an availability fee (energy rate) of 2.54 US\$/kVA and a consumption-dependent demand rate of 0.115 US\$/kWh. Major consumers are exempted from a fixed fee, instead paying an energy rate of 1.52 US\$/kVA and a consumption-dependent demand rate of 99.50 US\$/MWh.

This puts the electricity tariffs in Barbados at the lower end of the region's electricity prices. This is partly attributable to the island having its own oil fields.

Development planning

The island's generating capacities are being expanded, and its distribution network is being upgraded in order to satisfy increasing demand for electricity while improving the reliability and efficiency of supply. Additional generating capacities totalling 240 MW (gas turbines and slow-running diesel generators) are in planning for Trents Plantation, St. Lucy. This capacity expansion project will be spread out over the next 20 years, beginning with the installation of a 30 MW gas turbine in 2008. Also, a new sugar factory is being designed for combined heat and power generation straight off the drawing board.¹⁶

A wind farm with a rating of approx. 10 MW is being planned and scheduled for international tendering sometime in 2007 with the assistance of CREDP/GTZ's Caribbean Renewable Energy Development Programme.

12 Source: BL&P Ltd. 2005 Annual Report.

13 Source: Sealy, 2006.

14 www.blpc.com.bb.

15 All cited tariffs are exclusive of the legally prescribed 15% value-added tax.

16 BL&P Ltd., 2005 Annual Report.

The national power utility BL&P Ltd. has earmarked some US\$ 41 million¹⁷ for the upgrading and new construction of substations and for the installation of a new 132 kV transmission line for moving large quantities of electricity between the southern and northern regions of the country.¹⁸

9.2.2 Market actors

Barbados Light & Power Company Ltd.

The power utility company Barbados Light & Power Company Ltd. (BL&P) has a universal licence for generating, transmitting and distributing electricity in Barbados until 2028. BL&P is a limited liability company in the majority ownership of the local National Insurance Board (28%) and the Canadian International Power Co. Ltd. (37%).¹⁹

Other actors

Fair Trading Commission (FTC)

The FTC assumed responsibility for regulating the various power utility companies in Barbados in 2001. Its task is to ensure that regulated power utilities such as BL&P comply with the provisions of the Utilities Regulation Act and other laws concerning consumer protection and fair competition.

Recently the FTC issued a set of service standards applicable to the power utility operations of BL&P; the set includes a standard on the quality of electricity.

Ministry of Energy and Public Utilities

The Ministry of Energy and Public Utilities is responsible for decisions relating to energy and natural resources, public utilities, the National Petroleum Corporation and the Barbados National Oil Company.

9.2.3 Legal framework

The energy sector is governed by the Electric Light and Power Act (1899) and regulated by the Fair Trading Commission Act, Cap. 2000-31, and the Utilities Regulation Act, Cap. 2000-30.

The currently valid regulations do not provide for power generation by independent companies because the power utility holds a monopoly on the generation, transmission and distribution of electricity. While the law does allow autogeneration, i.e. the generation of electricity for in-house consumption, it prohibits the sale or injection into the grid of such electricity.

The electricity supply tariffs are set according to the provisions of the Utilities Regulation Act; responsibility for doing so lies with FTC. The law defines the principles, tariffs and service standards, makes adjustments, and monitors the law's implementation by users.

9.2.4 Policy promoting renewable energy sources

The Barbados Ministry of Energy and Public Utilities has overseen the drafting of an energy policy for Barbados in connection with which the government set itself the ambitious goal of seeing to it that renewable energy sources contribute more than 30% of the island's primary energy requirements by 2012.

The new energy policy is also intended to pursue the following two objectives:

1. reduce dependence on fossil fuels through focussing on renewable energies
2. promote research and development in the field of energy efficiency, oil and natural gas exploration and renewable energies (Sealy, 2006).

¹⁷ BL&P Ltd. Northern Expansion – BL&P news article: www.blpc.com.bb/wattsnew.cfm?ID=24.

¹⁸ The voltage level in the existing high-tension lines is 24.9 kV, with the exception of one buried transmission line rated at 69 kV.

¹⁹ Barbados Light and Power: Our History (www.blpc.com.bb/aboutus/history/history5.cfm).

Several provisions of the tax code are designed to promote renewable energies, particularly with respect to solar water heaters. The Fiscal Incentive Act of 1974 grants import benefits and tax exemptions to producers of such equipment. Tax concessions are also offered for the installation of solar water heaters under the 1984 Income Tax Amendment: the cost of such systems can be directly and fully deducted from the purchaser's income tax. In addition, all electric water heaters are subject to a 60% consumption tax, and are accordingly unattractive to purchase.

Clean Development Mechanism

Barbados signed the Kyoto Protocol in August 2000 and has established a Designated National Authority (DNA). To date, no CDM energy projects have been registered.

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9.2.6 Contact Addresses

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9.3.1 Electricity market

Dominica's power sector is based on a mixture of imported fossil fuels and locally produced hydroelectric power. The latter accounts for approximately 33% of the overall power output (2005). Dominica has so much untapped hydropower, wind energy, geothermal energy and solar energy that the country could actually obtain all of its electricity from renewable energy sources and even have some left over to export.²⁰ The Caribbean Renewable Energy Development Programme (CREDP/ GTZ/UNDP) and GeoCaribe, a geothermal energy project sponsored by GEF-UNEP and OAS, are presently rendering assistance.

Installed capacity

In 2005, the installed generating capacity at the disposal of Dominica Electricity Service Company (DOMLEC)²¹ amounted to 23.5 MW, of which 7.6 MW stemmed from hydroelectric plants. The guaranteed generating capacity was 14.8 MW, including 3.2 MW dry-season hydropower. The peak load in 2005 amounted to 14.4 MW.

Capacity expansion

DOMLEC expanded its generating capacity by 3 MW in 2005 by adding a new diesel generator and had planned to add another 3 MW in 2006, but that has not yet taken place.

Between 2000 and 2005, technical and non-technical power losses averaged a comparatively high 17.3% (LUCELEC: approx. 10%) and were mainly attributable to losses occurring in the low voltage grid. DOMLEC therefore commissioned a study for the purposes of identifying the causes and developing a programme to reduce the losses. Countermeasures were introduced, including the replacement of low voltage lines and defective capacitors, plus reductions in the ratings of underutilised transformers. Some of the switchgear at Padu Hydropower Station has already been replaced, and a meter replacement programme (MRP) is being implemented.

²⁰ Scheutzlich, Thomas, 2005.

²¹ DOMLEC lost its monopoly in all parts of the sector when the new electricity law took effect.

In addition, approximately 3,000 pre-paid meters were installed in 2005, and another 2,000 are scheduled for installation by the end of 2006.

Power generation

Power generation increased by 6.3 % between 2004 and 2006. This was mainly due to an increase in the use of diesel generators (plus 22.6%), while the share contributed by hydropower dropped 17%. This, in turn, was partly attributable to low precipitation levels and partly to technical problems at one of the hydropower facilities.

A 2005 feasibility study conducted by CREDP/GTZ illustrates the technical and economic options for rehabilitating and expanding the capacity of the existing hydroelectric power plants. DOMLEC, however, has not yet implemented any such option.

Power consumption

Following a 2.3 % drop in physical turnover in 2003 caused by a recession in Dominica (due to a decline in tourism), sales of electricity increased by 5.9 % in 2004 and 2.1 % in 2005.

Dominican consumers paid US\$ 23 million for 67.8 GWh of electricity in 2005; that corresponds to an average price of 0.34 US\$/kWh, or 2 % higher than in 2004. The domestic and commercial sectors registered consumption increases of 1 % and 4 %, respectively, while the industrial and hotel sectors consumed less electricity than before. The decline is regarded as a result of rising fuel prices that have had negative effects on autogeneration by some of the electricity customers.²²

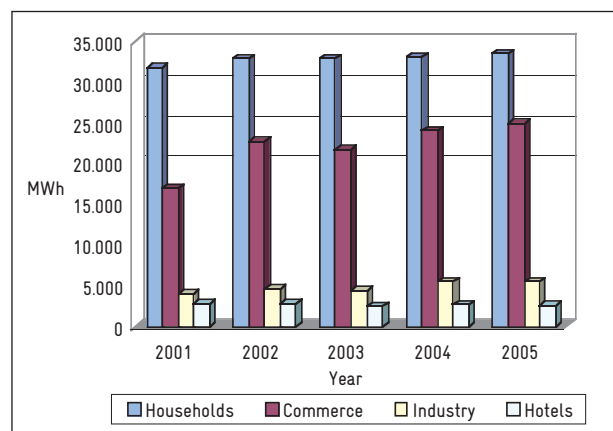


Fig. 2: Power consumption according to sector in Dominica; MWh; 2001-2005

Electricity prices

Electricity tariffs in Dominica are among the highest in the region. The average domestic tariff is 0.37 US\$/kWh, including a fuel surcharge to the amount of roughly 0.17 US\$/kWh. In 2005, the cost of fuel accounted for more than 50 % of the overall cost of power production. That was 46 % more than in 2004.

For five years running and despite all efforts, DOMLEC has been unable to achieve the legally prescribed fuel efficiency level of 17.5 kWh/gallon²³ (actually achieved: 17.4 kWh/gallon).

22 DOMLEC: 2005 Annual Report.

23 1 imperial gallon = 4.55 litres.

9.3.2 Market actors

Dominica Electricity Services Limited (DOMLEC)

At the moment, DOMLEC is still the only power provider on the island. Its main owner is WRB Enterprise Inc., based in Florida. However, when the new Electricity Supply Act was enacted in November 2006, DOMLEC lost its monopoly, and the market was opened up for independent power producers.

Other actors

Ministry of Housing, Lands, Telecommunications, Energy and Ports

The Ministry of Housing, Lands, Telecommunications, Energy and Ports is responsible for formulating Dominican energy policy.

Ministry of Public Work and Public Utilities

The Ministry of Public Work and Public Utilities is responsible for operating the public utility companies DOWASCO (water) and DOMLEC (electricity).

9.3.3 Legal framework

The power sector is regulated by the recently amended Electricity Supply Act (ESA). The new ESA was passed by parliament in November 2006 and entered into force in January 2007.

The new energy law dating from 2006 replaces the old ESA dating from 1996, which had granted DOMLEC a universal licence up until 2025. Under the old law, other companies required permission from DOMLEC to engage in autogeneration. The new law, though, abolishes DOMLEC's monopoly by opening up the energy market for companies interested in generating, distributing and marketing electricity on the island.

One key element of the 2006 ESA is the establishment of a regulatory authority (Independent Regulatory Commission – IRC) whose responsibility it is to regulate all power-sector enterprises and licensees to protect the interests of all market participants, and to approve electricity tariffs.

9.3.4 Policy promoting renewable energy sources

In parallel with the institution of the new regulatory authority, the National Energy Commission is also in the process of formulating an energy policy that will reflect the political will and long-term vision of the government.²⁴

A Sustainable Energy Plan (SEP) was drawn up in connection with the Global Sustainable Energy Islands Initiative (GSEII), but it has not yet been officially adopted by the government. The plan contains, among other things, measures for promoting renewable energy in order to diversify the national energy mix while enhancing energy efficiency.

While the government has not yet formulated any particular RE promotion policy, all RE systems are already exempt from import taxes and value-added tax.

The new electricity law dating from November 2006 now declares the use of renewable energy resources an official goal of the government's energy policy, whereby the following individual objectives are being pursued:

- a. Optimisation of present applications and further development of hydroelectric resources.
- b. Development of solar energy – the government has already invested in a small-scale PV system (in Morne Diablotin National Park) and regards solar thermal systems (water heaters) as an important contribution toward reducing power consumption levels.
- c. Further development of wind energy resources, particularly as 'fuel savers'.
- d. Participation in a geothermal energy project²⁵ – a GEF-financed, OAS-coordinated sub-regional initiative encompassing Dominica, St. Lucia and St. Kitts & Nevis for the purpose of analysing and developing geothermal resources.

Clean Development Mechanism

CDM measures on the island of Dominica are still at a very early stage. Dominica signed the Kyoto Protocol in January 2005 but has not yet established a Designated National Authority (DNA). No CDM-based energy projects have yet been registered.

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9.3.6 Contact Addresses

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9.4.1 Electricity market

As in most other Caribbean states, Grenada's energy supply is almost completely dependent on imported fossil fuels. On average, half of all export revenues are spent on fossil fuel imports. The latter, in turn, account for approx. 11 % of all imports. The sharply increasing price of oil in the past few years has worsened the situation. However, and again like most other Caribbean islands, Grenada has wind and solar energy resources, and in addition has biomass in the form of nutmeg production residue.

Grenada Electricity Services Ltd. (GRENLEC), as the only power provider serving Grenada, Carriacou and Petit Martinique, operates on a universal licence that runs until 2073. While there have been no commercial approaches to the exploitation of RE resources taken to date, since 2006 GRENLEC has been making preparations for a wind farm with a rating of approx. 5 MW. There was also a plan to install a small 900 kW wind farm on the island of Carriacou, but that plan had to be abandoned because GRENLEC was unable to acquire a suitable piece of property. GRENLEC is now in the process of redefining its internal policy with regard to net-metering and autogeneration.

Also since 2006, Grenada Solar Power Ltd. (GREN SOL) has been marketing photovoltaic systems, five of which – with ratings up to 9 kW – have already been installed.

The Paradise Bay Hotel situated at the southeast end of the island installed an 80 kW wind energy conversion system from Netherlands-based Wind Energy Solutions BV (WES) in March 2007. For the time being, the system will be operated in conjunction with a diesel generator to feed an isolated grid. GRENLEC has promised to purchase the surplus current.

Installed capacity

At the beginning of 2007 Grenada's power generating capacity amounted to 45.1 MW, with peak load running at 24 MW. Due to the catastrophic effects of Hurricane Ivan (September 2004), that peak-load level was only 92% as high as the mean load in 2004. A certain degree of recovery had been achieved, but not enough to re-attain the previous year's level. Hurricane Emily also grazed Grenada in 2005 but it mainly affected the smaller island of Carriacou.

Capacity expansion

Most activities in the power supply sector between mid-2004 and 2006 had less to do with capacity expansion and upgrading than with reconstruction of the power grid, which was completely destroyed by Hurricane Ivan. That work was brought to completion in April of 2005.

Still, GRENLEC was able to effectively expand capacity in the southern part of the island by commissioning a pair of 8-MW diesel generators and a transmission network there. A new 33-kV medium voltage line is now accommodating the anticipated increase in power consumption, but will continue to carry only 11 kV until the network is completed.

Power generation

GRENLEC relies exclusively on diesel generators for power production purposes. A total of 147.3 GWh of electricity was generated in 2005. That was 8.3% higher than the year before, but still 7.4% lower than in 2003 (159.2 GWh), i.e. the 'pre-Ivan level'.

Power consumption

In 2005, GRENLEC sold a total of 131.6 GWh of electricity for US\$ 39 million. That reflected an increase of 3.3% in the household sector, 4.5% for commercial consumers, and 24.1% in the industrial sector (see chart). The increase in industrial-sector demand, at 7.4%, was the highest yet in the post-hurricane period.

Technical and non-technical losses in 2005 amounted to only 10.7%. That was a substantial improvement over the average 'pre-Ivan' level of 13.2% (2000-2003).

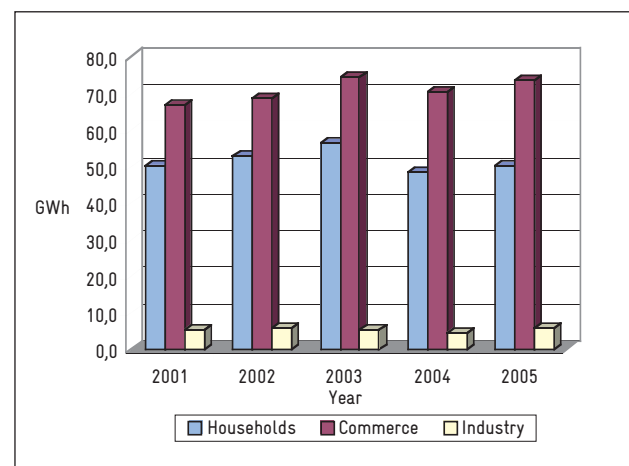


Fig. 3: Power consumption according to sector, in Grenada; GWh; 2001-2005

Electricity tariffs

The average cost of electricity for domestic customers in Grenada, at 0.30 US\$/kWh (2006), is very high. To a significant extent, this is due to the – now customary – attachment of a fuel surcharge to the electricity bill in recent years. In 2003, the surcharge amounted to 40% of the average basic tariff. Then, between 2004 and 2006, the percentage increased markedly in the wake of global oil price developments. In 2005, for example, rising oil prices made it necessary to increase the fuel surcharge to 42.7% – and pass it on to the consumers. Between 2004 and 2005, the fuel surcharge increased from an average of 97 US\$/MWh to 139 US\$/MWh.

9.4.2 Market actors

Grenada Electricity Services Ltd (GRENLEC)

GRENLEC has a universal license for generating, transmitting and distributing electricity until 2073. GRENLEC is a private company whose majority owner (more than 50%) is the Florida-based company WRB Enterprises Inc.; employees, local investors and the Government of Grenada each have smaller stakes in the company.²⁶

Other actors

Ministry of Agriculture, Lands, Forestry, Fisheries, Public Utilities, Energy and the Marketing and National Importing Board (MNIB)

MNIB is responsible for the energy sector and related policy formulation. It is the only ministry in any of the OECS states with its own internal energy agency as a government authority.

Ministry of Finance and Planning

This ministry's responsibilities include the formulation and implementation of the National Climate Change Policy and Action Plan, which, among other things, provides for liberalisation of the energy sector.

9.4.3 Legal framework

The electricity sector is regulated in accordance with the 1960 Electricity Supply Ordinance and the 1974 Electricity Supply Act (ESA). Since 1993, GRENLEC is also responsible for providing power to Carriacou and Petite Martinique.

A regulation dating from 1961 allows autogeneration by individuals, but only with permission from GRENLEC and with governmental approval. The same applies to other electricity market activities (transmission, distribution and/or sale of electricity, plus generation). Work has been ongoing since 2001 on a new electricity law, but it has not yet progressed beyond the draft stage.

9.4.4 Policy promoting renewable energy sources

The government does not yet have an official energy policy. It does offer an incentive to use renewable sources of energy, however, in that alternative energy products, including solar and wind energy systems, are exempted from the general consumption tax.

A Sustainable Energy Action Plan (SEP) was drafted in 2001 by the Global Sustainable Energy Islands Initiative (GSEII). The plan provides for a renewable energy promotion strategy, but it has not been adopted by the government and, as a consequence, the measures it proposes have only been implemented in isolated cases, on an ad-hoc basis, or not at all.

For several years now, a National Climate Change Policy and Action Plan has been the subject of public discussion, and especially after the Hurricane Ivan disaster of 2004 it gained more immediate relevance. A draft version of the plan has been completed and was up for final discussion in April 2007 pending adoption by the government.²⁷

²⁶ WRB is the main shareholder of the utility company DOMLEC in Dominica.

²⁷ National Roundtable on Draft National Climate Change Policy and Action Plan, 5 April 2007.

According to that plan, GRENLEC's monopoly and some stiff residual taxes on RE components and energy-efficient appliances are the main impediments to reductions in greenhouse gas emissions. The plan therefore calls for liberalisation of the energy sector and comprehensive renewable energy promotion measures.

The envisaged liberalisation of the energy sector would include provision enabling licences to be issued to independent operators for the generation, transmission and distribution of electricity. Priority is to be attached to the generation of electricity from renewable energy resources, and the creation of a renewable energy promotion fund is planned.

Clean Development Mechanism

CDM measures on Grenada are still at a very early stage. Grenada signed the Kyoto Protocol in August 2002, but has not yet established a Designated National Authority (DNA). No CDM-based energy projects have been registered to date.

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9.4.6 Contact Addresses

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Saint Lucia

9.5.1 Electricity market

As in most other Caribbean states, power generation on St. Lucia is almost completely reliant on fossil fuels. St. Lucia imported about 120,700 barrels of oil to meet its energy requirements in 2005.

Despite very considerable renewable energy potential in the form of wind energy, geothermal energy and solar energy, the only renewable resource that is even in marginal use is solar energy for heating water. In St. Lucia, too, the actual renewable energy potential has not yet been fully quantified.

Installed capacity

St. Lucia Electricity Services Ltd. (LUCELEC) is still the sole provider of electricity on St. Lucia and is operating on a universal license that does not expire until 2045. The island's total installed power generating capacity in 2005 amounted to 65.8 MW (diesel only), including a new 10.2 MW diesel generator that was commissioned early in that year. The peak load in 2005 amounted to 49.2 MW, or 5.6% higher than in 2004.

Capacity expansion

Recent years have seen massive expansion of the 11-kV distribution network along the west coast and in the north, and preparations are also under way for the erection of a 66-kV transmission line.

In connection with the electrification of rural inland areas, the distribution network has been expanded and its carrying capacity increased at numerous points. Like all of the other islands discussed here, St. Lucia boasts a very high electrification level (approx. 98%).

Power generation

The primary source of energy for power generation on St. Lucia is imported diesel fuel. LUCELEC, however, is pursuing the option of developing wind energy in order to achieve substantial savings on fossil fuel (fuel-saver function). This will help stabilise and, eventually, lower the cost of electricity for power consumers.

Total power production in 2005 came to 323.6 GWh; that was 4.9% higher than in 2004.

Power consumption

Demand for electricity is rising steadily in most consumption sectors, particularly in the commercial sector, where consumption has been increasing disproportionately for the past five years. Consumption there rose 4.6% (158.5 GWh), followed by the household sector with 2.9% (98.9 GWh); only the industrial sector registered no significant growth, increasing by only about 1% (12.5 GWh).

Technical and non-technical losses came to 10.2% in 2005. That was only marginally higher than the targeted 10%.

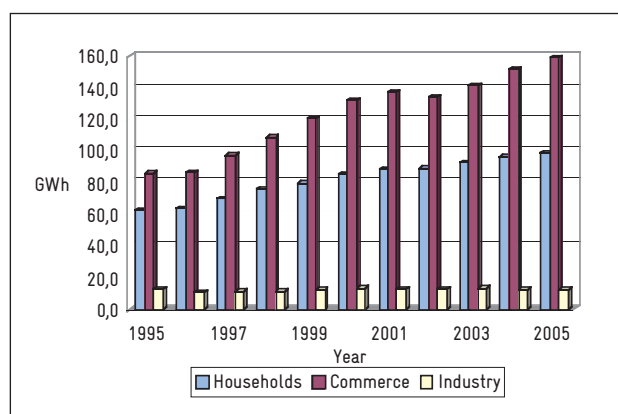


Fig. 4: Power consumption according to sector; St. Lucia; GWh; 1995-2004

Electricity prices

The average cost of electricity for private households, at 0.26 US\$/kWh, is very high in St. Lucia, too. As is the case on the other Caribbean islands, all of which are subject to the fluctuations in global oil prices, the cost of fuel accounts for a large percentage of the overall cost of electricity. In 2005, the average cost of fuel was 2.81 US\$/gallon, or 0.618 US\$/litre. In 2006, 45 % of the overall cost of power production was expended on imported diesel.²⁸

Expansion planning

Based on the high probability of continued growth in tourism, the electricity sector will have to keep expanding its power generating capacities. St. Lucia had 26 % reserve power in 2005 and is planning to expand that to 29 % in the course of 2007. An additional 10.2 MW generator is scheduled for commissioning in 2007.

9.5.2 Market actors

St. Lucia Electricity Services Limited (LUCELEC)

LUCELEC is a listed corporation owned in part (more than 40 %) by public institutions. In 2005, its main shareholders were as follows:

Shareholder	Percentage
CBPF Saint Lucia Ltd ²⁹	20%
First Citizens Bank Ltd. of Trinidad & Tobago	20%
National Insurance Corporation of St. Lucia (NIC)	16.79%
Castries City Council	16.33%
Government of St. Lucia	12.44%

Tab. 3: Share-capital composition at LUCELEC, in%

The remaining shares are held by various local and regional investors.

Other actors

Ministry of Economic Affairs, Economic Planning, National Development and Public Service

Newly established after the elections of 11 December 2006, the Ministry of Economic Affairs, Economic Planning, National Development and Public Service is responsible for, among other things, developing energy policy and engaging in energy planning.

Ministry of Communications, Works, Transport and Public Utilities

The Ministry of Communications, Works, Transport and Public Utilities is responsible for the national power utility LUCELEC.

28 LUCELEC: 2005 Annual Report.

29 Caribbean Basin Power Fund.

9.5.3 Legal framework

According to the 1964 Power Supply Regulation, LUCELEC holds a universal licence for generating, transmitting, distributing and selling electricity until 2045. While the 1964 regulation was superseded by the 1994 Electricity Supply Act, LUCELEC's exclusive licence was preserved. The 1994 ESA does allow auto-generation, but only with the approval and a sub-licence from LUCELEC and only subject to certain constraints and conditions.

9.5.4 Policy promoting renewable energy sources

In 2001, the government advocated a sustainable energy policy prescribing as target objectives the utilization of renewable energy sources in the electricity sector and reductions in the planned demand for electricity. A Sustainable Energy Action Plan (SEP) was elaborated with the assistance of the Global Sustainable Energy Islands Initiative (GSEII) and then adopted by the government. The plan specified quotas for renewable energy power generation capacity for the years 2005 and 2010: 5 MW (7%) and 17 MW (20%) respectively.

One of the measures that the government has implemented up to now is to offer incentives promoting the use of solar water heaters: the cost of the equipment can be offset against tax.

Until now, however, the renewable energy sector goal set for 2005 still has not been reached. Despite the help of the government, LUCELEC has been unable to purchase or lease the plot of land that was selected as a site for a wind farm. Nevertheless, LUCELEC is still professing to endeavour to meet its 10% renewable energy goal for power generation by the year 2007. This will involve erection of a 12.6 MW wind farm at an alternative location on the island's south-eastern coast. With average wind speeds well above 7 m/s, this location is outstandingly suited to the task in many respects.

Consequently, the CREDP/GTZ project advised the government to reserve the entire region for additional wind farm installations, which would allow gradual expansion up to 40 MW.

The new government, which took office on 11 December 2006, has stated that it intends to abide by the previous administration's policy of promoting the use of renewable energy resources and to cooperate closely with the Caribbean Renewable Energy Development Programme (CREDP/GTZ).

Clean Development Mechanism

St. Lucia signed the Kyoto Protocol in 2003 and has since established a designated national authority (DNA). However, no CDM energy projects have been registered to date.

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9.5.6 Contact Addresses

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St. Vincent and the Grenadines

9.6.1 Electricity market

In St. Vincent and the Grenadines (SVG), too, power generation is predominantly dependent on imported fossil fuels. However, St. Vincent's main island does have some hydropower reserves that are being tapped by three hydroelectric plants that presently cover some 20% of the island's overall power output. Like all other Windward Islands, SVG also enjoys outstanding wind conditions and, most likely, geothermal resources, though the latter have not yet been explored. Lastly, the main island possesses untapped hydropower potential.

Installed capacity

St. Vincent Electricity Services Ltd (VINLEC) is the only power utility serving the main island and four smaller islands. VINLEC's universal licence expires in 2033. The islands of Mystique and Palm Islands in the Grenadines chain also have some privately operated power providers.

In 2006, VINLEC's total installed generating capacity came to just below 40 MW, 85% of which was provided by diesel generators and the remaining 15% by hydroelectric plants. VINLEC's facilities are spread across the main island at St. Vincent and the smaller islands. A breakdown of nominal outputs is shown in the following table:

Location	Output [MW]
St. Vincent	33.2
Bequia	2.2
Union Island	1.3
Canouan	3.1
Mayreau	0.18 ³⁰

Tab. 4: Isolated networks operated by VINLEC in Saint Vincent and the Grenadines; MW

The output of St. Vincent's hydroelectric plants is subject to the usual seasonal fluctuations in water flow. Between June and December (the rainy season), when capacity can reach 5 MW, the hydroelectric plants serve as base-load stations, but their output drops to 2.5 MW during the dry season from January to March.

The peak load registered in 2005 was 20.6 MW, or 11% higher than the year before. That increase is largely attributable to rapidly expanding demand on the main island of St. Vincent.

Capacity expansion

Electricity generating capacities have had to be expanded due to economic developments in SVG. VINLEC commissioned the island of Mayreau's first power grid and diesel engine power plant, with a rating of 180 kW, in 2003. The following year, 2004, VINLEC purchased the diesel power plant on the island of Canouan. Until then, the plant had belonged to the government but was already being operated by VINLEC.

Power generation

Total power output in 2005 amounted to 120.7 GWh, 23% of which came from hydro-electric facilities. Between 1999 and 2003, overall output increased by 4.8% per annum on average.

Power consumption

As far as consumption according to sector is concerned, private households and commercial establishments registered increases of 7% and 21% respectively in 2004 (there was particularly strong growth in the commercial sector), while industrial consumption fell 6%.

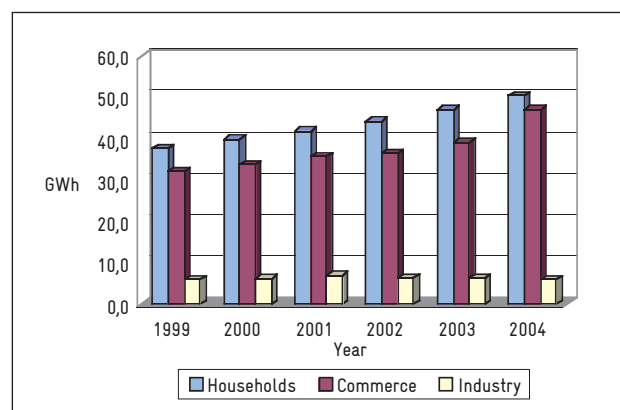


Fig. 5: Power consumption according to sector for St. Vincent and the Grenadines; GWh; 1999-2004

Technical and non-technical system losses in 2005 added up to only 9.8%. That has been so since 1999. As such, the losses here are lower than on the other OECS islands.

Electricity prices

In 2004, consumers paid US\$ 29.3 million for 103.7 GWh of electricity. The cost of electricity includes the adjusted fuel costs, which translate to an average price of approximately 0.28 US\$/kWh. The average price in 2006 probably increased to above 0.3 US\$/kWh as a result of the higher fuel surcharge.

According to VINLEC, the basic charges for electricity have remained constant for many years, while the effective tariffs fluctuate because of the fuel surcharge. In 2004 the actual cost of electricity was 0.28 US\$/kWh., with the fuel surcharge accounting for 36% of the price. That was 5% higher than in 2003. In 2005 and 2006, the high cost of oil made the price of electricity fluctuate between 0.3 and 0.34 US\$/kWh.

The table below lists the electricity tariffs (which have remained constant for some years):

Households	
≤ 50 kWh	16.0 US-ct/kWh
> 50 kWh	18.9 US-ct/kWh
Service charge	1.90 US\$/month
Commerce	
Work	18.11 US-ct/kWh
Power	5.70 US\$/kVA
Service charge	4.50 US\$/month
Industry	
Work	16.6 US-ct/kWh
Power	4.5 US\$/kVA
Street lighting	
Work	21.3 US-ct/kWh

Tab. 5: Electricity tariffs in St. Vincent and the Grenadines; US\$/US¢

The (fluctuating) fuel surcharge has to be added to all tariffs.

Expansion planning

A 0.4 MW expansion of the generating capacity on the island of Bequia is scheduled for April 2007. This is to be followed by another expansion in 2008/2009, when the first 8 MW diesel generator is commissioned at the new Lowmans Bay Power Station on St. Vincent's south-western coast. Lowmans Bay has enough space for an additional 18 MW generating capacity that could be installed within the next few years if necessary.

VINLEC, like other utilities in the region, is receiving technical assistance from the Caribbean Renewable Energy Development Programme (CREDP/GTZ) in connection with the rehabilitation and expansion of two hydroelectric generating facilities for which international tendering was already advertised in February 2007. The expansion and rehabilitation programme will add about 0.8 MW to the existing capacity and increase each unit's output by 30 to 40%.

Also with assistance from CREDP, VINLEC is likewise preparing for the erection of a 7 MW wind farm at Ribishi Point on the south-eastern coast. Both projects – hydropower and wind power – are focussing on the fuel-saver aspect.

9.6.2 Market actors

St. Vincent Electricity Services Limited (VINLEC)

VINLEC is wholly owned by the state and remains the only institution responsible for the supply of electricity in SVG.

Other actors

Ministry of Telecommunications, Science, Technology and Industry

The Ministry of Telecommunications, Science, Technology and Industry is responsible for energy affairs in SVG, in particular for alternative energy sources and energy policy.

Ministry of Transport, Works and Housing

The Ministry of Transport, Works and Housing manages the development and distribution of energy reserves in SVG.

9.6.3 Legal framework

The 1973 Electricity Supply Act (ESA) granted VINLEC a universal licence for generating, transmitting and distributing electricity in SVG until 2033.

Under the ESA, other companies are also allowed to generate, transmit and distribute electricity, but only with VINLEC's permission or as VINLEC licensees, and then only with the approval of the competent minister. Power generation for the owner's own use (autogeneration) also requires VINLEC approval.

According to the ESA, all equipment (machines, consumables, spare parts, etc.) required for power generation, transmission and/or distribution are exempted from customs duties and all other import restrictions. Moreover, the ESA conferred the water rights for all three hydroelectric plants on VINLEC at no cost.

By its own account, the government of SVG is open for liberalisation of the energy sector according to the same model as that which was recently adopted in Dominica.

9.6.4 Policy promoting renewable energy sources

Until now, SVG has had no particular initiatives aimed at promoting electricity generation from renewable energy sources, except that imported components for RE systems are exempted from customs duties on a case-by-case basis.

CREDP/GTZ is presently helping the government formulate an energy policy, and a Draft National Energy Action Plan³¹ has been drawn up.

Clean Development Mechanism

In St. Vincent and the Grenadines (SVG), CDM measures are still at a very early stage of development. SVG signed the Kyoto Protocol in December 2002, but has not yet established a Designated National Authority (DNA). No CDM-based energy projects have yet been registered.

9.6.5 Information Sources

- CREDP/GTZ:
Preparation of wind power projects at Dominica, St. Lucia and St. Vincent, September 2005
- Deane, L.:
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- Gonsalves, Dr. The Hon. Ralph:
2007 Budget Address "On the Cusp of Advanced Economic Take-off: Further Fiscal Consolidation and Tax Reform, Presented to the House of Assembly on December 11, 2006
- VINLEC:
Financial Statements for the year ended December 31, 2004

9.6.6 Contact Addresses

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There is great potential for generating electricity from renewable energy sources in many developing and emerging countries. Obstacles to the exploitation of such sources and to the involvement of foreign investors include a lack of knowledge of framework conditions in the energy industry and insufficient transparency with regard to the prior experience and interests of national actors. This fourth, updated and expanded edition is aimed at overcoming barriers such as these.

The electricity markets and their respective actors are investigated for 23 countries in various regions: Latin America, Africa - Middle East and Asia. The country studies analyse the energy-policy framework conditions and closely examine the status of and promotion policy for electricity generation on the basis of hydropower, wind power, solar power, biomass and geothermal energy. The chapters on each country are rounded off by information about rural electrification.

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