



ENERGY MATRIX COUNTRY BRIEFINGS

Antigua & Barbuda, Bahamas, Barbados, Dominica, Grenada, Guyana, Haiti, Jamaica, St. Kitts & Nevis, St. Lucia, St. Vincent and The Grenadines, Suriname, and Trinidad & Tobago



This publication is part of a series of reports produced by the Energy Division of the Infrastructure and Environment Department of the Vice President of the Research Department at the Inter-American Development Bank (IDB) with support from Compete Caribbean as a regional public good. It is designed to increase the base of knowledge about the characteristics and functions of the Energy Sector in Latin American and Caribbean countries (LAC).

The description of the energy matrix and sector governance of each country in the Caribbean has been carried out in parallel to similar work for the rest of the Latin American and Caribbean region. However, the methodology for this region varies slightly from country to country as there is not a single set of comparable data for all the nations in this group.

The sources of information are all publicly available and include the International Energy Agency, the U.S. Energy Information Administration, the Global Environment Fund, the United Nations, the International Renewable Energy Agency, consulting firms, and local governments and utilities.

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The sources of information are made explicit and the responsibility for their use and interpretation is exclusive to the authors of this monograph.

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We hope that this contribution to regional knowledge will be useful,

Ramón Espinasa

Malte Humpert

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ENERGY MATRIX COUNTRY BRIEFINGS

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Compete Caribbean is a private sector development program that provides technical assistance grants and investment funding to support productive development policies, business climate reforms, clustering initiatives and Small and Medium Size Enterprise (SME) development activities in the Caribbean region. The program, jointly funded by the Inter-American Development Bank (IDB), the United Kingdom Department for International Development (DFID) and the Foreign Affairs, Trade and Development Canada (DFATD), supports projects in 15 Caribbean countries. Projects in the OECS countries are implemented in partnership with the Caribbean Development Bank.



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READING AN ENERGY MATRIX

The colorful charts at the start of every country briefing are an innovative scheme developed at the IDB to depict a country's production, trade, transformation, and consumption of energy for a given year. The scheme is read from left to right, from primary energy sources until final consuming sectors.














Primary energy sources are all the forms of energy as they are found in nature. These include hydrocarbons (oil, gas, and coal) and renewables (hydro, geothermal, wind, solar, and biofuels & waste). Lastly, primary energy includes nuclear energy and peat.

Secondary energy, for final consumption, is derived from primary sources and is composed of oil products and electricity.

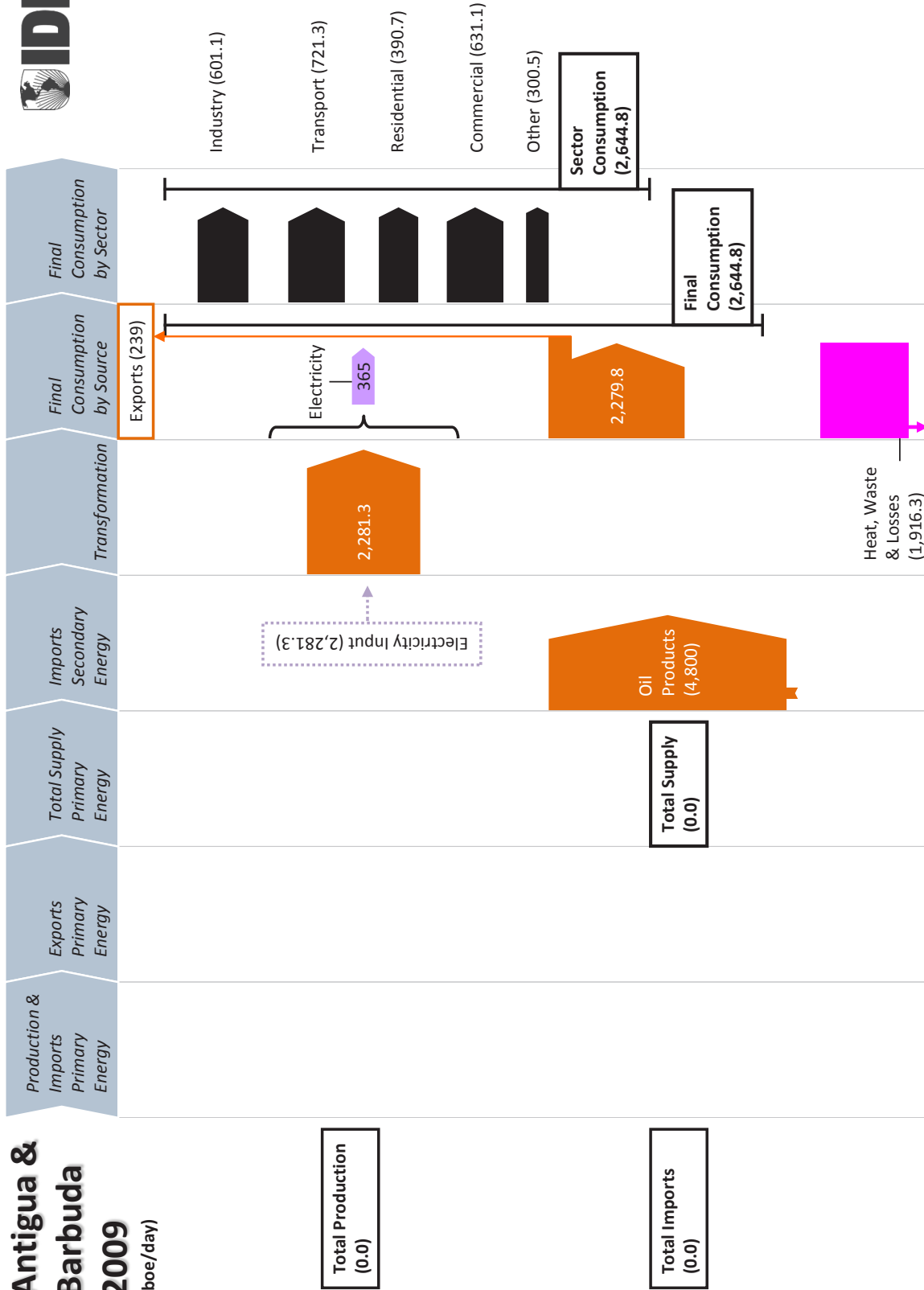
The schematic shows final consumption by energy source (mainly secondary but including some primary such as natural gas or coal for industrial purposes) and by economic sector (industry, transport, residential, commercial and others).

The unit of measure is common to all energy sources, primary or secondary: thousand barrels of oil equivalent per day (kboe/day) – or in the case of the smaller nations, barrels of oil equivalent per day (boe/day) – allowing for easy comparisons between countries.

ENERGY MATRIX KEY

PRIMARY SOURCES		SECONDARY SOURCES		OTHERS
 Crude Oil	 CR&W	 Geothermal	 Oil products	 Consuming sector
 Coal	 Nuclear	 Solar/Wind	 Electricity	 Heat, waste & losses
 Natural Gas	 Hydro	 Peat		

Antigua & Barbuda 2009 (boe/day)



Editor: Ramón Espinosa (INE/ENE)
 Authors: Malte Humpert
 Source: Own calculations based EIA, Castalia Consulting, GEF

Inter-American Development Bank, 2013
 Infrastructure & Environment / Energy

ANTIGUA AND BARBUDA

METHODOLOGY

The matrix was constructed with data from the Energy Information Administration (EIA), Castalia Consulting, and the Global Environment Facility Antigua (GEF)

Information about crude oil imports and export comes from the International Energy Statistics of the EIA. The Castalia Consulting Report on Sustainable Energy in the Eastern Caribbean provided information on the transmission and distribution loss rates of Antigua and Barbuda's electricity grid. The GEF report Greenhouse Gas Mitigation Assessment for Antigua and Barbuda enabled the consultant to calculate final consumption of energy by sector by looking at the CO₂ emissions in the transportation, residential, commercial and industrial sector. The data on sectoral distribution should be used with caution as data from several sources and base years were combined to arrive at a final rough estimate. There are no direct data available, as the Government of the Antigua and Barbuda does not track sectoral consumption of energy.

The island nation does not produce any primary energy and thus 100 percent of its energy is imported. Antigua and Barbuda import 4800 barrels of oil equivalent per day (boe/day), 239 of which are subsequently exported. This leaves a total of 4561 boe/day of oil products for consumption on the islands. Just under 50 percent of oil products (2281 boe/day) are used to generate electricity. Losses during generation, distribution, and transmission total 1916 boe/day leaving 365 boe/day of electricity for final consumption.

In total, final consumption of Antigua and Barbuda is 2645 boe/day, of which 2280 boe/day are oil products and 365 boe/day are consumed in the form of electricity. Consumption by sector is as follows. The transportation sector consumes about 30 percent of energy with 721 boe/day, followed by the commercial sector at 631 boe/day, the industrial sector with 601 boe/day, the residential sector with 391 boe/day and other at 300 boe/day.

COUNTRY OVERVIEW

Antigua and Barbuda is a two-island state located in the Eastern Caribbean. It is the wealthiest of the Eastern Caribbean states and also has the highest per capita consumption of electricity. The two islands cover a land area of 440 square kilometers and are home to a population of 82,000 people. Antigua is home to 98 percent of the population and almost 40 percent reside in the capital city of St. John's. The national economy is dominated by the tourism industry which accounts for more than half of the GDP, followed by investment banking and financial services. Tourism accounts for one third of foreign exchange. The industrial sector is minimal with the limited manufacturing capacity existing for the export market. The agricultural production is focused on the domestic market.

ENERGY SECTOR OVERVIEW

Antigua and Barbuda does not have known fossil fuel resources and almost 100% of energy resources are imported in the form of oil products. Antigua and Barbuda spends about 12 percent of its GDP on energy, the highest share of all states in the Eastern Caribbean. The import of oil products consumes about one-third of the country's foreign exchange. To offset the rising cost of energy the government announced a pass-through pricing system in August 2009 to raise prices and end a period of subsidized fuel prices. Following this change in policy energy costs have increased significantly and energy costs are now more in line with prices in other East Caribbean states. (Government of Antigua & Barbuda, 2010; World Bank, 2010)

ELECTRICITY SECTOR OVERVIEW

Apart from a small number of off-grid solar photovoltaic (PV) systems, electricity is provided by eight power plants using either high or low-speed diesel engines with a net capacity of 83 MW. Three stations are operated by the Antigua Public Utilities Authority (APUA) with the other five operated by one Independent Power Producers (IPP), the Antigua Power Company Limited (APCL). (Claude Davis & Associates, 2010; Government of Antigua and Barbuda, 2010) In 2009 base load stood at 42 MW and peak load reached 50 MW. APCL's capacity alone reaches 44 MW and it is able to produce electricity significantly cheaper than APUA which helps to explain why the majority of electricity was produced by APCL and subsequently purchased by APUA. In 2009 total net generation was about 326,383 MWh. The commercial sector consumed 101,818 MWh of electricity accounting for 48 percent of overall consumption, the domestic sector consumed 87,887 MWh representing 40 percent followed by the governmental sector with 6,290 MWh equaling 8 percent. These figures do not include street lighting. Technical losses during generation, transmission and distribution stood at 24 percent. (Castalia Consulting, 2012; Government of Antigua & Barbuda, 2010).

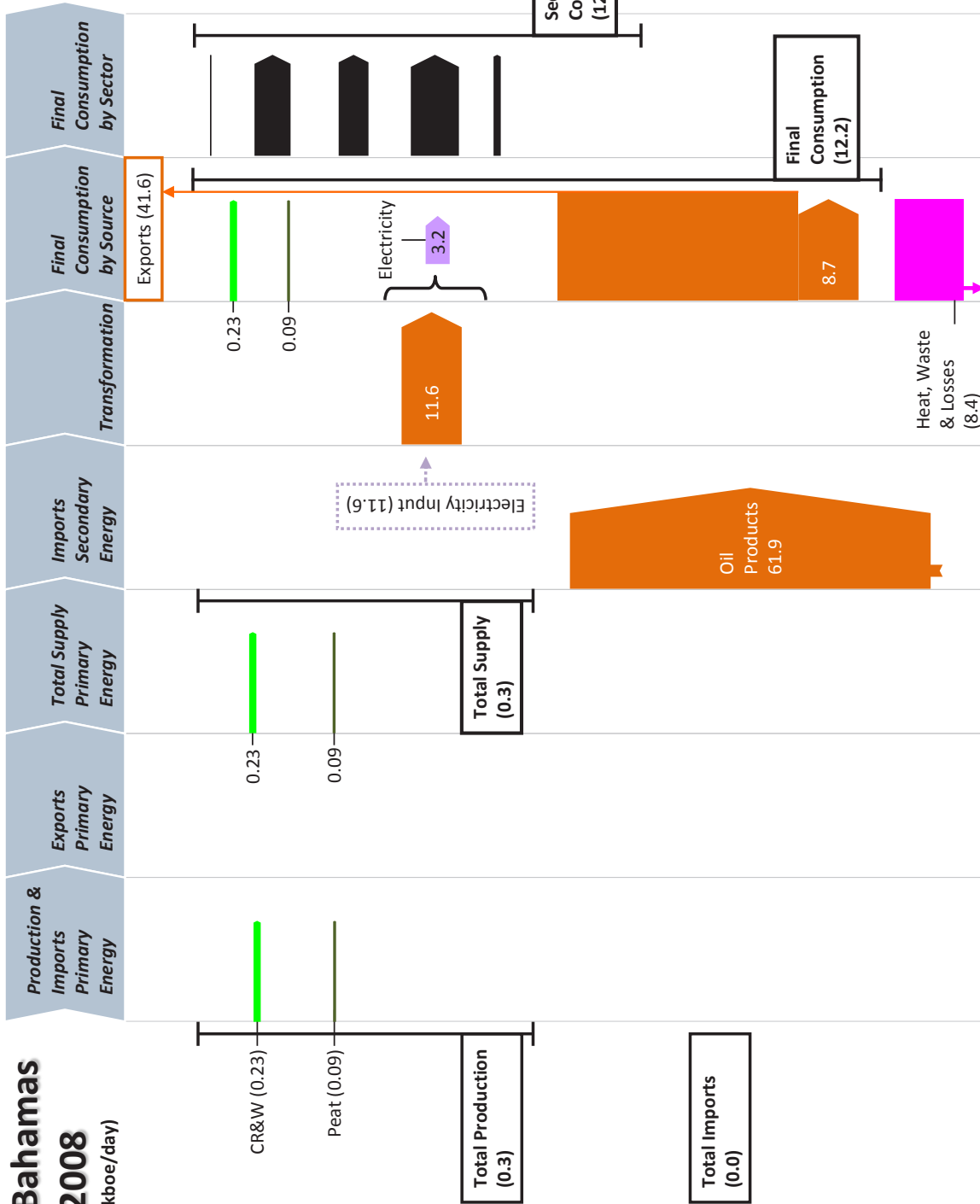
ENERGY SECTOR REGULATORY FRAMEWORK

Overall energy policy, including standards for renewable energy technologies, is developed and enacted by the Sustainable Energy Desk which is part of the Office of the Prime Minister. The desk was established in 2010 together with the National Energy Task Force which is responsible for developing the National Sustainable Energy Policy (NSEP). There does not exist an independent regulatory agency in the energy or electricity sector. (Castalia Consulting, 2012; Renewable Energy & Energy Efficiency Partnership, 2010; World Bank, 2010)

ELECTRICITY SECTOR REGULATORY FRAMEWORK

Under the Public Utilities Act of 1973, APUA was set up as a “tripartite government statutory agency” which controls and regulates telecommunications, electricity and water services. APUA holds the exclusive right for the generation, distribution, transmission and selling of electricity and it can grant permission to Independent Power Producers to generate and supply electricity and has done so as part of long-term power purchase agreements to meet peak demand. APCL is the largest of the IPP with an installed capacity of 44 MW. (Government of Antigua and Barbuda, 2010) The only institutions related to the energy sector are the Ministry of Public Utilities and APUA. There is no designated regulatory agency which ensures that consumers are guaranteed access to reliable and affordable energy services. Antigua and Barbuda is currently developing a National Energy Policy aiming to introduce a National Energy Unit and an independent regulatory agency with the participation in the planned Eastern Caribbean Energy Regulatory Authority (ECERA). (Government of Antigua & Barbuda, 2010; Organization of American States, 2010)

Bahamas 2008 (kboe/day)



Editor: Ramón Espinasa (INE/ENE)
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 Source: Own calculations based on EIA, Castalia

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BAHAMAS

METHODOLOGY

The matrix was constructed with data from the Energy Information Administration (EIA), Organization of American States (OAS), the International Renewable Energy Agency (IRENA) and the Bahamas Environment, Science and Technology Commission (BEST).

Information about crude oil imports and export comes from the International Energy Statistics of the EIA. IRENA's Renewable Energy Country Profiles Caribbean served as a data source for the share of combustible renewables and waste (CR+W) and peat of total primary energy. The OAS report on Energy Policy and Sector Analysis in the Caribbean provided information on the transmission and distribution loss rates of the Bahamas' electricity grid. The Second Report of the National Energy Policy Committee provided information about the generation losses of the larger of the two national electricity providers, Bahamas Electricity Corporation (BEC), which allows to arrive at estimates about total losses during generation. The BEST Commission's First National Communication on Climate Change to the UNFCCC enabled the consultant to calculate final consumption of energy by sector by looking at the CO₂ emissions in the transportation, residential, commercial and industrial sector. The data on sectoral distribution should be used with caution as data from several sources and years were combined to arrive at a final rough estimate. There are no direct data available as the Government of the Bahamas does not track sectoral consumption of energy.

The Bahamas production of primary energy is limited to 320 barrels of oil equivalent per day (boe/day), primary combustibles renewables and waste (230 boe/day) as well as peat (92 boe/day). The vast majority of energy is imported in the form of oil products. The island nation imports a total of 61,900 boe/day, of which 41,600 boe/day merely transit through the island nation and are subsequently exported. This leaves a total of 20,300 boe/day of oil products for consumption in the Bahamas. A little more than half of oil products (11,600 boe/day) are converted into electricity. Losses during generation, distribution, and transmission total 8,400 boe/day leaving 3,200 boe/day of electricity for final consumption.

In total final consumption of the Bahamas is 12,200 boe/day, of which 8,700 boe/day are oil products, 3,200 boe/day are consumed in the form of electricity with the remaining 320 boe/day coming from CR+W and peat.

Consumption by sector is as follows. The commercial sector consumes about 40 percent of energy with 4,600 boe/day, followed by the transportation sector with 4,100 boe/day, the residential sector with 3,200 boe/day and other at 300 boe/day. Based on the CO₂ emission data and information by the BEST Commission report energy consumption of industry sector are insignificant.

COUNTRY OVERVIEW

The Commonwealth of the Bahamas comprises about 700 islands and cays, 30 of which are inhabited, spread over an area of 100,000 square miles. Total land area is 5,383 square miles with a population of 338,000. More than two thirds of the population resides in the capital city of Nassau on the island of New Providence. The second major population center is Grand Bahama where 16 percent of the population reside. Like the economies of most Caribbean island states, the Bahamas' economy is disproportionately service oriented with little capacity for the manufacturing of goods. As a result the island's imports exceed exports by a factor of five. The service sector contributes 90 percent of the total GDP. (Wilson, 2009) The tourism industry is the country's most important sector contributing directly or indirectly to more than 60 percent of the overall GDP and employing half of the total labor force. (Organization of American States, 2010; Wilson, 2009)

ENERGY SECTOR OVERVIEW

The Bahamas' energy supply is provided almost entirely by imported oil products with a negligible share of combustible renewables & waste as well as peat. The Bahamas import 99 percent of their energy needs. The combination of high dependence on imported oil on one hand and rapidly growing demand and limited financial means to expand capacity on the other represents a major challenge for Bahamian energy security. The Bahamas' energy security is very low as it is almost wholly dependent on imported oil products and does not possess quantifiable or easily accessible sources of fossil fuels. The limited deep reserves that do exist are not viable at current price levels and the high dependence on imported fossil fuels is unlikely to change in the short or medium term. (Organization of American States, 2010; Wilson, 2009)

Although the diversification towards natural gas would result in lower costs, provide cleaner and more efficient energy generation and allow for longer-term contracts it is not a viable alternative for electricity generation as the size of the market is not sufficient to warrant the substantial costs of an LNG regasification plant. The economic viability of providing CNG to the Bahamas has not yet been assessed. (Government of Bahamas, 2010)

The island's renewable energy (RE) resources are substantial but they have yet to be exploited in a meaningful way. The technical potential exceeds current energy demand by a factor of 50 coming primarily from bio-energy, solar, wind, ocean energy and waste-to-energy. Today, the most competitive RE source in the Bahamas is biomass and according to the Bahamian government other RE technologies are not economically viable under current conditions. The lack of transmission lines and interconnectors between the Bahamas' 30 inhabited islands limits the potential share of renewable energy to 20 percent. Deriving a larger share of electricity from RE resources would require the transfer of energy from one island to another to balance energy supply and account for e.g. differing wind conditions in different parts of the archipelago. The centralized nature of energy demand, with two thirds of the consumer base living in the capital, would require a substantial network of interconnectors feeding renewable energy towards New Providence. (Government of Bahamas, 2010)

As is common with archipelagic nations with a large tourism sector and service-based economy, the transport sector consumes a disproportionate amount of overall energy. All three major modes of transportation, land, sea, and air, rely almost exclusively on petroleum products. Growth in the tourism sector closer relates to increasing demand for imported oil products. In part due to increasing prices, the value of imported oil products more than tripled between 2002 and 2008. The exact consumption patterns in the transportation sector can not be tracked or verified as official statistics related to the number, type, and model year of passenger and commercial vehicles, cargo and commercial marine vessels and passenger and private aircraft are incomplete or nonexistent. The island nation also does not track mileage and consumption data for these modes of transportation. (Government of Bahamas, 2010)

ELECTRICITY SECTOR OVERVIEW

Virtually all of the Bahamas' electricity is supplied by two large utility companies. Bahamas Electricity Company (BEC) produces about 80 percent of electricity with the remaining 20 percent coming from the Grand Bahama Power Company (GBPC). The BEC was established in 1956 through the Electricity Act of the same year and is wholly government owned. The Grand Bahama Power Company was established as Freeport Power Company in 1964 under the Grand Bahama Port Authority. Ownership is split between Emera (80.4 percent), a Canadian Utility company, and the Marubeni Corporation of Japan, which holds the remaining (19.6 percent). (GBPC, 2010)

The Bahamian grid is unique in that its electricity system is distributed among some 16 isolated island grids. Thus, expansion is incremental and generation capacity is primarily small diesel plants with a capacity of 25 MW and less. (Government of Bahamas, 2010) Electrification rate is nearly universal, with 99% for the service area of the BEC and 100% for Grand Bahama. Per capita consumption is high even considering the region's above average consumption, at 5,700 kWh per capita per year. (Organization of American States, 2010; Wilson, 2009)

BEC is a wholly government owned public corporation operating 29 plants, 28 diesel and one gas fired, with a total capacity of 438 MW supplying 93,000 customers on all major islands except Grand Bahama. The Grand Bahama Power company supplies about 18,000 customers exclusively on Grand Bahama. Demand for electricity on this island is above average as it represents the industrial center of the Bahamas, encompassing the international container port. Total generating capacity is 137 MW, including a 27 MW diesel plant, two gas-fired plants combining for 35 MW, and a 75 MW steam plant. In 2009 44 percent of electricity was produced using heavy fuel oil with the remaining 56 percent coming from automotive diesel oil. The complete reliance on fossil fuels in the generation of electricity results in extremely high loss rates during generation. More than two thirds of energy is lost before it reaches the final consumer, with transmission and distribution alone accounting for losses of 12.3 percent. (Government of Bahamas, 2010; Organization of American States, 2010)

ENERGY SECTOR FRAMEWORK

The Ministry of the Environment (MOTE) is the responsible agency for the energy sector in the Bahamas. It is supported by the Bahamas Environment, Science & Technology Commission (BEST) which assess the environmental impact of energy and electricity sector projects. At a future date yet to be determined by the government, the newly created Utilities Regulation and Competition Authority (URCA), which currently regulates electronic communications, will be task to “assume responsibility” for the electricity sector. (Government of Bahamas, 2010; Organization of American States, 2010)

ELECTRICITY SECTOR REGULATORY FRAMEWORK

The primary regulatory acts that govern the electricity sector are the Electricity Act, the Out Island Electricity Act and the Out Island Utilities Act. The BEC was established through the Electricity Act and tasked with the secure supply of electricity at a reasonable price and mandated to “purchase, generate, transmit, transform, distribute and sell energy to in bulk or to individual consumers.” (Government of Bahamas, 2010)

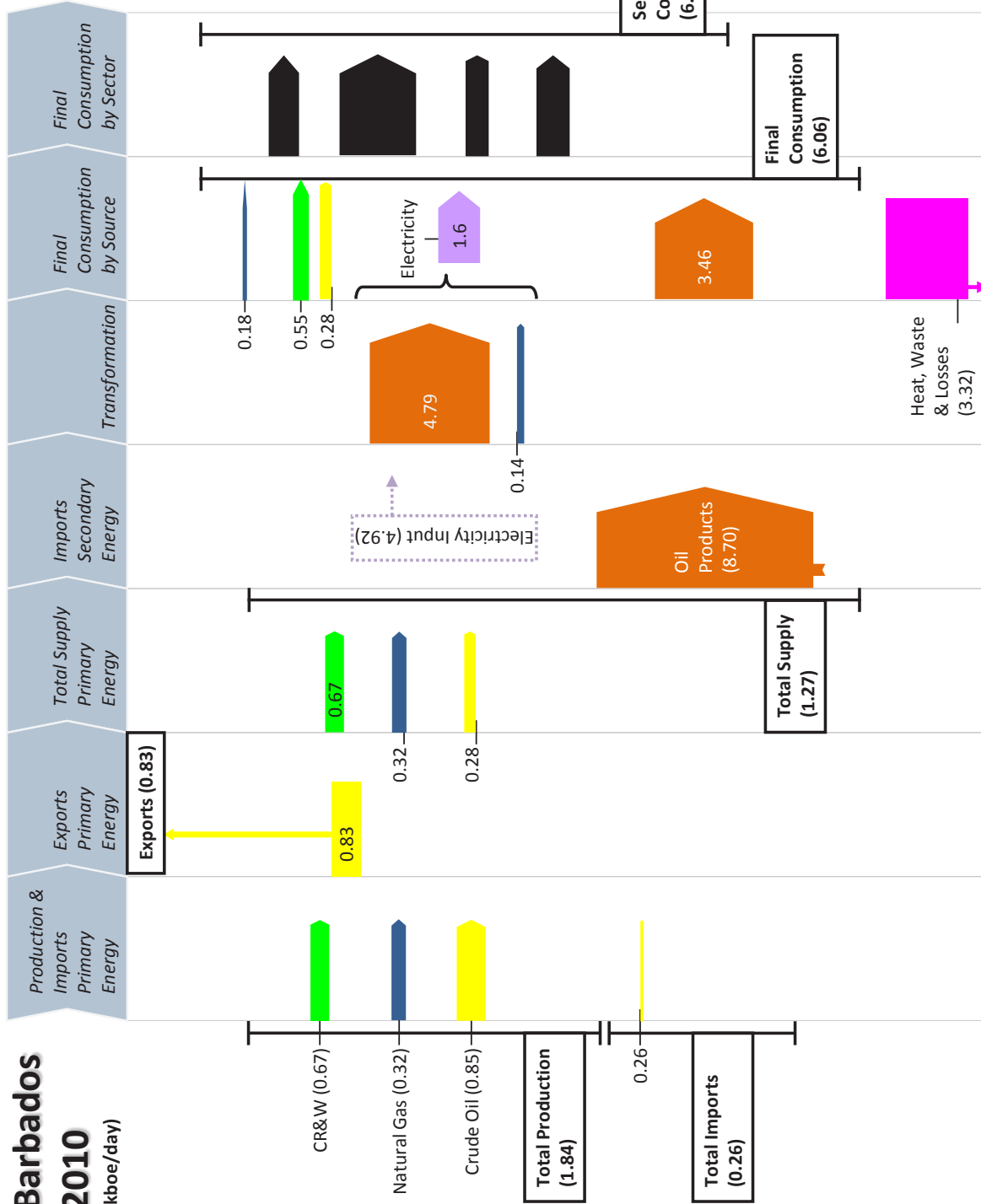
The Out Island Act allows for the creation and operations of private utilities to supply electricity to the Family Islands if “it is in the nation’s best interest.” It has been difficult for the private sector to meet this provision and as a result BEC continues to be the exclusive electricity provider except on Grand Bahama and a number of very small franchise holders which are allowed operation in the area controlled by the Grand Bahama Port Authority under the Hawksbill Creek Act. (Government of Bahamas, 2010; Organization of American States, 2010)

The monopoly supplier (BEC) is not required to purchase electricity generated by independent power producers (IPP) offering limited incentive for outside investments into the electricity sector as a whole or RE sources in particular. No regulation exists for the interconnection of power generation making it nearly impossible for IPP to feed their capacity into the existing grid. Furthermore, there does not exist a national energy efficiency standard or a national energy conservation effort and by some estimates as much as 27 percent of electricity demand could be saved through efficiency measures. The Government of the Bahamas functions at the same time as the “policy-maker, regulator, and owner” leading to a less than ideal set-up for the electricity sector. The current regulatory framework has resulted in a “regional monopoly on electricity production and distribution” which lacks competition and efficiency and fails to produce electricity at “reasonable” prices. (Government of Bahamas, 2010; Organization of American States, 2010; Renewable Energy & Energy Efficiency Partnership, 2012a).

As energy costs have increased significantly over the past few years, the government has initiated plans to reform the existing structure. It hopes to increase competition in the energy sector and achieve a modernization of the transmission and distribution network. As part of this effort the plan calls for two new companies: one responsible for the generation of electricity, the other in charge of transmission and distribution. (Government of Bahamas, 2013)

The existing regulatory framework severely inhibits the large scale utilization of RE and investments into the sector as the right for generation and sale of electricity is limited to a single entity, the BEC. Furthermore, the Bahamas does not have a RE energy plan, e.g. outlining requirements for a share of electricity being generated from renewable sources.

Barbados 2010 (kboe/day)



Editor: Ramón Espinasa (INE/ENE)
Authors: Malte Humpert

Source: Own calculations based on United Nations Energy Balances

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Infrastructure & Environment / Energy

BARBADOS

METHODOLOGY

The matrix was constructed using data from the United Nations Energy Balances.

Barbados produced 1,840 barrels of oil equivalent of primary energy per day (boe/day), coming from 670 boe/day of CR&W, 320 boe/day of natural gas and 850 boe/day of crude oil of which 830 boe/day are subsequently exported. In terms of primary energy, it also imports 260 boe/day of LPG for a total supply of 1,270 boe/day in primary energy. It imports 8,700 boe/day of oil products, 4,790 boe/day of which are used for the generation of 1,600 boe/day of electricity. Losses during the generation process account for 3,320 boe/day.

In total, final consumption of Barbados 6,060 boe/day, of which 180 boe/day are natural gas, 550 boe/day are CR&W, 280 boe/day are LPG, 1,600 boe/day are electricity and 3,460 boe/day are in the form of oil products.

Consumption by sector is as follows. The transportation sector consumes about 2,750 boe/day or 45 percent of energy, followed by industry with 1,160 boe/day, the residential sector with 870 boe/day. Other, which includes agriculture, combines for 1,280 boe/day.

COUNTRY OVERVIEW

Barbados is an island state of the Lesser Antilles located about 180 km east of St. Vincent and the Grenadines. Due to its location eastward of the other islands of the Lesser Antilles it is technically classified as an Atlantic island, not a Caribbean island. Barbados has a population of 284,000 people living across 431 square kilometers, making it one of the most densely population islands in the world. Around 25 percent of Barbados' population live in the capital Bridgetown.

ENERGY SECTOR OVERVIEW

The Barbados National Oil Company Ltd. (BNOC) produces about 1000 barrels of crude oil per day from a number of on-shore wells in the Woodbourne area located in the southeast part of the island. As the country does not possess any refining capacity crude oil is shipped to Trinidad and Tobago for processing and the refined product is subsequently returned to the island. As domestic production supplies only about 15 percent of the total energy need, the majority of the energy supply is imported. (Castalia, 2010; Williams, 2010)

In addition to its crude oil production Barbados also produces about 500 barrels of oil equivalent per day of natural gas used for domestic consumption by its approximate 20,000 residential and commercial customers. The natural gas network is owned and operated by the National Petroleum Corporation (NPC) which receives the natural gas from BNOC. (Castalia, 2010; Williams, 2010)

ELECTRICITY SECTOR OVERVIEW

Barbados Light and Power (BL&P) is the only utility company generating and feeding electricity into the national grid. A number of large customers, however, produce electricity for self-consumption. BL&P's capacity is 239 MW accounts for 92% of total generation capacity. Generation consists primarily of low speed diesel generators (113.5MW) and gas turbines (86MW). The country's electrification rate is 100 percent and BL&P supplies electricity to 119,000 customers. (Castalia, 2010; Williams, 2010; World Bank, 2010)

With the exception of small scale solar generation and the prevalence of solar water heaters in middle and high-income households, there does not exist generation of renewable energy. Despite hydrocarbon-based generation of electricity Barbados has, in comparison to other Caribbean states, relatively moderate electricity prices. (Williams, 2010) The prevalent use of low speed diesel generators allows for better than average efficiency rates. As a result, Barbados' loss rates are below even those of St. Vincent and the Grenadines and Dominica which both feature more efficient hydro power in the electricity mix.

However, as with most oil import-dependent electricity generation, prices fluctuate according to world market prices. About two thirds of BL&P's operating expenses are directly related to the cost of imported oil products. With rapidly growing oil prices, electricity prices rose 75 percent from 0.08 US\$ kWh in 2004 to 0.14 US\$ kWh in 2008. Electricity consumption continues to grow at a slightly slower rate than GDP, 3.6 percent vs. 4.1 percent. Electricity consumption is dominated by the commercial sector where 41 percent of all electricity is consumed, followed by residential at 32 percent and industrial with 27 percent. The 84 hotels and guest houses account for almost 10 percent of total electricity sales. (Duffy-Mayers, 2010). The renewable energy potential in Barbados is high due to high levels of solar radiation and steady supply of winds due to its location in the trade winds. About 30 percent of properties in Barbados, totaling about 30,000 homes, employ solar hot water heaters. (Castalia, 2010)

ENERGY SECTOR REGULATORY FRAMEWORK

The Energy Division within the Ministry of Finance, Investment, Technology and Energy (MFIE) is responsible for monitoring and regulating the overall energy sector. It was established in 1978 as part of the Ministry of Trade. The Division is tasked with monitoring BNOC, NPC and the Barbados National Terminal Company Ltd. (BNTC) BNOC is tasked with exploration, production and procurement of oil and gas, NPC is the national distributor for all gas produced by BNOC, and BNTC

is “responsible for the terminalling and storage of oil products and crude oil.” (Government of Barbados, 2013) The Energy Division develops, implements and enforces energy policy. Its is responsible for the issuing of licenses and leases for all oil exploration and production, it promotes the use of renewable energy and it advises on the pricing of petroleum products. (Government of Barbados, 2013)

ELECTRICITY SECTOR REGULATORY FRAMEWORK

The legislative framework of the energy sector is organized around three regulatory acts: the Electric Light and Power Act, the Fair Trading Commission Act and the Utilities Regulation Act. (Fair Trade Commission Barbados, 2012) According to this legislation, Barbados Light & Power Company Limited (BL&P), a vertically integrated utility company, is the sole producer of electricity for the national grid. It holds the mandate for generation, transmission and distribution of electricity. The law provides an exception for residential self-generation and consumption. Apart from changes in shareholder structure and corporate organization BL&P remains unchanged since before 1909. Ownership is split between the U.S.-based corporation Leucadia National which holds 37 percent, Barbados National Insurance Board which holds 23 percent, and about 2,800 private Barbadian shareholders which hold the remaining 40 percent. (Castalia, 2010; Renewable Energy & Energy Efficiency Partnership, 2012b; World Bank, 2010)

The Fair Trading Commission Act 2001 established the Fair Trading Commission FTC which regulates BL&P. The FTC functions as a government regulatory body responsible for, among other things, regulating electricity rates and stipulating the standards of service. It is an government body and its operating structure and procedures ensure that it operates independently.(Renewable Energy & Energy Efficiency Partnership, 2012b)

Dominica 2010 (boe/day)



Editor: Ramón Espinosa (INE/ENE)
 Authors: Malte Humpert
 Source: Own calculations based on EIA, Castalia Consulting, UNFCCC

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DOMINICA

METHODOLOGY

The matrix was constructed with data from the Energy Information Administration (EIA), Castalia Consulting, the International Renewable Energy Agency (IRENA), and the United Nations Framework Convention on Climate Change (UNFCCC).

Information about crude oil imports and export comes from the International Energy Statistics of the EIA. IRENA's Renewable Energy Country Profiles Caribbean served as a data source for the share of combustible renewables and waste (CR+W) and hydropower of total primary energy. The Castalia Consulting Report on Sustainable Energy in the Eastern Caribbean provided information on the transmission and distribution loss rates of Dominica's electricity grid. Dominica does not track losses during generation and an average loss rate of 60 percent is applied. The UNFCCC's Greenhouse Gas Mitigation Assessment for Dominica enabled the consultant to infer data on the final consumption of energy by sector by looking at the CO₂ emissions in the transportation, residential, commercial and industrial sector. The data on sectoral distribution should be used with caution as data from several sources and years were combined to arrive at a final estimate. There are no direct data available as the Government of Dominica does not track sectoral consumption of energy.

The island nation production of primary energy is limited to 40 barrels of oil equivalent per day (boe/day) of CR+W and 63 boe/day of hydropower. The vast majority of energy, around 90 percent, is imported in the form of oil products. The island nation imports a total of 916 boe/day. About 45 percent of oil products (411 boe/day) are used to generate electricity, with an additional 63 boe/day coming from hydropower. Losses during generation, distribution, and transmission total 329 boe/day leaving 147 boe/day for final consumption.

In total, final consumption of Dominica is 691 boe/day, of which 505 boe/day are oil products, 146 boe/day are consumed in the form of electricity and 40 boe/day are CR+W.

Consumption by sector is as follows. The transportation sector consumes about 40 percent of energy with 271 boe/day, followed by the commercial sector with 196 boe/day, the residential sector with 131 boe/day, the industrial sector with 86 boe/day and other at 9 boe/day.

COUNTRY OVERVIEW

The island of Dominica is part of the Windward Islands of the Eastern Caribbean. It has a total land area of 750 square kilometers and is home to a population of about 71,000. About a quarter of the population lives in the capital of Roseau. Like the economies of most of the Caribbean island states, Dominica's economy is disproportionately service oriented and dominated by the tourism and financial sector. The agricultural sector, however, continues to play an important role and contributed about 18 percent to the overall GDP. (Claude Davis & Associates, 2010b; Global Environment Facility, 2013)

ENERGY SECTOR OVERVIEW

Dominica does not have any domestic hydrocarbon resources. The island's energy supply consists of about 90 percent imported oil products and 10 percent renewables, combustible renewables and waste as well as hydropower. About 70 percent of the country's electricity is produced from oil products, with the remaining 30 percent coming from hydropower. Generation capacity stood at 22.4 MW, with 16 MW coming from the Fond Cole and Portsmouth diesel plants and 7.6 MW coming from the three hydro power plants Laudat (1.3 MW), Trafalgar (4.46 MW) and Padu (1.88 MW). Peak load demand was recorded in June 2012 at 17.23 MW (2012). (Dominica Electricity Services Ltd, 2012) Electricity prices in Dominica are among the highest in all of the Eastern Caribbean States, varying between 0.26-0.31 US\$ per kWh. (Castalia Consulting, 2012; Dominica Electricity Services Ltd, 2012; Organization of American States, 2010)

ELECTRICITY SECTOR OVERVIEW

Dominica Electricity Services Limited (DOMLEC), the sole supplier of electricity until the liberalization of the market in 2006, continues to dominate the electricity sector in Dominica. DOMLEC generated 101.6 GWh of electricity in 2012 of which it sold 90.1 GWh to final consumers. System losses (transmission and distribution) declined from 8.8 percent in 2011 to 8 percent in 2012. In addition to its own generation, DOMLEC also purchased 117 MWh of renewable energy from Independent Power Producers (IPP). In 2012 DOMLEC generated 26.7 GWh from hydro plants, a decline by about 30 percent compared to 2011 due to unusually low rainfall amounts. According to figures provided by DOMLEC, consumption in 2012 was dominated by residential and commercial consumers with 43 and 46 percent respectively. Industry consumed 8 percent, while the hotel sector accounted for 1 percent and street lighting consumed 2 percent. (Dominica Electricity Services Ltd, 2012) The majority of hotels self generate their electricity and their consumption is thus not included in DOMLEC's official figures. According to 2008 figures, the hotel sector accounts for 8 percent of total electricity consumption. (Fadelle, 2012)

Dominica possess substantial renewable energy potential. Its geothermal resources may be as large as 100 MW followed by solar photovoltaic potential of 45 MW and wind potential between 20-30 MW. In addition to the existing 7.6 MW of hydro capacity the island may possess an additional capacity of 8MW. (Claude Davis & Associates, 2010b) Electricity is transmitted through 368 km of 11kV lines before being converted and distributed to the final consumer through 922 km of 230/400 V lines. About 98 percent of the population is connected to the national grid. (Claude Davis & Associates, 2010b)

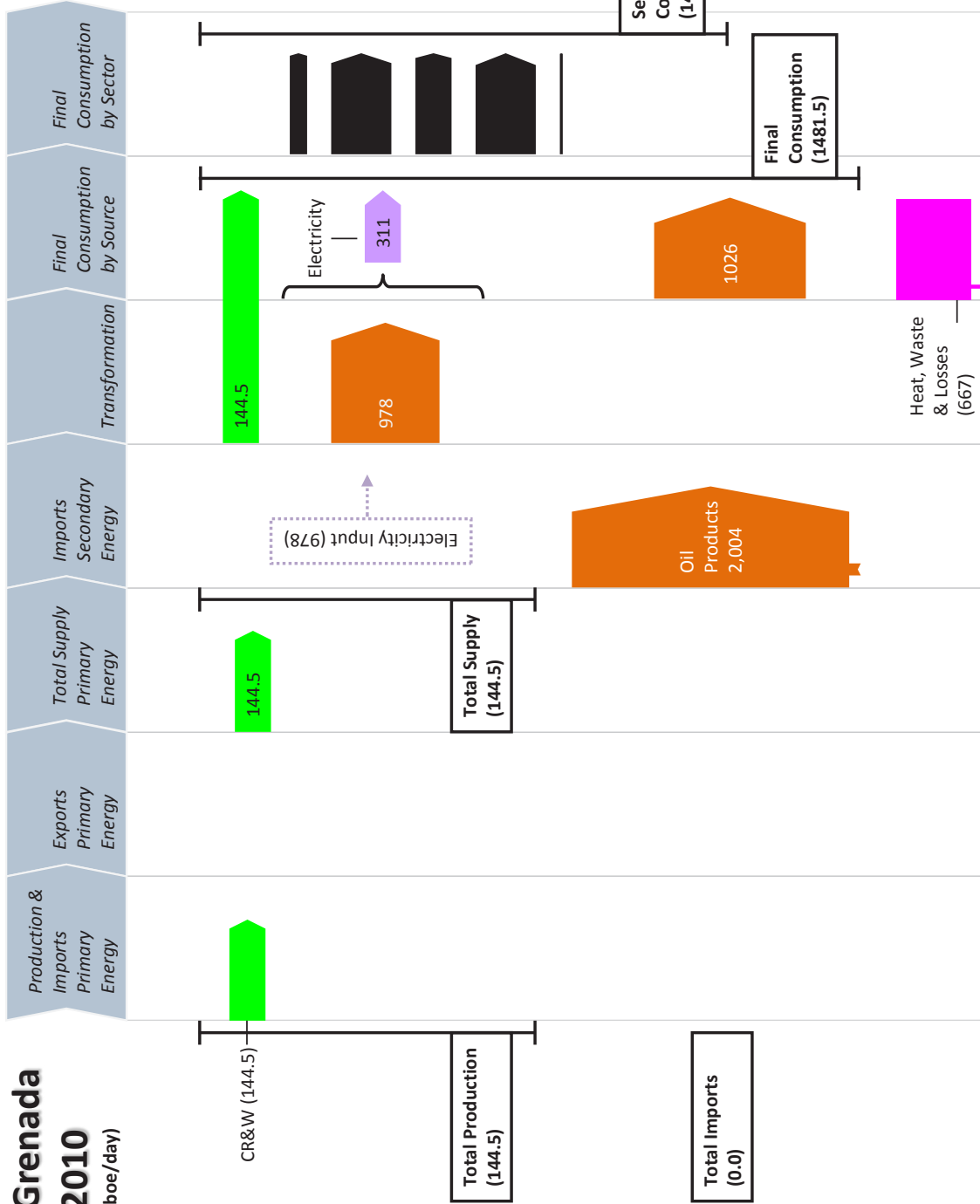
ENERGY SECTOR REGULATORY FRAMEWORK

The Ministry of Public Utilities, Energy, Ports and Public Service is responsible for all matters related to the energy sector. It coordinates all activities related to the development and expansion of electricity production and distribution and is responsible for the expansion of renewable energy sources. (Renewable Energy & Energy Efficiency Partnership, 2012c)

ELECTRICITY SECTOR REGULATORY FRAMEWORK

The Electricity Supply Act of 2006 liberalized the electricity sector and ended DOMLEC's role as the sole license holder for the generation, distribution and transmission of electricity. The newly established Independent Regulatory Commission (IRC) has been tasked with providing licenses for the generation, transmission and distribution to Independent Power Producers (IPP) "where this is economic and cost effective and in the public interest." The IRC aims to promote fair competition in the energy sector and protect the interests of electricity consumers. According to the law the IRC operates fully independent and shall not be subject to influence or control by the government. (Castalia Consulting, 2012; Claude Davis & Associates, 2010b) In September 2012 DOMLEC entered into negotiations with the IRC to secure new licenses for generation, transmission and distribution. The company was aiming to secure one single license, non-exclusive for generation and exclusive for transmission, distribution and supply, while the IRC's goal was to separate generation from transmission, distribution and supply into two licenses. Negotiations continued throughout 2012 and were expected to be finalized in the third quarter of 2013. (Dominica Electricity Services Ltd, 2012)

Grenada 2010 (boe/day)



Editor: Ramón Espinasa (INE/ENE)
 Authors: Malte Humpert
 Source: Own calculations based on EIA, Grenada Government, IRENA, UNFCC

Inter-American Development Bank, 2013
 Infrastructure & Environment / Energy

GRENADA

METHODOLOGY

The matrix was constructed with data from the Energy Information Administration (EIA), Castalia Consulting, the International Renewable Energy Agency (IRENA), and the United Nations Framework Convention on Climate Change (UNFCCC).

Information about crude oil imports and export comes from the International Energy Statistics of the EIA. IRENA's Renewable Energy Country Profiles Caribbean served as a data source to obtain the share of combustible renewables and waste (CR+W) of total primary energy. The Castalia Consulting Report on Sustainable Energy in the Eastern Caribbean provided information on the transmission and distribution loss rates of Grenada's electricity grid. Grenada does not track losses during generation and an average loss rate of 60 percent is applied. Grenada's Initial Communication to the UNFCCC enabled the consultant to calculate final consumption of energy by sector by looking at the CO₂ emissions in the transportation, residential, commercial and industrial sector. The data on sectoral distribution should be used with caution as data from several sources and years were combined to arrive at a final rough estimate. There are no direct data available as the Government of Grenada does not track sectoral consumption of energy.

The island nation production of primary energy is limited to 145 barrels of oil equivalent per day (boe/day) of CR+W. The vast majority of energy, around 93 percent, is imported in the form of oil products. The island nation imports a total of 2004 boe/day. About 50 percent of oil products (978 boe/day) are used to generate electricity. Losses during generation, distribution, and transmission total 667 boe/day leaving 311 boe/day for final consumption.

In total, final consumption of Grenada is 1482 boe/day, of which 1026 boe/day are oil products, 311 boe/day are consumed in the form of electricity and 145 boe/day are CR+W.

Consumption by sector is as follows. The transportation sector consumes just under 40 percent of energy with 578 boe/day, followed by the commercial sector with 456 boe/day, the residential sector with 368 boe/day, the industrial sector with 65 boe/day and other at 14 boe/day.

COUNTRY OVERVIEW

The island state of Grenada is located at the southern end of the Grenadines in the eastern Caribbean. The state's territory encompasses the three major islands Grenada, Carriacou and Petite Martinique, as well as a number of smaller islands. Together the islands cover 344 square kilometers with a population of 110,000 (2012). More than 90 percent of the population live on Grenada and about

one third reside in the national capital of St. George's. The national economy is dominated by service sector, primarily government services, education, banking and insurance, tourism and communications, which contributes 78 percent to the GDP. Industry and agriculture contribute 16 percent and 6 percent respectively. (IRENA, 2012a) The tourism sector directly contributes to 7.3 percent of GDP but taking multiplier effects into account the sectors contribution is estimated to be around 24 percent. (Organization of American States, 2010)

ENERGY OVERVIEW

Grenada is almost wholly dependent on imported oil products which provide 93 percent of its overall energy supply. The remaining 7% are provided by combustible renewables & waste.

ELECTRICITY OVERVIEW

Grenada Electricity Services Ltd. (GRENLEC), a private-public owned utility company, holds a monopoly on the generation, transmission and distribution of electricity, and provides electricity to the islands of Grenada, Petite Martinique, and Carriacou. Virtually all of Grenada's electricity is generated with diesel. (Government of Grenada, 2011) GRENLEC operates diesel power plants at Queens Park on the main island of Grenada with an installed capacity of 45.9 MW. In addition it has capacity of 3.2 MW on Carriacou, 0.5 MW on Petit Martinique, and 2.8 MW of backup capacity on the campus of St. George's University. (Government of Grenada, 2011) As part of a private sector initiative Grenada has approximately 0.1 MW of renewable energy capacity from wind and solar power. (Castalia Consulting, 2012; Government of Grenada, 2011; Organization of American States, 2010)

A total generation capacity of 52 MW compared to a peak demand of 30.8 MW in 2010. GRENLEC sold a total of 185.8 GWh to 41,222 customers. The cost of oil imports used for the generation of electricity is substantial representing 7 percent of total imports by value and equaling 76 percent of export revenues. Electricity prices, as in many other small islands states in the Caribbean, rank among the highest in the world and reached 0.64 US\$ per kWh in 2008. (Government of Grenada, 2011; Grenada Electricity Services Ltd., 2012)

About half of Grenada's energy supply is consumed by the transportation sector followed by the electricity sector at 40 percent. (IRENA, 2012a) Electricity consumption in Grenada is dominated by the commercial sector, which accounts for 57 percent of consumed electricity, followed by the residential sector at 38%. Industrial consumption stands at 3 percent and street lighting at 2 percent. GRENLEC had 5818 commercial customers, 38394 residential customers and 37 industrial customers in 2011. (IRENA, 2012a) Electricity prices per kWh for residential customers were around 40 cents USD in 2012 and a fuel charge, a non-fuel surcharge, Value Added Tax (VAT) and an environmental levy. (IRENA, 2012a) While fossil fuel-based generation of electricity remains inherently inefficient, GRENLEC has made improvements when it comes to losses associated with distribution and transmission of electricity. Between 2000 and 2008 it reduced system losses from 13 percent of generation

to 9 percent. (Government of Grenada, 2011; Organization of American States, 2010)

ENERGY SECTOR REGULATORY FRAMEWORK

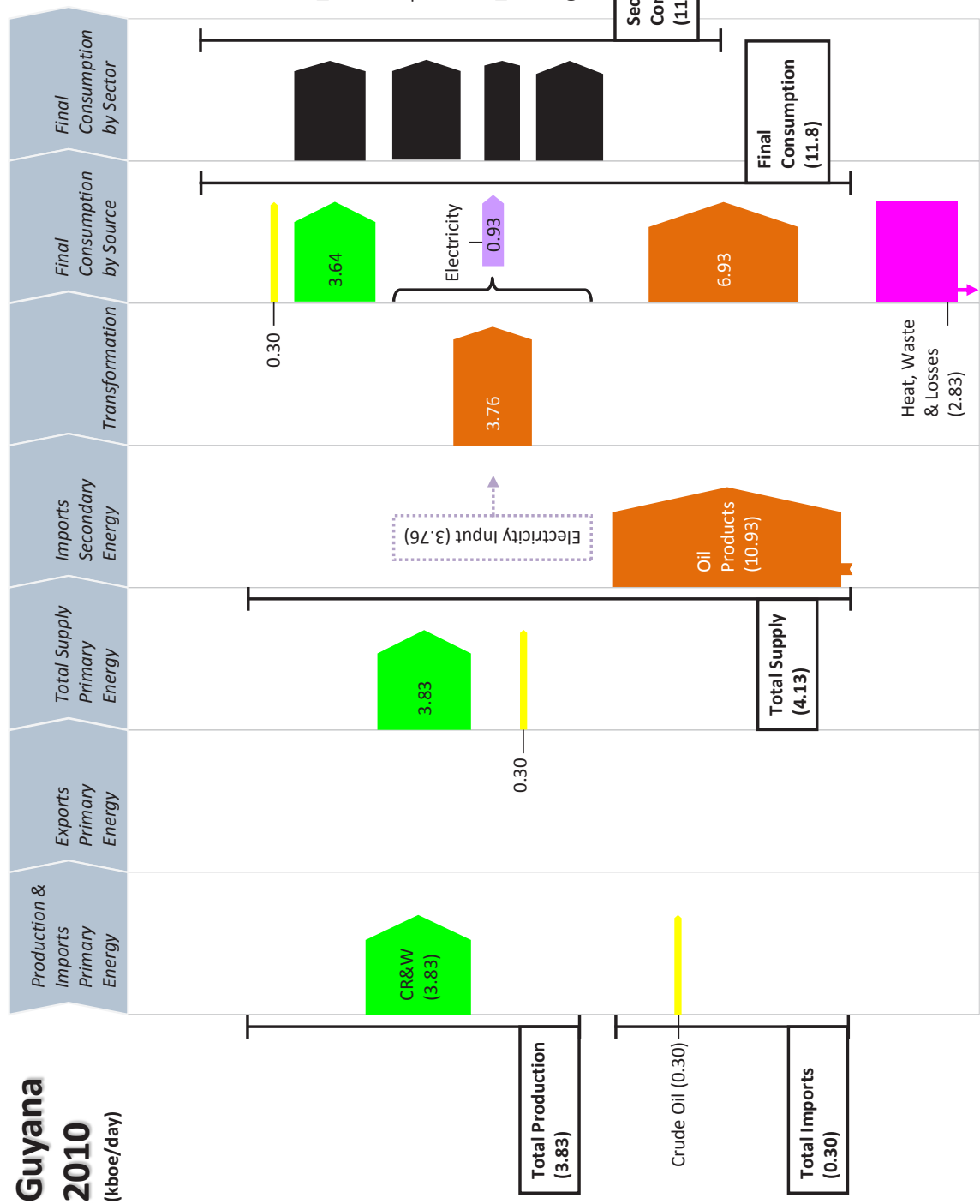
The Ministry of Finance, Planning, Economy, Energy & Cooperatives holds a broad mandate with responsibility for the energy sector. Within the ministry, the Department of Energy & Sustainable Development is tasked to ensure adequate, reliable and economical energy services and satisfy projected future demand. It is also responsible to encourage the use and promotion of renewable energy. The 2011 National Energy Policy sets out a roadmap to develop a diverse energy mix supplying 20 percent of overall energy needs from renewable sources by 2020. (Organization of American States, 2010; Renewable Energy & Energy Efficiency Partnership, 2012c)

ELECTRICITY SECTOR REGULATORY FRAMEWORK

The Electricity Supply Ordinance of 1961 provides GRENLEC with exclusive license for the generation, transmission, distribution and sale of electricity for a period of 80 years. (GRENLEC, 2011). In 1982 the Grenada government became the sole owner of GRENLECO until 1994 when it sold all but a 10 percent stake to investors. A new Electricity Supply Act of the same year reaffirmed GRENLEC's market dominating position and granted it a monopoly until December 31, 2073. (GRENLEC, 2011). Ownership structure of GRENLEC changed in early 2013 when Barbados-based Light and Power Holdings Ltd. (L&P), a subsidiary of Canadian firm EMERA secured a share of 61.4 percent. The remaining shares are held by the government (10 percent) and the general public. Under the agreement the government is able to purchase 11.4 percent of shares from L&P thereby reducing L&P's share to 50 percent. (Castalia Consulting, 2012; Grenada Electricity Services Ltd., 2012)

Recently GRENLEC agreed to purchase electricity produced by GRENSOL up to a limit of 1 percent of total demand. As the efforts of GRENSOL will be expanded it is likely that the arbitrary limit, set by GRENLEC, will be exceeded in the near future and may be "subject to review and negotiations" as part of a revised Electricity Supply Act. (Government of Grenada, 2011)

Guyana 2010 (kboe/day)



Editor: Ramón Espinosa (INE/ENE)
 Authors: Malte Humpert

Source: Own calculations based on United Nations Energy Balances

Inter-American Development Bank, 2013
 Infrastructure & Environment / Energy

GUYANA

METHODOLOGY

The matrix was constructed using data from the United Nations Energy Balances.

COUNTRY OVERVIEW

Guyana is located along the northern coast of South America covering an area of 214,970 square kilometers with a population of 778,000. Its neighbors are Suriname to the east, Venezuela to the west, Brazil to the west and south and the Atlantic Ocean to the north. (Government of Guyana, 2012) The vast majority of the country is populated extremely sparsely and 90 percent of the population reside in or in the proximity of the capital city of Georgetown. (Global Environment Facility, 2013) Guyana's agricultural sector is the largest contributor to the national GDP, comprising about 35 percent. Of importance are also the extractive industries, manufacturing and tourism. It was estimated that tourism contributed 12 percent to the national GDP in 2001. (Government of Guyana, 2012)

Guyana produced 3,839 barrels of oil equivalent of primary energy per day (boe/day), all of which comes from CR&W. In terms of primary energy, it also imports 300 boe/day of LPG for a total supply of 4,130 boe/day in primary energy. It imports 10,930 boe/day of oil products, 3,760 boe/day of which are used for the generation of 930 boe/day of electricity. Losses during the generation process account for 2,830 boe/day.

In total, final consumption of Guyana 11,800 boe/day, of which 300 boe/day are LPG, 3,640 boe/day are CR&W, 930 boe/day are electricity and 6,930 boe/day are oil products. Consumption by sector is as follows. The industrial sector consumes about 3,880 boe/day or 35 percent of energy, followed by transportation with 3,440 boe/day, the residential sector with 1,380 boe/day. Other, which includes agriculture, combines for 3,130 boe/day.

ENERGY SECTOR OVERVIEW

While Guyana has some reserves of petroleum in the Takutu Basin and explorations were conducted in the 1950s, the country never engaged in a commercial level of production. As a result the country is highly dependent on imported oil products for its overall energy supply. In 2009 a quarter of Guyana's imports were energy related. (Government of Guyana, 2012) Imported fossil fuels account for about half of final energy consumption with the other half coming from combustible renewables and waste products (CR&W). Energy consumption is dominated by the electricity sector, industry and mining. Together these three sectors account for 90 percent of primary energy consumption. Generation of

electricity is entirely fossil fuel based and the majority of generation capacity comes from plants utilizing heavy fuel oil or diesel. Like its neighbor to the east, Suriname, Guyana has significant hydropower potential. In contrast to Suriname however, Guyana has yet to tap this potential estimated at 700 MW. The country is currently constructing a 165 MW hydropower plant at Amaila Falls to begin operation in 2014 aiming to reduce the country's dependence on fossil fuels for electricity generation. The government also signed a Memorandum of Understanding with Delta Caribbean aiming to construct a 13.5 MW wind farm. (Global Environment Facility, 2013; Government of Guyana, 2012)

ELECTRICITY SECTOR OVERVIEW

The electricity sector is dominated by the primary producer and supplier of electricity, Guyana Power and Light Inc (GP&L) which functions as a state-owned vertically integrated utility. GP&L holds a monopoly on the transmission and distribution of electricity and produces about half of the country's electricity. GP&L's financial situation has deteriorated in recent years with increasing crude oil prices and building commercial and technical losses. It operates a capacity of 171.5 MW and produced 489 GWh in 2010. Its peak load in 2010 stood at 100.9 MW leaving about 70 MW in reserve capacity. GP&L's area of operation is highly concentrated around the capital and coastal areas and covers only 500 square kilometers.

The country's second largest producer is the Guyana Sugar Corporation, which sells excess electricity to GP&L. In 2010 it supplied 81 GWh of electricity to GP&L. (Guyana Sugar Corporation, 2010) The vast rural areas of the country are supplied by small scale private energy companies which produce and distribute electricity for the country's hinterland and rural villages. Their total capacity stands at 35 MW. (Global Environment Facility, 2013) Guyana's total installed capacity reached 314 MW in 2009 and it produced 819 GWh. (Government of Guyana, 2012) Due to the unreliability of the electricity system the majority of large and medium-sized firms in Guyana rely on self-generation of electricity. Per capita consumption of electricity in 2009 was 749 kWh compared to an average 1946 kWh per capita in Latin America. (IRENA, 2010)

As in most countries where electricity production is highly dependent on fossil fuel generation, electricity prices in Guyana are extremely high at around 0.28-0.32 US\$ per kWh. Guyana is also faced with above average system losses during the transmission and distribution of electricity due to inadequate or outdated infrastructure. Even with the high electricity tariffs GP&L operates at a loss and sells electricity below the cost of production.

The rate of electrification differs starkly between the capital and rural communities along the coast on one hand and rural areas in the country's hinterland on the other hand. GP&L has been successful in increasing electrification to almost 90 percent along the coast. In other parts of the country, however, 80 percent of the population lack access to electricity. The large size of the country, the lack of population centers and vast distances between small villages renders it infeasible to expand the coastal

grid into these areas. The country's reliance on imported fossil fuels for electricity generation in combination with rising crude oil prices over the past few years have had a negative impact on Guyana's economic growth. (Global Environment Facility, 2013; Government of Guyana, 2012)

ENERGY SECTOR REGULATORY FRAMEWORK

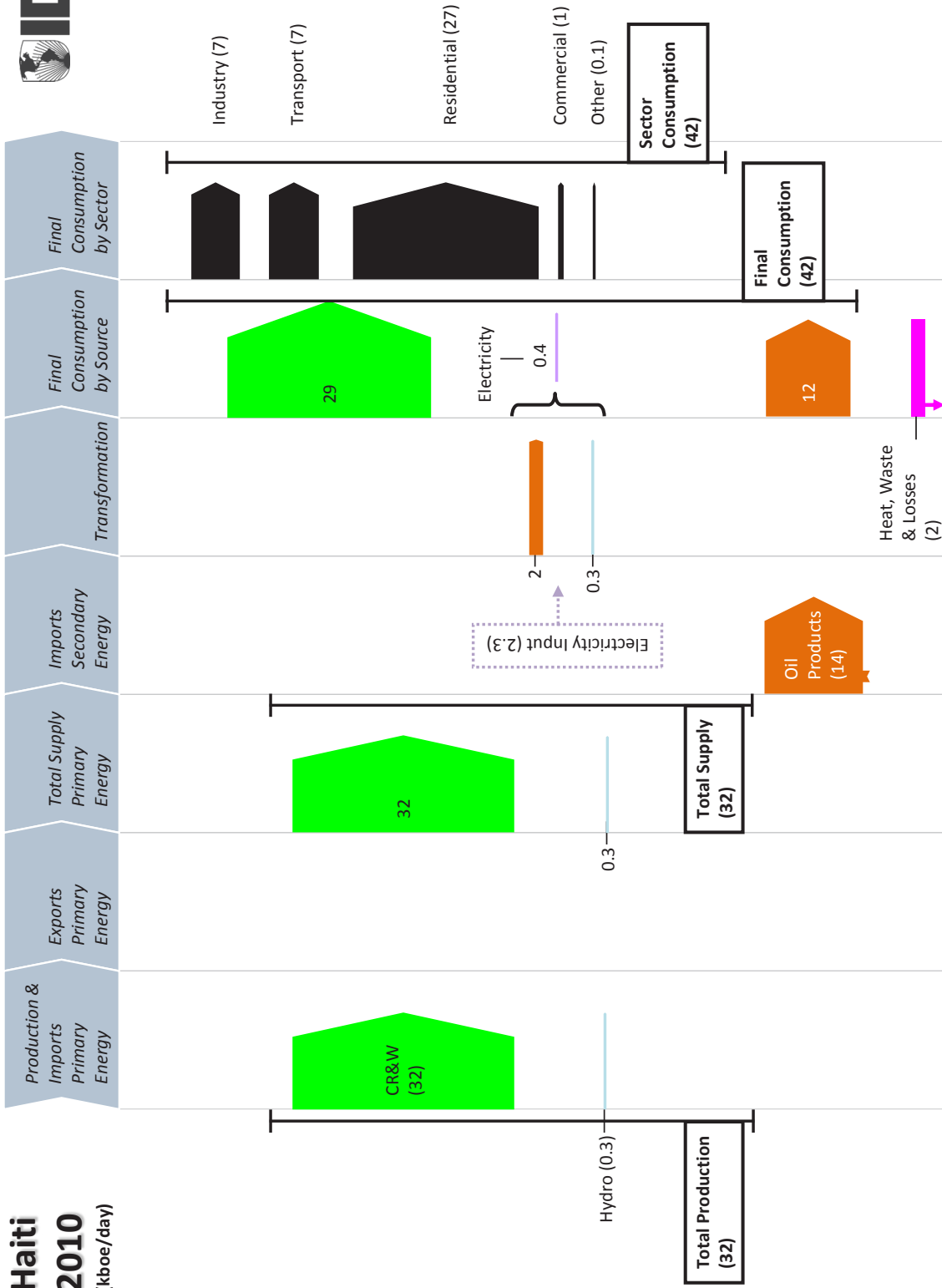
The Guyana Energy Agency's mandate is defined by the Guyana Energy Agency Act 1997, the amendment acts of 2004 and 2005, as well as the Petroleum and Petroleum Products Regulations 2004. The agency is tasked with developing a national energy policy and is responsible for its implementation. It "monitors the performance" of the overall energy sector, including the entire petroleum production chain from "production, importation, distribution and utilization." It also grants and issues licenses for the petroleum sector. (Guyana Energy Agency, 2013a)

ELECTRICITY SECTOR REGULATORY FRAMEWORK

The electricity sector has undergone some recent changes with the passing of the Guyana Energy Agency Act in 1997, the Electricity Sector Reform Act (ESRA) and the Public Utilities Commission Act in 1999. ESRA designates the Office of the Prime Minister (OPM) as the primary policy-making and regulatory body. The OPM has the power to grant licenses to IPP, develop and implement new regulation and alter or amend existing laws. In rural parts of the country - outside of the service area of GP&L - OPM works with the Ministry of Amerindian Affairs (MoAA) to achieve higher electrification rates. The Guyana Energy Agency (GEA) was established in 1998 and is responsible for all energy-related matters "ensuring the rational and efficient use of imported petroleum-based energy sources, while encouraging, where economically feasible and environmentally acceptable, increased utilization of indigenous new and renewable sources of energy." The GEA and the Environmental Protection Agency advise the OPM in matters related to granting new licenses. (Guyana Energy Agency, 2013b)



Haiti
2010
(kboe/day)



Editor: Ramón Espinosa (INE/ENE)
Authors: Lenin Balza (INE/ENE), Carlos Sucre (INE/ENE)
Source: Own calculations based on IEA World Energy Balances

Inter-American Development Bank, 2012
Infrastructure & Environment / Energy

HAITI

COUNTRY OVERVIEW

Haiti is located in the central Caribbean and occupies the western part of the island of Hispaniola together with its direct neighbor the Dominican Republic. It has a population of 9.7 million people and covers a total land area of 27,250 square kilometers. Average population density is about 300 inhabitants per square kilometers and 60 percent of the population live in rural areas. Nonetheless there is substantial pressure on urban areas as the population there has more than tripled over the past 30 years to almost 4 million inhabitants. More than half of the population is below 20 years of age and the population is expected to continue to grow at a rate of 1.4 percent per year. (Global Environment Facility, 2012)

The country's service sector contributes about 45 percent to the national GDP. The energy sector in contrast makes up only two percent of the overall GDP. Agriculture, mining and construction contribute 35 percent to the GDP and the industrial sector accounts for 10 percent. The general lack of high value export products results in a substantial negative balance of trade. Imports exceed exports by a factor of three. (Ministry for Public Works Transportation and Communications, 2007)

ENERGY SECTOR OVERVIEW

Per capita energy consumption in Haiti is by far the lowest in all of the Caribbean with less than 100 kWh annually. Overall energy supply is dominated by fuel wood and charcoal which account for 75 percent of final energy consumption. Fossil fuels provide about 20 percent of final consumption of electricity accounting for the remaining 4 percent. The majority of energy, 65 percent, is consumed residentially, followed by industry with 19 percent, transportation with 12 percent and services with 4 percent. Less than 30 percent of households are connected to the national electricity grid, of which only 12.5 are connected through metered and legal connections. The industrial sector consumes 43 percent of electricity. Without a domestic production of crude oil Haiti is required to import all its fossil fuels needs. Despite the relatively small energy sector, fossil fuel imports account for between 35 and 50 percent of overall imports. (Ministry for Public Works Transportation and Communications, 2007; Renewable Energy & Energy Efficiency Partnership, 2013)

ELECTRICITY SECTOR OVERVIEW

The state-owned vertically integrated utility Electricité d'Haiti (EDH) has a monopoly on the production, transmission and distribution of electricity. It has a total generation capacity of 216 MW of which roughly one third (61.75 MW) come from hydropower and two thirds come from thermal

generation. The majority of generation capacity (172 MW) is concentrated in the metropolitan region around the capital Port-au-Prince where two thermal plants and one hydropower plant provide electricity. The remaining 44 MW capacity are distributed throughout the country where small power plants with between 300kW and 9.8MW capacity generate electricity. Thermal generation relies mostly on diesel fuel with limited heavy fuel oil generation. (Ministry for Public Works Transportation and Communications, 2007) Haiti's annual per capita consumption of electricity is the lowest in the Caribbean with 36 kWh. In comparison, the Caribbean average is 1,251 kWh. (IRENA, 2012b; Ministry for Public Works Transportation and Communications, 2007)

In addition to EDH a limited number of Independent Power Producers (IPP) have been providing electricity since 1996 when the first IPP contract was signed with EDH. In total IPP provide 94 MW capacity, of which 70 MW are based in the capital region and 24 MW are located in the rest of the country. (Ministry for Public Works Transportation and Communications, 2007)

Due to the heavy reliance on hydropower and the subsequent dependence on the rainy season and a general lack of maintenance oftentimes less than half the installed capacity is available. In the Port-au-Prince region, where EDH has an installed capacity of 172 MW rarely more than 90 MW are available with as little as 45 MW during the dry season. On average the population in the capital has access to electricity for less than 10 hours a day. The degree of utilization of the available capacity is lower than in other Caribbean states. Haiti's capacity factor is around 25 percent, compared to a Caribbean average of 44 percent. Its direct neighbor, Dominican Republic, has the second lowest capacity factor at 37 percent, while Saint Kitts and Nevis' 63 percent is along the highest in the Caribbean. (Ministry for Public Works Transportation and Communications, 2007)

Haiti does not have an interconnected electricity grid and each region and the capital area have their own independent grid. The metropolitan region has 56 km of 115 kV lines, 53km of 69kV lines and around 900 km of 7.2/12.47 kV lines. Total length of transmission lines around Port-au-Prince is approximately 1029 km. (Ministry for Public Works Transportation and Communications, 2007)

A major issue in Haiti is the illegal consumption of electricity and according to estimates more than half of total electricity is consumed illegally. In 2002 out of a total production of 266 GWh, 115 GWh were consumed by metered households while 151 GWh were consumed illegally by households without meters. In 2010 the combined technical losses equaled 75 percent. (Ministry for Public Works Transportation and Communications, 2007) EDH continues to operate at a loss and the Government of Haiti is required to subsidize the state-owned utility with up to 120 million US\$ annually. (USAID, 2013)

ENERGY SECTOR REGULATORY FRAMEWORK

The overall institutional framework is weak and there exists a general lack of transparency. The Ministry of Public Works, Transportation and Communications (MTPTC) is the lead government agency responsible for the regulation of the energy and electricity sector in Haiti. Operating under supervi-

sion of MTPTC is the Bureau of Mines and Energy (BME), which was created as an independent agency in 1986. It is responsible for the exploration and promotion of mineral and energy resources and the technical aspects of the sector. It has close ties to EDH, e.g. the Minister of MTPTC also functions as the president of the Executive Board of EDH. The Ministry of Environment is tasked with the furthering of sustainable and renewable energy and questions relating to environmental protection in the energy sector. The overall institutional framework is weak and there exists a general lack of transparency. (Ministry for Public Works Transportation and Communications, 2007; Renewable Energy & Energy Efficiency Partnership, 2013)

ELECTRICITY SECTOR REGULATORY FRAMEWORK

Electricité d'Haiti (EDH) was established on August 9, 1971 as a state-owned, vertically integrated utility which holds a monopoly on the generation, transmission, distribution and sale of electricity. EDH underlies the control and direction of the MTPTC and reports its activities to the Ministry . Production of electricity by IPP began in 1996 when Interselect SA signed a contract with EDH. Since then EDH has signed a number of power purchase agreements with a number of operators, e.g. Haytian Tractor, Alstom and Sogener. (Ministry for Public Works Transportation and Communications, 2007)

Jamaica 2010 (kboe/day)



Editor: Ramón Espinosa (INE/ENE)
 Authors: Lenin Balza (INE/ENE), Carlos Sucre (INE/ENE)
 Source: Own calculations based on IEA World Energy Balances

Inter-American Development Bank, 2012
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JAMAICA

COUNTRY OVERVIEW

Jamaica is the third largest island in the Caribbean, after Cuba and Hispaniola, comprising about 11,000 square kilometers. The majority (53 percent) of its population of 2.83 million reside in urban areas. Jamaica does not have notable hydrocarbon reserves and relies fully on imports to meet its petroleum and coal requirements. The country consumes about 60,000 barrels of oil per day (2010). (Ministry of Energy and Mining, 2010) The country's largest contributors to the national GDP are the bauxite industry, the tourism sector, agriculture and the manufacturing sector. The tourism sector is an important source for foreign exchange. (Government of Jamaica, 2011) Jamaica has the highest per capita consumption of energy in the Caribbean, with the exception of the Netherlands Antilles. The high rate of energy consumption is in part due to the energy intense bauxite industry which uses about 40 percent of all oil imports. (Arbelaez & Marzolf, 2011)

ENERGY SECTOR OVERVIEW

The majority of the island's energy needs, about 84 percent, are imported in the form of crude oil, coal and oil products. (Government of Jamaica, 2011; IRENA, 2010b) Combustible renewables and waste (CR&W) account for the remaining 16 percent of primary energy supply. Hydropower and wind power represent only 0.4 percent. Thus far no concerted effort has been conducted to map locations suitable for harvesting wind energy. The island also possesses substantial potential for the production of bioethanol from sugar cane as well favorable levels of solar radiation allowing for production of solar energy.

The bauxite industry is the largest end user of energy consuming 37.4 percent of total energy followed by the electricity sector which consumes about 25 percent of energy, the transportation sector with 20.4 percent and the sugar industry with 12.2 percent. (Government of Jamaica, 2011) While the bauxite industry is very energy intense, it makes a significant contribution to the balance of payments, generating much needed foreign revenue through exports. (Government of Jamaica, 2011)

Like most island states in the Caribbean Jamaica's energy imports as a share of overall imports has grown significantly over the past decade. In 2007 energy imports represented 34.5 percent of all imports, a doubling over the previous five years. The economic cost of energy imports can not be overstated and the value of energy imports exceeds the value of total Jamaican exports. (Arbelaez & Marzolf, 2011) Oil consumption has grown at 3.75 percent per year since 2003, almost 8 times faster than population growth. With no domestic supply of hydrocarbon resources and the energy intensive bauxite and alumina industries, per capita oil consumption exceeds that of other Caribbean island states.

ELECTRICITY SECTOR OVERVIEW

Similar to the electricity sector in most Caribbean island states, Jamaica's electricity sector is highly dependent on fossil fuels, mainly fuel oil and diesel, for the generation of electricity. Steam and diesel account for 71 percent of overall generation, followed by combined cycle gas turbines at 17.2 percent, and gas turbines at 6.6 percent. Renewables account for just 5.2 percent of generation with 3.9 percent coming from hydropower and 1.3 percent from wind. (Arbelaez & Marzolf, 2011) The country has one functioning wind farm with a capacity of 20.7 MW and eight small-capacity hydropower plants provide a total capacity of 23 MW. Total generation capacity stands at 622MW. (Ministry of Energy and Mining, 2010; World Bank, 2010)

The electricity sector has a total of about 580,000 customers with commercial and industrial consumers accounting for 63 percent of overall consumption. The residential sectors consumes about 34 percent. (JPSCO, 2013a) About 74,000 households are supplied through the government subsidized Rural Electrification Program. A total of 22.9 percent of energy is lost during transmission and distribution. Losses in this category have grown rapidly over the past decade, up to three times faster than growth of net generation. (Arbelaez & Marzolf, 2011)

JPSCo is by far the largest provider with a generation capacity of 623 MW followed by Jamaica energy partners (JEP) providing 124 MW and four smaller providers combining for 112 MW. The bauxite industry has a self generation capacity of about 170 MW and feeds excess capacity of 11 MW back into the national grid. JPSCo accounts for 69 percent of generation and holds 73 percent of generation capacity. (Arbelaez & Marzolf, 2011)

Electrification rates for Jamaica are lower than in many of the smaller Caribbean islands states which have often achieved nearly universal coverage for electricity. Jamaica has made significant progress over the past decade increasing the electrification rate by 15 percent. Overall 92 percent of Jamaican households have access to electricity. This rate drops slightly, to 90 percent, for rural areas. The government aims to achieve universal access to electricity by 2015.

JPSCo's national grid features about 14,000km of transmission and distribution lines of which about 8 percent are high voltage transmission lines of either 138kV or 69kV. The smaller distribution lines operate at between 4-24kV. (JPSCO, 2013a)

ENERGY SECTOR REGULATORY FRAMEWORK

The Ministry of Science, Technology, Energy and Mining has overall responsibility for the formulation and review of energy policy, including energy efficiency and conservation, identifying consumption trends and forecasting future demand scenarios. The Energy Division within the Ministry implements policy and monitors the functioning of the energy sector. It works with the Petroleum Corporation of Jamaica (PCJ) and the Jamaica Public Service Company (JPSCo). (Ministry of Energy and Mining, 2013)

ELECTRICITY SECTOR REGULATORY FRAMEWORK

The electricity sector is governed by three regulatory framework documents: the Electric Lighting Act of 1890, the Utilities Regulation Act of 1995 and the All-Island Electric License of 2001.

The Electric Lighting Act anchors the government's role in the sector. It holds the power to regulate prices and quality of the energy supply and to grant licenses to local authorities, companies or individuals to generate electricity. The Utilities Regulation Act of 1995 establishes the Office of Utilities Regulation as regulatory body allowing it determine price structure or fares, and to establish standards for the quality and safety, environment, reliability and efficiency of electricity service. The All-Island Electric License of 2011 regulates the distribution and transmission of electricity. It grants exclusive rights to JPSCo to function as sole transmitter and distributor of electricity for the next 20 years. It also limited the development of any new generation capacity between 2001 and 2004 to JPSCo. (Ministry of Energy and Mining, 2009; World Bank, 2010)

Outside the existing regulatory framework, the Rural Electrification Program Limited (REP), which functions as an executive agency of the government, has been providing rural electrification since 1975. In addition to its mandate of providing electricity service in rural areas where JPSCo could not operate profitably, it has recently begun construction of distribution poles in non-electrified areas. Where customer density is too low, less than 20 houses per mile, REP encourages the use of renewable energy rather than extending the grid into these areas. (Arbelaez & Marzolf, 2011)

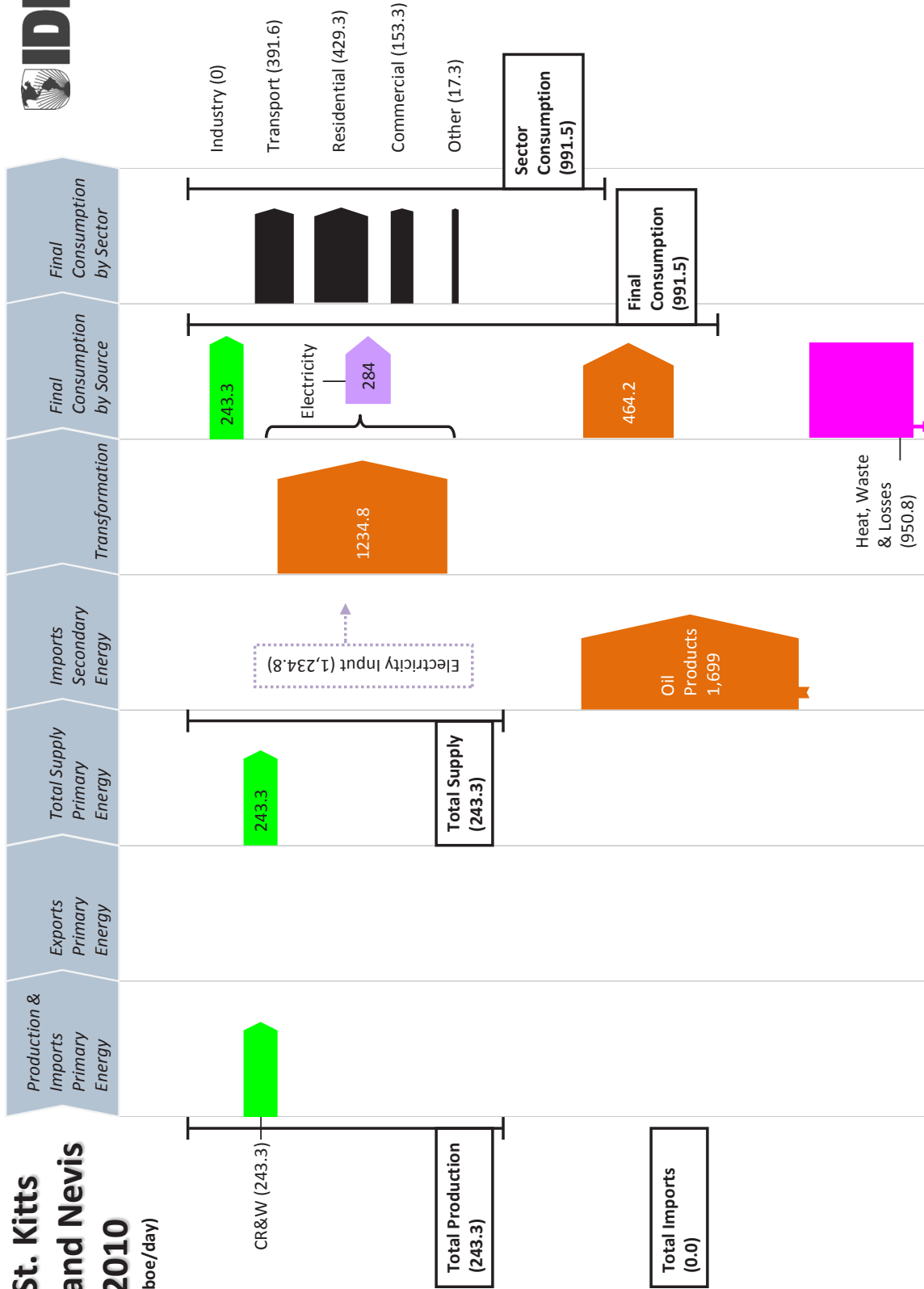
Similar to most Caribbean states, the electricity sector is organized around a single utility company, Jamaica Public Services Company, (JPSCo) which holds a monopoly for the transmission and distribution of electricity. Between 2001 and 2004 it also held exclusive license for the development of new generation capacity. Jamaica allows for independent power providers (IPP) to compete for long-term contracts to generate electricity and sell it to JPSCo. In addition to JPSCo and IPP electricity is provided by the Governments Rural Electrification Program (REP) in remote areas where electrification is not commercially viable. (Arbelaez & Marzolf, 2011)

JPSCo ownership structure has undergone significant changes over the past decade. In 2012 Marubeni Corporation held an 80 percent stake in JPSCo while the government held 19 percent and 1% were held by others. In 2001 the government sold an 80 percent stake in the utility company to Mirant which in turn sold its stake to Marubeni for 201 million USD. (JPSCO, 2013b)

Oversight of the electricity sector falls in the hands of Office of Utilities Regulation (OUR), an independent regulatory agency established in 1995. It is tasked to “establish and maintain transparent, consistent and objective rules” for the regulation of utility service providers. It also receives applications by IPP and issues recommendations to the Ministry regarding their approval. OUR also sets the electricity tariff for each provider and regulates the final price of electricity, though it does not set tariffs on the transmission and distribution of electricity. (Ministry of Energy and Mining, 2009) 9.3

Methodology

St. Kitts and Nevis 2010 (boe/day)



Editor: Ramón Espinasa (INE/ENE)
 Authors: Malte Humpert
 Source: Own calculations based on EIA, Castalia Consulting, UNFCC, St. Kitts and Nevis Government

Inter-American Development Bank, 2013
 Infrastructure & Environment / Energy

ST. KITTS AND NEVIS

METHODOLOGY

The matrix was constructed with data from the Energy Information Administration (EIA), Castalia Consulting, the International Renewable Energy Agency (IRENA), and the United Nations Framework Convention on Climate Change (UNFCCC).

Information about crude oil imports and export comes from the International Energy Statistics of the EIA. IRENA's Renewable Energy Country Profiles Caribbean served as a data source to obtain the share of combustible renewables and waste (CR+W) of total primary energy. The Castalia Consulting Report on Sustainable Energy in the Eastern Caribbean provided information on the transmission and distribution loss rates of St. Kitts and Nevis' electricity grid. St. Kitts and Nevis does not track losses during generation and an average loss rate of 60 percent is applied. St. Kitts and Nevis' Initial National Communication to the UNFCCC and the National Energy Policy and Action Plan St. Kitts and Nevis enabled the consultant to calculate final consumption of energy by sector by looking at the CO₂ emissions in the transportation, residential, commercial and industrial sector. The data on sectoral distribution should be used with caution as data from several sources and years were combined to arrive at a final rough estimate. There are no direct data available as the Government of St. Kitts and Nevis does not track sectoral consumption of energy.

The island nation's production of primary energy is limited to 243 barrels of oil equivalent per day (boe/day) of CR+W. The vast majority of energy, around 85 percent, is imported in the form of oil products. The island nation imports a total of 1699 boe/day. About 70 percent of oil products (1235 boe/day) are used to generate electricity. Losses during generation, distribution, and transmission total 950 boe/day leaving 284 boe/day for final consumption.

In total, final consumption of St. Kitts and Nevis is 992 boe/day, of which 464 boe/day are oil products, 284 boe/day are consumed in the form of electricity and 243 boe/day are CR+W.

Consumption by sector is as follows. The residential sector consumes just under 40 percent of energy with 429 boe/day, followed by the transport sector with 392 boe/day, the commercial sector with 153 boe/day, and other with 17 boe/day. The industrial sector consumes insignificant amounts of energy.

COUNTRY OVERVIEW

The two-island state of St. Kitts and Nevis is part of the Leeward Islands chain in the Eastern Caribbean. The two islands cover 269 square kilometers and are home to a population of 51,300. St. Kitts covers about two thirds of the territory, 176 square kilometers, with Nevis encompassing the re-

maining 93 square kilometers. About 75 percent of the population, about 40,000, reside on St. Kitts, the remaining approx. 12,000 live on Nevis. The island states' economy is dominated by the tourism sector which has grown significantly over the past decade. In 2009 tourism contributed 31.7 percent to total GDP and employs 32.2 percent of the work force. Other important contributors to the national GDP come from government services and the banking and insurance industry. Manufacturing and mining also play a role. (Government of St. Kitts and Nevis, 2009)

ENERGY SECTOR OVERVIEW

St. Kitts and Nevis receive about 88 percent of their overall energy through imported oil products, with the remaining share coming from combustible renewables & waste and also wind power.

ELECTRICITY SECTOR OVERVIEW

Each island of the two main islands in the federation of St. Kitts and Nevis has its own electric utility—St. Kitts Electricity Company (SKELEC) on St. Kitts, and Nevis Electricity Company Limited (NEVLEC) on Nevis. In contrast to utility companies in all other ECS, SKELEC and NEVLEC provide subsidized tariffs that are below the full cost of service. (Government of St. Kitts and Nevis, 2009)

The artificially low electricity tariffs encourage overconsumption, and as a result the country's GHG emissions per capita are higher than in other OECs countries. SKELEC relies entirely on diesel for the generation of electricity. The majority of electricity produced on Nevis also comes from diesel generation. Since 2011 a small wind farm (2.2MW), the first in the Eastern-Caribbean, provides limited amounts of electricity, on Nevis. (Government of St. Kitts and Nevis, 2009)

SKELEC operates a capacity of 28.5 MW (2009) with peak demand standing at 25.3 MW and a base load of 16 MW. Due to a shortage in capacity following a fire in mid-2009 and the loss of 8.8 MW capacity, the utility is renting diesel generators with a capacity of 7.5 MW. Distribution and transmission losses stand at 17 percent. (Castalia Consulting, 2012; Government of St. Kitts and Nevis, 2009; World Bank, 2010)

NEVLEC owns and operates capacity of 13.4 MW with peak demand of around 9 MW and a base load of 5 MW. The Four Seasons Hotel alone represents 1.1-1.2 MW demand. (Government of St. Kitts and Nevis, 2009; NEVLEC, 2013)

Total capacity on both islands, whose grid is not interconnected, stands at 41.7MW. Overall the system has very little reserve capacity to meet peak demand. Large hotels rely on self generation instead. The Marriott Hotel has a self generation capacity of 4MW using diesel generators. (Government of St. Kitts and Nevis, 2009)

In 2004 sectoral electricity consumption was as follows. On St. Kitts, residential customers consumed 41 percent, the commercial sector consumed 58 percent with the remaining 1 percent consumed for street lighting. On Nevis, residential customers accounted for 31 percent, the commercial sector for 65 percent and 3 percent used for street lighting. (De Cuba, 2006)

ENERGY SECTOR REGULATORY FRAMEWORK

The Ministry of Public Works, Housing, Energy and Utilities as well as the Ministry of Finance, Sustainable Development and Human Resource Development are responsible for the development and implementation of energy policy. The 1954 Petroleum Ordinance regulates the importation, storage and sale of petroleum products. The 2008 Nevis Geothermal Resources Development Ordinance allows for the exploration, drilling, production and use of geothermal resources. (Castalia Consulting, 2012; World Bank, 2010)

ELECTRICITY SECTOR REGULATORY FRAMEWORK

SKELEC is a state-owned-owned public utility responsible for the generation, transmission and distribution of electricity on St. Kitts. On Nevis, the same services are provided by NEVLEC, which is a private-state owned utility. Each company is tasked to provide effective and reliable electricity services and has the authority to set the price of electricity tariffs. There does not exist an independent regulatory body. . (Castalia Consulting, 2012; SKELEC, 2013; World Bank, 2010)

St. Lucia 2010 (boe/day)



Editor: Ramón Espinosa (INE/ENE)
 Authors: Malte Humpert
 Source: Own calculations based on EIA, Castalia Consulting, UNFCCC

Inter-American Development Bank, 2013
 Infrastructure & Environment / Energy

ST. LUCIA

METHODOLOGY

The matrix was constructed with data from the Energy Information Administration (EIA), Castalia Consulting, the International Renewable Energy Agency (IRENA), and the United Nations Framework Convention on Climate Change (UNFCCC).

Information about crude oil imports and export comes from the International Energy Statistics of the EIA. IRENA's Renewable Energy Country Profiles Caribbean served as a data source to obtain the share of combustible renewables and waste (CR+W) of total primary energy. The Castalia Consulting Report on Sustainable Energy in the Eastern Caribbean provided information on the transmission and distribution loss rates of St Lucia's electricity grid. St. Lucia does not track losses during generation and an average loss rate of 60 percent is applied. St Lucia's Initial National Communication on Climate Change enabled the consultant to calculate final consumption of energy by sector by looking at the CO₂ emissions in the transportation, residential, commercial and industrial sector. The data on sectoral distribution should be used with caution as data from several sources and years needed to be combined to arrive at a final rough estimate. There are no direct data available as the Government of St. Lucia does not track sectoral consumption of energy.

The island nation production of primary energy is limited to 60 barrels of oil equivalent per day (boe/day) of CR+W. The vast majority of energy, around 98 percent, is imported in the form of oil products. The island nation imports a total of 2914 boe/day. About 60 percent of oil products (1826 boe/day) are used to generate electricity. Losses during generation, distribution, and transmission total 1269 boe/day leaving 567 boe/day for final consumption.

In total, final consumption of St. Lucia is 1704 boe/day, of which 1088 boe/day are oil products, 557 boe/day are consumed in the form of electricity and 60 boe/day are CR+W.

Consumption by sector is as follows. The transportation sector consumes just under 40 percent of energy with 665 boe/day, followed by the commercial sector with 627 boe/day, the residential sector with 368 boe/day, the industrial sector with 79 boe/day and other at 13 boe/day.

COUNTRY OVERVIEW

St. Lucia is part of the Lesser Antilles and is located north of St. Vincent and northwest of Barbados. It has a population of 174,000 people, of more than a third reside in the capital of Castries. The island covers a total land area of 617 square kilometer. St. Lucia's economy used to be primarily based on mono-crop agriculture (especially bananas). However, since the early 2000s, tourism has emerged as the main revenue earner of the economy, with services, manufacturing and industry being the other important productive sectors. (Castalia Consulting, 2012)

ENERGY SECTOR OVERVIEW

St. Lucia, like most ECS, is characterized by a high dependence on imported fossil fuels to meet its energy demand. Saint Lucia has no known petroleum reserves and apart from limited usage of combustible renewables, all energy is imported, mainly from Trinidad. St. Lucia receives about 98 percent of its overall energy through imported oil products, with the remaining share coming from combustible renewables & waste. While the island state has significant wind and geothermal energy potential, other indigenous energy sources such as hydropower or fuelwood are limited. All of these options have yet to be developed commercially. All refined petroleum products are imported and subsequently stores at the Hess Oil St. Lucia Company Limited (HOSL) oil storage facility in the northern part of the island. Hess Oil is the exclusive supplier of fuel to the island utility company, St. Lucia Electricity Services Limited (LUCELEC). (Castalia Consulting, 2012; Government of Saint Lucia, 2003; World Bank, 2010)

ELECTRICITY SECTOR OVERVIEW

St. Lucia Electricity Services Limited (LUCELEC) is the sole utility company generating, transmitting, distributing, and selling electricity. It holds the sole license until 2045 with the exception for self-generation. St. Lucia's rate of electrification is about 98% and demand for electricity has steadily grown (4.6% annually between 2002 and 2007) over the last decade, especially in the commercial sector. LUCELEC produces most of its electricity at its Cul De Sac power plant and operates an additional five sub-stations throughout the island. Energy is transmitted via a 66kV high voltage line circumscribing the island. . (Castalia Consulting, 2012)

With about 90,000 customers, St. Lucia represents the largest electricity market in the Eastern Caribbean, both in terms of peak electricity demand and number of customers. Economies of scale allow it to offer some of the lowest electricity rates throughout the region. Nonetheless, electricity prices remain volatile, as all utility scale generation on the island is based on imported fossil fuels. To reduce this vulnerability LUCELEC actively conducts hedging against volatile fuel prices. As this practice began only in 2009 its impact on electricity prices and price stability is not yet known. As electricity demand continues to grow LUCELEC is facing the challenge to add capacity at a sufficient rate. A

new 10MW generation plant was scheduled to come online in 2013. The Government has proposed reforms to lower the country's dependence on imported fossil fuels, including a renewable energy portfolio standard, regulatory reform, and energy efficiency mandates. However, these reforms have not yet been implemented. The government of St. Lucia also leads the ECS in the adoption of building codes to increase energy efficiency, but the impact and level of enforcement of these measures remains unknown. (Castalia Consulting, 2012; Government of Saint Lucia, 2003)

ENERGY SECTOR REGULATORY FRAMEWORK

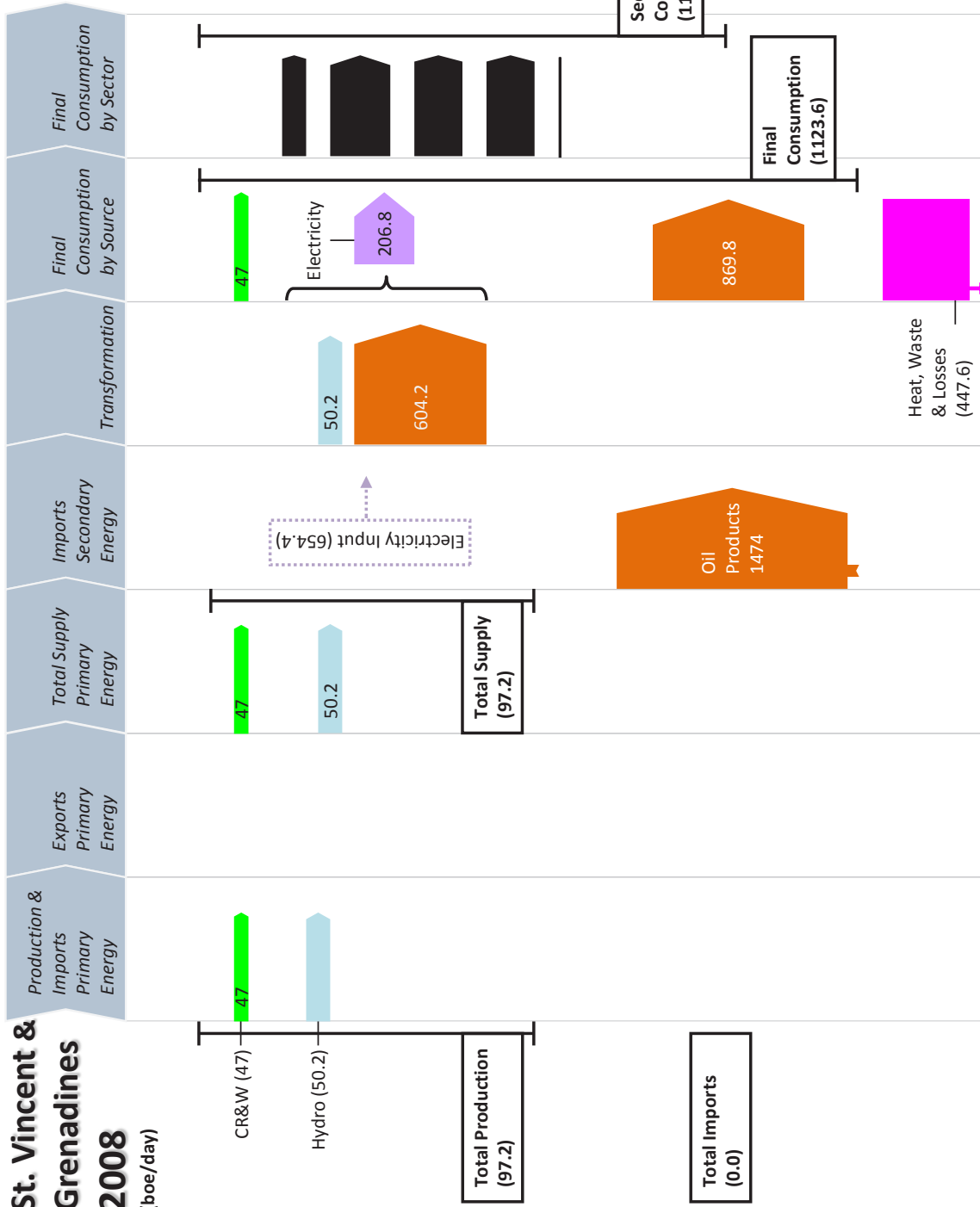
The Ministry of Physical Development, Environment and Housing as well as the Ministry of Public Service, Sustainable Development, Energy, Science and Technology are responsible for implementing the 2010 National Energy Plan and Sustainable Energy Plan. (Castalia Consulting, 2012; Ephraim & Tulsnie, 2010) An Independent Regulatory Commission is responsible for the issuing of licenses for the generation, transmission, and distribution of electricity. It also sets tariffs and rates and approves investments in the energy sector.(Organization of American States, 2010)

ELECTRICITY SECTOR REGULATORY FRAMEWORK

According to the 1964 Power Supply Regulation LUCELEC is the sole license holder for the generation, transmission, distribution and sale of electricity until 2045. (Organization of American States, 2010)When the regulation was amended by the Electricity Supply Act (ESA) in 1994 LUCELEC's exclusive license was left untouched. In theory the Minister of Public Utilities can intervene in and regulate LUCELEC's actions, but in practice the company is largely self-regulating setting its own electricity tariffs and self-monitoring that its standards are being met. (Castalia Consulting, 2012) Under ESA a system of tariffs was established which functions independently from political pressures and ensures that LUCELEC has sufficient funding to provide improved service quality and coverage. It also established a fuel adjustment surcharge which takes into account all increases or decreases in the price of imported fuels and passes costs on to the consumer. (Castalia Consulting, 2012)

St. Vincent & Grenadines 2008

(boe/day)



Editor: Ramón Espinosa (INE/ENE)
 Authors: Malte Humpert
 Source: Own calculations based on EIA, Castalia Consulting, IRENA, UNFCCC

Inter-American Development Bank, 2013
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SAINT VINCENT AND THE GRENADINES

METHODOLOGY

The matrix was constructed with data from the Energy Information Administration (EIA), Castalia Consulting, the International Renewable Energy Agency (IRENA), and the United Nations Framework Convention on Climate Change (UNFCCC).

Information about crude oil imports and export comes from the International Energy Statistics of the EIA. IRENA's Renewable Energy Country Profiles Caribbean served as a data source to obtain the share of combustible renewables and waste (CR+W) of total primary energy. The Castalia Consulting Report on Sustainable Energy in the Eastern Caribbean provided information on the transmission and distribution loss rates of St Vincent and the Grenadines' electricity grid. St Vincent and the Grenadines does not track losses during generation and an average loss rate of 60 percent is applied. St Vincent and the Grenadines' Initial National Communication on Climate Change enabled the consultant to calculate final consumption of energy by sector by looking at the CO₂ emissions in the transportation, residential, commercial and industrial sector. The data on sectoral distribution should be used with caution as data from several sources and years were combined to arrive at a final rough estimate. There are no direct data available as the Government of St Vincent and the Grenadines does not track sectoral consumption of energy.

The island nation production of primary energy is limited to 50 barrels of oil equivalent per day (boe/day) from hydropower and 47 boe/day from CR+W. The vast majority of energy, around 94 percent, is imported in the form of oil products. The island nation imports a total of 1474 boe/day. About 40 percent of oil products (604 boe/day) are used to generate electricity supplemented by 50 boe/day of electricity from hydro. Losses during generation, distribution, and transmission total 448 boe/day leaving 207 boe/day for final consumption.

In total, final consumption of St Vincent and the Grenadines is 1124 boe/day, of which 870 boe/day are oil products, 207 boe/day are consumed in the form of electricity and 47 boe/day in the form of CR+W.

Consumption by sector is as follows. The transportation sector consumes over 40 percent of energy with 392 boe/day, followed by residential sector with 301 boe/day, the commercial sector with 293 boe/day, the industrial sector with 128 boe/day and other at 9 boe/day.

COUNTRY OVERVIEW

St. Vincent and the Grenadines is a multi-island state comprising the main island of St. Vincent and seven smaller inhabited islands as well as about 30 uninhabited islets constituting the Grenadines. The islands are home to a population of 120,000 people and cover a land area of 389 square kilometers.

ENERGY SECTOR OVERVIEW

St. Vincent and the Grenadines receives about 95 percent of their overall energy through imported oil products, with the remaining share coming from combustible renewables & waste and also hydropower. St. Vincent and the Grenadines is a notable exception in the ECS as geography has allowed hydropower to be used to some extent on the main island of St. Vincent since the middle of the twentieth century. All other islands, however, depend entirely on diesel generation for their electricity supply. (Government of St. Vincent and the Grenadines, 2000) The transportation sector is the largest consumer of energy followed by the domestic and commercial sectors. (Castalia Consulting, 2012)

ELECTRICITY SECTOR OVERVIEW

St. Vincent Electricity Services Limited (VINLEC) was established as public electricity utility in 1931 and holds the exclusive license to provide the public with electricity until 2033. It can however issue license to other parties that wish to generate and distribute electricity. This is an important provision as VINLEC only provides power to St. Vincent and four of the Grenadines (Bequia, Canouan, Union Island, and Mayreau). VINLEC only services St. Vincent, Bequia, Canouan, Union Island and Mayreau. The private islands of Palm and Mustique generate their own electricity for exclusive consumption by their resorts. (Castalia Consulting, 2012; Government of St. Vincent and the Grenadines, 2000)

VINLEC currently operates a total generation capacity of 56.8MW, consisting primarily of diesel generators, as well as a heavy fuel oil generator and three small hydroelectric plants. The utility operates 5.7MW of installed hydro plant, of which 3.3MW came online in 2012. While studies of the island's remaining hydro potential have been conducted, no concrete steps to construct additional plants have been taken. Electricity tariffs are relatively low compared to other countries in the region, in part because VINLEC generates some electricity (about 16 percent) using hydroelectric plants. The islands hydro plants allow electricity to be produced more efficiently on St. Vincent and the Grenadines than on other ECS. Compared to conventional generation hydropower saves about 0.12 US\$ per kWh. In addition to hydropower for electricity generation, the use of solar energy for hot water production has recently been introduced. The country has a significant potential for renewable energy technologies such as solar photovoltaic, wind power, as well as geothermal. (Castalia Consulting, 2012; Government of St. Vincent and the Grenadines, 2000; World Bank, 2010)

The electrification rate is 99% and over the past decade the commercial sector (mainly hotels) has contributed the most to growth in demand since 2003. In 2008, commercial uses totaled approximately 47% of all electricity closely followed by residential use with 45%. Industry is of only minor importance. VINLEC installed new generation capacity in 2011 and 2012 to meet growing demand. Existing generating capacity is expected to meet demand until 2017 at which point VINLEC will need to add new capacity to satisfy annually growing demand of 6.9%. (Government of St. Vincent and the Grenadines, 2000) In 2008 the commercial sector consumed 47 percent of electricity, followed by 45 percent for the residential sector. (Castalia Consulting, 2012)

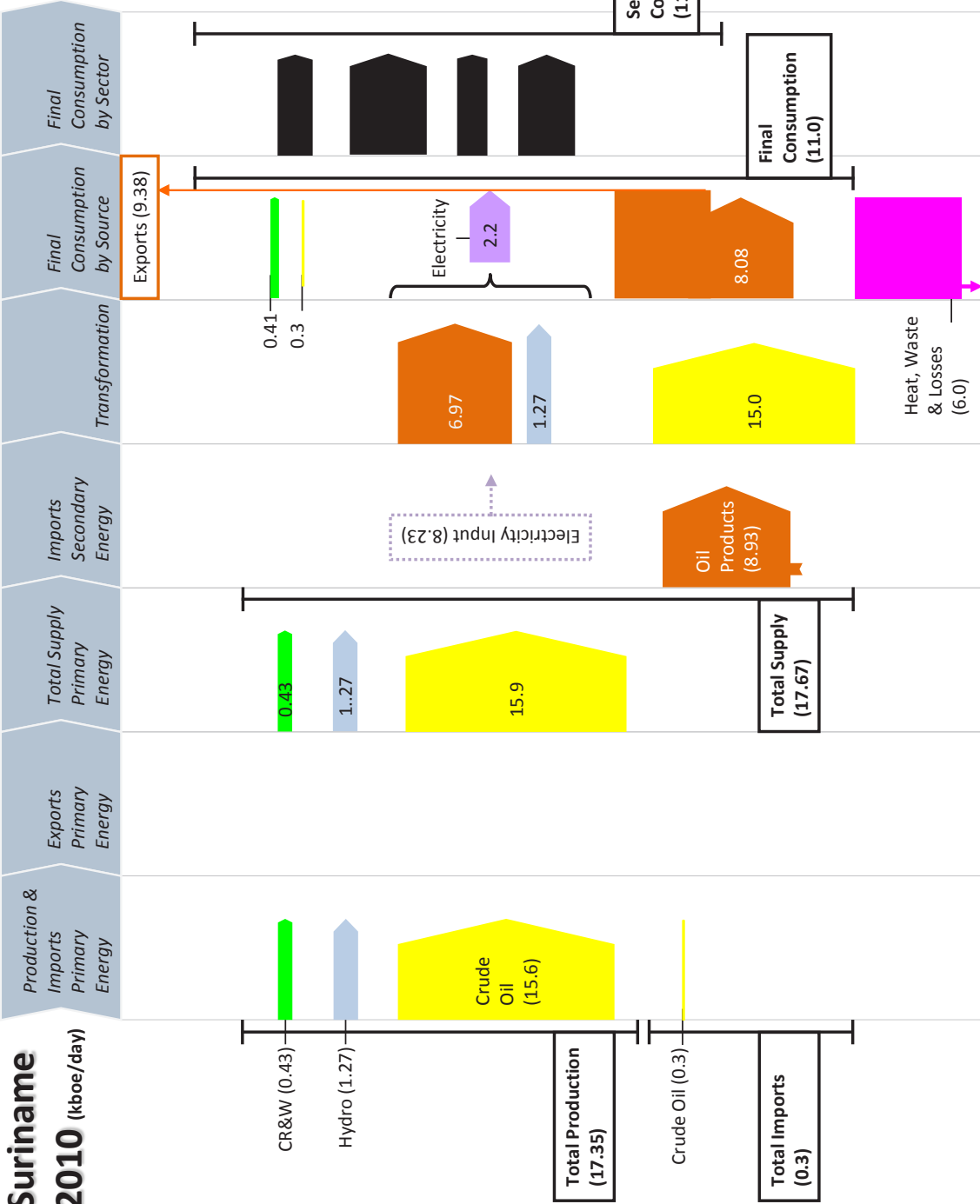
ENERGY SECTOR REGULATORY FRAMEWORK

The Prime Minister's office currently functions as the Ministry of Energy and holds overall control over the energy sector. In 2008 an Energy Unit was created within the Prime Minister's Office responsible for the formulation and implementation of energy policy when it comes to renewable energy and efficiency. In addition, the Ministry of Telecommunications, Science, Technology and Industry is also tasked with influencing energy policy. The distribution and transmission of energy falls into the portfolio of the Ministry of Transport, Works and Housing. The 2006 National Energy Committee is responsible for drafting a National Energy Policy. (Castalia Consulting, 2012; Renewable Energy & Energy Efficiency Partnership, 2012d)

ELECTRICITY SECTOR REGULATORY FRAMEWORK

VINLEC, a vertically-integrated utility, has held a monopoly on the generation, transmission, distribution and sale of electricity since 1973 and will continue to do so until 2033. VINLEC has the power to issue licenses, both to IPP and self-generators, that wish to generate electricity. Licenses have been granted to two IPP which supply the private islands of Palm and Mustique. There is no dedicated independent regulator in St. Vincent and the Grenadines. In theory the Ministry of Energy functions as a de facto regulator but VINLEC operates largely independent. (Castalia Consulting, 2012; World Bank, 2010)

Suriname 2010 (kboe/day)



Editor: Ramón Espinosa (INE/ENE)
 Authors: Malte Humpert
 Source: Own calculations based on United Nations Energy Balances

Inter-American Development Bank, 2013
 Infrastructure & Environment / Energy

SURINAME

METHODOLOGY

The matrix was constructed using data from the United Nations Energy Balances.

Suriname produced 17,350 barrels of oil equivalent of primary energy per day (boe/day) with the large majority, 15,600 boe/day coming from crude oil. Hydropower and CR&W account for 1,270 boe/day and 430 boe/day respectively. In terms of primary energy, Suriname also imports about 300 boe/day of LPG. The country imports about 8,930 boe/day in oil products. Its 15,600 boe/day of crude oil production is refined and turned into 16,230 boe/day of oil products, 6,970 boe/day of which is used to for the generation of electricity with about 9,380 boe/day being designated for export. Together with 1,270 boe/day of hydropower Suriname produces about 2,200 boe/day of electricity. Total losses, e.g. from heat and waste, are 6,000 boe/day, leaving 11,000 boe/day for final consumption.

In total, final consumption of Suriname is 11,000 boe/day, of which 410 boe/day are CR&W, 300 boe/day are LPG, 2,200 boe/day are electricity, and 8,080 boe/day are oil products.

Consumption by sector is as follows. The transportation sector consumes about 45 percent of energy with 5,100 boe/day, followed by residential sector with 1,500 boe/day, the industrial sector with 1,200 boe/day. Other, which includes agriculture, combines for 3,200 boe/day.

COUNTRY OVERVIEW

Suriname is located along the northern coast of South America covering 163,820 square kilometers and is home to a population of 492,000. It achieved its independence in 1975 making it the youngest independent state in South America. It is bordered by the Atlantic in the north, Guyana in the west, the territory of French Guyana in the east, and Brazil in the south. About half the country's population lives in the capital city of Paramaribo located along the coast in the north-eastern part of the country. The national economy is dominated by the extractive industry primarily oil, bauxite as well as gold. Taking into account indirectly related industries, the extractive industry accounts for more than 50 percent of national GDP and oil, bauxite and gold make up about 80 percent of national exports. The country's wealth in natural resources also extends into the agricultural sector where rice and bananas are the dominant products. (Global Environment Facility, 2012) The country is highly energy self-sufficient and imports less than 15 percent of its energy needs. Nonetheless 18.3 percent of its overall imports (2009), about 264 million USD, were fuel imports. Suriname's high energy independence is due to a combination of extraction of fossil fuels and significant wealth of hydropower. More than half of generated electricity, 53 percent in 2009, is from hydropower. (IRENA, 2010c)

ENERGY SECTOR OVERVIEW

Suriname is the third largest oil producer in the Caribbean after Trinidad and Tobago and Cuba. It produces approximately 16,000 barrels of oil per day (bbl/day). Domestic production of crude oil roughly meets domestic consumption. Refining capacity by the state-owned oil company Staatsolie, however, is limited to 7,000 bbl/day and to fulfill domestic demand refined oil products such as diesel and gasoline are imported. Staatsolie plans to increase capacity to 15,000 bbl/day by 2013. (European Union, 2008; Global Environment Facility, 2012)

ELECTRICITY SECTOR OVERVIEW

The majority of Suriname's electricity is produced in hydro plants and as a result of this the country has a very low reliance on fossil fuels for the generation of electricity. In total Suriname has an installed capacity of 390 MW of which 189 MW are operated by Suralco, the country's main aluminum and bauxite producer. The Afobaka hydropower plant, operated by Suralco, Afobaka functions as the backbone of the country's electricity system. Suriname's national power company NV Energiebedrijven Suriname (EBS) purchases excess electricity from Suralco. Since Suralco shut down its aluminum smelter in 1999 the amount of excess capacity from the Afobaka plant has increased from 50 MW in 1996 to 120 MW in 2007. EBS operates its own thermal power plant with a capacity of 82 MW. A third plant rated at 78 MW, owned by Suralco, normally does not feed electricity into the national grid. (Global Environment Facility, 2012) Total generation capacity stood at 389 MW in 2009 and the country produced 1,618 GWh of electricity, of which 857.4 GWh (53 percent) were produced by the country's hydropower plant. (IRENA, 2010c) The country has an estimated hydropower capacity of 2590 MW of which only 120 MW have been tapped into. (Government of Suriname, 2005)

Electricity is distributed through a number of separate and individual systems. The largest grid, EPAR, exists around the capital of Paramaribo and supplies 730 GWh of electricity annually and has a peak demand of 130 MW. A smaller grid, ENIC, supplied the area around Nieuw-Nickerie and delivers 47 GWh per year. In addition the two large mining operators Suralco and IAMGOLD also operate grids which deliver 429 GWh and 118 GWh annually respectively. (Global Environment Facility, 2012)

ENERGY SECTOR REGULATORY FRAMEWORK

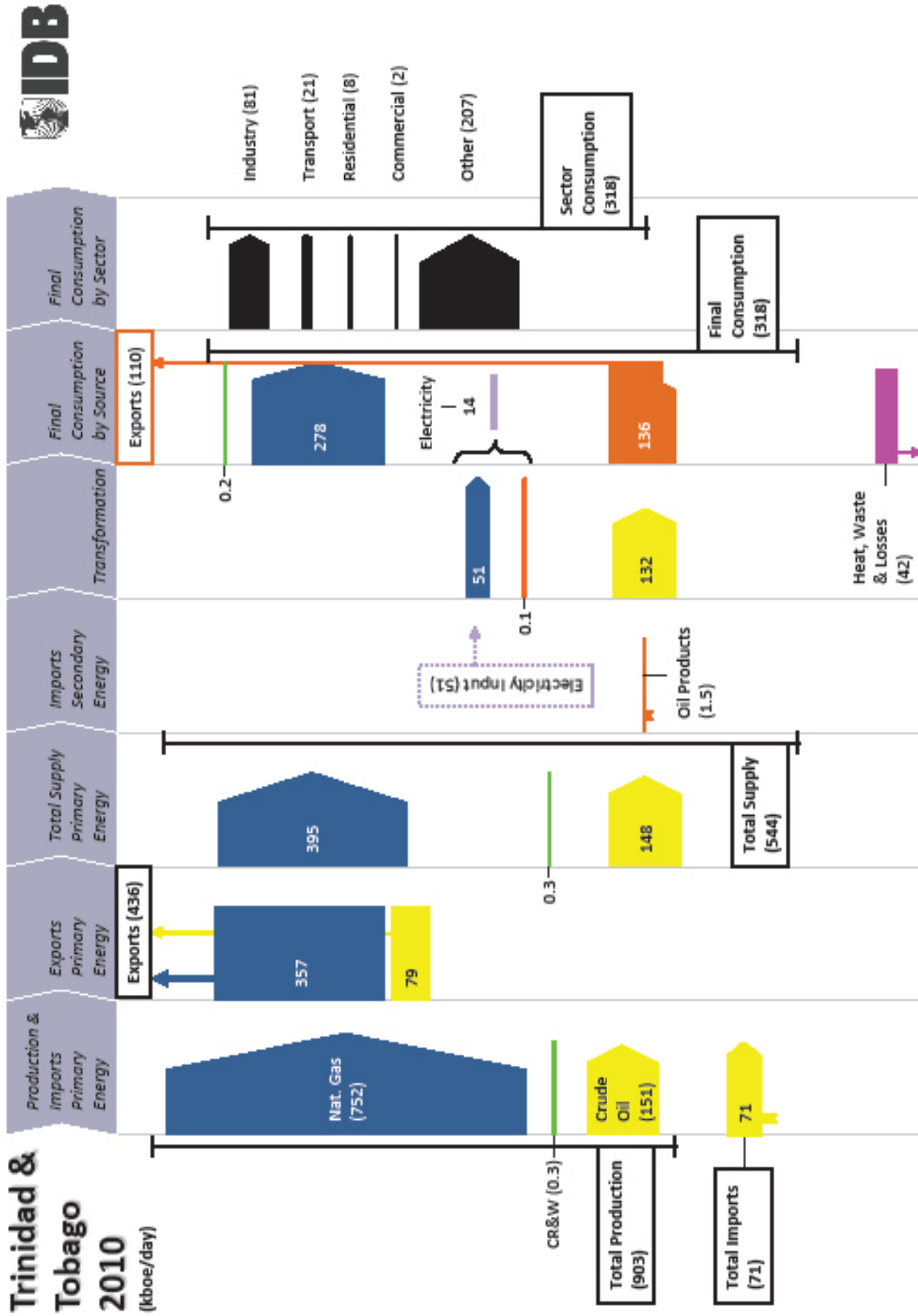
The Petroleum Law of 1990 established Staatsolie as the state-owned vertically integrated oil company with sole responsible for the extraction, refining and sale of petroleum products both domestically and for export. The company is solely responsible for the exploitation of hydrocarbon resources and foreign investors or oil companies can only get involved in the sector through exploration and production sharing agreements in partnership with Staatsolie. Staatsolie de facto functions as both an oil production company and as a regulator leading to potential conflicts of interests. (South Trinidad Chamber of Industry and Commerce, 2009)

ELECTRICITY SECTOR REGULATORY FRAMEWORK

The electricity sector in Suriname lacks an overarching policy and regulatory framework. Instead, a number of contractual agreements between Suriname's national power company EBS and private sector companies determine the functioning of the sector. The Brokopondo Agreement from 1957 established Suralco as the main electricity producer whereby excess electricity production would be fed into the national grid. The share of electricity produced by Suralco and subsequently purchased by EBS for domestic consumption has increased sharply since the closure of a major aluminum smelter in 1999. (Global Environment Facility, 2012)

Overall regulatory control of the energy sector lies with the Ministry of Natural Resources which determines and set electricity tariffs after recommendations by the Energy Advisory Committee. EBS, the national power company, is state owned and control by the Ministry of Natural Resources. Electricity tariffs are generally set too low, around 0.07 US\$ per kWh which does not allow EBS to recover the cost of generation which is around 0.20 US\$ per kWh. (Global Environment Facility, 2012)

Trinidad & Tobago 2010 (kboe/day)



Inter-American Development Bank, 2012
Infrastructure & Environment / Energy

Editor: Ramón Espinosa (INE/ENE)
Authors: Lenin Balza (INE/ENE), Carlos Suarez (INE/ENE)
Source: Own calculations based on IEA World Energy Balances

TRINIDAD & TOBAGO

COUNTRY OVERVIEW

Trinidad and Tobago are the southernmost of the Caribbean islands and are located just seven miles off Venezuela's north-eastern coast. Its population of 1.32 million lives across 5100 square kilometers on two main islands, with Trinidad being the largest and more populous. The islands are divided into nine regions and one ward with the largest region, Sangre Grande, comprising 18 percent of the land area and 10 percent of the population. The capital city of Port of Spain is home to a population of 50,000. Chaguanas, to the south of the capital, is the largest city with 85,000 inhabitants. About 40 percent of the population reside in urban areas. (Environmental Management Authority, 2001) Trinidad and Tobago's economy is highly dependent on the energy sector which accounts for 45.3 percent of national GDP (2011), provides 57.5 percent of government revenue and is responsible for 83 percent of merchandise exports. It however employs only 3 percent of the overall work force. (International Monetary Fund, 2012; Ministry of Energy and Energy Affairs, 2012a; Ministry of Planning and the Economy, 2012) In contrast to most other Caribbean states the tourism sector plays a minor role, contributing only around 1 percent to the national GDP.

ENERGY SECTOR OVERVIEW

Trinidad and Tobago's energy sector is dominated by gas production and the island state is among the five largest exporter of liquefied natural gas (LNG). (NGC Trinidad & Tobago, 2013) Until the large-scale development of shale gas in the United States, Trinidad & Tobago supplied 60 percent of American LNG imports. (Johnson, 2011) Gas production has come to the forefront since the decline of the oil sector started in the 1980s and today gas accounts for almost 90 percent of the energy sector. The largest companies operating in the sector are BP Trinidad and Tobago, British Gas and EOG Resources Trinidad. Together they account for about 95 percent of production. The majority of gas production, 57 percent, is exported in the form of LNG with the rest used domestically in the petrochemical industry (28 percent), the electricity sector (8 percent) and other (7 percent). (Castalia Consulting, 2011; Johnson, 2011). Atlantic LNG, the country's sole producer of LNG, exports about 15 million tons of LNG per year. The natural gas is liquefied in four "trains" each with a different ownership structure. (see annex 1 for details) Atlantic LNG's train number four is among world's largest with an annual capacity of 5.2 million tons of LNG. All LNG designated for export is collected and stored at Atlantic's production facility at Point Fortin. (Johnson, 2011)

Originally the U.S. was the largest destination for the country's LNG but with the increasing shale gas production in the U.S. exports are primarily destined for Europe, the Americas and Asia. While in 2004 99 percent of LNG was bound for the U.S. this share has fallen to 19 percent by 2011. About 40 percent of LNG exports are bound for the European market. (International Monetary Fund, 2012)

In addition to natural gas, Trinidad and Tobago produce about 80,000 barrels of oil per day (2012) of which 20 percent are consumed domestically, including for the transportation sector. Total proven reserves stood at 446.7 million barrels in 2013. (Petrotrin, 2013a)

About 60 percent of crude oil is produced by private companies with the remaining 40 percent coming from the state-owned oil and gas company Petrotrin. The largest private companies are BP Trinidad and Tobago, REPSOL and BHP Billiton. (International Monetary Fund, 2012)

ELECTRICITY SECTOR OVERVIEW

Electricity generation in 2010 stood at 8,485 GWh of which 98 percent was produced from gas turbines and the remaining two percent from medium speed diesel plants. Total generation capacity stands at 1,761 MW of which 1,503 MW come from gas turbines, 236 MW from combined cycle turbines and 22 MW from a medium speed diesel plant. An additional 720 MW combined-cycle plant was supposed to come online in stages by mid-2012, but according to Ministry of Energy and Energy Affairs this has not yet happened. There is no utility scale production of renewable energy and private off-grid production accounts for less than 2MW capacity.

Peak demand has grown by about 5 percent per year for the past decade and stood at 1222 MW in 2010 and is expected to grow at 4 percent per year until 2020. The majority of electricity is consumed by the industrial sector (60 percent), followed by the residential sector (29 percent), and the commercial sector (10 percent). The remaining one percent is consumed by street lighting. (Castalia Consulting, 2011)

ENERGY SECTOR REGULATORY FRAMEWORK

Overall energy and mineral policy, which includes the oil, gas and electricity sector, is set by the Ministry of Energy and Energy Affairs. Under the Petroleum Act (1969), the Petroleum Regulations (1970) and the Petroleum Taxes Act (1974) the ministry is responsible for monitoring and regulating the energy and mineral sector as well as issuing licenses for exploration and production. The ministry also decides which areas are made available for exploration and production and receives applications for the competitive bidding process. The Environmental Management Act No.3 of 1995 established the Environmental Management Authority (EMA). Under this new law companies involved in the exploration and production of natural gas must secure a certificate of environmental clearance (CEC) as part of the permit process. Decisions by EMA can be appealed at the Environmental Commission a Superior Court of record. (Environmental Management Authority, 2013)

The National Gas Company of Trinidad & Tobago (NGC) was established in 1975 as a incorporated and fully government-owned state-run company. NGC “operates in the midstream of Trinidad & Tobago’s gas industry and “purchases, compresses, transports, sells and distributes.” It is the sole

buyer and seller of gas in Trinidad and Tobago and purchases whatever share of natural gas is not exported in the form of LNG to market it to T&TEC, the petrochemical industries and other consumers. (NGC Trinidad & Tobago, 2013) The company owns, maintains, and operates the natural gas transmission system in the country comprised of approx. 1,000 km of pipelines. There is currently no legislation which prohibits the construction and operation of gas distribution network by third parties. (Johnson, 2011) NGC is headquartered at Pt. Lisas Industrial Estate and employs a staff of more than 800 people. NGC contributes over 40 percent to the national GDP and is in the Top 5 of ammonia, methanol and LNG exporters in the world. (NGC Trinidad & Tobago, 2013)

Ownership of natural gas reserves lies with the state and Trinidad and Tobago does not have a state-owned natural gas production company. Instead gas production is conducted predominantly by private companies. In 2012 major operators were BP Trinidad & Tobago LLC (51.4 percent), BG Trinidad & Tobago Ltd (23.7 percent) and EOG Resources Trinidad Ltd (13.2 percent). (Ministry of Energy and Energy Affairs, 2012b)

Petrotrin, the country's largest producer of oil and operator of the sole petroleum refinery, is a state-owned enterprise and the country's only fully integrated oil company working in exploration and production of both on-shore and off-shore fields, as well as refining and storage. (Ministry of Energy and Energy Affairs, 2013) It was incorporated in 1993 and combined the operations of Trinidad and Tobago Oil Company Limited (Trintoc) and Trinidad and Tobago Petroleum Company Limited (Trintopec). It underlies direct control of the Minister of Finance. (Petrotrin, 2013b) In 2012 Petrotrin produced 44,000 barrels per day and operated a refining capacity of about 168,000 barrels per day with an average throughput of 127,650 barrels per day. Total capacity exceeds domestic production of crude oil and to fill excess capacity the company purchases crude oil from other countries. (Petrotrin, 2013c) In addition Petrotrin produced 167 million cubic feet of gas per day. (Petrotrin, 2013d)

ELECTRICITY SECTOR REGULATORY FRAMEWORK

The electricity sector is dominated by the state-owned utility company Trinidad and Tobago Electricity Commission (T&TEC) which is responsible for operation and maintenance of all of the country's transmission and distribution lines and is also the sole power generator on the island of Tobago. Until 1998 T&TEC operated as a vertically integrated utility company holding a monopoly on generation, transmission and distribution of electricity. At that time T&TEC separated its power generation arm to the Power Generation Company (PowerGen) and sold a 39 percent stake to Marubeni TAQA Caribbean and an additional 10 percent to Amoco Trinidad Power Resources Corporation. In addition to PowerGen, there are two more independent power producers, Trinity Power Limited and Trinidad Generation Unlimited, selling all their electricity to T&TEC. Overall electricity prices are set by the Regulated Industries Commission (RIC) which was established in 1998 replacing the Public Utilities Commission. (Castalia Consulting, 2011)

The commission sets and reviews the electricity tariffs on a five year basis with the latest five-year period beginning in 2011. T&TEC asked for a 21 percent increase of rates as historically electricity rates are set too low for T&TEC to recover its cost of operation. RIC distinguishes between five categories of consumers when setting electricity rates. The categories include residential, commercial, industrial, heavy industrial and street lighting. Commercial and industrial rates are further differentiated based on electricity demand, maximum demand and voltage.

SOURCES

- Arbelaez, J. P., & Marzolf, N. C. (2011). *Power Possibility The Energy Sector in Jamaica*.
- Castalia. (2010). *Sustainable Energy Framework for Barbados (Vol. 1)*.
- Castalia Consulting. (2011). *Sustainable Energy for Trinidad and Tobago Final Report*.
- Castalia Consulting. (2012). *Sustainable Energy in the Eastern Caribbean : Achieving an Unrealized Potential Report to the*.
- *Claude Davis & Associates*. (2010a). *Greenhouse Gas Mitigation Assessment for Antigua and Barbuda*.
- *Claude Davis & Associates*. (2010b). *Greenhouse Gas Assessment for Dominica*.
- De Cuba, K. (2006). *Towards a Sustainable Energy Plan for St . Kitts and Nevis*.
- Dominica Electricity Services Ltd. (2012). *DOMLEC Annual Report 2012*. Retrieved from <http://www.domlec.dm/pdf/DomlecAR2012.pdf>
- Duffy-Mayers, L. (2010). *Caribbean Hotel Energy Efficiency Action Program (CHENACT)*. Retrieved from <http://www.onecaribbean.org/content/files/CHENACTPresentationFinalMarch30.pdf>
- Environmental Management Authority. (2001). *First National Communication UNFCCC*.
- Environmental Management Authority. (2013). *History of the Environmental Management Authority*. Retrieved from http://www.ema.co.tt/cms/index.php?option=com_content&task=view&id=35&Itemid=42
- Ephraim, J., & Tulsnie, B. (2010). *National Issues Report on Key Sector of Energy of Energy (Mitigation) For Saint Lucia (pp. 1–19)*.
- European Union. (2008). *Republic of Suriname - Country Strategy Paper*.
- Fadelle, M. A. (2012). *Energy Development Programme for Dominica*.
- Fair Trade Commission Barbados. (2012). *Renewable Energy, Where Are We ?* Retrieved from http://www.ftc.gov.bb/index.php?option=com_content&task=view&id=212&Itemid=26
- GBPC. (2010). *History of the GBPC*. Retrieved from <http://www.gb-power.com/en/home/aboutgbpc/history.aspx>
- Global Environment Facility. (2012). *Suriname: Development of Renewable Energy, Energy Efficiency and Electrification of Suriname*. doi:10.4135/9781452218564.n308
- Global Environment Facility. (2013). *Guyana: Sustainable Energy Program*.
- Government of Antigua & Barbuda. (2009). *Antigua and Barbuda's Second National Communication on Climate Change*.
- Government of Antigua & Barbuda. (2010). *Draft National Energy Policy Antigua & Barbuda*.
- Government of Bahamas. (2010). *Second report of the national energy policy committee*.
- Government of Bahamas. (2013). *Office of the Prime Minister Tender Notice (pp. 1–2)*. Retrieved from http://www.bahamas.gov.bs/wps/portal/public/gov/government/notices/rfp-reform-of-the-energy-sector-in-the-commonwealth-of-the-bahamas/_ut/p/b1/vZLZbqMwFlafpQ-QYhYDuSRAgATMvt5EE-JayBRlIJHn6ldVcdCrN9GZaW7Jk67N_nc8Hi7AAi07xVBbxWHanuHnuL_pAAknjOIrVWBXQQHEhzSJDJAABFyD8CEjwHTBUzmBkQqfAV_d9LEAhqfKD-VmxF63BzCb87ezDjh-geJ8dgSLsyZQrzesRbNNDtRIKR7r43ikG4S7S--s9J_f-pm3Tyj_6c9p0JAzq7VuLD6yb2-eBP4HRJULB73iuL_DUO2rj1koa6VE2zSoUiO3E-IOWsNOdtxBp-KZgUkQSaY7WZJyXXbhOjNwgmUunuidRz2wMk5BkXxguYbqsDt5ma4t7-9gD-MrgvPeywqEza1_nYvojXQJMSuSbINUvRcFkg511C6ibUyp-

so2pNZ672Lpiij-KIKW6OEAqc2jQ_SUa2M0PcqPXXkOPPX8-2cxOk6jQ0tieAlnTg872U1tceEVQL6vio6bSXhxbG1vB2Z9V5OizHk8zeY9JwKW_Wy2or-
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rOQNSku58DdcjZL4E8Tu9dCGwJ_-5ACers4ohxDA4SS63MDwdy1HcFSrpm8k-lzuapJJRljZjCjL_HKj-_wqR3LUZ1rfupMIJvLbxb8m9_AKiaAqi/dl4/d5/
L2dBISEvZ0FBIS9nQSEh/

- Government of Barbados. (2013). *Overview*.
- Government of Grenada. (2011). *A Low Carbon Development Strategy for Grenada, Carriacou and Petite Martinique*.
- Government of Guyana. (2012). *Guyana Second National Communication to the UNFCCC*.
- Government of Jamaica. (2011). *Jamaica Second National Communication to the UNFCCC*. Retrieved from <http://www.energycommunity.org/documents/snc2jamaica.pdf>
- Government of Saint Lucia. (2003). *Draft Energy Sector Policy and Strategy*.
- Government of St. Kitts and Nevis. (2009). *National Energy Policy and Action Plan*.
- Government of St. Vincent and the Grenadines. (2000). *Initial National Communication on Climate Change St. Vincent and the Grenadines*.
- Government of Suriname. (2005). *First National Communication under the UNFCCC*.
- Grenada Electricity Services Ltd. (2012). *GRENLEC Annual Report 2012*. Retrieved from http://www.grenlec.com/images/Annual_Reports/Report2012.pdf
- Guyana Energy Agency. (2013a). *About Us*. Retrieved from <http://www.gea.gov.gy/about-us>
- Guyana Energy Agency. (2013b). *Guyana Energy Agency*. Retrieved from <http://www.gea.gov.gy/releases/PR-energysavingprogramme.php>
- Guyana Sugar Corporation. (2010). *GuySuCo does reasonably well in its 1st crop performance despite effects of the El Nino phenomenon*. Retrieved from <http://www.guysuco.com/landsales/>
- International Monetary Fund. (2012). *Trinidad and Tobago: Selected Issues*.
- IRENA. (2010a). *Renewable Energy Country Profile: Guyana (pp. 22–23)*.
- IRENA. (2010b). *Renewable Energy Country Profile: Jamaica (pp. 20–21)*.
- IRENA. (2010c). *Renewable Energy Country Profile Suriname, 36–37*.
- IRENA. (2012a). *Grenada Renewables readiness assessment*.
- IRENA. (2012b). *Renewable Energy Country Profiles: Haiti*. Retrieved from http://www.irena.org/DocumentDownloads/Publications/_CaribbeanComplete.pdf
- Johnson, D.-M. (2011). *Gas Regulation in Trinidad and Tobago*. Retrieved from <http://jdsellier.com/images/pdf/gas-regulation.pdf>
- JPSCO. (2013a). *About JPS*. Retrieved from <http://www.myjpsco.com/about-us/>
- JPSCO. (2013b). *Our History*. Retrieved from <http://www.myjpsco.com/about-us/our-history/>
- Ministry for Public Works Transportation and Communications. (2007). *Haiti Energy Sector Development Plan*.
- Ministry of Energy and Energy Affairs. (2012a). *Downstream Gas Industry*.
- Ministry of Energy and Energy Affairs. (2012b). *Consolidated Monthly Bulletins 2012 (Vol. 49)*.
- Ministry of Energy and Energy Affairs. (2013). *State Energy Companies*. Retrieved from <http://www.energy.gov.tt/investors.php?mid=238#Petrotrin>

- Ministry of Energy and Mining. (2009). *Securing Jamaica's Energy Future Page ii*. Retrieved from http://www.men.gov.jm/PDF_Files/Energy_Policy/Energy_Policy_-_October_21,_2009.pdf
- Ministry of Energy and Mining. (2010). *National Renewable Energy Policy 2009 – 2030*. Retrieved from http://www.men.gov.jm/PDF_Files/Energy_Policy/National_Renewable_Energy_Policy_August_26_2010.pdf
- Ministry of Energy and Mining. (2013). *About the Ministry*. Retrieved from <http://www.men.gov.jm/men.htm>
- Ministry of Planning and the Economy. (2012). *Working for Sustainable Development in Trinidad and Tobago*.
- NEVLEC. (2013). *Generation (Prospect Power Station)*. Retrieved from <http://www.nevlec.com/about-us/departments/generation-prospect-power-station/>
- NGC Trinidad & Tobago. (2013). *NGC Company Profile*. Retrieved from <http://ngc.co.tt/about/>
- Organization of American States. (2010). *Energy Policy and Sector Analysis in the Caribbean 2010-2011*.
- Petrotrin. (2013a). *The Petrotrin Advantage*. Retrieved from <http://www.petrotrin.com/Petrotrin2007/ThePetrotrinAdvantage.htm>
- Petrotrin. (2013b). *Company Profile*. Retrieved from <http://www.petrotrin.com/petrotrin2007/CompanyProfile.htm>
- Petrotrin. (2013c). *Petrotrin Core Business*. Retrieved from <http://www.petrotrin.com/petrotrin2007/OurBusiness.htm>
- Petrotrin. (2013d). *Petrotrin E&P Update*. Retrieved from <http://www.petrotrin.com/petrotrin2007/Pdf/PetrotrinUpstreamVPEP.pdf>
- Renewable Energy & Energy Efficiency Partnership. (2010). *Energy Profile Antigua and Barbuda*. Retrieved from <http://www.reegle.info/countries/antigua-and-barbuda-energy-profile/AG>
- Renewable Energy & Energy Efficiency Partnership. (2012a). *Bahamas (2012)*. Retrieved from <http://www.reegle.info/policy-and-regulatory-overviews/BS>
- Renewable Energy & Energy Efficiency Partnership. (2012b). *Energy Profile Barbados*. Retrieved from <http://www.reegle.info/countries/barbados-energy-profile/BB>
- Renewable Energy & Energy Efficiency Partnership. (2012c). *Grenada*. Retrieved from <http://www.reegle.info/policy-and-regulatory-overviews/GD>
- Renewable Energy & Energy Efficiency Partnership. (2012d). *Energy Profile St . Vincent and the Grenadines*. Retrieved from <http://www.reegle.info/countries/st-vincent-and-the-grenadines-energy-profile/VC>
- Renewable Energy & Energy Efficiency Partnership. (2013). *Haiti Regulatory Framework*. Retrieved from <http://www.reegle.info/policy-and-regulatory-overviews/HT>
- SKELEC. (2013). *Reliability with Responsibility*. Retrieved from <http://www.skelec.kn/component/content/category/87-electricity-documents.html>
- South Trinidad Chamber of Industry and Commerce. (2009). *Assessment of the energy services sector in the caribbean*.
- USAID. (2013). *What is Institutional Strengthening ?* Retrieved from <http://haiti.usaid.gov/issues/institutional.php>
- Williams, P. (2010). *Fundamentals Of The Energy Sector In Barbados, (August)*. Retrieved from <http://businessbarbados.com/industries/energy-and-utilities/fundamentals-of-the-energy-sector-in-barbados/>
- Wilson, C. (2009). *Renewable Energy Policies in the Caribbean*.
- World Bank. (2010). *Caribbean Regional Electricity Generation , Interconnection, and Fuels Supply Strategy Final Report*.



ENERGY MATRIX COUNTRY BRIEFINGS

Antigua & Barbuda, Bahamas, Barbados, Dominica, Grenada, Guyana, Haiti, Jamaica, St. Kitts & Nevis, St. Lucia, St. Vincent and The Grenadines, Suriname, and Trinidad & Tobago



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