



Energy-policy Framework Conditions for Electricity Markets and Renewable Energies

21 Country Analyses

Eschborn, June 2004

Part Dominican Republic



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Background to the New Edition

Structural changes in the energy sector, accompanied by liberalisation of the relevant markets, have been continuing in many developing and transition countries in recent years. Growing demand for electricity and the ongoing climate debate are increasing the level of interest in technologies for generating electricity from renewable energy sources in these countries.

The rapid expansion of the use of renewable energy in Germany is a subject that is being followed with interest, even outside Europe. Experience here shows that the creation of a conducive political and economic framework and the implementation of appropriate promotion measures can speed up the exploitation of renewable energy.

The German and European market acts as the motor for a wind energy industry and provides an indispensable background of experience. The level of growth in this sector within Germany has slowed down, however. Project developers are therefore increasingly turning their attention to off-shore schemes, other parts of Europe, and the Mediterranean states. The markets for technologies based on other renewable energy sources are also experiencing growing interest. While it is true that the potential for hydro-power, wind power, solar power, biomass and geothermal energy in developing and more advanced countries is often considered to be high, obstacles to entry into this field include insufficient knowledge of the framework conditions prevailing in the energy industry in those countries and a lack of transparency with regard to the prior experience and interests of the national actors.

One of the aims of this third, updated and expanded edition of the study – under a new title – is to facilitate entry into the field of renewable energy. It is based on the previous editions from 1999 and 2002, which were published under the title ‘Producing Electricity from Renewable Energy Sources: Energy Sector Framework in 15 [or 12] Countries in Asia, Africa and Latin America’. These studies have been much in demand, not only by suppliers and project developers but also by financing and operating companies involved in renewable energy technologies.

The analyses of the individual countries comprise sections on the respective electricity markets and the actors in those markets, along with information on the energy-policy framework. The policy for promoting electricity generation from renewable energy sources is examined, and the status of the various forms of renewable energy is analysed in detail. The chapters on each country are rounded off by information about rural electrification.

In comparison with the 2002 edition, eleven new countries have been added. The information about a further ten countries has been updated:

New since 2002		Updated	
Albania	Philippines	Brazil	India
Bosnia - Herzegovina	Senegal	Chile	Mexico
Croatia	Sri Lanka	China	Morocco
Georgia	Vietnam	Colombia	South Africa
Jamaica	Yemen	Dominican Republic	Tunisia
Pakistan			

Information about Argentina, Cuba, Jordan, Kazakhstan and Turkey is given in the 2002 edition. Analyses of Egypt, Indonesia and Thailand were conducted in the 1999 edition. These previous editions are available in electronic form free of charge from www.gtz.de/wind/english/downloads.html.

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

Eschborn, June 2004

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.

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The TERNA Wind Energy Programme

Specialised knowledge and experience are needed to determine what wind energy resources a country possesses and to identify suitable locations. Technical and economic analyses of wind power projects are also impossible without hard information about wind conditions. Such analyses, however, form the basis for the financing and ultimately the successful implementation of a wind farm.

The purpose of the TERNA (Technical Expertise for Renewable Energy Application) Wind Energy Programme, implemented by the GTZ on behalf of the Federal German Ministry for Economic Cooperation and Development (BMZ), is to assist partners in developing and more advanced countries in planning and developing wind power projects. Since 1988 the aim within the TERNA framework has been to lay the foundations for sound investment decisions while at the same time enabling partners to plan and develop further wind power projects in the future.

The TERNA Wind Energy Programme's partners are institutions in developing and more advanced 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 know-how 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.

The prerequisite for promotion by the TERNA wind energy programme is that project development has a realistic prospect of implementation: if the underlying conditions in the electricity sector are sufficiently favourable, and if the proposed wind farm project has a minimum capacity of roughly 20 MW and is situated in a windy area (expected annual average wind speeds of over 6 m/s at a height of 10 m above ground level). Small individual installations or decentralised wind/diesel systems are not normally eligible for promotion, nor are research projects.

Up until 2004, TERNA has been active in over ten countries around the world. In Colombia the first wind farm started operation at the end of 2003 with the help of the TERNA programme. The municipal utility of Medellín built the 19.5MW Jepirachi wind farm on the Guajira peninsula with a total investment volume of some 27 million euros. The 800,000 tons of carbon dioxide saved by the wind farm by 2012 will be documented and sold to the Prototype Carbon Fund (PCF), which will mean additional revenues of around 3.2 million euros for the investor.

The TERNA projects are not financed from the country quotas which the Federal Germany Government agrees with individual partner countries. From the viewpoint of the partner country, therefore, TERNA offers additional funds for wind energy.

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

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Electricity Market

Generating capacity

The power generating capacity feeding into the public grid in the Dominican Republic totals 3,596 MW (as of July 2003) and relies largely on fossil fuels (coal, fuel oil and natural gas, totalling 84%) and, to a lesser degree, on hydropower (534 MW, or just under 16%). This heavy dependence on fossil fuels, all of which have to be imported, poses a heavy burden on the trade balance of the Dominican Republic.

In mid-2003, only 2,145 MW of the total capacity was reliably available. The maximum anticipated demand for power in 2003 was forecast at 1,950 MW. Despite the existing technical reserves, an average of 15% of the potential power demand could not be delivered in 2002.

Lack of supply reliability

New power plants with installed capacities totalling some 1,300 MW were installed between the end of 2000 and mid-2003, but the situation still has not improved with regard to the reliability of supply, which remains characterised by frequent outages and lack of demand coverage.⁷² The unsatisfactory supply situation is attributable not only to a considerable rise in demand, but also to poor payment behaviour on the part of ultimate consumers and the public sector, where electricity bills for public-sector consumption and subsidies promised for certain consumer tariffs are not being paid on time, if at all. Expanding burdens of debt, attributable in part to the temporary freezing of electricity tariffs despite the increasing cost of fuel, are making it difficult to find and procure new kinds of fuel and have repeatedly prompted the power producers to remove capacity from the grid and cease the supply of electricity. In early 2004, the total debt owed to distributing companies and power producers by the government added up to an estimated US\$ 400 million. For several weeks running, power plants with ratings totalling only about 700 MW were on line, and power outages lasting more than 20 hours daily crippled the economy and everyday life.

Power generation

Net power output in 2002 was somewhat more than 10,000 GWh (compared to 9,623 GWh in 2001), and the three power providers together sold 7,073 GWh to ultimate consumers. The forecast for 2003 was 11,037 GWh generated, or 7.8% more than in 2002. Between 1993 and 2002 net power generation increased by 8.4% annually on average, though quite irregularly, and the sale of electricity grew by 11.3% per year.

Power generation in 2003 relied on hydropower (11%), coal (13%), heavy fuel oil (58%), natural gas (9%) and diesel (9%).

		EDESUR	EDENORTE	EDEESTE	Total
Sale of electricity	GWh	2,749	1,946	2,378	7,073
Technical losses (distribution only)	GWh	390	332	327	1,049
	%	10.8	10.8	10.8	
Non-technical losses	GWh	463	786	315	1,564
	%	12.9	25.7	10.4	
Peak load	MW	572	481	514	

Table 16: Sale of electricity and power-distribution losses; Dominican Republic; 2002; GWh, %⁷³

Transmission network

The transmission network is made up of 1,500 km of 138kV power lines extending radially outward from Santo Domingo to the north, west and east, plus nearly 2,000 km of 69kV lines. The east/west and north/south connections in particular are in urgent need of reinforcement to prevent the kind of system outages that have occurred in the past.

Losses

Roughly 29% of all generated electricity is lost due to technical and non-technical factors. The rate of unpaid electricity consumption from illegal connections, unlicensed routing of electricity and poor payment behaviour is extremely high, even to the extent of exceeding, in absolute terms, the network power losses in 2002. The non-technical losses are particularly high in the Edenorte distribution network.

⁷² In 2003 alone, 422 MW of new power generating capacity was added to the interconnected power grid.

⁷³ Source: Superintendencia de Electricidad, March 2003.

	GWh
Net power demand	11,781.5
Power deficit	1,766.8
Net power generation	10,014.8
Transmission losses	252.1
Supply to distributors et al	9,762.7
Distribution losses	2,614.1
Distribution losses	7,148.6 ⁷⁴

Table 17: Breakdown of public power supply; Dominican Republic; 2002; GWh⁷⁵

Power consumption

Only about half of the country's officially counted nearly two million households are registered electricity customers. Their average consumption is low, amounting to some 340 kWh per year. In addition to these official electricity customers, there are probably some 500,000 households that use electricity without paying for it.

	Customers	Consumption (GWh)
Households	950,000	3,232
Services	85,500	649
Industry	8,644	2,131
Public sector	7,081	1,062
Total	1,051,723	7,074

Table 18: Electricity customers and consumption; Dominican Republic; 2002, GWh⁷⁶

IPP electricity prices

In June 2003, the average contractual supply price for electricity from all sources (including hydropower) amounted to 7.1 US cents/kWh. At the same time, 5.9 US cents/kWh was achieved on the spot market. The overall market-average producer's price therefore amounted to 6.9 US cents/kWh.

Electricity tariffs

The household tariffs (BTS1) have a progressive component for both the fixed, consumption-dependent base prices and the kilowatt-hour rates. All private-sector consumers receive their first 300 kWh at a subsidised price. Like all other regulated tariffs, that price is subject to monthly adjustment. However, the rapid depreciation of the Dominican peso's exchange rate in the course of 2003 was not fully apportioned to the electricity tariffs. Consequently, the highest tariff for consumption in excess of 300 kWh dropped from approximately 15 US cents/kWh in January 2003 to approximately 9 US cents/kWh in January 2004 and, as a result, is now submarginal.

* CCGT: combined-cycle gas turbine

Company		Steam turbines	Gas turbines	CCGT*	Fuel-oil engines	Diesel engines	Hydro-power	Total
Haina	%	10.2	4.8		4.5			19.5
Itabo	%	7.6	5.1					12.7
EGEHID	%						15.9	15.9
Union Fenosa Gen.	%				5.7			5.7
Cia. De Electricidad de Puerto Plata (CEPP)	%				2.3			2.3
Monte Rio	%				2.9			2.9
AES Andrés ⁷⁷	%			8.8				8.8
Complejo Metalurgico Dominicano (Metalcom)	%				1.2			1.2
Consorcio Laesa	%					2.5		2.5
Dominican Power Partners LDC	%		6.9					6.9
Transcontinental Capital Corp.	%				3.4			3.4
Smith Enron Cogeneration Ltd.	%			5.4				5.4
Maxon Engineering Services	%					0.9		0.9
Energycorp Caribbean S.A.	%		3.0					3.0
Cia. Eléctrica de San Pedro de Macorix (CESPM)	%			8.8				8.8
Total	%	17.8	19.8	23.0	20.0	3.4	15.9	100.0

Table 19: Breakdown of installed capacities according to type of generation; Dominican Republic; June 2003; %

74 The reader's attention is called to the difference between this figure and the corresponding fig. in the previous table. Both fig., however, stem from the same source.

75 Source: Superintendencia de Electricidad, March 2003.

76 Source: Superintendencia de Electricidad, March 2003.

77 The first combined-cycle power plant, with a rating of 300 MW, to operate on imported compressed natural gas (CNG) from Trinidad entered service in October 2003.

Market Actors

Ever since the early 1990s, as a result of the Law on Energy Sector Development Incentives (*Ley de Incentivo al Desarrollo Energético*), not only the formerly state-owned Dominican Electricity Company CDE (*Corporación Dominicana de Electricidad*), but also a dozen (mainly American) independent power providers are active on the Dominican electricity market. Together, those companies are providing roughly half of the installed generating capacity, which is composed solely of thermal power stations.

State-owned companies

Under the General Electricity Act of 2001, independent state-owned power transmission companies (*Empresa de Transmisión Eléctrica Dominicana–ETED* and *Empresa de Generación Hidro-eléctrica Dominicana–EGEHID*) were established and made responsible for the transmission network and for the operation of hydroelectric power plants. The tasks of rural and urban-marginal electrification, the coordination of electricity companies, and the administration and implementation of contracts with independent power producers were combined and assigned to a new company called *Corporación Dominicana de Empresas Eléctricas Estatales (CDEEE)*, which also serves as a holding company for ETED and EGEHID.⁷⁸

Itabo and Haina

CDE's thermal power generating division was split up into two separate companies. The new thermal power operator Itabo was partially owned by Gener⁷⁹ (Chile) and Coastal (USA), while Seaboard and the erstwhile Enron (both USA)⁸⁰ initially held interest in the power producer Haina. At the end of 2002, each of those two companies held roughly 22.5% of the country's total installed power generating capacity.⁸¹

New power providers

The statistics differentiate between the 'traditional' independent power producers operating on the basis of power purchase agreements (PPA) with the former CDE and present CDEEE, and so-called 'merchant power

plants', which sell their electricity either directly to a supply contract partner (normally a regional power distributor) or via the electricity exchange (spot market). Now, CDEEE is to be liberated from its role as a speculative buyer of electricity in a gradual manner based on new negotiations with the power producers and, hence, the replacement of all PPAs by new contract agreements.

Distribution networks

The power distribution networks were privatised in 1999. A group under the leadership of the Spanish company Unión Fenosa took over the northern and southern grids (EDENORTE/EDESUR), with each holding 50%, and the American company AES bought itself into the eastern grid (EDEESTE). In both cases, operational management was left to the private co-owners. Due to the poor financial and operational situation of the distribution networks⁸², the Dominican Government has reacquired, via CDEEE, Unión Fenosa's stakes in Edenorte and Edesur as of September 2003. Reprivatisation by way of international competitive tendering is planned for September 2004.

Comisión Nacional de Energía (CNE)

The duties of Comisión Nacional de Energía (CNE), which was established in 2001, include the formulation of laws and ordinances and the preparation of supply and demand forecasts. Acting under the auspices of the Ministry of Industry & Commerce, CNE is subordinate to the Ministry of Finance, the Technical Secretariat of the Office of the President, the Director of the Central Bank, the Ministry of Agriculture, the Ministry of the Environment and the Director of the Telecommunications Institute. This executive body has the legal power to enact regulations for the power sector. Since mid-2003, CNE has a new department for alternative energy sources and rational use of energy (*Gerencia Energías Alternas y Uso Racional de Energía*).

Regulatory authority SIE

Superintendencia de Electricidad (SIE), which was established by decree no. 118-98 on 16 March 1998 and became functional in July 1999, supervises market

78 According to the Madrid Agreement dating from July 18, 2001, certain contracts with independent power producers are to be transferred from CDEEE to the distribution companies.

79 Now operating under the name of AESGener, with AES (USA) as majority owner.

80 The possessory interests have changed a number of times since then. The present owner of the holding is a consortium comprising Commonwealth Development Corporation (UK), Basic Energy (USA), Fondo Básico del Caribe, Haert Energy (USA) and the Dominican Grupo Nacional de Finanzas.

81 Due to the appearance of new power producers on the market in 2003, this percentage has decreased markedly.

82 Substantial debts are still outstanding vis-à-vis the Interamerican Development Bank and other commercial banks as well as various power producers (including power plants operated by Unión Fenosa), which have not received payment for supplied electricity.

regulation. SIE's status as a public law body was officially established by the General Electricity Act of 2001. Its duties include in particular the supervision of prices for regulated consumers (households, trade & commerce), who have to purchase electricity from one of the distribution companies. By contrast, large consumers are allowed to negotiate freely to obtain electricity from the supplier offering the most favourable conditions. A spot market for electricity was set up in June 2000 to enable short-term power purchasing transactions.

Coordination of the wholesale market

Another new body that was created by way of the 2001 General Electricity Act is Organismo Coordinador, a coordination group with the main task of harmonising the operations of the various power producers and network operators with each other on the wholesale market and ensuring that the necessary capacity is made available on the spot market. This institution serves to promote the market's self-regulating capacities. It is not a state authority. Its highest authority is a coordinating committee, the members of which include one representative each of the independent power providers, the power producers with private participation, and the transmission and distribution sectors.

Ministry of Industry & Commerce

The Ministry of Industry & Commerce (Secretaría de Estado de Industria y Comercio – SEIC) is concerned with the energy policy guidelines and establishes the general framework conditions for the energy sector. Decree no. 146-2000 placed the Non-Conventional Energy Programme (Programa de Energía no Convencional) under the auspices of SEIC for the purpose of promoting research & development projects concerning the exploitation of renewable energy sources.

Water management

Instituto Nacional de Recursos Hidráulicos (INDRH) is responsible for water resource management. This institute also issues licences for the use of water as a source of energy and attends to its harmonisation with other forms of use, especially with regard to agricultural irrigation.

Legal Framework

Unbundling and privatisation

Law 141-97 on the Reform of Public Enterprises⁸³, which was adopted in June 1997, initiated the unbundling and partial privatisation of the erstwhile state-owned power utility CDE (Corporación Dominicana de Electricidad). The generation, transmission and distribution of electricity were separated from each other in 1998. All constituents of the company with the exception of the transmission lines and the hydroelectric plants were put up for privatisation. Private companies were allowed to acquire 50% capital interests and to take over operational management of the plants. Private-entrepreneurial involvement in the thermal power stations was also accompanied by the obligation to build an additional 100 MW of capacity per year and to bring the plants up to World Bank standards within five years. All economic activities on the part of the government in the electricity sector were subordinated to the newly formed CDEEE.

General Electricity Act of 2001

A General Electricity Act (Ley General de Electricidad, No. 125-01) was approved by parliament and entered into force at the end of July 2001. This law set out the general conditions for further private-sector involvement, gave customers better legal protection vis-à-vis power providers, and created a flexible wholesale market for electricity.

In addition to the institutional changes described in the preceding chapter, the key provisions of the new electricity act relate primarily to the following areas:

- ensuring that at least 20% of all electricity trading is done on the spot market
- authorising power generators to install connecting lines to the interconnected grid system and/or to their own customers (self-sufficient suppliers)
- limiting distribution companies' ownership of generating plants to not more than 15% of peak load in the interconnected system; renewable energy sources are exempted from this rule
- regulating electricity tariffs for public-grid customers with maximum connected loads of 2,000 kW (1,400 kW from 2002, 800 kW from 2003, or 200 kW from 2004 onwards), as long as the

customers do not enter into direct contracts with the suppliers

- regulating transit tariffs for the use of transmission and distribution of facilities
- giving preferential treatment to companies that generate electricity from renewable energy sources with regard to sales and load distribution if prices and conditions are otherwise identical
- exempting companies that generate electricity from renewable energy sources from national and local taxes for five years
- creating a national energy commission (Comisión Nacional de Energía – CNE) to develop energy policy measures and long-term planning of the energy sector
- strengthening Superintendencia de Electricidad to establish it as an independent, neutral regulatory authority with far-reaching competences
- investing 10% of the proceeds from fines for the theft of electricity in an incentive fund for the development of renewable energy sources

Implementation regulation for the General Electricity Act of 2002

A regulation governing the application of the General Electricity Act (Reglamento para la Aplicación de la Ley General de Electricidad) was adopted as Regulation 555-02, dated 19 July 2002, and modified by Regulation 749-02, dated 19 September 2002. This regulation details the roles played by the various market actors and the functioning of the market.

New tariff system

SIE Resolution 31-2002, dated 17 September 2002, introduced a new tariff system for ultimate consumers and substantially reduced cross-subsidisation. Comparable to the Chilean model, the regulated tariffs comprise a component dictated by energy costs and demand costs, regular adjustments for changes in the cost of fuel, exchange rates and inflation rates, plus a fixed amount for power distribution (Valor Agregado de Distribución), which is redetermined at four-year intervals. This is intended to reduce the heavy losses sustained by the electricity industry, amounting to some 4.4 billion pesos in 2002 alone.

Clean Development Mechanism

The Dominican Republic ratified the UNFCCC in October 1998 and acceded to the Kyoto Protocol in February 2002. An initial national report on climate protection was submitted in June 2003. No Clean Development Mechanism projects have yet been defined.

Policy for Promoting Electricity Generation from Renewable Energy Sources

Taxation of fossil fuels

At the end of 2000, with a view to promoting the use of renewable energy sources, the Dominican Government supplemented the preferential arrangements in the electricity act by passing a law that levies consumption taxes on fossil energy sources and petroleum products.⁸⁴ Beginning in 2002, 2% of those tax revenues is being fed into a special fund for the promotion of alternative energy sources and energy conservation programmes.⁸⁵ Each year, the proportion of revenues earmarked for the fund will increase by one full percentage point until it reaches 5%.

Draft of a law promoting renewable energy sources

The draft version of an incentive law for the development of renewable and clean energy sources was submitted to the National Congress for debate in October 2001.⁸⁶ With the help of the GTZ, that draft was modified in the course of 2003 and resubmitted in December 2003 under the altered title Proyecto de Ley de Incentivo al Desarrollo de Fuentes Renovables de Energías. The October 2003 version of the law relates to wind farms with ratings up to 50 MW, hydroelectric power plants up to 5 MW, biomass power plants with an organic fuel content of at least 80% and a maximum output of 40 MW, and electricity-generating solar installations of any size.

The law provides for subsidies covering up to 50% of the initial capital outlay for up to 5 MW installed capacity (to be provided on an individual-case basis); tax exemptions for imported components to be employed in installations using renewable supplies of energy; halving of the power transmission fees (except in cases where trans-

84 Ley que establece un impuesto al consumo de combustibles fósiles y derivados del petróleo (112-00).

85 Fondo de Interés Nacional, for which the Ministry of Industry and Commerce is responsible.

86 Proyecto de Ley de Incentivo al Desarrollo de Fuentes de Energías Renovables o Limpias. The original draft was drawn up by INDOTEC.

mission lines had to be specially installed for electricity generating systems based on renewable energy sources); fixed remuneration rates for wind and hydropower and biomass electricity for 15 years; a five-year tax exemption on earnings from electricity generation based on renewable energy sources; and a fiscal incentive for auto-producers.

Preferential arrangements are also envisaged for feeding into the public power grid. Moreover, CNE is authorised to set annual quotas for the amount of electricity from renewable energy sources to be remunerated outside of the spot market. Due to the presidential elections scheduled for May 2004 and to the anticipated amendments to the draft law, it is not yet foreseeable just when these promotive arrangements will actually enter into force.

GTZ project since 2003

Since March 2003 the GTZ has been providing SEIC and CNE with assistance for their projects promoting the use of renewable energy sources.⁸⁷ The focal areas in this connection are the provision of advice and guidance for the shaping of legal and regulatory framework conditions and for managing the Fund for Renewable Energy, for the electrification of rural communities with micro hydropower plants, and the promotion of PPP approaches to the exploitation of renewable energy sources.

Status of Renewable Energy Sources

Hydropower

Despite extensive exploitation, the Dominican Republic still has untapped hydropower resources. Frequently, power generation is closely linked with reservoirs for drinking water and irrigation, as well as with irrigation channels. In all, the country presently has about 20 hydropower plants in the medium-output range from 3 to 100 MW. All the plants now in operation have a total capacity of 534 MW.⁸⁸ Additional sites with an approximate composite potential of about 500 MW could still be developed.

Mini hydropower potential—international involvement

In the early 1980s, with Taiwanese assistance (Sinotec Engineering Consultants, Inc., Taipei), the erstwhile hydropower divisions at CDE and INDRHI identified an extensive portfolio of possible mini hydropower plants (> 100 kV) with grid connection potential and have since developed them to the point that they are now ready for implementation. This engendered a total of 25 projects with capacities ranging from 370 kW to 4,000 kW and a total capacity of 30 MW, only two of which were implemented by 1986. Recently, however, diverse investors have begun to turn their attention to these projects. Belgium's Fortisbank, for example, is planning to become actively involved, while French development cooperation is represented in the choice of two projects that are to be implemented with the help of the power provider EDF, and the French building contractor Bouygues also intends to actively participate in a pair of projects.

UNDP-GEF provided financial and technical assistance for basic studies into 18 mini and micro hydropower plants⁸⁹ with ratings of 1.5 kW to 250 kW for supplying electricity to remote communities, and UNDP and PROFER/GTZ are further pursuing those studies.

All in all, only half a dozen mini hydropower plants with capacities totalling roughly 1 MW are presently in operation. Additionally, there are roughly 15 pico hydropower plants with ratings of less than 1 kW in service.

According to a presidential decree dated 8 December 2000 (no. 1277-0), the private sector is authorised to engage in the licensed use of hydropower resources yielding 1 MW or less. Conversely, this also means that all hydroelectric plants of larger size count as being relevant to the national interest and therefore may only be operated by the responsible state-owned power utility EGEHID.

Wind Energy

Until now, the substantial wind resources have gone unutilised. The U.S. National Renewable Energy Laboratory (NREL) performed an initial assessment of the wind energy potentials that could serve as a point of departure for major wind-power projects. The main goal of the study was to map the wind resources in all regions of the Dominican Republic and to compile the results in a wind atlas.⁹⁰

87 Proyecto Fomento de las Energías Renovables en la República Dominicana—PROFER.

88 Including 452 MW in connection with impounding reservoirs. Fifteen of the Dominican Republic's 34 reservoirs are also used for generating electricity.

89 Micro hydropower plants are understood as including the relevant generating systems.

90 To consult the wind atlas, go to www.rsvp.nrel.gov/pdfs/wind_atlas_dominican_republic.pdf.

The analysis showed the best wind conditions to be situated in the extreme south-west (in the provinces of Pedernales and Barahona) and north-west (in the provinces of Puerto Plata and Monte Cristi), and in exposed inland areas at elevated altitudes, where suitable sites could be used for providing non-grid electricity (rural electrification). Additionally, some other coastal regions also have good wind conditions.

All in all, some 1,500 km², or 3% of the total land area, were identified as having good or very good wind potential. Together, this would suffice for more than 10,000 MW of power generating capacity. Twenty provinces have a potential of at least 100 MW, and three provinces even more than 1,000 MW. However, further studies will be necessary in order to more closely investigate the power transmission routes and to determine the extent of accessibility. If the locations with wind conditions that are moderate but sufficient for the purposes of rural electrification are included, the potential rises beyond 30,000 MW, or 60 TWh per year. In that case, there are 12 provinces with a wind potential of at least 1,000 MW each.

Plans for wind farms

For some time now, implementation plans for large-scale wind-power projects have been available, but no such project has been implemented to date. The wind farm project in Cabo Engaño, which is being carried out by the power provider Consorcio Energético Punta Cana (CEPM),⁹¹ is nearing completion. This 15MW project has already been licensed for generating electricity. The same enterprise also has plans to install a wind farm with up to 100MW in Juancho in the province of Pedernales, and another one in Matanzas in Peravia province. SIE has already issued power-generating licences to Unión Fenosa for its 100 MW wind farm and to Parques Eólicos del Caribe (90 MW) in 2001. It has not yet been possible to finish any of the installations on time.

Additional plans are being pursued by TROC Internacional (40 MW) in the community of Oviedo in Pedernales province and by the AXOR Group (100 MW). In mid-2003, York Caribbean Windpower (115 MW), a subsidiary of U.S.-based York Research, pulled back from a project in which it had already invested three years of preliminary work, because attempts to secure a financial guarantee from the Dominican Government

failed, as did the renegotiation of a 30-year power purchase agreement that was signed in connection with the sectoral reform in 2001.

In the absence of a separate code of practice for wind power projects, all such projects will have to continue to be guided by the existing regulations for the electricity sector.

Biomass

The main source of energy from biomass utilisation is bagasse, or cane waste from sugar production, which is already in use for generating heat and electricity in sugar factories. However, many of the facilities are outdated, frequently yielding no more than 20 kWh per ton of ground bagasse, so no electricity is left over for feeding into the public grid. Increasing plant efficiency to the technically achievable level would – based on an annual sugar production rate of 550,000 tons – yield between 470 GWh and 575 GWh of electricity per year in modern combined heat and power stations in the sugar industry. This would correspond to roughly 5% of the Dominican Republic's current power generation rate. There are also expectations regarding the production of ethanol from sugar as a substitute for fossil fuel that would be easier to market than cane sugar, which is difficult to export.

Further organic materials for use in generating power include, in particular, agricultural residues, most notably for producing biogas from banana trees and from the husks and leaves of rice. Biogas could also be produced from cattle farming as well as from urban wastes, which contain a large percentage of organic material. Other materials with high energy potential include such oleiferous produce as coconuts and peanuts, the planting and marketing of which have drastically declined over the past 20 years due to the availability of cheaper imported oils. Peanut farming in particular is seen as having good potential as a source of starting material for the domestic production of biodiesel fuel.

91 Endesa, Spain's biggest power provider and wind-farm operator, holds shares in CEPM, a private-sector enterprise that primarily provides electricity for the tourism infrastructure in Punta Cana.

Solar Energy

According to the available meteorological data for 1970 to 1972, the mean daily solar irradiation in the Dominican Republic is between 4,250 and 5,100 kcal/m². As such, the conditions for the harnessing of solar energy are favourable.

The total number of PV modules now in use for the electrification of rural areas has been estimated at more than 20,000 units. Most of the systems were installed on the basis of funds provided by non-governmental organisations and financial assistance from USAID, UNDP and other international donors. Since 2000, the programme for non-conventional energy sponsored by the Ministry of Industry and Commerce (SEIC) alone has put some 600 PV systems in service for rural schools and health care centres, military and police facilities, drinking-water chlorination systems, computer-science laboratories, observation posts in national parks, and rural homes. In early 2004 another 2,000 small PV systems were installed in rural households, with financing provided by the Promotion Fund for National Interests.

Geothermal Energy

The Dominican Republic has no geothermal potential for power generation.

Rural Electrification

It is assumed that some 350,000 households across the country, most of them in rural areas, still have no access to the national power grid. Most of these households have to get by without any electricity at all.

CDEEE Department of Rural Electrification

Following the establishment of the special department for rural electrification within CDEEE (Unidad de Electrificación Rural y Suburbana), gradual elimination of the still considerable deficits within the sector is expected. The associated tasks are to be financed in part from the regular revenues of the privatised distribution companies and generating plants. Twenty percent of the total resources from the relevant fund (Fondo Patrimonial) are earmarked for this purpose.

National Electrification Plan

A national rural electrification plan (Plan Nacional de Electrificación Rural – PER) was presented in June 2003. The plan was drawn up by the rural electrification department at CDEEE with the technical assistance of NRECA and financial assistance from USAID. In addition to expanding the existing grid, the plan also explores the potentials of renewable-energy technologies for application in remote regions, including the relevant financing. The electrification plan is intended to help bring grid electricity to 95% of the rural population within the next 15 years. USAID has concluded a co-operation agreement with NRECA for US\$ 1.4 million to be spent helping CDEEE implement some of the identified high-priority projects.

Rural electrification projects involving renewable energy sources

In the past, the non-governmental organisations REGAE, NRECA and Fondo Pro Naturaleza (PRONATURA) have already implemented a number of projects in the field of renewable energy sources and rural electrification (solar home systems and small wind power systems for the basic electrification of rural households and community facilities, and micro hydropower systems for decentralised village power supplies), all in close cooperation with rural regional development programmes (e.g. Plan Sierra) and village cooperatives. Most of the financing for those programmes came from GEF (small projects fund) and USAID.

Soluz Dominicana

Soluz Dominicana, a subsidiary of U.S.-based Soluz Inc., has been in the market since 1994 as a power service provider of PV systems based on a fee-for-service model. The solar home systems in question serve basic-electrification purposes and are financed either by way of fixed monthly payments or short-term loans. Soluz installs the equipment and provides the requisite maintenance. In April of 2000, Soluz Dominicana had already installed more than 3,500 solar home systems, some 1,700 of them with a fee-for-service contract. In addition to small stand-alone PV systems, a limited number of wind energy conversion systems for rural households and small business establishments also have been put in service.⁹²

92 More detailed information on the work being done by Soluz Dominicana is available in: National Renewable Energy Laboratory (NREL), Renewable Energy for Microenterprise, November 2000. See also: Eric Martinot (GEF), Making a Difference in Emerging PV Markets: Experience and Lessons from a Workshop in Marrakesh, Morocco, September 2000, Washington, November 2000.

PV electrification by SEIC

With financing from Fondo de Interés Nacional, SEIC has implemented a number of rural electrification measures with PV systems in recent years. At the end of 2003, SEIC advertised a competitive contracting project for equipping an additional 2,000 homes in 14 different provinces with solar power installations rated at 75 W each, in addition to 23 cultural centres. Técnicas Energéticas Solares (Tecsol), representing the Spanish manufacturer Isofoton, was chosen to supply the equipment.

Exchange rate (5 March 2004): 100 Dominican pesos = € 1.74
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The potential of renewable sources of energy in developing and emerging countries is often considered high. Obstacles to their exploitation and foreign investors' engagement often include a lack of knowledge of framework conditions in the energy industry and insufficient transparency with regard to the prior experience and interests of the national actors. These are barriers which this third, updated and expanded new edition intends to overcome.

The **electricity markets** and their respective **actors** are investigated for **21 countries** in various regions: **Latin America – Caribbean, Africa, Europe – Caucasus** and **Asia – Pacific**. The country reports 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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